Size Matters

Seeing the Values in Large Technology Heritage

Leonie Alison Wain

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The research presented in this thesis, except where acknowledged in the text, is the original work of the author. The ideas upon which this thesis was based were developed by the author in consultation with her supervisors.

Leonie Alison Wain
30 October 2012
Size matters. HMAS Ovens on the slipway at the Western Australian Maritime Museum.

Image: Alison Wain, 2008
Abstract

Large technology heritage objects are impressive, exciting and fascinating. They can also be difficult, dangerous and expensive. When working with large technology objects every project demands more resources, every triumph is more newsworthy and every mistake is more visible. With large technology objects “getting it right” is vital.

This thesis explores what “getting it right” means in both affective and practical terms, and for both producers of, and visitors to, large technology heritage displays. During 2008-9 over 80 producers and 368 visitors were interviewed at seven heritage sites and, for comparison, one non-heritage site within Australia. These interviews were analysed both qualitatively and quantitatively to examine people’s attitudes to large technology heritage, and to understand the major influences that form, maintain and change such attitudes. The thesis also examines methods of interpreting and displaying large technology objects, as well as the impact of heritage industry standards on the preservation, restoration and management of large technology heritage.

The results of the study indicate that, while the practical challenges of giving big, old machines a new life as heritage are formidable, it is the values that different people see in such objects that are the source of the greatest difficulties. Producers of large technology heritage come from different backgrounds and communities of practice, and they see different values in the objects and look to different practical ways to enhance those values. Unfortunately they do not always understand, or value, each other’s values, which can lead to bitter disputes over which is the right way to do things. They also do not always understand the values that their visitors see in the objects, or recognise that display methods that are welcoming and engaging for their visitors may be very different from the ways in which they themselves expect to see large technology objects presented.
The major finding of this study, therefore, is that an emphasis on developing technical methods of preserving, restoring and interpreting large technology heritage is doomed to failure unless it is combined with an equally strong emphasis on developing methods to draw out and reconcile the different values that people see in that heritage. Different practical methods of preserving, restoring and interpreting large technology objects are not “right” or “wrong” in themselves, but they do have the effect of enhancing some values and reducing or destroying others. Unless everyone involved in the project agrees on the values that practical treatments should enhance, there will be no consensus about the success of those treatments.

The findings of this study have important implications for research and practice in large technology heritage. In particular, research is needed into the social impacts of large technology heritage, and into ways of incorporating values effectively into the practice of caring for large technology heritage. Such research, and concomitant changes in practice, will contribute significantly to the success and sustainability of large technology projects, and to the survival of these fabulous objects for the future.
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A.21 Childcare status 2 — Interest in technical specifications

A.22 Childcare status 3 — Desire to touch large technology objects
List of quoted producers

The following is a list of producers of large technology heritage who have been quoted or otherwise identified in the text.

Les Bell Private Owner, Campbelltown Museum
Michelle Berry Objects Conservator, Museum Victoria
John Boardman Private Owner, Campbelltown Museum
Tom Brereton Volunteer Guide, Pumping Station, Scienceworks
Michael Brevenholt Education Officer, Western Australian Maritime Museum
Matthew Churchward Senior Curator of Engineering and Transport, Museum Victoria
Garry Collins Private Owner, Gold Coast car show
Jamie Croker Large Technology Conservator, Australian War Memorial
Graeme Daniel Volunteer Steam Engine Driver, Puffing Billy
Steve Deacon Private Owner, Campbelltown Museum
Jenine Fleming Marketing Manager, Scienceworks
Steve Gower Director, Australian War Memorial
Ray Graf Private Owner, Campbelltown Museum
Ron Gunn Leading Hand Fitter, Puffing Billy
David Hallam Senior Conservator (Industrial and Engineering Collection Objects), National Museum of Australia
Sue Ham Volunteer Co-ordinator, Puffing Billy

Allen Hillard Private Owner, Campbelltown Museum

Deborah Hillard Private Owner, Campbelltown Museum

Robin Hirst Director (Collections, Research and Exhibitions), Museum Victoria

Graeme Hoobins Volunteer, Pumping Station, Scienceworks

Diana Jones Acting Director, Western Australian Museum

Karl Kelenen Private Owner, Campbelltown Museum

John Kemister Large Technology Conservator, Australian War Memorial

Nikki King-Smith Conservator of Submarine and Slipway, Western Australian Maritime Museum (on secondment to Tasmanian Museum and Art Gallery when interviewed)

Rod Lovell Private Owner, Campbelltown Museum

Ian Macleod Executive Director of Collection Management and Conservation, Western Australian Museum

Sally May Head of Maritime History, Western Australian Maritime Museum

Andrew McVey Private Owner, Campbelltown Museum

Maggie Myers Objects Conservator, Western Australian Maritime Museum

Col Ogilvie Engineering Conservation Consultant, National Museum of Australia

Helen Privett Objects Conservator, Museum Victoria

Geoff Rooks Private Owner, Gold Coast car show

Lyle Ross Private Owner, Gold Coast car show

Eamonn Seddon Chief Executive Officer, Puffing Billy
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Andrew Schroeder</td>
<td>Large Technology Conservator, Australian War Memorial</td>
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<tr>
<td>Ray Shelley</td>
<td>Private Owner, Gold Coast car show</td>
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<td>Mike Smith</td>
<td>Senior Research Fellow, Centre for Historical Research, National Museum of Australia</td>
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<tr>
<td>Carl Thomson</td>
<td>Private Owner, Campbelltown Museum</td>
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<td>Fred Vanags</td>
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Secondly I would like to thank my specialist supervisors Kate Clark and Linda Ferguson. I met Kate soon after starting the thesis, and it was she who introduced me to the idea of values as a basis for making decisions in heritage. As well as being fundamental to the development of the thesis, this idea has also taken me on a personal journey from a focus on the physical fabric of objects, to a more holistic view of heritage. Linda’s extensive experience in visitor evaluation for museums was enormously helpful in introducing me to the possibilities and options of qualitative research, a methodology to which I was completely new.

Thirdly I would like to thank Dr Terry Neeman of the Statistics Consulting Unit at ANU, who probably did not know quite what she was taking on when she agreed to help me, but who has been my statistics angel. As a “stats newb” I have plagued her with the dumbest questions, to which she has ever replied with gentle patience and careful explanations. She took my small sample sizes in her stride, and was always positive about what I could do with them.

As I moved into the fieldwork phase of the project, I had the pleasure of meeting and interviewing so many interesting people. This included many visitors to heritage,
who happily took time out of their visiting experience to attend to my questions, and provide often lengthy and personal answers. It also included staff, volunteers and private large technology owners at the organisations I visited who were equally happy to sit down with me, often for an hour or more, to share their passion and their knowledge. I would like to thank all these people for their generosity and insight — their ideas helped me to move beyond my limited preconceptions and discover a world of new ways of valuing big old machines.

I would like to thank all the students and staff at the ANU Research School of Humanities and the Arts who were such good companions on the journey and who invariably offered help and advice when I needed it. In particular, Jacqui D’Arcy, Sophie Jensen, Sophie McIntyre and my office mate Anna Edmundsen were always on hand (or online) with tea, sympathy and gossip for light relief.

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Steaming up at Puffing Billy on an autumn morning

Image: Alison Wain, 2009
Chapter 1

Why Large technology?

1.1 The special place of large technology heritage

Heritage, as defined by UNESCO, is a source of life and inspiration. It is “our legacy from the past, what we live with today, and what we pass on to future generations.”¹

Heritage, though, is very personal, and means many different things to many different people. For some it is objects and ideas from the past or family and cultural traditions. For others it is re-enactments of past events and ways of life. For many heritage is found in a mix of different ideas, things and events. At this more personal level, as Kate Clark notes, “…heritage is what people value and want to hand on to the future.”²

The preservation of heritage, and the production and consumption of a variety of forms of heritage experiences, have grown enormously around the world in recent decades, and heritage is increasingly recognised as an important resource for the construction of personal and community identity, for informal and lifelong learning, for entertainment, and for sustainable economic and cultural development.³ One of the

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³Chapter 7 of the UNESCO report “Our Creative Diversity” discusses these issues at length, as well as differences in the preservation and use of heritage in different regions of the world. Rosenzweig and Thelen note the growing interest in history in the United States of America (USA), the plethora of forms this takes, and the importance of heritage in the construction of personal identity and meaning.
aspects of heritage that has grown most in the latter half of the twentieth century (and
the early years of the twenty-first), is the conservation, restoration, use and display of
technology heritage.

This is somewhat ironic, as the modern heritage movement itself was driven, at
least in part, by antipathy to the perceived degradation of monuments and landscapes
by the technology and consequences of the industrial revolution. John Ruskin and
William Morris, both of whom were instrumental in the early development of the
heritage preservation movement, considered the increasingly complex machines of
the nineteenth century to be at best soulless, and at worst evil. According to Ruskin,
machines produced articles that had a spuriously high finish, but that were fatally
flawed by being divorced from the higher, human qualities of skill and imagination.
He felt that the impact of such machines was not just economic or practical but had
moral connotations as well: according to Ruskin the new machines corrupted society,
dehumanising workers and making them into slaves.\footnote{Ruskin’s impassioned arguments on this subject were expressed in his famous essay “The Nature of
Gothic”, which formed part of The Stones of Venice II: The Sea Stories written in 1851–3. This was reprinted in E. T. Cook and Alexander Wedderburn, eds., The Works of John Ruskin. 36 vols. Library Edition, George

Morris was milder in his con-
demnation, conceding that it was alright to use machines merely to save labour (as in
grinding corn), but still maintaining that they should not be used to replace artistry
(as in crafts such as weaving).\footnote{See “The Aims of Art”, written by William Morris in 1886 and reprinted in May Morris, ed. The
Collected Works of William Morris with Introductions by his Daughter May Morris. 24 vols. (Longmans Green
pp. 86-7). Morris, author of “The Manifesto of The Society for the Protection of Ancient Buildings”, was
much influenced by his friend Ruskin’s ideas about the preservation of heritage and its importance for society. Kate
Clark, “Values in cultural resource management”. In Heritage Values in Contemporary Society, ed. by George Smith, Phyllis Mauch and Hilary Soderland, Left Coast Press, Walnut Creek, California, 2006, p. 39.}

He was particularly scathing about steam power, the

Falk and Dierking discuss the growth in museum numbers, size and attendance in the USA, and the
perception of visitors that museums provide opportunities for both learning and fun. Andrews discusses
the importance of heritage for community identity and regeneration. UNESCO, Our Creative Diversity:
Experiences and the Making of Meaning, AltaMira Press, Walnut Creek, 2000, pp. 72 and 220. Baroness
Andrews, “Sustainable communities: the economic, social and environmental benefits of heritage.” In
Capturing the Public Value of Heritage: The Proceedings of the London Conference, ed. by Kate Clark, English
new motive power for machinery that drove equally new techniques of production, and modes of consumption:

… the life of modern times forces on [the workman] the production of many things which can be nothing but utilitarian, as for instance a steam engine… (Emphasis added.)

Steam powered machines today, of course, are seen as some of the most romantic and exciting examples of heritage, a reversal of taste that would surely have astounded Ruskin and Morris. This turnaround in public opinion, however, did not happen quickly, despite the example of pioneering technology collectors such as Henry Ford. More generally, as Neil Cossons has noted:

It was not until the 1950s and the arrival of industrial archaeology that the first attempts were made… to emphasise that the great age of industry itself had a distinguished heritage…

Since that time, however, interest in technological heritage has soared, a phenomenon that Lucy Taksa attributes to the desire to memorialise industrial sites as they — and the skills, communities and ways of life they supported — are in their turn lost to new technologies and the off-shore opportunities of globalised markets. Much of

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7The particular enthusiasm that people have for steam technology is regularly noted, both in the literature and by people who produce and consume heritage. For example, a report on the state of transport heritage in the United Kingdom (UK) noted the particular popularity “of steam propulsion, even among children”; Lucy Taksa noted that the interpretation of the Eveleigh Railway Workshop heritage precinct in Sydney, Australia strongly emphasised the “romance of the steam era”; and Ray Graf, a private owner of small electrical locomotives at the Campbelltown Museum field day, noted that “You will find most people turn up here and the only reason is to see the steam locomotives.” The Transport Trust. “Transport heritage: an assessment of needs and potential”. c. 2000. Heritage Lottery Fund. URL: www.hlf.org.uk/English/PublicationsAndInfo/AccessingPublications/Transport+heritage.htm (accessed 13/07/2009), Section 1: Executive Summary: Railways.Lucy Taksa. “Globalisation and the memorialisation of railway industrial heritage”. *Historic Environment* 21, no. 2 (2008): 11–19, p. 15.


9Taksa, “Globalisation and the memorialisation of railway industrial heritage,” p. 11.
that technological heritage is physically large, and it is this imposing, challenging “large technology heritage” that is the major subject of this study.\textsuperscript{10}

It is difficult to directly determine the size of the technological heritage industry, as assessments of the size of the heritage industry generally, the number of people employed, and the resulting economic and social benefits to communities rarely report on technological collections and institutions as a distinct category. It is, however, possible to gain some impression of the level of present-day participation in activities centred around this type of heritage from other sources. In the Australian context, Collections Australia Network (CAN) lists many heritage organisations that describe large technology heritage as a major feature of their collections and displays, and even more that feature at least one or two large technology items.\textsuperscript{11} The Steam and Engine of Australia website lists 83 museums of historic technology (covering areas as diverse as transport, agriculture, energy production, water movement, mining and telecommunications),\textsuperscript{12} the Australasian Motor Museums Association (AMMA) lists 58 museums of motoring heritage around Australia,\textsuperscript{13} and Engineering Heritage Australia (EHA) has formally recognised over 137 mostly in-situ items of outstanding engineering heritage interest.\textsuperscript{14}

In the sphere of private ownership, the Australian Historic Motoring Federation represents over 900 historic motoring clubs around Australia,\textsuperscript{15} and the level of activity of clubs devoted to the care of more general industrial technology (mainly agricul-

\textsuperscript{10}The definition of “large technology heritage”, and what it means and encompasses, is discussed in detail in Chapter 2.
\textsuperscript{11}See the CAN website at URL: http://www.collectionsaustralia.net.au/institution_list/, (accessed 26/01/2011).
\textsuperscript{14}The list cited here was produced in 2008, and EHA continues to actively research and mark engineering heritage sites through its Heritage Recognition Program. Engineering Heritage Australia, Register of Engineering Heritage Markers, Engineering Heritage Australia, n. p., 2008. URL: http://www.engineersaustralia.org.au/shadomx/apps/fms/fmsdownload.cfm?file_uuid=C7EEAE52-EB40-C8C9-4858-41066D279042&siteName=ieaust (accessed 30/12/2010). Note that while most of the organisations listed on the Steam and Engine of Australia website are also listed on CAN, very few of the sites or organisations listed by either EHA or AMMA are listed by CAN, so there is little overlap between the Steam and Engine of Australia, the EHA and the AMMA lists.
tural, but including other genres such as military technology and small scale power generation), is evinced by the fact that in New South Wales (NSW) alone seven major field day events were held between January and July 2011. In 2010 CAN also held a list of 583 preserved steam engines, and the Australian National Maritime Museum held a list of 400 historic vessels.

The number of paid staff, volunteers and private owners involved with such organisations is considerable, and the number of people who participate as visitors even more so. Peter Hiscock, Deputy Chairman of Puffing Billy estimated that, as well as paid staff, his organisation drew on the services of over 700 volunteers. Peter Garnham, a driving force in the organisation of the Hunter Valley Steam Festival for many years, noted that the work of running the festival was almost entirely done by volunteers, and that visitors at the weekend event were estimated by Tourism NSW in 2008 to have injected $2.1M into the economy of the host town of Maitland. Allison Russell, Acting Director of the National Motor Museum at Birdwood in South Australia, noted that the Museum’s Bay to Birdwood Run (for pre-1956 vehicles) and Bay to Birdwood Classic (for 1956–1977 vehicles) events, which are run on alternate years, attract about 1300 and 1700 vehicles respectively and lure about 10,000 visitors through the museum gates for each event.

A key element of the appeal of much technology heritage is its sheer size, which has a strong affective power. Big things generally seem to have a deep, visceral attraction for people: witness the enduring appeal of big dinosaurs, tall buildings, and large works of art. Andrew Schroeder, large technology conservator at the Australian

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18 With a large number of these being retirees, only about 550 of them were active volunteers. Active or not, though, they were interested enough to belong to an organisation focussed on the preservation of large technology heritage.
19 The people quoted throughout this Introduction were interviewed as part of the research for this study. Details of the interview, data collection and analysis procedures are provided in Chapter 2.
20 Allison Russell, personal communication with the author, 04/01/2011.
War Memorial (the Memorial), commented simply that “people see [big things] as impressive — they want them” and noted that many places built their own big things, such as the “Big Banana” purely to attract visitors. Diana Jones, acting director of the Western Australian Museum — Maritime (WA Maritime Museum) said of the enormous turbines in the old East Perth Power Station, “…they are amazingly daunting and majestic.” These words have nothing to do with the functionality of the objects, but instead describe their affective presence, both beautiful and sometimes uncomfortable. They also describe an immediate and instinctive personal reaction which is not mediated by words: as Kit Messham-Muir said of his encounter with a similarly enormous artwork, “I didn’t think — I felt.”

Robin Hirst, a senior exhibition manager of many years’ experience at Museum Victoria, also noted that big things are essential in displays to provide vistas and directions:

Exhibitions of small things get repetitive. Large things add relief and rhythm. It’s a matter of juggling shape, design, and colour to keep people’s attention focussed.

He also commented that big things are memorable in a way that small things are not:

You have to build a shrine around a small thing to give it a sense of importance: the physical footprint is important.

This view was echoed by a visitor at the Memorial who felt it was the big things he remembered seeing as a child that brought him back to the same museum as an adult.

Big things are so memorable, in fact, that they can become intergenerational things, the iconic objects and experiences that people bring their children and grandchildren to see. An 88–year-old great grandmother riding on Puffing Billy with her family said:

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22 Memorial 290: Male, 56–65, quantity surveyor.
A big part of the attraction of many large technology objects is the history that they embody. Andrew Schroeder noted that, for an organisation, having a big thing was good, but having a big thing with a well-known history was even better, commenting that “…it brings an audience or a profile to their collection.” Many visitors spoke of the respect they felt for an object which had had a long and hard working life, but spoke quite dismissively of an object — even a “real” one — which had never been used. As a mechanic remarked at the Campbelltown Steam and Machinery Museum (Campbelltown Museum):

You can see the integrity. You can see that it’s done what it was meant to do rather than something that looks all showroom and pretty but is yet to prove itself.25

The sheer size of the “real” thing also has a major impact on visitors, especially when they feel that they have seen the object before and therefore should already know how big it is. A visitor at the Memorial said:

When you go to an air-show you don’t really get up close to them, so you don’t really get a true sensation of what the inside of the plane was like, what the size was.26

A visitor at the WA Maritime Museum made a similar comment:

I didn’t expect [the yacht] Australia II to be that large, from below. It’s a lot different from when you see it on the television. You have no idea or concept of the scale or size.27

23Puffing Billy 382: Female, > 65, watchcase maker and home maker.
24“Real” here is used in the sense of having had a prior existence and purpose before being incorporated into a heritage display.
26Memorial 248: Female, > 65, childcare centre owner.
27WA Maritime Museum 180: Male, 56-65, landscape architect.
Even memory seems to falter in the face of things of this size. An ex-RAAF veteran at the Memorial remarked with interest:

I can’t remember these aircraft being so large.  

Size is not only surprising but encompassing — many large technology heritage objects are built specifically for people to climb inside, and even when they are not, the sensory impact of their size and — if they are working — their sound, smell, movement and vibration, creates an immersive environment which invites people to step imaginatively into a different world. Conservator Nikki King-Smith said of the submarine she worked on at the WA Maritime Museum:

…what I found really interesting…was the closed environment, because it was dangerous and strange…The fact that these people lived in it and loved it…This was like a giant cubby house.

Michael Brevenholt, education officer at the WA Maritime Museum, also commented that the physical impact of the submarine made communicating its significance much less difficult:

It’s very easy to do an immersion style thing, going inside an object like that and [asking the children] to partake in the lives of the submariners for an hour. But it also works from the outside, because of its size and impact…everyone sees it… and says “wow”. That makes kids more inclined to listen to what you have to say.

Many visitors want to experience how the physical environment of a large technology object feels in relation to their own bodies. A visitor at the Memorial said:

You see it on TV and hear about it but you don’t ever grasp what it really is until you use your five senses — see, touch… to understand it.  

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28Memorial 281: Male, > 65, printer.
29Memorial 261: Female, 26–35, office manager.
Seeing the interior environment of the object can also stimulate people to think about the objects not in terms of broad historical concepts or general technological principles, but in terms of the practical reality of what it must have felt like to live and work with the objects every day. A couple at the Memorial discussed their insight into life in the cockpit of an Avro Anson trainer aircraft with some amusement:

Man: The guide said “Look at the size of the seats.”
Woman: How did they fit in them?
Man: Can you imagine sitting in that seat for 12 hours? And you can’t move, you’ve just got to sit there, and think about bodily functions!\(^{30}\)

Large technology heritage objects also often have particularly long and complex life histories, a feature that seems to engender a sense of empathy and fellow feeling in many people, even to the point of anthropomorphism. A visitor at Darling Harbour, for instance, when asked if big old machines should be made to work again, replied with a laugh:

It doesn’t matter because no one can work for [too] long. The human and the machinery don’t work for ever.\(^{31}\)

A visitor at the WA Maritime Museum, when asked if the machines should be restored to look new, likewise reasoned:

Sometimes, I suppose, but we can’t be restored to look new again can we?\(^{32}\)

Another visitor at the Campbelltown Museum was of the opinion that the most important time in a machine’s life was when it had been used for a while because:

... by then they’ve developed a bit of character... Brand new out of the box you don’t know her.\(^{33}\)

\(^{31}\)Darling Harbour 384: Male, 56–65, physics professor.
\(^{32}\)WA Maritime Museum 172: Female, > 65, telephonist.
\(^{33}\)Campbelltown Museum 151: Male, 36–45, electrician and mechanic.
There was a strong sense from the people interviewed in this study that large technology heritage objects were more than just collections of parts, and that their character and performance was determined by more than just their technological specifications. As with people, the idiosyncrasies of their physical bodies and the circumstances of their lives were seen to interact throughout their “lives”, amplifying differences to create individuals with distinct characters, quirks and abilities. These features made them interesting and — mostly — likeable, and it was evident that many people, from a wide range of backgrounds, wanted to see such objects preserved, interpreted and made accessible.

1.2 Where things go wrong

Unfortunately, along with the interested visitors and the many successful projects, there are problems in the world of large technology heritage, and it is in part these problems that have led to the present study. These issues are outlined below.

1.2.1 Missing the point

There are a number of different approaches to preserving large technology objects. Each of these approaches can preserve some important aspects of this type of heritage, but not all, and the requirements of these different approaches often conflict with each other.

For example, evidence of the life and use of a machine is embodied in its physical fabric, and can only be understood in detail through close examination, sampling and scientific analysis. Preserving this information means changing the object as little as possible.

Alternatively, the way a particular machine works and the skills needed to maintain and operate it can only be understood in detail by experiencing the machine while it is working, and this may mean changing the object considerably, both to return it to (and maintain it in) working order, and to meet modern safety requirements.
Both these approaches preserve important aspects of information about the object, but they are different aspects, and they require treatments that are on different sides of a philosophical divide. Knowing which treatment is appropriate means identifying what is most significant about that object, and devising an approach to treatment and interpretation that will preserve and enhance that significance.

Producers of large technology heritage, though, come from many different skill backgrounds, and frequently draw their ideas about how such objects “should” be treated more from the traditions of their knowledge backgrounds than from the needs of the heritage object and situation with which they are actually dealing. Consequently, producers whose background traditions stress the importance of replacing worn parts with new, and maintaining a “spick-and-span” appearance that connotes good care and workmanship, may inadvertently remove original evidence that is fundamental to the historical significance and accurate understanding of the object. Jamie Croker, large technology conservator at the Memorial, described the impact of the recovery of the original wartime fabric from the Memorial’s German Albatros aircraft, which had been removed and discarded by well-meaning restorers in the 1960s:

…it still had all of the original paint on it… it helped us get all the stitching in the right spots for all the fabric. It also clarified a lot of things… that we didn’t realise, which was [that] not all the fabric on the Albatross was lozenge-print fabric. The majority of it was actually plain linen that had been painted…

This information not only helped to guide the physical restoration of the aircraft, but also prompted new lines of investigation about its history:

…it what the curator thinks is that the date of manufacture on that aircraft seems to coincide roughly with the production of lozenge fabric — when it was first brought into production. So [maybe] it was just starting to be brought in then and they had left-over plain linen fabric… Maybe at the
time, lozenge was still hard to get... and they decided that... everywhere
it was [going to be] painted — they’d use plain linen...

The end result was both more historically accurate, and more interesting than could
have been achieved without the opportunity to examine the original fabric.

On the other hand, producers whose backgrounds stress the importance of retain-
ing all original material, and who view change to the object essentially as damage
to the historical record, may inadvertently cause the complete loss of the intangible
heritage associated with the object; the heritage skills and embodied knowledge that
are required to run the object, and the sensory experience of its operation. It has to
be asked whether a large technology object that has lost a few original parts is less
original or authentic than one that has lost its ability to move. Eamonn Seddon, chief
executive officer of Puffing Billy, spoke of the challenges of reconciling these two ap-
proaches to ensure that visitors continued to be able to experience the thrill of a fully
operational steam train:

[On our locomotives] instead of white metal axle faces, [as] the public can’t
see them, we’ve introduced a very high density plastic axle face. Now,
somebody might say,“Well, that’s not very original” But I’m saying,“Well,
hang on though, it’s actually protecting the wheels, [otherwise] they’re
actually going to wear out” They’re going to last me 50 times longer than
[the old type] would have...We can’t put [the locomotives] on plinths,
that’s not what we’re about...

Values and traditions from the past are important to the preservation of large tech-
nology heritage, as it is these legacies from past experiences that drive producers’
passionate interest in, and commitment to, the objects for which they care. To develop
approaches to management and display that meet the needs of a large technology
object in a heritage context, though, producers need to acknowledge the differences
between the object’s service and heritage roles, as well as the differences between the
large technology object and more traditional museum objects. Planning and implement-menting practical preservation and display strategies means bringing the expertise from different traditions together to develop new, shared ways of doing things that meet new and different needs.

1.2.2 Missing the opportunity

It is common to find large technology both poorly cared for and poorly interpreted in museums, offering a stark contrast to other items stored and displayed by such organisations. The constraints of money and space undoubtedly play a part in this — particularly in small organisations which have very limited resources — but these are not the underlying reasons. The real causes are the decisions made by organisations as to where to place their resources.

For instance, the opportunity to preserve and make accessible to the public the grand and historic Spotswood Pumping Station was a key reason in 1992 for siting Museum Victoria’s new Scienecworks campus in an otherwise out-of-the-way back-water of Melbourne. In 2009, however, when visitors to Scienceworks were interviewed for this study, it was apparent that many visitors to the site did not realise that the Pumping Station was part of the museum site at all, and visitor profile surveys showed that only 18% of visitors to the site actually visited the Pumping Station while they were there (the lowest visitation of any part of the site except for the popular, but restricted seating, areas of the Lightning Room and Planetarium).

This is hardly surprising, though, as it is quite hard to find information about the Pumping Station unless you already know exactly what you are looking for. Jenine Fleming, marketing manager for Scienceworks, commented that Museum Victoria had explicitly decided not to promote it with a dedicated campaign, commenting that “It’s not a key driver for our audience.” Presumably for this reason it also has

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34 Interview with Jenine Fleming, marketing manager for Scienceworks, January 2011.
Figure 1.1: This illuminated sign is the only list of site attractions that visitors see as they enter Scienceworks. In practical terms the Pumping Station does not need to be listed here, as the sign is there to show admission costs, and the Pumping Station is free. The sign also, however, acts as a default list of “special” things that are not part of the regular exploratorium-style galleries, and this makes the omission of the Pumping Station a problem. Visitors are also handed an A4 sheet listing tours and special events which does mention the Pumping Station, but by the time they read this they are already likely to have selected all the extras they can manage from the attractions promoted on the illuminated board. Image: Alison Wain, 2009

minimal exposure on the Scienceworks website,\(^{36}\) while at the Scienceworks site itself there is equally little signage to indicate what the Pumping Station is, where it is, or how to access it (Fig. 1.1).

Those that do make their way there find dusty buildings and machinery with minimal and poorly integrated interpretation. Potential attractions such as the extensive

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\(^{36}\) The Pumping Station is not listed on the Museum Victoria as an exhibition. It is listed alongside administrative options such as “Venue Hire and Events” in a small, grey font link leading to very brief information that only describes it as being open for tours or self-guided tours. This is not eye-catching and does not suggest that it is regularly and readily accessible. See the Museum Victoria website at URL: http://museumvictoria.com.au/scienceworks/ (accessed 01/02/2011).
and cave-like sub-surface tunnels, wells and machinery are not even hinted at, despite being arguably the most unusual and sensational part of the site. For comparison, Fremantle Prison offers guided tours of the cramped and flooded tunnels underneath it for a healthy $60 per adult, and bookings are essential.

During the time that Museum Victoria has had responsibility for the management and display of the Pumping Station it has, amongst other major projects, opened two major new sites — the Melbourne Museum and the Immigration Museum — developed the Lightning House and Planetarium at Scienceworks itself, and undertaken major refurbishments of the exhibitions in the main galleries of all of its sites. The lack of attention to the Pumping Station is, therefore, not due to lack of resources, but to deliberate decisions not to use those resources to upgrade the Pumping Station experience.

Undoubtedly those decisions were backed by sound reasoning given the Museum’s circumstances at the time, but it was reasoning that seems to have been underlain by the perception that the Pumping Station, its machinery, and its history were too dull or too intractable to warrant making their interpretation a priority project. In fact Robin Hirst, of Museum Victoria, repeatedly expressed negative perceptions of large technology heritage as being difficult and inconvenient:

For all the space they only get across one message…they can distort the story because they take up so much space.

Getting them out is so difficult and expensive. It makes it difficult to change things around regularly to attract repeat visitors.

[Sometimes] we have constructed large things rather than used collection objects, because you can walk through or get in fabricated objects…With the real objects…you have to go around them which makes them take up even more space.

Such negative attitudes to large technology heritage are not uncommon in the mu-
seum world. Hilda Hein, for instance, makes assertions about the difficulty and undesirability of operating old machinery without any substantiation, and without apparently recognising the dismissive personal prejudices embedded in her words:

Periodic performances by museum staff trained to use antique instruments are sometimes scheduled, but they are expensive and possibly obtrusive, hazardous, and unsanitary. The equipment’s unpredictable performance may be what captivates the visitor’s curiosity, but these somewhat unreliable demonstrations are increasingly giving way to prepackaged and scripted lessons that inform the public in standardized, repeatable detail regarding an object’s capabilities. Regrettably, video tapes leave little room for exploration, but they can easily be replayed.37

Large technology objects present large challenges that are sometimes easier to just ignore, but this process of denial can result in the loss of tremendous opportunities. To enable an object to fulfil its role as heritage and become an asset rather than a liability, producers need to address the challenges openly, and with the same levels of creativity and attention to detail that are applied to the mentally safer comfort zones of more traditional museum objects.

1.2.3 Missing the audience

Producers put large technology objects on display for visitors without necessarily undertaking much investigation of what those visitors really want to see and experience. A number of producers interviewed for this study expressed opinions about what visitors were or were not interested in, or what sort of presentation they found most engaging, but these were personal and anecdotal views. In no case was there any systematic study of visitor attitudes to large technology heritage.

The relationship of visitors to such objects is, though, significantly different from

the relationship of producers to those same objects. Visitors generally have only a fleeting engagement with the object, mostly on the day of their visit, though strands of connection may twine out from that visit into both the past and the future. For most visitors, engagement with the object is seen through the prism of leisure — they have come for a good day out, and that day out should comprise pleasurable experiences such as fun, learning and social interaction. For most producers, however, their extended care of an object or collection generates in–depth knowledge and emotional investment, and engagement with the object is seen through the prism of achievement — they have come to do something worthwhile. They too expect fun, learning and social interaction, but they also expect satisfaction, respect and, sometimes, payment. They are also deeply conscious that, through their work on such objects they place their skills, standards and ideas on display and they will be judged, both by other producers and by their visitors.

The attitudes of visitors and producers to large technology objects are therefore substantially different. Many producers use their large technology objects to express strongly held personal or organisational messages and viewpoints. To visitors, who are looking more for ways to make personal connections to the objects, this passion and ideology can come across as boring and obsessive. Visitors on the other hand, do not have the opportunity to develop a detailed knowledge of the object, so their understanding of it is disproportionately influenced by information that is quickly and easily accessible at the time of their encounter. This includes the immediate sensory experience of the object, and information that they or their companions already have. This information is, of course, not always accurate, leading producers to be often amused at, or saddened by, the perceived ignorance of visitors.

The different motivations and perceptions of producers and visitors mean that they can have very different views on the best way to present large technology heritage, and the messages that producers try to transmit to their visitors about large technology heritage can be very different from the messages that visitors actually take

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away with them. In particular, the positive messages of ingenuity, achievement and even glory that seem unquestionable to producers who are passionate about the technology, can seem biased and unjustified to visitors with different points of view. The WA Maritime Museum’s celebrations of the 25th anniversary of Australia II’s victory in the 1983 America’s Cup yacht race, for instance, involved media and other events featuring the yacht as the centre of a story of Australian ingenuity, all-out effort and national triumph. The messages received by one interviewee from these events were, however, very different:

I came to the lecture here about the [America’s Cup] race. I thought it was all crazy, like a bunch of children. [In the video] the [Australia II] crew and the US crew were exercising and the Australia II crew punched the US crew to the ground and ran off. And the US crew were yelling obscenities in the race… And they only won one race and they made such a song and dance about it. Men just go on! They’re never going to let this story go.\(^\text{39}\)

With their long periods of use and complex connections with society, large technology objects have audiences that go beyond those who once manufactured or used them, and carry meanings and information that go beyond celebrations of their technical ingenuity and achievements. To maximise the potential of a large technology object as heritage, it is important to understand and recognise these diverse audiences and messages, and to include them in both management and display strategies.

1.3 Understanding the problems

None of the issues described above are strictly to do with the technology itself. It is not the nature of the technology that determines what people do with it and how they perceive it; it is people themselves, and the values that they bring to it. Accordingly it is people, and their various values, that are the subject of this study: the produc-

\(^{39}\)WA Maritime Museum 197: Female, >65, telephonist.
ers of heritage who preserve, restore, interpret and display large technology heritage objects; and the visitors who come to see those objects. The study investigates the many views of large technology heritage that people hold, explores the influences that underlie those views, and links those views to the decisions people make as both producers of, and as visitors to, large technology heritage.

In 1991, Nick Merriman conducted a postal survey of 1,500 people in the UK that aimed to:

...understand how people themselves think about the past and museums and how they use them, rather than how analysts think they use them.

In 1998, Roy Rosenzweig and David Thelen conducted a telephone survey of 1,500 people in the USA which also aimed to find out how ordinary people used and understood the past. Both of these studies focussed on capturing the opinions and values of ordinary people about the past, and comparing them with the views of “experts” (academics, teachers, politicians, museum professionals and others). Both studies sought to understand popular uses of the past both through interviewees’ actual words (in Merriman’s study through written survey responses; in Rosenzweig and Thelen’s study through telephone interviews) and through statistical analyses of their coded responses.

Merriman noted that, due to the size of the project, his work had two key limitations. These were that:

- the study was based on a large scale survey, and therefore analysis was kept at a broad level only;

- the survey dealt with the concept of “the museum” as an undifferentiated genre, with no questions about specific examples or types of museums or other heritage

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40Note that both these groups may include people who are (or were) manufacturers of large technology items as service objects, but that this role is different to that of producing heritage, just as the role of the object in its service life is different to its role as heritage.

41Nick Merriman, Beyond the Glass Case: the Past, the Heritage and the Public in Britain, Leicester University Press, Leicester, 1991, p. 3.

display sites.

These limitations, he felt, meant that the “complexity and fine-grain of people’s images of the past or their attitudes to museums have been glossed over”, and that “ideally this now needs to be supplemented with in-depth analyses of specific elements of museums, conducted in the manner of the ethnographer.” With a similar interest in people’s images of the past and of heritage, the present study takes up this challenge, focussing on the specific area of large technology heritage in an Australian context.

1.4 Outline of the study

To help the reader navigate quickly through the study, this section briefly describes the contexts and contents of the remaining chapters.

Chapter 2 discusses the methodology of the study, including the complementary use of qualitative and quantitative research techniques, decisions regarding data acquisition and analysis, the siting of the study in the Australian context, the ethical foundations of the study and the selection of interview sites and participants. To provide context and background information for the reader the chapter defines the boundaries of the study (including what is meant by “large”, and by “technology”), provides a brief explanation of relevant statistical ideas for readers who are new to statistics, and discusses the demographic make-up of the study population (the overall sample of visitors who were interviewed).

While some private owners of large technology heritage care for and work on their machinery solely as a private joy, most love to share their passion with others, showing their objects off at open days, competitions and privately run display sites. Volunteers and professional heritage staff working with large machinery in public museums are similarly in the business of displaying large technology heritage to visitors. For all these producers of heritage displays, pleasing their visitors — giving them an experience that they would like to repeat, and which they would recommend to their friends

\[43\] Merriman, Beyond the Glass Case: the Past, the Heritage and the Public in Britain, p. 6.
— depends upon understanding who their audiences are (and could be), how they respond to different types of displays, and why they respond as they do. Chapters 3 and 4, therefore, use the qualitative and quantitative methods described in Chapter 2 to analyse visitor responses to large technology displays at eight different Australian sites. Chapter 3 focusses on the importance for visitors of being able to relate what they see to their existing frames of reference, and the personal and individual circumstances of their lives. Three broad theoretical themes are used to set this data in context: the way information about the world is stored and processed by the human brain; the way people choose and use information about the past; and the ways in which sensory experience and personal relevance underpin the power, affect and memorability of events. Chapter 4 explores the impact of technical information on visitors’ confidence, understanding and engagement with heritage machinery, with particular reference to gender segregation in technological training and employment as a source of difference in male and female responses to technical information in heritage.

Just like their visitors, producers of large technology heritage come from many different backgrounds. Consequently, although they mostly share a deep commitment to the welfare of their objects, their approaches to preserving and displaying their objects are varied, and sometimes even in conflict. This can lead to tensions between different producers and organisations, and to destructively negative views of each other’s abilities, motivations and achievements. Large technology heritage is, however, too complex to preserve, too expensive to care for, and too diverse for any one organisation or individual to be able to tackle it alone, so strategies for sharing a distributed network of knowledge, skills, funding, research and collections are vital. Understanding where different values and approaches come from, and how they influence the preservation and use of different aspects of large technology heritage, is crucial for understanding how conflicts can be resolved, and sound collaborative arrangements established, and therefore Chapters 5 and 6 examine the factors from
the past and the present that influence the way large technology heritage producers approach their objects.

Chapter 5 focusses on the past, looking at the influence of different routes into the world of large technology heritage — the confidence in tacit and embodied knowledge created by early, regular and often family association with large technology, and the more cerebral approach engendered by professional tertiary training in engineering or heritage studies. It looks at the influence of different genres of large technology heritage on attitudes to visual presentation of the objects, anticipated target audiences, expectations of visitor experiences, and the different goals of historical accuracy and expressive creativity. Finally, it discusses the influence of communities of practice — particularly those from the formative period of late adolescence and early adulthood — and discusses in detail philosophical and ethical differences between the conservation and engineering approaches to large technology heritage. Chapter 6 focusses on the present, looking at the influence of social relationships, identity and self-esteem on producers’ participation in large technology related organisations through three different modes of belonging: engagement, alignment and imagination. Engagement is about joining in; alignment is about working together; and imagination is about seeing new potential and transcending past experience.

As well as being influenced by values from their personal lives, social groups and vocational communities of practice, producers of large technology heritage also operate within a wider world of heritage theory and practice. This wider community has its own traditions and values, which are developed and disseminated through research and publication, and promoted — sometimes enforced — through industry codes and standards. Chapters 7 and 8 discuss the assumptions and dictates of such industry values and standards in terms of their impact on the preservation and presentation of large technology heritage.

Chapter 7 discusses the importance for heritage producers of engaging a wide range of audiences, not just people who are similar in age, background, taste and
level of specialist knowledge to themselves. The many ways in which large technology objects are, and could be, interpreted as heritage, are therefore examined through discussions of the physical, intellectual and ambient messages conveyed by different display and interpretive techniques. Firstly, the chapter documents the unintended messages that are often conveyed about the worth of large technology heritage by the presentation of objects in poor condition and in poorly designed and maintained displays. Secondly, it identifies the need to disentangle the type of information used in a display (such as technical, historical or personal) from the way that that information is used (for instance through a formalist, analytical or local perspective), to understand its contribution to an effective and engaging display. Finally it discusses three elements of a good display that were of particular importance to visitors to large technology heritage in the current study: variety, narrative, and a desire for a sense of control over their experience.

Chapter 8 notes that heritage standards are used by large technology heritage organisations to achieve legitimacy in the professional heritage world, and to gain access to financial and legal benefits. Such standards, though, are not necessarily well-suited to the needs of large technology heritage, and most prioritise a traditional European model of preservation that prioritises physical fabric over intangible heritage and community values. This chapter argues that early development of a values-based approach to heritage decision making, which accommodated a diversity of views and uses of heritage, was stifled for much of the twentieth century by an emphasis on standardisation and its perceived benefits of improved performance, shared measurement and compatible goals. My research shows that the Venice Charter, which was developed for built heritage preservation but was rapidly adopted as the global standard for practice in all areas of heritage, was compiled and adopted with minimal consultation or testing, with the result that it has significant deficiencies. Nevertheless, because of its position as a world heritage document, a number of standards specific to large technology heritage continue to be based upon it, which leads to both
practical and ideological difficulties.

The chapter examines the advantages and disadvantages of other standards documents that are applicable to large technology heritage, in particular the Australia ICOMOS Burra Charter, which despite also being originally developed for the needs of built heritage preservation, offers highly appropriate and flexible guidelines for large technology heritage practice. One of the objectives of this study is to identify areas where amendments to current policy and practice could usefully be made, and the author identifies ways in which minor amendments to the Burra Charter could refine its application to heritage generally, including to the many complexities of large technology heritage. Finally, the chapter discusses the place of economic value in heritage decision making, and the crucial distinction between the use of heritage as a witness to a historical past, and the use of heritage as a source of inspiration for creative affect and expression in the present.
Victorian magnificence at the Spotswood Pumping Station, Scienceworks.

Image: Alison Wain, 2008
Chapter 2

Methodology

2.1 Introduction

Having established, in the previous chapter, that the issues to be explored in the current study are more to do with people and their values rather than the technical or historic nature of large technology heritage, it is necessary to turn to methods of studying people to draw out the information that will clarify these issues. For this reason an ethnographic approach has been used for the study. Qualitative data was gathered through face-to-face interviews with both producers of, and visitors to, large technology heritage at a variety of sites within Australia. This allowed the opinions, values and perceptions of the producer and visitor groups of participants to be qualitatively compared. In addition, closed, quantifiable questions were included in the visitor surveys and a random sampling procedure was used to select visitor interviewees. This allowed statistical analysis of the visitor data. The use of the two techniques was important because, as Rosenzweig and Thelen commented, closed, quantifiable answers are useful for developing “benchmarks for participation in and attitudes towards past-related activities”, but cannot provide the richer, deeper data needed to examine people’s motivations, values and experiences in detail.1

This chapter has four sections. The first section will outline the boundaries of the

1Rosenzweig and Thelen, The Presence of the Past : Popular Uses of History in American Life, p. 211.
study — the criteria used to define “large” and “technology” objects and the selection of sites and people for study. The second section will discuss the choices made in selecting data collection and analysis techniques, and the potential impacts that these choices have had on the study. The third section will describe the statistical techniques used in the study for the benefit of readers who do not have a background in statistics. The fourth section will describe the demographic characteristics of the visitors who were interviewed for the study.

2.2 Boundaries

The material culture that defines the boundary, or setting, for this study is “large technology heritage”. While this term readily conjures images of big mechanical things — such as trains and factory equipment and aircraft — it does not so readily bring to mind the things that hover at the edges of the definitions of both large and technology. It is therefore necessary to describe the guidelines that have been used in selecting objects, and object genres, for the study.

In addition, there are many different sites that display large technology heritage, and they attract many different audiences. It is also necessary, therefore, to describe the guidelines that have been used in selecting sites and participants for the study.

2.2.1 The meaning of “large”

In the preservation and display of large technology heritage, size is important not only because of its affective power and high-impact display potential, but also because it raises the stakes. Size makes every aspect of a project — cost, space, time, safety issues, number of people involved, media interest — bigger and more difficult to manage. It raises the potential pay-off, but it also raises the potential for very public mistakes. If the preparation and display of a large technology object goes well the rewards, in terms of personal status, object recognition and increased organisational visitation and funding, can be enormous. If it goes badly, the backlash can cause the loss of
reputations, funding and public goodwill. All this combines to increase the emotional pressure of such projects and create the conditions for panic, competition for resources and emotional burn-out.

In my experience, the point at which objects in museums begin to be affected by these issues is the point at which they are too large for two people to handle safely without handling equipment, and the point at which they are too large to be accommodated easily in a showcase. This is the point at which specialist expertise and equipment is required to handle them, the point at which they become difficult to manoeuvre through museum buildings, and the point at which additional strategies must be identified to keep them safe on open display. This is the point, in short, at which museum staff have to make special plans and find extra funds for them, and this is, consequently, the point at which they start to be thought of as “difficult”. At the low end of this size criterion are objects such as bicycles (which are easily carried by two people, but difficult to fit into lifts and showcases), and smaller mounted guns (which are heavy and require attention to floor-loadings). At the high end of this size criterion are items that are sites and buildings in their own right, such as ships, steelworks, pumping stations, and transport networks.²

In general, the challenges posed by such items increase in proportion to their size, not in relation to the genre of technology involved. Individual museums, societies and owners often specialise in the display and operation of one particular genre of technology (for instance, cars, railways, or military or agricultural machinery), but as the UK Transport Trust report notes:

²Whether the object is self-mobile has surprisingly little impact on the ease with which it can be handled, because the complications associated with making it self-mobile — which involve providing the skills, maintenance and infrastructure or environment for it to be operated safely and reliably — make the project of managing it just as complex as moving and providing for a static object of a similar size. The challenges are different but they require equal, and often even greater, levels of funding and special arrangements. The apparent immobility of buildings also has surprisingly little influence on the relationship between increasing size and increasing management challenges. Buildings need to be detached from their foundations and stabilised before they can be moved, but the difficulty of doing this, as well as the difficulties involved in subsequent movement, re-siting, conservation and management are directly related to their size. In fact, the solution for managing many large objects — whether technological or otherwise — is to break them into sections, thereby creating a number of smaller objects that can be more easily managed. The size rule still holds, as it is only the larger objects that require the extra complexity of being disassembled into smaller parts and subsequently reassembled.
Although there are major differences... there are some striking similarities. Many objects are at risk to export abroad, and deterioration by wear and weather. All categories benefit from both private and public expenditure. All struggle with inadequate finance... Most lack adequate mechanisms for preserving records and all share problems of accommodation and workshop facilities. All face the dilemma of balancing the establishment of displayable collections against the cost of high curatorial standards and the increasing pressures of health and safety. All have to reconcile the economies of scale with local loyalties and motivation. Some are struggling to find ways of prioritising without strife.³

It is therefore size, rather than genre, that is used as a defining criteria for the inclusion of technology items in this study. Any technology item is a fitting subject for study, providing that it meets the size criterion described above.

2.2.2 The characteristics of “technology”

As mentioned above, many organisations and individuals that preserve and display large technology do so by focussing on particular types of technology. Separate associations exist, for example, for people interested in historic vessels and for people interested in historic railways,⁴ but there is little communication between them and (as will be discussed in Chapter 8), they tend to duplicate rather than share efforts to solve common problems. A more collective approach is taken by the International Council of Monuments and Sites (ICOMOS) group The International Committee for the Conservation of the Industrial Heritage (TICCIH) which, as its name suggests, concerns itself with all industrial heritage, regardless of genre. TICCIH, however, is more focussed on buildings than machinery, and does not concern itself with things that fall into the domestic rather than the industrial sphere, such as privately owned

³The Transport Trust, Transport heritage: an assessment of needs and potential, Section 2: Introduction.
⁴For example European Maritime Heritage (EMH) and the Federation of European Museum and Tourist Railways (Fedecrail).
cars. Both of these approaches identify subsections of “technology” but do not provide a definition of the whole class.

To understand the common characteristics of all technology items, it is necessary to understand that being a technological object is not so much a matter of type but of degree. A mattress would not generally be considered a technology item, though it certainly contains the products of various technologies. A sofa bed would also not be considered a technology item, although it does contain simple mechanical components. A modern hospital bed, however, which is a complex mechanical system able to perform a range of movements, and which is commonly equipped with ancillary machines to monitor and manage a patient, is likely to be considered a technology item. All of these things are beds, but only one of them embodies the extensive knowledge and application of scientific and mechanical principles that would encourage people to think of it spontaneously as a “technological” object.

Boats similarly range from the apparently simple to the obviously complex, though even the simplest practical boat embodies an applied understanding of the physical forces exerted by wind and water and is shaped to accommodate these. Many modern artworks, on the other hand, incorporate complex mechanical components and a sound understanding of applied science, yet they are not created for “practical purposes” such as industry and manufacturing, but for aesthetic and affective purposes, and their associated meanings, connections and aspects of significance are consequently very different from more utilitarian objects.

For the purposes of this study, therefore, it is more useful to regard “technology” less as a set — to which objects either do or do not belong — and more as a cluster of shared characteristics. Some objects possess all the shared characteristics, and sit squarely at the centre of the cluster, while other objects posses only some of the char-

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6 The word “technology” has, from the late eighteenth century, come to mean principally “The branch of knowledge dealing with the mechanical arts and applied sciences”. See “technology”, definition 4a in the OEDOnline, URL: http://www.oed.com/ (accessed 09/08/2012).
acteristics and sit on the margins of the cluster. The characteristics that help to identify a technology object for the purposes of this study are:

- Items that are made, not found;
- Items that have multiple components;
- Items that have complex interactions between their components;
- Items that are designed and manufactured for a primarily utilitarian purpose.

A steam locomotive, for instance, possesses all of these characteristics, and is therefore a central and highly typical member of the cluster. The sofa-bed, the simple boat and the artwork, however, each possess only some of these characteristics, and are therefore more marginal and somewhat atypical members of the cluster.

As well as helping to define the parameters of the study, the cluster model is helpful in defining the applicability of the results. Where items possess more of the defining characteristics of the model, the results of the study are likely to be more relevant: where items do not possess key characteristics of the model, the results of the study are likely to be less helpful. For instance the owner of a mechanically complex artwork may benefit from insights into the physical management of complex mechanical items, but not from insights about the interpretation of more utilitarian items.

2.2.3 The choice of sites

As mentioned above, there are many organisations and individuals even within Australia that own and display large technology heritage, and a much larger number outside Australia. The nature of this project made a comprehensive survey of such individuals, organisations and their associated sites prohibitive (even within Australia), especially if the project was to include an in-depth, qualitative investigation of the perceptions and motivations of the people involved.

There are, however, many ways in which individuals, sites and organisations differ from each other, and one aim of this project was to see if any of those differences
had a significant effect on the presentation and reception of large technology heritage. Factors of interest include the following:

- organisational arrangements, tradition and decision making structure (professional institution, community organisation, private sector club);
- funding sources and sources of control over monetary allocations (government, commercial, sponsorship, private ownership);
- relationship of the heritage producers to the organisation (paid, volunteer, club member);
- training and background of the heritage producers (formal heritage training, formal training in other skills, amateur skill acquisition);
- major audiences (tourists/locals, school groups/social groups, specialists/non-specialists);
- impact of local environment (wet/dry, hot/cold, clean/polluted, coastal/inland);
- region of Australia in which the organisation was situated.

To investigate the impact of these various factors, visitors and producers of large technology heritage were interviewed at eight sites where large technology heritage was displayed and, for comparison, one where it was not. The full names of these sites, or the organisations hosting the events, are listed below, along with the short titles that, for brevity, will be used to denote these sites and organisations throughout the rest of the thesis:

Western Australian Museum — Maritime (WA Maritime Museum)
Australian War Memorial (Memorial)
Melbourne Museum (Melbourne Museum)
Scienceworks (Scienceworks)
A pilot study was also conducted at the National Museum of Australia (NMA).

Four of these sites — the WA Maritime Museum in Perth, the Memorial in Canberra, the NMA in Canberra and the Melbourne Museum campus of Museum Victoria in Melbourne — are publicly funded museums. Their large technology heritage objects are presented most commonly as static, fairly highly restored, indoor displays. The Scienceworks campus of Museum Victoria is also a publicly funded museum, but the large technology objects are housed in buildings which are partially open to the weather and periodically operated, which gives them a less pristine appearance than in the other institutions.

All these institutions are run by salaried staff, many with formal heritage training, but they also have significant volunteer programs. Most of the volunteers working with large technology heritage tend to have engineering or trade training backgrounds, and to have acquired some heritage training on an amateur basis through their volunteer work. All these institutions have a broad mix of audiences — including local and international tourists, school and social groups — but relatively few visitors who come because of a specialist interest in large technology heritage.

The WA Maritime Museum, the Melbourne Museum and Scienceworks are located in coastal cities. The WA Maritime Museum and Scienceworks are actually adjacent to estuaries which makes their environments salty and highly corrosive, and the Melbourne Museum and Scienceworks, being located in the city of Melbourne, are affected by moderate humidity and pollution. The Australian War Memorial (Memorial) and the National Museum of Australia (NMA), in Canberra, have a dry, inland location with relatively low levels of pollution and negligible levels of salt.

Puffing Billy is a heritage railway which began as a community volunteer organ-
isation and has developed in later years into an organisation combining a core of salaried staff (some of whom have formal heritage training), with a very large volunteer program, the latter carrying out day-to-day maintenance and operation of the machinery and public programs. Again, most of the volunteers working with large technology heritage tend to have engineering or trade training backgrounds, and to have acquired some heritage training on an amateur basis through their volunteer work. Puffing Billy’s audience has a particularly high proportion of international visitors (many tourist coach tours stop there) and families (especially with small children), but — like the institutions described above — seems to attract relatively few visitors who come because of a specialist interest in large technology heritage.

Puffing Billy, on the north eastern edge of Melbourne, has a relatively unpolluted and salt-free (though wet) forest environment. The rolling stock and other heritage items at Puffing Billy are stored and operated constantly outdoors, however, so while they have been heavily restored to cope with constant exposure to the elements they are, and look, well-used rather than pristine.

Interviews at all of these six institutions were conducted over a period of 4–5 days, which included both weekdays and weekends.

Of the other three venues studied, the Campbelltown Steam and Machinery Museum (Campbelltown Museum) is in fact a club rather than a traditional museum, whose members restore, operate and display their own technology heritage objects either at the club’s permanent site at Campbelltown on the edge of Sydney or at their homes. The club is not publicly funded, but runs operating machinery weekends twice a year, for which it charges entrance fees. Like the volunteers at the institutions described above, most of the private owners tend to have engineering or trade training backgrounds. Although few seemed to have done any specific heritage skills courses, many actively discussed issues of heritage ethics and display, were aware of publicly available information such as the Burra Charter, and had contact with museum staff with formal heritage training at museums such as the Powerhouse in Sydney and
Museum Victoria in Melbourne. The level of restoration varied with the individual owner, but many objects, like the Puffing Billy trains, showed the wear and dirt of regular operational use.

Visitors to the Campbelltown Museum include many family groups and a very high proportion of people (mainly men) who themselves own and display large technology heritage, but very few visitors from outside Australia and no school groups (though one producer interviewee mentioned that special tours were arranged outside the weekend events for disabled groups). Visitor interviews at this site were conducted at one of the club’s twice yearly open weekends, where operating machinery is displayed for the public. Producer interviews were conducted on the preceding two days, while club members were organising the event.

The Campbelltown Museum site is semi-rural — not too close to the coast or the pollution of Sydney — and with a relatively high rainfall, although it must be noted that the climate of the site has minimal impact on the many machines that are not stored at the site, but which are driven or freighted in from other areas especially for the weekend event.

The Automobile Restorers Association Gold Coast (Gold Coast car show) is similarly a club, but for owners of cars which have an “Historic” Conditional Registration (for which the vehicles must be over thirty years old). Not having a permanent site, the members of this club on the Gold Coast in Queensland come together for rallies and for their annual public swap meet and “show-and-shine”, a competition based on the presentation of their vehicles that is open to both members and non-members of the club. Many of these private owners have trade backgrounds related to automotive maintenance and repair, although many also have only amateur mechanical skills, or rely on contractors for the maintenance of their machines. None of the club members or visitor interviewees mentioned doing any heritage skills courses however, and there was very little discussion of heritage ethics and issues in their interviews. The presentation of objects in this context is almost exclusively restored to look as new as
possible, with much time, energy and money being put into keeping the cars looking sparkling clean and undamaged.

Audiences for the swap meet were mainly people who owned and operated their own cars, had a strong interest in older cars, or were visiting with a person who owned or had a strong interest in old cars. Visitor interviews at this club were conducted during one of the swap meet events (which took place over a single brief, but high-energy, morning), and producer interviews were conducted the day before, while club members were organising the event.

The swap meet site was close to the Gold Coast itself, and therefore warm, wet, and somewhat salty (and perhaps, from the level of surrounding traffic, mildly polluted). This was only one of several sites the club might hire for its annual events, but interviews with club members suggested that most lived, and garaged their cars, in the local area, so its climate was a useful indication of preservation challenges in the vicinity.

Visitors to all the above sites were explicitly attending a heritage-based experience, so the final site, Darling Harbour, was chosen to capture the views of people who were not explicitly there for heritage. Although large technology heritage is present in the precinct — the National Maritime Museum of Australia is located there, and the swingspan Pyrmont Bridge is a major feature of the built environment — the interviews were conducted closer to the Paddy’s Market end of the site where these features are not visible, and only two visitors said that they had come to the area deliberately to see such attractions. Where Darling Harbour was similar to the heritage venues, and what made it a useful counterpoint, was that it provided a leisure environment that was attractive to a wide variety of people and social groups.

2.2.4 The selection of participants

Whose opinions are important to this study? Whose values matter? Is it the people who have made and used the objects during their working lives? Is it the people who
have collected, preserved, restored and displayed the objects as heritage? Or is it the people who come to visit them for a good day out?

It is, of course, all of these, and many more. It is anyone who finds interest or pleasure or significance or benefit in an involvement with large technology heritage. It is also the people who do not find large technology heritage interesting, or enjoyable, or significant: these are exactly the people who provide a important counterpoint to the large technology enthusiasts. 7 It is also the people who are challenging to survey because they are very young, or dislike surveys, or do not speak the survey language well.

It goes without saying that different people will have different viewpoints. Some will have thought deeply about the issues raised by large technology heritage; for others the subject may never have crossed their minds. While such differences can mean that interview and data analysis techniques need to be tailored to the information they can give, their views are equally valid and equally informative in their areas of experience. An engineer in his sixties can no more say what is relevant about large technology to a seventeen year old school student, than that student can describe the life-long web of connections that inform the engineer’s view of that same technology. The one cannot stand in for the other.

Collecting information from all these different people therefore, is not merely an attempt to be inclusive. Rather, it is an essential aspect of the study, allowing the opinions of different people, groups and organisations to be compared, and their views of the technology, and each other, to be tested and explored.

2.3 Methods

This section of the chapter will focus on the details of the methods used in the study to gather and analyse data. The chapter is divided into the following sections:

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• Questionnaire design and interview technique
  Validity in social research
  Conduct of interviews

• Ethics

• Demographic variables
  Gender
  Age
  Occupation
  Education
  Postcode and ethnic background
  Group description
  Organisation and site
  Role in organisation

• Transcription of data

• Sampling methodology
  Sites
  Visitors
  Producers

• Qualitative analysis

• Quantitative analysis
  Survey questions included in statistical analyses
  Controlling for reactivity
  Missing data
2.3.1 Questionnaire design and interview technique

After initial research into qualitative and quantitative data collection procedures, separate questionnaires were drafted for visitors and producers. The questionnaires were tested in a pilot project carried out at the NMA, which resulted in changes to improve clarity and reduce repetitiveness in the questions, and to shorten the visitor interview so that the questions fitted onto a single A4 sheet. Visitors could thus see at a glance the commitment they were making in agreeing to the interview, a change that significantly improved visitors’ willingness to participate. An alternative set of questions for visitors who expressed dislike or lack of interest in large technology heritage was also added on the reverse of the normal questionnaire, as it was inappropriate to continue to ask such people questions about what they liked or thought interesting about this type of heritage. The alternative questionnaire maintained a positive tone by asking the visitors what they did find interesting, and how this was different from large technology heritage. The final questionnaires are reproduced in Appendix B.

All interviews were conducted by the author of the study. Apart from a small num-

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8There is an enormous literature on both qualitative and quantitative data collection and analysis. I will not attempt to summarise these literatures here, both because the most appropriate sources of procedural information depend upon the context of the study being undertaken, and because, for a beginner, no book is as important as the guidance of experienced teachers and practitioners in the field. Key influences in the development of my appreciation of the field of qualitative research were my co-supervisor Linda Ferguson, an expert in museum audience evaluation, and Dr Pat Bazeley, an expert in the use of mixed methods (combining qualitative and quantitative methods together) and qualitative research software. Texts that were particularly applicable to my study were Michael Quinn Patton’s seminal book on qualitative research and evaluation methods, and Dr Pat Bazeley’s book on analysing qualitative data using the NVIVO software. Patton, *Qualitative Research and Evaluation Methods*; Pat Bazeley, *Qualitative Data Analysis with NVIVO*, SAGE Publications, London, 2007. Key influences in the development of my understanding of the field of quantitative research were courses provided by the Statistics Consulting Unit (SCU) at the Australian National University, as well as the detailed guidance of Dr Terry Neeman of the SCU (whose experience in handling small statistical samples was invaluable), and of Bruce Fraser, a senior statistician at the Australian Bureau of Statistics.

9The need to respect the limits of interviewees’ patience has been noted by other researchers. Rosenzweig and Thelen, *The Presence of the Past: Popular Uses of History in American Life*, p. 212.

10Chapter 7 of Patton’s book, which describes alternative techniques for qualitative interviewing, was particularly helpful, especially pp. 348–80 which deal in-depth with the issue of question design. Patton, *Qualitative Research and Evaluation Methods*. 

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ber of interviews with producers conducted by telephone, interviews were conducted face-to-face. A hand held digital voice recorder was used to record each interview, except in the very rare instances where interviewees preferred not to be recorded. These interviews were recorded with handwritten notes.

Validity in social research

As neutral as a researcher may try to be, the very acts of observation and data collection have the potential to introduce bias into, and threaten the validity of, the data collected. Where the potential for bias can be anticipated, efforts must be made to reduce its effects, or those effects must be “controlled for” (taken into account) in the analysis of the data. Where the potential for bias is less apparent, alternative explanations of the data must be sought and tested, to ensure that the conclusions drawn are not merely artefacts of the way the study has been conducted.11

Issues of particular importance when interviewing research subjects are reflexivity — the impact of the values and expectations of the researcher, which can subtly influence both subjects’ responses to the research, and the researcher’s selection and interpretation of data — and reactivity — the impact of the subject’s perceptions of the data collection process and assumptions about the research outcomes. Reactivity is strongly affected by the data collection environment, the method of interviewing and the personal presentation of the interviewer, sometimes in such subtle ways that the exact mechanisms by which information that introduces bias is transmitted and received are still uncertain.12 The following paragraphs describe sources of potential bias in the interview process used for this study, and the actions taken to mitigate

11 Maxwell notes that the concept of validity does not imply the existence of an objective truth, but rather “some grounds for distinguishing accounts that are credible from those that are not” and a way of “testing these accounts against the world”. Joseph A. Maxwell, Qualitative Research Design: An Interactive Approach. 2nd, SAGE Publications, Thousand Oaks, 2005, p.106.


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them (subsequent sections will deal with potential bias in the selection and analysis of data in the study).

- Use of plain language: language was used that would be clear and intelligible to interviewees, to avoid confusing or intimidating them. This was particularly important for those who were not part of the heritage industry, who might have been confused by heritage-specific language. For example, when interviewing visitors and non-museum producers, the words “big, old machinery” were used in addition to, and to explain, the more formal “large technology heritage”.

- Use of neutral and unambiguous language: language was used that, as far as the interviewer could ascertain, did not lead interviewees in any particular direction and did not suggest that particular answers might be “right” or “wrong”. For example, restoration to a high visual finish is (as discussed in Chapter 5) seen by some people as evidence of care and good workmanship, and by others merely as the destruction of history. Participants were therefore asked “Do you think objects like this should be restored to look new again?”, which provided a clear mental image for them to comment on, but no information as to whether the interviewer thought such restoration was a good or a bad thing.13

- Use of a neutral persona: The interviewer, as the author of the study, is a middle-aged, middle-class, English-speaking, Caucasian female. All of these features could affect interviewee responses, although the only systematic effect that was detectable was the fact that, as an adult and a stranger, the interviewer probably represented an authority figure to younger children, causing shyness and a tendency for some to try to “please” the interviewer (see note 2.3.3).14 While these

13The term “restoration” was chosen for the interview question and the level of restoration being discussed was clarified by the words “to look new again”. While the words “restoration”, “conservation” and “preservation” all have distinct connotations in the heritage world, “restoration” is the term commonly recognised by people outside the heritage area as meaning any work done to either stabilise heritage objects or to recreate a past appearance or functional state. The strength of this identification can be seen in the use of the title “Restoration” for the popular British TV series about heritage (see http://www.bbc.co.uk/history/programmes/restoration/), in contrast to the term “conservation”, which is often confused in the public mind with environmental conservation.

14Jóhanna Einarsdóttir, who has worked extensively with children, comments that, “Some children
features of the interviewer’s persona were unalterable, other aspects of presentation were chosen to try to create a friendly and non-threatening impression that reduced perceptions of social or professional difference between the interviewer and interviewees. Dress and hair were kept neat but casual, reflecting the leisure context of the interview sites, and visible equipment was restricted to a clipboard, pen and hand held voice recorder.

- Use of a consistent approach: The interviewer’s manner, phrasing and intonation were kept as consistent as possible, within the variation required to suit the site and the interviewee. As an example of site related variation, outdoor venues such as Puffing Billy required a much louder presentation than indoor displays, to overcome the noises of wind and operating machinery. As an example of interviewee related variation, asking questions of children in the 6–11 age group required the replacement of potentially unfamiliar words with less complex ones with related connotations. The word “restored”, for instance, was commonly replaced in interviews with 6–11 year-olds with the word “painted”.¹⁵

### Conduct of interviews

The aim of interviewing both producers and visitors at each site was to be able to compare the needs, desires and goals expressed by both groups and see whether they were similar or different. It was not, however, possible to treat these groups in the same way; the many visitors at each venue typically had little knowledge of the site or its collections, while conversely there were relatively few producers at each site, but each had extensive knowledge of the issues involved in large technology heritage production, particularly at that venue. The decision was therefore made to follow a methodology described by Patton, in which in-depth interviews were conducted with

¹⁵For a detailed discussion of the need to use language appropriate to the setting and interviewees see Patton, Qualitative Research and Evaluation Methods, pp. 361–3.
people who were knowledgeable and deeply interested in an area (in this study the producers), and short, structured interviews were conducted with people who had a key alternative viewpoint but not much specific knowledge or interest in the area (in this study the visitors).\textsuperscript{16} This methodology maximised the collection of relevant qualitative information from both groups and also permitted quantitative statistical analysis of the visitor group. A total of 88 producers and 368 visitors were interviewed.

To engage people, and encourage them to speak freely, interviews were presented as a friendly conversation rather than an official survey. To this end the first question at each site was tailored to the feel and general interests of the audience. Thus at the WA Maritime Museum the first question was generally “Are there any of the large objects here today that have particularly grabbed you?”, whereas at the Gold Coast car show it was “Are you into this hobby yourself?” Once the conversation was established, the standard part of the questionnaire was commenced, which was common to all sites.

While the question order remained roughly similar in all interviews, to retain the feeling of a conversation questions were sometimes brought forward, to pick up on themes that the interviewees raised themselves. Where an interviewee had answered a later question in their response to an earlier question, the pre-answered question was not explicitly asked again. When interviewees had constraints on their time, or were not very interested in the interview process, the interviews were shortened by omitting some questions. I felt that it was better to get as much data as possible in such cases than to discard them altogether, as the opinions such people expressed about large technology heritage were entirely valid, even if they were limited in their desire or ability to complete the whole survey. In these cases, questions that generally seemed to interest people were asked first (principally whether they liked to see the objects restored to look new or made to work, wanted to touch them, or wanted to know more about their history), and the remaining questions were asked if they seemed interested in continuing to talk.

Undertaking face-to-face interviews, and allowing them to vary according to circumstances, could be seen to be introducing an element of non-standardisation into the interview process, which could prejudice the impartiality of the data collected. On the other hand, asking people to fill out a survey sheet on their own reduces the randomness of the sampling process, as only people who are interested in, and capable of filling out, the survey will participate (people who are not interested in surveys per se will often participate if asked to do so by an interviewer). The need to fill out a survey sheet on their own would also largely have excluded children, as well as visitors to outdoor sites, where wind, the scale of the venues and the number of alternative routes around the venues make it unlikely that visitors will either notice or bother with a survey. In addition, visitors at outdoor sites often assumed that the survey was market research for a commercial product, and only became interested in participating when they heard the spoken words “big, old machines”. Finally, being interviewed in person allowed participants to clarify the meaning of questions where necessary. It is also important to note that this is not unusual in data collection of this sort. Rosenzweig et al, for example, went so far as to encourage their interviewers to create a sense of a normal social conversation, and both their interviewers and other researchers felt that by doing this they had gained insights beyond the reach of a normal survey. Rather than sticking to an unvarying script, interviewers were allowed to use humour, curiosity, and their own experiences to create a sense of collaboration between interviewer and interviewee.17 One interviewer commented:

Because the tone was so conversational, I feel people opened up to us more…I think they felt I was genuinely interested in what they had to say.

For visitor interviews, a paper copy of the questionnaire was used at the time of the interview to record details of the case which were not spoken on the recording (such as the case number, visitor group description and location) and to make brief

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notes of answers to questions. This provided a backup for correlating recordings with their case numbers, clarification where answers were unclear on the recording (or had included non-verbal cues), retention of data for statistical analysis on the odd occasions where recordings failed, and notification of the order in which certain questions were asked.

For producer interviews, the consent form each person signed at the time of their interview was used to record the case number, and handwritten notes were used to record any non-verbal details.18

Visitor interviews were kept short, varying between 5–15 minutes depending on how much the participant wished to talk. Producers, though, were generally happy to talk at length about their subject, and their interviews took anywhere up to two hours. A shortened version of the Producer questionnaire was used to interview senior managers of the larger organisations, as they generally had less time available, but again they were passionate about their organisations and several of them took the time to talk in more detail.

2.3.2 Ethics

The Australian National University requires all researchers undertaking interviews to obtain ethics approval. The ethics approval for this study, Protocol number 2007/2257, was received on 4 December 2007. Copies of the information and consent forms can be seen in Appendix B.

Visitor participants were not asked to provide any identifying personal details, so the protocol required only that they give verbal consent to the interview and be offered an information sheet about the project. The sheet included contact details at the university should they wish to have more information about the study, or wish to raise any concerns in relation to the study. For documentation purposes visitors were given case numbers, and where they have been quoted in the text they are identified

18On the three occasions when the recorder failed, handwritten notes were used to record the remainder of the interview.
by their site and case number, for example “Memorial 290”.

Children were only interviewed with the consent of both the carer and the child. Children who were with school groups were not interviewed, both because school groups are generally on a strict timetable, and because teachers do not have parents’ authorisation to give consent for their charges to be interviewed.

Producers were given the options of providing their names and contact details, of their contribution being acknowledged by name in the study, and of agreeing to be contacted for further information in the future. The protocol therefore required that they sign a written consent form, and that they also be offered an information sheet about the project. In some cases producers requested that certain details of their interview be kept confidential, and this has been respected in the study. Producers are referred to in the text initially by their name, site and role in their organisation, and thereafter by their name and site for the first reference in each chapter, followed by their name only throughout the remainder of the chapter. A list of producers quoted or otherwise identified in the text has also been provided at the start of the thesis for ready reference.

2.3.3 Demographic variables

This section describes the demographic details that were chosen for collection during the interviews, the reasons for their inclusion, and the ways in which they were implemented.

Gender

As described in Chapters 1 and 2, gender is important both for the way people see large technology heritage, and also for their perceptions of other people’s views of large technology heritage. This information was straightforward to collect.
Age

Like gender, age has an influence on the way people see large technology heritage. This information was, however, less straightforward to collect than gender, as it can be acquired by different methods and in different categories, all of which affect the ways in which the data can be used and the analyses that can be done.

On the one hand, there is the issue of data collection. To ask people, particularly older adults, their exact age, is often seen as being invasive and embarrassing, especially if they have to answer within the hearing of their companions. The decision was therefore made to ask participants to choose one of a series of age ranges, and this worked well as an interview technique.

On the other hand, there is the issue that age ranges, once set, cannot be changed, other than to combine them into larger ranges. This makes the initial selection of age ranges crucial, as data collected under these age ranges cannot later be analysed according to different ranges. It also restricts comparison with other studies, each of which will tend to have its own age breakdowns designed according to the purpose of the particular study. With a small study sample there is also the tension between having smaller age ranges (which allows more fine-grained analysis) and having so many separate age groups that statistical analysis cannot provide a suitable level of confidence (which limits the confidence with which the results can be generalised to other populations).

The selection of appropriate age ranges to use for children up to the age of eighteen is particularly challenging. Childhood is obviously a period of enormous change, and some distinction must be made between the responses of younger children and those who are approaching early adulthood. As noted by the Australian Bureau of Statistics (ABS), however, there is no universally accepted standard as, while age is used as an indicator of developmental stage and level of dependence, the age ranges chosen for each study depend (as mentioned above) on the issues being analysed. While the ABS mostly uses the age groups 0–14 years for children and 15–24 years for
youth, it is noted, for instance, that “when analysing education data the age ranges used may be more influenced by levels of education such as primary or secondary school.”19 By contrast, in its study “Making progress: The health, development and wellbeing of Australia’s children and young people” the Australian Institute of Health and Welfare uses the ranges 5–12 and 13–19, based on the challenges and risks posed by the progressive exposure of the child to the world outside the home, firstly through compulsory schooling, and later through an increasing level of independence.20

The Swiss scientist Jean Piaget, whose work on the cognitive development of young children provided the foundation for systematic study of this area and continues to influence research today, suggested that young children show distinct stages of cognitive development, which occur in the same order in almost all children. Piaget believed that these stages were strongly related to age, with the sensorimotor stage occurring between years 0–2, the pre–operational stage occurring between years 2–7, the concrete operational stage occurring between years 7–12, and the formal operational stage occurring from age 12 onwards. Subsequent research, though, has found that there is considerable variation in the age at which different stages are reached, a factor which seems to be closely linked to cultural variation and the different experiences and opportunities available to children in different cultures. Determining whether a child has reached a particular stage of development also depends on how a task or test is constructed, as younger children may have a basic understanding of a concept but be confused by a complex problem. Further development is required before they are able to correctly complete a complex version of the task, indicating that each “stage” is in fact a continuum of increasing skill and ability.21

With these qualifications in mind, however, researchers still find a broad relevance

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in Piaget’s groupings, and the concrete operational and formal operational stages have
proven to be illuminating for the current study. Piaget held that children at the con-
crete operational stage are logical, objective and flexible in their thinking, and able
to pay attention to more than one aspect of a problem at a time, but that they are
“tied to concrete reality — that is, they can often solve problems only if the objects
necessary for problem solution are physically present.” By contrast, children at the
formal operational stage were seen as able to think about abstract problems, to si-
multaneously consider alternative possible reasons for things and to formally think
about thinking itself: “Children in this stage…can consider different ways of arrang-
ing the world…and they can imagine alternative lifestyles and universes.”

This is important, as, statistically, the current study demonstrates that children of 6–12 years
showed a preference for the workings of the machines they saw, with relatively little
interest in the history of those machines or the people who may have worked them.
The machines of course, are a real, physical presence which the children could inter-
rogate with their own eyes (and sometimes hands), but the history of those machines
is a ghostly thing which must be conjured up by imagination and the ability to picture
other people’s worlds.

Piaget’s approach drew on the natural sciences and saw children’s development
predominantly from a biological viewpoint. Other researchers have looked at cogni-
tive development from a more humanist point of view, emphasising the importance
of the social and cultural environment. Lev Vygotsky, an influential Russian psychol-
ogist whose work reached the West in the 1970s, suggested a distinction between el-
ementary mental functions (which are predominantly natural and genetic and which
emerge spontaneously through the child’s interaction with the world), and higher
mental functions, which are more abstract and complex, and which are mediated by
tools such as language, and teaching from other members of the community. This
view of cognitive development is dependent not so much on age as on the opportu-
nities the child has to acquire knowledge from skilled partners, either through formal

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schooling or social interaction.\textsuperscript{23}

Working in the later twentieth century, Uric Bronfenbrenner extended the idea of the importance of a child’s social and cultural environment through his Ecological theory. This theory stresses the influence on the child’s development of nested social niches, moving from the early, close influences of family, school and peers through the child’s extended family and wider community to the broader society. He also noted the impact on children’s experiences of changes in society over time. Again, this view of cognitive development focusses less on age groups and more on the exposure of the child to individuals and experiences that mediate their cognitive development.\textsuperscript{24}

Both Vygotsky’s and Bronfenbrenner’s theories recognise that the child’s understanding of the past may be developed both informally, as part of the collective memory passed down through social interactions, and formally, through schooling. Peter Lee points out that the narratives the child receives from these different sources are varied and sometimes conflicting, and understanding them in any depth requires a grasp of meta-historical concepts such as evidence, time and change. He notes that these concepts are somewhat counter-intuitive and therefore have to be taught,\textsuperscript{25} a process which the National Centre for History Education suggests is only effective when teachers themselves are confident in using such concepts.\textsuperscript{26} Trained history teachers therefore, and the school system within which they work, potentially have a crucial impact on young people’s appreciation and understanding of history and objects from the past.

In the Western context schooling is both sequential and fairly rigidly defined by age, progressing from primary education in middle childhood, to secondary education in adolescence, and tertiary education in early adulthood. In Australia, primary schooling broadly covers the period from 5–11 years, and secondary school the pe-

\textsuperscript{24}Hetherington, Ross, Gauvain and Locke, \textit{Child Psychology: A Contemporary Viewpoint}, pp. 18–19.
\textsuperscript{25}Peter Lee, “Understanding history”. In \textit{Theorizing Historical Consciousness}, ed. by Peter Seixas, University of Toronto Press, Toronto, 2004.
period from 12–18 years, and there is usually a substantial difference both in the style of teaching and the expectations of students in these two school settings, which might be expected to influence their formal instruction in skills that would help them develop a sense of history. Research into the teaching of history over the last forty years, however, suggests that the development of historical understanding in children and adolescents progresses as a continuum rather than as a series of age-related steps, and that an increased ability to “think historically” is related as much to the learning environment and opportunities to become familiar with the subject matter, as to age-related stages.27

This may be partly due to the nature of history as a discipline — Martin Booth argued in 1992 that the “logic of historical thought” is not the same as the inductive and deductive methodologies that underpin the natural sciences, but rather that it is based on “adductive’ reasoning, a “drawing together of related events to a common centre and the construction of [an] imaginative web” to illuminate past events.28 This model sees historical reasoning as the construction of a convincing, evidence based narrative.

Narrative is a fundamental human form of communication, common to most social groups and situations. Unlike inductive and deductive reasoning, narrative is intuitively grasped by the human brain. Falk and Dierking note that cognitive research indicates that humans can organise information more effectively if it is recounted to them in a story, that the use of narrative scripts to represent and remember information is demonstrated by children as young as three, and that narrative is a key mechanism through which cultural and historical heritage is transmitted.29 As narrative, therefore, historical thought is an extension of a form that is fundamental to human

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27The chapter “Children’s ability to learn history” in Taylor and Young’s comprehensive 2003 survey of history education theory and practice provides an excellent overview of research in this area. See particularly pp. 15–16 on the abilities of younger children versus adolescents, pp. 17–18 on the foundational work of Jerome Bruner and Martin Booth, and pp. 19–20 on the work of Ashby and Lee on children’s ability to empathise with people from the past, and to use concepts of evidence and explanation. Taylor and Young, Making History: a guide for the teaching and learning of history in Australian schools.


psychology and social life, and as such the skills it requires are not taught or acquired at a particular stage of development, but grow continuously with the child, according to the opportunities and influences available.

Understanding the development of historical thought as a continuum, though, does not suggest any obvious ways in which to subdivide the period between six and eighteen years into smaller age ranges, and yet an age range of 6–18 is both too large and too generic to be useful for the present study, as well as being hard to compare with other studies that break childhood down into smaller stages. In the absence of clear age ranges related to the theme of the study therefore, it was decided to use the age related divisions commonly found for children in both Australian society and other statistical studies. As mentioned above, the division between the primary and secondary periods of schooling occurs in Australia at about 12 years of age, and data collected by government bodies such as the ABS and Australian Institute of Health and Welfare frequently reflect this boundary. Graham Black also notes that many museum audience evaluation studies use this division, to allow them to structure the data for educational purposes. For the purposes of this study, therefore, young participants have been divided into the age ranges 6–11 and 12–18. It should be noted that children under six years of age were not interviewed, as they mostly lacked the confidence to express opinions to a strange adult, and had difficulty understanding the meaning of the questions (some 6–8 year olds were also very tongue-tied, and these cases were discarded because the responses were felt to be unreliable, or because their parents, in an effort to help, had supplied answers to which the children had merely assented). It should also be noted that, although young people legally become adults on reaching the age of 18, many of them are still finishing school in their eighteenth year and this year group is therefore included in the school-based age range of 12–18. This means that, for convenience, 18 year olds will be included in the term “children” when the interview responses of 12–18 year olds are being discussed.

Adults in the study were divided into ten year age ranges, with the exception of 19–25 and >65. The latter range was chosen to separate out people of retirement age, to see whether retirement appeared to have any noticeable effect on attitudes towards large technology heritage (it did not). With hindsight, it would have been interesting to be able to separate 66-75 from >75 year olds, although there were no strong qualitative indications that these cohorts felt differently about large technology heritage. The 19–25 age group was less than ten years long to allow the other adult age ranges to be based on a ten year bracket ending at 65.

Occupation

To evaluate whether pre-visit familiarity with machinery and technological information influenced visitors’ engagement with large technology heritage, interviewees were asked to give their occupation (or occupation prior to retirement). Where more than one occupation was cited, the occupation chosen for analysis was the most technically orientated, or if they had no technical orientation, the occupation that they spoke of as their main or most significant one.

Interviewees’ descriptions of their occupations were matched to ABS occupational categories, which were then used to classify and group the data. This allowed the current study to take advantage of the rigorous work done by the ABS on job classification, and facilitates comparison with other studies using ABS classifications. In line with ABS methods, tertiary students were allocated to an occupation in their study area (but at a lower level than a fully trained person), while primary and secondary students were filtered out of the analysis.

Participants were then grouped into four occupational categories, each of which reflected a different training background, occupational focus, mental toolkit and practical skill base. The four resulting categories are:

- Ideas & Hands: professional and creative occupations characterised by a familiarity with handskills, tools, machinery and materials, and by a drive to question
existing norms and use problem solving to find new solutions. This group includes scientists, engineers, artists and performers.

- Hands & Machines: trade and craft based occupations characterised by familiarity with handskills, tools, machinery and materials, and by work focussed on tangible materials and objects. This group includes construction workers, mechanics, plant operators, agricultural and transport workers, food workers such as bakers, and miscellaneous trades such as shoe repairers.

- People: occupations characterised by a close involvement with people, but generally minimal familiarity with tools and machinery. This group includes health care, education, security and customer service workers, as well as management and media positions.

- Data: occupations characterised by a close involvement with pure data and a tendency to work almost entirely within an office environment, leading to a general lack of familiarity with tools, machinery or handskills. This group includes administration, finance, information management and software engineering, as well as areas of research, creativity and problem solving (for example much humanities research and design work) which do not generally involve hand tools or large machinery.

**Education**

At the first five sites to be studied participants were not asked for details of their education levels. This was both to reduce the length of the questionnaire and because it was felt that the participants’ occupations would have more influence on their responses to large technology than their education levels. For instance, the training of both an mechanical engineer and a lawyer will typically be at the same degree level, but the subject matter of those degrees will be very different and only the mechanical engineering degree is specifically likely to promote a familiarity with, and liking for,
large technology.

Much research in the area of museum studies and audience evaluation, however, does show that there is a statistically significant association between higher levels of education and increased heritage visitation, so to see if this association would be reflected at the remaining study sites, education data was collected during visitor interviews at the Memorial, Puffing Billy and Darling Harbour.

As expected, inclusion of the education question did make the demographic part of the questionnaire too long (many interviewees became noticeably impatient), and the question also felt invasive, with a sense that participants wondered why this data was relevant and whether the validity of their answers might be judged on the basis of their education levels. Education levels were also hard to categorise reliably. There are increasing numbers of educational products available within many different settings at many different stages of a person’s life and career, and it was often hard to establish the exact level of participants’ educational qualifications, as well as the comparative levels of qualifications from different eras. As the ABS notes in relation to apprenticeships, for instance:

Apprenticeships have existed in Australia since the early part of the 19th century. Since that time they have evolved and, in recent decades in particular, the nature of apprenticeships has changed substantially in terms of the forms they take, the length of the indenture period and the occupational fields covered.

This gives rise to a concern that “what respondents mean when they state that they are [or were] an apprentice may have changed.”

Some professions, such as nursing, have also moved from an apprenticeship to a degree level qualification. An older nurse, for instance, may have completed only

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an apprenticeship-style course as her initial training, but have participated in regular professional updates throughout her career. Putting her education level down as “apprenticeship” may therefore severely underestimate her level of comfort with complex, text-based information such as might be found in a museum.33

The line between secondary and tertiary education has also become blurred, with many students studying at TAFE (Technical And Further Education) institutes both during and after secondary school. Many qualifications can also be gained at a range of educational institutions; both TAFE institutes and universities, for instance, offer diplomas. To collect reliable data on non-school qualifications, the ABS offers five separate qualification categories (none of which explicitly mentions apprenticeships), and still finds that a significant number of people either do not respond to the question, choose “Not applicable”, or do not describe their level of education adequately for it to be classified.34

As a result of these difficulties in assessing educational levels, and the fact that education in technical subjects is likely to have a disproportionate impact on visitors’ interaction with large technology compared to education in non-technical areas, the education data was felt to have limited reliability for this study and was not used for further analysis.

Postcode and ethnic background

Postcode data (or in the case of overseas visitors, home country data) was collected to allow visitor responses to be analysed by home location if necessary. It also provided a useful way of positively correlating digital interview recordings with their corresponding written data sheet, as the postcode was both spoken on the recording and written on the sheet.

33 In fact, as nursing was always mentioned with respect as being a course with status and intellectual rigour, nurses were categorised as having tertiary equivalent education levels regardless of the age (and therefore exact training regime) of the actual interviewee.

34 To establish this, the ABS tool Census CDATA Online on the ABS website was used to construct a table of Non-School Qualification: Level of Education (QALLP) for the whole of Australia.
In practice, however, there seemed to be little variation in visitor responses that could be related to a geographic origin as opposed to other demographic variables (such as gender, age, occupation or the site at which the interview was conducted).

Early versions of the questionnaires also asked whether the interviewee spoke a language other than English at home, on the basis that this would pick up influences from cultural groups other than primarily English-speaking Australians. Very few people, however, identified a non-English language spoken at home, and most of those who did were either from the relevant overseas country (for instance German speakers from Germany), which made their cultural background obvious, or they had sons or daughters-in-law from another culture, which was unlikely to have a significant influence on their personal perceptions of large technology heritage. In any case, the small percentage of people who did have a cultural background other than English-speaking Australian did not express obviously culturally influenced opinions of large technology heritage — as with English-speaking Australians, differences were more likely to be associated with differences in age, gender and occupation. As this question seemed to add little useful information it was dropped from later versions of the questionnaires.

**Group description**

The composition of the social group with which each interviewee was associated was recorded, as was whether they were with or without companions when they participated in the actual interview, as these factors did seem to influence their attitudes towards large technology heritage. One influence was logistical, as interviewees had to take the wishes of their companions into account when deciding whether to be interviewed and how long to spend on the interview. The other influence was on the content of the interview, as many interviewees involved their companions in their responses. This was not a negative process — many illuminating opinions were expressed during such interactions — but it does need to be acknowledged. There were
also some surprise effects, such as the finding that interviewees showed different levels of interest in touching objects and receiving information on particular subjects depending on whether they were alone or with other adults, or whether they were also accompanied by children.

To avoid adding a potentially invasive and lengthy question to the interview, the social group was visually assessed by the interviewer and recorded in terms of the number of male and female adults and children. The relationship of the members of the party to each other was not recorded (except where this emerged incidentally through their conversation). Age estimates of the children were made by the interviewer as a rough guide to the level of care and attention they required from adult members of the party.

Each randomly selected visitor-interviewee was categorised as being alone, with adults, or with children up to, and including, the age of 18 on the basis that, while having companions of any age can enhance the experience of a heritage visit, it does place constraints upon a visitor’s individual freedom, and having responsibility for children restricts that freedom the most. Interviewees aged up to and including 18 were excluded from this categorisation, as they were not assumed to have carer responsibilities for other people in their group.

Each randomly selected visitor-interviewee was categorised as answering interview questions alone, with companions listening, or as part of a group answering together. Whether the interviewee was classed as answering alone or with companions listening was based on whether any companions were actively listening. For example, at Puffing Billy when interviewees’ companions were sitting nearby in the carriages but were either not paying attention or were unable to hear the responses, the interviewee was categorised as answering while alone. Similarly when children were around, but not actively or consistently listening, the interviewee was categorised as answering while alone. There were no indications that these different social situations biased interviewees responses in any particular way, however, so this variable has not
been explored further. The only exception to this was child interviewees whose caregivers “helped” them by suggesting answers: as they did not represent the child’s own responses such interviews were discarded before data processing began.

Organisation and site

Interviewees were assigned to the context in which their interview was undertaken. For visitors this meant the site at which they were interviewed, while producers were assigned to the organisation that formed the primary context for their interview. For instance, one producer was interviewed as a volunteer at Puffing Billy, although he noted during his interview that he also volunteered at the Polly Woodside (Melbourne Maritime Museum).

Role in organisation

Producers were asked to state their role in the organisation that formed the primary context for their interview, at the time of the interview.

2.3.4 Transcription of data

All visitor interviews and some producer interviews were transcribed by the author of the study. Additional producer interviews were transcribed by a data transcription service, and subsequently checked and edited by the author.

2.3.5 Sampling methodology

Sites

As was discussed earlier in the chapter, there are a great many sites, societies, festivals and field days within Australia that are devoted to, or feature large technology heritage, and it was only possible in this study to interview visitors and producers at a very small number of them. The sites at which interviews were conducted were
therefore chosen to represent a range of heritage display styles, large technology genres, locations around Australia and organisational and management arrangements. Darling Harbour, a site that did not feature large technology heritage displays but which provided a family friendly leisure experience, functioned as a point of comparison with the large technology heritage sites.

Both visitors and producers were interviewed at all sites except Darling Harbour, which, of course, did not have a producer group associated with it. It should also be noted that interviews were conducted at the NMA as a pilot project to test and refine both the visitor and producer questionnaires. The qualitative data from the NMA interviews have been used in the study, as the opinions expressed remain valid. The statistical data from the NMA visitor interviews, however, have been excluded from the study, as they were collected before the questionnaire and interview technique had been standardised.

Visitors

Within the targeted sites, visitor-interviewees were chosen using a random sampling methodology to avoid interviewer bias in the selection of interviewees and thereby facilitate statistical analysis of the results. It must be noted, however, that the ideal of random sampling will inevitably be affected by real world constraints such as time, budget and the conditions under which participants will consent to be interviewed. For example, as Gaea Leinhardt and Karen Knutson point out, visitors in the later afternoon may just want to go home, making it difficult to recruit interviewees at this time. They also note that it is difficult to recruit sufficient participants at sparsely visited sites, and that it may be necessary to concentrate interview resources at such sites on times and days when visitors are most likely to attend. This problem was encountered at Scienceworks, for example, where relatively few people visited the large technology on display at all and interviews had to be concentrated in the early afternoon to recruit sufficient participants. The problem also occurred at the Gold Coast car show
which was a morning-only event, thus limiting the time available for interviews.\textsuperscript{35}

The time of year at which a site is visited, or an interview conducted, can affect the interviewee’s experience and the topics that feature in conversation,\textsuperscript{36} but it was not possible in this study to conduct interviews at all sites in the same time period as there was only one interviewer available (the author), and the field days at the Campbelltown Museum and the Gold Coast car show were, in any case, held at different times of the year. It was possible, though, to interview on both weekdays and weekends, and this was done at all sites except the field days (which were held on weekends only).

At each site one or more suitable locations were selected, the criteria for selection being that the locations were comfortable (not too noisy, windy, cold or hot), and provided a clear “pass point”, (for example defined walkways, and entrances and exits to and from galleries). The interviewer turned away from visitors to prepare the next interview sheet, and upon turning around, approached the next visitor who passed the “pass point” (excluding very young children).

Thirty three visitors declared that they were not interested at all in large technology heritage, but consented to answer the alternative set of questions (see Appendix B, Visitor Questionnaire: Non-interest questions). The site that generated the most of these “no interest” interviews — eighteen — was Darling Harbour, which is as expected for a site that does not feature large technology heritage as an attraction. The demographic details for these interviewees were included in the statistical analysis, with “no data” recorded against the questions that they did not answer.

A number of visitors declined to be interviewed, which could bias the results if their reason for refusal was related to the content or presentation of the interview. To check this possibility, the gender and reasons for refusal were noted for visitors who refused to be interviewed at the Memorial and Darling Harbour. At the Memorial


twenty men and fifteen women refused to be interviewed, with the reasons given being time constraints (19), not wanting to do a survey (9), needing food or toilet (3), language difficulties (2) and carer responsibilities (1). At Darling Harbour forty-nine men and forty-six women refused to be interviewed. Those who stopped long enough to give a reason for refusing used the same range of reasons as at the Memorial (except for the need for food or toilet), but many walked by with just a shake of the head, making it clear that it was not the content of the survey they objected to but the survey situation itself. In fact, a number of people who were interviewed at Darling Harbour mentioned that they had initially assumed that the questionnaire was a commercial market survey, and only became interested in being interviewed when they discovered that it was about heritage and was not for a commercial company. The lack of any association between the content or presentation of the survey and refusal to be interviewed indicates that refusals have not biased the results of the survey.

Producers

Unlike visitor-interviewees, producer-interviewees were not randomly selected, or statistically analysed. This was for two reasons. Firstly, there are relatively small numbers of producers involved with large technology heritage at any one site, making recruitment of sufficient numbers of interviewees for statistical analysis difficult. Secondly, most large technology producers are passionate about their subject, and to restrict them to a 5–10 minute interview consisting of relatively simplistic questions would be seen as shallow and insulting (once engaged, they like to cover a subject thoroughly) and would, in any case, be a waste of the insights that their deep engagement can provide. Conducting longer interviews, however, meant that there was time for less interviews. Producers, therefore, were chosen to represent differ-

37 Leinhardt and Knutson found that most refusals in their study of museum visitors similarly related to time constraints. Leinhardt and Knutson, *Listening in on Museum Conversations*, p. 166.
38 Rosenzweig and Thelen noted that the explosion of market research surveys in recent years has made people in the USA much less willing to participate in surveys, and that this affected recruitment for their telephone survey about uses of the past. Rosenzweig and Thelen, *The Presence of the Past: Popular Uses of History in American Life*, p. 229.
different professional and interest backgrounds, different roles within organisations, and engagement with different technology genres. In some cases they were also chosen because of their potential to illuminate a particular issue, or because they were recognised by their peers as having noteworthy expertise or influence in a particular area or organisation.

2.3.6 Qualitative analysis

Qualitative text was coded to themes using the NVIVO qualitative research data analysis program. Themes were initially generated using broad categories that avoided terms specifically associated with large technology and heritage. Instead of themes such as “restoration”, “conservator” or “museum”, the primary themes became actors, attitudes, coping strategies, conceptual frameworks, emotions, subjects of interest (ideas that arose spontaneously from a number of interviewees), personal context, and project dimensions. The results of each interview question were also collated together. This approach had a significant impact on the study, as it avoided preconceptions about heritage, large technology and demographic groups, and allowed more nuanced understandings to emerge of the motivations, connections and barriers that influenced producers, visitors, projects and organisations.39

Qualitative data was used to identify and illuminate issues of potential interest, where appropriate in conjunction with statistical analyses. For example, during fieldwork it became clear that many people expressed negative feelings about technical specifications, and statistical analysis confirmed that fewer visitors were interested in technical specifications than in any other information about large technology heritage. Statistical analysis, though, could not explain why this was so, and it was only further study of the coded qualitative data that suggested that many people disliked this type of information because it made them feel inadequate.

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39 An excellent list of broad, “starter” themes is provided by Pat Bazeley in her book on qualitative data analysis using the NVIVO software. Bazeley, *Qualitative Data Analysis with NVIVO*, pp. 106–7.
2.3.7 Quantitative analysis

Statistical analysis of data from the visitor survey was undertaken using the PASW Statistics software (formerly SPSS).\textsuperscript{40}

Survey questions included in statistical analyses

Statistical analysis was undertaken on eight structured questions in the visitor questionnaire:\textsuperscript{41}

- Do you like to see these objects restored to look new?
- Do you like to see these objects made to work again?
- When you are looking at a large technology object, do you find the following types of information interesting or not interesting?
  - History of the object
  - How the object worked
  - How the object was made
  - Stories about people connected with the object
  - Technical information about the object (with an explanatory prompt of “For example: how fast it could go, or how much it could carry.”)
- Do you like to touch these objects?

The results of statistical analyses of responses to these questions are presented as tables in Appendix A, and discussed in detail in Chapters 3 and 4.

\textsuperscript{40}Dr Terry Neeman of the ANU Statistics Consulting Unit generously provided guidance in the interpretation and presentation of the statistical data.

\textsuperscript{41}The question — “What do you think is the most important period of the object’s life?” — was not included in the statistical analysis as respondents often seemed unclear about the meaning of the question, which made the reliability of their answers doubtful. The question “What is it about large technology objects that appeals to you most — the structure and workings or the overall look and feel?” — was also not included in the statistical analysis, as many visitors declined to choose one of the responses included in the question, and instead defined their own preferences in their own words. These responses have been qualitatively analysed, but were not suitable for statistical analysis.
Controlling for reactivity

As discussed in the earlier section on validity in social research (see above), interviewees’ responses can be affected by their perceptions of what the interviewer wants or expects. Without realising it, interviewees may try to please the interviewer by giving what they guess is the “correct” answer, or by trying to perform in ways that they feel will fulfil the goals they imagine the researcher is pursuing. These assumed goals or answers, known as “demand characteristics”, can lead participants to express ideas or behave in ways that are products of the research situation, not of the interviewees’ real beliefs or personalities.42

In this context it is noticeable that, where answers to questions in the current study had positive/negative connotations, positive responses dominated in seven out of eight questions, a result that could indicate a desire to please, or agree with, the interviewer.43 Where interviewees gave a negative answer, however, they were clearly not influenced by a desire to please the interviewer by selecting an answer with a positive connotation, and therefore the group of “negative” respondents to each question provided a set of cases that were not affected by this type of demand bias. For this reason, although the raw data reflected scaled positive responses (from “slightly” to “very” interested), specific concerns (such as a desire for maintenance rather than “as new” restoration), and undecided responses, the decision was made to aggregate all responses into one of four groups: positive, negative, undecided and missing. Undecided and missing responses were excluded from the analyses, leaving the data divided into a binary format of positive and negative groups. As the negative group was not affected by demand bias, this division provided a firm basis for statistical

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42 Rosnow and Rosenthal, People Studying People: Artifacts and Ethics in Behavioural Research, see Chapter 4: The Person Behind the Look, especially pp. 63–4. See also Patton on the importance of the interviewer being perceived to be neutral. Patton, Qualitative Research and Evaluation Methods, pp.365–6.

43 Positive responses were overall in the majority for the questions about History, How the object worked, How the object was made, Stories about people connected with the object and Technical specifications, where visitors were asked if they were interested (a positive answer) or not interested (a negative answer) in these topics. Positive responses (yes) were also in the majority for the questions about whether visitors would like to see objects Made to work again, or would like to Touch the objects, while negative responses (no) were only in the majority for the question about whether visitors would like to see objects Restored to look new again.
analysis.

Discussing results in terms of people who did not want things, however, presents difficulties. Firstly it is unwieldy (it is easier to talk about 30% of people being interested in a topic than about 70% not being interested in it), and secondly there is substantial evidence that people find it hard to imagine or utilise negative information as it lacks concreteness and salience.\(^4\) For this reason, as the positive group of responses is the “mirror image” of the negative group in terms of its relationship to the total sample, the results have been presented in tables and discussed in the text mostly in terms of the groups of positive responses.

**Missing data**

Due to social and logistical issues described elsewhere in this chapter (such as visitors who were not interested in large technology objects, visitors who were not interested in information about the objects, and visitors who had limited time or patience for questionnaires) not all visitors were asked all the questions in the survey, and not all questions that were asked were answered in a way that was relevant to the question.\(^5\) Where a question was not asked, or the interviewee did not answer the question, the result was coded as “No data”. Such missing values were excluded from the statistical analyses of responses to the question.

As discussed above, ambivalent or undecided responses were also excluded from the analyses.\(^6\)


\(^5\)Clarification was sought if an answer was ambiguous, but as Patton notes, if one or two attempts at clarification do not work, it is best to leave the topic, as it can cause confusion and risks making the interviewee feel that they are being “inarticulate, stupid or muddled”. Patton, *Qualitative Research and Evaluation Methods*, p. 374.

\(^6\)The table of analytical results for each question lists how many cases were excluded from the analysis of that question, either because of missing data or for other reasons.
**Question order**

It is possible that the order in which questions are asked in a survey may affect the responses. Taking as an example the five questions asking interviewees whether they were interested in history, how the object worked, how the object was made, people stories, or technical specifications, interviewees might say that the information type mentioned in the first question was interesting out of politeness, and then adjust their answers to subsequent questions in relation to the level of enthusiasm expressed for the first question. To check for such effects these five questions were asked in a rotating order in most interviews. The only cases where this did not apply were at Puffing Billy and the Gold Coast car show, where many people responded to the first question they were asked by saying that they were not interested in any information about the objects at all, making it rude to continue asking the rest of the questions. As the question interviewees were most likely to respond positively to was the question about history, this became the question that was asked first at these sites, as a positive first answer allowed the interviewer to continue asking the remainder of the questions.

Crosstabulation of the responses to these five questions with the order in which they were asked showed no significant order effects, except for the history question, where interviewees were more likely to say they were not interested if the question was asked first than if it was asked later in the question order (83% of interviewees said they were interested in information about history if this question was asked first, as opposed to 94–100% if the question was asked at any other position - see data in Population table in Appendix A). This is probably because, as discussed above, the history question was asked first particularly frequently at the Puffing Billy and the Gold Coast car show site as it was the question most likely to interest interviewees enough to entice them to complete the remainder of the questionnaire. On the other hand, it also captured many people who were not interested in having any further information about the objects, which meant that instead of their negative responses being spread evenly between the different information questions, their lack of interest
was recorded primarily against the question about history. This does not seem to have made a great difference, however, as history was overall the most popular topic of information.

**Statistical techniques**

Each question was analysed using the frequency distribution of responses for the total sample population, followed by crosstabulations of the responses with the demographic variables of gender, age group, site, occupation group and childcare status. The Pearson chi-squared test and generalised linear models (GLM) were used to assess statistically significant differences between these demographic groups.

As the responses to the survey questions had been reduced to a binary format, it was also possible to use logistic regression to explore alternative interpretations of the results. This was particularly important for analysing data by demographic variables that had many categories (particularly age group and site), as the relatively small sample of 368 cases reduced the confidence level of the results when divided by so many categories. Where more than one demographic factor appeared to have a significant influence on results, logistic regression was also useful in determining which of those factors was the driving, or ultimate influence. For instance, although both gender and occupation appeared to have an influence on interviewees’ interest in how the objects worked, logistic regression showed that gender was the most significant variable of the two. In all occupation groups, men were more likely to be interested in how the objects worked than women.47

For readers who are not familiar with statistical techniques, brief description of the processes used are provided below.48

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47See Table A.19: Gender–Occupation 5(a).

Table 2.1: Sample crosstabulation: Desire to touch large technology heritage objects

<table>
<thead>
<tr>
<th>Demographic group</th>
<th>Total number</th>
<th>Number wanting to touch</th>
<th>Number not wanting to touch</th>
<th>% wanting to touch</th>
<th>% not wanting to touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample</td>
<td>300</td>
<td>182</td>
<td>118</td>
<td>60.7</td>
<td>39.3</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>177</td>
<td>110</td>
<td>67</td>
<td>62.1</td>
<td>37.9</td>
</tr>
<tr>
<td>F</td>
<td>123</td>
<td>72</td>
<td>51</td>
<td>58.5</td>
<td>41.5</td>
</tr>
<tr>
<td>Chi-square</td>
<td>.550 (df=1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Frequency distribution

A frequency distribution is a list of how many times each type of response (or response category) occurred within the whole sample. For instance the frequency distribution for interest in the history of large technology objects was:

- Interested: 296 people
- Not interested: 29 people
- Total sample asked: 325 people

Crosstabulation

A crosstabulation (also known as a two-way frequency distribution), establishes whether there is an association between two factors, or variables. For example, the crosstabulation of the factor “Gender” with the variable “Desire to touch objects” generates a table that shows how many males do and do not want to touch objects, and how many females do and do not want to touch objects (Table 2.1). If there is no association between these variables, the percentage of males and females that do want to touch objects should be reasonably similar, and the percentage of males and females that do not want to touch objects should be reasonably similar. Table 2.1 shows that this is so. If there is an association between the different variables, these percentages should be very different.

See Table A.2: Interest in history of large technology heritage objects. Note that only the “Interested” responses and the total sample are shown in this table, but that the “Not interested” responses can be calculated from these two pieces of information.
Note, however, that association does not imply a causal relationship between the
two variables. The crosstabulation of “Gender” with “Interest in technical specifica-
tions”, for instance, shows that males and females do tend to respond differently to
technical specifications. This does not mean, however, that gender “causes” the dif-
fERENCE. As will be discussed in detail in Chapter 4, further research suggests that the
association between these variables is ultimately due to social norms that create very
different life experiences of technical information for males and females, and it is the
impact of these life experiences that can be seen, indirectly, in the crosstabulation of
their gender and interview responses.

Chi-square

A Pearson chi-squared test assesses the statistical significance of an apparent associa-
tion between two variables by measuring the difference between the range of values
observed in the actual data, and the range of values that would theoretically be ex-
pected if there were no association between the two variables. When this difference is
small, the observed values are likely to have arisen by chance, and are unlikely to be
evidence of any association between the two variables. When this difference is large,
the observed values are unlikely to have arisen by chance, and are more likely to be
evidence of a genuine association between the two variables. In this case the result
is said to be statistically “significant”, and is commonly reported as a “p-value” (a
p-value is the probability of obtaining a difference between observed and theoretical
values that is at least as big as the one observed, if there is no association between
the two variables tested). P-values of .05 or less are generally regarded as statistically
significant, and the lower the p-value, the higher the level of significance. A p-value
of .05 or less means that spurious evidence of an association between the variables
tested “would be expected to occur by chance fewer than 5 times in 100”, giving a
confidence level of 95% in the result. This also suggests how likely it is that the result
will hold for (or can be generalised to) a larger population.

P-values are affected by the observed differences and sample size. For the same observed difference (for example 40% vs 60%), larger sample sizes will give smaller p-values. The larger the sample size, the more confidence can be placed in the estimated proportion.

Degrees of freedom

Degrees of freedom (df) is the number of values that are free to vary in the calculation of a statistical result. It is always one less than the total number of values in the set compared in the calculation. For example, 8 age groups are used in the current study, and therefore df=7 for calculations of the influence of age group on survey responses. By contrast, there are only 2 genders, and therefore df=1 for calculations of the influence of gender on survey responses.\(^{51}\)

Generalized Linear Modelling

Generalized Linear Modelling (GLM) is an umbrella term for a range of similar mathematical techniques that allow the researcher to “explain variation in more than one response variable simultaneously.”\(^{52}\)

The GLM method used in this study is logistic regression, a technique used with data where the response variables are dichotomous (meaning they have only two possible values, for example yes and no, or interested and not interested). Logistic regression was used to test the influence of various independent variables (independent meaning pre–existing conditions such as gender, age and occupation) on dependent variables (in this study responses to survey questions) both separately and in combination. Firstly, each independent variable was tested as a fixed effect in a single factor model. This showed whether the independent variable had any associa-

\(^{51}\) An excellent, relatively plain language tutorial on the meaning of degrees of freedom within statistics is presented by Ron Dotsch at http://ron.dotsch.org/degrees-of-freedom/ (accessed 06/08/2012).

\(^{52}\) The details of GLM techniques are beyond the scope of this chapter: for an introductory text on such techniques see Edward F. Connor. “Generalized Linear Models”. N. d. URL: http://userwww.sfsu.edu/~efc/classes/biol710/Glz/Generalized%20Linear%20Models.htm (accessed 09/08/2012).
tion with the dependent variable at all. Secondly, potentially interesting combinations of independent variables, such as the effect of gender and occupation on interest in technical specifications, were tested as fixed effects in a parallel factorial model. This indicated whether both variables had parallel influences on the response, or whether one variable was more important than the other. If both independent variables had a significant influence on the dependent variable, they were tested further using an interacting model, to see whether the influence of the independent variables interacted to influence the response variable. This process allowed increasingly complex models to be tested, stopping at the model which was able to explain the results with the least complexity.

P-values were used to assess the relative significance of the independent variables in the models tested. Table 2.2 shows the results of a series of logistic regression tests using the independent variables of Age and Childcare Status and the dependent variable Desire to Touch Objects, and following the above procedure. The table shows the p-values for each test. In this case, as will be discussed in detail in Chapter 3, age and childcare status affect people’s desire to touch objects independently, but they also interact. People in the 36-45 year age group are particularly likely to have childcare responsibilities, and this seems to be associated with a particular reluctance to touch large technology heritage objects.

In four cases the standard logistic regression algorithm was unsuccessful and the Forward WALD logistic regression algorithm was used instead. Three of these cases involved the single factor model, fixed effect analysis of association between site and interest in the history of the objects (p=.025), site and interest in how the objects worked (p=.358), and site and desire to see objects made to work again (p=.026). The third case involved the parallel factorial model, fixed effects analysis of association between interest in people stories and the variables of gender and occupation (gender p=.041, occupation p=.269).
<table>
<thead>
<tr>
<th>Model</th>
<th>Independent variable</th>
<th>Dependent variable: Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single factor</td>
<td>Age df=5*</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>Childcare status df=1</td>
<td>.001</td>
</tr>
<tr>
<td>Two factor parallel</td>
<td>Age*</td>
<td>.037</td>
</tr>
<tr>
<td></td>
<td>Childcare status</td>
<td>.003</td>
</tr>
<tr>
<td>Two factor interacting</td>
<td>Age/Childcare status valeur</td>
<td>.006</td>
</tr>
</tbody>
</table>

Table 2.2: Significance results (p-values) for logistic regression tests of the influence of age and childcare responsibilities on adults’ desire to touch large technology objects. P-values that show a statistically significant association between independent and dependent variables are highlighted in yellow. Data was drawn from Table A.22: Influence of age and childcare status on desire to touch large technology objects.

2.3.8 The visitors

The composition of the sample population of visitors was examined (see data in the Population table in Appendix A) and compared to demographic data provided by the Memorial (2008–9), the WA Maritime Museum (2007–8), and the Melbourne Museum and Scienceworks (July–December 2008).

The gender distribution of the sample showed that more males were interviewed than females (58.4% to 41.6%). Breaking this down by site showed that more males than females were interviewed at all sites except Puffing Billy, where slightly more females were interviewed (52.8% females, 47.2% males). Of the visitor data provided by the participating institutions, only the data provided by the Memorial contained a gender breakdown of visitors, but at 57% males to 43% females, this was close to the gender distribution of both the overall sample in the current study (see above) and of the sample interviewed at the Memorial (60% males to 40% females).

The gender distributions at the different sites divided into two distinct groups: the Memorial, the Melbourne Museum, the Campbelltown Museum and the Gold Coast car show had an average of 33.1% difference in the number of males and females, whereas the WA Maritime Museum, Scienceworks, Puffing Billy and Darling Har-
bour had an average of only 6.75% difference. In other words, the gender balance at the first four sites was much more strongly biased towards males than at the other sites. This may be due to chance as there is no obvious similarity between these sites that would explain this grouping. For instance, the Campbelltown Museum and the Gold Coast car show (which both had lots of operating machinery) drew many male visitors who owned machinery themselves, but this was clearly not the drawcard at the Memorial or the Melbourne Museum which had no operating machinery at all. Similarly, while the Memorial had obvious relevance to ex-service visitors — many of whom are male — the Melbourne Museum did not.

The age distribution of the sample overall was reasonably evenly divided across all age groups, though with slightly lower proportions of children of 6–11 and 12–18 years due to the logistical difficulties of interviewing children. Breaking the results down by site revealed some slight differences, with more than 50% of interviewees being 46 years old and over at the Memorial, the Campbelltown Museum and the WA Maritime Museum, and more than 50% of interviewees being younger than 46 years at the Melbourne Museum, Scienceworks, Puffing Billy, the Gold Coast car show and Darling Harbour. Again, this concurs with the age distributions reported in the institutional visitor data sets, as the Memorial and the WA Maritime Museum both reported more visitors over than under 45 years, while Scienceworks and the Melbourne Museum both reported more visitors under than over 40 years.

The distribution of the overall sample across the four occupational categories was fairly even. Breaking the results down by site showed that Hands & Machines people were particularly strongly represented at the Campbelltown Museum and the Gold Coast car show, but were under-represented at Scienceworks. Ideas & Hands people were well-represented (along with Data people) at Darling Harbour, but were under-represented at the Melbourne Museum and Puffing Billy. The Memorial and the WA Maritime Museum had similar proportions of all groups. The data sets pro-

53 Each of the institutions that provided visitor data used different age ranges, and the division point of 46 years was chosen to facilitate a reasonable comparison between these data sources and the current study.
vided by the institutions did not contain occupational breakdowns of their visitors for comparison.

The occupational categories were highly segregated by sex, as will be discussed in detail in Chapter 4. The Ideas & Hands and Hands & Machines categories were dominated by males, while the People category was dominated by females. The Data category was the only one that showed an even distribution between both genders (see data in Table A.15: Gender–Occupation 1—Total sample by gender and occupation).

Of the overall adult sample, 74% came alone or with other adults, and only 24% came with children (child interviewees, as discussed above, were always with adult carers). Breaking the results down by site showed that 11% of adult interviewees were with children at the Memorial, Darling Harbour and the WA Maritime Museum, and 20–26% of adult interviewees were with children at the Campbelltown Museum, the Gold Coast car show and the Melbourne Museum. The only sites that had a markedly higher percentage of adults with children were Scienceworks (where 50% of adults were with children) and Puffing Billy (where 67% of adults were with children. See data in the Population table in Appendix A).

The social group data corresponds less closely with the institutional reports than the data on gender and age. The Melbourne Museum reported 50% of visitors being with children (the current study found 23%), Scienceworks reported 93% of visitors being with children (the current study found 50%) and the WA Maritime Museum reported 27% of visitors being with children (the current study found 11%). As all the figures for visitors with children are lower in the current study than in the corresponding institutional data, this suggests a selection bias in the current study that has allowed visitors with children to be under-represented. A possible reason for this bias is the selection of interviewing points: the institutions adopt selection strategies that will ensure even coverage of all their display areas, whereas interviewing points for the current study were chosen to maximise the chance of visitors having seen some

54 The Memorial did not provide data on this topic.
of the large technology items on display before they were interviewed. There is evidence that this issue may have influenced the results from Scienceworks, as one visitor specifically commented that she had not taken her children to visit the Pumping Station (the main large technology heritage area of the site) because she assumed that her children were too young to appreciate it. This suggests that other parents may also have been reluctant to visit the area.\textsuperscript{55}

\section*{2.4 Conclusion}

The discussions above have outlined the boundaries of the current study, the methods used to collect and analyse data, and the statistical composition of the sample of visitors who were interviewed. The following chapters will build on this information, using the concepts outlined to discuss large technology heritage in terms of the views and perceptions of visitors, the aims and concerns of producers, the challenges and opportunities of display, and the constraints and influences of heritage industry standards. This discussion will begin, in the next chapter, with the views of visitors.

\textsuperscript{55}Scienceworks 112: Female, 26–35, mechanical engineer and teacher. This woman was randomly selected while taking her children to a play area near the Pumping Station.
Fun with bulldozers at the Campbelltown Museum
Image: Alison Wain, 2008
Chapter 3

Finding Connections

3.1 Introduction

Reader response theory, a branch of literary criticism developed in the late 1960s, suggests that the creation of meaning is an act of negotiation between the creator of a work and the reader of that work. Rather than the meaning of a work being singular, fixed, or static, meanings are multiple, malleable and ever-changing, varying with the reader of the text and the context in which the work is read.

Historic objects can be understood as texts, as indeed so can the various ways in which they are interpreted as heritage, and thus reader response theory can be seen to have relevance in heritage. It introduces the idea that the visitor to heritage is an active participant in heritage construction, helping to decide what is heritage, to identify the meanings of that heritage, and to imagine how heritage can be used.

It is consequently very important for the producers of heritage displays and experiences to understand their visitors. Why do they come? What do they expect to see? What do they enjoy? What drives them away?

While considerable research has been done on the needs, aims and responses of visitors to heritage in general, little work has been done to explore the desires and experiences of visitors to large technology heritage in particular. Producers of large technology heritage displays, therefore, predominantly rely on their own experiences
and preferences to guide them. Their desires, expectations and responses are, how-
ever, likely to be substantially different from many of their visitors, and relying on
their own preferences as a guide may not provide them with the information they
need to make displays that will attract, please and intrigue a wide range and a sus-
tainable number of visitors.

The current study has taken a significant step towards filling that gap by asking
visitors to large technology heritage display sites in various locations around Aus-
tralia how they felt about the displays that they saw — what they liked, what they
did not like, what they would have liked to do if it had been possible. Their responses
have been analysed both quantitatively and qualitatively, and the results of these anal-
yses are discussed in both this chapter and the following chapter, drawing on a wider
theoretical context to understand and illuminate statistically significant trends in the
data.

Aspects of the data that are explored in particular detail in this chapter are the pop-
ularity of history with all visitors except children under twelve years of age; the low
level of interest in technical specifications in all demographic groups; the ambivalence
of most visitors towards personal stories unless they already know, or know of, the
person in question; the high interest across all demographic groups in seeing objects
made to work again, the comparatively low interest — again across all groups — in
seeing objects restored to look new; and finally the interest in touching large technol-
ogy objects, and the unexpected impact of childcare responsibilities on adult desires
to touch the objects.

Three broad theoretical themes were found to be particularly helpful in under-
standing this data. The first theme relates to the way information about the world
is stored and processed by the human brain. The second theme relates to the way
people choose and use information about the past. The third theme relates to the
ways in which sensory experience and personal relevance underpin the power, affect
and memorability of events. These areas of theory will be briefly outlined below to
provide a context for the following discussion of visitor interview responses.

3.2 Frames of reference — storing and processing information about the world

In his study of the role of social participation in learning, Etienne Wenger comments that:

… the concepts we use to make sense of the world direct both our participation and our actions. We pay attention to what we expect to see, we hear what we can place in our understanding, and we act according to our world views.¹

Different life circumstances provide people with different frames of reference, which guide the way they approach new experiences, new information and new opportunities.² This is as true for encounters with heritage as much as for any other experiences — every visitor brings with them their own set of preconceptions and expectations, and these influence both whether they choose to engage with particular aspects of heritage in the first place, and what they see when they do. An interviewee at Darling Harbour, for example, said:


²It should be noted that much research in the areas of social and cognitive psychology was initially done using predominantly participants from Western cultures. Within recent decades a movement to redress this imbalance has emerged, with studies specifically evaluating differences between participants from a greater variety of cultures. Most studies, however, have still been focussed on an East–West dichotomy, with “Easterners” typically represented by people from China, Japan and Korea, and “Westerners” commonly represented by people from the USA and Canada. This dichotomy led to one assumption in particular — that the ways in which people represent and use knowledge shows a pattern of East–West difference, with people from Western countries having a tendency to be highly individualistic, and to be better at identifying distinction and separateness, and people from Eastern countries tending to be more collectivist, and better at identifying relationships. More recent research using a greater variety of cultural groups, however, suggests that individualist and collectivist approaches are universal psychological strategies, and that use of one or the other is primed by the situation in which the individual finds him or her self. While cultural tendencies are one of a number of factors that can influence this priming, studies have shown that members of ‘collectivist’ cultural groups can adopt “individualistic” strategies (and vice versa) when primed in ways that counter their normal cultural expectations. Daphna Oyserman. “Culture as situated cognition: cultural mindsets, cultural fluency, and meaning making”. European Review of Social Psychology 22, no. 1 (2011): 164–214, pp. 170-73, 206–7.
I never read that much about heritage, so I don’t know much about it. I was never raised going to museums and stuff like that.³

For this man, heritage was a conceptual blank, discouragingly unfamiliar and devoid of any known attractions. He preferred shopping or sporting activities, with which he was more familiar, and which he already knew that he liked. A woman visiting the NMA made a similar comment about the large technology displays there:

I have to say that I wasn’t very interested…Maybe because I have no idea about technology… I wandered around the places and had a look at things that I already knew something about, and that was more like these animals and then Aborigines, because that stuff I learned about at uni… I guess when I wander round I look for things that I can recognise or that I have any notion of where to put them, in which area and things.⁴

Very few people, in fact, seem to welcome completely unfamiliar concepts, perhaps because, as Paul Connerton points out, “To understand the meaning of something, it is necessary to have something to relate it to or contrast it against.”⁵ John Falk and Lynn Dierking have found a similar dislike of unfamiliar concepts in their research on museum visitors, and noted that visitors in their studies not only tended to focus their attention on familiar topics and objects in the museum, but that they preferred to use museum visits to confirm pre-existing knowledge rather than to acquire new knowledge.⁶ While negative or missing frames of reference for heritage may be discouraging for visitors, though, positive frames of reference are equally likely to promote engagement with heritage. It is useful, therefore, to understand something of how such frames of references are constructed, and how they affect perception and learning.

³Darling Harbour 383: Male, 19–25, commerce and statistics student.
⁴National Museum of Australia 39: Female, 19–25, student teacher studying sports science and English. This woman was interviewed as part of a pilot survey at NMA. The results of this survey have not been included in the statistical analysis of the current study as there were changes in the collection of quantitative data during the pilot: the qualitative data, however, remains relevant.
⁶Falk and Dierking, Learning from Museums: Visitor Experiences and the Making of Meaning, pp. 27, 84.
Studies in cognitive psychology show that people deal with the avalanche of sensory data they get from the world around them by looking for the gist, or meaning, of things and events rather than their precise physical details, and by building knowledge categories, or schemas, which contain details that are expected to be representative of a particular thing or event. Such schemas can be used to make predictions about new encounters and are therefore very economical ways of representing and communicating information. Cognitive psychologist John Anderson notes that:

...if you tell someone, “I was licked by a dog,” your listener can predict the number of legs on the creature, its approximate size, and so on.

The speaker does not have to describe every detail of the dog for the listener to form a general impression of the experience which is being communicated.\(^7\)

The danger of such categorisation is, of course, stereotyping, as inferences which seem plausible in the light of pre-existing data may not, in fact, be accurate in the current instance.\(^8\) For example, in an experiment conducted by Brewer and Treyens in 1981, in which participants were asked to write down everything they could remember about an office in which they had just been waiting, the participants were strongly influenced by their schema of what an office contained. They would very accurately recall items that were part of their “office” schema, but they were much less able to recall items that were not part of the office schema, and would falsely recall items that were part of their office schema but had not actually been present in the office they had just experienced.\(^9\) A teacher visiting Scienceworks with a group of schoolchildren demonstrated a similar merging of real data with a pre-existing mental schema when, just after he had watched one of the large stationary steam engines working in the historic Pumping Station, he commented:

I don’t go to that loud crashing thing with the steam and the smoke. I’m

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not really into that.\textsuperscript{10}

His comment bore little relation to what he had actually seen because, as the engine was run on compressed air rather than steam, there was actually no steam, no smoke, and almost no sound. The huge components, in fact, moved with the barest whisper. His comment seems to be much more in keeping with his pre-existing beliefs about technology in general, and older technology in particular:

I am not into the older style stuff. It is partly the noise and pollution of the older things...I suppose I am a bit of a greenie in that respect...I marvel at the way man has developed so many things which aren’t good for us, which are in fact harmful.

This visitor seems to have placed his experience at the Pumping Station into a pre-existing frame of reference about machinery that identified machines in general as harmful, and old machines in particular as noisy and polluting. Most of the specific details of his experience appear to have been discarded within moments of the experience ending, and to have been replaced with more standard details extracted from his pre-existing “old machinery” schema.

In analysing the data collected from visitors in the current study, therefore, it is important to understand the strength of the influence that prior knowledge — or lack of it — can have on both engagement with new experiences, and the creation of memories of new experiences.

### 3.3 Bringing yourself to heritage — choosing and using information about the past

The idea that it is as much what a visitor brings to a heritage visit, as what they find there, that enables them to construct meaning, is well-established. It came to prominence, as mentioned in the introduction to this chapter, in the late 1960s with the

\textsuperscript{10}Scienceworks 77: Male, 56-65, teacher.
development of the theory of reader response, which is analogous to the theory of schemas discussed above in a cognitive psychology context. Both theories deal with the capacity of the human brain to store and communicate information, and both centre around the essential problem that a complete representation of any object or situation is impossible. The only full representation is the object or event itself, and any description or retelling of it — whether accomplished through the medium of personal memory or artistic creation — is necessarily a partial reconstruction, full of gaps which must be filled by the imagination of the person who is recalling the event or reading the text. 11 In both cases, those gaps are not filled randomly, but by details suggested by the expectations, assumptions, prior knowledge and even moods of the reader. 12 Wolfgang Iser, one of the initiators of the reader response movement, also noted that texts are encoded in specific ways, and that readers must understand these codes to be able to understand texts, extract meaning from them, and generate their own interpretations. 13 Together these ideas imply that the meaning of a text is not controlled by either author or reader, but is a shared construction in which both author and reader participate.

These ideas entered museology in the 1980s, 14 and visitors increasingly came to be understood as active agents who participated in the creation of their own meanings and visiting experiences. This was also supported by more general studies of people’s use of, and interaction with, the past. 15 In a major survey of American attitudes to

11 The term “text” here refers not merely to written text, but to any object or creation that conveys meaning and information and can therefore be “read”.

12 Reader response theory drew on earlier work, such as Roman Ingarden’s 1930 writings on the subject of “concretization”. Ingarden noted that there are details in every text that cannot be determined from the text itself, and that these indeterminacies must be filled by concrete details from the reader’s imagination. The sentence “The child bounced the ball,” for instance, does not tell you the age or appearance of the child or anything about the child’s surroundings or motivations. These details must be interpolated by the reader. Robert C. Holub, Reception Theory: A Critical Introduction, Methuen, London, 1984, pp. 25–26.


15 There is a long-running debate on the distinction in meaning between the terms “history” and “the past”. Martin Booth, in his study of students’ historical thinking, summarised a pithy critique of the discipline of history from Keith Jenkins as distinguishing between “the past — [which is] all that has
the past, for instance, Roy Rosenzweig and David Thelen found that people sought evidence from the past to construct meanings which were relevant to themselves and their families. They found that their respondents used such meanings to understand the impact of the past on their lives, and to see how they might take responsibility for shaping their futures. Similar surveys in Australia and Canada, found similar personal and family orientations. A survey conducted by Nick Merriman in the United Kingdom, looking at patterns of heritage visiting and people’s attitudes to and images of the past, also found a very personal orientation: when asked what was the most important reason for studying the past, respondents’ answers fell into three broad categories — a desire to understand more about what life was like in the past, a desire to orient themselves in the present, and a desire to more effectively plan their futures.

While family history was the aspect of the past that was most important to most happened in time — and history — [which is] those stories or discourses of events on which historians choose to focus”. The study by Rosenzweig et al., mentioned above, found that the term “history” in America seemed to connotate formal, official and distant information, which most of the survey respondents felt had little relevance to their own lives, whereas the term “the past” elicited a much warmer and richer response. In the current study, however, the term “history” drew rich, enthusiastic and personal responses from participants, and was frequently chosen by respondents, without prompting, to describe the aspect of an object which gave them the greatest feeling of engagement. A Canadian study, modelled in many ways on the study by Rosenzweig et al., explicitly tested this issue: “For a randomly generated third of the first three questions in the survey relating to general interest in the past, as well as in a question in the last section probing respondents’ sense of the past, the word ‘history’ was used, ‘the past’ in another third, and, for the final third, ‘history and the past’.” They found no statistically significant difference among the responses of these three groups, although they did note that this may have because they had identified the issue at the beginning of their interviews with the statement “We’d like to ask you some questions about the past. By ‘past’ we mean everything from the very recent past to the very distant past, from your personal history to the history of Canada and other countries.” A brief introduction and select bibliography on this issue, especially as it relates to the public (as opposed to academic) impulse to discover and make sense of the past, is presented in a paper by Peter Seixas et al. See below for this and other references: Booth, Student’s Historical Thinking and the History National Curriculum in England, pp. 12–13 (14–15 in online copy); Keith Jenkins, Rethinking History, Routledge, London, 1991, pp. 56–57; Rosenzweig and Thelen, The Presence of the Past: Popular Uses of History in American Life, p. 211; Margaret Conrad, Jocelyn Létourneau and David Northrup, “Canadians and their pasts: an exploration in historical consciousness”. The Public Historian 31, no. 1 (2009): 15–34, p. 26; Peter Seixas, Kadriye Ercikan and David Northrup. “History and the Past: Towards a Measure of ‘Everyman’s’ Epistemology”. 2008. URL: http://www.canadiansandtheirpasts.ca/publications.html (accessed 28/03/2012). Presented to a conference of the American Educational Association, New York City, March 27, 2008, pp. 1–2.
people in these surveys, this interest was not restricted to genealogical history but also included family perspectives on, or involvement in, larger historic events. Keith Barton and Linda Levstik, noting the research done by Rosenzweig and Thelen,\textsuperscript{19} comment that people tend to see public events through their impact on their own or their families’ lives, not through the impact of such events on broader political or global relations.\textsuperscript{20} Merriman found that even though he defined “the past” in his survey as “before your grandparents were alive” precisely to exclude events with which people could have had personal contact, the people who participated in his study still related to things personally, finding ways in which they could connect things from the past to themselves or their families.\textsuperscript{21}

Family history, or family or personal involvement is, therefore, very often the lens through which people approach history, and it is equally the lens through which many people approach large technology as heritage. As one visitor said of the aircraft at the Memorial:

I love them all because my father was in the air force.\textsuperscript{22}

### 3.4 Feeling involved — sensory experience and personal relevance

As well as bringing mental frames of reference and personal backgrounds to their interactions with large technology heritage, visitors bring those most personal and individual ways of encountering the world around them — their senses. The sheer size of the larger objects, and the multiple sensory impacts generated by operating technology, provide particular opportunities for sensory experience, and have enormous power to create affect and a sense of personal involvement.

\textsuperscript{21}Merriman, \textit{Beyond the Glass Case: the Past, the Heritage and the Public in Britain}, p. 26.
\textsuperscript{22}Memorial 245: Male, >65, plumber.
In a review of the psychology of affect, Robert Webb notes that — from a neurological perspective — affect is a primitive, pre-conscious level of emotional arousal. This emotional arousal causes each new experience to be appraised as it occurs, and stored with a tag — good, bad, safe, dangerous — that facilitates a quick response when the individual meets a similar situation again. This is a deep, fast-response way of processing sensory stimuli, of which people can be largely unaware, and it is separate — and parallel to — the neural pathway that leads to emotional awareness, cognition and understanding.23

Affect is important because it has “personal relevance” — it is highly relevant to a specific individual. It is a way of getting the individual’s attention in a hurry and making an important stimulus more memorable. It is particularly relevant to this study because affect appears to increase with the size of the perceived object, and Webb theorises that object size is therefore a major factor in making heritage experiences attention-getting and memorable:

This is doubtless why museums often have one big item to attract visitors…a railroad locomotive…a stagecoach. Such items are generally the thing remembered longest and most favourably by visitors. The large item will also likely be the thing people return to see again and will create a comfortable feeling of orientation and familiar space for returning visitors.24

This sense of direct and memorable physical experience also gives encounters with large technology objects a quality that Richard Nisbett and Lee Ross call “vividness”.25

24Webb, “The nature, role and measurement of affect,” p. 24; A study of young children as museum visitors in Queensland, Australia, also found that young children’s memories of museum visits centred around large objects, including large vehicles such as “full-scale aircraft, WWI tanks, and historic automobiles”. Barbara Piscitelli and David Anderson. “Young children’s perspectives of museum settings and experiences”. Museum Management and Curatorship, 19, no. 3 (2001): 269–282, p. 275.
Vividness is a combination of the emotional intensity of the event (a plane crash, for instance, is more vivid than an ordinary flight, and a plane crash that involves a known person is more vivid than one that does not), how well the stimulus helps people to imagine it (a detailed description is better than statistics) and sensory, temporal or spatial proximity (a local plane crash is more vivid than a non-local one).

Part of the attraction, and one reason for the vividness, of large technology objects is that they are generally real (if only because of the high cost of making replicas), and people perceive real objects as being unmediated. This is only partly true, as presenting objects as heritage involves many acts of interpretation including (but not limited to) the selection of the objects, their arrangement or relocation for display, the periods or aspects of life they are made to represent, and the ways in which they are treated to enable them to create the desired visitor experience. Nevertheless, many people still see real objects as giving them direct access to the past, providing evidence and experiences that they can interrogate personally, using their own senses, knowledge and experience to gather and evaluate information. A woman visiting the Memorial, for instance, saw the damage and wear on WW2 aircraft as tangible evidence of events which her family had excised from their communal history, but which she now wanted to understand and engage with:

> I prefer to see [the aircraft] restored to the point where you understand what you’re looking at, so that you can still see some of the damage and what’s happened. I wouldn’t like to see all “new” objects in there. Because of the history. I was so well protected that I didn’t know any of it, and it’s only in these latter years that I’ve got to get involved with it. Our home was kind of taboo about it, the war.

Rosenzweig and Thelen found that interaction with real objects made people feel that they could put themselves into the picture and experience a moment from the past.

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27 Memorial 245: Female, >65, accountant.
“almost as it had originally been experienced.” This gave them a sense of how people in the past might have felt in similar situations and allowed them to ask what they might have done had they been there themselves.\textsuperscript{28} A couple looking at the cockpit of a World War 2 Avro Anson aircraft at the Memorial, for instance, discussed with astonishment the conditions pilots had endured, and imagined their own reactions to such difficulties:

Can you imagine sitting in that seat for 12 hours? And you can’t move, you’ve just got to sit there, and think about bodily functions!\textsuperscript{29}

A visitor at Puffing Billy said of his experience:

[It] makes me feel like I’ve gone back in time. I’ve been back and appreciate that, years back, this is how people lived and this was their lifeline and if they didn’t have this they wouldn’t survive.\textsuperscript{30}

Attempts to “recreate” or “relive” the past are, however, often criticised for a lack of intellectual rigour, and for falsely claiming to reproduce past times and events. Criticisms vary from accusations of simple inaccuracy in physical or factual detail; to concerns about the inevitable mixing of past and present understandings; to trepidation about the replacement of scholarly and analytical understanding with “individualised memory discourses” — personal and emotional reactions to representations of the past that are “informed by romantic traditions of nostalgia and reminiscence”.\textsuperscript{31} In particular there is a fear that such problems will lead to sanitised representations of the past; fictions that are cleaner, less challenging, less uncomfortable and arguably less monotonous than the reality of everyday life for most people in the past. As

\textsuperscript{28}Rosenzweig and Thelen, \textit{The Presence of the Past : Popular Uses of History in American Life}, p. 106.
\textsuperscript{29}Memorial 294: Male, 56–65, electrician.
\textsuperscript{30}Puffing Billy 371: Male, 46–55, fitter and turner.
Iain McCalman and Paul Pickering observe in discussing the genre of historical re-enactment “Joy is welcome, revulsion less so.”

As McCalman and Pickering also observe, however, re-enacting the past has a visceral emotional impact. It can also reveal physical details and realities that documentary evidence has failed to preserve, or that modern minds and expectations have misunderstood. As discussed above in relation to reader response theory, in every text there are ‘indeterminacies’; things that cannot be determined merely by reading the text. Interacting with real objects enables people to bring their observational skills and practical understanding of the world into play to help them fill those gaps, or even to identify gaps they had not realised existed. For a visitor at the WA Maritime Museum, for example, the opportunity to see historic boats “in the flesh” raised questions that she had not anticipated:

I have to be honest and say I would not like to be in some of those boats, the little aboriginal ones and the Indonesian ones — my goodness…Surely they didn’t take them out on big seas?

For two girls on their way to spend a Saturday at the National Maritime Museum of Australia at Darling Harbour, the opportunity to view real artefacts was an important and enjoyable way of enhancing their classroom study of history:

Girl A: We are doing a topic on shipwrecks and corrosion in Year 12 HSC [Higher School Certificate], so we just want to see some of the artefacts.
Girl B: To help with the course.

For another visitor at the WA Maritime Museum it was the opportunity to view a machine working that provided the clues he needed to understand and ask new questions about what he was seeing:

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34 WA Maritime Museum 172: Female, >65, telephonist.
35 Darling Harbour 390: Both respondents female, 12–18, students.
So you look at something like that and you go “Aah, now I know how it works. Now, why has it got that lever on the side, why are all those little arms and stuff there?”

The ideas discussed in the previous three sections — frames of reference, reader response, family-centred viewpoints, construction of personal meanings, personal relevance, and vividness — are important in understanding the responses of visitors in the current study to large technology heritage objects. The following sections — Making Personal Connections, and Making Physical Connections — will draw on these ideas to explore and illuminate the results of quantitative and qualitative analysis of the visitor interview data collected in the study.

3.5 Making personal connections

Visitors were asked whether they were interested or not in five different topics of information about large technology heritage — history, stories about people connected with the object, how the object worked, how it was made, and technical specifications. Statistical analysis of responses to these questions provided interesting and, in some cases, unexpected insights into visitor responses to these information topics, and this section will begin with a summary of the quantitative results before moving into a discussion of the implications of those results. Table 3.1 provides an overview of the quantitative results, with statistically significant results highlighted in yellow.

History stood out as being the most popular topic of all, with 80% or more members of all demographic groups wanting to know about the history of the objects they saw. The only group that was markedly less enthusiastic about history was the 6–11 year old age group, but interest in history increased significantly in later age groups (though this occurred in later age groups for males than females). The influence of gender on interest in history was just below statistical significance and might, with a larger sample population, show females to be slightly more inclined to be interested.

Table 3.1: Interest in history, people stories, how the object was made, how the object worked and technical specifications: results of GLM showing the significance of the influence of different variables on visitor responses. Results that show a statistically significant interaction between responses and demographic factors are highlighted in yellow, with lighter yellow indicating results that are very close to significance. Data was drawn from Tables A.2, A.3, A.4, A.5 and A.6; Tables A.11, A.12 and A.13; and Tables A.16, A.17 and A.18. These tables show both the numbers and the percentages of people interested in each variable.
History Statistics

A frequency analysis of the responses showed that 91% of respondents who answering the question about interest in the history of the object (n=325) said that they were interested or very interested in the topic. As shown in Table 3.1, GLM demonstrated that interest in the history of the objects did not differ significantly between occupation groups (df = 3, p = .614), but did vary significantly with age (df = 7, p = .003) and interview site (df = 7, p = .025). The p value in each of these GLM models was based upon a test of a single factor (gender, occupation, age or site respectively) as a fixed effect. There was also a suggestion of variation with gender, as the result for gender as a single factor was only slightly below significance (df = 1, p = .069) and the tests for gender as one of two factors in tests of gender–age and gender–occupation parallel effects recorded gender as a significant effect (see below).

A GLM test of parallel gender–age effects using a factorial model with gender and age as fixed effects, showed that gender and age were parallel influences on visitors’ interest in history, but that age was the stronger influence (p = .051 for gender, p = .004 for age). A GLM test of potential interaction between gender and age, however, showed no significance (p = .997).

A GLM test of parallel gender–occupation effects using a factorial model with gender and occupation as fixed effects, showed that gender was a greater influence on visitors’ interest in history than occupation, which had no influence (p = .025 for gender, p = .241 for occupation). Since the occupation factor was not statistically significant, an interaction model was not fitted.

Data drawn from Tables A.3, A.11 and A.16.

than males. Interest in history was not affected by visitors’ occupations, but did vary significantly with the site at which they were interviewed, as visitors at Puffing Billy, the Gold Coast car show, and the Melbourne Museum showed lower interest in history than visitors at other sites (see History Statistics panel for details).

At the opposite end of the scale was interest in technical specifications, which only reached 80% or above in 4 demographic groups and which, in many groups, was lower than 50%. As well as the overall lower level of interest compared to history, there was more divergence in the responses of different groups, with males being more likely to be interested than females, and people with training in technology-related skills and disciplines more likely to be interested than people without such training. The influence of age group on interest in technical specifications was just below statistical significance and might, with a larger sample population, show interest in technical specifications to be higher among younger visitors — especially 6–11 year
A frequency analysis of the responses showed that 63.4% of respondents who answered the question about interest in technical specifications (n=320) said that they were interested or very interested in the topic. GLM showed that interest in technical specifications differed significantly between genders (df = 1, p < .0001), occupation groups (df = 3, p < .0001) and visitors interviewed at different sites (df = 7, p = .010), but that differences between age groups were just below significance (df = 7, p = .079). The p value in each of these GLM models was based upon a test of a single factor (gender, occupation, age or site respectively) as a fixed effect.

A GLM test of parallel gender–age effects using a factorial model with gender and age as fixed effects, showed that gender and age were both strong influences on visitors’ interest in technical specifications (p = < .0001 for gender, p = .019 for age). A GLM test of interaction between gender and age confirmed that these factors also interacted to influence visitors’ interest in technical specifications (p = < .0001).

A GLM test of parallel gender–occupation effects using a factorial model with gender and occupation as fixed effects, confirmed that gender and occupation were both strong influences on visitors’ interest in technical specifications (p = .002 for gender, p = .002 for occupation). A GLM test of interaction between gender and occupation confirmed that these factors also interacted to influence visitors’ interest in technical specifications (p = < .0001).

Data drawn from Tables A.3, A.11 and A.16.

olds. There was also a significant difference in interest between visitors at different interview sites, with visitors at Puffing Billy, the Gold Coast car show and the Memorial being less likely to be interested in technical specifications than visitors at other sites (see the Technical Specifications Statistics panel for details).

Interest in how an object was made and how it worked fell between the extremes of interest in history and technical specifications. As with technical specifications, males were more likely to be interested than females, and people with technology-related training were more likely to be interested than people without such training. Unlike interest in both history and technical specifications, however, age did not influence visitors’ responses to these topics, and nor did the site at which they were interviewed (see the How it was Made, and How it Worked Statistics panels for details).

Interest in stories about people connected with an object also fell between the extremes of interest in history and technical specifications. Gender was a significant influence on visitors’ interest in this topic (females were more likely to be interested
How it was Made Statistics

A frequency analysis of the responses showed that 75.9% of respondents who answered the question about interest in how the object was made (n=303) said that they were interested or very interested in the topic. GLM showed that interest in how the object was made differed significantly between genders (df = 1, p = <.0001) and occupation groups (df = 3, p = .020), but not between age groups (df = 7, p = .412) or visitors interviewed at different sites (df = 7, p = .305). The p value in each of these GLM models was based upon a test of a single factor (gender, occupation, age or site respectively) as a fixed effect.

A GLM test of parallel gender–age effects using a factorial model with gender and age as fixed effects, confirmed that gender was a strong influence on visitors’ interest in how the object was made, but that age had no influence (p = .001 for gender, p = .630 for age). Since the age factor was not statistically significant, an interaction model was not fitted.

A GLM test of parallel gender–occupation effects using a factorial model with gender and occupation as fixed effects, also confirmed that gender was a strong influence on visitors’ interest in how the object was made, but that occupation had no influence (p = .005 for gender, p = .586 for occupation). Since the occupation factor was not statistically significant, an interaction model was not fitted.

Data drawn from Tables A.4, A.12 and A.17.

than males), while occupation was not. Age was also not an influence, a finding that contrasted with the significant influence of age on interest in history, but was similar to the lack of influence of age on the topics of technical specifications, how the object was made and how it worked. As with both history and technical specifications, the site at which visitors were interviewed was significant. In particular, visitors to the Campbelltown Museum showed relatively little interest in people stories, while visitors at Memorial showed very high levels of interest in the topic (see the People Stories Statistics panel for details).

These results raise a number of issues which deserve further discussion. Two issues — the influence of age on the perception of history, and the reasons for the relatively low interest in stories about people — will be discussed below. The particularly complex issues of the influences of technical specifications and technological information on visitors’ responses to large technology heritage will be dealt with separately, in Chapter 4.
**How it Worked Statistics**

A frequency analysis of the responses showed that 88.4% of respondents who answered the question about interest in how the object worked (n=301) said that they were interested or very interested in the topic. GLM showed that interest in how the object worked differed significantly between genders (df = 1, p = <.0001) and occupation groups (df = 3, p = .007), but not between age groups (df = 6 as low case numbers required age groups 6-11 and 12-18 to be combined, p =.789) or visitors interviewed at different sites (df = 7, p = .358, analysis completed using Forward WALD binary logistic regression). The p value in each of these GLM models, with the exception of the WALD site analysis, was based upon a test of a single factor (gender, occupation, age or site respectively) as a fixed effect.

A GLM test of parallel gender–age effects using a factorial model with gender and age as fixed effects, confirmed that gender was a strong influence on visitors’ interest in how the object worked, but that age had no influence (p = <.0001 for gender, p = .735 for age). Since the age factor was not statistically significant, an interaction model was not fitted.

A GLM test of parallel gender–occupation effects using a factorial model with gender and occupation as fixed effects, also confirmed that gender was a strong influence on visitors’ interest in how the object worked, but that occupation had no influence (p = .003 for gender, p = .346 for occupation). Since the occupation factor was not statistically significant, an interaction model was not fitted.

Data drawn from Tables A.5, A.12 and A.17.

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**People Stories Statistics**

A frequency analysis of the responses showed that 82% of respondents who answered the question about interest in how the object worked (n=317) said that they were interested or very interested in the topic. GLM showed that interest in stories about people connected to an object differed significantly between genders (df = 1, p = .034) and visitors interviewed at different sites (df = 7, p = .025), but not between age groups (df = 7, p = .891) or occupation groups (df = 3, p = .318). The p value in each of these GLM models was based upon a test of a single factor (gender, occupation, age or site respectively) as a fixed effect.

A GLM test of parallel gender–age effects using a factorial model with gender and age as fixed effects, confirmed that gender was an influence on visitors’ interest in stories about people connected to an object, but that age had no influence (p = .029 for gender, p = .850 for age). Since the age factor was not statistically significant, an interaction model was not fitted.

A GLM test of parallel gender–occupation effects using a factorial model with gender and occupation as fixed effects, also confirmed that gender was an influence on visitors’ interest in stories about people connected to an object, but that occupation had no influence (p = .031 for gender, p = .277 for occupation). Since the occupation factor was not statistically significant, an interaction model was not fitted.

Data drawn from Tables A.6, A.13 and A.18.
Figure 3.1: Younger interviewees expressed a comparative lack of interest in the history of large technology heritage objects. See note 37 for further details.

### 3.5.1 Growing into history

The history of the objects was the one topic that was most likely to interest adults of all demographics, but it was of surprisingly little interest to males or females in the 6–11 age group, or to adolescent or young adult males in the 12–18 and 19–25 age groups (see Fig. 3.1).³⁷

This raises two questions. Firstly: at what age do people move from being much less likely to express interest in history than in other topics, to being much more likely

³⁷ A GLM test of parallel gender–age effects using a factorial model with gender and age as fixed effects, showed that gender and age were parallel influences on visitors’ interest in history, but that age was the stronger influence (p = .051 for gender, p = .004 for age). Data drawn from Tables A.2, A.11 and A.16.

³⁸ The statistics relating to the 6–11 years age group must be treated with caution. There were comparatively few cases in this age group (a total of 26), which causes difficulties in converting the low case numbers into percentages: five out of five girls saying yes is 100%, but three out of five girls saying yes is only 60%, which is a huge drop in percentage, but actually represents a change in only two cases. This age group is also the most likely to be affected by a “please the interviewer” bias (see Chapter 2: Controlling for reactivity). Girls in this age group, for instance, were much more likely than adult women to say they were interested in technical specifications, but this could have been because it seemed rude to say no when an authority figure (an adult interviewer) asked them if they were interested in the topic. So the fact that both boys and girls in this age group were particularly likely to take their courage into their hands and firmly say they were not interested in history gives that unusual result much greater weight.
to express interest in history than in other topics? Secondly: why should attitudes to
history be so different for younger and older people?

Rosenzweig and Thelen noted that many respondents in their study reported changes
in their attitudes to the past as they grew older. They saw childhood as a time
when they had tended to live in the present, to look forward rather than back, and to
see events as individual incidents rather than an overall picture or pattern. By con-
trast, they saw late adolescence as the time during which they had made the transition
to responsible adulthood, and had begun to see connections between the past and the
present that they could use to help understand and shape their lives. They said that
their interest in using the past to interpret their lives emerged as a result of taking on
new responsibilities, such as leaving home, getting married and having children, be-
cause such responsibilities “required them to free themselves from other people’s uses
of the past and develop their own.” They were no longer happy to take other people’s
opinions for granted and began to explore the past for themselves. 

The report on the Australian study of attitudes to the past did not discuss the issue of age in much
detail, but did note that “Most respondents reported changes to their sense of the past
as they grew older and passed major life milestones such as marriage, having chil-
dren, or losing parents.” Participants in the current study also made reference to age
related changes in their appreciation of the past, as in the following three examples:

The older I get the more interested I become in it.

The [objects] that give me the most interest are the ones that stir memories
of myself… I’ve reached an age where I’ve experienced a lot of things, and
to be able to see them [reflected]…

As age comes we really appreciate the people who invented and who
made [these objects].

40Hamilton and Ashton, “At home with the past: initial findings from the survey,” p. 27.
41Memorial 290: Male, 56–65, estimator.
Age related changes in attitudes to history is an area which is surprisingly little studied. While Rosenzweig and Thelen did discuss interviewees’ comments about changes in their attitudes to the past over time, the survey was only conducted with respondents of 18 years and above. The Australian study of attitudes to the past set a minimum age of 16 or, in the case of a few school based interviews, year 10. The Canadian study has not reported its age groupings in its preliminary report, but as it was based broadly on the methodologies of the other two studies, it is reasonable to suppose that it, too, focuses on adult responses. There is also a substantial literature focused on the methods and outcomes of the teaching of history, from the influential Schools History Project — a wide ranging trial of new history teaching methods and learning outcomes started in Britain in the 1970s — to research conducted by the Centre for the Study of Historical Consciousness founded by Peter Seixas in Canada in 2002, which has been a major catalyst for theoretical and practical research in the field of history education in recent years. Most of this work, however, is focused on high school students, and most of it evaluates their understanding of history rather than their levels of interest or motivation for being interested in the topic. It does not, therefore, facilitate an exploration of possible changes of motivation and interest level with age.

A large European study did focus on young people rather than adults, and did ask questions which assessed how interested the participants were in history. Overall,

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46It does, however, mention additional studies by partner organisations which focus on high school students (3 cases) and students in years 4–9 (one case), with the latter study specifically comparing the students’ responses with those of their families and teachers. This last study may be particularly helpful when published in full. Conrad, Létourneau and Northrup, “Canadians and their pasts: an exploration in historical consciousness,” pp. 26–27.
47For details see the Schools History Project website at: http://www.schoolshistoryproject.org.uk/AboutSHP/index.htm (accessed 09/08/2012).
49The study surveyed about 30,000 fifteen-year-old students. 1,000 history students and their teachers were surveyed in each of 30 countries which were either part of, or strongly relevant to, the European Union (for simplicity the discussion of this study will adopt the convention used in the study of calling all participating countries “European”). Magne Angvik and Bodo von Borries, eds., Youth and History:
the students registered a fairly strong voluntary interest in history, rejecting assertions that history was “dead and gone”, or that it was merely a school subject with no relevance to their own lives.\footnote{Angvik and Borries, \textit{Youth and History: A Comparative European Survey on Historical Consciousness and Political Attitudes among Adolescents}, p. A 66.} It is worth noting, though, that students in countries in the north and west of the study area were less inclined than their southern and eastern counterparts to rate history positively, an effect so pronounced that, in combination with sociodemographic data, it led the authors to comment “\textit{The more a country is modernized, the more its students are demotivated to learn history.}” (Italics in original.)\footnote{Angvik and Borries, \textit{Youth and History: A Comparative European Survey on Historical Consciousness and Political Attitudes among Adolescents}, p. A 72.} One of the countries to demonstrate this effect was Britain, a fact that may be of relevance to Australia as the two countries share close cultural links and are similarly politically secular and highly modernised societies. On the other hand, Britain was among the countries most likely to see history as a source of information about the past which could be used to inform the present, and western European countries in general saw history as just as important for understanding the present as for knowing about the past.\footnote{Angvik and Borries, \textit{Youth and History: A Comparative European Survey on Historical Consciousness and Political Attitudes among Adolescents}, pp. A 66–A 68.}

While this study is invaluable for its breadth and rigour, the fact that it only surveyed fifteen-year-olds means that it still made no attempt to compare levels of interest in history, or motivations to learn about history, between different age groups.\footnote{Data from an older age group was provided by the teachers who were surveyed, but the teachers’ questionnaire focussed on their assessments of the students’ abilities and interests rather than their own interest in the subject. The results are therefore not comparable. See the student and teacher questionnaires reproduced in the Appendix to volume A of Angvik and Borries, \textit{Youth and History: A Comparative European Survey on Historical Consciousness and Political Attitudes among Adolescents}.} This is a pity because, as discussed above, there were hints from the qualitative data in both the American and Australian studies of attitudes to the past, as well as in the current study, that respondents’ interest in history, and ways of using history, did change with age. Crucially, the qualitative data from all these studies suggests that differences in interest in history between different age groups are a product of develop-
oping maturity and changing phases of life, rather than of different social influences experienced by successive cohorts or generations. This strongly supports the idea that the 6–11 year olds in the current study, who displayed so little interest in history, may begin to see the wider relevance of the topic as they pass through adolescence and begin to encounter major milestones in their adult lives.

There are indications outside the area of history and heritage that people of different ages prefer different types of information, or information expressed in different ways. Nell Duke, in a study of the development of informational literacy in American schools, notes that fictional narrative texts have long been regarded in the USA as the most effective way of teaching children to read and write, but that there is increasing evidence that children also need to encounter what she terms “informational text” to develop skills in understanding and reproducing technical information. Indeed, she found that many children actively prefer information in this format. This accords with the enthusiasm that children in the current study showed for technical specifications, and may account for the relative lack of enthusiasm that they showed for history, which is usually presented in a more narrative format. It also resonates with the findings of the psychologist Jean Piaget (discussed in Chapter 2) that children between the ages of about 7–12 are more strongly focussed than older children and adults on concrete reality, preferring physical objects and hard facts to abstract concepts and alternative possibilities.

Duke defines “informational text” as having:

(a) a function to communicate information about the natural or social world, typically from one presumed to be more knowledgeable on the subject to one presumed to be less so;
(b) an expectation of durable factual content;
(c) timeless verb constructions;
(d) generic noun constructions;
(e) technical vocabulary;
(f) classificatory and definitional material;
(g) comparative/contrastive, problem/solution, cause/effect, or like text structures;
(h) frequent repetition of the topical theme; and
(i) graphical elements such as diagrams, indices, page numbers, and maps.

In research related to later phases of life and learning, Corinna Löckenhoff and Laura Carstensen report that, as they age, people prioritise information with emotional meaning over information that provides new factual knowledge. While this change is strongly correlated with time and ageing, the actual cause of the change appears to be a person’s perception of the amount of time they have left before the end of their life. When a person perceives their time to be limited, their goals change from maximising the acquisition of new information and social contacts that may benefit them in the future, to strategies that maximise their sense of emotional well-being in the present through encounters with emotionally meaningful information and emotionally gratifying social contacts.55

These studies suggest that desires for information about history may fit into a broader pattern of gathering and processing information at different stages of life; an arc that moves from a preference in childhood for denotative information (which may give children the information they need to build the schematic, categorical models that form a core component of an individual’s understanding of the world); through an interest in early adulthood for social narratives that can connect (and provide insights into) the past, present and future; to a preference in later life for positive and emotionally gratifying information that provides a sense of well-being, social adjustment and contentment.

3.5.2 The personal relevance of personal stories

As demonstrated by the statistical results reported above, interviewees in the current study were not hugely interested in stories about people connected with the large technology heritage objects they saw. The exception to this was when they already knew, or knew about, the person whose story was being told. As one visitor to the Campbelltown Museum remarked:

55This effect occurs in young people with a limited life expectancy, as well as in older people. Corinna E. Löckenhoff and Laura L. Carstensen. “Socioemotional Selectivity Theory, aging, and health: the increasingly delicate balance between regulating emotions and making tough choices”. Journal of Personality 72, no. 6 (2004): 1395–1424, pp. 1396,1398.
people don’t really have much relevance to you unless you know who they were.\textsuperscript{56}

This was something of a surprise because personal stories have been a major focus of interpretation in museums and heritage sites in recent years, probably as a result of the uptake of ideas from the teaching of history in school settings. Barton and Levstik, for instance, note that in the USA in recent years, education practitioners “…have been advised to emphasize individuals…as a way of increasing students’ interest in the subject and helping them understand the ‘human dimension’ of the subject.” Students’ apparent lack of interest in history was thought to be a result of too great a focus on abstract and overarching entities and events, and it was assumed that, “If a shared sense of humanity can be used to encourage students to see connections between themselves and people in the past…they will be more likely to consider the subject relevant and meaningful.”\textsuperscript{57}

Museum and heritage practitioners have similarly been exhorted to use personal stories to engage visitors in their more informal learning settings. The 2005 NSW Heritage Office interpretation guidelines, for instance, state that:

For an item …the choice of themes for interpretation involves a detailed understanding of its characteristics, history, people and its context, and especially its “people stories”.\textsuperscript{58}

Graham Black, in a book dedicated to making museums more engaging and involving for visitors, recommends:

…displays in which visitors feel represented, with personal stories to the fore.\textsuperscript{59}

\textsuperscript{56}Campbelltown Museum 126: Male, 46–55, engineer.
\textsuperscript{57}Barton and Levstik, \textit{Teaching History for the Common Good}, pp. 150, 153.
\textsuperscript{59}Black, \textit{The Engaging Museum: Developing Museums for Visitor Involvement}, p. 247.
The use of personal stories has become so important in many museums that some people in the heritage industry even feel that it is interfering with the presentation of other important aspects of heritage. Helen Privett, objects conservator at Museum Victoria said with frustration:

There are curators who are attempting to acquire things based simply on things being a really interesting example of a particular technology, and I think they’re being hampered by this need to have a personal story attached to everything … likewise when things are being put on display… And I think that’s really sad because sometimes things just are really interesting technology.

Personal stories do humanise things, and without them displays can become merely a recitation of facts and figures without human connection or interest. The responses of interviewees in the current study, however, suggest that not every personal story is equal — different stories mean different things to different people, and a personal story will only engage a visitor if that visitor can make a personal connection of their own to the story in question. This raises the question of how people make such connections, and how displays do, or do not, facilitate them.

The most obvious route to feeling a personal connection is, as mentioned by the visitor quoted above, to have an existing personal relationship with the individual in the story, and the closer the relationship, the closer the sense of connection. As Nisbett and Ross note in their description of the quality of vividness, “events…are more interesting when they happen to people we know… and when they happen to people about whom we have strong feelings…”60 Family members were, not surprisingly, the most common reasons given in the current study for feeling a personal connection to large technology heritage. This was sometimes because a relative was remembered as being particularly associated with similar machinery and sometimes because people saw the objects in front of them through the prism of a relative’s interest:

My grandfather ended up in Goulburn, in Camberwell Council, making roads, so he would’ve used a lot of this equipment. So it’s a bit of a common history in our family.  

Australia II was pretty cool… I’m not really into boats but my Dad is and I took some pictures for him.  

A second route to feeling a personal connection is for visitors to feel they already know something about the person in question — to have an existing frame of reference for them. Looking at a truck that had carried a troupe of boxers around Victoria in the 1950s — 1960s, one visitor commented:

I came here to look at the aboriginal area mostly, so I was interested to read that half the blokes in it were aboriginal.

This sense of connection and personal relevance could include known historical figures or celebrities whose identity was already familiar, as was noted by a woman at Darling Harbour:

[I am interested] if it’s like the astronauts. Something that I’m aware of and I know about.

A third route to feeling a personal connection is for visitors to see similarities between themselves and the person in the story, and therefore to feel an identification with that person. This is the route to engagement mentioned above in the context of helping school students to understand “the human dimension” of history, and while it is not in itself a new approach (in the USA at least, the use of biographies as a method of teaching history was in vogue at the start of the twentieth century, though it later fell out of favour), the particular innovation of recent years is a focus on the lives of

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63 Melbourne Museum 103: Male, 36–45, business owner in the surf industry.
64 Darling Harbour 397: Female, >65, nurse.
65 Barton and Levstik, Teaching History for the Common Good, p. 152.
people who are not generally the subject of biographies; people who are not famous, not rich, and who have not achieved especially unusual things. Interest in the lives of such people has stemmed from a worthy desire to bring into focus the history of people that have traditionally been marginalised or left out of mainstream history, such as women, cultural minorities and working people. Paradoxically, though, in desiring to rediscover and celebrate lives that do not fulfil traditional criteria of noteworthiness, academics and heritage practitioners have come to celebrate such lives explicitly for their “ordinariness”. This is evident in the following extract from the interpretation plan for Prospect Hill (a culturally significant historic site near Sydney):

In the past, interpretation has often focused on the more famous or infamous individuals associated with a place. This approach can be justified to some extent in that there has often been more written about major figures… However, there is a wealth of material available about the lives of relatively ordinary people such as quarry workers with whom visitors can possibly relate more closely.

A note of doubt creeps in in the following sentence however, with the authors apparently struggling to imagine why visitors should relate more closely to such “ordinariness”:

The challenging task for the interpreter is to make these ordinary lives interesting…

In his seminal book, “Theatres of Memory”, Raphael Samuel commented that the public is not very interested in the lives of ordinary people unless they have become

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“retrospectively exotic”, and that it is sensational events and larger-than-life personalities, such as disasters and kings, that really capture and hold people’s attention.68 A less cynical way of interpreting this interest in dramatic and sensational lives and events is to recognise that they have the quality of vividness that was discussed above, and to understand that it is not the ordinariness or otherwise of any life that makes it interesting, but whether it is interpreted in a way that highlights its individual vividness. There are “ordinary” parts in even the most dramatic lives, but equally there is something extraordinary in most lives, and it is these moments of personal achievement, courage or creativity that visitors find relevant, inspiring and involving. For a couple visiting the Memorial, these were exactly the features that had captured their interest:

**Male visitor:** When I look at those people flying those planes and the sight of the planes in the sky [in the wartime footage] I think what a tremendous call was made on the generation then... 

**Female visitor:** That’s why I would like to hear the personal stories, because they were amazing people in that period.69

Visitors are, in any case, unlikely to identify with lives that are celebrated for their ordinariness, because visitors do not consider themselves ordinary. They may not see themselves as being exceptional either but, like people everywhere, they do see themselves as being above average in natural ability, accomplishment and general “interestingness”, especially in areas of life which are important to them.70 Visitors may

69Memorial 248: Male, >65, building inspector. Female, >65, childcare centre operator.
70People consistently rate themselves as better than average on traits they perceive as desirable and feel that information about themselves is more interesting than information about other people, a process known as “self-enhancement”. This is not merely a Western phenomenon but has been documented also in a number of Asian cultures, though Westerners may tend to be more public about their positive self-assessments and to focus on individualistic traits such as self-reliance or leadership, while Asian people are more likely keep their self-assessments discrete and to focus on collectivistic traits such as loyalty and respect. There is evidence that self-enhancement has both physical and psychological benefits, helping people to deal more effectively with stress, reducing levels of depression, and increasing success in social relationships. Mark D. Alicke and Constantine Sedikides. “Self-enhancement and self-protection: What they are and what they do”. *European Review of Social Psychology* 20, no. 1 (2009): 1–48, pp. 15, 21, 24–7.
be able to find a personal connection with people from the past who were, like them, female, or aboriginal, or quarrymen, but this is not likely to be because they see such people as having been ordinary. Rather they are more likely to be interested because they see such people as having been special in their own ways, as having possessed qualities, skills and achievements that they admire and seek to find in themselves, and as having faced and overcome problems in ways that have relevance for the present day.

A fourth and somewhat different route to feeling a personal connection is to see things from the past “through the eyes” of a person from that time. Black says:

> Personalisation of sites and objects — seeing them through the eyes of people who lived there or used them — can transform visitor interest and fire their imaginations.\(^{71}\)

This route to personal connection is different from the other three, as it does not require the visitor to have any prior knowledge of, or interest in, the life of the person whose story is presented, or to feel any prior sense of similarity between themselves and the person described. Indeed, a number of visitor experiences use the device of issuing visitors randomly with an identity from the period of interest to create a sense of engagement. Mary Ellen Flannery notes that at the United States Holocaust Memorial Museum in Washington visitors are issued with identity cards for real Holocaust victims, while at “Titanic: The Artifact Exhibition” visitors are issued with boarding passes containing the identities of real passengers. In both cases, visitors are encouraged to imagine their assigned person’s experience of the events depicted, and in both cases visitors often develop a strong sense of emotional connection with the person whose identity they have been given, and through this a sense that the person’s life and the events depicted are personally relevant to them.\(^{72}\)

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Personal stories, and the use of real identities as a frame of reference through which to view the past are, therefore, potentially highly effective ways to help visitors connect with historic objects and events. Personal stories are, though, not necessarily interesting in and of themselves, and they are certainly not interesting just because they are “ordinary”. As the responses of interviewees in this study demonstrate, personal stories are only engaging if they are vivid and personally relevant for the people being engaged.

3.6 Making Physical Connections

The sensory impact of being in the same space with a large technology object was an experience that most visitors found both vivid and personally relevant. This was particularly the case for objects displayed in a relevant physical context, such as the trains in the forest of the Dandenong Ranges at the Puffing Billy Railway, the submarine at the mouth of the Swan River at the WA Maritime Museum, and the many objects working together in the semi-rural environment of the Campbelltown Museum club site. But it also held for museum galleries, such as those at the WA Maritime Museum where different display levels meant that boats were above, below and all around visitors, and those at the Memorial, where object theatre displays helped to create a sense of immersion for many people. The look and feel of the objects, their smells and sounds when they were operating, and the physical sense of power and size that they projected triggered powerful emotions. It was not merely an intellectual engagement, but an affective, visceral experience:

I think that’s the wonderful thing about it, to embrace them. It’s an organic thing…it’s like a built environment. The other thing is the noises they make. They talk, they have a life, so you touch that life.\textsuperscript{73}

\textsuperscript{73}Campbelltown Museum 149: Male, 46-55, human resources administrator.
Such sensory experiences are, however, as much an interpretation as the text labels that may accompany the objects, and as much a product of the many different ways in which heritage producers see their objects and want to present them. As will be discussed in Chapters 5 and 6, producers who bring different social and training backgrounds to their heritage work, or who wish to use historic objects for different purposes, may have very different ideas about what is the “right” way to present large technology heritage, how audiences will respond to displays, and whether certain display methods are damaging or protective for objects.

On one of the aspects of display that causes most dissension is whether to restore objects to look “as new” again, or to leave the signs of wear and tear that have resulted from objects’ service lives. Steve Gower, for instance, director of the Memorial, argued that there was little point in preserving signs of age and use on an aircraft, when he felt that these changes were merely the result of wartime shortages and age related deterioration, and were not related to the important issues of the aircraft’s type or performance:

Having an engine cowling cover not matching… why have a thing like that when it looks like you haven’t completed the job properly and a visitor will say “It looks silly. Why haven’t they painted that?”

Gower is an engineer by training, and sees the large technology objects presented at the Memorial more as a representations of technological ingenuity and achievement than as repositories of evidence about their life in service. He therefore views age and use related changes to an individual object as largely incidental and of relatively low significance.

By contrast, museum and heritage conservators are trained to see deterioration and change as historic evidence of an object’s life and usually feel strongly that such evidence should not be tampered with. Even they, however, sometimes assume that visitors will want to see the object restored to a new-looking finish. Maggie Myers, for instance, the conservator responsible for maintaining the large objects on display at
the WA Maritime Museum, worried that the interior of the submarine she looked after might have been cleaned and polished to an inappropriate and unrealistic level, but she was equally concerned that an object that was not pristine might have a negative impact on visitors’ reactions to the WA Maritime Museum displays:

…you see there is a section of the public that wouldn’t like to see something that is used and not [in good condition]…

Private owners of historic cars and motorcycles typically restore their vehicles to a pristine appearance, painstakingly filling holes, sanding and repainting repairs and repeatedly cleaning and polishing surfaces. Other private owners, though, particularly those with industrial and agricultural machinery, feel that this process is often taken too far, producing surface finishes that are unrealistically shiny and perfect. As Ray Graf, private owner of electric locomotives at the Campbelltown Museum, remarked:

I know people do restore them to new. In a lot of cases they restore them beyond new… You see photographs in the British magazines of traction engines and portables and things like that and they are painted better than new and they look too much like toys for my personal liking. They don’t look right to me.

Another contentious issue is whether large technology objects should be made to work again. Most large technology heritage producers agree working objects are very popular, but some — conservators in particular — worry that the amount of physical change required to make the object operate robustly and reliably, and to meet modern safety conditions, causes unacceptable damage to the historic integrity of such objects. Michelle Berry, for instance, objects conservator at Museum Victoria, commented on the differences between conservators’ desire to preserve the physical fabric of the object, and curators’ desire to preserve and demonstrate the functional aspects of the technology.
I don’t think [the curators] share the same kind of view on what should or shouldn’t happen. We [conservators] are interested in the preservation of that technology at some level, and there doesn’t seem to be the same level of concern about the preservation issues that might be associated with trying to activate something.

The issue of touch has similar tensions: being able to touch objects is seen by many producers as an important element in helping visitors to engage with large technology objects, but concern about the potential for damage through careless or continual handling — and regrettably even theft of small items — or for visitors to be hurt by operating machinery, causes many producers to prevent visitors touching their objects. As Michael Brevenholt of the WA Maritime Museum lamented:

For us as educators, not being able to touch is a big issue, but as museum educators, of course, we are fully aware of what can and can’t be touched inside this museum… The submarine — Boy! it is a tough nut because we are inviting [schoolchildren] into an artefact, to become part of it as it were, and [saying that they are not] able to touch at the same time. It is very tricky.

Producers’ expectations of what visitors might like in terms of sensory experiences, though, are likely to be biased by their own preferences, and may not reflect visitors’ needs and desires at all. To assess visitor preferences more directly, therefore, visitors in this study were asked three questions — whether they wanted to see objects restored to look new, whether they wanted to see them made to work again, and whether they wanted to touch them. Analyses of the responses to these questions are discussed in the following two sections: Operating and looking new — two different things; and Touching. Tables 3.2 and 3.3 provide overviews of the quantitative results, with statistically significant results highlighted in yellow.
Table 3.2: Desire for restoration, activation and touching of large technology heritage objects: results of GLM showing the significance of the influence of different variables on visitor responses. Results that showed a statistically significant statistical interaction between responses and demographic factors are highlighted in yellow (with lighter yellow indicating results that are very close to significance). These results are discussed in detail in the following sections. Data drawn from Tables A.7, A.8 and A.9; A.13 and A.14; and A.18 and A.19. These tables show both the numbers and the percentages of people interested in each variable.
A frequency analysis of the responses showed that only 27.8% of respondents wanted to see objects restored to look new (n=273). GLM showed that interest in seeing objects restored to look new differed significantly between genders (df = 1, p = .019) and visitors interviewed at different sites (df = 7, p = .0001), but not between age groups (df = 7, p = .240), or occupation groups (df = 3, p = .175). The p value in each of these GLM models was based upon a test of a single factor (gender, occupation, age or site respectively) as a fixed effect.

A GLM test of parallel gender–age effects using a factorial model with gender and age as fixed effects, confirmed that gender was a statistically significant influence on visitors’ interest in seeing objects restored to look new, but that age had no influence (p = .023 for gender, p = .269 for age). Since the age factor was not statistically significant, an interaction model was not fitted.

A GLM test of parallel gender–occupation effects using a factorial model with gender and occupation as fixed effects, showed that neither gender nor occupation was an influence on visitors’ interest in seeing objects restored to look new (p = .232 for gender, p = .285 for occupation). Since neither the gender nor occupation factors were statistically significant, an interaction model was not fitted.

Data drawn from Tables A.7, A.13 and A.18.

3.7 Operating and looking new — two different things.

Despite the number of large technology heritage producers that assumed that visitors would want to see objects restored to look new, only a minority of visitors actually did want to see this. With the sole exception of visitors interviewed at the Gold Coast car show (who, as mentioned above, were very keen to see objects restored to look new), the majority of visitors of both genders, in all age groups, all occupation groups and at all sites other than the Gold Coast car show preferred to see objects showing marks of age and use that reflected their service lives. Males were more likely to want to see objects restored to look new than females, but the males who wanted to see restoration were still firmly in the minority: 67% of males still preferred not to see objects restored to look new (see the Restoration Statistics panel above for details).

Many interviewees, in fact, spoke of how disappointed they would be if the objects were restored to look new, as it was the objects’ aged appearance which made visitors feel that they were real, trustworthy and evocative. They wanted to see them as they
felt they would have looked when they were in regular service; neither neglected, nor too new:

I think it depends what their purpose in being displayed is. So in the case of that, [the Parry Endeavour boat which has heavy surface wear] you would remove its history if you restore it. Whereas Australia II, you can take it looking shiny, and that’s how it looked when it was racing so I think it’s right to display it polished up again.  

I think they have more of a sense of age and having had a working life when you can actually see a bit of wear and tear on them. Not dilapidated, but they don’t have to be spanking new.  

For many visitors, signs of age and wear made them feel that large technology objects were sources of information that they could trust:

I think they’re here to reflect the history and you don’t change history. History is the past.

I prefer it when they look old. Because [if it is restored] I don’t know whether it is real.  

Signs of age and wear were not only a matter of truth for some visitors, but also of standards and propriety. Making objects look new was seen by some visitors as pretentious and not appropriate for heritage sites:

You don’t want to see it brand-new. You can see that in television…like in re-enactments, historical things they make new.

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75 Darling Harbour 411: Male, 46–55, interviewee did not provide job details when asked, instead merely describing himself as “not mechanical”.
76 WA Maritime Museum 208: Female, 46–55, speech therapist.
77 Memorial 300: Female, 19–25, tourism student from Austria.
78 Melbourne Museum 89: Female, 36–45, florist.
Don’t paint over it for heavens sake… It’s a museum after all, it’s not an artistic place. It doesn’t have to be spotless and clean and beautifully presented… They should remain genuine rather than pretty.\textsuperscript{79}

Many visitors anthropomorphised large technology objects, speaking of them as living entities with which they could empathise. These people tended to see marks of age and wear as honourable scars; evidence of the objects’ hard working lives and achievements:

…we can’t be restored to look new again can we? That’s just wear and tear isn’t it?\textsuperscript{80}

Restored as new they don’t look as if they’ve done it. Being nice and shiny — well, it hasn’t done anything yet.\textsuperscript{81}

Other visitors just felt that visible signs of age and damage made it easier for them to imagine and connect with the past:

If it looks brand-new then I don’t have a connection with the way it was and the way it used to operate. If it looks like it has just come out of a factory, then it doesn’t have the age associated with its actual physical place in time.\textsuperscript{82}

You get an idea of how close the pilot came to death when you see all the machine-gun marks and the bullets.\textsuperscript{83}

A number of people explicitly commented that, while making objects look new was not important or appropriate, making them work again — even partially — was:

\textsuperscript{79}Memorial 281: Male, >65, printer.  
\textsuperscript{80}WA Maritime Museum 172: Female, >65, telephonist.  
\textsuperscript{81}Memorial 316: Male, 56–65, storeperson.  
\textsuperscript{82}Scienceworks 112: Female, 26–35, mechanical engineer and teacher.  
\textsuperscript{83}Memorial 266: Female, 46–55, ferry master.
They should be restored to workable condition, not to look new again. It
takes away the value of the piece, from its originality.\textsuperscript{84}

Looking new is not the point, the point is them being working machines.\textsuperscript{85}

I personally would restore it nice and shiny but some other people wouldn’t.
So it’s personal preference. The big criteria is that they’re actually doing
something, not just a static display like a museum.\textsuperscript{86}

The distinction drawn by many visitors between making objects look new and
making them work again was surprising, because large technology heritage producers
tend to view making an object work again, and making it look new again, as two
parts of the one process. Col Ogilvie, engineering conservation consultant at NMA,
demonstrated this conflation of different concepts when he referred to an object that
had been repainted to look new as being “better restored” than one that had merely
been made to work:

Ogilvie: . . . we had one of the stationary engines chuffing away. And some
of the kids were mesmerized by this big thing going “ka-chu-ka-chu-ka-
chu” and the noise, the smell, and the feel of the whole thing . . . They’d all
come up to this thing that was moving. And yet right along side it was a
much better restored unit [that] wasn’t moving . . . But they were interested
in the one that had movement.

Interviewer: What do you mean by “better restored”?

Ogilvie: Ah . . . aesthetically. It looked better.

Interviewer: It was more brightly painted?

Ogilvie: Yes, more brightly painted. It represented, really, an artistic ver-

sion of the stationary engine. It’s a very common thing in the restoration

of these machines. They paint them up very brightly.

\textsuperscript{84}Campbelltown Museum 115: Female, 36–45, mechanic.
\textsuperscript{85}Campbelltown Museum 149: Male, 46–55, human resources officer.
\textsuperscript{86}Campbelltown Museum 126: Male, 46–55, engineer.
Most visitors, however, saw these two actions as being quite separate, and as having quite different aims and outcomes. To restore the surface of an object to make it look new was, for many people, to deny the object’s history and show disrespect to an honourable working life. To restore the mechanism of an object to make it work, though, even partially — enough to open doors and provide views of the interior workings — was both exciting, and a way of honouring the object by preserving its function and vitality. The difference in visitors’ perceptions of these two approaches was reflected in the difference in their popularity: only a minority of interviewees wanted to see objects restored to look new, but a large majority of interviewees wanted to see them made to work again. While some visitors raised the issue that it was often too dangerous, too expensive, or too damaging (especially for unique objects) to be made fully operational again, the majority of interviewees in both genders, all age and occupation groups and at all sites still loved to see them being active in some way wherever it was possible (see Activation Statistics panel for details). As a visitor commented at the Campbelltown Museum:

It’s nice to see and hear and smell them. It’s like a living machine when they’re running.\(^87\)

### 3.8 Touching the past

As discussed above, physical interaction with objects from the past potentially allows visitors to bring their physical senses, observational skills and practical understanding of the world into play to help them make connections with and develop an understanding of that past. It also creates vividness and personal relevance through proximity — bringing objects from the past close in sensory and spatial ways. The idea of touching objects can have negative connotations as well as positive though: a number of visitors interviewed in this study feared getting hurt or dirty from touching

Activation Statistics

A frequency analysis of the responses showed that 84% of respondents wanted to see objects made to work again (n=250). GLM showed that desire to see objects made to work again differed significantly between visitors interviewed at different sites (df = 7, p = .0001, analysis completed using Forward WALD binary logistic regression), but not between genders (df = 1, p = .350), age groups (df = 7, p = .724), or occupation groups (df = 3, p = .496). The p value in each of these GLM models, with the exception of the WALD site analysis, was based upon a test of a single factor (gender, occupation, age or site respectively) as a fixed effect.

GLM test of parallel gender–age effects, using a factorial model with gender and age as fixed effects, showed that neither gender nor age influenced visitors’ desire to see objects made to work again (p = .409 for gender, p = .755 for age). Since neither the gender nor age factors were statistically significant, an interaction model was not fitted.

As neither gender nor occupation alone had any significant influence on visitors’ desire to see objects made to work again, neither parallel nor interaction models of gender–occupation were fitted.

Data drawn from Tables A.8, A.14 and A.19.

the machinery, and the mechanical and industrial nature of large technology means that, in many cases, their concerns were well-justified.

This mix of positive and negative feelings about touching large technology heritage objects probably explains interviewees’ somewhat ambivalent response to the question “Do you want to touch the objects?” Overall, a majority of people in both genders, all age groups except 36–45 and 56–65 years, all job groups, and at all sites except Puffing Billy wanted to touch the objects. At about 60–70%, however, this was a considerably smaller majority than the 80–90% that wanted to see objects made to work again (see Touch Statistics panel for details).

The influence of age on the desire to touch objects drew attention to an unexpected result. Many interviewees commented that younger children loved to touch objects, and this was borne out by the statistical results, which did indeed show that children of 6–11 years were especially enthusiastic about touching objects (Fig. 3.2). With

88 <.0001. p-value based upon a crosstabulation of age and desire to touch objects. Data drawn from Table A.9.
89The desire of both pre-school and school-age children to touch and physically interact with objects has been documented in a number of studies. Black, The Engaging Museum: Developing Museums for Visitor Involvement, pp. 66–7, 164–6.
A frequency analysis of the responses showed that 60.7% of respondents wanted to touch objects (n=300). GLM showed that desire to touch objects differed significantly between age groups (df = 7, p = .001) and visitors interviewed at different sites (df = 7, p = .016), but not between genders (df = 1, p = .529) or occupation groups (df = 3, p = .585). The p value in each of these GLM models was based upon a test of a single factor (gender, occupation, age or site respectively) as a fixed effect.

A GLM test of parallel gender–age effects, using a factorial model with gender and age as fixed effects, confirmed that age was a strong influence on visitors’ desire to touch objects, but that gender was not (p = .001 for age, p = .562 for gender). A GLM test of potential interaction between gender and age, however, suggested that gender and age were interacting factors in visitors’ desire to touch objects (p = .035).

As neither gender nor occupation alone had any significant influence on visitors’ desire to touch objects, neither parallel nor interaction models of gender–occupation were fitted.

A GLM test of parallel age–childcare status effects using a factorial model with age and childcare status as fixed effects, showed that both age and childcare status influenced visitors’ desire to touch objects (p = .037 for age, p = .003 for childcare status). A GLM test of interaction between age and childcare status confirmed that these factors were interacting factors in visitors’ desire to touch objects (p = .006). The age–childcare status tests were restricted to adult age groups 19–25 through >65 (n=279), as only these adult age groups were considered to have childcare responsibilities.

Data drawn from Tables A.9, A.14 and A.19.

The exception of 56–65 year olds, however, adults in all age groups were less likely to want to touch objects themselves if they had children with them than if they were alone or with other adults (Fig. 3.3). People of 36–45 years, who were the most likely to be accompanied by children (Fig. 3.4), were the least likely to want to touch the objects themselves (Fig. 3.3). This suggests that adults tended to suppress their own desires to touch objects when they were with children, even though the children themselves wanted to touch the objects and were generally encouraged to do so. It also suggests that the particularly low interest in touching objects among the 36–45 age group was largely due to their childcare responsibilities. Adult interviewees did not, however, explicitly identify childcare responsibilities as a factor that reduced

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90 A GLM test of parallel age–childcare status effects using a factorial model with age and childcare status as fixed effects, showed that age and childcare status were both strong influences on visitors’ interest in touching objects (p = .037 for age, p = .003 for childcare status). A GLM test of interaction between age and childcare status confirmed that these factors also interacted to influence visitors’ interest in touching objects (p = .006). Data drawn from Table A.22.

91 p <.0001. P-value based upon a GLM test of childcare status in a single factor model. Data drawn from Table A.20.
Table 3.3: Results of GLM showing the influence of different variables on visitor responses. Results that showed a statistically significant association between demographic variables and the survey responses are highlighted in yellow. Data drawn from Table A.22.

<table>
<thead>
<tr>
<th>Model</th>
<th>Variable</th>
<th>Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single factor</td>
<td>Age df=5*</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td></td>
<td>Childcare status df=1</td>
<td>.001</td>
</tr>
<tr>
<td>Two factor parallel</td>
<td>Age*</td>
<td>.037</td>
</tr>
<tr>
<td></td>
<td>Childcare status</td>
<td>.003</td>
</tr>
<tr>
<td>Two factor interacting</td>
<td>Age/Childcare status*</td>
<td>.006</td>
</tr>
</tbody>
</table>

* Significant

*Ages 0-18 excluded

their desire to touch the objects, and it is unclear why being accompanied by children would have this effect. See Table 3.3 for a summary of GLM analyses of the influence of age and childcare status on desire to touch large technology objects.\(^{92}\)

Touching objects was important to people for different reasons. For some, touching was simply more involving:

I want to sit in the car and just cruise off!\(^ {93}\)

For others it was a way to get a better feel for the object as a whole:

...you don’t ever grasp what it really is until you use your five senses — see, touch...— to understand it.\(^ {94}\)

For many though, the importance of touching real objects arose from one of two contrasting motivations: the opportunity to learn more about the object’s physical characteristics and workings, and the opportunity to make a spiritual connection to the

\(^{92}\)A GLM test of parallel age–childcare status effects using a factorial model with age and childcare status as fixed effects, showed that both age and childcare status influenced visitors’ desire to touch objects (p = .037 for age, p = .003 for childcare status). A GLM test of potential interaction between age and childcare status confirmed that age and childcare status were interacting factors in visitors’ desire to touch objects (p = .006). The age–childcare status tests were restricted to age groups 19–25 through >65 (n=279), as only these adult age groups were considered to have childcare responsibilities. Data drawn from Table A.22.

\(^{93}\)Gold Coast car show 226: Female, 12–17, butcher’s apprentice.

\(^{94}\)Memorial 261: Female, 26–35, office manager (marine industry).
Figure 3.2: 6–11 year olds were more likely to want to touch large technology objects than people in other age groups. See note 88 for further details.

Figure 3.3: Adults in most age groups were significantly less interested in touching objects when they were accompanied by children. See note 90 for further details.

Figure 3.4: 36–45 year olds were particularly likely to be accompanied by children. See note 91 for further details.
object and the people who had once used it. One visitor at the Campbelltown Mu-
seum, for instance, explained that he was not interested in touching for its own sake,
but he would like to touch an object if he was allowed to drive it as this would give
him an opportunity to learn more about how the object worked:

To drive it, to see how it feels, how it operates, [yes]. Just standing and
looking at it, yes. But rubbing your hands over it for no reason at all, no.95

Another visitor at the Campbelltown Museum spoke of the pleasure she had got
from being able to experience and learn about the workings of a classic car:

One of the men made me sit in his old car and showed me the workings
of the pedals and that was fabulous. I would never have known how they
worked before. It’s good for that, just the feel of the seats and things…I’ve
never sat in one of the old cars before, but today, after doing that, it’s a
nicer feeling about them.96

Other visitors, though, wanted a more emotional engagement:

[I want] just to touch them so I can say “We had one of those. I’ve seen
one of those.” It’s just the feel, like to feel the earth when you go back to a
place after years.97

As a visitor at the Memorial explained:

[It’s] just that tactile thing. You think of the history, and where it’s been,
and who else has touched it, and historically what it went through.98

95 Campbelltown Museum 133: Male, 46–55, panel beater.
96 Campbelltown Museum 141: Female, 46–55, nurse.
97 Campbelltown Museum 140: Female, >65, office and farm worker, nurse.
98 Memorial 283: Male, 46–55, stage manager.
3.9 Conclusion

To engage their visitors effectively, producers of large technology heritage need to engage with their visitors, and to understand more about the ways in which objects and displays stimulate, shape and interact with visitor experiences. As a step towards this understanding, therefore, the interview data collected from visitors in the current study has been analysed both qualitatively and quantitatively, and the results examined in detail in this chapter.

Existing research into the goals and behaviours of people visiting heritage sites has shown that people undertaking such informal and usually leisure-oriented activities tend to look for the familiar rather than the unknown, seeking things they already know something about that they can place in pre-existing frames of reference. To some extent this means that they see what they expect to see, and may substitute pre-existing, stereotyped information for the information that is actually in front of them. On the other hand they engage with the past very actively, and usually do this using a personal lens, finding ways to understand what they see by making connections to their own and their families’ lives, and looking for information from the past to help them both understand the present and shape the future.

Finding personal connections to objects and information from the past gives such things “personal relevance” and “vividness”, qualities that make them attention-grabbing and memorable. These qualities can also be created by strongly affective sensory experiences and large technology heritage objects, with their impressive physical presences and their capacity when operating to generate movement, sound, and even smell, are recognised to have great potential to create vivid experiences through sensory stimulation.

This existing research informed the interpretation of the data from the current study. Qualitative and quantitative analysis showed, for instance, that people interviewed in this study were very enthusiastic about history generally, but less so about stories of individual people — unless they already knew, or knew of, the person in
the story. This suggests that history as a general topic was broad enough for them to interpolate their own personal or family connections, and therefore find personal relevance in it, whereas stories of individual people were too narrowly focussed to facilitate them making a connection unless one existed already, or unless the display helped them to feel that they actually had come to “know” the person in the story. The data also showed that the type of information that interviewees favoured changed as they aged, with younger children preferring the more concrete information available in technical specifications, adults preferring the more contextualised, social information generally found in history, and adolescents and young adults making the transition between these two preferences.

The data also showed that visitors valued the appearance of age and life history much more than many producers expect them to, and that machines that have been made to work again, but which still preserve the appearance of having had a long and interesting life, are often preferred to machines than have been made to work again, but which have also been painted up to look bright and new. It also showed that, while the opportunity to touch and interact physically with large technology heritage was welcomed by many visitors, particularly children between 6–11 years, adults who were in charge of children were surprisingly reluctant to touch the objects, for reasons that are not yet clear.

The other major aspect of the data that became evident was the high percentage and broad distribution of interviewees who disliked, or felt intimidated by, the presence of technical specifications in displays. Women, for example, were likely to avoid technical specifications, but so were interviewees from other demographic groups, including men who did not have training in technical areas. Most large technology heritage displays include at least some technical specifications, and some rely on them almost exclusively to interpret the objects, so the fact that they alienate a large number of visitors is a significant problem. The next chapter, therefore, will look in detail at interviewees’ responses to technical specifications.
The unfamiliar, the unexplained, and the un-engaging

Image: Alison Wain, 2008
Chapter 4

Facing barriers

4.1 Introduction

The previous chapter showed that, with a few key exceptions — and depending on a few subtleties of presentation — the topics of history, people stories, how objects worked and how objects were made were generally popular with a majority of the visitors interviewed for this study. Information about technical specifications, on the other hand, was markedly less popular, with many visitors being reluctant, or unable, to engage with such information at all (see Chapter 3, Section 5). This chapter will explore the reasons why this is so, and the impact that an inability to tackle technical specifications can have on visitors’ response to technological displays in general.

An interest in technical specifications — and in technology generally — is often assumed to be a stereotypical male trait, and a number of interviewees in the current study even saw such interest as an “innate” male characteristic that females were simply (and by implication biologically) unequipped to share. Analysis of the data confirmed that the majority of females were, indeed, reluctant to tackle information in the form of technical specifications, but then so were many males who lacked training in technical subjects, visitors who were with children, and visitors at the predominantly experiential sites of Puffing Billy and the Gold Coast car show. A lack of interest in technical specifications, therefore, seems to be less a matter of innate pre-disposition,
and more a matter of personal circumstance.

The chapter will argue that the reluctance of many visitors to engage with technical specifications is primarily a product of the interaction of various external influences, including cultural norms, feelings of self-esteem, and changing life circumstances. Cultural norms reflect what it is considered normal for a particular group of people to do, and with whom it is considered normal for them to do it. Images of self-worth reflect areas and feelings of competence and confidence, and they are often strongly influenced by perceived cultural norms. Changing life circumstances are usually a matter of logistical constraints on interest and involvement in particular activities, but again, they can reflect cultural ideas about the roles and activities that are appropriate for particular groups of people, especially when it comes to taking time out from adult pursuits to have and care for children.

This chapter will explore in detail the reasons why visitors in some demographic categories find technical specifications so especially confusing and alienating, and how such negative emotions can profoundly influence their approaches to, and engagement with, large technology heritage.

4.2 A fear of technical specifications

The quantitative analysis of the interview data, discussed in the previous chapter, showed that many visitors were reluctant to engage with technical specifications. The qualitative data was therefore also examined to see if visitors’ comments gave any indication as to why technical specifications rated so low as a hook for visitor engagement, particularly when contrasted with the popular topic of history.

The many positive comments about history tended to focus on the general good of knowing about history, and frequently described the topic using warm, all-embracing
words and phrases, such as important, good, love the history, and fascinating. The relatively few negative comments about history, in contrast, were unemotional and focussed on not wanting to be “bothered” by more information about the topic. As a man at Puffing Billy commented dismissively:

It’s nice to read the information that’s here already but I wouldn’t really be bothered about learning that much more about it to be honest.

Positive comments about technical specifications, on the other hand, were generally focussed on the interviewees’ individual interests rather than the general good, as in this comment from a man at the Campbelltown Museum:

I’m interested in what revs they do and their capabilities and fuel consumption.

Negative comments about technical specifications also tended to be focussed on the interviewee’s personal response but, crucially, they were not focussed on the content of the information but on the interviewee’s perception of his or her ability to understand the information. As is evident from the comments below, visitors who did not have the skills to decode the information contained in technical specifications blamed themselves rather than the display for their lack of understanding, and perceived themselves either as lacking in expertise or as being simply inadequate:

It’s a bit over my head.
I am not a technical person...
That’s a bit past me.

1Scienceworks 106: Male, 46–55, engineer.
2Campbelltown Museum 121: Male, 46–55, aircraft engineer.
3Campbelltown Museum 131: Male, 46–55, mechanic.
4WA Maritime Museum 203: Female, >65, home duties.
5Puffing Billy 334: Male, 36–45, IT worker.
6Campbelltown Museum 119: Male, >65, prison officer.
7Memorial 249: Female, 26–35, childcare worker.
9Puffing Billy 332: Female, 36–45, financial controller.
In Australia, information about history is generally presented in an narrative format, using words rather than numbers and connected sentences rather than lists of facts. While this may have its own problems for younger children, non-English speaking visitors and those with reading difficulties, for the majority of visitors this format is familiar, and no special skills are required to decode it beyond ordinary reading. Perhaps because of this, history appeared to be perceived by interviewees in the current study as accessible, non-threatening and widely relevant. By contrast, technical specifications are generally presented in lists (or paragraphs) of partial sentences. They typically use numbers as much as words, as well as unexplained (and often abbreviated) specialist terms and units (see, for example, the photograph at the start of this chapter of a display board at the WA Maritime Museum). This presentation is unfamiliar to many visitors, and can only be decoded using specialist skills that go beyond ordinary reading. As a result, technical specifications are likely to be perceived as inaccessible, threatening, and relevant only to the initiated. In fact, visitors interviewed in the current study seemed to be polarised by the challenges that technical specifications presented, and to feel a need to comment on their competence — or otherwise — to the interviewer. As shown by the quotations above, those who felt confident in their understanding of the information typically affirmed their interest, and sometimes demonstrated their knowledge by providing a relevant example of information they liked to see. Those who could not understand the information, though, commented apologetically about their shortcomings. Failing to understand technical specifications, therefore, did not merely make visitors feel bored; it made them feel incompetent. Visitor research at the Arizona Science Centre in 1997 found a similar effect:

One of the major anxiety factors surrounding a museum visit... is what we call the “numbskull factor.” Mountains of facts can make a person feel dumb. Feeling dumb is inhibiting...10

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10 Unpublished memo from research with a Non-Technical Adults Interest Group. C. Storad, Unpublished memo from the Non-Technical Adults Interest Group, Arizona Science Center, Phoenix, 1997
As was also discussed in Chapter 3, Section 5, interviewees were asked whether they were interested in how the object was made, and how it worked, and interest in these topics fell between interest levels in history and technical specifications. This is perhaps not surprising, as they combine elements of both historical and technical information. As with history, they are often presented in a prose format, using words rather than numbers and connected sentences rather than lists of facts, so no special reading skills are required, and the format is familiar to most people. As with technical specifications however, they are often expressed in highly specialised language, which reinforces the idea that the appropriate audience members for this information are those who are already fluent in this language. The interpretation board for the Weir General Service Pump in the WA Maritime Museum is a good example. It reads:

This pump was used to pump condensate from the condenser to the boilers.
The direct-acting pump has an ingenious steam shuttle valve design.
The complexity of the valve’s porting proved the downfall of many marine engineer candidates taking their Certificate of Competency examination.

The prose is grammatical and includes social as well as technical information, but specialist terms such as “condensate”, “direct–acting” and “porting” make its meaning inaccessible to most visitors. These are words that were not part of a mainstream vocabulary even when steam engines were common, and they are even more obscure now that the technology they describe has largely disappeared from everyday life.11

In contrast to their responses to technical specifications, interviewees did not seem to feel that a lack of personal skills or abilities was responsible for any lack of interest in how objects worked or were made. Rather they interpreted any lack of engagement

11Rob Pilgrim also noted this use of unexplained specialist language in his study of motor museums: ‘Quite often the labelling assumed a level of technical competence which was not necessarily available to the average visitor. For example a label at the Skopos Museum [M192] referred to a vehicle having a 4, 6, 8 motor, [while another] at the National Motorcycle Museum [Birmingham — M204] stated that a certain motorcycle had a “face-cam” engine without explaining what these were and how they differed from other engines.’ Rob Pilgrim. “The BlokeMuseum; Motor Museums and their Visitors” (PhD thesis, Flinders University, 2004), p. 111.
as resulting from inadequacies in external things, such as the display techniques or even the objects themselves. In relation to how the object worked, for example, one visitor commented:

In some cases it might be hard to see how it worked. Maybe a movie or a video clip would help.\textsuperscript{12}

Another, speaking of how the object was made, observed that she might be interested:

Depending on what it is I guess.\textsuperscript{13}

As was discussed in Chapter 3, new experiences are stored in the brain with emotional tags which aid recall of pertinent information about the event. Along with the aspects of vividness and personal relevance that were discussed in Chapter 3, such emotional tags also record whether the experience was pleasant or unpleasant. This is important because pleasant experiences have been shown to be more likely than unpleasant ones to be remembered, to facilitate learning, and to encourage people to repeat the experience.\textsuperscript{14} If visitors’ experiences of heritage are associated with feeling inadequate, confused and alienated, they are unlikely to make personal connections to the heritage, to learn or remember much about it, or to want to come back to see it again. It is therefore vital for producers of technology heritage to understand which display techniques have the most potential to create unpleasant experiences, which audience members are most likely to be affected, and what factors underlie the different responses of different types of visitors.

4.3 Cultural attitudes to technical subjects

As discussed in the previous section, technical information — and particularly technical specifications — about large technology heritage divided the interviewees in the

\textsuperscript{12}Scienceworks 80: Female, 56–65, teacher.
\textsuperscript{13}Memorial 326: Female, 46–55, horticulturalist.
\textsuperscript{14}Falk and Dierking, \textit{Learning from Museums: Visitor Experiences and the Making of Meaning}, pp. 17–22.
current study into two groups: those who could understand and use the information provided, and those who could not. This section will discuss the factors that influence which of these groups an interviewee might fall into — and why — and draws on statistical analyses of interview data presented in Chapter 3, particularly Table 3.1 and the Technical Specifications Statistics Box.¹⁵

One of the major factors influencing whether or not interviewees understood and engaged with technical specifications was gender. Females overall were significantly less likely to be interested in technical specifications than males (Fig. 4.¹⁶); women in each of the four occupation groups were less likely to be interested than men in the same job groups (Fig. 4.²¹); and females in all age groups except 6–11 year olds were less likely to be interested than males in the same age groups (Fig. 4.³¹⁸).

One possible explanation for women’s comparatively low interest in technical information is the presence of children, as women interviewed in this study were more likely than men to have children with them,²⁰ and it is possible that people who are accompanied by children do not have the time and focussed attention necessary to enable them to grapple with topics that they find complex and unfamiliar. Being accompanied by children did, in fact, reduce the likelihood of both women and men in this study expressing interest in technical specifications by about 10%, which does suggest that childcare responsibilities are partly responsible for the lower interest shown by women in technical specifications. GLM, though, showed that the effect of childcare responsibilities was smaller than the impact of other gender specific factors that

¹⁵These in turn draw on Tables A.2, A.3, A.4, A.5 and A.6; Tables A.11, A.12 and A.13; and Tables A.16, A.17 and A.18.
¹⁶p < .001. p-value based upon a GLM test of gender in a single factor model. Standard error is 3.1% for males, 4.4% for females. Data drawn from Table A.3.
¹⁷A GLM test of parallel gender–occupation effects using a factorial model with gender and occupation as fixed effects, showed that gender and occupation were both strong influences on visitors’ interest in technical specifications (p = .002 for gender, p = .002 for occupation). Data drawn from Tables A.3 and A.16.
¹⁸This will be discussed further below, but the sample size for the 6–11 year old age group was so small that the results must be treated with caution.
¹⁹A GLM test of parallel gender–age effects using a factorial model with gender and age as fixed effects, showed that gender and age were both strong, but parallel, influences on visitors’ interest in technical specifications (p = < .0001 for gender, p = .019 for age). Data drawn from Tables A.3 and A.11.
²⁰A cross-tabulation of gender and childcare status showed that 35% of women were accompanied by children, as opposed to only 19.5% of men (p value = .002). Data drawn from Table A.20.
reduced women’s interest in this topic.\textsuperscript{21}

Within each occupation group, though, women and men responded to technical specifications in much the same way. That is to say, both women and men with expertise in technological areas (those in the Ideas & Machines and Hands & Machines occupations), were more interested in technical specifications than those without such expertise (those in the People and Data occupations). In other words, women and men shared the same (occupation-related) patterns of interest, even though they showed different (gender-related) levels of interest. This means that differences in responses are not merely due to people being male or female, but are also, and independently,

\textsuperscript{21}GLM using a model based upon tests of a single factor (gender and childcare status respectively) as a fixed effect showed that interest in technical specifications differed significantly between genders (df = 1, p = <.0001) and between people with and without accompanying children (df = 1, p = .007). A GLM test of parallel gender–childcare status effects using a factorial model with gender and childcare status as fixed effects, however, showed that gender was the stronger influence on visitors’ interest in technical specifications (p = <.0001 for gender, p = .103 for childcare status). A GLM test of interaction between gender and childcare status showed that gender and childcare were interacting influences on visitors’ interest in technical specifications, and confirmed that gender was the stronger influence. The presence of children reduced the likelihood of being interested in technical specifications for both males and females, but females were much less likely than males to be interested in technical specifications in any case. (p = <.0001). The gender–childcare status tests were restricted to age groups 19–25 through >65 (n=279), as only these adult age groups were considered to have childcare responsibilities. Data was drawn from Table A.21.
Figure 4.2: Women in each of the four occupation groups were less likely to be interested in technical specifications than men in the same job groups. See note 17 for further details.

affected by whether they have competencies in technology related areas. The implication — which (as demonstrated above) is supported by the qualitative data — is that both men and women who lack technological backgrounds find technical specifications confusing or intimidating.

Women were, however, less likely to be interested than men in all three of the technically oriented subjects (technical specifications, how the object worked, and how it was made), regardless of their training. The only exception to this was that women in the Hands and Machines occupation group were more likely to be interested in technical specifications than men in either the People or Data occupation groups (Fig. 4.4\textsuperscript{22}, Fig. 4.5\textsuperscript{23}, Fig. 4.6\textsuperscript{24}). For a number of interviewees in the study — including both men and women — these results would have come as no surprise. They automatically assumed that men were more likely to be interested in large machinery than women,

\textsuperscript{22}GLM based on a factorial model with gender and occupation as fixed effects: (p = .005 for gender, p = .586 for occupation). Data drawn from Tables A.4 and A.17.
\textsuperscript{23}GLM based on a factorial model with gender and occupation as fixed effects: (p = .003 for gender, p = .346 for occupation). Data drawn from Tables A.5 and A.17.
\textsuperscript{24}GLM based on a factorial model with gender and occupation as fixed effects: p = .002 for gender, p = .002 for occupation. Data drawn from Tables A.3 and A.16.
and that men were typically fascinated by the technical details of the machinery and how it worked. A number of women, for instance, when asked whether they were more interested in the structure and workings or the look and feel of the machines, explicitly related their choice of the look and feel of the objects to their gender.

I like the overall and look and feel, but that is a girly thing isn’t it?\(^25\)

A mechanical engineer at the Memorial, for instance, commented enthusiastically:

> If you’ve ever been around big machinery when it’s working…it’s good. What can you say? It’s a bloke thing.\(^26\)

A female tourism officer, however, saw male enthusiasm in a more negative light:

> …To me big machinery is boys’ toys. I think the boys get off on “Ooh how does that machinery work?”\(^27\)

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\(^{25}\) Scienceworks 111: Female, 36–45, nurse.

\(^{26}\) Memorial 303: Male, 56–65, mechanical engineer.

\(^{27}\) Memorial 275: Female, 36–45, tourism officer.
Figure 4.4: Women were less likely to be interested than men in how the object was made. See note 22 for further details.

Figure 4.5: Women were less likely to be interested than men in how the object worked. See note 23 for further details.

Figure 4.6: Women were less likely to be interested than men in technical specifications, with the exception of women in the Hands and Machines occupation group, who were more likely to be interested than men in the People and Data occupation groups. See note 24 for further details.
In these comments male and female approaches to large technology and technical information take on the aspect of innate, emotional responses rather than learned or culturally mediated attitudes. The fact, though, that both men and women in this study who had technology related occupations showed a significantly higher level of interest in technical subjects than their technologically untrained male and female counterparts, shows that this interest is at least partly a product of the training and experience that such occupations provide. If people do not have access to such training or experience, or choose not to undertake it, they are unlikely to get the exposure to technical information and objects that induces feelings of confidence and interest in such areas. While this is equally relevant to males and females, there are strong cultural norms that act to suggest that involvement with technical subjects and occupations is unsuitable for females, and consequently the number of females who do undertake training in these areas is disproportionately low.

This was reflected by many of the women interviewed for this study: they had not engaged with technical subjects in the past, and they did not see them as being an appropriate part of a woman’s place in the world. An eighty-year-old woman interviewed at Darling Harbour, for example, found it hard to believe that an interviewer would address questions about large machinery to women, queried whether it was the women or their menfolk who actually answered the questions, and expressed her disbelief that women could give answers that were of any use in such matters. This attitude was an outcome of her own life experience:

For me as a woman, especially at my age and at the age that I grew up in,
I don’t know from beans about these things.  

As Paul Connerton notes, people’s past life and actions are an important source of the way they see themselves and their potential, and if women have believed in the past that they are unsuited to working in technical areas, and that such work is

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28Darling Harbour 397: female, > 65, home duties.
29Connerton, How Societies Remember, p. 22.
socially inappropriate for the type of person they perceive themselves to be, they are unlikely to change that attitude during a day out at a heritage venue.

The attitude that machinery and technical subjects are not appropriate work for women has a long history and, even today, there is a strong tendency for occupations that involve large machinery to be considered “male” jobs. Data compiled by the ABS in 2002 shows that the Australian workforce is still highly segregated by sex, with female dominated occupations typically including secretaries, higher level service workers, health professionals, clerical workers and sales workers. Male dominated occupations, on the other hand, typically include labourers, tradespeople (including construction, mechanical and fabrication engineering, electrical and electronics, and automotive trades), scientists, building and engineering professionals, production and transport workers, farmers, agricultural and horticultural workers, road and rail drivers and plant operators. It is evident from these categories that large machinery, and the technical knowledge related to that machinery, is an intrinsic part of most of the “male” occupations, but is almost completely absent from the “female” occupations.30

This segregation is found, with remarkably little variation, in many different cultures. Surveys conducted by the International Labour Organisation (ILO) in countries as diverse as Bulgaria, India, Cyprus and Ghana (amongst others) showed that employers in these countries perceived similar groupings of “male” and “female” occupations as in Australia. Where assumptions of appropriate male and female occupations were found to diverge, they served to emphasise how little these assumptions are based in fact, and how much in purely social constructs. In Australia, for instance, sales is seen as one of the “female” occupations,31 but in Lucknow in India, most employers considered women unsuitable, or less suitable than men, for sales.32

31 The Australian view of sales as a “female” occupation is noted in the ABS data quoted in Preston and Whitehouse, “Gender differences in occupation of employment within Australia.”
32 Richard Anker. “Theories of occupational segregation by sex: An overview”. International Labour
Richard Anker argues that the underlying reason for these pervasive attitudes is that the characteristics of “female” occupations are expected to mirror traditional ideals of women as attractive, caring home makers who are subordinate to male authority. Female occupations are therefore seen to be those which require a caring nature, skill in household work, manual dexterity, honesty, and an attractive physical appearance. Male occupations, on the other hand, are seen to require an inclination to supervise others, physical strength, ability in science and mathematics, a willingness to travel and a willingness to face physical danger. Of these two lists of attributes, it is again those associated with “male” occupations which are traditionally most likely also to be associated with the use of large machinery.

The idea that appropriate female occupations should echo the traditional role of home maker was current during the period in which large machines were becoming part of everyday life in Australia. Charles Fox and Marilyn Lake note, for instance, that the Victorian Parliamentary Papers of 1891 recorded that the justification given for manipulating census data on women’s occupations was to prevent “the impression elsewhere that women were in the habit of working in the fields”. They also quote Archibald Forbes who, in 1883, stated that Australian men considered domestic work unmanly, and were therefore reluctant to either work themselves as indoor men-servants, or to employ other men to work as indoor men-servants. The ability of each sex to undertake the occupations in question was not mentioned in either case: the issue was solely the perceived propriety of the tasks being undertaken by the different genders, and the potential shame that would be felt if the job were seen to be done by the “wrong” sex. As equipment mostly developed for use outside the home, large technology was inevitably associated with the non-domestic “male” occupations, and working with large machinery became one of the things that men were expected to do.

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34 Charles Fox and Marilyn Lake, Australians at Work: Commentaries and Sources, McPhee Gribble, Ringwood, Victoria, 1990, pp. 143–144, 149, 151.
The persistence of this cultural connection between men, “male” occupations, and large machinery means that male and female children who apparently have very similar backgrounds and interests, can grow up to have very different relationships to large machines. A couple at the Campbelltown Museum commented:

Man: Both our fathers were pioneer mechanics out in the west near Griffith... I remember as a boy going out to start tractors on the farms.
Woman: I spent most of my life in my Dad’s shed.\textsuperscript{35}

Despite their apparently similar exposure to the workings of large machinery as children, however, and their shared interest in looking at old machinery in later life, the wife made it clear that it was her husband rather than her who actually did physical restoration work on machinery. It is perhaps worth noting that the occupations of this couple were sex segregated along exactly the lines discussed earlier in this chapter, raising the question of whether social norms had required this woman to leave behind her childhood love of playing around machinery and adopt more ‘normal’ female pursuits as she became an adult.

Patterns of workforce training and participation suggest that the cultural association between men and large machinery remains strong, and this persistence is probably the reason that, even in younger age groups, male interviewees in the current study were more likely to show interest in technical subjects than female interviewees. Apprentices and trainees in occupations that use heavy machinery are still overwhelmingly male,\textsuperscript{36} and Martin Watts comments that many women who do have qualifications in these fields still do not actually work in these occupations. He suggests that this is because the typical male workplace culture is unwelcoming to

\textsuperscript{35}Campbelltown Museum 141: Male, 46–55, bricklayer. Female, 46–55, nurse.

women, but Anker notes that, while traditionally male workplaces may indeed be difficult for women because of “strong social sanctions, which often include sexual harassment or rude behaviour by men”, the lack of women working in these occupations is probably also due to logistical factors, as male-dominated workplaces do not usually develop the flexible work conditions that allow women to meet traditionally female family responsibilities.

On the other hand, amongst women themselves, younger women were more likely to express interest in technical subjects than older women. Perhaps this is due to increasing educational opportunities to engage with these subjects when they are young. Boys still have a greater tendency to study mathematics and sciences than girls both at school and in tertiary education, but institutions concerned with education have changed their approach to girls substantially since the 1970s and girls are now increasingly successful in science and mathematics subjects. Certainly the few women interviewed who were actively employed in technical areas, and regularly worked with large machinery, expressed a similar enthusiasm and concern for the survival of historic machinery as many men. As Matilda Vaughan, mechanical engineer and a volunteer guide at Scienceworks said:

I really worry about people losing a sense of this type of technology, what it has done in the past. So I figure that by staying interested in it and trying to make other people more interested in it, that we are passing on — it sounds like a legacy — but just not forgetting the technology.

While women’s opportunities to encounter large technology in the workplace have been limited, there are a small number of objects which fit the smaller end of the definition of large technology (as outlined in Chapter 2) that have become commonplace

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in the domestic sphere, most obviously the larger ‘white goods’ (such as washing machines and refrigerators), and cars. Women have enthusiastically embraced these items and made them part of their lives, and no-one would consider it odd or inappropriate for women to use them. There are suggestions, however, at least with regard to cars, that it is considered culturally inappropriate for women to usurp the traditional male connection to large machinery or the “male” role characteristics — such as technical competence — that are perceived to be associated with it, and that this sensibility shapes women’s attitudes to, and interactions with, such objects.

Women interviewed in a study of the driving experiences of older Swedish women, for instance, were concerned that driving was chiefly a male preserve, and was only really socially acceptable for women if it was used to support the traditionally approved female activities of caring for family and community. Anu Siren and Liisa Hakamies-Blomqvist call this a “discourse of practicality”, noting that the idea of a woman driving or using a car purely for her own pleasure was felt to be “morally precarious”, and to require active defence. They comment:

… the practicality discourse that highlights the practical [as opposed to the pleasurable] meaning of the car and presents women’s driving as serving the common good is a socially appropriate way of talking of and signifying women’s driving. Taking social responsibility, nursing and helping others… are strongly embedded into the norm of the “natural woman” and thus executing these duties with the help of the car appears as a way to act along [with] the norms.40

By using such norms to legitimise their use of cars, the women in this study were invoking exactly the traditionally approved “female” occupations of domestic work and caring for others that were discussed earlier in the chapter. Siren and Blomqvist note that this was not seen by the women as a negative or passive stance, as their roles

as family and community carers were major, and highly positive, aspects of their identities, from which they derived much of their sense of competence and self-worth.\textsuperscript{41} It does suggest, however, that when women interact with cars, they may feel the need to be seen to do so in a specific and culturally approved “female” way, focusing on the practical rather than the pleasurable aspects of car use, the development of social relationships rather than mechanical skills, and the acceptance of males as the primary arbiters, or “supervisors”, of the car-related aspects of life.

Women in the current study who were interviewed at the Gold Coast car show described adopting similarly “female” roles in their participation in car-related activities. Asked which car was her favourite, one young mother responded: “Mine of course — the 2-door!”, but when asked if she actually took part in the physical work of restoring the car she replied “Oh, we sit out in the shed with daddy. He [the baby] tries to help.”\textsuperscript{42} Her involvement with the car was centred around the traditionally female and domestic activities of childcare and family socialising, while her partner took on the traditionally male role of working with machinery outside the home.\textsuperscript{43}

In this case there was clearly a clash between childcare responsibilities and work on large, messy and potentially dangerous machines, but couples who had taken up the restoration of old cars as a hobby in middle age or retirement, when young children were no longer an issue, described similar “male” and “female” ways of interacting with their cars. One retired couple, for instance, were asked whether they restored cars for a hobby, to which the man replied “Yes, we have an Austin 1800.” When they were asked if they both worked on the cars, however, the man replied “No”, and his

\textsuperscript{41}Siren and Hakamies-Blomqvist, “Sense and sensibility. A narrative study of older womens car driving,” p. 220.
\textsuperscript{42}Gold Coast car show 238: Female, 19–25, home duties.
\textsuperscript{43}“Outside the home”, in this case, meant a shed very close to the home rather than a formal workplace, but there is a wide acceptance in Australia that, while the house is the domain of the female partner in a couple, the male partner is commonly in charge of a workshop area outside the house. This area is generally known as “the shed” and is typically equipped for work with, or on, machinery. This tradition has recently led to the development of the “Mens Shed” [sic] movement in Australia, which aims to promote physical and social well-being among men by providing community spaces tailored to male needs and interests. This movement has been so successful that it has already generated a number of international offshoots. For further information see the Australian Mens Shed Association website at http://www.mensshed.org/home/.aspx
wife elaborated — with a laugh — “No, I just sit and watch.” They obviously consi-
dered that they participated together in the hobby, but equally obviously both felt that the woman’s role in the hobby was primarily social and the man’s was primarily technical. In both these cases the “female role appeared to be relatively passive, whereas the “male” role was more active, technically competent and supervisory. In this context, it is worth noting that although several women had spoken of a car on display as being specifically their own car, all but one of the cars in the final parade were driven by men. In other words, although a woman might feel that she owned a car, that sense of ownership did not seem to change the way she interacted with the car, which was still governed by the cultural norm of “appropriate” female car use described above.

4.4 Conclusion

To maintain both economic viability and community goodwill large technology her-
itage displays must endeavour to provide a satisfying experience for all their visitors.
To ensure that they do this, the producers of large technology heritage displays must understand how different audiences respond to different display styles and why, so that they do not inadvertently create displays that are inaccessible and alienating to many of their visitors.

Interviews with visitors in this study showed that information about the technical specifications of objects was particularly likely to alienate visitors, especially if they had no training in technical areas, or were adult females (young girls were actually very keen on technical specifications). Technical specifications are usually presented without any explanation of the codes that are necessary to interpret and derive meaning from them, so it is unsurprising that people who lack training and experience in the use of such codes should find them confusing and alienating. It should be more surprising that women find them less accessible than men, but the persistence

44Gold Coast car show 215: Male, > 65, computer engineer. Female, > 65, occupation not recorded.
of strongly gendered cultural norms within Australian society means that women are relatively unlikely to either train or work in technological areas, or to feel that expressing interest in technological subjects and activities is culturally appropriate for them.

This does not mean that technical specifications should be avoided, merely that displays that use them are likely to be more effective if they also give visitors the tools to interpret them. Such displays likely to also engage a wider variety of audiences if they offer a variety of ways of seeing and interacting with such material, so that visitors are likely to be able to find both a frame of reference that engages them personally, and a level of complexity that suits their degree of confidence and skill. These ideas will be explored further in Chapter 7.

People who create displays of large technology heritage, however, naturally draw most heavily on their own frames of reference to shape experiences that they believe will engage and involve their visitors. Many large technology heritage displays, therefore, are likely to have an inherent bias toward specialist points of view and ways of understanding. To understand the potential impact of this bias on large technology heritage displays, it is necessary to know more about how specialists think when they stop being visitors and start being producers of heritage displays. Chapters 5 and 6 will therefore examine the factors that influence producers’ approaches to the preservation and display of large technology heritage.
Hanging out at the Gold Coast car show

Image: Alison Wain, 2009
Chapter 5

Reflecting the past

5.1 Introduction

Chapters 3 and 4 discussed some of the many ways in which family, community, education and past experiences combine to shape people’s personal preferences, preferences that include their interests, the situations in which they feel comfortable, and the ideas and things that they value. When they interact with large technology heritage, their preferences are reflected in the choices they make and the experiences they have with that heritage, both as visitors and as producers. The previous two chapters explored how such preferences affected their choices and experiences as visitors. This chapter will explore how such preferences affect their choices and experiences as producers.

Most producers of large technology heritage have preferred methods of preservation, and styles of presentation, that they like to apply to all the objects they work with, regardless of what the objects are, what is most significant about them, or the circumstances of their display. While it might be anticipated that these preferences would be shaped by an understanding of what works, or does not work, in a heritage situation, I argue that they actually stem from much earlier life experiences, which predispose producers to a particular style of object management and presentation, often even before they begin to work with heritage material.
Almost all producers interviewed in this study spoke with conviction and enthusiasm about the large technology heritage on which they worked, even those who had initially come to work with large technology heritage because of the needs of their organisation rather than as a result of a personal interest. Within the overall spectrum of engagement, however, different themes and approaches emerged, many of which were related to the time of their life and the context in which they had first encountered or become involved with large technology. In particular, the age at which they first became involved with large technology affected whether they engaged with it in a participative or a detached manner; the type of vocational or professional training they had undergone influenced whether they focussed on specific details or broader principles; the genre of the technology affected whether they saw it more through the prism of the past or the present; and their allegiances to past communities of practice largely dictated the communities they continued to see as most relevant to it. This chapter will draw on qualitative data from eighty three in-depth interviews, to explore the influences of the past on the practices of the present in the world of large technology heritage.

5.2 Participation and detachment: details and big pictures

Producers in this study who had worked with a particular type or genre of large machinery for much of their lives, or who had seen family members working with it, tended to see that machinery as part of their identity. For such people, interaction with large technology heritage was physical, participative and confident: they were rediscovering and honouring parts of their own and their families’ lives, and they saw meaning — and history — as being created and re-created by their own actions, by “doing”. Vicki Warden, museum development officer with the Museum Resource Centre of Southern Inland Queensland, remarked of the community volunteers who worked in her museums:

In my experience...they are rural people, they work on the land, they are
used to working with this equipment, and when they see it sitting in a museum they say “It’s deteriorating, it’s worn, we need to make it nice and shiny and repaint it because that’s what we’d do on the land, we would keep it running.”

In contrast, producers who did not have a family connection with such machinery, and had not worked with it in their daily lives, tended not to see it as part of their identity. These people saw themselves as stewards rather than participants and their interaction with large technology heritage was intellectual, comparatively detached and respectful. They were rediscovering and honouring parts of other people’s lives and, for them, history was brought to light by research, and meaning was created by “imagining” based on the results of that research. John White, senior curator of military heraldry and technology at the Memorial, commented:

[Large technology items] are as powerful as a terrific painting... The more you keep, the more possibilities there are. The more you eliminate, the less possibilities there are. And an object like [a large technology object] is so full of complexities that a broad-brush approach — you know, “Fix it!” — means that you don’t make all those little decisions. You don’t look at it and say, “Is that hole important? Is that patch important? If I take off all of those things and remove them, have we lost something?”

Stewardship has connotations of responsibility, of maintaining things for others rather than for oneself and of preserving an inheritance for the future rather than using a resource in the present. Traditionally a steward is someone who has the proper knowledge and ability to care for something, and who has been entrusted with the authority to do so. Seen from this perspective stewardship is expert, noble, selfless and disinterested, and as Laurajane Smith argues, these notions of expertise, authority and selflessness are used to privilege the stewardship approach to looking after objects from the past over other, more participative, approaches:
The current generation, best represented by “experts”, are seen as stewards…of the past, thus working to disengage the present (or at least certain social actors in the present) from an active use of heritage. Heritage…is inevitably saved “for future generations”, a rhetoric that undermines the ability of the present, unless under the professional guidance of heritage professionals, to alter or change the meaning and value of heritage sites and places.¹

By its very nature the active, participative approach to heritage weaves elements of the present into the past and so alters the past for future generations. If preserving heritage for the future is a matter of detachment, and of changing as little as possible, then an approach that stresses participation, and actively changing elements of the past, can be seen as violating the needs of future generations by squandering their inheritance, or “using it up” in the present.

Stephan Michalski and Salvador Muñoz Viñas interpret the participative and detached modes of heritage preservation from a viewpoint that is less judgemental than Smith’s, and that more accurately reflects the commitment and passion reported in this study by proponents of both types of heritage use. Michalski and Muñoz Viñas note that objects from the past can simultaneously embody and represent both personal and impersonal meanings, and that the meaning seen by a particular person strongly influences the way they treat it as heritage. Their ideas regarding the meanings of heritage objects are visually summarised in Fig. 5.1.²

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Figure 5.1: Michalski and Muñoz Viñas suggest that there are three main types of meaning imputed to heritage objects: personal meanings, impersonal social meanings, and impersonal scientific meanings. In the above diagram, the further an object is from the origin of the three axes, the less personal and specific are the meanings seen in the object. Diagram reproduced from Muñoz Viñas, 2005, p. 63, based on an earlier version in Michalski, 1994, p. 249.

the impersonal narrative and scientific value axes, are likely to prompt detached and observational uses of the heritage. Distance, in this analysis, gives rise to detachment.

An interesting consequence of this, and one that was mentioned by Warden, is that as time passes and direct personal contact with the object is lost, the meanings that objects hold for people become primarily impersonal and the participative approach to managing objects as heritage gives way to the detached approach. This means that the participative approach has an inherent time limit: future generations may inherit objects from the past, but they cannot inherit the personal meanings they carry. Unless people in future generations have the opportunity to create their own personal con-
nections to the objects, therefore, they will inevitably adopt a more detached approach to the management of those objects.

We’re finding that here at the Cobb & Co Museum, because it is all horse drawn vehicles...I believe the museum here used to get a lot of people saying “We want to come and fix your wagons.” I don’t think that’s happening as much any more, because they don’t have that association with the material. Whereas our other museums in the area, it’s predominantly agricultural machinery and that is still very much in use on the land.3

In interviews conducted in the current study “participative” producers generally saw their involvement with large technology as dating from their childhood or adolescence. They usually remembered such machinery as having been part of family life, or recalled being taken to work sites filled with large machinery by relatives who actually operated that machinery. Alternatively they remembered being young apprentices, watching masters of their trades demonstrate their skills. They remembered being fascinated, awed and involved, and through this physical and sensory immersion in a world filled with complex machinery, they had gained a sense of familiarity and confidence with it. As children they had often been allowed to ride on or in such machines, or to help with simple maintenance tasks, and as they had grown older they had increasingly been allowed to operate the machinery and perform more complex tasks. As Rod Lovell, private owner of a truck at the Campbelltown Museum remarked:

Learning to operate machinery used to be a rite of passage...The reward for a good day’s work was driving the truck. You learnt a little bit more each time.

For producers whose involvement had begun this way, handling, maintaining and operating machinery was a natural thing to do, and to preserve it as heritage meant

3Vicki Warden, museum development officer with the Museum Resource Centre of Southern Inland Queensland.
preserving as much as possible of the experiences of it that they remembered. By and
large this meant that the machinery should be operated (albeit with concessions to its
age and modern safety regulations), maintenance should be carried out in the same
manner as it was when the machines were in full service (with concessions to both
safety regulations and the producers’ available time and finances) and operation of
the machines should recreate the same level of fascination and excitement that they
remembered. Steve Deacon, private owner of steam traction engines at the Campbell-
town Museum explicitly made this connection between early experiences and a love
of operating large machinery as heritage:

I live at Thirroul where the railway locomotive depot was, and of course
as a kid you go down the railway depot and have a look at the big en-
gines…and I started going for rides up and down the yards at probably
five or six years old on the steam engines and the bug grew.

As an private owner Deacon could not afford to run a railway locomotive, so he pur-
chased a steam traction engine which provided similar steam-related sensory experi-
ences and challenges, but on a more manageable scale.

They are a full on hand-operated machine. Whereas in a car you just put
your foot down to climb the hill, with these there is a lot of skill in prepar-
ing for it: the fire, water levels, and you have got to know that up and
down everything changes rapidly, so it is a very labour-intensive skill to
work one properly…I find that really a challenge and I really like that sort
of thing.

Vocationally trained, participative producers like Deacon, whether they were pri-
ivate owners or volunteered or worked in a larger organisation, generally demon-
strated a long-term engagement with relatively few objects, usually within a particu-
lar genre such as steam engines, cars or electrical generators. Through this long-term
engagement they had developed an extensive knowledge of the mechanics and oper-
erational characteristics of their group of objects, and sometimes (depending on their
level of interest and commitment) of the wider genre as well. In particular, their expertise in the operation of their machines preserved a great deal of implicit knowledge that has either never been written down, or that cannot be effectively recorded because it is embodied knowledge, expressed through the interaction between an individual human, a particular artefact, and the surrounding environment. Fred Vanags — private owner of steam engines and custodian of Maitland City Council’s steam heritage assets — provided an illustration of this issue in the interview he gave at the Campbelltown Museum. He pointed out that the skills required to operate an engine under load, to keep it in operation all day, and to shepherd it safely up and down hills were not a matter of carrying out written instructions, or applying explicit standards, but of monitoring the interplay between many unpredictable factors, and responding to the sensory information available at the time:

[When you are pulling a load] you need to keep the engine pressure up… so the engine is running right on the pressure, but it’s not lifting the safety valve so you’re wasting water. When you run the engine at maximum pressure… the steam’s drier and you get more energy from it, and because it’s dry you use less water and fuel. So it’s managing the engine so that

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4The difficulty of describing and recording embodied knowledge has been discussed specifically in relation to technological processes and practices by Robert Gordon. More generally, there is a substantial literature on tacit and explicit knowledge, though an exact description of the differences and interaction between the two remains elusive. Michael Polanyi’s seminal book, “The Tacit Dimension”, which founded the study of tacit knowledge in the 1960s, remains relevant to this study, but most subsequent work has focussed on highly specialised areas of psychology, philosophy and management theory. Two studies that do have relevance to this project are Connerton’s 1989 book, “How Societies Remember”, in which he discusses the concept of “habit-memory”, and Collins’ 2010 book, “Tacit and Explicit Knowledge”, in which he divides tacit knowledge into the three areas of relational, somatic and collective tacit knowledge. Collins’ idea of collective tacit knowledge appears to be close to Connerton’s idea of habit-memory — both are about the understanding and performance of shared, implicit social norms — but Collins’ theory — that collective tacit knowledge is the only area that is truly unable to be communicated by explicit means — is poorly developed, and does not seem to fit the ways of knowing and transmitting knowledge seen in the present study. See Robert B. Gordon, “The interpretation of artifacts in the history of technology”. In History from Things : Essays on Material Culture, ed. by Steven Lubar and W. David Kingery, Smithsonian Institution Press, Washington, 1993, p. 75; Michael Polanyi, The Tacit Dimension, Routledge, London, 1967; Connerton, How Societies Remember; Harry Collins, Tacit and Explicit Knowledge, The University of Chicago Press, Chicago, 2010.
you are efficient, and that’s where the skill is... And then again, when you go downhill the water goes to the front of the boiler, so you’ve got to make sure you can get the water in. You’ve got to run it, then break it, so that it starts to slosh backwards and forwards to keep the boiler covered. If you’ve got a really big fire and the crown of the boiler doesn’t have water on it, very soon it becomes red hot and turns plastic, and the pressure within the vessel will collapse it...

As Deacon noted:

There are books on the subject, but you can’t learn it out of a book. You can get theories and it will help immensely, but you still have to have practical experience to feel what they’re doing, the time lag.

The other major route to engagement with large technology heritage was through tertiary training in an area of either engineering or heritage studies, followed by entry into professional heritage work. Producers who came to large technology heritage by this route did not always have a family or childhood association with large technology, and their engagement with it tended to be less hands-on and more cerebral. Although a number of them did maintain or operate large machines — either privately or within heritage organisations — they tended to approach knowledge about the machines, and interpretation of them, through principles rather than practice. For instance Steve Gower of the Memorial, cited the Hunslet steam locomotive as being “without a doubt” the most interesting large technology heritage project he had ever been involved with, but the reasons he gave for his interest were focused not on the machine itself, but on the overarching principles of physics and engineering that he had studied during his mechanical engineering degree:

... the elements of a steam engine... embody three of the main disciplines... of mechanical engineering: thermodynamics; a subject called theory of
machines, which is working out the forces in reciprocating, rotating bod-
ies, moments of inertia... And then there’s a design element [as well]. [And
you] bring that together with the fourth element of mechanical engineer-
ing — in those days it would be [called] fluid mechanics. That’s what I did
my post-graduate work on, how objects move around or in fluids, be that
air or oil, water, whatever. So steam engines embody all the disciplines.

For producers whose involvement had begun this way handling, maintaining and
operating machinery could be fun, but it was not as natural to them as to producers
who had been immersed in the world of operating machinery from an early age. Nor
was it their main priority. A deep experiential knowledge of one machine was not as
important to them as an understanding of the common patterns in many different ma-
chines, as both their training and later employment tended to focus on the application
of broad principles to the investigation and assessment of a variety of situations, with
the implementation of recommendations often being delegated to others. Sometimes
this role could be accomplished even without physical inspection of the technology,
as mechanical engineer Matilda Vaughan described:

I have sat on my phone connected to a laptop that is connected to a man-
ufacturing plant up in far north Queensland, and they have talked me
through what was wrong, and I can see on the screen in real time what is
going on, and I tell them what they should be doing.

Producers with such backgrounds were typically involved with large technology
as heritage through employment with a large heritage institution, or as a consultant
to a range of heritage organisations. Their big-picture approach — based on the un-
derstanding of common patterns and the application of system-wide solutions — was
well-suited to the logistics of larger heritage organisations, which often have big col-
lections but comparatively little money, time or space to allocate to individual objects.
They also generally expected to be paid for their skills, so approached their interac-
tion with large technology heritage as a profession rather than as a hobby. Many of
them had also started working with large technology because their employing institution required them to, rather than because they had a personal passion for the objects (though many had developed a strong interest in the technology as a result of their involvement with it). All these factors promoted a less detailed engagement with individual objects, and less specialised skill development than was evident in many of the “participative” producers. Running counter to this, the “detached” large technology heritage producers tended to be aware of a wider range of objects, to be familiar with a bigger range of problems and solutions in the heritage context, and to be more aware of the broader history and social impact of such machines.

5.3 Enjoying the past and expressing the present: the impact of genre

Most of the participative, “hands-on” producers who were interviewed for this study work predominantly on industrial, commercial transport or military machines (hereafter referred to collectively as “industrial machinery”), and are therefore working on machines that were made for practicality rather than image. While appearance could be a factor in their design, their selling points were predominantly functional, and their success or failure resulted mostly from their ability to carry out those functions efficiently and cheaply. As Andrew Schroeder of the Memorial commented:

...when it is war [the look of it] doesn’t really matter...you don’t have time to worry about whether it looks good because you are so worried about dying.

Producers working on historic cars, however, are focussed on a technology that has long been seen to be at least as much about glamour, excitement and comfort as utilitarian efficiency.⁵ Cars were (and still are) made predominantly to appeal to

⁵It should be noted that the historic car community is represented in this study by only one club and relatively few interviews, and therefore appears to be a sub-group of a wider large technology heritage
domestic users — many of whom have no mechanical background — and, like houses, they are made to be part of social rather than industrial life. Their levels of comfort and presentation therefore, have to reflect those of domestic society rather than the workshop or paddock, and both the design of cars, and the marketing messages used to sell them have, almost from the inception of the car industry, been strongly focused on their look and feel. This was particularly so in America, where the early market success of Henry Ford’s utilitarian Model T car was quickly overtaken in the 1920s by the fashionably styled cars of General Motors.

Mass production — and the relatively low prices that mass production made possible — depended on the production of high volumes of identical parts. Identical looking parts make identical looking cars, however, and this (as Ford discovered to his cost), did not encourage people to buy new cars, as any new car would look much like their old car. Alfred Sloan — the head of General Motors from the 1920s through to the 1950s — understood this and instituted a policy of keeping the mechanical components of General Motors cars as similar as possible to meet the demands of mass production, while using a cycle of three yearly major body redesigns and annual trim changes to encourage consumers to buy new cars to keep up with changes in styling.6

Sloan had to fight the preconceptions of his engineers who believed that selling “better quality” cars meant selling cars with improved performance and economy, with styling being merely an afterthought. Sloan, however, realised that cars were not merely workhorses, but were also part firstly of people’s domestic lives — which meant that they needed to be well-presented and comfortable — and secondly of peo-

6 The annual styling changes created the illusion of technological progress, but in fact the most expensive and the cheapest General Motors cars shared many of the same mechanical features. Some mechanical components also remained in production for decades: David Gartman notes that “The ‘Stovebolt Six engine’ that Chevrolet introduced in 1929 remained in production with only minor changes through 1954”. David Gartman, Auto Opium: A Social History of American Automobile Design, Routledge, London, 1994, pp. 75–6, 96–7.
people’s leisure time, which meant that they needed to be exciting.\(^7\) Sloan’s revolutionary designer, Harley Earl, commented:

People like something new and exciting in an automobile as well as [they do] in a Broadway show — they like visual entertainment and that’s what we stylists give them.\(^8\)

The European school of car production had always been more focussed than the American on economical vehicles, and the privations of the aftermath of World War 2 significantly curtailed the ability of most people in Europe and Britain in the mid twentieth century to afford cars that were expensive to buy or run,\(^9\) a situation that was also reflected in Australia.\(^10\) Mass production of small, economical cars of utilitarian appearance therefore became a strong focus in the European and British markets, and provided the bulk of the cars exported to Australia in the 1940s.\(^11\) Even the smallest car was a symbol of “the good life” however,\(^12\) and the look and feel of many of these small cars came to be fondly regarded and remembered by many people. As Schroeder said:

Toyota Corollas are a great car, but I don’t think that anyone in the future is going to think of Corollas in the way that they think of “VW”s or Minis. Because they were great cars... they had humanity in their look.

As people gained more purchasing power, however, they tended to want to move up the automobile “ladder” and buy cars that were increasingly luxurious and powerful. A 1944 survey in the *Argus* newspaper in Melbourne, Australia, suggested that

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\(^8\)Gartman, *Auto Opium: A Social History of American Automobile Design*, p. 82.


readers favoured a car that was practical rather than glamorous: "modern design features were all very well, but not if they added to the cost or detracted from the reliability of the new vehicle." By the mid 1950s, however, Australian car buyers were both more able and more willing to pay extra for attractive, and non-utilitarian, styling.\textsuperscript{13} This desire to upgrade was a tendency powerfully exploited by Alfred Sloan's business model of having a range of cars of increasing status tailored to a range of income brackets, and Sloan's model was gradually adopted around the world. Opel, for example, used it in Germany in the 1960s to lure customers away from the one-model-fits-all monotony of the ubiquitous Volkswagen Beetle,\textsuperscript{14} and it was introduced to Australia by Sloan's own company General Motors, as well as Ford Motors, both of which set up Australian manufacturing plants in the late 1940 and 1950s.\textsuperscript{15}

5.3.1 Creating and re-creating

The private owners of historic cars who were interviewed for this study almost all reflected this emphasis on style over function, expressing much more concern over the appearance of their cars than private owners of industrial machinery. Indeed, there was a general feeling — amongst both groups — that it was acceptable for industrial machinery to be presented "in its working clothes", but that a similar presentation for historic cars was not acceptable. Expressing his approval of the visually unrestored steam engines operating at the Campbelltown Museum, one producer who was familiar with both communities said:

\begin{quote}
...there's a few going around here that are absolutely covered in rust, but running, and it's just great to see them back in working condition again.

It's good to see the ones back to pristine condition but it's also good to see
\end{quote}

\textsuperscript{13}Graeme Davidson with Sheryl Yelland, \textit{Car Wars: How the Car Won Our Hearts and Conquered Our Cities}, pp. 3–4, 16–19.

\textsuperscript{14}Sachs, \textit{For Love of the Automobile: Looking Back into the History of Our Desires}, p. 80.

\textsuperscript{15}General Motors produced the Holden, a car based on the company's American models but adapted to Australian tastes and conditions. Ford followed some years later with the Ford Falcon, also an existing model adapted for Australia. Graeme Davidson with Sheryl Yelland, \textit{Car Wars: How the Car Won Our Hearts and Conquered Our Cities}, p. 16.
the ones that are a work in progress.\textsuperscript{16}

When asked whether he felt differently about historic cars, though, he commented:

I suppose I do because, my vintage cars, I like to have them back to as good a looking condition as possible. And I have also been a judge at vintage car shows, and part of that is are they as good as they could be…

He explained this further by saying:

I suppose because cars, if you wanted to appeal to the masses and you were having a car show, the average person’s not going to come along and appreciate “Yes, the engine’s running, but the outside’s as rusty as anything and full of holes” and really [people] would [say] “You could have put the extra effort in”. But knowing the effort that’s involved in getting the engines on these [industrial machines] running, and keeping them running, that’s probably the more important part of these… the actual workings themselves.

This interviewee still spoke of rusty and dirty engines as works in progress, however, and as engines that remained unkempt because just keeping them running was such a huge effort. This suggests that, while he accepted that there was a practical need for the industrial machinery community to have different standards of presentation to the historic car community, at heart he still perceived a non-pristine condition as evidence of a poorly cared-for machine or an incomplete project and expected that, given sufficient time, commitment and money, a pristine condition would be achieved. Ray Graf of the Campbelltown Museum, saw it differently:

I don’t know where it came from, but [“working clothes”] is an expression used. In other words cleaned, maybe not polished, but cleaned and look-

\textsuperscript{16}Campbelltown Museum 139: Male, 46–55, aged care quality assurance manager. He restored old cars, while his nephew owned a steam traction engine.
ing all right, as against leaving it covered in gunge. Versus the other extent of cleaning and painting it better than new.

Andrew McVey, private owner of the steam traction engine “Warragul” at the Campbellsbelltown Museum had a similar opinion:

I get a great deal of positive response towards the Warragul because it is in its working clothes, because they can see what it would have looked like. And there are a few other engines that people keep them clean, keep them wiped over but don’t shine everything up — it makes them more realistic. I think you can picture it working in a paddock, whereas if it is all shiny it is the showroom tractor.

Industrial machinery is expected to do dirty things and, if it is operated in an environment fairly close to its service conditions, even a visually restored and repainted machine will quickly develop a surface coat of dirt and wear marks that is, if not original in the sense of being part of its service history, at least original in the sense of being produced by the same processes as in its service life. As such, dirt and wear marks on such machines are generally seen as being appropriate to the genre of the machinery. By contrast, a car cannot carry out its service function of transporting its owners in comfort and style if it is dirty, rusty or damaged, and probably because of this, dirt and marks of damage and wear are not seen by most private owners as being appropriate to the genre of the machinery. One woman, in fact, was highly critical of a car that had been brought to the Gold Coast car show with an un-repainted repair visible:

The whole purpose is to restore them to a new condition, so it is a shame to see something like this with panel beating [showing]. Why bring it?

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18 Gold Coast car show 223: Female, 46–55, designer and photographer.
Notably, members of both the industrial machinery and the historic car communities mentioned people within their communities who they felt were obsessive about the appearance of their objects, but their criticisms were based on different concerns. Owners of industrial machinery were concerned about authenticity, and the capacity of objects to accurately reflect the past. Fred Vanags commented:

You see a lot of machines that have been restored and painted up and they go right to the “n”th degree of filling little deformities in the casting with body putty and then they make it look sparkling new. Well, when they were manufactured they were never like that, they were just roughcast and normally a coat of paint was thrown over them and then they went off to work. Tractors particularly are the ones that are over-restored — they never looked like that when they came out of the factory, never ever.

Owners of historic cars were not much concerned about over-restoration, but they did dislike over-cleanliness, as it prevented the cars being driven. As can be seen from the following quotations, several car owners distinguished between cars that were kept impossibly clean to enable them to win shows, and cars that were actually driven and enjoyed as a sensory experience:

We don’t like poony show cars! We like to be able to drive it…without worrying about it. We always think there should be two categories at shows, the “poony” cars and then the “drivers”.

I like to see them restored, and a showpiece like this, yet practical. Still be able to drive it. If you put something in the shed and don’t use it then there’s no point.

My sister was into cars in New South Wales; she had a Holden car. Her car was very tidy but she could never work out why she only got a few prizes

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19 Gold Coast car show 239: Female, 36–45, massage therapist.
20 Gold Coast car show 223: Male, 46–55, storeman.
here and there, because she had an oil leak here and an oil leak there... I said to her “The ones who don’t have any oil leaks don’t have any oil in the engine, so it can’t leak out.” So it looks immaculate up on a stand with a mirror underneath it, but it is never driven on the road.\textsuperscript{21}

Another difference between the two communities was the way they viewed the processes and results of restoration. Owners of historic cars saw the restoration process as an act of creation rather than re-creation, an expression of personal individuality rather than a reflection of the history of the car itself. One couple, asked if they like to see the cars restored to look new, responded that they liked to see a variety of imaginative presentation styles:

\textbf{Male visitor}: [I like] some to be back to the original, but some to be customised or whatever.

\textbf{Female visitor}: I suppose it is to see what people’s imagination brings them back to, because it’s a lot personal as to how they bring them back.

\textbf{Male visitor}: Their own style, the owner’s style.\textsuperscript{22}

The restoration process, and the people who did it, were topics of particular interest for this community. One visitor at the Gold Coast car show, asked whether the most interesting time in the car’s life was when it was brand new, working, at a special event or any other time, replied:

\textit{Oh, no no. Restored. Because of the effort that is put into them.}\textsuperscript{23}

Another visitor at the Gold Coast car show, when asked whether he would like to know how the car was made, commented:

\textit{Not as they were made in the factory but how they have been restored or modified by the current owner, yes.}\textsuperscript{24}

\textsuperscript{21}Gold Coast car show 220: Male, 56–65, engineer.
\textsuperscript{22}Gold Coast car show 221: Female, 46–55, administration officer. Male, 46–55, upholsterer.
\textsuperscript{23}Gold Coast car show 243: Male, 56–65, plumber.
\textsuperscript{24}Gold Coast car show 223: Male, 46–55, storeman.
When this visitor was asked whether he liked to know stories about people connected with a car, he automatically took this to mean people engaged in the hobby of restoring and driving historic cars, rather than people who might have owned or used the car during its pre-restoration service life:

… a lot of people in this game turn over their vehicles from time to time, and if you’ve known the people over the years you’ve known the cars that they’ve had, and it is more the history of the people than of one particular car.25

A number of producers at the Gold Coast car show did know the pre-restoration history of their cars, but there was an sense that interest in a car’s service history was a personal preference rather than normal or required knowledge. Asked whether he liked to know the history of his cars, or whether this did not worry him, Lyle Ross, private owner of cars at the Gold Coast car show said:

Well, some people don’t care, but I like to do the research. I know my Chevy. I know the day it was bought.

Private owners of historic industrial machinery also restored and made changes to their objects but these were generally for practical rather than aesthetic reasons. It was important to be reasonably faithful to the look and feel of a past era, but there were limits to people’s time, money and patience, and operating the objects had to be enjoyable enough for people to want to do it as a hobby. Deacon commented:

I do a lot of driving on the road, [and] I wanted to not go deaf! So I deliberately went out of my way to make [replacement] gears that are far more efficient… And a friend, who is a brilliant engineer, redesigned them… It just transformed [my Fowler] from a nice [but noisy] engine to run to something that you could have a conversation on.

25Gold Coast car show 223: Male, 46–55, storeman.
Vanags said:

More often than not though we make improvements, mainly for longevity. So at the end of the day the improvements are not cosmetic — we try and keep them as original looking as possible…

For producers working with industrial heritage the past was a key resource. Karl Kelenen, private owner at the Campbelltown Museum whose interest in Russian tractors reflected his early life as a farmer in Croatia, explained that the past provided a firm decision-making framework for his collecting activities:

All my tractors actually worked here in Australia. I was overseas on holiday [in Croatia] and I saw a lot of interesting tractors that I would like to bring here. But then I was thinking…if somebody asks me “Where was this tractor worked?”, if I tell him where it worked he will just look and say “Why would you talk about that?” I mean, we need to preserve the Australian history and this is a part of the Australian history.

Ron Gunn, leading hand fitter at Puffing Billy, also noted how important information from the service lives of the objects was as a source of knowledge and context:

One of the guys has a huge big photographic collection…so you can look at old photos and say “Well, that is what it used to look like in this particular time.”…[For] a lot of things that were done to the railway we have actually used old photos to give us indication of what things did look like.

The two approaches were summed up by a visitor at the Memorial, who remarked:

Cars are different. They’re just a hobby and a love. This [the large technology on display at the Memorial] is something different…A bloke puts into a car what he likes, where here you are trying to keep what really happened.26

26Memorial 290: Male, 56–65, estimator.

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The interest shown in the creative aspects of car restoration suggests that members of the car community are focussed on the present rather than the past, and on using cars from the past as a source of stylistic inspiration rather than historical information. In this they perhaps have less in common with owners of historic industrial machinery, who mostly want to recapture a sense of the past, and more in common with people who modify, or “customise,” cars to create imaginative fantasy objects that strongly express their personal passions and identities in the present.\(^{27}\)

Henry Glassie has observed that the more changes or marks a user leaves upon an object, the more the object can say about that user. Speaking specifically of cars, he noted approvingly that the changes wrought by use and customisation created layers of alterations that became history in themselves, expressing “the wills of many makers.”\(^{28}\) He was, however, less sanguine about changes made through deliberate restoration processes:

… the restoration of old buildings to some fancied early state is an act of violent appropriation. The building rebuilt becomes a monument to the restorationist’s taste: the building’s builders are obliterated.\(^{29}\)

It has long been recognised in the professional academic and heritage worlds that restoration often says more about the period and culture in which the restoration was

\(^{27}\) Car customisation, or modification, is an international phenomenon, commonly (though not exclusively) associated with young males. For example, Tom O’Dell has written about the Swedish raggare (greasers), “…the cars became a forum for self-expression… it was important for youths to personalize the cars and make them their own.” Daniel Miller has discussed the extensive customisation of cars in Trinidad, and the extent to which people are publicly identified and described through their individualised cars. More locally and recently, Andrew Warren and Chris Gibson’s study of custom-car culture in the Australian city of Wollongong makes the point that, while car-customising is a highly creative activity, it is usually ignored in mainstream assessments of artistic activities and industries. They comment that customisation: “…was a careful and richly creative process: ideas and designs were firstly hatched amongst social groups, informed by personal tastes and feelings; then in performing custom-car work technical knowledge about mechanics, electrical wiring, painting, metal fabrication, and upholstery became requisite — but only towards ends that emphasised idiosyncratic personal expressions and aesthetic preferences.” See Tom O’Dell, “Raggare and the panic of mobility: modernity and hybridity in Sweden”. In Car Cultures, ed. by Daniel Miller, Berg, Oxford, 2001, p. 114–15; Daniel Miller, Modernity: An Ethnographic Approach, Berg, Oxford, 1994, pp. 236–45; Andrew Warren and Chris Gibson. “Blue-collar creativity: reframing custom-car culture in the imperilled industrial city”. Environment and Planning A 43 (2011): 2705–2722, pp. 2706–7, 2715.


\(^{29}\) Glassie, Material Culture, p. 109.
done than it does about the period when the restored object was made or was in service. Like Henry Glassie, however, many scholars and heritage professionals interpret this as a negative outcome, seeing it as an involuntary result of changing fashions in restoration techniques and approaches, or of mistaken assumptions about the past. As far back as the nineteenth century John Ruskin lamented, also in relation to architectural restoration, that:

…that spirit which is given only by the hand and eye of the workman, can never be recalled. Another spirit may be given by another time and it is then a new building; but the spirit of the dead workman cannot be summoned up…The whole finish of the work was in the half inch that is gone; if you attempt to restore that finish you do it conjecturally…

Barbara Appelbaum has addressed the same issue, in less emotive terms, in relation to heritage objects more generally:

One problem is determining what the original state actually was…Technical facts about the object’s creation will not necessarily reveal the details of appearance, and subtleties of execution may be long gone. In addition, the original context, which has a strong affect [sic] on the impression conveyed to the viewer, may be unknown.

It is possible, however, to see such issues in a more positive light. For those who wish to use old machinery as a source of reliable factual information about the past, accuracy is of primary importance. For those who wish to use old machinery to enhance their enjoyment of the present, accuracy is less important than the successful melding of the old and the modern into a new creation that suits their present needs. Raphael Samuel dubs such blending of old and modern influences “retrochic”, and notes that


while it is an approach often accused of being obsessed by style over substance, and even of being fraudulent and of commodifying the past, it generates excitement from the juxtaposition of the old and the new, and can create the imaginative space for new ideas.32

A study of a larger sample of people who own and restore historic cars would undoubtedly turn up alternate views, some of them much closer to the emphasis on the recreation of the past that is such a strong theme amongst owners of historic industrial machinery. Jamie Croker, for instance, noted that his formal job as a large technology conservator at the Memorial had much in common with the approach to historic cars that he had learnt informally, from his father, as a family hobby:

I guess it’s from the way I was brought up, especially with Dad with the muscle cars, to try and save [original material]. They were always worth more if they were unrestored. Dad’s got an RT Charger that has still got the original paint on it. And when I was a kid, we took it to one of the biggest Chrysler shows in Australia, which is at the “Mopars on the Murray” at Albury. It won top original…

Croker is also a member of a hot-rodding community that aims to recreate the practice and the sensory and aesthetic experience of hot-rodding in 1940s–50s America, by using historic methods of building and racing such cars:

…I am building [a 1930 Ford Roadster] to resemble a 1940s style Dry Lakes or salt flat Racer. …After World War II, all the fighter pilots and the bomber pilots and the crew were coming back to America from World War II, and they had a desire to go fast. And they would buy these cars for $20 or $30 and pull the mudguards off them and work on the engines to get them to go faster.….I modify the vehicles as they would have been done in the 40’s and 50’s. So I use an engine from the 1940’s or 50’s. I use brakes from that period as well, like they would have then.

32Samuel, Theatres of Memory, pp. 112–114.
Croker was not interested in recreating the historic appearance of any one car, but he did aim to reflect the attitude to appearance and maintenance that was typical of the original hot-rodning communities:

The car still looks old. . . . the type of vehicle that we’re trying to replicate or build, is a vehicle that would have been built by teenagers. And teenagers didn’t necessarily have money, as they don’t now, to have the best of everything. . . . If the vehicle required repairs, they would just patch the repair, undercoat it, and leave it. It didn’t really matter how the vehicle looked. It was all about going fast on the salt, on the dry lakes.

This approach has much in common with that of many owners of historical industrial machinery, who, as discussed above in Section 2, are as interested in learning and preserving the skills and knowledge required to understand the operation of historic machinery as they are interested in preserving its historic appearance.

5.3.2 Doing it for ourselves and doing it for our visitors

Another key difference between private owners of industrial machinery and historic cars was that, while owners of industrial machinery were generally very keen to educate their visitors and to communicate their passion for their machines, owners of historic cars were much less likely to express interest in doing so. This seems to be related to the fact that the key fascination of historic industrial machinery is its variety, especially in function, movement and motive power, whereas the key fascination of historic cars, as discussed above, is their stylistic variation and good looks.

Functional variety is most effectively displayed through operation, which means that owners of industrial machinery usually operate the machines they have on display. This means that they must remain with the machines to operate them, both to keep them running smoothly and to supervise visitors who may be unaware of their dangers. A side effect of this is that owners of industrial machinery are typically present when visitors come to look at their machines, providing the opportunity for them to
answer visitors’ questions and call attention to points of interest (see Fig. 5.2). They
like to talk to visitors about how the machines worked and what they used to do, and
in some cases allow people to touch, or even — where safety allowed — to have a go
at operating them. This was something that they found hugely satisfying, as McVey
described:

I had a lovely fellow from England a couple of years ago and he was stand-
ing back about three or four metres away with his hands behind his back
looking at it… and I said “G’day mate” and he said “Hello…” I said, “Tell
you what, you’d better be a steersman.” He said “Oh I couldn’t do that.”
I said, “Of course you could.” He climbed up smiling from ear to ear. He
had only ever been able to look at them [in England] and it made his trip,
first time to Australia.

The beauty of cars, on the other hand, can be appreciated without them being op-
erated, and indeed, while it can be exciting to see them moving, they all share the
same function (transporting people) and the same movement (rolling horizontally),
and most of them share the same motive power (a liquid fuel combustion engine).
These fundamental similarities mean that the smell and sight of most them moving
is very similar (the sound of them operating is arguably the most distinctive feature
of their operation, varying considerably between different makes and models). Their
beauty and styling, moreover, can be appreciated from an aesthetic standpoint, in-
formed by the personal preferences of the visitor and without explanation from the
owner. A side effect of this, at least at the Gold Coast car show, was that the cars
remained parked and static for most of the show, and were only run at the final pa-
rade when they all left the ground together in a visual feast of bright paintwork and
gleaming chrome. Until this time their owners were free to wander around, them-
selves admiring other people’s cars. This meant that they mostly did not stay near
their cars during the show, and were therefore not available to talk to visitors, or an-
swer questions (see Fig. 5.3).
Figure 5.2: Owners of historic industrial machinery at the Campbell Museum mostly stayed with their machines, keeping them running, and acting as interpreters for visitors. Image: Alison Wain, 2008
Figure 5.3: Owners of historic cars at the Gold Coast car show, whose machines were parked and not running, were free to look at other exhibits, and therefore tended not to be available to act as interpreters for other visitors. Image: Alison Wain, 2009
The importance of visual distinction in cars, and their relative lack of functional distinction, may also explain why cars often seem to be displayed as art rather than as machinery. Pilgrim, for instance, in his study of car museums, notes that in contrast to other technology objects, cars are usually displayed with all the mechanical components hidden beneath their artfully concealing body panels and closed bonnets, and there is rarely any attempt to introduce the visitor to either the technical details or the history of the functional components that lie beneath the attractive exterior:

…the point that removes most motor museums from the realm of technology museums [is] that the technology is rarely exhibited or interpreted. The vehicles are exhibited as aesthetic objects and the mechanical technology is not generally visible…\(^{33}\)

This focus on cars as aesthetic rather than functional object was underlined at the Gold Coast car show by the fact that the only cars that were displayed with their bonnets open had their engines cleaned and polished to a gleaming finish that made it quite clear that they were never subjected to the dirt and oil of operation (see Fig. 5.4).

Just as in art museums, touching the objects was viewed with strong disapproval, as touching could easily damage the expensive paint coatings that made the cars look so beautiful. This was a major point of etiquette within the community: of 18 visitors who were asked whether they would like to touch the cars, 16 (88.9%) said that touching the cars was considered quite inappropriate. Many related their reluctance to touch other people’s cars to their dislike of people touching their own cars, and to their respect for the time, effort and money spent on paint work that could be ruined by a careless scratch or fingerprint.

People go to a lot of trouble to polish their cars up and present them in the best manner they can and they don’t need my fingerprints on them.\(^{34}\)

\(^{34}\)Gold Coast car show 222: Male, 56–65, builder.
Figure 5.4: The few engines that were on display at the Gold Coast car show were not presented as functional components but as aesthetic objects, immaculately cleaned and polished. Image: Alison Wain, 2009
Even the woman who had been so adamant that she disliked “pooncy” show cars, and that her own car was meant to be enjoyed and driven every day, was reluctant to touch other people’s cars, and did not like to see them being touched. Children were a particular concern:

...I know paintwork costs a lot, and maintaining the paintwork’s a hard job...I get annoyed when I see little kids hanging on people’s show cars. Because I know how much time and effort goes into them.35

The prohibition against touching the cars also meant that exhibitors at the Gold Coast car show viewed the idea of providing hands-on access to the machinery as a negative rather than a positive thing. This attitude presented a sharp contrast to that at the Campbelltown Museum, where visitors were enthusiastically invited (within the bounds of reasonable safety) to touch the machinery, as was demonstrated by McVey’s invitation to a visitor to step up and have a go at driving his steam traction engine. Of 35 visitors at the Campbelltown Museum who were asked whether they would like to touch the objects, only 6 (17.1%) said that they felt it would be inappropriate, while 20 (57.1%) said they would very much like to touch the objects. Two of them, including the visitor quoted below, particularly mentioned the benefits of children being able to touch them:

I’d like the kids to be able to sit on them or something. They’ve been asking that all morning. Touch of what the history was, what they went through and how hard it was. How modern and easy they’ve got it now.36

In fact it was notable that heritage producers and visitors at the sites of both the Campbelltown Museum and the heritage railway Puffing Billy saw the chance to get close to old machines and see them operating as being a particularly exciting and enriching experience for children, and many visitors had organised their visit speci-

35 Gold Coast car show 239: Female, 36–45, massage therapist.
36 Campbelltown Museum 150: Female, 46–55, home duties.
cally to give their children that experience. At the Campbelltown Museum and Puffing Billy sites machinery owners and staff respectively took pains to talk to children and offer them opportunities to touch and ride on the machines, and some developed displays specifically to help children relate to and understand the machines, as McVey also described:

... two years ago there was a big Steaming Under the Southern Cross [event] in Jondaryan in Queensland ... We had schoolkids from seven to 16 ... I was doing haulage demonstrations in the Warragul steam traction engine and I had a tipping wagon and I ran the kids through how you build roads and things like that.

In contrast, while a few parents at the Gold Coast car show mentioned that their children worked on their cars with them at home, the children who were actually at the show were limited to passively looking at the cars with their parents. To put it in heritage industry terms, at the Campbelltown Museum and at Puffing Billy children were seen as a major target audience. At the Gold Coast car show they were not.

This situation is consistent with Pilgrim’s findings in relation to museum displays of historic cars. His study of visitors to the National Motor Museum at Birdwood in South Australia showed that while 55% of visitors came with family, only 5% cited wanting to show the museum to children as their reason for visiting.\(^{37}\) Five visitors who were interviewed also actually complained about other people’s children running around, an attitude that was reflected in a comment from a museum owner interviewed by Pilgrim, who explained that he discouraged child visitors as they reduced the pleasure that adults gained from the experience.\(^{38}\)

The comparison of these two communities of historic machinery owners is instructive. People who restore large technology heritage items often assume that they are all doing the same thing, and because they assume they are doing the same thing, they

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\(^{38}\) Pilgrim, “The BlokeMuseum; Motor Museums and their Visitors,” pp. 120–121.
judge each other by their own standards. In fact, they are not doing the same thing at all, and what is considered good work in one community because it meets the needs and expectations of that community, may be considered poor work in another community that has different needs and expectations. The historic car community can be seen, as discussed above, to restore and use their objects for reasons that centre around the self and the present — they want to use their cars to have fun, to socialise and to express themselves. In contrast, the industrial machinery community can be seen to restore and use their objects for reasons that centre around their visitors and the past — they want to use their machines to recreate a small part of the past, and to share it with their visitors. These communities have very different goals and practices. As will be discussed in Section 4 of this chapter they are, in fact, different communities of practice.

5.4 Keeping faith: allegiances to communities of practice

Etienne Wenger defines a community of practice as a social group that is “created over time by the sustained pursuit of a shared enterprise”. Communities of practice, he argues, arise wherever a group of people need to co-ordinate their work practices and social relations in order to get things done, and are defined not by formal memberships but by mutual engagement and negotiation of meaning. Becoming part of such a community involves not merely the learning of intellectual and technical knowledge, but also of the social practices associated with that community. Wenger suggests that this is not a formal learning process, but “a process of being active participants in the practices of social communities and constructing identities in relation to these communities. [Emphases in original.] “Such participation,” he says, “shapes not only what we do, but also who we are and how we interpret what we do.”

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39Wenger, Communities of Practice: Learning, Meaning and Identity, pp. 6, 45, 73.
41Wenger, Communities of Practice: Learning, Meaning and Identity, p. 4. It should be noted that communities of practice, in Wenger’s analysis, are not limited to occupational communities but may also
According to this view, becoming an accepted and respected member of an occupational community involves more than just learning its technical skills and concepts. It also involves accepting the attitudes and behaviours of that community and internalising its shared standards and preferences, its language and mannerisms. Jean Lave and Etienne Wenger describe this process in some detail:

[Newcomers] gradually assemble a general idea of what constitutes the practice of the community. This...might include who is involved; what they do; what everyday life is like; how masters talk, walk, work, and generally conduct their lives; how people who are not part of the community of practice interact with it...how, when, and about what old-timers collaborate, collude, and collide, and what they enjoy, dislike, respect, and admire.\(^4\)

Lave and Wenger emphasise that members of such communities will always have different interests and viewpoints and will make different contributions to the community, so they are not suggesting that, through joining a community, members will become identical copies of each other. Rather they argue that community members come to “share understandings concerning what they are doing and what that means in their lives and for their communities.”\(^4\)

In Australia it is common for people to join their first professional community of practice in their late teens or early twenties as they leave school and begin tertiary, apprenticeship or on-the-job training. This is a key period in a young person’s life and development: research has shown that things learned and events experienced in the period between 10–30 years of age (and especially between 15–25 years of age,

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\(^4\) Lave and Wenger, *Situated learning: legitimate peripheral participation*, p. 95.

\(^4\) Lave and Wenger, *Situated learning: legitimate peripheral participation*, p. 98.
peaking at about age 20) are likely to be remembered more positively and more often, and perceived as having greater emotional intensity, than anything but very recent memories, a finding that has been termed the “reminiscence bump”.

The reminiscence bump is remarkable because it runs counter to the normal trend, which is for memories to decay fairly uniformly with time. It is also remarkably wide-ranging, being found to affect autobiographical memory, memories of cultural, social and political events and eras, and factual and semantic memory (which broadly covers general knowledge and understanding of the world). The title of the influential 1998 paper by David Rubin, Tamara Rahhal and Leonard Poon was “things learned in early adulthood are remembered best,” and this appears to be true for information from a broad range of areas and contexts.

Rubin et al suggested a number of possible theories to explain the reminiscence bump, but they favoured the theory that they termed the “cognitive account” (later succinctly dubbed the “novelty account” by Martin Conway and Shamsul Haque). According to this theory experiences during the period between 10–30 years were likely to be novel, and therefore distinctive and vivid. They were also often transitional, preceding a period of relative stability. Because of these features Rubin et al suggested firstly that they were subjected to more detailed initial cognitive processing, and secondly that they were likely to become reference points for the evaluation.

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45Most memories decay according to a mathematical relationship between a person’s ability to recall an event (the performance measure) and the time since the event occurred (the delay). This relationship is called the power law of forgetting. Anderson, Cognitive Psychology and its Implications, p.178.

46Rubin, Rahhal and Poon, “Things learned in early adulthood are remembered best,” pp. 45, 5–7 and 12–14 respectively.

47Rubin, Rahhal and Poon, “Things learned in early adulthood are remembered best,” pp. 3,16. The reminiscence bump has also been found to exist in a number of different cultures. Conway and Pleydell-Pearce, “The construction of autobiographical memories in the self-memory system,” p. 280.

of situations in the subsequent period of stability. This would mean that memories of those events would be likely to be richer than other memories, and that they would be more likely to be rehearsed (retrieved and used) regularly in later life. Jerome Sehulster pointed out, however, that not all experiences remembered from this period are novel and that therefore, while the novelty account may explain the meaningfulness and longevity of some memories, it is not sufficient to explain all of them.

One of the alternative explanations put forward by Rubin et al for the reminiscence bump (though not the one they actually favoured) was that experiences during this period of life, especially during the period from 15–25 years, were particularly important for the development of the self. They called this the “account based on identity formation” (Conway and Haque subsequently coined a more succinct term, “the self account”, which will be used here). This concept built on ideas developed by Erik Erikson in the mid twentieth century, which suggested that:

…a sense of identity develops in late adolescence. A major goal of this time period is to discover who and what you are socially, vocationally, and ideologically, and to merge these factors into an adult identity…[and] if much of identity is formed in early adulthood, there will be more events in that narrative that come from early adulthood than would be [otherwise] expected…

Rubin et al reviewed literature on preferences in cultural life (books, music and films) and on the social and political events from their lifetime that people judged to be most significant, and found the same reminiscence bump as they had identified in autobiographical memories. They attributed this finding to the novelty effect, theorising that:

49Rubin, Rahhal and Poon, “Things learned in early adulthood are remembered best,” pp. 13–15. Research by David Pillemer supports this, showing that transitional events are more than ordinarily memorable, even if the events themselves are not especially significant, such as the beginnings and endings of school terms. David B. Pillemer. “Momentous events and the life story”. Review of General Psychology 5, no. 2 (2001): 123–134, p. 125.


51Rubin, Rahhal and Poon, “Things learned in early adulthood are remembered best,” p. 16.
Before the age of young adulthood, people lack the cognitive abilities to learn about complex events, but even after they have acquired these abilities, in our culture they lack much awareness of the world beyond the family until age 17. The frequently reported political events of adolescence and early adulthood are the first political events encountered and understood.\(^{52}\)

Conway and Pleydell-Pearce, though, saw the presence of a reminiscence bump in memories of social, cultural and political events as evidence of the formation of a sense of identity rather than the effect of novelty, suggesting that the reason that they continued to be remembered so strongly and positively was that they came from the period in an individual’s life when long–term goals were being formed, and that as long as these life goals remained relevant, the memories associated with them would also remain relevant and accessible.\(^{53}\)

Both of these theories may have relevance for the current study. For most people the period between 10–30 years of age (and especially the period from 15–25 years of age), involves many novel experiences, one of which is usually initiation into the culture and practices of an adult vocational community of practice. Equally, becoming an integrated part of such a community of practice demands a level of commitment and acceptance that must have a significant impact on the formation of a developing personal identity. Perhaps novelty and self-relevance both contribute to making the skills, knowledge and values of people’s early communities of practice particularly memorable and influential in later life.

Further research by Dorthe Berntsen and David Rubin in 2002, however, found that not all memories from the “bump” years were preferentially preserved. Positive memories were highly likely to be preserved, but sad and traumatic memories decayed uniformly with time, just like memories from outside the “bump” period.

\(^{52}\)Rubin, Rahhal and Poon, “Things learned in early adulthood are remembered best,” pp. 5–6.

This means that people not only tend to remember more positive than negative things from this period of their life, but also that they remember things from this period more positively than from any time in their life, except for their more recent years.\textsuperscript{54} This is very similar to the effect that is commonly known as nostalgia, and strong connections have been noted between the effects of the reminiscence bump and the tendency for people to remember the time of their youth nostalgically, both as a special and positive time in their individual life, and as “their” time in the sense of their being a member of a special generation or cohort.\textsuperscript{55}

Berntsen and Rubin suggest that positive memories are preferentially preserved because they fit into socially acceptable “life scripts”, which they define as the positive life events that are expected to occur and the patterns that normal lives are expected to take within a given culture. While negative events such as death are recognised to occur, they are not viewed with anticipation and are not generally expected to happen at any particular time of life. Positive milestones, on the other hand, are looked forward to, planned for and celebrated, and in the West at least, most of these important milestones are expected to be achieved between the ages of 15 and 30.\textsuperscript{56} Berntsen and Rubin suggest that because these milestones are considered so important and positive, they are regularly discussed and thought about throughout the remainder of the life span, meaning that memories of them, and of the time in which they happened, are regularly rehearsed and reinforced. Negative events, however, are socially less acceptable, and rehearsal of them is often discouraged (albeit in subtle ways). With less rehearsal to reinforce them they are more likely to fade according to the normal power law described in note 45, regardless of whether they are formed during or outside the period of the reminiscence bump. No studies have yet been done, however, to find direct evidence that life scripts exclude negative memories and preferentially allocate

\textsuperscript{56}Berntsen and Rubin, “Emotionally charged autobiographical memories across the life span: the recall of happy, sad, traumatic, and involuntary memories,” pp. 640.
positive events to young adulthood, so the theory at present remains speculative.$^{57}$

The exact mechanism of memory formation and retention aside, however, the research discussed above does suggest that the period of late adolescence and early adulthood is a particularly important source of positive and long-lasting memories, and that such memories can continue to influence people’s views and behaviour throughout their lives. As David Pillemer has remarked:

Some momentous events contain lessons that apply far more broadly than the local context in which the episode first occurred. When the person encounters new situations that are structurally similar to the initial occurrence, the resonant memories are activated, thought about, and discussed. In these instances, personal event memories are not simply static records of “what happened”; they are active, persistent influences on the life course.$^{58}$

In relation to the current study, this suggests that the knowledge and values that people carry with them from early vocational communities of practice remain influential throughout their lives precisely because becoming a paid member of a vocational community of practice (in other words, getting a job), is an important and positive event in a culturally determined “life script”. A number of large technology heritage producers interviewed for this study in fact provided examples of this occurring in their own lives, as they noted the formative influence of their early (non–heritage) training and experiences on their later approach to heritage. Schroeder, for example, described the influence of his initial training as a mechanic on the way in which he continued to make a first appraisal of an historic object:

One of the things I think I bring to conservation because of [being a mechanic] is that the first thing I look at when I look at anything technical… is how is it designed to work? And how is it constructed?

$^{57}$Berntsen and Rubin, “Emotionally charged autobiographical memories across the life span: the recall of happy, sad, traumatic, and involuntary memories,” p. 647.

$^{58}$Pillemer, “Momentous events and the life story,” p. 126.
Eamonn Seddon described the impact of his initial training in theatre on his vision for the visitor experience at Puffing Billy railway:

My background before I got involved in playing trains was in the theatre. I was a professional actor, stage manager. And you go to the theatre to have an experience, you read a book to have an experience, you go to a film to have an experience. Why not go to a railway to have an experience? So it needs to become far more than a train trip.

John Boardman, private owner of tractors at the Campbelltown Museum, described demonstrating — for heritage purposes — skills that he began learning as a child on his family farm and then reinforced through a formal apprenticeship as a young man:

I’m a plant mechanic — did my time with Caterpillar, 18 years on the spanners, then started operating which I’d done part time since I was a kid…The old bulldozers — you’ve got to stop and put it in gear…The old drag line — it’s like trout fishing.… You demonstrate an old art and when you get it running right it just seems natural and easy, but people don’t realise how much is involved in doing it.

The formative influence and persistence in memory of learning from late adolescence and early adulthood may well be the reason that many producers of large technology heritage tend to approach their objects from the point of view of the values and approaches of their first occupational community of practice, regardless of whether their object, their organisation, or their visitors, are best served by that tradition in the new heritage context. Producers who trained first as conservators, curators, engineers, tradespeople, industrial archaeologists and others all have distinct community traditions of ethics and practice, and as these traditions have served them well in previous situations, they have come to believe that they are the “right” way to do things both in a practical sense and, to some extent, a moral sense as well. This leads to
philosophical and practical divisions among people working with large technology heritage, causing significant barriers to co-operation, and sometimes outright conflict.

The most obvious of these divisions is between those who feel they belong to the community of engineers and those who feel they belong to the community of conservators. Large technology has only recently come to be seen as an area of heritage that offers particular challenges and requires specific training, and there are still very few people who have formal training in both mechanical or engineering skills and materials conservation. People with engineering backgrounds are therefore frequently hired to carry out conservation work on large technology heritage items regardless of whether they have any formal conservation training, while conservators are frequently drafted into looking after large technology items regardless of whether they have any understanding of machinery, or any familiarity with the challenges presented by big objects.

People with mechanical or engineering backgrounds typically have a good understanding of the needs of machinery in service but as John White explained, they generally have relatively little understanding of the demands placed on machinery in a museum:

I think engineering expertise is useful with large technology objects, but it brings with it such major problems about the conservation of an object as a historic item... Because applying an engineering approach to an object to one of those historic [large technology objects] can mean that you can effectively wreck it in 12 months... [Wrecking it meaning] that you look at an object and you wouldn’t know the difference between it and a fullscale model. [Eliminating] all the things that make an object real and all the things that tell you, in the first hand, about how it was built and operated and its history...

Conservators, on the other hand, typically understand the materials of which the machine is made very well, but have little idea what the actual machinery is or what goes
on inside it, as McVey pointed out:

Our biggest museum in Sydney is the Powerhouse... One of the conservators there [was talking about] “that big green thing over there and that small black thing over there”... They could preserve it and it was in a nicely controlled environment but they had no idea what they were looking at.

Schroeder, who trained first as a mechanic and later as a conservator, explained his view of the differences between the two approaches:

The conflict is... about what you’re trying to do... The premise for... a mechanic [is that] their customer wants [their] car to go well. So if it needs major work you will ask them [for permission], but you will [also] do things that maybe are not 100% necessary, but [that] will enhance their experience of it... As a mechanic, you learn that most of the stuff you do people can’t see, so their impression of what you have done is based on what they can see. So you do these things that aren’t necessary. [Even for minor things.] If it’s broken you always fix it, or suggest that it should be fixed.

According to Schroeder, for a mechanic the desired result is a satisfied customer, and if the customer does not know enough about the vehicle to understand the improvements that have been made to the hidden parts of the vehicle (those parts that, as discussed above, are so effectively disguised by elegantly styled body panels and comfortable interiors), mechanics will often fix or adjust something that is not strictly necessary — but that the customer can see or feel for themselves — to increase the customer’s confidence that work has actually been done and improvements made. For a conservator, however, the desired result is preservation of as much of the historical evidence of the object’s life as possible, and such mechanics’ “confidence boosters” are seen as confidence tricks — unnecessary and dishonest alterations to the historical
evidence embodied in the object. For people who were initially trained as mechanics, and who begin working with historic mechanical objects later in life, these two different approaches set up a conflict that has to be worked through and resolved, either by moving to a new set of values, or by integrating the two different approaches into a new and more nuanced approach to the preservation of historic machinery. Schroeder described this as a non-intuitive process that generally required explicit discussion and exploration of alternative options, either through a formal teaching course, or through workplace mentoring:

The conflict for me...was dealt with while I was training, at an intellectual level. But...people [like volunteers] who come direct from trade background to this sort of work, I can see them working through the conflict as they are working...it was often hard to get [the volunteers] to stop and record what was wrong and ask 'What should we do about this?' Rather than just jumping in and going "I'll just fix this bit" as a natural thing to do. But because I did the course at university...it was always the ethics [you considered]. The "How do we do this? What are we here to do?"

The engineering tradition is also focused on understanding and appreciating the way the object was designed to function. When the object has become "heritage" the original utility of its function is usually no longer practically or commercially important. Instead it has a new "heritage" purpose, which many engineers see as being to embody and express engineering ingenuity and technical progress. Each object provides a demonstration of their status and achievements, both as individuals and as a community of practice. For Steve Gower, for example, this record of progress and achievement could be seen in the carefully controlled, stepwise development of military weapons:

When you start...you test the prototype and you say "Right...[we] will... freeze the pattern [at], say, a Mark 1." Then you do more trials and you
say, “Hey, that didn’t work... We’ll have another [design] program.” This will be Mark 2 or Mark 1 star or something... I’ve seen missiles: P10, P20, P38, P41. They’re all different modifications, for a good reason, because something has a weakness and you’ve enhanced it. And this thing might [be modified] like that it’s whole life.

This interpretation of the significance and meaning of technology objects is so fundamental for the engineering community that in 2008 the National President of Engineers Australia (EA), in the opening sentence of his foreword to the guide to EA’s Heritage Recognition Program, defined the rationale of the program as follows:

Recording the history of engineering and ensuring the conservation of engineering heritage works play important roles in establishing engineers’ professional standing within the community.59

For engineers, a technology object that is in working order, or as close as possible to working order, is felt to be better able to represent and honour the history of engineering progress and achievement than one that is not in working order, as Schroeder described:

My preference is to have them working because that is one of the things that speaks to me, that it is a working thing... That is what it is for when it comes to technology, it is for a purpose and it achieves that purpose by functioning. If you take away the function then you are distancing yourself further from what it is about... [And] if people in the future do want to investigate the past, then if it works... they are going to be in a better position to understand it than if it doesn’t.

From this point of view an object which does not function is damaged or incomplete, and of lesser worth than a similar object that does work. For an engineer, a damaged object is not adequate for its original purpose, and neither can it satisfactorily represent that original purpose as heritage. White explained:

...an engineer would often have some considerable difficulty viewing a damaged object as being legitimate. They would wish to repair it because their entire training has directed that a damaged item is flawed, possibly dangerous, and certainly is unsatisfactory in terms of what they expect to achieve in working on an object...you can have conversations with people with that background and they can’t understand why you would want to conserve damaged material... It was also believed, from that background, that the best way of preserving an object was to apply the kinds of techniques which were associated with an operational object; in other words removing paint, neutralising corrosion, repairing all structural damage, repainting, refitting, re-machining, and ending up with something that looked like an object, or in fact performed like an object which could be operated. That...cuts very deep. If it doesn’t work, there is a problem with it.

For an engineer or mechanic, to leave a machine in a damaged, dirty or even just shabby condition goes against their vocational training and implies neglect or betrayal of the standards of their community of practice.

By contrast, the materials conservation tradition views the object as a witness.\textsuperscript{60} Conservators’ training and codes of ethics teach them that the physical fabric of the object, and any alterations to that fabric, should be preserved as documents that provide evidence of the eras and events through which the object has lived. Current heritage assessment methodology includes the question “Does the condition of the item make an important contribution to understanding its use, history, creation or develop-

\textsuperscript{60} Muñoz Viñas, Contemporary Theory of Conservation, p. 30.
ment?”. The Australian Institute for the Conservation of Cultural Material (AICCM) Code of Ethics, which both reflects and influences the professional standards of conservators in Australia, states that: “Evidence of provenance and of the history of the cultural material should be preserved.” As Maggie Myers of the WA Maritime Museum said:

I think generally in conservation we are more aware of what the total history of an object tells us and that we don’t remove things unless we are sure that that is what we have to do.

Myer’s use of the pronoun “we” implies a sense of being part of a community with clearly defined values that members are expected to uphold. These values are explicitly inculcated in conservators during their training, and learning them is part of the process of becoming part of the conservation community of practice, as Schroeder explained:

The first part of every subject [at university] would be a discussion of what the ethics of conservation are and what conservators are here to do and how you approach a treatment... [It was] related to the AICCM code of ethics, a prescriptive list of “conservators don’t do the following things.”

Documents of heritage standards and methodology rarely discuss any requirement to preserve or restore the functionality of an object, and even if they do conservators may disregard them. Barbara Appelbaum observes that, despite the fact that

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61 This question is raised in the publication Significance 2.0 in the section on Comparative criteria [for significance]: Condition or completeness (p. 49). A sample answer to the question in relation to a large technology item is provided in the statement of significance for the Clayton and Shuttleworth steam traction engine (p. 51), which says: “The engine shows evidence of its hard working life and some post-manufacture adaptations to enhance its operation and to equip it for other work, such as chaff-cutting.” Roslyn Russell and Kylie Winkworth. “Significance 2.0”. 2009. Collections Council of Australia. URL: http://significance.collectionscouncil.com.au/ (accessed 24/06/2010).

to perform treatments that “do not adversely affect cultural property or its future examination, scientific investigation, treatment or function”, in practice conservators tend to ignore the mention of preserving function as it conflicts with the commonly held conservation principle that physical use causes objects to deteriorate, and should therefore not be allowed. Moreover, an historical event which may have stopped an object functioning is often seen as the most historically significant event in its life, and physical evidence of the event is seen as a high priority for preservation. The Japanese midget submarine on display at the the Memorial, for instance, was deliberately scuttled by its crew when it became trapped in Sydney Harbour, a suicidal action that prevented either the sailors or their craft falling into Australian hands in working order. From the perspective of a conservator, and indeed many curators, to restore functionality to such an object would be to remove a major part of the significance that makes the object worthy of preservation as heritage, as well as a feature that gives it drama and pathos as a display.

The changes required to restore either the functionality of an object or a semblance of an earlier appearance are also viewed with concern by conservators. John Kemister, large technology conservator at the Memorial, commented:

> I think that’s the biggest thing in dealing with these relics, is being faithful to the relics. By that I mean not changing them. The moment you undo a nut or a bolt, you’re changing it, so even just doing that simple action you’ve got to be very careful about why you’re doing it… Is there a little bit of paint evidence under the head of the bolt? Is what I’m doing damaging the relic, or is it going to be providing more of a benefit than a detriment to the relic?… We need to be faithful to the things that we’re dealing with


64 Appelbaum, Conservation Treatment Methodology, p. 100. The same problem arises in relation to objects from indigenous cultures, and is discussed in detail in this context in: Miriam Clavir, Preserving What Is Valued: Museums, Conservation, and First Nations, UBC Press, Vancouver, 2002. See the Introduction for a good summary of the issues.
here because very often, other than the documented stories behind them, the only concrete evidence we’ve got of the history of a particular relic, is the relic itself.

This concern for the object itself is a guiding principle of the conservation community of practice, and while conservators may recognise the need to modify the way they treat objects to accommodate display requirements, or restricted budgets, or alternative ideas of the “best” way to preserve heritage, they often feel personally guilty about such compromises and worry that they will be judged negatively for their actions, both by their peers and by future generations. As Schroeder said:

…it is always going to look as though it was my [fault]. Certainly if people read the treatment report, they are going to think that I am the person who chose this route… I shouldn’t really be worried what people in the future think of me as a person, or as a professional, as long as I am comfortable with what I have done, but it’s hard not to feel that people will think that I have done a bad job.65

Communities of practice are supportive, but they also require support in return. To belong to such a community, and to have status within it, members have to respect and share its values and participate in its enterprises. This is a personal investment that becomes part of a person’s identity. It is not lightly cast aside, and continues to inform that person’s life and actions beyond their engagement in that particular community of practice. As Wenger notes:

…your colleagues are there too, looking over your shoulder, as it were, representing for you your sense of accountability to the professional standards of your community.66

65While not specifically talking of concerns about technological heritage objects, Barbara Appelbaum has also discussed the guilt and worry often experienced by conservators when they feel unable to reconcile the practical needs of heritage with the idealistic ethics of the conservation community. Appelbaum, Conservation Treatment Methodology, pp. 252–5, 266–9.

66Wenger, Communities of Practice: Learning, Meaning and Identity, p. 57.
5.5 Conclusion

The different ways of approaching and interacting with large technology that have been discussed above are neither mutually exclusive or deterministic. To follow one route is not necessarily to eschew another: to come from one particular background is not to end up with one particular, pre-determined result. These preferences do, however, go some way towards explaining the diversity of approaches that can be observed among large technology heritage producers.

None of these approaches are intrinsically good or bad or right or wrong. They are merely different. They come from different perceptions of value and they achieve different results. They are, as discussed in this chapter, strongly influenced by the values and perceptions that producers of large technology heritage bring with them from their pasts, and in particular the skills, approaches and social attitudes in which they have been immersed during the formative period of late adolescence and early adulthood.

Producers of large technology heritage are also, though, influenced by their situations in the present, and it is therefore the influence of the present that will be discussed in the next chapter.
A shared passion. Allen and Deborah Hillard in their shed at the Campbelltown Museum

Image: Alison Wain, 2008
Chapter 6

Belonging in the present

6.1 Introduction

The previous chapter explored the influence of experience from the past on the preferences and choices of large technology heritage producers. This chapter will explore the equally pervasive influence of social and personal needs in the present, with particular reference to the human impulse to belong to groups and to create shared identities.

Belonging — being involved in social relationships — is considered to be a fundamental human drive, as demonstrated by Roy Baumeister in an extensive review of the social psychology literature. The need to belong is so strong that people will form social bonds under almost any conditions:

People who have anything in common, who share common (even unpleasant) experiences, or who simply are exposed to each other frequently tend to form friendships or other attachments.1 [Emphasis added.]

Forming and consolidating positive social relationships makes people happy, keeps

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them healthy, and helps them cope with stressful situations: being unable to form satisfactory relationships, or suffering deterioration or loss of existing relationships, makes people anxious and unhappy, makes their health poorer and reduces their capacity to deal with problems. Belonging to a group — any group — thus has significant advantages, and receiving acceptance and positive feedback from members of that group is of the highest personal importance.2

The pre-requisite for becoming involved with large technology heritage is therefore not necessarily an interest in the machinery. The formation of social bonds may often be the most powerful incentive to become involved in the field, at least for voluntary workers (those who are involved with large technology heritage either as private owners or as organisational volunteers). For paid workers the initial impetus to become involved with large technology heritage may be the needs of their organisation rather than social connections, but the motivation to continue that involvement can be strongly influenced by whether the social identity and relationships they develop through their participation are characterised by positive interactions or by conflict and rejection.3 For both voluntary and paid workers, belonging to a group in which they feel accepted, valued and needed, is of crucial importance, and in the context of large technology heritage, this group usually takes the form of a community of practice.

Wenger, in his study of communities of practice, suggests that there are three different modes of belonging: engagement, alignment and imagination. Engagement is about joining in — a process of mutual participation in the negotiation of meaning and the formation of identities. Alignment is about working together — co-ordinating individual efforts and activities to contribute to broader, shared structures and enterprises. Imagination is about seeing potential — creating new images of the world and of the self, which are both based on, and at the same time transcend, past experience.4

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3 Baumeister and Leary, “The need to belong: desire for interpersonal attachments as a fundamental human motivation,” p. 520.
4 Wenger, Communities of Practice: Learning, Meaning and Identity, pp. 173–81.
This chapter will examine the impact of the need to belong on the context, and the character, of producers’ interactions with large technology heritage.

6.2 Engagement

While it is has been demonstrated that people can and do form social bonds in almost any situation, it is equally true that, much of the time, they make quite specific choices about where to focus their social energies. This raises the question of what drives some of them to join groups focussed on large technology heritage, and why they might choose one large technology heritage organisation over another.

Most voluntary producers interviewed for the current study mentioned that they had a long-standing general interest in mechanical objects and skills, but their choice of a particular object, society or institution in which to invest their time and energy was often driven by less by passion for the particular technology than by the need to find a social setting in which they felt comfortable. A private owner at the Gold Coast car show for example, listed the opportunity to spend time with friends as the major motivation in his choice of an organisation and activity for his retirement. His interest in hand-skills came second:

[I was] retired, looking for something to do. The people next door were in the club, they had a couple of cars. I have always been interested in mucking around with my hands.5

Graeme Hoobins, volunteer at the Pumping Station at Scienceworks, obviously felt a sense of guilt that his choice of volunteer activity and organisation was as much driven by social considerations as by his passion for the technology:

The social — That should not make any difference but it does... If you get a good bunch of guys, people, that makes a difference.

5Gold Coast car show, Producer 59, male, name not provided.
Although there is compelling evidence that people who belong to groups are better off both physically and psychologically, to gain the benefits of group membership the individual must feel that the group is relevant and appropriate for them, and has meaning for them.\textsuperscript{6} In other words the individual must “self-categorize” as a member of the group. Self-categorization theory argues that people form group bonds on the basis of perceived similarities to each other. Such similarities can seem fairly arbitrary to group outsiders, but the important thing is that they have meaning for the group insiders, making them feel more similar to each other than to people in other groups.\textsuperscript{7} People who feel that they have such a shared perspective will see themselves as an “ingroup” with a shared social identity, and will perceive groups who do not share this social identity as “outgroups”.

Most people, of course, belong to many different groups simultaneously, some of which are “nested” inside each other. A member of a large technology heritage club for instance, may also feel part of a broader community of people who are interested in heritage generally, or a linked community of people who are volunteers, or a completely separate group of people who are family members. The social context at the time determines which of these social identities is most salient, and therefore which has most influence on the individual’s behaviour in that context. A person who defines themselves as a member of a large technology heritage society, and expresses the values of that group while in the company of other members, may re-categorise themselves as primarily a family member, and behave accordingly, when relatives arrive to be shown around the club site.\textsuperscript{8} One consequence of this is that, in different contexts,

\begin{itemize}
\item \textsuperscript{8} This is the component of self-categorization theory known as “comparative fit” — the perception that “the differences between members of [one] category on a given dimension of judgement [are] smaller than the differences between members of that category and others that are salient in a particular context.” The other component of self-categorization theory is “normative fit”, which is the caveat that specific membership categories only come into play if the perceived differences between them are consistent with, or normal to, the perceiver’s expectations for those categories. Haslam, \textit{Psychology in Organizations: the Social Identity Approach}, p. 50.
\end{itemize}
the perceiver can see the same person as both an ingroup and an outgroup member.\textsuperscript{9}

Members of an ingroup tend to treat other members of their group more favourably than they do members of outgroups.\textsuperscript{10} In other words, such groups are not merely the sum of their parts; the sense of belonging and shared identity shared by individuals in a group induces them to define themselves, think and act in terms of group rather than in terms of individual values and goals. While ties such as kinship, shared interests, or similar life circumstances are often seen as the basis for social bonds, as was mentioned above, any tie has been shown to promote this feeling of bondedness and the behaviours that go with it, even being assigned to groups that are known to be randomly generated.\textsuperscript{11} It need not be surprising, then, if social identity takes precedence over specific aspects of large technology heritage as a motivation for joining a group, as it is not the heritage that drives the bonding process but the need to belong.

This is not to say that the technology has no importance. Certainly it is often the initial incentive for a person to contact a large technology heritage society and to go and meet its members, and certainly a shared interest in large technology heritage is one of the perceived similarities that can promote feelings of shared social identity. But the fact that it is not the most important factor in this process is made very clear by the people who do not generally join such clubs or societies, or who join only under specific social circumstances.

Many people interviewed for this study commented that on the fact that the members of such societies are predominantly older males. In fact this was a major source of concern, with many participants fearing that there would be no-one interested enough to continue preserving and displaying the technology when the current generation of enthusiasts had passed on. The issue was, however, almost always spoken of in terms of interest in the technology. For instance Eamonn Seddon of Puffing Billy commented that:

\textsuperscript{10}Haslam, \textit{Psychology in Organizations: the Social Identity Approach}, p. 27.
...most of our old volunteers are ex-railwaymen — they’ve had this passion and interest all their life. Now, the modern railwaymen that sits in his ventilated cab...has not got that same passion of those guys that drove big steam engines on main line railways, so the numbers game doesn’t work for you.

What was not raised was the issue of whether some people who might potentially be interested in becoming involved with large technology heritage were simply unable to find, in such societies, social identities which they were willing to take on.

As Haslam notes, people will only identify with a social group, and define themselves in its terms, “if they value the group and find it involving”,12 and that has a lot to do with whether the group is perceived to provide opportunities for self-enhancement. Self-enhancement, in this context, can mean maintaining self-esteem or striving for self-improvement (or a mixture of the two), and it reflects the individual’s search for positive outcomes from group membership.13 If the group does not seem to offer self-enhancement to a potential member, it is unlikely they will choose to identify with it. The two demographic groups that were particularly underrepresented in the large technology heritage voluntary groups studied for this project were women and young people.14 While the reasons for their comparative lack of participation are undoubtedly complex and individual, it is useful to explore the potential role that may be played by a lack of opportunities for people in these groups to gain self-enhancement from involvement in large technology heritage groups.15

The role of women in these groups is particularly interesting. Although there were

14 People from non-English speaking backgrounds were also rare within these groups, but the study provided insufficient data to explore the reasons for this further.
15 In addressing these topics it must be noted that, while gender and age was recorded for all producer interviewees, similar data could not be collected in the present study for the whole membership of each club or society. This was because, for privacy reasons, every member of the society would have to have been contacted for permission to provide these details, and for the club administrators this was a level of work (and intrusiveness) that went well beyond what they were able to do or had agreed to do when they joined the study. Further work is needed in these areas, to more clearly identify the demographic groups who are underrepresented in large technology heritage voluntary work.
less women than men involved in both the societies of private technology owners that were investigated in this study — the Campbelltown Museum and the Gold Coast car show — there was a significant female presence in both societies. While many of the male members of the clubs were either single, or participated in the clubs without their partner, however, the women with whom the interviewer spoke were almost without exception either married to (or partnered with) a male member of the society. This suggests that the women’s social identification may have been primarily with their partner rather than with their respective club.

The women were noticeably prominent (and confident) in organisational roles within the clubs. They were, however less likely to do hands-on work on the technology than the men. As Geoff Rooks, private owner of cars at the Gold Coast car show commented:

...you don’t see a woman here tinkering with an old car. Perhaps her husband tinkers for her...

This is important because, while the women’s contributions were obviously valued, they were not perceived as being at the heart of what the club was about — they were not “core business” and they did not demonstrate the technical skills and knowledge that were seen as typical of a member of such a club. Even if a woman was technically skilled, and liked “tinkering” with machinery, it is possible that she would still never be considered absolutely typical of the group’s norms, as technology heritage enthusiasts are generally assumed to be male.

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16 Partnership status was not a focus of the research during the data collection phase, and was therefore not formally or comprehensively recorded. Further work would be needed to quantitatively analyse the level of participation of women and their attachment to male members of the clubs. During fieldwork, however, the author found that women were generally either introduced as part of a couple, or mentioned their partnership status during conversation. This applied both to women interviewed for the study, and to women encountered during casual conversations at club events.


18 Orr in fact found, in his study of photocopier repair agents, that the desire to tinker with machinery was common to both the males and females in the job, and in all cases was one of the factors that had led to their involvement in the job. Julian E. Orr, Talking About Machines, ILR Press/Cornell University Press, New York, 1996, p. 66.
This was demonstrated during data collection for the current study, when interviewees co-opted the interviewer as a member of a gender based ingroup or outgroup, and used this on-the-spot shared social identity to infer the interviewer’s levels of interest in and engagement with large technology heritage. Facial expression, body language and the pronoun “we” were used by a woman at the WA Maritime Museum to indicate that she and the interviewer shared a salient social identity as women, and as representatives of this ingroup, were unlikely to share her male companion’s outgroup interest in “boats and ships and things”:

It’s a man’s thing. We wouldn’t understand.\textsuperscript{19}

A visitor at the Campbelltown Museum made an almost identical comment, but placed himself and his male companion in the gender-based (homosocial) ingroup and the interviewer in the outgroup:

It’s a boys’ world. Sorry, but you being female you wouldn’t understand.

This is a giant sandpit!\textsuperscript{20}

A lack of interest in large technology items was seen as such a core characteristic of femaleness, that being female, in these interviews, completely trumped the fact that the female interviewer was explicitly (but uncharacteristically) expressing interest in large technology items. As Brown and Turner have said, “Individuals react to themselves and others not as differentiated, individual persons but as exemplars of the common characteristics of their group.”\textsuperscript{21}

As mentioned above, social identity groups are often nested, and while female members of large technology heritage groups may categorise themselves as members of the overall club, they may not categorise themselves as members of the technological community of practice if their role in the group is more focussed on organisation

\textsuperscript{19}WA Maritime Museum 196: Female, age not recorded but probably 46–55 or below, journalist.

\textsuperscript{20}Campbelltown Museum 129: Male, 56–65, accountant.

and administration. This raises the interesting point that the group identity of a large technology heritage society does not map exactly onto a single, technology based community of practice: within most such societies there exists at least two communities of practice — one based around the technical skills associated with the machinery, and the other based around the social, administrative and organisational skills required to run the clubs. While many of the members are part of both communities of practice, the skills, and the tools, for each are quite distinct, and there are certainly some members who focus their contributions primarily in one practice and not the other. The technological community of practice is, however, the one that is at the core of the perceived identity of the overall group, and as such has higher recognition and higher status, both within and outside the group. If the skills and activity preferences a woman brings to the group automatically place her in a role that is peripheral, and relatively low-status, she is likely to assume, probably correctly, that the group will not provide her with opportunities to maintain or increase her self-esteem. Sharing the group identity, therefore, would bring her no particular benefits.

A woman with a partner, however, is at the identity core of her family group. Membership of a family group is the most traditional role a woman can have in most societies, and the social and organisational skills that go with managing a family are seen as very typical for a woman. As a partner, therefore, she is an exemplar of the characteristics of her group and — if the relationship is a positive one — she may find more potential for self-esteem if she treats her family membership as her most salient identity and her club membership as a secondary identity.22 Her central role as a family member may then offset the more peripheral nature of her position within the club as a whole.

In contrast, Puffing Billy has many women who volunteer their time without the buffer of the involvement of a male relative, but the organisation is distinctively different from those of the private technology owners’ clubs, and has much more potential

22There is significant research showing that married people, and those with close personal relationships, are happier and healthier than those without. Baumeister and Leary, “The need to belong: desire for interpersonal attachments as a fundamental human motivation,” p. 508.
to offer women opportunities for self-enhancement. Firstly, the core values and goals of the organisation are much broader than the preservation of individual pieces of machinery. The brand “Puffing Billy” evokes not just not one train but a holistic identity that encompasses the rolling stock and built environment, the experience of travelling on the train, the connection with the surrounding forest and towns, and the comfort and pleasure factors that make for a satisfying leisure experience. This range of values and activities provides much more scope for the accommodation of non-technical skills and interests. Secondly, the key arbiter of Puffing Billy’s success as an organisation is not the satisfaction of its membership but the satisfaction of its audience, many of whom will rate the non-technical aspects of the experience at least as highly as the presentation of the technology. Because of these goals and definitions of success, Puffing Billy is much more likely to offer women self-esteem and opportunities for self-improvement than the private clubs, and it is therefore much more likely to be worth their while to self-categorise as a member of the larger Puffing Billy group and adopt its shared social identity.

Similar motivations can be seen in younger people. Again, at the Gold Coast car show and the Campbelltown Museum the few younger people who participated tended to do so through an older male relative who was a member of the society and who acted as a mentor and facilitator of access to the technology. Young people are likely to have a fairly low status overall in such groups, in part because, like most women, they tend not to have the in-depth mechanical skills that are seen as “core competencies”, but also simply because they are young, and therefore inherently junior to the older members of the group. Like women, however, they are central members of their family group, and their central status as part of a family group within the club may act to offset their lower status in the club overall.

Mentoring seems to be a key aspect of drawing younger people into involvement with large technology heritage, not merely because it facilitates access to technology that otherwise is often too dangerous, too unfamiliar or too expensive for young peo-
ple to manage on their own, but also because it induces older members of technology heritage groups to focus on the particular needs, interests and activity levels of younger people. For instance, Les Bell, a private owner at the Campbelltown Museum, liked collecting airport tow motors in part because his grandchildren could drive them safely, and he and his grandson had placed a Caspar figurine on the front of one because, although it had nothing to do with the service history of the vehicle, it appealed to them both and represented their shared interest. Jamie Croker, who, as well as being a conservator at the Memorial, was also a member of the Romans Hot Rod Association in Sydney, commented that the majority of the younger people in the Romans were second-generation hot rodders who had been introduced to the hobby by their fathers, and that the older members of the club specifically encouraged younger members to step up to management positions within the club. Puffing Billy ran a dedicated youth group that undertook activities that contributed to Puffing Billy but which also provided fun, novelty and the opportunity to learn new skills. As Sue Ham, volunteer co-ordinator explained:

They do gardening, have fun, do things which are not available anywhere else… They ran the Menzies Creek shop last time, under supervision, and they had a wonderful time.

The opportunity to gain new skills and experiences is particularly important to younger people, who generally tend to prioritise finding new information and expanding their horizons in anticipation of a future pay-off. This is less important to older people, though, who may feel that they will not have the opportunity to use new information. Many older people prefer to focus on activities which have emotional meaning for them in the present rather than offer the potential for self-improvement in the future, and they are therefore inclined to reduce the attention they pay to new information, especially that which is challenging and thus generates negative emotions. This change from a desire for future-oriented information to present-orientated

emotional meaning is not actually a product of ageing itself, but of a perception that the future is limited; it is also found in young people with terminal illnesses and even to some extent in healthy people when a particular future is limited by an upcoming change in circumstances, such as relocation to a new city. In relation to large technology heritage societies, however, it is clear that this mismatch in goals and strategies might easily lead to the view that young people were impatient, disruptive and interested in change “just for the sake of it” and an opposing perception by younger people that the “old-timers” were staid, backward-looking and unwilling to face up to necessary changes.

Such views were, in fact, expressed by a number of interviewees. Fred Vanags, one of the organisers of the very successful Maitland Hunter Valley Steamfest and a demonstrably active and innovative thinker, still expressed a surprisingly negative view of the motivations of younger people in relation to large technology heritage:

... we have very few young people coming in to learn these trades because a lot of the kids of this day and age are of the disposable generation.

Rooks, however, felt more frustration with people older than himself:

I have found them, the old ones, a bit staid.

The fact that Vanags and Rooks were both in their mid-fifties demonstrates the subjectivity of such opinions: they are not related to absolute ages, or even stages of life, but to the difference in age and outlook between one particular person or group and another.

Notably, none of the interviewees remembered having prioritised similar future-oriented goals when they were young. None mentioned, for instance, having felt that it was interesting or useful, in their youth, to learn largely obsolete trade skills that had been current fifty to a hundred years before they were born. Neither did

\[24\text{Löckenhoff and Carstensen, “Socioemotional Selectivity Theory, aging, and health: the increasingly delicate balance between regulating emotions and making tough choices,” pp. 1396–97.} \]
\[25\text{The current full name of the festival is the Maitland Toyota Hunter Valley Steamfest.} \]
they acknowledge that, as they themselves aged, they might find it more important to enjoy their existing world than to reach out to find new ones.

One of the major benefits of being part of a social group, regardless of that group’s explicit common interest, is the sense of being part of a reciprocating network of support. When people feel they share a social identity, they are more likely to regard each other positively and to communicate and co-operate with each other, thus increasing their readiness both to give and to receive help. John Wilson notes that helping is self-validating; it provides evidence that the helper is competent and can make a difference, as well as evidence that the person who is being helped is socially accepted. Both these outcomes build self-esteem and confidence.

Such reciprocal networks were spoken about with both pleasure and pride by people interviewed for the current study. For Ray Shelley, for instance, private owner of cars at the Gold Coast car show, the satisfaction he felt at being able to help other people with their cars was a big part of his liking for the whole club:

It’s a good car club we are in. I help my friends a lot with other cars.

Carl Thomson, private owner of a truck, spoke at the Campbelltown Museum from the viewpoint of the “helpee” but expressed similar feelings of pride and satisfaction:

I skimped and scraped and had a lot of help from different people with the motor and the gearbox, the diff. Benny Hugh, he owns a steam train, he is pretty lively bloke, he helped me, he owns buses.

The willingness of other club members to use their time and expertise to help him restore his truck clearly reflected well on his own standing and level of social integration into the group. Wenger, in fact, notes in his discussion of communities of practice,

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that it is “more important to know how to give and to receive help than to try to know everything yourself”, as helping each other creates mutual engagement, and thereby strengthens social bonds.\textsuperscript{30}

Helping has, as John Wilson notes in a discussion of volunteering, “a peculiar moral economy”.\textsuperscript{31} Reciprocation is expected,\textsuperscript{32} but in ways that are rarely explicitly quantified — in fact, it is considered rude, in most situations, to specify ways of reciprocating in any detail, and beyond the pale to explicitly demand the more intangible rewards for helping, such as friendship and goodwill. Helping is a mechanism that allows reciprocation to be deferred and left undefined until it is needed, and it is generally provided even if the receiver has few resources to use for reciprocation at the time the help is given. It is a way of building a “support reserve” for difficult times in the future, and there is evidence that, when they are in need, people are more willing to ask for help from someone with whom they feel they have already built up a support reserve.\textsuperscript{33}

It is perhaps not surprising, then, that of all the producers interviewed for this study, it was the private owners who spoke with most enthusiasm about the importance and positivity of helping each other. If private owners cannot pay for or do work on their objects themselves, their only option is to cultivate personal relationships that might lead to the sharing of resources.\textsuperscript{34}

Social networks are, of course, not static, but change over time according to an individual’s needs and circumstances, providing a social “support convoy” through an individual’s life. Close ties, especially family ties, may remain in the convoy for most of an individual’s life, but weaker ties, for instance to work colleagues, may drift in and out at different life stages.\textsuperscript{35} There is evidence that a considerable number

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\textsuperscript{30}Wenger, *Communities of Practice: Learning, Meaning and Identity*, pp.75–6.
\textsuperscript{31}Wilson, “Volunteering,” p. 230.
\textsuperscript{34}Warren and Gibson, “Blue-collar creativity: reframing custom-car culture in the imperilled industrial city,” pp. 2714, 2716–17.
\textsuperscript{35}Antonucci, “Personal characteristics, social support, and social behaviour,” pp. 97, 99–101.
\end{footnotesize}
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of people use volunteering, including with large technology heritage societies to fill
gaps in their support convoy, especially at transitional periods in their lives, where
they may become involved with large technology heritage as a way of replacing social
networks that they have left, or anticipate leaving. Rooks, for instance, felt that the
Gold Coast car show was something of a social refuge for many people:

We love our cars but there is something missing in our life. It is like my-
self, I am divorced... a lot of the old men in the club, older or younger or
whatever, they might have different views, but I see it as something lost in
their life and they want to tinker with their hands [instead].

Karl Kelenen used the social network he discovered at the Campbelltown Museum to
combat his feelings of isolation as a Croatian immigrant living in Sydney:

When I came here from overseas, because I had lost my family and ev-
erything, I was really disappointed... I just felt lost. Sydney is a big city
and I thought “Jeez what am I doing here?” Then my [then wife]... picked
up from the paper shop a tractor magazine...[and] there was an ad for
this club... And when I walked in there were a few boys here, showing me
the tractors and just bang! The week after I had already bought my first
tractor.

Allen and Deborah Hillard, private owners of agricultural machinery at the Camp-
belltown Museum also saw the need to replace social networks that they were about
to leave through retirement, but they had taken the proactive approach of joining the
Campbelltown Museum well before they retired, so that they were able to develop a
strong sense of identification with their new social network before leaving their old
one. They were thus able to reduce the stress associated with change by ensuring that
elements of their changing support convoy overlapped in time, with stability in one
social network able to buffer potentially stressful movement into, or out of, the other.
The major motivations for many people for participating in large technology heritage societies can thus be seen to be less about an overriding passion for the technology, and more about sharing a social identity and a sense of mutual interdependence with other people. The technology is a convenient focus for this sharing, but it will not maintain people’s participation if the social situation is not supportive, congenial and “a good fit” for the individual’s own values and sense of self-identity.

The situation is somewhat different for paid staff in heritage organisations, who have generally joined an organisation because a paid position was available, regardless of whether that position was focussed on large technology heritage or not. Many paid staff have, in fact, drifted somewhat haphazardly into working with large technology as a result of institutional need rather than personal interest, being drafted in to fill a gap or involved indirectly through their work in areas such as marketing, education or exhibition design. These are all areas of expertise that have a significant input into the success of a large technology display, but they are not areas in which people necessarily possess a pre-existing interest in large technology.

Coming from these different areas of interest and expertise, and responding to different work situations, paid staff do not necessarily feel that they have a shared social identity, or at least not one that is focussed on a common interest in large technology heritage. According to the context they might categorise themselves as members of the overall organisation, as members of specialist sections within the organisation, or even as members of a particular exhibition team, but, particularly within organisations that have a wide range of collections, they do not necessarily feel a sense of shared identity as a group interested in the preservation and display of large technology heritage. A group identity for them is therefore more often salient at the level of the organisation as a whole, and interactions around large technology heritage below this level are often a result of conscious efforts to form and maintain working relationships that cross group identity boundaries rather than a result of the organic growth of relationships within a shared social identity. These are issues of alignment rather
than engagement, and it is these that will be discussed in the next section.

6.3 Alignment

To maintain coherence within a group it is important that its members align themselves with the group’s values, and ensure that their activities contribute towards group goals.\textsuperscript{36} While this can be a very intuitive process when people already feel that they share a social identity,\textsuperscript{37} when they do not it may require conscious adjustments to their ways of seeing each other and working together. For instance, when he moved from the world of operational aircraft maintenance to the museum world of large technology heritage, Jamie Croker of the Memorial found that the requirement to conserve as much original material as possible in a historic object conflicted with his QANTAS apprenticeship training, which dictated that he should replace any damaged parts with new ones. Realising, however, that this approach was familiar to him from his family background in hot rodding, Jamie was able to align his values with his new workplace group by accepting that his family–based skills and values were more relevant to the heritage context than the values he had learnt during formal workplace training:

Dad’s Charger’s got a few stone chips on the front. The bumblebee stripes … were half polished off. And he won top original with it. So I guess I was always brought up in a “don’t muck around with it if you don’t have to” [way]. So I guess it was something that was sort of in my subconscious. But after working at Qantas, you just go to a store and buy a new part. “There’s a scratch, strip it, paint it.” So when I first started here, it was interesting to realise that you couldn’t just necessarily get a new bolt even. You had to try and save the bolt. So, yes, it was a bit of a change, but I wouldn’t say it was something that I was totally unfamiliar with.

\textsuperscript{36}Wenger, \textit{Communities of Practice: Learning, Meaning and Identity}, p. 179.
Values also had to be realigned when people moved between different heritage contexts. For example, the role of fun and personal enjoyment was quite different when working with technology that was privately owned than when working with technology that was publicly owned. John Boardman of the Campbelltown Museum, expressed his pleasure and pride in his privately owned tractor in a very personal way:

I’m probably the only bloke in Campbelltown that can do doughnuts in the middle of the main street in front of the police commissioner [in my tractor] and get away with it. I guess I’m a bit of a show off.

Matthew Churchward, however, was the senior curator of engineering and transport at Museum Victoria, and was therefore working with a publicly owned collection. He expressed his pleasure and pride more earnestly, stressing the need to use his enjoyment of the object to acquire understanding and to communicate that understanding to a wider public:

I love getting back into the experience of the way they were operated and what it was like to operate them, to work with them, and the smells of being around them and the sounds that they create. We have a Bulldog tractor that I love because it has a lovely big throaty “boomp, boomp, boomp, boomp” when it runs and it gives you a nice feeling when you hear that chugging away. It gives you pleasure. I just love displaying technology to the public and explaining to the public.

Although this may be seen as a matter of professionalism, it is actually one of context. If an object belongs to the wider community, it is inappropriate to use it for personal gain, and while this is most explicit in regards to financial gain, the principle colours all dealings with the object, including the greyer areas of deriving personal satisfaction and enjoyment from the object. Fun, and expressing your own values,
is therefore permitted and admired in the area of private ownership, but disapproved of — and often forbidden — in a public ownership context. Diana Jones of the WA Museum described the difficulties caused when volunteers used a public object for private and personal fun:

When you get the amateur people who are absolutely fanatical about some of these large objects...they can often become quite fixated on these objects. This is what we find for instance with the submarine...[It] is amazing, their complete and utter dedication to one object, but it is sometimes a little dangerous, especially if they become involved. All the people who do our tours onto the submarine are volunteers, and it is “theirs”. And it is not the museum’s! It is the museum’s, but “really” it is theirs, and they know best, and so quite bizarre things start happening. Like, they will put their own little notices up; they arrange drinks parties for their friends on board. When it is a [collection] object you can’t do this sort of thing. So it can have some management implications which, unless they are nipped in the bud pretty quickly, can lead to great embarrassment.

Actions that connote ownership and control of an object, such as putting up notices, holding events and inviting friends, are not inappropriate in themselves. Privileged access to large technology objects is, for example, quite often made available in public institutions (with drinks included) as a public program for paying guests, or as a way of thanking volunteers and stakeholders for their contributions. Such actions are only permissible in the public ownership context, however, if they are sanctioned by appropriate museum authorities and implemented using appropriate museum procedures, because these processes make it clear that the museum is the owner, that privileges are extended on a reciprocal basis (with the museum receiving appropriate benefits in return) and that potential risks to the objects are assessed

sidered to be held to be in trust for the public. The boards of trustees of these new museums had an explicit mandate to look after the collection assets on behalf of that public, and could not be seen to be deriving benefit from it themselves. Clavir, *Preserving What Is Valued: Museums, Conservation, and First Nations*, p. 13.
and appropriately managed. This is understandable in a publicly funded situation, but it does mean that people who own the technology they work on have much more freedom to play and take risks with their objects, and to make them exciting and accessible in ways that are rarely considered acceptable in publicly owned collections. Boardman commented that:

...everything here you’re encouraged to drive it around, get it dirty and have a bit of a go. [In contrast, the Powerhouse ploughing engine] came out here, they gave it a good run — [but] they had security out here 24/7 with it: from the moment it arrived to the moment it left there was somebody with it. It becomes quite a feat to get it here. Museums get the funding and restore it [and then] they don’t want to see it broken.

Aligning perspectives and contributing to shared enterprises was very difficult when people saw the differences between their separate professional or workgroup identities as being much more salient than their shared higher level organisational identity, and when these identities and groupings could change their character and meaning over time, as well as their relevance in the present. John White of the Memorial explained:

...[there are] issues that come with being in an organisation for a long, long time. You make enemies. You are present from one kind of administration which has a certain character to another administration that has a quite different character. You are present over time when fashions change. You are present over time when interest in a particular kind of period of history changes. The real issue involved and arising from that is...How do you continue to do your job?...you have to kind of learn how to work the fruit machine, which levers to pull, which battles to fight, which to ignore. How do you get on with people? How do you not get on with people?
The question of how not to get on with people is crucial because, as White notes, conflict can create enemies and cause reputations to accrete “issues”. It also causes significant distress, because people’s pleasure in forming social bonds is equalled by the distress they experience when those bonds deteriorate or are broken. Consequently, while people involved with large technology heritage could decide to leave an organisation when social relationships deteriorated, it was often in their interests to try to manage negative social interactions and to minimise perceptions of otherness and lack of alignment between groups.

It was important to do this, though, without alienating or being seen to betray the values and goals of the group that provided the individual with their primary group identity and their closest and most supportive social network. One way of doing this was to publicly express the values of the individual’s primary ingroup, but at a level that did not directly challenge significant or powerful outgroups, or in a way that explicitly acknowledged outgroups’ rights to alternative approaches. An individual could, for instance, raise or document their disagreement with a directive, but still carry out that directive. John Kemister of the Memorial commented:

You have got to have the guts to stand up to other people…without being dogmatic…You have got to stand up and say “Hang about, have you thought about this?”…all you can do in those situations is make sure that whatever the treatment is that is done doesn’t destroy that particular significant area…You can’t win everything, but you can win something.

Alternatively the individual or group could publicly acknowledge that there were multiple agendas within the organisation which prioritised different, but valid goals. Andrew Schroeder, also from the Memorial said:

I feel that any way you decide to treat an object is acceptable, regardless of the technique that you are using, as long as you provide documen-
tary justification and a record of the process you went through to come
to the conclusion that you came to. . . . sometimes I have had to. . . let go
of things and say “I am not in charge.” . . . It’s usually been in cases where
I’ve thought that more work needed to be done, or a different aspect of
the treatment. . . . was more important. And often when I’ve thought that
something else was more important it’s because I am seeing that as impor-
tant to the well-being of the object. And it’s usually something that is not a
high organisational priority. . . . And in a lot of those cases I think I probably
wasn’t being pragmatic enough.

Social identity theory predicts that such strategies, which redefine but avoid di-
rectly challenging powerful outgroups, will be adopted when people do not believe
it is possible to move between the groups involved, and when they wish to maintain
secure relations and avoid open conflict with the outgroups. These conditions require
them to be “socially creative” — to manage the situation by redefining the way it is
seen by one or both groups.40

When such strategies were not successful, conflict could stymie intergroup co-
operation and make it difficult to achieve the shared goals of the larger organisa-
tion. At the WA Maritime Museum, for example, the difficulties of managing the
outdoor display of the submarine HMAS Ovens during a period of major redevelop-
ment and tight financial restrictions polarised staff opinion, and made the submarine,
for many, a project which they did not support and with which they did not iden-

40In social identity theory these strategies are seen to apply where members of a lower status group
feel they cannot move into a higher status group, and therefore seek other ways to change their social
situation. Discussing social identity theory in his 1999 book, however, Haslam notes that a major limita-
tion of the theory is that it does not explain why people define themselves in terms of one group rather
than another, and that it is in fact self-categorization theory that sheds light on this issue. Within heritage
organisations there are certainly groups that are defined by differing levels of status and power, but there
are equally groups that define themselves along lines of knowledge and understanding. Conservators
engaging in a difference of opinion with a museum director may therefore feel that their position as ex-
erts in their field gives them professional status to which the director may not be able to aspire, even
though the director has a level of authority which they do not. Individuals in both groups may there-
fore feel that they have higher status in ways that are valued by their group, and therefore the group
boundaries may be seen as impermeable as much because members of the different groups do not wish
to move as because they cannot move. Haslam, Psychology in Organizations: the Social Identity Approach,
pp. 37–39 (especially Figure 2.5a) and pp. 42–44.
tify. Nikki King-Smith, a conservator who had worked extensively on the submarine, commented:

… there was an element of fear which came with people thinking of it because they felt that it was going to suck the museum dry of money, and it was going to take up all the resources and they just didn’t want it… people would go “Oh, bloody submarine”.

Graeme Daniel, volunteer at Puffing Billy, spoke of similar divisions:

There’s people screaming out for money in all different sections. They all want to do their own thing, and in the end they don’t know what to do…

The only positive way out of such situations was often to imaginatively reframe the challenges, a strategy that is discussed in the next section.

6.4 Imagination

Imagination — Wenger’s third way of belonging — is about seeing potential and envisioning change. As discussed earlier in this chapter, the chance to explore new possibilities is generally important to younger people who hope to have the opportunity to realise those opportunities. Seeing potential and envisioning change is, however, also a fundamental ingredient for the long-term continuity of social groups. While overly radical change may constitute a break in continuity and a loss of tradition, too little change will result in obsolescence, which is eventually also likely to lead to a loss of tradition, as the group members who maintain traditions will not replaced when they leave. Imagination is therefore vital to the persistence of social groups beyond a single cohort or generation. This issue was particularly identified by interviewees in the current study as they pondered what might happen to their objects when the current generation of older voluntary workers had passed on.

The very complexity of large technology objects provides stimulation for the imagination, and a need to imagine new ways of coping with their challenges. When
approached negatively such challenges can seem overwhelming, and can mire both
individuals and organisations in conflict and denial of the real issues. When they
are approached positively, however, they can be a source of transformation, inspiring
people to find resources and opportunities within themselves, their organisations and
their political and social worlds that they had not realised existed.

Several people mentioned personal journeys of discovery that had occurred as a
direct result of the challenges posed by large technology heritage. Rod Lovell of the
Campbelltown Museum spoke of coming to terms with his Mack truck project:

For me it has been a big learning process... I bought [my truck] unrestored
and it was in my backyard at home and I thought “Geez — this is a big
job, you have got yourself into trouble here alright.” And then I had a
rethink about it and I thought no, it is not one big job, it is thousands of
small jobs. And when I broke it down to that it was great! Psychologically
it was fantastic. Every day, even if I had scraped off a chip of paint, I had
completed a job.

Kemister made a journey from student to expert as he learned to have confidence in
his decisions about the complex layers of history in an object:

Starting from right at the start, when you are somewhat overawed with
the whole thing... you tend to be a little bit tentative... [Then] you get to
the phase where, “OK, well I’ve done that before and I haven’t destroyed
everything.” So you take a similar approach and you go into something
with a lot more confidence. And now I think I might be turning a little
bit further back towards being a little bit more conservative and thinking,
“Hang on, do we really need to do that?” or “Just a second, I need to have
a look at this, and have a closer look, because there could be something
interesting there.”

Imagination could also be a way to initiate change on a wider scale. White spoke
of convincing the Memorial to adopt a non-traditional approach to the treatment of its historic de Havilland DH98 Mosquito aircraft:

We were told, for instance, with the Mosquito, that we would have to do a traditional reconstruction by a number of people. Engineers, people from the services… And finally, with the aid of enough professional staff, particularly conservation, we had the advice to be able to say “Well actually, that’s not correct. There is another way of doing it.”

David Hallam, who, while working with White at the Memorial, had been one of the principal developers and advocates of the unconventional treatment of the Mosquito, spoke of initiating similarly innovative, cross-disciplinary work on the Grub telescope in his subsequent role as senior conservator of industrial and engineering collection objects at the National Museum of Australia:

…the thing that was really critical with [the Grub telescope project] that was that it had to evolve. We didn’t know everything we needed to know at the beginning of the project to actually forecast how long it was going to take. The curators were gathering information, as were we, as we went along. Then we had to bring in an optical engineer, retired, and reconstruct the pieces that were missing.

White and Hallam both fit Wenger’s description of “change brokers” — people who “are able to make new connections across communities of practice, enable coordination, and… open new possibilities for meaning.” Such brokers must be able to

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41 A traditional approach would be to repair the materials and components of the aircraft in the same way as they would be repaired in service. In the case of the de Havilland aircraft this would have meant cutting out and replacing large areas of delaminating plywood in its wing structures. The non-traditional approach adopted in this case was to consolidate and infill the voids and de-laminated layers with epoxy based consolidants, thus preserving original material and saving money and time. This treatment would not have been appropriate in a service situation, as the repaired wings would not have been strong enough to fly, but it was appropriate in this heritage situation, as the aircraft was not expected to fly but to represent and embody the past.

42 Wenger, *Communities of Practice: Learning, Meaning and Identity*, pp. 109–10.
translate between practices, align different perspectives, and to negotiate the introduction of elements of one practice into another. These are difficult goals to achieve and because such innovation challenges existing ways of thinking and doing, and may involve negative assessments of current practices, it may not always be welcomed with open arms.\textsuperscript{43} Ian Macleod, executive director of collection management and conservation at the WA Maritime Museum, spoke of the difficulties of challenging established practices:

> We stuffed up on the Xantho project [the conservation of the cast iron engine from the Xantho shipwreck], but I wrote up a paper about the stuff-up, because the purpose of doing work is to stop other people making the same mistakes. And there is nothing to be gained by trying to hide the fact that things went wrong. But in the process we learnt the mechanism of why and how it went wrong, so we can prevent other people making that same mistake. . . [But] you’ve got to be prepared to be sacrificed on the stage of ridicule as a conservator by saying “Yeah, we fucked up.” . . .

Macleod combines a background in pure chemistry with an understanding of the real-world complexities of historic objects, and it was this combination of different knowledge areas that drove his discovery:

> . . . we were treating the cast iron as if it was a cannon. But a cannon is deconcreted in a day. The Xantho engine was de-concreted over 5 or 6 episodes of about a week. And because you kept the cannon wet, we kept the Xantho wet, but as we were keeping it wet with sprinklers and hoses, we were washing the [protective] caustic [solution] out of the graphitised zone [of the iron] and letting fully oxygenated Perth tap water with a chloride level of 120ppm\textsuperscript{44} into the interface. And then oxygen . . . oxidised sol-

\textsuperscript{43}Löckenhoff and Carstensen, “Socioemotional Selectivity Theory, aging, and health: the increasingly delicate balance between regulating emotions and making tough choices,” p. 1396.

\textsuperscript{44}ppm = parts per million. This is a measure of the concentration of a chemical, in this case the concentration of damaging chloride in tap water.
uble corrosion products at that interface, turning them into FeOOH,\textsuperscript{45} and “boof”... the graphitised zone got spalled off! So now we know — don’t hose it, don’t continually wash it.

Even when new and better practices are developed, however, it can take a long time to convince other people to take them on. Macleod notes that similar projects are still being done in the same way that caused so much damage to the Xantho, despite his team having published their results and despite there being personal acquaintance- ships amongst the people involved in the different projects:

So what are they doing on the Monitor? [a 19th century United States historic iron ship that has, in recent years, been raised from the seabed to be conserved]. Continually washing it!... But trying to get people to change approaches and to accept new methods is one of the biggest challenges of dealing with large object conservation.

In imagining new ways of doing things, and looking outside their communities of practice to find new ideas, change brokers are not merely challenging established norms but also crossing ingroup-outgroup boundaries. This means that they are rarely typical of a group or community of practice, and rarely at the social centre of it. They operate, in fact, at the boundaries of multiple groups, and acceptance of their ideas can therefore be affected by issues of trust and legitimacy, as well as by their tendency to introduce challenging and sometimes negative information. Nevertheless, Wenger notes that some people thrive in this environment, preferring to continue creating new connections rather than moving to the established core of any one practice.\textsuperscript{46} For these people the complexities of large technology objects offer almost

\textsuperscript{45}FeOOH is an iron corrosion product that is significantly larger in volume than the original metal. As the corrosion grows it expands, pushing lumps of corroded iron off the surface of the object and rapidly destroying it.

\textsuperscript{46}Perhaps this is because, as Wenger also notes, people tend to identify most with the communities in which they develop the most ownership of meaning. Wenger, \textit{Communities of Practice: Learning, Meaning and Identity}, p. 207. It is not surprising, therefore, that people who make their greatest contributions through boundary-crossing innovation, and who feel most competent in inter-practice areas, should
unlimited scope to stretch their imaginations, grapple with exhilarating challenges, and make important contributions.

6.5 Conclusion

For producers of large technology heritage, the social world of the present is as powerful an influence on their work as the historical world of the past. The human need to belong to groups, and in the context of those groups to maintain satisfying personal relationships, to be valued, to have fun, and to be creative, drives and frames responses to large technology at least as much as the specifics of the technology itself. The importance of these social factors mean that producers’ ideas about, and presentations of, large technology heritage tend to be closely aligned with the values of the groups in which they participate, especially when those groups are focussed on a shared interest in large technology and see themselves as having considerable expertise in the area.

Some visitors to large technology are themselves producers of large technology heritage, but many are not and have no connection to groups that are interested in the subject. The groups to which they belong share their own interests and identities and these, along with their individual personal preferences, will colour their reaction to large technology heritage in ways that large technology heritage producers may not expect. There is no guarantee, therefore, that approaches to the display of large technology that engage and satisfy producers will have the potential to engage or satisfy their visitors. The next chapter will look at the attitudes of both producers and visitors to the display of large technology heritage, and examine whether their expectations and perceptions match up.

A captured audience at the Australian War Memorial

Image: Alison Wain, 2012
Chapter 7

Reaching out

7.1 Introduction

One of the aims of this study, and the reason that both producers of, and visitors to, large technology heritage were interviewed at each site, was to investigate the relationship between producer aims and visitor needs. What is the message, or the experience that producers want to give their audiences? And is this the message, or the experience, that visitors would like to receive?

In asking these questions it must be remembered that producers and visitors are not homogenous groups. As discussed in Chapter 5, producers come from many different backgrounds and consequently have many different ideas about what is the “right” way of presenting large technology heritage, the “appropriate” information to provide, and the “proper” way to present that information. Visitors also come from many different backgrounds, and range from people with extensive knowledge relevant to the objects on display (many visitors are themselves producers of large technology heritage displays in other contexts) to people such as children, who may lack even a frame of reference with which to connect the objects they are seeing.

Very often, and not unnaturally, producers aim to give their visitors the experience that they would like to have themselves, and the type of information they would like to find when they go as visitors to large technology heritage displays. These are the
experiences and the information that they find compelling, and that they regard as an essential part of a high quality experience. Eamonn Seddon of Puffing Billy, for instance, described how important it was to him to provide his visitors with the type of experience he sought himself, describing both what it was that he wanted to see in a heritage display and how disappointed he felt when he did not find it:

I want the same experience that I’m trying to offer everybody else... I’m a very firm believer in Australian history as our people and place, because it’s not old... therefore what is interesting is about the person who used it. We are such a young country that the information about the person who used it is available. We know about it and we’re not making use of it, and that to me is the massive lost opportunity.

Producers may not realise, though, that the often considerable time they have spent working on their object or area of interest may have given them different perspectives on their displays from most of their visitors. They have become, to a greater or a lesser extent, specialists, with a detailed knowledge of their area and of its connections to other subjects of interest. Their interest has also become more personal, as their experiences and growing familiarity with their chosen areas have been built into their personal histories and identities.

This chapter will explore different ways of presenting heritage information and experiences, as well as how these are — or could be — used in the presentation of large technology heritage, and how they interact with the expectations and preferences of both producers of, and visitors to, large technology heritage.

7.2 Visitors’ definitions of success

Chapters 3 and 4 examined both how visitors responded to large technology heritage generally, and how they responded to particular display options (such as seeing large technology objects highly restored, seeing them working, being able to touch them
and being able to access different types of information about them). Another influence on their responses that was highly important was the venue they were visiting at the time, as statistical analysis showed that the site where a person was interviewed actually had a stronger influence on their preferences for different display methods and types of information than their demographic characteristics.

Many visitors came with well-developed expectations of what they would see and how it would be presented. A couple at the Memorial, for instance, were quite clear about what they did, and did not, expect from the site they were visiting:

Female visitor: … You go to a museum where you can see a steam engine work and that is great, and we like to do that. But I can’t quite imagine these planes taking off and flying overhead.

Male visitor: They’re static exhibitions. If we want to see those sort of aircraft [operating] there are [other] places we can go to…¹

As demonstrated by this quotation, for some sites and display methods, the connection between site and visitor preference was clear.² The exceptionally high (92.3%) proportion of people who wanted to see objects restored to look new at the Gold Coast car show, for example, had in common not their gender, age group or occupation type, but the fact that they were all at the Gold Coast car show. Car enthusiasts are known for their detailed, self-expressive restoration work on their vehicles (as was explored in Chapter 5), so it is not surprising that their visitors should be highly interested in this aspect of the displays. The even higher (100%) interest shown by Puffing Billy visitors in seeing objects made to work again is also not surprising, since watching the trains run and riding on them is what Puffing Billy is all about. The interest in history of 98.7% of visitors at the Memorial can also surely be explained by the fact that the Memorial is a commemorative museum that tells the historical story of Australians’

¹Memorial 281: Male, >65, printer. Female, age not recorded, accountant.
²The results presented in this section are statistically significant, and generalized linear modelling has been used to confirm that site rather than other demographic characteristics, was the dominant factor in visitors’ interest in the display methods discussed.
experience of conflict. These people knew what they were looking for, and expected the site they were visiting to deliver it.

There was no evidence, though, that visitor preferences for different types of information or presentation varied along the lines traditionally drawn by producers between static museum presentations and field days (or rallies) showing operational machinery, or between the largely depersonalised presentation of public collections and the highly personalised display of privately owned objects. The Memorial, the Melbourne Museum, Scienceworks and the WA Maritime Museum, for instance, are all relatively traditional museum sites, in which large machines are mostly displayed as static objects and the focus is on information transfer and cognitive learning rather than affective and sensory experience. Scienceworks certainly features a much higher level of interactive exhibits than the other three venues, but the interactives, like the objects, are there to illustrate and reinforce a purposefully designed curatorial message and educational outcome. The Campbelltown Museum, Puffing Billy and the Gold Coast car show, on the other hand, are “living heritage” sites, in the sense that they focus on the display of operating objects and the practice and display of related skills. This is a style of presentation that offers ample affective and sensory experience but, usually, relatively little cognitive information. Objects at these sites are also presented in a relatively uncontrolled context, with visitors being largely left to construct their own experiences and interpretations. These diverse methods of presentation are fundamentally related to the way the organisations work, and to their aims and goals, and it might be expected that visitor responses would reflect such deep-seated differences consistently and strongly. Yet, overall, they do not.

Interest in information about history, for instance, was relatively low at the operating object sites of Puffing Billy and the Gold Coast car show, which might be due to expectations that these sites would provide sensory information in the present rather than cognitive information from the past. Interest in information about history was, however, also low at the Melbourne Museum, which is a museum in the traditional
style and relies strongly on the presentation of cognitive information about the past. In contrast, at the other traditional museums visited in the study (the Memorial, Scienceworks and WA Maritime Museum), interest in information about history was very high, as it was also at the Campbelltown Museum, despite the latter being another site full of operating machinery which might, superficially, seem to have more in common with Puffing Billy and the Gold Coast car show in its display methods (see Fig. 7.1)\textsuperscript{4}.

Figure 7.1: Varying levels of interest in the history of large technology objects at the different interview sites. See note 3 for further details.

Interest in objects being restored to look new was enormous at the Gold Coast car show but quite low everywhere else, including the Campbelltown Museum and particularly at Puffing Billy. Interest in seeing objects working, however, was high at all

\textsuperscript{3}A GLM test of site as a fixed effect showed that site was a significant influence on visitors’ interest in the history of the objects (df=7, \( p=0.025 \)). Data drawn from Table A.2.

\textsuperscript{4}Interest in history appears to be highest of all at Darling Harbour, but many people interviewed at Darling Harbour (which was chosen because it was not a site with an historical focus) said at the start of their interview that they were not interested in heritage. They were therefore interviewed using the “low interest” questionnaire which asked for qualitative answers only and did not include a question about interest in history. In other words, although they were likely to have had a low interest in history, they do not appear in the statistical results because they did not answer the statistically analysed questionnaire. The Darling Harbour interviewees who did express an interest in heritage answered the quantitatively analysed primary questionnaire, and are therefore reflected in the statistical results. Their 100\% enthusiasm for the topic of history, therefore, is probably at least partly an artefact of this inadvertent pre-selection process.
sites except the Melbourne Museum and the Memorial, where visitors were roughly evenly divided on the issue. The desire to touch objects was high at all sites except Puffing Billy. Interest in information about technical specifications was noticeably higher at Scienceworks than at the other traditional museum sites, but surprisingly low at Puffing Billy and the Gold Coast car show, which are both sites that might be expected to attract a high number of technically-minded machinery enthusiasts. Interest in stories about people connected with the objects was particularly low at the Campbelltown Museum, but not at Puffing Billy and the Gold Coast car show. By contrast, interest in how the object was made and how it worked showed no statistically significant variation by site at all (for details of all these statistics see the relevant tables in Appendix A).

Clearly the choices that heritage producers make — both consciously and unconsciously — have subtle and often unexpected impacts on their visitors, and equally clearly the choices that visitors make may not reflect what heritage producers expect them to do. So what are the messages that producers might be sending to their audiences as a result of the display choices they have made?

7.3 Physical messages

7.3.1 The poor relation

The traditional museums studied in this project — the Melbourne Museum and Scienceworks campuses of Museum Victoria, the Memorial, the WA Maritime Museum and the National Museum of Australia — all have large technology objects on display in their galleries that have a similar level and type of labelling, interpretation and well-cared-for presentation as the other objects displayed in the galleries. Each of these museums, however, also displays large technology objects in “outlier” locations — outdoors or in relatively open buildings or shelters. They do this for reasons including the size of the objects; the need to maintain a connection with the objects’
service contexts; the need to accommodate operating display needs; and the desire to use the objects as visual points of interest in the museum grounds.

In many of these outlier displays the level of presentation is markedly lower than in any area in the galleries. At the WA Maritime Museum and Scienceworks, for example, outdoor objects are “parked” rather than displayed to advantage; labels offer minimal interpretation; surroundings offer little contextual material; and the display spaces and objects look neglected and uninspiring. Fig. 7.2 shows the colourless and self-effacing signage that directs visitors towards the HMAS Ovens submarine, the museum’s biggest, and arguably most iconic object.

Figure 7.2: From the front of the WA Maritime Museum the HMAS Ovens submarine is largely obscured by slipway outbuildings. The only sign showing the way to the submarine is small, dull, uses grey type that merges into the grey background of a water tank, and is sited next to a tatty garbage bin. Connotations of “dull” and “rubbish” are hard to avoid. Image: Alison Wain, 2008
Fig. 7.3 shows a detail of the space within the Pumping Station at Scienceworks which demonstrates the lacklustre presentation that so often surrounds large technology objects, a level of presentation that drew the following comment from Matthew Churchward of Museum Victoria:

…the museum still has not found a way of maintaining that space [the Pumping Station] to what really should be an acceptable standard. They don’t treat it like all their other display galleries, and they really should. You might say “It is an industrial space and it doesn’t have to be quite as spick and span and clean [as a gallery space]”, but no other museum gallery in Australia would be as filthy as the Pumping Station gets and is allowed to stay.

This is not merely a matter of different conditions. It would certainly be hard to incorporate small and relatively fragile contextual materials — such as documents, uniforms and tools — in most outdoor displays, as such items are highly vulnerable to the ravages of weather, pests and (unfortunately) pilfering. It would, though, be quite easy to install weather resistant interpretive panels, and to allocate sufficient time and money to keep the displays clean and tidy. This would entail additional expense, but the internal galleries of all these museums are furnished with expensive interpretive material and cleaned regularly, so money in itself is clearly not the issue. Helen Privett, also of Museum Victoria, acknowledged the situation and offered another explanation:

We definitely have different approaches to the internal and external displays at Scienceworks…All of our internal displays at all of the sites are cleaned every six months in a program we’ve been running for about the past ten years. This includes objects included in our store tours at Scienceworks. On the other hand the objects housed in our “garage” display at Scienceworks are never included in this cleaning program. Part of the
Figure 7.3: The walls and floor of the historic Spotswood Pumping Station at Science-works are grimy and water stained, the crane rails and roof trusses that can be seen near the top of the image are thick with corrosion, dirt and bird droppings, and the tool boards and tools that once lined the walls are gone. The only interpretive material is a stand-alone unit that is stylistically unsympathetic to the era of the Pumping Station and is not integrated with the surrounding space and objects. There are impressive stationary steam engines in this space, but their setting is neglected and confusing and leaches excitement away from them. Image: Alison Wain, 2008.
reason for this is that there is dispute... about whether this building con-
stitutes storage or display/exhibition. As neither the collection managers
nor the exhibition managers take responsibility for the management of the
space we have found it drops into a black hole of management and as a
result has become very untidy and dirty...

So... we definitely treat these objects and spaces differently to internal ex-
hibition spaces. The good news is that we are starting to address this dif-
ference and question why it is the case.

This difference in presentation is important because, as Elaine Gurian notes, “...visitors can deduce from their experience what we, the producers of exhibitions, think
and feel about them.”

Graham Black discusses this in more detail, arguing that the
professionalism and level of maintenance of a presentation demonstrates the regard
an organisation has for its visitors. He also suggests that, if a particular genre of ob-
jects is presented in a way that is noticeably less professional and less well-maintained
than the rest of the displays, the implication is that that type of heritage (and those
who value it) are not as worthy of professional attention and representation as those
who value better maintained heritage.

In the non-museum, operational contexts that are such a big part of the world of
large technology heritage — field days, car shows, heritage railways and the like —
these issues are, to a large extent, non-existent. Large technology items are the cen-
tre of attention at such sites, so the sites are designed to accommodate them and to
direct visitors’ focus towards them (even hired sites, such at the car park used for
the the Gold Coast car show car Show’n’Shine, are organised on the day to feature
large objects and their display). Even though such sites often do have neglected ob-
jects on their periphery, or outside their owners’ sheds, the contrast is not between
well-presented small objects and poorly presented large objects, but between well-

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presented large objects and less well-presented large objects. The resulting message may be that some large technology objects are less significant than others, but not that large technology objects are less significant as a genre than other object types.

### 7.3.2 Peas in a pod

Two studies have commented on the tendency for collections of transport heritage to be presented in lines, noting that this is often a temptingly efficient way of accommodating collections which are daunting both in size and in the infrastructure they require.\(^7\) Rob Pilgrim, for instance, found that many automobile museums do not have separate display and storage facilities, but function more or less as open storage, with their entire collection parked in rows in buildings which are open to the public.\(^8\) Colin Divall and Andrew Scott point out that where display facilities are converted from former industrial spaces — often contextually appropriate to the objects they are displaying — the facilities themselves are organised to take advantage of such efficiencies and therefore inherently promote the display of objects in lines or rows. Railway lines, runways, piers and wharves all dictate linear arrangements of technology, and apparently open interior spaces, such as factories, may have hidden floor loading restrictions that confine heavy objects to linear arrangements.\(^9\) Logistics also restrict display options for objects that are regularly operated, as they must be reasonably easy to remove from their static display area for operational display and maintenance (see Fig. 7.4).

Display arrangements that optimise spatial and financial efficiencies are, however, not necessarily efficient at engaging a diverse range of audiences, or at helping visitors learn about or be inspired by the objects. Even when they have undeniable relevance to specific aspects of the lives of large technology objects (such as production line manufacture, sale room displays and some industrial service contexts), they still tend

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\(^7\)This style of presentation is, of course, not restricted to transport heritage — much manufacturing equipment, for example, is similarly organised.

\(^8\)Pilgrim, “The BlokeMuseum; Motor Museums and their Visitors,” p. 100.

Figure 7.4: The operating vehicles at Scienceworks are stored in a shed with lift-up doors that allow them to be driven out on the museum’s “Machines in Action” days. The need for a straight run to the operating display area, and the limited space in the shed mean, however, that when the machines are not being operated — which is most of the time — they are parked in a row, in a visually intrusive building, with monotonous signage. Image: Alison Wain, 2008.
to be monotonous and, to all but the most diehard enthusiast, overwhelming.\textsuperscript{10} This raises the question of whether the primary purpose of the site (and therefore its associated definitions of efficiency and success) is to hold and maintain a collection, or to interest and inform visitors.

If the primary purpose of the organisation is to acquire and maintain collection objects, its definition of success may be merely to have as many objects as possible, and its definition of efficiency may be to have as many of those objects housed in the available space as possible. The time that visitors spend looking at those objects and the information or inspiration that they get from them may not be of particular interest to the organisation. Pilgrim, for example, notes that many automobile collections began as, or still are, personal or corporate collections of objects, and for these organisations public display can be primarily used as a way of raising money to maintain the collection, rather than as a way to disseminate knowledge of the collection.\textsuperscript{11}

Even for these organisations, however, the visitor experience is important, inasmuch as a good visitor experience is a spur to maintaining visitor numbers, and therefore to providing the income which the organisation needs. Indeed, Pilgrim observed that a number of organisations that exhibited their collections by displaying as many objects as possible in the minimum space, were experiencing declining visitor numbers.\textsuperscript{12}

For organisations that see their primary purpose as being to engage and educate their visitors, however, the time that visitors spend looking at the objects, and the information and inspiration they derive from them, are key indicators of success. Spatial efficiency, on the other hand, is only a goal for collection storage areas. Indeed, modern exhibition designs usually place relatively few objects on display, surrounding them with space to emphasise their importance and individuality, and interpretive material to contextualise them. Such design principles help to capture and hold visitors’ interest.\textsuperscript{13}

\textsuperscript{10} Falk and Dierking, \textit{Learning from Museums: Visitor Experiences and the Making of Meaning}, p. 126.


\textsuperscript{12} Pilgrim, “The BlokeMuseum; Motor Museums and their Visitors,” p. 124.

\textsuperscript{13} Black, \textit{The Engaging Museum: Developing Museums for Visitor Involvement}, pp. 278–280.
7.4 Intellectual messages

It is not only physical arrangement and presentation that is often thought to be qualitatively different for large technology and other types of heritage, but the content and stylistic presentation of information. Ghislaine Lawrence, writing about the display of machinery in museum contexts, feels that technological items have long been displayed in a distinctly different way to other types of heritage. In Britain, she argues, the establishment of mechanics’ institutes in the nineteenth century, and of the Science Museum in 1885, meant that early museum displays of machinery were explicitly designed to offer instruction and information about the way machines functioned and the principles underlying the various branches of engineering.14 They were not designed to provide any information about the particular history of individual machines, or about aspects of their existence that were not related to engineering, such as their aesthetic design or economic and social impacts.15 Writing in 1990 she felt that this had not changed, either in Britain or America:

The perception that what an object “is” may be defined by what, in a limited technical sense, it “does” remains widespread… The labels given to artefacts such as the computerized tomography (CT) scanner… will, if they continue in the present tradition, emphasize the superior quality of the image… rather than the cost, availability, reasons for development or benefit assessments of the technique.16

Similar reservations about interpreting technological objects primarily in terms of technical ingenuity and achievement have led a number of academics and technology heritage producers to look for alternatives. A common solution is seen to be to include

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“social history” in technology displays. Divall and Scott, for example, begin their chapter on “Exhibiting social histories of transport” with the statement that:

By the late 1990s few transport museums that hoped to interest the general public could ignore “social history”…[which is] sometimes understood in an academic sense to refer to the social structures, processes and contradictions of the past, but more commonly referring [sic] to all aspects of past experience that are not obviously technological, or perhaps economic, in nature.17[Emphasis added.]

In the current study, Sally May and Nikki King-Smith of the WA Maritime Museum, who had been involved with the display of the HMAS Ovens submarine respectively as curator and conservator, saw social history as a way of interpreting a difficult and potentially stereotyped object in new and creative ways:

Sally May: Most of the Oberons haven’t been in any offensive situation, and we thought that having it [showing] just the ordinary life on board, and the cabins and their bits and pieces and their clothes, and what they wore [would be appropriate]. Because most of them just wore overalls, and they used to stink of diesel. They might wear a pair of jocks and an overall and that’s all they ever wore. For months on end. And their videos and tapes and things like that that they had on board. [And] the kitchen…

Nikki King-Smith: …[museum] people were instantly thinking of it in a way that it was a big piece of machinery and therefore that it needed to have a machinery approach…[but] most of the people who were coming to see it were interested in how people lived in it. So I tried to frame it in terms of it being a house, where you thought about how people lived in it, survived in it, worked in it, how they fixed it up, their tastes in how they decorated it and how it worked technically. [Emphasis added.]

17Divall and Scott, Making Histories in Transport Museums, p. 78.
Others such as Churchward, however, felt that the emphasis on social history had, in some cases, been less successful:

...I think over the 15-odd years we have been running here the museum has actually struggled to come to terms with what they are trying to do with the Pumping Station. They present it as an historic pumping station still, and so it is mainly interpreted in the context of the history of Melbourne’s sewerage system (improving sanitation), and the Pumping Station itself (what the technology is and a little bit about how the technology works). But they’ve failed to use it in a wider context to explain more about 19th and early 20th century technology; different forms of motive power; innovation; adaptation. There’s a lot of different themes which could possibly be developed if they were a bit more focused on the possibilities there.

Michelle Berry of Museum Victoria also had reservations, and raised the question of whether social history had really provided all the interpretive answers for large technology heritage:

I was thinking about the change in historical theory in museology, and how social history is triumphing over the original focus which was about technological innovation — documenting it and communicating it so that the industrial world could “improve”. Whereas now — I don’t know where we are now...why are we interested in technological objects?...I think technological stuff does have inherent interest, but it’s not driven by all those things that it used to be driven by.

Social history is generally spoken of as though it is separate from — and indeed in opposition to — a focus on the technological aspects of machinery, and as though it is intrinsically more interesting than technical information. This is, however, not necessarily so, and the reason that it is not so is also the reason that “social history”
is not a simple and universal solution to the challenges of presenting large technology heritage. The issue is that the content of information about the social aspects of technological history has become tangled up with the presentation of those aspects of history. To untangle this it is necessary to understand more clearly the different types of information that can be used to interpret objects, as well as the impact of different methods of presentation. This is, of course, a vast topic, so the following discussion will focus on information and presentation methods that have particular relevance to large technology heritage.

### 7.4.1 The formalist perspective

Traditional exhibition interpretation for technological objects tends to focus on the physical aspects of the objects and the engineering principles behind their development, a style of presentation that Michael Ettema has termed “formalist”.

Formalist information, according to Ettema, is focused on the development of the physical forms of objects, and on “the concrete aspects of history — both fact and artefact”.\(^{18}\) Much of it is underpinned by physical, biological or mathematical principles that do not, in themselves, vary (although understanding of them may vary), and much of it is expressed in standardised units. This makes it highly transferrable and comparable: steam power, for example, behaves today as it did two hundred years ago, and it behaves according to the same physical rules in one country and culture as it does in another. In theory, therefore, visitors can interact with formalist information, using it to relate the object they are seeing to their existing knowledge, and to ask questions and draw conclusions in the light of their own interests and background. This is a process known as elaborative processing, through which, as John Anderson describes, people create

\[\ldots\] additional information that relates and expands on what it is that needs to be remembered\[\ldots\] [and this] significantly improves a person’s ability to

learn and recall information, especially when the elaborations that person makes are driven by their own knowledge.\textsuperscript{19}

The elaborative processing of formalist information should, therefore, increase the meaningfulness of the information and its personal relevance.

There are, however, two major problems with formalist information. Firstly, the information is only useful to people who already understand the principles and units in which the information is expressed. Secondly, knowing the physical principles behind the development and use of an object does not explain people’s emotional and social responses to that object, or the impact that such factors have had on its development and use.

The first of these problems can be addressed by interpretation that introduces untrained visitors to the principles and codes underlying the relevant discipline. Unfortunately, this often leads to panels of complex technical information that give visitors little opportunity for the elaborative processing that will make the information meaningful for them. This should not be an inevitable outcome, though, as many of the concepts described in formalist information are not in themselves either obscure or specialist; they are merely highly codified examples of skills that are common to almost all humans, such as classification, measurement and comparison. Lisa Roberts, for instance, writes of the development of an exhibition designed to introduce visitors (including even young children), to the complexities of plant classification by drawing on their existing — if often unacknowledged — ability to classify things in their own lives. As Roberts points out:

Classification is amongst the most basic and universal of human activities...it is the process by which people sort everything from laundry to knowledge.\textsuperscript{20}

By inviting them to think of their own ways of classifying plants, the developers of the display introduced the idea that there were many different possible ways to classify plants, and that the visitors’ classifications were just as valid as the traditional scientific classification, albeit they produced different ways of understanding and relating to plants. By approaching the topic through the visitors’ own life experiences, the display avoided the subliminal message that the information was “difficult” and only accessible to the initiated (a perception that was noted in Chapter 4 to be a particular problem with many displays of technology objects). It also provided the opportunity for visitors with different levels of familiarity with the subject to share ideas and interact socially, without the less experienced members of the group feeling left out or at a disadvantage.

The second problem with formalist information — that it does not provide any understanding of human emotional and social behaviour — is the one that has led to the interest in “social history”, and the perception that displaying social information will make technological objects more interesting and accessible to visitors who do not have a technological background. Unfortunately, this perception rests on the fallacy that formalist information is about things and is inherently dull and impenetrable to the uninitiated, and that social information is about people and is inherently interesting and accessible to everyone. It is only necessary, however, to think of the multitudes of social statistics that are generated in the modern world (census records are a perfect example) to realise how misleading this perception is. Such statistics are about people, not objects, and yet they are presented and analysed in a formalist manner. One of the criticisms often levelled at them, in fact, is that they are dull and impenetrable, and that they focus on “what” happened and not why it happened.

The formalist information/perspective, therefore, can be either technical or social — it is the presentation of the information, not its content, which defines it.
7.4.2 The analytical perspective

Formalist information is contrasted, by Ettema, with what he defines as the “analytical perspective”, an approach that focusses on abstract explanations for the events of history, contextualised by the “ideas, values, and other social circumstances of their time”. According to Ettema, the analytical perspective aims to teach “not just what happened, but how and why it happened”.21

Ettema’s distinction between formalist and analytical approaches provides a way of separating the content of information from the methodology adopted to make sense of and disseminate it, and therefore of moving beyond the simplistic idea that concrete facts are dull, and social facts are interesting. It is, in fact, equally possible to discuss the development and physical form of objects from an “analytical perspective”, focussing on the values and social circumstances that influenced their development rather than concrete details such as date, maker, function and place of origin. Andrew McVey, private owner of a steam traction engine at the Campbelltown Museum analysed the difference between British and American steam tractors in exactly this way:

The one on my right is an American built [Case] engine, the one on my left is British built [a Fowler engine]. If you look at the two, they are both large, they both did basically the same job. The American engine, for a lot of people, is an uglier engine, everything is exposed, everything is functional. The British engine is a lot more nicely finished, rounded edges, more brassware, a lot of techniques involved. However when you get down into it, the engineering in the American engine is made for maintenance, ease-of-use, replaceability, fixing it in the field. And ultimately the Americans won: Case is still around today, Fowler is long gone.

The analytical perspective, just like the formalist perspective, is only a way of handling information; it is not, in itself, information.

Ettema asserts that the analytical interpretive perspective is empowering for visitors to museums because:

…it communicates ideas that allow people to use the past to formulate reasonable explanations for the way we live, the things we value, and the problems we have in the present.²²

The analytical perspective is certainly very powerful in one particular way: it gives the visitor a social frame of reference in which to place concrete facts, a way to integrate social and concrete information to better understand the development of different things under different circumstances. In another sense, however, the analytical perspective is very limited, as the conclusions it presents are not deducible from first principles or reducible to standard categories, but rely upon a synthesis of many different sources of data. It is, therefore, the preserve of people who have done research in the relevant area, and this makes it arguably less amenable to elaborative processing by a visitor than information presented in a formalist manner. After all, while a fair number of museum visitors do have some background in formalist physical or statistical information, far fewer of them have a background in the study of the highly variable factors that have influenced historical developments in a particular context. Ettema himself acknowledges that visitors tend to find exhibitions developed using the analytical perspective abstract, remote and intangible, and that — much to the chagrin of the exhibition developers — they commonly bypass carefully constructed analytical presentations of information to just gaze at the objects.²³

7.4.3 The local perspective

There is another approach to information that is not discussed by Ettema, but which is implicit in the many texts that discuss the importance of information that is connected to visitors’ own experiences. For the purposes of this study, this will be termed

²²Ettema, “History museums and the culture of materialism,” p. 75.
the local perspective. As with the formalist and analytical perspectives, the local perspective is not a particular type of information but a way of understanding and using information. Where the formalist perspective provides understanding by placing information in named and quantified categories, and the analytical perspective provides understanding by placing information in broad social and historical contexts, the local perspective provides understanding by connecting information to a particular identity, such as a person, an object, a place, or a time.

The local perspective thus integrates different types of information on a very small scale. For a visitor to a heritage site, this can make the information very affective and very much part of the present, and therefore vivid and personally relevant. These are qualities that — as discussed in Chapter 3 — work to promote visitor engagement with displays. And because the local perspective presents information through the prism of a local identity, that local identity is often present in the display in some way, allowing visitors to interact with it, or interrogate it, on their own terms and for their own purposes. When the local identity in question is a physical object, visitors have the opportunity to gain sensory and affective information just by looking at it and bringing into play their general knowledge of the world. A familiarity with technical principles, or a background knowledge of social history, may deepen their understanding of such an object, but such special knowledge is not a pre-requisite for engagement. This means that the local perspective is important for engaging visitors who do not already have an interest in, and sense of connection to, the heritage on display.

On the other hand, the local perspective can be seen as small and obsessive — the minutiae of a single life, a single place or a single object may tell the visitor nothing about the wider human story and prompt few connections with other times and places. This limitation was at the root of the dislike that the director of the Memorial, Steve Gower, felt for a service patch that disfigured an otherwise undamaged Messerschmitt Bf109 aircraft — the patch, for him, represented only an isolated incident in-
volving a single plane, which he felt detracted from a wider and more important story of wartime engineering and ingenuity.

The formalist, analytical and local approaches to the presentation of information all have important roles in producing engaging and meaningful heritage displays. Used on their own all of them can be dull and un-engaging — especially to people who do not already have the expertise to understand them, or a prior interest in the information they present — but used together to illuminate a topic from different perspectives, they can be very effective.

7.5 Ambient messages

When Pilgrim interviewed visitors to the National Motor Museum in South Australia for his study of car museums, five of them turned out to be men whose female companions felt the museum had so little to offer them that they had not even come into it, but were waiting outside in the carpark. These women were clearly not enjoying their time at the museum, and their dissatisfaction — and presumably impatience — was also curtailing the enjoyment the men felt, as well as the duration of their visits.24

Producing displays that can engage a variety of audiences simultaneously requires more than just well–cared–for objects and well-designed information. They must be able to make visitors who do not have prior knowledge of a subject feel catered for and included, without boring visitors who do have an extensive prior knowledge of the subject. Three factors emerged from the interviews in this study as being particularly helpful for all visitors engaging with large technology heritage, regardless of their level of prior knowledge or their demographic categories. These were variety, narrative, and a desire for a sense of control over their experience, and it is these factors that will be discussed in the last section of this chapter.

7.5.1 Variety

The first factor that was mentioned by many visitors, and indeed producers as well, was a desire for variety. Visitors sought variety in the types of site that they visited, in the heritage that they saw and in how it was presented. This is perhaps not surprising, as humans seem to require a certain level of novelty to feel interested and satisfied, and will actively seek out situations that provide it. Drawing on psychological research Falk and Dierking comment that:

Curiosity...is driven by the need for stimulation...the desire to promote, then satisfy, curiosity aptly characterizes the motivation behind most free-choice learning...and is a major factor in determining whether environments are appealing. Environments that have “mystery”, provide a moderate sense of the unknown, are complex, and invite exploration are far more desirable than those without those qualities.25

Visitors interviewed in the current study also frequently mentioned choosing the sites they were visiting to satisfy a variety of specific needs, such as the needs of particular members of their party, the desire to learn about particular subjects, or the desire to immerse themselves in particular experiences. They did not expect all heritage sites to do the same things, and they did not expect heritage sites to do the same things as other leisure attractions.

Some visitors, for instance, commented that the commemorative aspect of the Memorial meant that they neither expected, nor wanted, to see objects there made to look new or made to work:

You’ve got all sorts of live displays around the place. Up in Queensland we’ve got the army air museum out at Oakey: you can go to any other number of places which specialise in these activities. I think that’s the place [for working objects]. To me this is a memorial and a display.26

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26Memorial 274: Male, >65, mechanical and electrical engineer.
The unrestored look of the Cobb & Co. coach at the Melbourne Museum was also seen as providing a distinctively different experience from other leisure activities:

I like the way the carriage looks a bit rundown. You don’t want to see it brand new. You can see that in television, see it brand new, like in reenactments, historical things they make new. It’s interesting to see an old one.27

Puffing Billy was expected to provide a unique sensory experience, particularly for children:

…when we were kids we sat on the edge [of the carriage windows], and they wouldn’t ever [get to] do things like that [anywhere else], so it’s more just the experience of doing something like this and seeing the steam and going to see all the mountains.28

Visitors also expected variety within a particular venue or experience. A comment frequently prompted by the question “Do you think objects like this should be restored to look new again?” was that people would like to see both restored and unrestored versions of the same or similar objects, as the following comment demonstrates:

Yes probably [I would like to see them restored to look new], because that gives you an impression how they looked back then. But maybe both. On the one hand I want to see the plane which really flew in the state which it is right now, but on the other hand it is also interesting to see the plane brand new [as it was] in those days.29

Other visitors mentioned their fascination with the variety of different objects that could be presented, and the many different jobs they had done:

27MM89: Female, 36–45, florist.
29Memorial 260: Male, 26–35, civil engineer.
When I first came here there was just steam machinery and they wouldn’t have anything else. And they hardly got anyone here. Since they’ve had dozens of things it’s much better.\textsuperscript{30}

\ldots these boats all did a different job and they’re built for different things. That’s the interesting part. In England I saw a boat with a lighthouse on it\textsuperscript{31}

Still other visitors mentioned the attraction of different styles of presentation:

\ldots I’ve always had an interest in submarines… We’ve been inside the one in Sydney which is the same class, so I just wanted to have a look at the submarine out of the water, not in the water.\textsuperscript{32}

The ability of unexpected or unusual displays to engage attention was noted by both visitors and producers. The Parry Endeavour yacht at WA Maritime Museum, mounted at a dramatic angle as though sliding down a massive wave, was mentioned by visitors as a display that had drawn them in and made them want to know more about the boat and her history. Mike Smith, Senior Research Fellow at the National Museum of Australia, felt that a vehicle for catching buffalo which was displayed in a gallery focussing on Australia’s environment worked particularly well because it was not interpreted through “prissy green issues” but through the story of the people who built and used it and the rugged lifestyle associated with the buffalo industry in the Northern Territory. According to Mike this atypical presentation surprised people, challenged their preconceptions and reached “beyond the usual environment audience”.\textsuperscript{33}

Variety and the unexpected, though, have to be balanced by the familiar, as too much novelty can become overwhelming and frightening. People experience the

\textsuperscript{30}Campbelltown Museum 152: Female, details not recorded.
\textsuperscript{31}WA Maritime Museum 173: Male, \textgreater{}65, sales representative for steel.
\textsuperscript{32}WA Maritime Museum 192: Male, \textgreater{}65, joiner.
\textsuperscript{33}Other research has also suggested that many people react negatively to the presentation of information in ways that are perceived to be too politically correct. Laura M. W. Martin and Richard Toon. “Narratives in a Science Center: Interpretation and Identity”. \textit{Curator} 48, no. 4 (2005): 407–25, p. 413.
greatest satisfaction in moderately novel situations, those which stimulate their curiosity but allow them to place what they encounter within their existing frames of reference, to make predictions, and to have the satisfaction of seeing some of their expectations confirmed.\textsuperscript{34} For people who are already interested in large technology heritage, the technology itself will provide both familiarity and stimulation — the general look and feel of the technology is likely to be familiar, but new types of objects and new information will provide novelty and stimulation. For people who do not have an existing interest in large technology heritage the objects themselves are unlikely to provide feelings of familiarity, and may even seem overwhelmingly strange. For these people supportive feelings of comfort and familiarity may need to be provided through other aspects of the display, that they can more easily recognise and relate to.

### 7.5.2 Narrative

The second factor that seemed to be important in helping a range of people engage with large technology objects was the use of narrative. As mentioned in the section on children’s understanding of history in Chapter 2, narrative is a fundamental human way of organising and communicating information, and even children as young as three use narrative scripts to help them represent and remember information.\textsuperscript{35} The use of a story format seems to help people visualise information, set it into a meaningful context, and activate their own knowledge and memories to help them interpret it.

Much large technology heritage information, though, is presented either without a narrative structure at all, or with only rudimentary connections between information about different machines, those connections usually being made along the lines of chronology or technical development.\textsuperscript{36} Ghislaine Lawrence points out that, in both

\textsuperscript{34}Falk and Dierking, \textit{Learning from Museums: Visitor Experiences and the Making of Meaning}, pp. 61, 116–17.


\textsuperscript{36}Pilgrim, for example, notes that where motor museums use narrative strategies, these are nearly always based around a theme of chronological development, with visitors following a track that takes
British and American museums throughout much of the twentieth century, technological objects were typically interpreted through labels that read very like science textbooks, adopting a voice of impersonal authority and treating objects as decontextualised examples of scientific principles rather than as historic items with distinct and individual stories.\footnote{Pilgrim, “The BlokeMuseum; Motor Museums and their Visitors,” p. 109. Divall and Scott also comment that many machinery displays are organised around a narrative of progress, celebrating successive technological changes that have produced increasingly powerful and dominant machines. Divall and Scott, \textit{Making Histories in Transport Museums}, pp. 64–5.}

Narratives, which are a more intuitive way of organising and communicating information, may be a more effective way to link ideas and objects in technological displays, and may be a better way of encouraging visitors to engage with and remember the material that is presented.\footnote{Lawrence, “Object lessons on the Museum Medium,” pp. 110–14.} In fact, the high popularity of history in the current study may be, at least in part, because history is generally expressed in a narrative format and therefore feels accessible and easy for visitors to integrate into their existing mental models. Equally, the low popularity of technical specifications may be, in part, because they are not generally expressed in a narrative format, and they therefore require the visitor to absorb information in an unfamiliar format.

It was notable in the current study that visitors constructed their own narratives to help them relate to and understand the objects they saw. Extrapolating from the information available in the display, they fleshed out factual details with imaginative reconstructions of the emotions and responses of the people who might have used the technology in the past. These reconstructions helped them to think more deeply about the information available, ask questions that reflected their own interests, and create connections with their own knowledge. A visitor at the Memorial, for example, described the unexpected information that he had gained from a close inspection of the wheel of an aircraft, and the very visual narrative he had constructed to help him explain what it was and how people might have used it in the past:

\footnote{Martin and Toon, “Narratives in a Science Center: Interpretation and Identity,” p. 410.}
I looked at that Messerschmitt 262 [German aircraft] and it has a goddamn air-hose down to the front tyre. What’s that all about? The only thing I can imagine is that there is an air compressor on board and that just before it took off it pumped that tyre up to be sure it had enough air not to nose down. And as it got out on the end of the runway some German kid pulled it off [and] stuck it up on another latch that we couldn’t see, so that it got away.39

In another example, a visitor at the Melbourne Museum, who had clearly read technical details of the number of passengers carried by the Cobb & Co coach on display, used that information to create a lively mental image of people and luggage being cramped in and around the impossibly small coach, an image that also drew on his own ideas about the condition of early Australian roads, and the stability of overloaded vehicles:

Knowing the roads that it probably had to travel over you wonder how stable it was with a maximum of seventeen passengers. You think of trying to fit the seventeen passengers into the coach — and their luggage!40

As is demonstrated by the strongly visual nature of the narratives described above, narratives do not have to be limited to words, and large technology objects — with their physical size and complexity — are ideally suited to creating non–verbal narratives. This creates opportunities that are exploited, often quite consciously, by producers of displays of operating machinery. Fred Vanags of the Campbelltown Museum wanted to create physical narratives by linking engines which generated power to machines which used that power (see Fig. 7.5). He felt that, especially for children, this made it clearer how the machinery would once have been used:

This [steam engine] is like half an interpretive display. I’d like to have something to run with it so they could say “the physical output of that

39Memorial 297: Male, >65, university teacher.
40MM58: Male, >65, electronics technician.
engine is ending in a result for something”…Peter…[is] going to set it up so he can run the lathe. So when you’re at a show you can run the engine and it’s not just sitting there going putt putt putt, it’s actually doing something. So that the kids can see what they used to do.

Figure 7.5: Fred Vanags, Peter Garnham and other members of the Campbelltown Museum all help to maintain and run this display of power generation. The image on the right shows the boiler that creates the steam. The steam is piped under pressure to the stationary engines in the image on the left, which convert reciprocating power (steam pushing on pistons) to rotary power, a circular movement that can power a belt drive. A belt drive, in turn, can be used to power a machine such as the lathe that Vanags mentions. Images: Alison Wain, 2008.

Linking the machines in this way, and particularly having them operating, is a powerful way of communicating both the technological and the affective aspects of such machinery. On the technological side it demonstrates the event schemas that are appropriate to the objects’ operation and use. Event schemas are the sequences of actions or events that people have learned to expect in a particular situation, and which help them predict what will probably happen next.41 People who are familiar


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with the machinery will generally be familiar with the event schemas that are appropriate to large technology — the typical ways in which different classes of machines work, how they can be linked together and the range of tasks required to make them work. They have usually seen many examples and repetitions of such events, and the satisfaction they gain from seeing their general expectations fulfilled is likely to make the experience enjoyable for them. People who are not familiar with the machinery, however, generally do not have this background knowledge to draw on and, as discussed in Chapter 4, often find verbal or textual explanations of such things difficult to understand, especially if they are expressed in unfamiliar technical language. For these people the opportunity to see machines linked in different ways, and (if they are working), to watch and become familiar with the repetitive movements and tasks of their operation, offers the opportunity to develop a basic event schema “on the spot”. And because this is largely a non-verbal process it is accessible to a wide range of people, regardless of their age, knowledge of technical terms, or ability to read or speak a particular language, as is demonstrated by Andrew McVey’s description of introducing groups of disabled children and adults to the intricacies of his steam traction engine at the Campbelltown Museum:

We have had a Deaf, Dumb and Blind School come out, and to have a tour of an engine [for them] is a bit different. You park it in the paddock… you introduce yourself, tell them about the engine and what it has done. You start at the back and one by one they feel the wheel, feel the spokes, you show them what a rivet is, coal, they can feel the heat of the engine, [and] they are probably seeing things that I have never seen with two perfectly good eyes because they are asking questions about particular noises I do not often pick up on. And then we got them up one by one on the engine and had it ticking over forwards, then backwards. You tell them to reach out forward, find the cord [and then ask] “Can you guess what that is?” A

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smile spreads across their faces — they have worked out they have got the whistle cord.

7.5.3 A sense of control

A third element that was important to visitors in the current study was a sense of control over their experience. This was expressed explicitly, for example, by the thirty-seven people who said that they would like to have the opportunity to operate or control working objects, or to handle the controls, climb on top of, or sit in the driving seat of static objects.\(^{43}\) The desire for empowerment also emerged more indirectly, through visitors’ comments about things they liked, or did not like. One 12-year-old girl, for example, was not interested in large technology heritage because it was not something she felt able to participate in herself. This was an opinion she held so strongly that she stood her ground in the face of the other members of her family to express it, despite their obvious desire to be on their way. She preferred fashion to large technology, because:

\[
\text{…it’s more useful to people. Not all people can use machines, and young people, anyone, can wear clothes.}^{44}
\]

People interviewed in this study wanted to have things presented in a way they could understand, to have their questions answered, and to feel that they could empathise with the people and the lifestyle that was being displayed. Many tried to imagine what it must have been like to experience the situations and conditions that they encountered in the displays, often using their own lives as points of comparison to help them judge what they were seeing:

\[
\text{[It makes me feel] how things have changed over the years and how difficult it probably was in times when people relied on this kind of train.}
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\(^{43}\)Many of these responses came in answer to the question “Would you like to touch the objects?” so the interest in physical interaction is not surprising. What is more interesting is the number of people wanting to feel or pretend that they were in some way in charge of the objects and of their experience with them.

\(^{44}\)Darling Harbour 424: Female, 12–18, student.
[Puffing Billy] for public transport. How lucky we are to have cars! How much our lives have changed over the years. And I think it’s nice to be able to experience how people used to live.45

Some visitors felt that, through viewing historic machinery, and imagining what life was like when such machines were in use, they could better understand their own relatives and ancestors.

It gives me a perspective on the age of my grandparents, because that is the age of the equipment that I guess I like. I know that their life was very different to mine and very different to my kids’. I guess for [my daughter] Alex, who is six, her concept of what her grandparents did will be different to my concept of what my grandparents did. But I think it’s important we understand where we have come in 50 years…46

Graham Black points out that these desires for choice and control over an experience are closely aligned with the group of psychological needs identified by Abraham Maslow in level four of his famous 1943 hierarchy of needs — self-esteem, confidence, achievement and the respect of others.47 To enjoy their experience visitors need to feel that they are accepted and respected by both the heritage site and other visitors, and they need to feel confident enough to hold their own opinions and make their own decisions.

45 Puffing Billy 370: Female, 36–45, nurse.
46 Scienceworks 112: Female, 26–35, mechanical engineer and teacher.
47 Black, The Engaging Museum: Developing Museums for Visitor Involvement, pp. 32–36. Despite being immensely influential, Maslow’s 1943 hierarchy of needs has attracted some criticisms in the nearly seventy years since it was developed, particularly in relation to the hierarchical aspects of the model. It has been pointed out, for instance, that the implication in Maslow’s original diagram that higher level needs replace more basic needs is misleading and that, in reality, the satisfaction of higher needs is progressively added to the continuing satisfaction of more basic needs. Douglas T. Kenrick, Vladas Griskevicius, Steven L. Neuberg and Mark Schaller. “Renovating the pyramid of needs: contemporary extensions built upon ancient foundations”. Perspectives on Psychological Science 5 (2010): 292–314, pp. 292–3. For the purposes of the current study, however, the exact position in the hierarchy of the need for self-esteem is of minor importance — what is important is that issues of self-esteem are distinct and vital components of human needs, and that heritage producers must understand and address these needs in order to satisfy their visitors.
For a start, as Black notes, all visitors should feel valued and welcomed to the site, and should not experience feelings of exclusion. Younger children, for example, may feel excluded if they cannot see over safety barriers or in at car windows. Women may feel locked out because they do not have the engineering training to infer the scientific principles behind the design of the objects. Older people may feel bypassed when information is presented in units with which they are unfamiliar, an issue mentioned by Tom Brereton, an experienced volunteer in the Pumping Station at Scienceworks:

If you have a seniors group and you say “pounds per square inch” they all clap. If you say “kilopascals” they all look blank.

Black particularly mentions the need to give people with disabilities the same opportunities as everyone else, which leads him to ask the question “Can [disabled people] interact with friends and family, not just through following the same route, but also, for example, by using the same audio-tapes etc?” Visitors at large technology displays who do not have a technological background often seem to suffer feelings of exclusion for reasons very similar to those that affect disabled visitors to heritage more generally: in other words that their needs, both physical and intellectual, may be different to the audience envisaged by the creators of the display (indeed, for many visitors to large technology displays, the lack of a technological background itself seems to be treated almost as a mild intellectual disability, as was discussed in Chapter 4). These different needs limit visitors’ access to information and participation in activities, and the message they send is that such visitors do not “belong” — they are not the people for whom the display was really intended. The example, discussed above, of women who waited in the car park of the National Motor Museum in South Australia rather than visit the museum with their male partners shows that such feelings may even cause a social group of visitors to fragment as, within the context of the display, individual members of the group redefine their primary sense of identity, or self-categorisation, from “member of my current social group” to “member of a

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different social group that feels out of place at this display”. Asking the question, “Can all visitors interact with friends and family, not just through following the same route, but also, for example, by feeling that they all have something worthwhile to contribute?” may prompt a realisation that a large technology display is constructed in such a way that only those with prior knowledge and experience in the area will feel able or authorised to comment on it, and that visitors without such knowledge are likely to feel lost, unable to contribute and relegated to an inferior position within their social group.

Another way of promoting self-esteem and confidence in diverse audiences is to provide ways for them to orient themselves, both within the site and within a particular display. As Falk and Dierking point out, at a very basic level survival depends on knowing where you are in time and space, so to feel lost or disoriented is very stressful and consumes large amounts of attention. Conversely, knowing where you are and being able to predict roughly what will happen next provides feelings of safety, comfort and satisfaction. These are all feelings which tend to increase people’s confidence and sense of control over their experiences, and which in turn have been shown to increase both their enjoyment, and the time and energy they spend engaging with the content of displays. Pilgrim notes that visitors with a specialist interest in a subject (in his study historic cars), usually come into a museum already knowing — at least in general terms — what they want to see. Their knowledge of the subject gives them the confidence, and the resources to orient themselves and make choices that are likely to meet their needs. Non-specialist visitors, though, often enter a heritage site without such pre-existing cues, but if they are quickly able to quickly a sense of what they can see and do — and where — they can take control of their own experience, and be less dependent on the presence of more knowledgeable companions.

49See Chapter 6 for a more detailed discussion of social identity and self-categorisation theories, as well as an analysis of the influence of social identity and self-esteem on large technology heritage participation.
A traditional way of helping visitors to orient themselves in a new environment is to provide them with a map, but Falk and Dierking found that few people in their study used maps or found them very helpful; the methods that proved most effective were those that tapped into non-textual, informal orientation skills such as regular geometric patterns, estimates of how far people had travelled, well-marked sections and views of the surrounding external environment. Similarly, while a conceptual overview of a site or exhibition could help people orient themselves in terms of time and content — what they were likely to see and when — research conducted by Falk and Dierking showed that the most effective orientation concerned practical things, such as travel, food and where to find the shop. They commented that:

This seemed to set [visitors’] minds at rest and allow them to focus on learning... They were not spending the whole trip wondering whether they would get to go to the gift shop.

Using a human guide rather than text labels would also seem to be an ideal way of providing visitors with both assistance in orientation and information about the displays, as it is verbal rather than textual, encourages the use of natural forms of human communication such as narrative, and allows the information to be tailored to the demographics and interests of a group or even an individual. Matilda Vaughan, volunteer in the Pumping Station at Scienworks, had a creative solution to the difficulty of communicating ideas about steam pressure to groups that might include both people who were used to different types of pressure units, and people who were unfamiliar with any formal ways of describing pressure:

...if you can describe that pressure as like having a car on your head, a Mini versus a Mac truck on your head, then people go “Oh!” They can visualise the pressure.

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53 Falk and Dierking, Learning from Museums: Visitor Experiences and the Making of Meaning, p. 117.
54 This research was done with school groups and the orientation was generally delivered before the actual visit, but there seems to be no reason why the results should not apply to the orientation of visitors in general, and to the provision of orientation during heritage visits.
Unfortunately, guides are not always an effective way of providing a welcoming and supportive presence to non-specialist visitors at large technology heritage sites, precisely because many of them are so passionate about the subject, and so much a part of the engineering culture and community that has been responsible for the development and use of most large machinery. Many large technology heritage guides see their roles as being disseminators of information about that machinery, and they can feel disappointed and resentful when visitors demonstrate ignorance of, or lack of interest in, what they are trying to disseminate. One guide interviewed for this study refused to have children on his tours specifically so that he could exclude boys, whom he found inattentive and disrespectful:

Little girls are great — they’re obedient, they sit there. Mostly. Ninety nine times out of a hundred. And they’ll watch you and say nothing. Boys — you stand there [talking, and] if they can rock on something, they’ll rock. . . They’re time wasters. See, I’m there to do a job you know, other people want to know what I’m saying. But [the boys will] say “What’s that? What’s that?” Just for the sake of talking…

This guide obviously felt that he had successfully completed his job if he had declaimed all his information without being interrupted, and he assumed that if people were quiet they were listening, and understanding what he was saying. He does not seem to have considered that the girls may have been silently wondering how long they would be trapped with such a dull speaker, that the boys may have been trying to divert him into speaking about something more interesting, or that his adult audience may have appeared to have been listening out of politeness rather than interest or understanding. His additional comment, that he was “…amazed at how stupid people can be”, strongly suggests that he left his audience confused rather than enlightened.

This is a problem highlighted by Falk and Dierking, who note that guides and interpreters need to see themselves as facilitators of experiences rather than dissemina-

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55Producer number 51. Identity and organisation withheld.
tors of information, and that they will be more effective in communicating their information if they aim to understand and build on their audiences’ existing knowledge rather than just follow a prepared speech or list of points. No visitor will remember everything a guide has to say, but visitors who feel they have had an interesting and pleasurable experience are likely to remember a great deal more than those who merely recall feeling bored and confused.

The other issue for large technology guides may be that, as discussed in Chapter 6, decades of workforce segregation and the tendency of many people to undertake volunteer activities in retirement mean that the majority of large technology guides are older males. Further work needs to be done to establish whether this makes younger or female visitors feel excluded or at a disadvantage, as indications in the current study were ambiguous. Diana Jones of the WA Museum, for instance, felt reticent about participating in what she saw as a particularly male way of sharing information:

…I have noticed people going off on the tour and coming back on the tour and there is a lot of interaction with the guide…but I am not that sort of person…I am a more private person than that, so I wouldn’t get as much out of the tour as perhaps somebody who has that sort of yarn and chat like that. And again, it seems a very blokey sort of thing.

As mentioned in Chapter 3, however, a female visitor at the Campbelltown Museum felt that her experience of an old car was enormously enhanced by the interpretation provided by the male owner of the car:

One of the men made me sit in his old car and showed me the workings of the pedals and that was fabulous.\textsuperscript{57}

7.6 Conclusion

Colin Divall and Andrew Scott, writing about transport museums, expressed the opinion that there will always be a place for museums that are aimed solely at the interests, passions and expectations of technologically inclined specialists and enthusiasts. Most of the producers interviewed in this study, though, wanted to share their passion, to have their work admired, and to be sure that there would be people in the future interested enough to care for and visit their beloved objects, and they recognised that achieving these aims meant reaching a variety of different audiences. Such producers were very conscious of the needs of non-specialist visitors, and many catered for them explicitly and successfully. Innovative and accessible presentation methods that were encountered in this study included warm and well-targeted guiding techniques, dramatic and communicative narratives, opportunities for sensory experiences of objects, and displays that encouraged visitors to draw on their own experiences and knowledge to help them understand large technology heritage. Furthermore, these presentation methods seemed to be as well received by visitors who already possessed technological knowledge (including other large technology heritage producers) as they were by visitors who did not have such knowledge.

Large technology heritage producers can, however, have a very different view from their visitors of the objects on which they work, and they can sometimes forget that what makes them feel comfortable, happy and engaged may not do the same for their visitors. Even with the best of intentions it is hard to see with other people’s eyes, and producers can be blissfully unaware that the displays that seem to them so accessible, clear and welcoming, may seem to other people inaccessible, obscure and alienating. This is not, however, a problem restricted to large technology heritage. Writing in 2000 of museums in general, Michael Spock, then Research Fellow at the Chapin Hall Center for Children at the University of Chicago, commented that there were still many poorly designed exhibitions where, for instance:

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...labels are too long, copy is not broken down into manageable paragraphs with helpful subheads, type is too small and low ...[and] terms are obscure to a person new to the subject. The entrance to an exhibition fails to give any clue to what it is really about, what you might be expected to get out of it, how it is organized, and where a good place to start might be. An interactive unit, appealing to a family audience, does not allow room for all members of the family to gather around and participate...and makes few concessions to the different skills and strategies each member of the group brings to the experience.\(^{59}\)

Many large technology heritage displays are, unfortunately, still designed along traditional lines that perpetuate exactly these problems, and it is clear that there is much room for creativity in generating new ways of interpreting large technology heritage. A particular challenge is to find ways to engage diverse audiences while coping with the unusual — sometimes extreme — physical, financial and logistical challenges that large machinery presents.

Tradition, in this case, can be a major stumbling block, as too great a reverence for the past can prevent a clear view of the present and constrain ideas for the future. The next and final chapter of this study will examine the evolution of standards and ethics within the professional and academic worlds of heritage, and discuss the influence that these professional traditions continue to exert on the display and interpretation of both privately and publicly owned large technology heritage.

A job well done. Ron Gunn with Locomotive NA 7A at Puffing Billy

Image: Alison Wain, 2009
Chapter 8

Meeting Standards

8.1 Introduction

In the preceding chapters I have examined the different ways in which people approach large technology heritage. I have discussed the role of sensory and emotional stimuli, the impact of learned responses that are products of past life experiences and training, and the influence of current circumstances, companions and motivations. I have looked at the influence of producers’ passion and vision on the experiences of their visitors, and at the influence of visitors’ needs and expectations on the display techniques and directions taken by producers. All these things have been shown to affect the values that different people see in large technology heritage, and the way they express those values through their work with, and their responses to, big old machinery.

The diversity of values reflected in this study is eclectic and exciting and demonstrates that — thankfully — people do not need to ask permission to own, care for, display and visit large machines: they just do, according to their own interests and goals. When they wish to gain the support of other groups within the community, however, they may have to modify their approaches to fit in with the expectations of those groups, and demonstrate compliance with heritage industry norms and standards. The Federation of European Museum and Tourist Railways (Fedecrail), for ex-
ample, wanted heritage railways to be able to “improve their profile in the same way as had been achieved by the museum world with their [sic] Athens and Venice Charters.” Consequently, Fedecrail members wrote a Charter that was highly similar to the Venice Charter. This demonstrated Fedecrail’s adherence to Venice Charter principles, and therefore its fitness to be seen as a part of the international, professional world of heritage. Similarly the European Maritime Heritage (EMH) industry body took the Venice Charter as a model for its Barcelona Charter because of the perception that, “adoption of these [Venice Charter] guidelines has helped [those in charge of historic buildings] to gain public support, not only in funding but also in tax concessions and other preferential treatment.” By publicly adopting the principles of the Venice Charter, EMH hoped to also be able to tap into this network of benefits.

Apart from the political, financial and legal doors they may open, it could be asked whether such documents — produced by global and national bodies and concerned with overarching principles — really have much influence on the day-to-day approach of heritage practitioners. It seems, however, that they do. From an ideological viewpoint, such documents call attention to the fact that old machinery has moved from a service into a heritage context, with all the changes in values, use and maintenance requirements that such a transition brings. Eamonn Seddon of Puffing Billy noted that:

...we’ve got a tendency within the enthusiast heritage railways, [and] the enthusiast heritage ships, to actually look at these items as items of transport. And not necessarily as items for museums.

Seddon commented that having items of Puffing Billy rolling stock listed on the State Heritage Register of Victoria helped to change the way people within his organisation viewed and treated the objects they cared for. From a practical standpoint, such doc-

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uments set forth the standards that organisations must achieve if they wish to receive support from funding and accreditation bodies, as Seddon also describes:

…we’ve just recently, in the last twelve months, got fourteen items of rolling stock onto the State Heritage Register. It wasn’t a difficult process…Heritage Victoria very much recognised the need for us to run an operating railway. [But], at the same time, that put flags up to say it’s not a carte blanche to do what we want with heritage items.

The standards documents that will be discussed in this chapter have come to have pre-eminent professional, moral and legal status within heritage practice. They are understood to be “the way to do things” for anyone who wants to be seen to be acting professionally, to be behaving ethically, and to be eligible for financial and other assistance. But they descend from a tradition of built heritage management in a largely European context, and date back to origins in the first half of the twentieth century. How relevant are they to large technology heritage, in Australia, in the twenty-first century?

This chapter takes a critical view of the development of such documents, and in doing so provides new insight into why the Venice Charter in particular became so influential, the development of subsequent large technology and industrial heritage standards, and the need for large technology heritage producers to embrace standards that facilitate a flexible, inclusive and nuanced approach to heritage.

### 8.2 Accepting diversity

In 1903 Alois Reigl argued that people considered objects to be heritage\(^3\) not because of values inherent in the objects themselves, but because of the values that people

\(^3\)Reigl used the term “monuments”, which he interpreted broadly to mean any human creation of artistic or historical value. Alois Reigl. “The modern cult of monuments: its character and its origin”. Trans. from the German by Kurt W. Foster and Diane Ghirardo. *Oppositions* 25 (1982 [original 1903]): 20–51, pp. 21–22.

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attributed to them.⁴ Reigl recognised that different people saw different values in heritage, that these differing values prompted them to treat heritage in different ways, and that the different approaches they took to the preservation and use of heritage were not right or wrong but accomplished different goals and outcomes. This remarkably clear-sighted analysis anticipated the value-based approach to understanding heritage that has become so popular in the early years of the twenty-first century, and which underpins much of the current study. It was, perhaps, an idea ahead of its time, and it is worth examining in some detail.

Reigl identified two main strands of value — **age-value** and **present-day value**. He defined age-value as an emotive response to the passage of time, perceived through observation of the effects of time rather than mediated by scholarly analysis and knowledge:

> ...monuments [which have age-value] are nothing more than indispensable catalysts which trigger in the beholder a sense of the life cycle, of the emergence of the particular from the general and its gradual but inevitable dissolution back into the general. This immediate emotional effect depends on neither scholarly knowledge nor historical education for its satisfaction, since it is evoked by mere sensory perception. Hence it is not restricted to the educated...but also touches the masses independent of their education...⁵

Age-value was, in Reigl’s opinion, the aspect of heritage that allowed people to experience a sense of direct, personal connection with the past, and to be able to interrogate and respond to that past on their own terms rather than filtered through the worldview and expectations of others. This affective way of valuing the past is close to that expressed by many people today, including in the current study (See the introduction in Chapter 3), and its focus on the importance of experience rather than didactic

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knowledge is in tune with many modern efforts to interpret heritage in dynamic and affective ways to reach new and more diverse audiences.

Within the broad set of things that had affective age-value (things that provided a general sense of the past) Reigl defined a subset of things that had specifically historical value, providing actual physical evidence of past events in human history. Reigl noted that historical value was particularly good for achieving a better understanding of the past, but that, in its careful detail and reliance on scholarly study, it could be unappealing to a broader audience without considerable interpretation.6

Within present-day value Reigl included the subsets of use-value, art-value and newness-value. He described use-value as the capacity of a monument — usually, but not exclusively, a building — to continue to be used in the present, either for its original or for a new purpose.7 He described art-value as a present-day value because it was so mutable, constantly being redefined in accordance with the tastes and fashions of each new era. He suggested that this was a consequence of people “seeing something modern in the old”, and feeling that past art embodied principles that were also admired in the new era.8 Finally, he described newness-value as an appreciation of the completeness and purity of form and colour that were seen as the defining qualities of new things. These qualities, he felt, were reassuring evidence of their newness, just as a lack of completeness and purity were reassuring evidence of the age of old things.

Man’s creative activity is nothing other than the organisation of a number of dispersed and/or shapeless elements in nature, the fashioning through shape and colour of an integrated and delimited whole [that stands out from the surrounding nature] … A lack of completeness would therefore only displease us in a modern work: which is why we do not build ruins (except to fake them), and a newly built house with crumbling stucco or sooty walls disturbs the viewer because he expects an accomplished or

6Reigl, “The modern cult of monuments: its character and its origin,” p. 34.
flawless form and polychromy.\(^9\)

Reigl provides a useful example of Western heritage thinking at the start of the twentieth century. He speaks of tangible rather than intangible heritage; he discusses predominantly buildings, objects of the visual arts and archaeological remains; and he traces the development of heritage values and approaches through the examples of ancient Rome and Greece, the Western Renaissance period, and the Western debates of the nineteenth century on the nature and purpose of history, art and heritage. In these respects his work is very much a product of what Smith calls the “Authorised Heritage Discourse” — the Western appreciation for the tangible, the monumental and the elite, and the Western presumption that only “experts” are capable of preserving and interpreting such heritage.\(^10\) Where his work seems to break from this discourse, however, is in his acceptance of a range of different ways of valuing heritage, and his acknowledgement that these differences are not only valid but helpful: they are varied means to different ends. As noted above, this insight seems to presage much that is current in heritage thinking, but it is a view that has taken a back seat throughout much of the twentieth century. The question therefore has to be asked — why did these ideas, which were already circulating at the beginning of the twentieth century, have so little influence on heritage policy and practice throughout so much of the twentieth century?

The answer seems to be that the idea that an acceptance of different values in heritage might be desirable — indeed necessary — seems to have been swept away by the tide of a much stronger movement in the opposite direction, a movement away from diversity and towards standardisation. The next section of the chapter will discuss in detail this impetus towards standardisation, and its impact on heritage policy and practice.

\(^10\)Smith, Uses of heritage, p. 4.
8.3 Developing standards

Standards work in three ways: performance, measurement and compatibility. They ensure a minimum level of quality by specifying ways to perform certain tasks; they make it possible to compare similar physical qualities by specifying objective and quantifiable units of measurement; and they promote interoperability, efficiency and economies of scale by defining standard interfaces between different products or processes.\textsuperscript{11} In the heritage field this effectively translates to recommending effective procedures, providing a common language of defined terms, and identifying shared needs, aims and opportunities between both different cultural regions and different types of heritage.

The standardisation movement began in the eighteenth century in the scientific arena, and by the nineteenth century it had become an matter of considerable importance.\textsuperscript{12} Efforts to share information between scientific communities resulted in the formation of national scientific bodies and the holding of international meetings, all of which required scientists to be able to communicate using shared units, assumptions and nomenclature.\textsuperscript{13} In industry, standardisation was driven by fledgling attempts at mass production, and by the evolution of mechanised, long-distance transport and communications. Such developments required the use of compatible and interchangeable parts over large areas and networks, and the use of common units and standards for defining quality, quantity and even time between physically distant companies and operators.\textsuperscript{14} Unfortunately, as Larry Lagerstrom comments, a side effect of these approaches was “to erase local cultures and create national ones in the


\textsuperscript{14}Lagerstrom, “standardization.”
Western world”, but this seemed a small price to pay for the power and efficiency promised by effective standardisation.\textsuperscript{15}

The standardisation movement was stalled by the First World War, during which nationalist interests overwhelmed internationalist attempts to share information. After the war, the movement resumed and, significantly, activity in the scientific and industrial fields was joined by activity in the political and cultural fields. In particular, the formation of the League of Nations, which was established to “promote international co-operation and to achieve international peace and security,”\textsuperscript{16} broke new ground by giving its members the right to comment on — and take measures to influence — each other’s behaviour and attitudes.\textsuperscript{17} This policy pressured member states of the League of Nations to conform to a shared set of attitudes, principles, goals and methodologies: in other words, shared values and standards.

The Athens Charter for the Restoration of Historic Monuments was written in this international context in 1931. As a product of the First International Congress of Architects and Technicians of Historic Monuments it was naturally focussed on built heritage, but it was nevertheless the first in a line of international documents that continues — as noted above — to serve as models for heritage practice more generally up to the present day.\textsuperscript{18} Although it was very much part of the internationalist, standardising political milieu of the time, it reads as a surprisingly polite and cautious document. Section VII on the Conservation of monuments and international collaboration, for instance, earnestly hopes for international collaboration:

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\item \textsuperscript{15}Lagerstrom, “standardization.”
\item \textsuperscript{17}Kalevi Holsti comments “The idea of mutual guarantees and the statement (Article 11) that any use of armed force was a matter of concern to all members contravened the old principle of neutrality. The covenant also undermined the principle of a sovereign’s right to employ force. War was not outlawed, but its legitimacy became highly circumscribed. Finally, the league inaugurated the idea of collective economic sanctions.” Kalevi J. Holsti, “League of Nations”. In \textit{The Oxford Companion to the Politics of the World}, ed. by Joel Krieger. 2nd ed, Oxford University Press Inc., Oxford Reference Online, 2001. URL: \url{http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t121.e0425}. (accessed 03/01/2012).
\end{enumerate}
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The Conference...

Hopes that the States, acting in the spirit of the Covenant of the League of Nations, will collaborate with each other on an ever-increasing scale and in a more concrete manner with a view to furthering the preservation of artistic and historic monuments; [and]

Expresses the wish that requests to attain this end, submitted to the Intellectual Co-operation Organisation of the League of Nations, be recommended to the earnest attention of the States.

Section II on Administrative and legislative measures, though, acknowledges the difficulties posed by legal and cultural differences between states:

The Conference heard the statement of legislative measures devised to protect monuments of artistic, historic or scientific interest and belonging to the different countries.

...while approving the general tendency of these measures, the Conference is of the opinion that they should be in keeping with local circumstances and with the trend of public opinion, so that the least possible opposition may be encountered...

These statements demonstrate a search for shared values, but also an acceptance that there will be differences and that, in fact, the ideals to which the Charter aspires are still open to negotiation.

The movement towards international standardisation was again interrupted, by the Second World War, but re-emerged after the war with renewed vigour. In the political arena the League of Nations was succeeded by the United Nations, an event with particular importance for the place of culture in international relations due to the creation of its offshoot, the United Nations Educational, Scientific and Cultural Organization (UNESCO), which has an explicit mission to “contribute to the building of peace, the eradication of poverty, sustainable development and intercultural dia-
logue through education, the sciences, culture, communication and information. “

Through UNESCO, culture was given a central role in the drive to promote global post-war stability and harmony, and an essential part of this cultural mission was deemed to be heritage. This is illustrated, for example, by a submission by Jean Thomas to the Sixth Session of the General Conference of UNESCO, which referred to:

...the universally recognized principle that the preservation of the national cultural patrimony is of interest to the whole international community, and that the loss of a single object of cultural value represents a spiritual loss for the whole of humanity.

To assist in the promotion of harmony, UNESCO began to develop its own tradition of standardisation, focussed on compatibility and performance. The initial impetus for establishing compatibility seems to have been the very worthy aim of establishing an international monetary fund to help UNESCO member states protect and conserve their heritage. This would involve member states both giving and receiving money, so it had to be established firstly that the donor states would benefit from their good global citizenship, secondly that the monies raised would be disbursed fairly according to both project worthiness and financial need, and thirdly that the money would be achieve good results. Compatible understandings, therefore, had to be reached concerning project worthiness, financial need and good results.

UNESCO established compatible understandings of project worthiness by constant references to “universal” heritage (see, for example, the quote from Jean Thomas


21 As UNESCO’s current website makes clear, the promotion of cultural standards continues to be a major UNESCO goal even today: “UNESCO...[serves] as a central forum for coordinating the ethical, normative and intellectual issues of our time, fostering multidisciplinary exchange and mutual understanding, working — where possible and desirable — towards universal agreements on these issues, defining benchmarks and mobilizing international opinion.” UNESCO. “Standard-Setting Instruments”. N. d. UNESCO. URL: http://portal.unesco.org/en/ev.php-URL_ID=12024&URL_DO=DO_TOPIC&URL_SECTION=201.html (accessed 24/02/2012).
above). This reassured member states who donated money that they were protecting “global” heritage, which they felt belonged — in a conceptual sense — to all people, and which, by implication, was part of the cultural inheritance of their own citizens.

This broad understanding of cultural benefit, however, did not help in distinguishing project worthiness; the sites and monuments that might be of most benefit to the global community, and which were therefore most deserving of assistance for preservation. For this UNESCO felt that it needed a standardised process of evaluation, leading to a list of sites and monuments that all member states agreed were important, and which were therefore prime candidates for assistance. As noted in a 1963 UNESCO study of possible measures for the preservation of monuments:

12. (b). . . it is felt that [financial assistance] could not be used for every monument requiring conservation or restoration work, but would have to be confined to those situated in various countries, which are genuinely of world interest because they form an essential part of the cultural heritage of mankind. In order to ensure the logical and systematic application of this principle, all States which have contributed towards the establishment of the fund and wish to obtain assistance from it should therefore make an inventory of the monuments of world interest situated on their territory.22

This was the start of the process that eventually led to the creation of the World Heritage List, but the difficulty of getting all member states to agree on the most important monuments, and the complicating factor of disagreement over appropriate funding models, ensured that the World Heritage List did not become a reality until 1972.23

Finally UNESCO worked towards compatible understandings of “good results” by establishing a body to promote best practice in heritage preservation. The International Centre for the Study of the Preservation and the Restoration of Cultural


23These protracted negotiations can be followed through the selection of documents on the UNESCO World Heritage Centre website at http://whc.unesco.org/en/documents/
Property (ICCROM) was founded in 1959 with the expectation that it would:

a) collect, study and circulate documentation concerned with the scientific and technical problems of the preservation and restoration of cultural property;

b) coordinate, stimulate or institute research in this domain, by means, in particular, of commissions to bodies or experts, international meetings, publications, and exchanges of specialists;

c) give advice and recommendations on general or specific points connected with the preservation and restoration of cultural property;

d) assist in training research workers and technicians and raising the standard of restoration work.\textsuperscript{24}

ICCROM was not merely expected to set, but also to enforce standards of heritage care. Discussions of the functions that it would be suited to undertake included the power to:

\dots coordinate research and having a stronger moral authority eventually prevent badly trained conservators from undertaking restoration of important works of art.\textsuperscript{25}

Explicitly set up to be a centre of expertise in heritage, and backed by the global reach of its member states (83 in 1959 when ICCROM was formed, rising to 125 within the next decade,\textsuperscript{26}) ICCROM was well positioned to carry out its mission of improving the standards of heritage care across the world. Its standards were set to become the standards.


Due in a large part to the energetic lobbying of Piero Gazzola,\textsuperscript{27} Monuments Specialist in the Museums and Monuments Division of UNESCO,\textsuperscript{28} ICCROM was established in premises in Rome.\textsuperscript{29} Its members worked in close collaboration with two other bodies that were also trying to raise standards and improve co-ordination across the nascent heritage sector; the International Council of Museums (ICOM) — which had been instrumental in establishing ICCROM itself\textsuperscript{30} — and the International Institute for Conservation of Historic and Artistic Works (IIC).\textsuperscript{31} These bodies had distinct but complementary roles and objectives: ICCROM was focussed on research and dissemination of heritage conservation information generally, whereas both IIC and ICOM were focussed on the provision of services to a particular professional group — museum professionals in the case of ICOM, and conservators in the case of IIC.

In 1964, during the IInd International Congress of Architects and Technicians of Historic Monuments, a new body was formed: the International Council on Museums and Sites (ICOMOS). Strongly driven by architect Piero Gazzola, and his friend and colleague Raymond Lemaire, ICOMOS was created to promote and manage international co-operation for the preservation of exceptional examples of built heritage.\textsuperscript{32} The spur to its creation seems to have been a sense of the critical urgency of the need to save built heritage from destruction in the path of post-war development, and an equal sense that UNESCO, which had been mired in bureaucratic argument for over a

\textsuperscript{29}ICCROM was initially known as the “Rome Centre”, with its title formally being changed to ICCROM in 1978. Isabelle Vinson. “ICCROM’s contribution to the ethics of heritage”. Museum International 61, no. 3 (2009): 90–97, p. 95.
\textsuperscript{31}ICOM was formed in 1946 to promote international co-operation among museums and museum professionals. See Sid Ahmed Baghli, Patrick Boylan and Yani Herreman, History of ICOM (1946-1996), International Council of Museums, Paris, 1998, p. 9. IIC was formed in 1950 to “improve the state of knowledge and standards of practice and to provide a common meeting ground and publishing body for all who are interested in and professionally skilled in the conservation of museum objects”. Originally called the International Institute for the Conservation of Museum Objects, it acquired its present title in 1959. See the IIC website, http://www.iiconservation.org/node/11 (accessed 12 January, 2012).
decade, could not be relied upon to do this. As can be seen from the resolutions made at the Congress, speed was deemed to be of the essence:

[The meeting considers]

— that it is necessary rapidly to promote legislation for safeguarding historic centres...
— that it is important to find a solution soon, both on a national and an international scale...
— that works of every kind increasingly interfere with sites...and lead to their destruction...
— that in consequence a serious responsibility for our cultural heritage rests upon the present society...  

There was also a delicately veiled suggestion that the glacial pace of UNESCO efforts was no longer acceptable, and a brief reference to possible methods of funding international conservation projects that completely sidestepped the complex funding proposals that had so bedevilled UNESCO negotiations:

[The meeting]

regarding

with satisfaction the efforts made by UNESCO to promulgate international regulations...

resolves

that this international body should take immediate steps to hasten the bringing of these regulations into effect and
draws the attention

of the same body to the necessity of setting up an international organisation to finance the work of preserving threatened monuments of international importance. It is suggested that... international financing bodies

such as the International Bank of Reconstruction and Development, the United Nations Special Fund, or the Technical Assistance Board, with enlarged powers, should secure the necessary finance.\(^{34}\)

The conference delegates also considered that it was “essential that the principles guiding the preservation and restoration of ancient buildings should be agreed and laid down on an international basis”.\(^{35}\) To this end they formulated the enormously influential document that would come to be known as the “Venice Charter”.

In his Foreword to the Venice Conference proceedings, Gazzola expressed his pride in the achievements of the conference and his conviction that the formation of ICOMOS and the drafting of the Venice Charter were turning points in the battle to save heritage for the future. He did not envisage that ICOMOS would be an offshoot of UNESCO, but that it would become the pre-eminent authority in matters of heritage preservation:

\[\ldots\] ICOMOS [is now] the institution which constitutes the court of highest appeal in the area of the restoration of monuments, and of the conservation of ancient historical centres, of the landscape and in general of places of artistic and historical importance…

With the creation of ICOMOS a gap lamented by every nation has been closed and a need which had been felt by every local organization concerned with conservation satisfied.

As the key statement of the principles underlying ICOMOS, he saw the Venice Charter as quite literally the last word in heritage standards, able to provide the answers for all heritage needs and problems:

\[\ldots\] the most important positive results by far of this assembly has been the


formulation of the international code for restoration: ...a text of historical importance. In fact, it constitutes an obligation which no one will be able to ignore, the spirit of which all experts will have to keep if they do not want to be considered cultural outlaws. The concerns thus codified constitute...an unassailable document the validity of which will be affirmed more and more as time passes...from now on, the Charter of Venice will be in all the world the official code in the field of the conservation of cultural properties. [Emphasis added.]

This overwhelming confidence, and the influence of the Venice Charter’s authors within UNESCO,\(^{37}\) propelled the Venice Charter to glory. In 1968, at a UNESCO Meeting of Experts (which included founding ICOMOS president Gazzola and secretary general Raymond Lemaire, as well as the president of the Soviet chapter of ICOMOS, Vladimir Ivanov) the Venice Charter was quietly adopted as UNESCO’s own standard for best practice in heritage conservation:

It was agreed that the principles incorporated in the International Charter for the Conservation and Restoration of Monuments and Sites, known as the Venice Charter, (1964), were perfectly adequate even for groups and areas [of buildings] and should be strictly applied.\(^{38}\)

Although the Venice Charter was undoubtedly an important document, it was put together very quickly by a small group of very influential people, and it reflects both the restricted range of their personal interests and expertise, and a lack of wider

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\(^{36}\)Gazzola, “Foreword,” p. 3.


consultation or testing against real-world situations. The research undertaken in this study suggests that its rise to greatness owed more to the considerable influence of its principal authors than to its being a definitive standard for the heritage profession. It was an excellent first chapter, but it did not deserve to be the last word.

8.4 The pros and cons of different standards

Even at this early point in its history there was ambiguity as to whether the Venice Charter was applicable just to built heritage, or to heritage generally, including movable cultural heritage. The Charter was written by built heritage professionals at a conference on the preservation of built heritage, and defines its scope of relevance as being built heritage, but the use of it in connection with terms not specifically linked to built heritage, such as “heritage”, “cultural property” and “conservators” seems to have created a slippage in meaning and thought that gradually saw it accepted as the UNESCO-endorsed standard for the preservation of all other forms of cultural heritage as well. While this could have been seen as a reasonable stop-gap measure, UNESCO never did take the step to develop a document that either extended the remit of the Venice Charter, or filled a similar position with regard to other forms of cultural heritage.

The reason for this almost certainly lies in the confidence and prominence of advocates of built heritage preservation within the overall conservation movement. The dominance of both archaeologists and conservation architects in cultural heritage management processes has been noted by Smith, who argues that this stems at a philosophical level from their position as cultural heritage “experts”, and their key role in

40The subject of the Charter is defined in Article 1 as an historic monument, by which it means “not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilization, a significant development or an historic event.” Committee for drafting the International Charter for the Conservation and Restoration of Monuments, The Venice Charter: International Charter for the Conservation and Restoration of Monuments and Sites.
the development of the Western conservation ethic in the nineteenth century; and at a practical level from their significant work in lobbying for cultural heritage legislation, particularly through their presence in UNESCO, ICOMOS, amenity societies such as National Trusts, and government bureaucracies.41

The tendency of conservators in the built heritage area to consider themselves representative of, and fully able to speak for, conservators working in other areas of cultural heritage persists today. An example of this is provided by Boguslaw Szmygin, a delegate to a recent conference devoted to questioning the appropriateness and relevance of the Venice Charter. He writes:

...there is no doubt about the fact that the [Venice Charter] was prepared by the world representation of conservators, and for the conservators...

Undoubtedly, the present representative of this community is the International Council on Monuments and Sites (ICOMOS).42

Szmygin is not merely so embedded in his field that he has forgotten to take account of allied professionals, as in the first pages of his article he explicitly argues that the Venice Charter can be understood to cover all conservation purposes, and that all heritage can be included in its term “monument”:

...It contains all the information a source of reference in this discipline (monument conservation) should include...It broadly explains the term “monument”, indicating that it can be an object, an urban or rural complex or a site...The directives of the [Venice Charter] concern different scales: the monument; its surrounding; furnishing; materials or even modern ad-

41Smith, *Uses of heritage*, p. 26. Salvador Muñoz Viñas also comments that the wide recognition of architects as cultural experts in recent times is the result of their high social status over many centuries, which ensured that they were among the first professional groups to have formal academic training and to form strong national and international associations. Muñoz Viñas, *Contemporary Theory of Conservation*, p. 71.

This confidence is unfortunately undermined later in his article, when he contradicts himself by attributing inadequacies in the Venice Charter to the fact that it was composed specifically with monuments of architecture in mind, and actually cannot cover all the things understood to be heritage today. Nevertheless, he still passionately defends it as a canonical conservation text that, in its overarching statement of principles, cannot be bettered. He is not alone in this, and his thoughts are quoted here not because they are especially illuminating, but rather because they are very typical of those who continue to maintain that the Venice Charter is still widely and profoundly relevant.

Even within the Venice Charter’s core focus of built heritage many professionals find it difficult and even counter-productive to work with. Many documents have therefore been drawn up (though not by UNESCO) with the aim of either replacing it or, more commonly, extending its philosophy into other areas of heritage practice. At least five of these documents have particular relevance to the management of large technology heritage, as listed below:

- Barcelona Charter: European Charter for the Conservation and Restoration of Traditional Ships in Operation (2001);

- Nizhny Tagil Charter for the Industrial Heritage (2003) and the closely related Joint ICOMOS — TICCIH Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes (The Dublin Principles, 2011);
• Riga Charter: Conservation guidelines for operational railway museums (2005);


While all these documents — including the Venice Charter — aim to function as standards, they all go only half-way. Referring to the key functions of standards as described by Russell (see Section 3 of this chapter), they do try to raise performance in the industry by recommending best-practice procedures, but they do not provide a common language for measurement (in other words assessment and evaluation) of heritage, and they do not provide compatible interfaces even between very closely related sub-genres of the heritage industry.

As an example of this, the operational heritage ships and railways treated by the Barcelona and Riga Charters have much in common in terms of their needs as heritage. In both cases their objects tend to be:

• large (and therefore costly to move, house and preserve);

• potentially functional (and therefore requiring heritage mechanical skills and techniques to maintain them);

• potentially dangerous (necessitating much adaptation to modern safety requirements);

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• highly visible (and therefore requiring the management of much community, media and often political attention); and

• enriched with complex, multi-period, multi-layered life histories that can have many different meanings for many different people.

With so many issues in common, it would seem to be of more value to have one charter rather than two for these closely aligned areas of heritage, providing a basis for sharing useful approaches and methodologies. Unfortunately, what these documents do share is the rigid prescriptiveness of the Venice Charter, which assumes a limited range of circumstances in heritage, and a limited range of potential outcomes.

Article 5 of the Venice Charter, for instance, acknowledges that the conservation of heritage monuments is helped by identifying a “socially useful purpose” for them. It goes on, however, to stipulate that, regardless of the circumstances or desired outcome of any particular case, such use “must not change the lay-out or decoration of the building.” Recognising that this may be next to impossible in the restricted confines of a ship, the Barcelona Charter introduces some flexibility by changing this wording to “Such use . . . must not significantly change the exterior layout of the ship.” Evidently feeling that this still does not meet the practical needs of heritage railways, the Riga Charter explicitly notes the necessary influence of the circumstances of each case, stipulating that “such use should involve the minimum change necessary, and such changes should be fully reversible.” A broader document would have the potential to unite these closely related fields and encourage the sharing of solutions between them, acknowledging from the start the need to achieve a compromise between idealism and reality, and to accommodate different heritage aims and values.

The Nizhny Tagil Charter and the Dublin Principles do go some way towards achieving these aims. Although they limit their scope primarily to the period since the European industrial revolution, within this period they do cover the field of industrial heritage as a whole, recognising the commonalities between the different sub-genres of technology and underlining the value of this approach for both shar-
ing scarce resources and providing a united lobby group for this type of heritage. The Nizhny Tagil Charter also recognises that the values to be found and preserved within industrial heritage may cover a broader range than just the artistic and historic evidence values cited in the Venice Charter, and the traditional skills values added in the Barcelona and Riga Charters. In particular, it acknowledges that such heritage may have affective social and emotional values:

\[\text{. . . [the] continuity that re-use implies may provide psychological stability for communities facing the sudden end [of] long-standing sources of employment.} \] 47

Such social and emotional values are akin to Reigl’s category of “age-value” and are qualitatively different from aesthetic and historic values. They are not the product of study or expertise, but of familiarity and a sense of connection, and because of this they are not the preserve of experts but of lay people. In particular, they are commonly found in local lay people who often have a long-standing, lived association with the heritage.

This is a critical factor as it is these people who will have to live with the heritage, and provide support — through their taxes, volunteer labour and return visitation — to support it in the future. The accommodation of their values and meanings in the management and interpretation of the heritage is therefore fundamental to its continued survival. Unfortunately the Venice, Barcelona and Riga Charters omit all mention of such people or their values, and therefore implicitly exclude them from a role in the heritage management process. According to these charters, the values to be found in heritage are artistic, historical and technical rather than social or emotional, and the preservation of heritage is strictly a matter for experts trained in “…all the sciences and techniques which can contribute to the study and safeguarding of the [heritage].” 48 The process of restoration, especially, is declared to be “a highly specialised

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47 TICCIH, *The Nizhny Tagil Charter for the Industrial Heritage*, Articles 7.1 and 5.V.
The Nizhny Tagil Charter made a radical departure from this approach in that, while it reiterated the important role of heritage and technical expertise, it also accepted that non-experts might have their own reasons for valuing the heritage, and as such should have an active role in identifying, protecting and promoting that heritage. 

Unfortunately the authors of the successor to the Nizhny Tagil Charter, the Dublin Principles, have failed to recognise the importance of this development and have once again removed all mention of current social values or participation by lay community members. The only way “non-experts” are expected to participate in heritage in the Dublin Principles is as sources of information for expert research.

This return to an approach much more similar to that of the Venice Charter is probably no coincidence, given that it was ICOMOS members who wrote (and continue to vociferously support) the Venice Charter, and that the Dublin Principles represent the formal integration of TICCIH and ICOMOS ideas with regard to industrial heritage.

The document that does explicitly allow for community values and participation in heritage is the Burra Charter, which was developed by the Australian chapter...
of ICOMOS specifically to make the European-focussed tenets of the Venice Charter more applicable to the realities of heritage in the Australian context. The major ideas behind the drafting of the Burra Charter were:

Firstly, an acceptance of the general philosophy of the Venice Charter.
Secondly, the need for a common conservation language throughout Australia.
Thirdly, an emphasis on the need for a thorough understanding of the significance of a place before the policy decisions can be made.
Fourthly, an approach more flexible and practical than is suggested by the Venice Charter, and one which could cope with the realities of Australia's heritage, and in particular which would permit the stringency of conservation processes to be varied according to the nature of significance.
Fifthly, that technical words or jargon be avoided and that where this was not possible, as in the types of conservation processes, definitions be inserted.
Sixthly, that a neutral or multidisciplinary approach be adopted which would avoid defining the fields of architects, engineers, archaeologists, historians etc. and instead use terms like “place” and “work”.

Central to the Burra Charter is the idea that the cultural significance of potential heritage should be determined on a case-by-case basis, before determining the details of how it should be treated, used or interpreted. This idea obviates any need to specify what cultural significance might be in the standards document itself, and opens the door for the nomination of diverse and sometimes unanticipated cultural values by

anyone with an interest in the heritage, regardless of whether or not they are considered an expert. It also obviates the need to specify in the standards document exactly what conservation techniques are, or are not, appropriate for heritage work, as these are likely to change rapidly with the development of new techniques and materials. What is less likely to change, if well-designed, is the guiding philosophy for conservation. In the Burra Charter conservation work is simply expected to preserve and enhance the cultural significance of the heritage — whatever that significance might be — by aiming to:

    …do as much as necessary to care for the place and to make it usable, but otherwise change it as little as possible so that its cultural significance is retained.55

The implication of this is that, if people see values in heritage that are outside heritage industry norms, it may well be necessary — and under the Burra Charter perfectly acceptable — to find new approaches to preserve those values and provide access to them.

Applying Burra Charter principles to large technology heritage, it can be seen that if the cultural significance of an item is that it functions and can be experienced as a working object, changes to the fabric of the object to make it safe and cost effective can be seen less as damage to historical evidence and authenticity, and more as practical measures to facilitate preservation of the skills required to operate the object and maintain access to the sensory experiences of seeing, hearing, feeling and smelling it as it moves. A good example of this is the rolling stock at Puffing Billy (Fig: 8.1).

If, on the other hand, the cultural significance of the heritage is that it bears the historic marks of a long and interesting life, changes to the fabric of the object may need to be limited to making it safe and stable, or to recreating the appearance of a particularly significant period of its service life. A good example of this approach is the display of the Parry Endeavour boat at the WA Maritime Museum (Fig: 8.2).

55Australia ICOMOS. “Australia ICOMOS Burra Charter”. 1999. Australia ICOMOS. URL: http:
Figure 8.1: The cultural significance of Puffing Billy’s rolling stock is that it provides the experience of a working steam train. To enable them to fulfil this role Puffing Billy locomotives and carriages are regularly repainted to protect them from the weather, and from the rough and tumble of visitors, seen here hanging out of the train carriages. The high cost of coal, and its tendency to throw out cinders that can start bushfires in the close-growing forest, have also raised the question of whether at least one of the locomotives might have to be converted to burn oil rather than coal to produce steam. Image: Alison Wain, 2009.
Figure 8.2: The cultural significance of the Parry Endeavour boat is that it bears witness to the record breaking triple circumnavigation of the world by John Sanders in 1986–1988. To enable it to fulfil this role the Parry Endeavour has been stabilised, and is emotively displayed as though sailing down a massive wave. No attempt has been made to repaint her worn hull or to touch up the faded logos of her sponsors, as these elements are evidence of the length and tough conditions of the trip that made her significant. Image: Alison Wain, 2008.
This openness to different approaches also means that while the Burra Charter was, like the Venice Charter, originally formulated to address the needs of built heritage, it is potentially applicable to a much wider range of heritage. Recognising this adaptability, the EHC Guidelines — the last of the documents mentioned above as dealing specifically with the management of large technology — is based on the Burra Charter rather than the Venice Charter. Unlike the Barcelona and Riga Charters, however, the EHC Guidelines document is not merely a tweaked version of its antecedent, but a discursive essay that extends the Charter into the area of engineering heritage in more depth and contextualises it for engineers who are not familiar with heritage processes.

The EHC Guidelines document also raises two areas in which it feels the Burra Charter does not adequately cater for engineering heritage. The first of these is the Burra Charter’s use of the concept of “place” as the key to defining and considering heritage, which the Guidelines document notes has to be considerably stretched to accommodate engineering heritage that was either designed to move — like railway locomotives and ships — or which, like smaller engines, was intended to be portable. The second is the Charter’s lack of detail regarding the changes that are acceptable to allow an item to be used, to “function and be appreciated without unnecessary risk.” These two points are well worth discussing, because they go to the heart of how the Burra Charter works, what it does and does not do, and how easily it could be adjusted to become a unified standard for best practice across all types of tangible heritage.

8.4.1 Place, wholeness and issues of tangible and intangible heritage

The first area in which the Burra Charter struggles to cover the particular needs of large technology heritage is in its reliance on the idea of place. Place is defined in the Burra Charter as “…site, area, land, landscape, building or other work, group of

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56 Engineering Heritage Australia, Engineering Heritage and Conservation Guidelines, p. 2.
buildings or other works, and may include components, contents, spaces and views.\footnote{Australia ICOMOS, \textit{Australia ICOMOS Burra Charter}, Article 1.1.} While this implies heritage that has a fixed location, Article 9.2 of the Charter already recognises that some heritage may be more mobile than this, noting that, “Some buildings, works or other components of places were designed to be readily removable or already have a history of relocation.” Article 9.2, however, also comments rather negatively that removal to a new location may only be appropriate “…provided such buildings, works or other components do not have significant links with their present location…”. As noted in the Outline of this study in Chapter 1, one of the objectives is to identify areas where amendments to current policy and practice could usefully be made, and this is a case in point. It seems clear that this Article has the potential to more comprehensively cover the issue of place in relation to movable objects by including a minor amendment to the effect that some heritage items were designed to move or be portable, and that their movement between different places was a key part of their cultural significance. The movement of objects of transport heritage, in particular, was usually associated with particular areas, routes and infrastructure, and any assessment of the significance of such an object should take into account that fact that continued operation between associated places, or relocation to a site that formed part of the object’s historic area of operation will contribute to maintaining its cultural significance and links with relevant local communities.

Further reading of the Charter suggests that, while “place” appears to be a key concept, it is not actually the idea of place that is so central, but the idea of “wholeness”. In the Burra Charter a place is not merely a building, site or location but, as is evident from the definition quoted above, a complex mix of fabric, meaning and context. Preserving the cultural significance of a place does not merely mean preserving its physical fabric in situ, but rather preserving its association with a web of other places, items and — most importantly — people. This sense of wholeness is just as important for items of movable cultural heritage as it is for built heritage and archaeological sites, and it raises the possibility that, as the Burra Charter is designed
to retain the cultural wholeness of heritage places, it should be just as applicable to retaining the cultural wholeness of heritage items. The feasibility of this idea can be demonstrated by replacing the word “place” throughout the Burra Charter with the words “place or item” — apart from requiring minor grammatical changes, the result is as sensible and practical as the original document. The only significant change is to explicitly make the Burra Charter applicable to all tangible heritage, including the various sub-genres of technological heritage.

The restriction to tangible heritage is important and is, perhaps, the key restriction on the potential of the Burra Charter to become a unified standard for the preservation and management of all forms of heritage. This is firstly because, while built and movable cultural heritage are essentially sub-categories of the same stuff, intangible heritage is wholly different stuff. The relationship of tangible and intangible heritage to change, for example, is distinctively different. For tangible heritage, change is a matter of external forces working on something that is itself essentially static. Tangible heritage, such as the fabric of a ship, may be weathered, repaired, modified or rebuilt, but if these changes were not imposed upon it, it would continue to exist without change. For intangible heritage change is an essential element of the heritage itself, the source of both its vitality and authenticity. The beliefs, experiences and performances (and here performances includes all actions that people perform, rather than just artistic performances) that constitute intangible heritage must be continually created anew and adapted to incorporate new ideas and experiences. If this process of renewal ceases, the remnants of the tradition will, like a replica of a tangible object, be considered merely a mindless copying of a lost art, devoid of understanding or inspiration. This also means that intangible heritage comes in many versions rather than one authoritative entity, and that even a work of intangible heritage that does have a specific form, such as a play or a formally structured piece of dance or music,

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will be different every time it is performed.\textsuperscript{59} In addition, the very act of recording an iteration of a form of intangible heritage can be enough to distort or even destroy it, as the physical record comes to replace the lived tradition that it was supposed to protect.\textsuperscript{60} The Burra Charter’s central concept of cultural significance is eminently suited to dealing with these aspects of intangible heritage, but its approach to preservation — with its focus on documentation, prioritisation of physical fabric and minimising change — is largely not.

There is, however, an even more fundamental reason why the Burra Charter may be inappropriate for the management of intangible heritage, and that is because it considers tangible cultural artefacts as the primary category of heritage and intangible cultural artefacts as a secondary category. Intangible heritage in the Burra Charter is mentioned only as the meanings, associations and traditions associated with, and therefore dependent upon, physical heritage.\textsuperscript{61} Smith argues that this is an “upside-down” understanding of heritage, and that it is in fact intangible culture — the beliefs, experiences and performances that are passed on through personal sharing and communication — that is the core of heritage and that constitutes what people wish to pass on to future generations. Physical items and places are important, she says, but serve mostly to provide context, affective experiences and mnemonics for the communication of intangible heritage values.\textsuperscript{62} A number of Canadian First Nation community members interviewed by Miriam Clavir commented that tangible and intangible heritage — objects and lived traditions — were two halves of a whole, and that each had less richness and authority, and was more vulnerable to loss, without the other...

\begin{footnotes}
\footnotetext{61}{The 1999 revisions to the Charter “broaden the understanding of what is cultural significance by recognising that significance may lie in more than just the fabric of a place” and the Charter’s definition of significance (Article 1.2) includes “the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.” Australia ICOMOS, \textit{Australia ICOMOS Burra Charter}, Notes on the 1999 revisions to the Burra Charter}
\footnotetext{62}{Smith, \textit{Uses of heritage}, pp. 44, 46, 76–7, 305.}\
\end{footnotes}
to support it.\textsuperscript{63} Barbara Kirshenblatt-Gimblett has also noted that policy-makers are increasingly realising that tangible and intangible heritage are inseparable, and that the divisions between them are largely arbitrary.\textsuperscript{64} Certainly it would be helpful from a practitioner’s point of view if standards documents provided a unified framework, under which both these types of heritage could be addressed with consistency and balance.

8.4.2 Function, use and present-day values

The second area in which the Burra Charter struggles to cover the diverse needs of large technology heritage centres around ideas of use and function. Use-value — putting a heritage building or item to use in the present — is one of the values identified by Reigl (see Section 2 of this chapter), and it is consistently mentioned through all the charters and guidelines discussed in this chapter. Some of them focus on the economic or practical utility of using heritage in the present, while others focus on the importance of maintaining traditional functions that are culturally significant in themselves.\textsuperscript{65} All these documents, however, assess the appropriateness of present–

\textsuperscript{64}Kirshenblatt-Gimblett, “Intangible Heritage as Metacultural Production,” p. 60.
\textsuperscript{65}The Venice, Barcelona and Riga Charters all assert that finding “socially useful” purposes for historic buildings facilitates their preservation (Committee for drafting the International Charter for the Conservation and Restoration of Monuments, The Venice Charter: International Charter for the Conservation and Restoration of Monuments and Sites, Article 5; European Maritime Heritage, The Barcelona Charter: European Charter for the Conservation and Restoration of Traditional Ships in Operation, Article 5; Brook, The RIGA Charter — a significant new initiative, Article 4). The Nizhny Tagil Charter comments that using heritage buildings instead of constructing new ones “avoids wasting energy and contributes to sustainable development” (TICCIH, The Nizhny Tagil Charter for the Industrial Heritage, Sections 4.III, 5.IV and 5.V). The successor to the Nizhny Tagil Charter, the Dublin Principles, keeps the idea that use of the heritage is likely to contribute to the sustainability of the heritage itself, but drops the idea that this approach might have a positive value in contributing to sustainable development and energy conservation in a more general sense. The Dublin Principles document does, though, note that the continuation of the historic use and function of industrial heritage structures or sites “might carry some of their heritage significance” (ICOMOS-TICCIH, The joint ICOMOS – TICCIH Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes (The Dublin Principles), Sections III.10 and II.8). This is an approach also favoured by the Burra Charter, which notes that a use that has cultural significance should be retained (Australia ICOMOS, Australia ICOMOS Burra Charter, Article 7.1), and may in fact be the most appropriate and effective way to conserve the heritage (Australia ICOMOS, Australia ICOMOS Burra Charter, Article 23), while a new use should be compatible with the culturally significant use, so that it does not detract from the cultural significance of the heritage (Australia ICOMOS, Australia ICOMOS Burra Charter, Article 7.2).
day use in terms of its impact on the capacity of the heritage to act as an accurate witness to the past, and not in terms of its capacity to embody or inspire new meanings in the present.

Use of heritage as evidence of the past is, especially in the West, regarded as a very important cultural good, providing physical confirmation of known facts, and the raw material for research to reveal forgotten, unexpected or unimagined information. To use heritage in this way means being able to trust that the physical evidence contained in heritage is uncontaminated and unmodified, as modification may inadvertently change or destroy the information needed to answer future questions. In this context, using heritage in the present, and accepting all the modifications for safety, practicality and leisure values that such use requires, can seem at best an irresponsible degradation of evidence, and at worst a deliberate distortion of historical truth.

The past, however, has roles in the present in addition to providing evidence and these are roles that require heritage to be actively accessible, useable and malleable. The first of these, as has been discussed earlier in this study, is the use of the past to explore issues of identity and belonging, and to use ideas from the past to help imagine the future (see Chapter 3, Section 3). For these purposes affective and emotional truth can be as important as technical truth. The presentation of a large technology heritage object as a static display, for instance — inside a museum environment, with no movement, sound or smell and no opportunity to touch, control or ride on it — is

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67 Clavir, *Preserving What Is Valued: Museums, Conservation, and First Nations*, p. 28. As an example, the Portable Antiquities Scheme, which was established in the UK to encourage members of the public to report archaeological finds, has as its first and second aims:

- To advance knowledge of the history and archaeology of England and Wales by systematically recording archaeological objects found by the public;
- To raise awareness among the public of the educational value of archaeological finds in their context and facilitate research in them;

A recent report on the success of the scheme noted that these aims had been amply fulfilled, with substantial new knowledge being derived about the past, and the resulting website and database attracting substantial numbers of visitors. These aspects of knowledge creation and dissemination were cited as key impacts of the scheme and along with the significant social success of the scheme in bringing experts and community members together, formed major justifications for its continued funding. Kate Clark, *A Review of the Portable Antiquities Scheme*, The Museums, Libraries and Archives Council, n. p., 2008. URL: finds.org.uk/blogs/centralunit/files/2008/11/pas-final.pdf (accessed 28/02/2012), pp. 5, 11–12, 19–21.

arguably much less affectively truthful or informative than one that is actually oper-
ating, in a real outdoor or workshop environment, and often immersing the visitor in
a whirl of noise, vibration and smoke. It is the latter display that is more likely to en-
able visitors to imagine their grandparents’ feelings and experiences as they lived and
worked with such machines, to speculate how they themselves might have responded
to the challenges of that life, and to ask whether their forebears demonstrated qual-
ities and skills that might be rewarding or helpful in their own lives. It is the latter
display that, through guided interactions and volunteer opportunities, is able to of-
fer people the opportunity — at least in part — to experience the sensations, gain the
skills and share in the cultural performances that constitute the intangible aspects of
such heritage. The fact that machines may have had bronze bearings replaced with
Teflon bearings for longer wear, or narrow seats replaced with wider seats for comfort,
or guard rails installed for safety, acts much less to reduce their affective authenticity
than keeping them immobile, inaccessible and in an improbably clean and “designed”
museum environment.

Miriam Clavir’s interviews with First Nation communities in Canada have some
relevance to this and, in fact, Clavir notes similarities between the views of some of
her respondents and amateur groups working to preserve technological objects, par-
ticularly their shared convictions that:

- use is what the objects were intended for;
- use helps establish understanding of the heritage;
- use is particularly good at evoking emotional responses to the heritage; and
- use is a vital element in preserving the meaning of the objects.⁶⁹

Functional use of First Nation objects, however, seems to be generally assumed to
be a rich cultural experience, while the functional use of technological objects often

⁶⁹Clavir, Preserving What Is Valued: Museums, Conservation, and First Nations, p. 149, Table 5, section comparing avocational groups and First Nations.
seems to be assumed to be merely a way of demonstrating their technical functions. Clavir’s interviewee John Moses, for instance, assumed that functioning technological objects were used “in purely didactic terms…specifically so that the method of their construction and/or operation might be made known to as many people as possible…” He appeared to be completely unaware of the themes of community, family, celebration and sensory affect that are a particular feature of the community use of technological heritage (as discussed in this study in Chapter 5), and which are so similar to the First Nation community approach to the use of objects.\textsuperscript{70}

To use heritage effectively as a method to help people explore and negotiate community and identity issues, a more appropriate approach may be to accept that heritage must remain a vital part of everyday life and that, as discussed above, change is an integral part of vitality. The implications of this idea are that the tangible aspects of heritage may need to be allowed to move on into something new rather than being maintained in a fixed and unchanging state: continuity may need to replace stability as the cornerstone of good heritage practice.

A good example is the blast furnace and ancillary equipment at the Henrichshütte ironworks in Hattingen in the Ruhr region of Germany. This site was considered polluted and poisoned during its service life, but since it closed as a working plant in the 1960s the pollution has dissipated and plant life has begun to colonise the site. Without the heat, dirt and drama of its operating functions, the site has become tranquil, safe for visitor access, and increasingly full of beautiful natural phenomena (see Fig. 8.3).

As heritage, this place and its machinery have become less a document of the physical nature and workings of a steel manufacturing plant, and more a place of reflection, pleasurable sensory experience and community pride.\textsuperscript{71} There is, nevertheless, a continuity between these two stages of the ironworks’ existence, and its

\textsuperscript{70}Clavir, \textit{Preserving What Is Valued: Museums, Conservation, and First Nations}, p. 147. Hilde Hein, a museologist quoted in Chapter 1, made exactly the same assumption from a Western point of view.

\textsuperscript{71}Personal communication, Norbert Tempel, Head of Engineering and Restoration Workshops at the LWL Industrial Museum in Germany.
current presentation is neither dishonest or irrelevant. Indeed, it can be seen as a very poignant reflection of the wider social and environmental changes in the Ruhr area, as big, polluting industrial activities have moved elsewhere and left an environment that is cleaner and quieter, but deprived of the work and industrial bustle that once supported the local community.

The other way in which the past is used in the present is as a source of ideas. Preserving elements of the past within the fabric of the present — even if they are fragmentary, uninterpreted and largely unsignposted — enriches the present, providing sensory and often subliminal cues that can trigger memories, encourage connections and inspire creativity in ways that cross normal barriers of time, genre and “appropriateness”.\(^2\) Ironically, the preservation or recreation of such details are often admired in buildings and objects from the past — the use of column designs based on those of

\(^2\)Raphael Samuel dubs this use of the past “retrochic”. Samuel, *Theatres of Memory*, p. 112.
ancient Greece, for instance, has long been a staple of more modern Western architecture — but are belittled as meaningless cultural bricolage when used in the present. Jane Lennon’s comments on “façadism”, for example, are particularly caustic:

    …the mid to late 1980s saw a strong commitment to “fashionable or market driven conservation”. Often this has been at the expense of truly protecting the historic fabric of cities…(One of its tell-tale signs is façadism [the preservation of the façades only of historic buildings] and another is to watch large numbers of warehouses along waterfronts being recycled into condominiums.)

It is not possible though (or even desirable), to save every detail of the past. Where the preservation of an entire building or example of technology is not feasible, the integration of key parts of it into the present as decoration, points of interest or even a visual link to the past to temper the strangeness of new things in the present, can be a positive benefit to society.

This use of the past is affective rather than educational, more about making new connections than understanding old history. This conclusion has been reached by Marcello Source Keller in relation to music: each piece of music has its own origin, history and context, but few people who listen to it will be aware of these things, and the meaning and enjoyment they find in the music will be largely a product of their own ideas, preferences and circumstances. With music, he suggests, this potential for reinterpretation and adaptation to a modern context is seen as an indicator of conceptual depth and continued relevance. To use heritage in a similar way is similarly creative, and without such remainders and traces of the past in the world around us

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heritage would become something set apart from everyday life, a thing that people would only encounter if they made a deliberate decision to visit designated heritage sites. What is important is that the outcome of this integrative approach is recognised for what it is. Heritage treated in this way is being used for the purposes of enjoyment, comfort and inspiration in the present, and not to preserve an accurate understanding of the past.

8.5 Accepting diversity within standards

Understanding the work that is actually being done, and the goals that are actually being achieved with different approaches to heritage is critically important, because it paves the way for people using heritage in different ways to understand and respect each other’s motives and methods.

This is particularly important for large technology heritage because so much of it is, and always will be, in private hands. Even the richest organisations can only preserve and display a tiny fraction of the diversity of large machines and vehicles that are significant for the understanding and remembrance of our increasingly industrialised world, especially when it is not just technical diversity that must be represented, but also social diversity and meaning. In fact, this is a particular challenge for large, public collecting organisations — which are usually expected to be representative of a range of technologies, time periods and sectors of society — as they can generally afford to have only one, or at most two, of any single type of large technology object. Smaller, volunteer and private societies and owners have far more liberty to focus on tightly defined areas of interest, preserving a number of machines from just one type of technology, one context, one period, or any other aspect of personal or community relevance. The preservation of a variety of types, meanings and histories in large technology heritage is therefore likely to depend upon the distributed efforts of many different organisations and people, who will have diverse approaches and goals in heritage.
Public collecting organisations, for example, are generally expected to use historic objects to represent values of age and historicity, but private owners of large technology heritage often prefer to use their objects to express ideas that are closer to the present-day values identified by Reigl. These are art-value (seeing something modern in the old), use-value (practical usability) and newness-value (completeness and purity of form and colour). These different aims can create misunderstandings about desired outcomes, personal and professional integrity and definitions of success. Col Ogilvie, engineering conservation consultant at the NMA illustrated the difficulties generated by such misunderstandings when speaking about his days as a private car restorer:

... restoration of these vehicles is personal. I did a Holden for a bloke years ago, an FC Holden, and the only thing about it that was FC was the body shape. Everything else [pause] — it had a V-6, V-8, an engine in it. It had all the front end out of a HR, and the diff out of something else, you know. It was all a compromise. It wasn’t an object of beauty for me as in an FC Holden. But it was an object of beauty to him because it represented what he wanted. He wanted a very fast-looking, going FC Holden. His interpretation of an object restoration is not the same as mine. [To me] his was an object conversion. But to him, it was a restoration. Difficult.

There was nothing inherently wrong in the owner’s desire to combine heritage styling with modern mechanical performance and a luscious newness of appearance, any more than there was anything inherently right in Ogilvie’s desire to keep the car closer to the physical and operational specifications of a normal FC Holden. Ogilvie would have liked to see the car restored to reflect age-value (a sense of the form of the past and the effects of time) and perhaps historical value in preserving the mechanics and performance of an earlier era. His customer, on the other hand, was more interested in adapting the car to express present day use and art values by creatively

76 See Section 2 of this chapter.
fusing modern mechanical performance capabilities with an appealing style from the past. Both of these approaches to the object are perfectly valid, but they come from completely different ideas of cultural value and lead to completely different cultural outcomes.\footnote{77}{A similar potential for divergent treatments and uses of heritage is described in Erica Avrami, Randall Mason and Marta de la Torre, Values and Heritage Conservation, Getty Conservation Institute, Los Angeles, 2000. URL: www.getty.edu/conservation/publications/pdf_publications/valuesrpt.pdf (accessed 29/02/2012), p. 8.}

To bring these two people to a better understanding of each other’s aims would require two things to happen. Firstly, the owner of the car would need to recognise that he had fundamentally changed his object, and that therefore it no longer contained much information relevant to historic FC Holdens, but had become a completely new creation that expressed his personal identity and passion. Secondly, Ogilvie would need to reframe his view of the restoration to see it as embodying positive values of creativity rather than negative values of ignorance or poor taste. This is a situation where the idea of cultural significance used by the Burra Charter would be extremely useful, because it accommodates the possibility that the primary cultural significance of the object may be as much the importance of its present day values to its private owner as any historic significance to a wider public.

\section*{8.6 Economic value}

The other present-day value that is almost completely avoided by all the charters and guidelines discussed in this chapter, as well as by Reigl’s work, is that of economic value. It could be argued that this is because the economic value of heritage arises purely from its cultural significance,\footnote{78}{According to Randall Mason this is the reason that mention of economic values are minimised in the Burra Charter. Randall Mason, “Assessing values in conservation planning: methodological issues and choices”. In Assessing the Values of Cultural Heritage, ed. by Marta de la Torre, Getty Conservation Institute, Los Angeles, 2002. URL: http://www.getty.edu/conservation/publications_resources/pdf_publications/index.html (accessed 05/03/2012), p. 10.} but David Throsby, an economist with a strong interest in the intersection between culture and economics argues that this is not necessarily so. He suggests that economic and cultural values are distinct measures that
each say something different about the worth of a cultural commodity.

For Throsby, culture consists of the “[a]ctivities, and products of those activities, undertaken by people to do with intellectual, moral and artistic aspects of life”. These are activities that he defines as being characterised by creativity, the generation and communication of symbolic meaning, and the creation of outputs that embody some form of intellectual property. Throsby’s idea of culture is very personal, though, and very much aligned with the ideals of elite culture that Smith sees as being at the heart of the Western value system that she refers to as the “Authorized Heritage Discourse”. In Throsby’s assessment, for instance, atonal music has high cultural value while soap operas do not, and his assessment of the disjuncture between cultural and economic values appears to be mostly prompted by his astonishment that the economic value of atonal music should be so low while that of many soap operas is so high.\footnote{David Throsby, *Economics and Culture*, Cambridge University Press, New York, 2001, pp. 4–5, 34.}

If these cultural products are assessed through a different value framework, however, Throsby’s judgements become irrelevant. This is one of the key insights of the Burra Charter: that cultural significance will be different for different people, who have different backgrounds, experiences, assumptions and preferences. With this understanding, it is evident that cultural and economic values are actually very closely linked, but that they are related through a third variable — the person or group that defines the cultural value. The corollary of this is that an item does not have one economic value any more than it has one meaning or cultural value: it will have different economic values for different people and groups. If the world were made up entirely of people who shared David Throsby’s opinions, soap operas would have no economic value at all.

One way of expressing economic value is in terms of people’s *willingness to pay* to acquire or have access to things. In this sense even items that only have cultural significance for people who feel a strong personal connection to them have an economic value, which is expressed through the individual’s willingness to pay for their maintenance. This is particularly relevant to heritage, as many people will pay substantial
sums of money to have items of purely personal significance — such as family photographs — conserved and mounted for display, in the full knowledge that the return on this investment will be social and emotional rather than monetary.\(^80\)

On the other hand, economic value can be a cultural value in its own right. A diamond ring may be a family heirloom because it is beautiful, has been handed down through generations and is a touchstone for family and personal memories, but one of the main reasons that it became an important family item in the first place was because its high economic value as a tradable commodity said much about the family’s status and identity. For some objects, such as the Welcome Stranger gold nugget of Australia, it was their high economic value that gave them the status of heritage icon in the first place, or which led to their association with key historic events and people.

Equally people may invest in heritage in the hope that it will create economic value for them. This is a situation that is particularly relevant to large technology heritage, as the high economic value of large technology objects and complexes in their service lives has given many of them an identity and status in the local community — or in some cases even broader national and international communities — that can be resurrected as heritage. Such social identities can contribute to economic growth by attracting visitors, and also to social growth by providing the foundation for a burgeoning sense of community pride. In all these cases, economic value is a positive contributor to the history and significance of heritage items.

In the heritage documents considered in this chapter, however, economic values or considerations barely rate a mention, implicitly suggesting that there is an unbridgeable divide between cultural and economic values, and that economic value is not a suitable criterion for heritage decision-making. All of the documents appear to follow the approach established by Piero Gazzola when he remarked that it is “…necessary to place material development under the guidance of spiritual values.”\(^81\) To be ac-

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\(^{80}\) Michalski, “Sharing responsibility for conservation decisions,” p. 251. Also see Throsby, *Economics and Culture*, p. 82.

\(^{81}\) Confusingly, Gazzola followed this by explicitly calling for economic value to be taken into account in heritage decision-making, saying that “…by considering only the cultural value of the works of the
cepted into a public collection using the evaluation approach outlined in the Collections Council of Australia publication Significance 2.0, for instance, an object must generally score well on at least one of the four primary significance criteria of historic interest; artistic or aesthetic quality; scientific or research potential; or social or spiritual significance. If it does not fulfil any of these criteria, it will need to score extremely highly on one of the secondary significance criteria of provenance; rarity or representativeness; condition or completeness; or interpretive capacity. Its economic value, however, is unlikely to be taken into account at all except as a possible restriction on the institution’s ability to purchase it. Public institutions are using public money and must be seen to be spending it in ways that have public benefit, and as members of the public cannot gain benefit from an object’s economic value (except through community pride in public possession of an object of high economic value), evaluations of the suitability of the object for collection must depend on its cultural value, which the public can access through the institution’s provision of opportunities to see, study and connect with the object.

In a private context, however, this is surely not so at all. In fact, it is clear that past, we achieve only or above all else a partial recognition of the effective value of these monuments…” Gazzola, “Foreword,” pp.1–2. Despite this the Venice Charter itself does not consider economic value, and nor do the Barcelona or Riga Charters. On the other hand, the Athens Charter, which pre-dates the Venice Charter, does mention the need to consider the rights of private owners and the “sacrifices…[they] may be called upon to make in the general interest”, which suggests an anticipated loss of both proprietal control and financial return from properties that were declared to be heritage. Some of the documents do mention financial issues as matters of logistics, though not of value: the Commentary on the Barcelona Charter, and the Dublin Principles, both mention the possibility of gaining income through present–day use of the heritage, while the potential cost-effectiveness of the use of heritage is mentioned by the Nizhny Tagil Charter. The Burra Charter itself does not mention economic matters at all, and the attached guidelines on the assessment of cultural significance only refer very briefly to the need to consider “costs and returns” when managing heritage. The publication Significance 2.0 does not mention economic value either, even as one of the secondary, comparative criteria that it proposes should be used to determine the degree of significance of heritage within the Burra Charter’s four primary areas of cultural significance. Only the EHC Guidelines briefly acknowledge the need to accept the influence of economics on what should be considered the “right” way to do things in heritage, commenting that market forces and community expectations may change what should be regarded as effective conservation. International Committee on Intellectual Cooperation, The Athens Charter for the Restoration of Historic Monuments, Section II; European Maritime Heritage, The Barcelona Charter: European Charter for the Conservation and Restoration of Traditional Ships in Operation, Introduction; ICOMOS-TICCIH, The joint ICOMOS – TICCIH Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes (The Dublin Principles), Section II.8; TICCIH, The Nizhny Tagil Charter for the Industrial Heritage, Section 4.iii; Australia ICOMOS, Australia ICOMOS Burra Charter, Guidelines on Cultural Significance, Section 1.5; Russell and Winkworth, Significance 2.0, p. 10; Engineering Heritage Australia, Engineering Heritage and Conservation Guidelines, p. 3.
the primary and secondary criteria may be reversed in their importance for decision-making. The professionally unmentionable economic value of the object may be a key factor in decision-making, not only in terms of what the item may cost to purchase, restore and maintain but also as a source of pride and as an asset that can be realised when circumstances change. A number of private car owners regarded the saleability of their cars as a distinct advantage and commented that, while they enjoyed cultural values in their cars in the present (mostly, to use Reigl’s criteria, present-day art, newness and use values) and often hoped to pass the cars on to their children, they were well aware that they could convert the cars into pure economic value if money got tight, or if their children were not interested. As Garry Collins, private owner of cars at the Gold Coast car show said:

…preferably I would love to be able to hand [the car] on to the children or grandchildren, but one daughter and granddaughter is in France and my three grandsons are in Melbourne. But it is too young to tell if they are interested at the moment, and with the world and the economy and keeping them running, keeping them registered and insured and maintaining them, having the place to store them and keep them, it is getting expensive. So you wouldn’t want to burden them with it if they can’t use it and can’t restore [it]. So if it doesn’t suit you are best to sell it and buy something for them, or put the money away for them.

Economic value may not be a primary heritage value — in that it is not what distinguishes heritage from other items of economic value — but it is still a factor, and ignoring it altogether means that heritage decisions are taken without acknowledging its impact, with often peculiar and unfortunate consequences.82

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8.7 Conclusion

Recognition of multiple values in heritage has come, in recent years, to be seen not just as a pragmatic way of dealing with potential conflict, but as a positive way of enriching the understanding and experience of heritage. This understanding, however, took a back seat through much of the twentieth century, arguably because of the drive towards the development of standards for heritage.

Standardisation is a powerful way of integrating the efforts of many different people and organisations and has, as noted above, the power to increase efficiency by making it easier for people to share information, become aware of best practice, and make their efforts and products compatible. Poorly designed standards, however, have the capacity to reduce efficiency by enshrining procedural rigidity, reducing variety and stifling innovation.

The twentieth century movement towards standardisation in heritage drew from industrial and scientific contexts, where standardisation was very much about specifying physical qualities, quantities and methods. Physical materials have limited variability and success could be defined in fairly concrete and measurable terms, so it was relevant to develop precise methodologies that could be relied upon to consistently produce the same results given certain specified inputs. Heritage, however, does not work this way; it is too dependent on people, and people are infinitely variable.

Because of the variability of people, standards for heritage need to provide ways of sharing information and promoting good practice that do not limit understandings of what heritage is or can be, and do not stifle the creativity that is needed to deal with its myriad manifestations. Unfortunately, in the rush to jump on the standardisation bandwagon, heritage professionals in the twentieth century failed to recognise this. Instead they developed standards documents such as the Venice Charter, that were confined within narrow definitions of culture and heritage, that were methodologically rigid, and which (in contrast to their science and industry antecedents) made no provision for being updated as the field of heritage preservation evolved.
In the last two decades of the twentieth century Reigl’s insights about the importance of values for heritage have been resurrected, and these ideas — and others like them — have engendered new research and debate, and new and more open standards documents. These documents have begun to acknowledge the diversity of values in heritage, and are increasingly encouraging creativity and flexibility in determining and facilitating appropriate heritage outcomes. In the Australian context, and more particularly in the area of large technology heritage, the most important of these is the Burra Charter, supported and extended by the EHC Guidelines (which contextualise the Burra Charter for the large technology field) and Significance 2.0 (which provides detail on how to use the Burra Charter’s central concept of cultural significance in practical situations). These documents do not assume what the values to be found in heritage will be, or how they should be treated, but suggest a process for discovering such values and enhancing them whatever they may be.

There is, nevertheless, still some distance to go in creating a unified standard for heritage. A framework is needed that can encompass both different genres of heritage — such as built and movable heritage — as well as different parts of that heritage, such as tangible and intangible aspects, and social and economic values. For now though — and particularly in the large technology context — much progress can be made just by acknowledging that there are many different ways of seeing and valuing heritage and that while none of these are “right” or “wrong”, they do focus on different things, prompt different decisions, and lead towards different outcomes. Looking at these differences with open eyes and minds will challenge our preconceptions and blur our carefully drawn boundaries, but it will may also lead us to find new people, new ideas and new solutions to our problems.
Chapter 9

Conclusion

When I began this project I was a conservator. I had spent much of my working life working on, or managing, large technology conservation projects, and I understood from the inside the practical difficulties created by their size and complexity. I was also aware that practical issues were perhaps the least difficult challenge in treating and displaying such objects. A far greater challenge was managing the different attitudes people had towards them, and the different — and often conflicting — assumptions people made about the “right” ways to treat and display them.

And yet I did not, at this stage, realise that understanding peoples’ attitudes was the key to solving many of the practical problems. Practical issues are relatively easy to resolve if you can get people to sit down together and discuss them co-operatively and collaboratively, with respect for each other’s different skills and different points of view. It is getting to this point of sitting down together, of finding respect and understanding and a reason to adjust individual expectations to meet shared goals, that is the hard part.

The initial proposal for this project, therefore, was filled with practical, methodological questions, to which I hoped there would be practical, deterministic answers. I wanted to know how to decide which period of an object’s history should be prioritised for preservation or restoration, which parts of it should be seen as “original” and
kept for the future, and which parts could be regarded as unimportant and discarded. I wanted to find out whether visitors preferred to see objects looking old or restored to look new again, and how much they wanted to see them working. I wanted to explore how to make large technology heritage sustainable, looking at the issues of planning, financing and marketing, and the problem that obsolete equipment suffers from an ever shrinking support network of parts, maintenance equipment and skills.

Moreover I aimed to suggest better ways of answering these questions because the methods I (and others) had used before had not been adequate. Although I had been involved with a number of large technology projects that ultimately produced effective and engaging displays, there were many others that had become mired in bitter disagreements over what to do and how to do it, and these had mostly resulted in poor displays, poorly maintained objects and deep unhappiness amongst the people involved. Large technology objects almost always involve a lot of people, with a consequent diversity of skills, opinions and expectations, and while we all shared a commitment to preserving and promoting the machines, our different backgrounds often led us to see each others’ approaches to treating and using them as unsatisfactory, ignorant, or even negligent. How could we find an approach that satisfied everybody?

The answer was, of course, that we could not. Furthermore, if we continue to address these problems from a purely practical standpoint, we never will. From a purely practical point of view it is not possible to decide which of two treatments is “right” and which is “wrong”, as typically neither is right or wrong or even better or worse — they merely provide different outcomes which are preferred by different people. The problem is not in the practical options available, but in people’s perceptions of those options.

It might seem that the way to decide between options is to look at the apparent goals of an immediate project, and ensure that the option chosen facilitates those goals. Unfortunately this is also of surprisingly little use since — as discussed in
Chapter 5 — most people have a standard, preferred approach to objects that they apply regardless of what the object is or what is intended for it. The difficulty, again, is not with the goals of the project, but with the personal goals of the people.

It might also seem important to match the management of an object to the resources available, but even this rarely helps to reduce conflict, since people usually want to allocate the resources that are available to the type of treatment and management that they personally expect. Yet again, it is the values of the people involved that are the sticking points.

This is the crux of the matter. Values are fundamental to people’s identities. As discussed in Chapter 6 they are the product of a lifetime of learning and experience and underpin an individual’s self-esteem and social relationships. If people feel that accepting a different method of treating or displaying large technology heritage means abandoning their own values and substituting someone else’s, they will be understandably reluctant to accept that new method and will fight to defend their values and what they see as right.

On the other hand, the very ubiquity of values means that they are potentially a common point of reference — people may hold different values, but the knowledge of what it is to have values, and to look to values as a source of guidance and justification, is something that they have in common. I believe this makes values not only the source of, but potentially the solution to, many of the problems that undermine efforts to preserve and display large technology heritage.

We are unlikely to find answers to all the separate, practical issues until we have a shared theoretical framework that allows us to bring our ideas together. We need a comparable measure of importance that will allow us to evaluate different aspects of an object from the same standpoint, a common currency with which to represent and interrelate our ideas. Values have the potential to be this common currency. If we can understand that people who hold different ideas in heritage are not merely incompetent, or insensitive, or “wrong”, but that their actions are driven by values to
which they are as deeply committed as we are to our own, then we have a basis for understanding why they do things the way they do, and how we could work together to find a solution.

Currently, we rarely make our values explicit, and often misunderstand ourselves, each other, and our projects as a result.\(^1\) If we learn to make our values explicit, we may discover that our past practices do not, in fact, fit our present goals particularly well, and that adopting or developing new practices may provide solutions that meet our current goals and values better. Alternatively, we may find that our values begin to change, as we see the possibilities in new alternatives and understand that there are new audiences whose values also need to be taken into account.

As a number of scholars have pointed out, this is hard territory. Etienne Wenger, whose ideas about communities of practice are discussed in Chapter 5, notes that crossing boundaries between different communities of practice means entering regions where there are few guidelines and fewer models. These are regions where we can no longer be certain what competence means, either socially or technically.\(^2\) Hugh Glassie, however, argues that this is a sign of professional maturity, the point where experts add real value to their practice:

> To be useful [experts] must go beyond their narrow disciplinary expertise into other territory where they are amateurs. This transdisciplinary stage happens as they mature as [experts]. They keep technical rigour, but embrace new disciplines.\(^3\)

Daniel Miller, in fact, suggests that “value” is created by finding a balance or intersection between properties — “values” — that seem at first to be incommensurable, and that it is the people who can find new ways to link different worlds who are the

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\(^1\) Alison Wain and Andrew Schroeder. “We’ll have that . . . and that . . . and, oh, just everything!” 2010. *Big Stuff 2010: On the Conflict and Avoidance of Conflict between the Display and Conservation Requirements of Large Technology Objects within the Museum Setting*. Imperial War Museum Duxford. URL: [http://anu.academia.edu/AlisonWain/Papers/1794058/Well_have_that_and_that_and_oh_just_everything_](http://anu.academia.edu/AlisonWain/Papers/1794058/Well_have_that_and_that_and_oh_just_everything_) (accessed 25/07/2012).
\(^2\) Wenger, *Communities of Practice: Learning, Meaning and Identity*, pp. 152–3.
\(^3\) Glassie, *Material Culture*, p. 5.

The size, complexity and cost of large technology projects inevitably mean that they are team projects, requiring input from many different areas of expertise and therefore multiple communities of practice.\footnote{Even private owners supplement their own skills and capacities with those of friends, fellow club members and paid contractors to achieve their projects, as discussed in Chapter 6.} When cross-practice teams collaborate successfully they begin to develop their own practice, their business being to negotiate shared meaning and agreed practices, resolve conflicts and promote connections.\footnote{Wenger, Communities of Practice: Learning, Meaning and Identity, p. 114.}

This is, as noted in Chapter 6, fertile ground for people who derive personal and professional satisfaction from looking to the future, reframing problems, and creating new solutions. Having said that, the integration of different values and practices into a shared, holistic understanding does not always happen spontaneously, and a number of “dialogue methods” have therefore been developed to provide frameworks for processes of discussion and negotiation (a brief list of methods that have particular relevance to large technology heritage are described in Appendix C\footnote{The emerging research discipline of Integration and Implementation Sciences is entirely devoted to understanding and developing better ways to help people from different communities and disciplines understand each other’s points of view and reach consensus. Gabrielle Bammer of the ANU, who has been instrumental in developing this area, has written of the aims of the new discipline in relation to academic research, but the concepts she outlines are just as applicable to the world of heritage and its many stakeholders. Bammer, “Integration and Implementation Sciences: Building a New Specialisation”}). One of the challenges of developing new ways of working is to get people with entrenched viewpoints to talk to each other, and a common feature of all dialogue methods is that they provide structures that encourage people to negotiate openly with each other, with the recognition that their values are equally worthy of consideration even if their positions in organisational or knowledge networks are very different.

These processes of dialogue and value analysis are only likely to transform the way people approach large technology heritage, however, if they become a standard part of the way large technology teams do their work. Each team, and its organisation, needs to become familiar and comfortable with the process that suits it, and to embed that process (or multiple processes) into a continuing conversation. This is the mutual
engagement and social interaction that will enable new communities of practice to coalesce around the challenges of large technology heritage, sharing the excitement of using old and new knowledge to generate solutions to unusual and intriguing problems.

Three issues were identified in Chapter 1 of this study as being particularly relevant for large technology heritage:

- **Issue 1**: The need to bring expertise from different traditions together to develop shared, innovative ways of preserving and enhancing large technology in its new and different role as heritage.

- **Issue 2**: The need to bring as much creativity and attention to detail to the challenges and opportunities of large technology as are typically applied to the “comfort zone” of more traditional museum objects.

- **Issue 3**: The need to recognise and understand the different needs of diverse audiences for large technology heritage, and to meet these needs by developing accessible and engaging display strategies.

The research undertaken in this study has shown that there are already many different technical and cultural approaches to the preservation and display of large technology heritage but that, at present, many of these approaches remain in “silos”, used and appreciated chiefly by one particular group or community and ignored, avoided or even derided by others. The research has also shown, however, that creative partnerships are beginning to emerge between people from different communities of practice who have set aside their pre-conceptions about what is “right”, “wrong”, “appropriate” and “inappropriate”, to focus on re-imagining what is possible, sustainable and inspirational in large technology heritage. Their visions focus on what they need to do to make their heritage sufficiently exciting, thought-provoking, and relevant for people to keep visiting it, and looking after it, for generations to come.

Heritage is a melding of the past and the present. The past cannot continue to exist
unless it is colonised and adapted by the interests and desires of the present, and to
fight against this will not bring back the reality of the past, but only create a different
version of the past-present mix. It is important, however, that we recognise what it
is that we value about the past, and why, and how these things are reflected in the
choices we make. We should also endeavour to become more aware of the things that
we have not valued and that we are in danger of throwing out, or allowing to vanish,
without even being aware of them. Thinking about these things more carefully may
lead us to re-evaluate what we really do want to keep, and consequently what we
really do want to do with our large technology heritage objects.

This has been my journey. As a conservator I used to believe that all the extant
physical evidence in the object should be preserved, and that every effort should be
made to minimise further physical stress on the object. Through the research I have
conducted for this study I have come to realise that the true consequences of that
approach are often an aggressive destruction of the intangible heritage associated with
the object — the knowledge, skills and culture involved in running it, and the sensory
affect of experiencing it running. This does not mean that every object should be
operated, but it does mean that operation, and the restoration techniques that go with
it, should be considered as an essential and appropriate part of the large technology
heritage toolkit, potentially applicable to any object depending on the circumstances
of its preservation and the values which it is seen to represent.

Equally, I have found evidence that the physical signs of the past have enormous
value to most people, and that most visitors treasure the connection they feel they can
make with the past through visible signs of wear, the textures of genuine materials
from the past, and the scars that bear witness to past events. These things add depth
and subtlety to objects, and make them “real”. I would encourage every owner of
a large technology object to look over their object with new eyes, searching for the
value in the stories told by details such as paint liveries, upholstery, wear marks and
modifications. Observing and understanding these things is also an essential and
appropriate part of the large technology heritage toolkit, and may lead us to discover things about our objects that we never imagined and that, having discovered, we want to share.

My biggest surprise, however, was discovering how important the past is as an affective and artistic resource, and the joy and excitement of drawing the past into the present through creative restoration, or customisation. Customisation does not preserve an accurate representation of the past any more than a painting of an historical event by an artist is a photographically accurate representation of that event. Rather, both are distilled interpretations of the original, drawing together in a new composition the elements of the original that the artist considers most important and affective. As a conservator, I once viewed customisation as a destruction of historical evidence and truth. Through the research I have conducted for this study, I have come to understand that it is a completely different way of bringing the past into the present, and making it sustainable for the future. It fulfils needs that are quite different to, and which are not fulfilled by, the preservation of mere historical accuracy.

This, then, is the final conclusion. Large technology objects are fascinating, complicated, sometimes frightening, sometimes inspiring. Different people see many, many different values in them. They are far too big, too costly, too difficult and too varied for one approach, or set of people, or type of organisation to be able to preserve them all for the future. To do them justice we have to understand each other’s goals, to share our resources, and to celebrate each other’s triumphs. I believe that our route to doing that with goodwill and success is by recognising what we all have in common — the value that we place on our values.
Appendix A

Tables

A.1 Brief guide to tables

The following tables present the results of frequency, crosstabulation and GLM analyses of the statistical data collected in this study. The rationale and procedures used for data collection and analysis are described in Chapter 2.

As noted in Chapter 2 (Quantitative analysis: Controlling for reactivity), data were reduced to binary categories (interested/not interested, wanting/not wanting, preferring/not preferring) to increase statistical confidence in the results given the small sample size, and to allow GLM to be used to explore and confirm patterns of association between responses and demographic variables.

One consequence of binary data categories is that each is a mirror image of the other: 70% positive responses provides the implicit information that there were also 30% negative responses. To reduce redundancy, therefore, only one of the binary data categories has been reported in the tables, and as it is the category of positive responses that is mostly discussed in the text, it is the category of positive responses that is primarily reported in the tables. Results that show or discuss positive responses only are shaded in grey.

The “mirror image” data can, however, be easily calculated if required: percentages of negative responses can be calculated by deducting the percentage of posi-
tive responses from 100% (for example 100% - 70% = 30% negative responses), and the number of individual cases expressing negative responses can be calculated by deducting the number of positive responses in a demographic group from the total number in the same demographic group.

All figures presented are the results of crosstabulations unless otherwise noted (exceptions are the Total Sample frequency analyses at the top of Tables A.2–A.9, and the GLM analyses in Tables A.11–A.14, A.16–A.19, and A.20–A.22). Each crosstabulation and GLM result is also provided with a p value, which is a statistical measure of the likelihood of the result being merely due to chance rather than to a genuine relationship between the variables being studied (these statistical techniques are described in more detail in Chapter 2).

The number of excluded cases (missing data) is noted below each table or group of tables.

A.2 Influence of individual demographic categories on responses to survey questions

The tables in this section report the results of the crosstabulation of individual demographic categories with survey responses.

In Table A.1 the interview sites are denoted by acronyms, to reduce the size of the table. Figure A.2 contains a list of each acronym and the short title of the site it denotes:\(^1\)

\(^1\)The full titles of these sites and organisations are provided in Chapter 2: The choice of sites.
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* † ‡ § See page 332 below for notes
Notes for Table A.1

* Exact method unless otherwise noted
† No cases were excluded from the above data, which constitutes the total sample of interviewees.
‡ 48 cases were excluded from the Occupation group analysis because they were students or had no defined occupation.
§ 46 cases were excluded from the Childcare Status analysis because they were grouped as children (18 or under) and 3 cases because their social group was not recorded.

AWM    Australian War Memorial
CSMM   Campbelltown Steam and Machinery Museum
ARAGC  Automobile Restorers Association Gold Coast
DH     Darling Harbour
MM     Melbourne Museum
PB     Puffing Billy
SW     Scienceworks
WAMM   Western Australian Museum — Maritime
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<td>75</td>
<td>.001 (df=7)</td>
</tr>
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<td>94.4</td>
<td>34</td>
<td>(WALD GLM p=.025)</td>
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<td>Darling Harbour</td>
<td>25</td>
<td>100.0</td>
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<td>81.5</td>
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<td>78.0</td>
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<td>93.1</td>
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</tr>
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<td>53</td>
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<td>51</td>
<td>.617 (df=3)</td>
</tr>
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<td>Hands &amp; Machines</td>
<td>75</td>
<td>94.7</td>
<td>71</td>
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<tr>
<td>People</td>
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</tr>
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<td>197</td>
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</tr>
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<td>Adults with children 0–18</td>
<td>76</td>
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<td>70</td>
<td></td>
</tr>
</tbody>
</table>

* † ‡ § See page 334 below for notes

Table A.2: Interest in history of large technology heritage objects
Notes for Table A.2

* Exact method unless otherwise noted
† 43 cases were excluded because no response data was available.
‡ As above, 43 cases were excluded because no response data was available. 48 cases were also excluded from the Occupation group analysis because they were students or had no defined occupation. There is some overlap between these two groups of excluded cases, making a total of 82 excluded cases.
§ As above, 43 cases were excluded because no response data was available. 46 cases were also excluded from the Childcare status analysis because they were children (18 or under) and 3 cases because their childcare status was not recorded. There is some overlap between these groups of excluded cases, making a total of 83 excluded cases.
<table>
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<th>Total number</th>
<th>% interested</th>
<th>Number interested</th>
<th>Chi square*</th>
</tr>
</thead>
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<td>63.4</td>
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</tr>
<tr>
<td>Gender *†‡§</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>192</td>
<td>75.5</td>
<td>145</td>
<td>&lt; .0001 (df=1)</td>
</tr>
<tr>
<td>F</td>
<td>128</td>
<td>45.3</td>
<td>58</td>
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</tr>
<tr>
<td>Age group *†‡§</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–11</td>
<td>23</td>
<td>91.3</td>
<td>21</td>
<td>&lt; .035 (Asymptotic method, df=7)</td>
</tr>
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<td>12–18</td>
<td>15</td>
<td>66.7</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>19–25</td>
<td>27</td>
<td>81.5</td>
<td>22</td>
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</tr>
<tr>
<td>26–35</td>
<td>49</td>
<td>59.2</td>
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<td>36–45</td>
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<tr>
<td>46–55</td>
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<td>56–65</td>
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<tr>
<td>&gt; 65</td>
<td>43</td>
<td>62.8</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Site *†‡§</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian War Memorial</td>
<td>77</td>
<td>57.1</td>
<td>44</td>
<td>.004 (Asymptotic method, df=7)</td>
</tr>
<tr>
<td>Campbelltown Museum</td>
<td>36</td>
<td>69.4</td>
<td>25</td>
<td>(GLM p=.010)</td>
</tr>
<tr>
<td>Gold Coast car show</td>
<td>27</td>
<td>48.1</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Darling Harbour</td>
<td>24</td>
<td>70.8</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Melbourne Museum</td>
<td>27</td>
<td>77.8</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Puffing Billy</td>
<td>44</td>
<td>47.7</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Scienceworks</td>
<td>29</td>
<td>89.7</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>WA Maritime Museum</td>
<td>56</td>
<td>64.3</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Occupation group *†‡§</td>
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<td></td>
<td></td>
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<td>Ideas &amp; Machines</td>
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<td>78.8</td>
<td>41</td>
<td>&lt; .0001 (df=3)</td>
</tr>
<tr>
<td>Hands &amp; Machines</td>
<td>75</td>
<td>80.0</td>
<td>60</td>
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</tr>
<tr>
<td>People</td>
<td>83</td>
<td>45.8</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>72</td>
<td>44.4</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Childcare status *†‡§</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Adults only</td>
<td>209</td>
<td>65.6</td>
<td>137</td>
<td>.008 (df=1)</td>
</tr>
<tr>
<td>Adults with children 0–18</td>
<td>72</td>
<td>47.2</td>
<td>34</td>
<td></td>
</tr>
</tbody>
</table>

*†‡§ See page 336 below for notes

Table A.3: Interest in technical specifications
Notes for Table A.3

* Exact method unless otherwise noted
† 48 cases were excluded because no response data was available.
‡ As above, 48 cases were excluded because no response data was available. 48 cases were also excluded from the Occupation group analysis because they were students or had no defined occupation. There is some overlap between these two groups of excluded cases, making a total of 86 excluded cases.
§ As above, 48 cases were excluded because no response data was available. 46 cases were also excluded from the Childcare status analysis because they were children (18 or under) and 3 cases because their childcare status was not recorded. There is some overlap between these groups of excluded cases, making a total of 87 excluded cases.
<table>
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<th>Total number</th>
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<th>Number interested</th>
<th>Chi-square*</th>
</tr>
</thead>
<tbody>
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<td>Total sample (frequency analysis)</td>
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<td>75.9</td>
<td>230</td>
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</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=303†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>181</td>
<td>83.4</td>
<td>151</td>
<td>&lt; .0001 (df=1)</td>
</tr>
<tr>
<td>F</td>
<td>122</td>
<td>64.8</td>
<td>79</td>
<td></td>
</tr>
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<td>Age group</td>
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</tr>
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<td>22</td>
<td>86.4</td>
<td>19</td>
<td>.391 (df=7)</td>
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<td>66.7</td>
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<td>19–25</td>
<td>27</td>
<td>63.0</td>
<td>17</td>
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</tr>
<tr>
<td>26–35</td>
<td>45</td>
<td>73.3</td>
<td>33</td>
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<tr>
<td>36–45</td>
<td>42</td>
<td>83.3</td>
<td>35</td>
<td></td>
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<td>46–55</td>
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<td>72.4</td>
<td>42</td>
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<td>56–65</td>
<td>55</td>
<td>81.8</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>&gt; 65</td>
<td>39</td>
<td>74.4</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Site</td>
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</tr>
<tr>
<td>n=303†</td>
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<td></td>
</tr>
<tr>
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<td>75</td>
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<td>.268 (df=7)</td>
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<td>80.0</td>
<td>28</td>
<td>(GLM p=.305)</td>
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<td>Gold Coast car show</td>
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<td>61.5</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Darling Harbour</td>
<td>21</td>
<td>81.0</td>
<td>17</td>
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</tr>
<tr>
<td>Melbourne Museum</td>
<td>27</td>
<td>70.4</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Puffing Billy</td>
<td>36</td>
<td>72.2</td>
<td>26</td>
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<tr>
<td>Scienceworks</td>
<td>29</td>
<td>89.7</td>
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</tr>
<tr>
<td>WA Maritime Museum</td>
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<td>81.5</td>
<td>44</td>
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<td>50</td>
<td>84.0</td>
<td>42</td>
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<td>84.3</td>
<td>59</td>
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<tr>
<td>Data</td>
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<td>68.1</td>
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</tr>
<tr>
<td>n=265‡</td>
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</tr>
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<td>154</td>
<td>.323 (df=1)</td>
</tr>
<tr>
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<td>65</td>
<td>70.8</td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>

* † ‡ § See page 338 below for notes

Table A.4: Interest in how the object was made
Notes for Table A.4

† 65 cases were excluded because no response data was available.
‡ As above, 65 cases were excluded because no response data was available. 48 cases were also excluded from the Occupation group analysis because they were students or had no defined occupation. There is some overlap between these two groups of excluded cases, making a total of 102 excluded cases.
§ As above, 65 cases were excluded because no response data was available. 46 cases were also excluded from the Childcare status analysis because they were children (18 or under) and 3 cases because their childcare status was not recorded. There is some overlap between these groups of excluded cases, making a total of 103 excluded cases.
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<thead>
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<th>Demographic group</th>
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<th>% wanting to touch</th>
<th>Number wanting to touch</th>
<th>Chi-square*</th>
</tr>
</thead>
<tbody>
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<td>Total sample (frequency analysis)</td>
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<td>266</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>182</td>
<td>94.0</td>
<td>171</td>
<td>&lt; .0001 (df=1)</td>
</tr>
<tr>
<td>F</td>
<td>119</td>
<td>79.8</td>
<td>95</td>
<td></td>
</tr>
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<td></td>
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<td>N=301†</td>
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</tr>
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<td>6–11</td>
<td>22</td>
<td>95.5</td>
<td>21</td>
<td>.318 (df=7)</td>
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<td>12–18</td>
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<td>71.4</td>
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<tr>
<td>19–25</td>
<td>25</td>
<td>88.0</td>
<td>22</td>
<td></td>
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<tr>
<td>26–35</td>
<td>46</td>
<td>91.3</td>
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<td>36–45</td>
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<td>46–55</td>
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<td>56–65</td>
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<td>89.1</td>
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<tr>
<td>&gt; 65</td>
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<td>Site</td>
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<td>Australian War Memorial</td>
<td>74</td>
<td>82.4</td>
<td>61</td>
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<td>88.9</td>
<td>32</td>
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</tr>
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<td>Gold Coast car show</td>
<td>25</td>
<td>84.0</td>
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<td></td>
</tr>
<tr>
<td>Darling Harbour</td>
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<td>100.0</td>
<td>22</td>
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</tr>
<tr>
<td>Melbourne Museum</td>
<td>27</td>
<td>92.6</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Puffing Billy</td>
<td>33</td>
<td>84.8</td>
<td>28</td>
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</tr>
<tr>
<td>Scienceworks</td>
<td>28</td>
<td>92.9</td>
<td>26</td>
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<tr>
<td>WA Maritime Museum</td>
<td>56</td>
<td>91.1</td>
<td>51</td>
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<tr>
<td>Occupation group</td>
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<td></td>
</tr>
<tr>
<td>N=265‡</td>
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<td></td>
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<td></td>
</tr>
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<td>50</td>
<td>96.0</td>
<td>48</td>
<td>.003 (df=3)</td>
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<td>Hands &amp; Machines</td>
<td>71</td>
<td>93.0</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>People</td>
<td>74</td>
<td>77.0</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>70</td>
<td>90.0</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>Childcare status</td>
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</tr>
<tr>
<td>N=264§</td>
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</tr>
<tr>
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<td>198</td>
<td>90.9</td>
<td>180</td>
<td>.070 (df=1)</td>
</tr>
<tr>
<td>Adults with children 0–18</td>
<td>66</td>
<td>81.8</td>
<td>54</td>
<td></td>
</tr>
</tbody>
</table>

* † ‡ § See page 340 below for notes

Table A.5: Interest in how large technology heritage objects worked
Notes for Table A.5

* Exact method unless otherwise noted
† 67 cases were excluded because no response data was available.
‡ As above, 67 cases were excluded because no response data was available. 48 cases were also excluded from the Occupation group analysis because they were students or had no defined occupation. There is some overlap between these two groups of excluded cases, making a total of 103 excluded cases.
§ As above, 67 cases were excluded because no response data was available. 46 cases were also excluded from the Childcare status analysis because they were children (18 or under) and 3 cases because their childcare status was not recorded. There is some overlap between these groups of excluded cases, making a total of 104 excluded cases.
<table>
<thead>
<tr>
<th>Demographic group</th>
<th>Total number</th>
<th>% interested</th>
<th>Number interested</th>
<th>Chi-square*</th>
</tr>
</thead>
<tbody>
<tr>
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<td>82.0</td>
<td>260</td>
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</tr>
<tr>
<td>Gender n=317†</td>
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<td></td>
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</tr>
<tr>
<td>M</td>
<td>188</td>
<td>78.2</td>
<td>147</td>
<td>.037 (df=1)</td>
</tr>
<tr>
<td>F</td>
<td>129</td>
<td>87.6</td>
<td>113</td>
<td></td>
</tr>
<tr>
<td>Age group n=317†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–11</td>
<td>22</td>
<td>81.8</td>
<td>18</td>
<td>.890 (df=7)</td>
</tr>
<tr>
<td>12–18</td>
<td>15</td>
<td>73.3</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>19–25</td>
<td>28</td>
<td>78.6</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>26–35</td>
<td>49</td>
<td>85.7</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>36–45</td>
<td>43</td>
<td>88.4</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>46–55</td>
<td>59</td>
<td>81.4</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>56–65</td>
<td>57</td>
<td>78.9</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>&gt; 65</td>
<td>44</td>
<td>81.8</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Site n=317†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian War Memorial</td>
<td>77</td>
<td>92.2</td>
<td>71</td>
<td>.013 (Asymptotic method, df=7)</td>
</tr>
<tr>
<td>Campbelltown Museum</td>
<td>36</td>
<td>61.1</td>
<td>22</td>
<td>(GLM p=.025)</td>
</tr>
<tr>
<td>Gold Coast car show</td>
<td>26</td>
<td>76.9</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Darling Harbour</td>
<td>24</td>
<td>83.3</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Melbourne Museum</td>
<td>27</td>
<td>81.5</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Puffing Billy</td>
<td>42</td>
<td>88.1</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Scienceworks</td>
<td>29</td>
<td>79.3</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>WA Maritime Museum</td>
<td>56</td>
<td>80.4</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Occupation group n=280‡</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideas &amp; Machines</td>
<td>51</td>
<td>74.5</td>
<td>38</td>
<td>.307 (df=3)</td>
</tr>
<tr>
<td>Hands &amp; Machines</td>
<td>74</td>
<td>83.8</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>People</td>
<td>83</td>
<td>81.9</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>72</td>
<td>87.5</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>Childcare status n=279§</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults only</td>
<td>210</td>
<td>81.4</td>
<td>171</td>
<td>.360 (df=1)</td>
</tr>
<tr>
<td>Adults with children 0–18</td>
<td>69</td>
<td>87.0</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

* † ‡ § See page 342 below for notes

Table A.6: Interest in stories about people connected with the objects
Notes for Table A.6

* Exact method unless otherwise noted
† 51 cases were excluded because no response data was available.
‡ As above, 51 cases were excluded because no response data was available. 48 cases were also excluded from the Occupation group analysis because they were students or had no defined occupation. There is some overlap between these two groups of excluded cases, making a total of 88 excluded cases.
§ As above, 51 cases were excluded because no response data was available. 46 cases were also excluded from the Childcare status analysis because they were children (18 or under) and 3 cases because their childcare status was not recorded. There is some overlap between these groups of excluded cases, making a total of 89 excluded cases.
<table>
<thead>
<tr>
<th>Demographic group</th>
<th>Total number</th>
<th>% interested</th>
<th>Number interested</th>
<th>Chi-square*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample (frequency analysis)</td>
<td>273†</td>
<td>27.8</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Gender n=273†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>163</td>
<td>33.1</td>
<td>54</td>
<td>.019 (df=1)</td>
</tr>
<tr>
<td>F</td>
<td>110</td>
<td>20.0</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Age group n=273†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–11</td>
<td>22</td>
<td>50.0</td>
<td>11</td>
<td>.208 (df=7)</td>
</tr>
<tr>
<td>12–18</td>
<td>13</td>
<td>23.1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>19–25</td>
<td>26</td>
<td>34.6</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>26–35</td>
<td>40</td>
<td>20.0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>36–45</td>
<td>38</td>
<td>18.4</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>46–55</td>
<td>50</td>
<td>32.0</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>56–65</td>
<td>47</td>
<td>27.7</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>&gt;65</td>
<td>37</td>
<td>24.3</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Site n=273†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian War Memorial</td>
<td>63</td>
<td>20.6</td>
<td>13</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Campbelltown Museum</td>
<td>25</td>
<td>40.0</td>
<td>10</td>
<td>(Asymptotic method, df=7)</td>
</tr>
<tr>
<td>Gold Coast car show</td>
<td>26</td>
<td>92.3</td>
<td>24</td>
<td>(GLM p= &lt; .0001)</td>
</tr>
<tr>
<td>Darling Harbour</td>
<td>24</td>
<td>33.3</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Melbourne Museum</td>
<td>22</td>
<td>18.2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Puffing Billy</td>
<td>44</td>
<td>9.1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Scienceworks</td>
<td>25</td>
<td>20.0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>WA Maritime Museum</td>
<td>44</td>
<td>18.2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Occupation group n=238‡</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideas &amp; Machines</td>
<td>45</td>
<td>20.0</td>
<td>9</td>
<td>.169 (df=3)</td>
</tr>
<tr>
<td>Hands &amp; Machines</td>
<td>59</td>
<td>37.3</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>People</td>
<td>68</td>
<td>25.0</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>66</td>
<td>22.7</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Childcare status n=237§</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults only</td>
<td>177</td>
<td>27.7</td>
<td>49</td>
<td>.400 (df=1)</td>
</tr>
<tr>
<td>Adults with children 0–18</td>
<td>60</td>
<td>21.7</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

* † ‡ § See page 344 below for notes

Table A.7: Desire to see objects restored to look new
Notes for Table A.7

* Exact method unless otherwise noted
† 46 cases were excluded because no response data was available and 49 cases were excluded because they were undecided, making a total of 95 excluded cases.
‡ As above, 95 cases were excluded because response data was unavailable or undecided. 48 cases were also excluded from the Occupation group analysis because they were students or had no defined occupation. There is some overlap between these two groups of excluded cases, making a total of 130 excluded cases.
§ As above, 95 cases were excluded because response data was unavailable or undecided. 46 cases were also excluded from the Childcare status analysis because they were children (18 or under) and 3 cases because their childcare status was not recorded. There is some overlap between these groups of excluded cases, making a total of 131 excluded cases.
<table>
<thead>
<tr>
<th>Demographic group</th>
<th>Total number</th>
<th>% interested</th>
<th>Number interested</th>
<th>Chi-square*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total sample (frequency analysis)</strong></td>
<td>250†</td>
<td>84.0</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>Gender n=250†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>154</td>
<td>85.7</td>
<td>132</td>
<td>.378 (df=1)</td>
</tr>
<tr>
<td>F</td>
<td>96</td>
<td>81.3</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Age group n=250†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–11</td>
<td>20</td>
<td>80.0</td>
<td>16</td>
<td>.705 (df=7)</td>
</tr>
<tr>
<td>12–18</td>
<td>12</td>
<td>83.3</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>19–25</td>
<td>22</td>
<td>72.7</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>26–35</td>
<td>37</td>
<td>83.8</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>36–45</td>
<td>37</td>
<td>91.9</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>46–55</td>
<td>43</td>
<td>81.4</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>56–65</td>
<td>45</td>
<td>84.4</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>&gt; 65</td>
<td>34</td>
<td>88.2</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Site n=250†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian War Memorial</td>
<td>67</td>
<td>71.6</td>
<td>48</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Campbelltown Museum</td>
<td>32</td>
<td>96.9</td>
<td>31</td>
<td>(Asymptotic</td>
</tr>
<tr>
<td>Gold Coast car show</td>
<td>19</td>
<td>94.7</td>
<td>18</td>
<td>method, df=7)</td>
</tr>
<tr>
<td>Darling Harbour</td>
<td>20</td>
<td>100.0</td>
<td>20</td>
<td>(WALD GLM</td>
</tr>
<tr>
<td>Melbourne Museum</td>
<td>16</td>
<td>50.0</td>
<td>8</td>
<td>p=.026)</td>
</tr>
<tr>
<td>Puffing Billy</td>
<td>34</td>
<td>100.0</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Scienceworks</td>
<td>19</td>
<td>89.5</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>WA Maritime Museum</td>
<td>43</td>
<td>79.1</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Occupation group n=218‡</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideas &amp; Machines</td>
<td>41</td>
<td>85.4</td>
<td>35</td>
<td>.495 (df=3)</td>
</tr>
<tr>
<td>Hands &amp; Machines</td>
<td>57</td>
<td>87.7</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>People</td>
<td>62</td>
<td>79.0</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>58</td>
<td>87.9</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Childcare status n=217§</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults only</td>
<td>163</td>
<td>82.2</td>
<td>134</td>
<td>.194 (df=1)</td>
</tr>
<tr>
<td>Adults with children 0–18</td>
<td>54</td>
<td>90.7</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

* † ‡ § See page 346 below for notes

Table A.8: Desire to see objects made to work again
Notes for Table A.8

* Exact method unless otherwise noted
† 55 cases were excluded because no response data was available and 63 cases were excluded because they were undecided, making a total of 118 excluded cases.
‡ As above, 118 cases were excluded because response data was unavailable or undecided. 48 cases were also excluded from the Occupation group analysis because they were students or had no defined occupation. There is some overlap between these two groups of excluded cases, making a total of 150 excluded cases.
.§ As above, 118 cases were excluded because response data was unavailable or undecided. 46 cases were also excluded from the Childcare status analysis because they were children (18 or under) and 3 cases because their childcare status was not recorded. There is some overlap between these groups of excluded cases, making a total of 151 excluded cases.
<table>
<thead>
<tr>
<th>Demographic group</th>
<th>Total number</th>
<th>Number wanting to touch</th>
<th>Chi-square*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample (frequency analysis)</td>
<td>300†</td>
<td>60.7</td>
<td>182</td>
</tr>
<tr>
<td>Gender n=300†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>177</td>
<td>62.1</td>
<td>110</td>
</tr>
<tr>
<td>F</td>
<td>123</td>
<td>58.5</td>
<td>72</td>
</tr>
<tr>
<td>Age group n=300†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–11</td>
<td>24</td>
<td>91.7</td>
<td>22</td>
</tr>
<tr>
<td>12–18</td>
<td>12</td>
<td>75.0</td>
<td>9</td>
</tr>
<tr>
<td>19–25</td>
<td>24</td>
<td>54.2</td>
<td>13</td>
</tr>
<tr>
<td>26–35</td>
<td>46</td>
<td>69.6</td>
<td>32</td>
</tr>
<tr>
<td>36–45</td>
<td>46</td>
<td>37.0</td>
<td>17</td>
</tr>
<tr>
<td>46–55</td>
<td>54</td>
<td>68.5</td>
<td>37</td>
</tr>
<tr>
<td>56–65</td>
<td>52</td>
<td>49.1</td>
<td>26</td>
</tr>
<tr>
<td>&gt; 65</td>
<td>41</td>
<td>63.4</td>
<td>26</td>
</tr>
<tr>
<td>Site n=300†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian War Memorial</td>
<td>79</td>
<td>62.0</td>
<td>49</td>
</tr>
<tr>
<td>Campbelltown Museum</td>
<td>36</td>
<td>66.7</td>
<td>24</td>
</tr>
<tr>
<td>Gold Coast car show</td>
<td>18</td>
<td>66.7</td>
<td>12</td>
</tr>
<tr>
<td>Darling Harbour</td>
<td>24</td>
<td>79.2</td>
<td>19</td>
</tr>
<tr>
<td>Melbourne Museum</td>
<td>18</td>
<td>72.2</td>
<td>13</td>
</tr>
<tr>
<td>Puffing Billy</td>
<td>50</td>
<td>36.0</td>
<td>18</td>
</tr>
<tr>
<td>Scienceworks</td>
<td>19</td>
<td>57.9</td>
<td>11</td>
</tr>
<tr>
<td>WA Maritime Museum</td>
<td>56</td>
<td>64.3</td>
<td>36</td>
</tr>
<tr>
<td>Occupation group n=263‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideas &amp; Machines</td>
<td>47</td>
<td>66.0</td>
<td>31</td>
</tr>
<tr>
<td>Hands &amp; Machines</td>
<td>70</td>
<td>57.1</td>
<td>40</td>
</tr>
<tr>
<td>People</td>
<td>75</td>
<td>53.3</td>
<td>40</td>
</tr>
<tr>
<td>Data</td>
<td>71</td>
<td>59.2</td>
<td>42</td>
</tr>
<tr>
<td>Childcare status n=263‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults only</td>
<td>191</td>
<td>63.9</td>
<td>122</td>
</tr>
<tr>
<td>Adults with children 0–18</td>
<td>72</td>
<td>40.3</td>
<td>29</td>
</tr>
</tbody>
</table>

* † ‡ § See page 348 below for notes

Table A.9: Desire to touch large technology heritage objects
Notes for Table A.9

* Exact method unless otherwise noted
† 68 cases were excluded because no response data was available.
‡ As above, 68 cases were excluded because no response data was available. 48 cases were also excluded from the Occupation group analysis because they were students or had no defined occupation. There is some overlap between these two groups of excluded cases, making a total of 105 excluded cases.
§ As above, 68 cases were excluded because no response data was available. 46 cases were also excluded from the Childcare status analysis because they were children (18 or under) and 3 cases because their childcare status was not recorded. There is some overlap between these groups of excluded cases, making a total of 105 excluded cases.
A.3 Interaction of gender and age

The tables in this section report the results of GLM analysis of the interaction between gender and age, and the influence of the combination of these demographic factors on visitors’ responses to the survey questions.

The first table section shows the total population of interviewees divided by gender and age. Each subsequent table section shows firstly the results of crosstabulation of gender and age with one of the survey questions, along with the Chi-square significance values for that crosstabulation. Below these results are the significance values for GLM analyses of the combined influences of gender and age on responses to the same survey question, with statistically significant GLM results shown in yellow (light yellow for results very close to statistical significance).

As discussed at the start of this Appendix, results that show or discuss positive responses only are shaded in grey.
<table>
<thead>
<tr>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>76.90</td>
</tr>
<tr>
<td>F</td>
<td>23.10</td>
</tr>
<tr>
<td>n</td>
<td>215</td>
</tr>
<tr>
<td></td>
<td>153</td>
</tr>
</tbody>
</table>

Chi-square*: 0.014

* Significance of difference in proportions of males and females within different age groups (Asymptotic method, df=7).

Table A.10: Gender–Age 1 — Total sample by gender and age
### Interest in History: n=325

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age group</th>
<th>6–11</th>
<th>12–18</th>
<th>19–25</th>
<th>26–35</th>
<th>36–45</th>
<th>46–55</th>
<th>56–65</th>
<th>&gt; 65</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males and females within each age group who were interested in history</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>M</td>
<td>66.70</td>
<td>66.70</td>
<td>63.60</td>
<td>96.00</td>
<td>85.70</td>
<td>94.70</td>
<td>97.40</td>
<td>93.30</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>66.70</td>
<td>88.90</td>
<td>100.00</td>
<td>100.00</td>
<td>90.00</td>
<td>95.50</td>
<td>100.00</td>
<td>93.30</td>
</tr>
<tr>
<td>n</td>
<td>M</td>
<td>12</td>
<td>4</td>
<td>7</td>
<td>24</td>
<td>24</td>
<td>36</td>
<td>37</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>4</td>
<td>8</td>
<td>17</td>
<td>24</td>
<td>18</td>
<td>21</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>Chi-square*</td>
<td></td>
<td>1.00</td>
<td>.525</td>
<td>.016</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**GLM**

- Single factor: Gender (df=1) < .0001
- Single factor: Age (df=7) < .0001
- Two factor parallel: Gender < .0001
- Two factor parallel: Age < .0001

* Significance of difference in proportions of males and females within different age groups who were interested in the history of the objects (df=1).

Generalised linear modelling showed that age was more significant than gender in determining interest in the history of large technology objects. For both genders, interest in history was particularly low in the 6–11 age group and increased significantly with age. Gender did have some effect, though, as the rise in interest in history occurred later in males than in females.

Total interested and not interested.

### Interest in Technical specifications: n=320

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age group</th>
<th>6–11</th>
<th>12–18</th>
<th>19–25</th>
<th>26–35</th>
<th>36–45</th>
<th>46–55</th>
<th>56–65</th>
<th>&gt; 65</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males and females within each age group who were interested in technical specifications</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>M</td>
<td>88.9</td>
<td>83.3</td>
<td>90.9</td>
<td>84.0</td>
<td>73.1</td>
<td>68.4</td>
<td>64.1</td>
<td>79.3</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>100.0</td>
<td>55.6</td>
<td>75.0</td>
<td>33.3</td>
<td>50.0</td>
<td>31.8</td>
<td>38.9</td>
<td>28.6</td>
</tr>
<tr>
<td>n</td>
<td>M</td>
<td>16</td>
<td>5</td>
<td>10</td>
<td>21</td>
<td>19</td>
<td>26</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>5</td>
<td>5</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>7</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Chi-square*</td>
<td></td>
<td>1.00</td>
<td>.580</td>
<td>.618</td>
<td>&lt; .0001</td>
<td>.133</td>
<td>.008</td>
<td>.92</td>
<td>.002</td>
</tr>
</tbody>
</table>

**GLM**

- Single factor: Gender (df=1) < .0001
- Single factor: Age (df=7) < .0001
- Two factor parallel: Gender < .0001
- Two factor parallel: Age < .0001

* Significance of difference in proportions of males and females within different age groups who were interested in technical specifications (df=1).

Generalised linear modelling showed that both gender and age were significant in determining interest in technical specifications, but that gender was the stronger influence. More males than females were interested in technical specifications in all age groups except 6-11 years, but men in all age groups showed similar levels of interest in technical specifications, while women in younger age groups showed more interest than those in older age groups.

Table A.11: Gender–Age 2 — (a) Influence of gender and age on interest in the history of large technology objects; (b) Influence of gender and age on interest in technical specifications
Table A.12: Gender–Age 3 — (a) Influence of gender and age on interest in how the object was made; (b) Influence of gender and age on interest in how the object worked

### Interest in how the object was made: n=303

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age group</th>
<th>6–11</th>
<th>12–18</th>
<th>19–25</th>
<th>26–35</th>
<th>36–45</th>
<th>46–55</th>
<th>56–65</th>
<th>&gt; 65</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
<td>82.4</td>
<td>66.7</td>
<td>63.6</td>
<td>86.4</td>
<td>87.0</td>
<td>81.6</td>
<td>86.8</td>
<td>88.5</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>100.0</td>
<td>66.7</td>
<td>62.5</td>
<td>60.9</td>
<td>78.9</td>
<td>55.0</td>
<td>70.6</td>
<td>46.2</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>14</td>
<td>4</td>
<td>7</td>
<td>19</td>
<td>20</td>
<td>31</td>
<td>33</td>
<td>23</td>
<td>181</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>5</td>
<td>6</td>
<td>10</td>
<td>14</td>
<td>15</td>
<td>11</td>
<td>12</td>
<td>6</td>
<td>122</td>
</tr>
</tbody>
</table>

**Chi-square**<sup>*</sup>

| Gender | Age group | 1.000 | 1.000 | .911  | .682  | .061  | .255  | .008  |

### Interest in how the object worked: n=301

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age group</th>
<th>94.1</th>
<th>50.0</th>
<th>100.0</th>
<th>95.7</th>
<th>91.3</th>
<th>91.9</th>
<th>97.40</th>
<th>100.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
<td>100.0</td>
<td>87.5</td>
<td>78.6</td>
<td>87.0</td>
<td>78.9</td>
<td>71.4</td>
<td>70.6</td>
<td>83.3</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>16</td>
<td>3</td>
<td>11</td>
<td>22</td>
<td>21</td>
<td>34</td>
<td>37</td>
<td>27</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>5</td>
<td>7</td>
<td>11</td>
<td>20</td>
<td>15</td>
<td>15</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>1.000</td>
<td>.245</td>
<td>.230</td>
<td>.608</td>
<td>.384</td>
<td>.059</td>
<td>.009</td>
<td>.089</td>
</tr>
</tbody>
</table>

**Chi-square**<sup>*</sup>

| Gender | Age group | <.0001 | .412  | <.0001 | .630  | <.0001 | .735  |

### GLM<sup>1</sup>

| Gender | Age group | .<.0001 | .789  | .<.0001 | .735  | Not relevant |

<sup>*</sup> Significance of difference in proportions of males and females within different age groups who were interested in how the object was made (df=1).

<sup>1</sup> Generalised linear modelling showed that gender was significant but age was not in determining interest in how the object was made. More males than females were interested in how the object was made.

<sup>‡</sup> Total interested and not interested.
Table A.13: Gender–Age 4 — (a) Influence of gender and age on interest in stories about people connected with the object; (b) Influence of gender and age on interest in objects being restored to look new again
Table A.14: Gender–Age 5 — (a) Influence of gender and age on interest in objects being made to work again; (b) Influence of gender and age on interest in touching large technology heritage objects
A.4 Interaction of gender and occupation

The tables in this section report the results of GLM analysis of the interaction between gender and occupation, and the influence of the combination of these demographic factors on visitors’ responses to the survey questions.

The first table section shows the total population of interviewees divided by gender and occupation. Each subsequent table section shows firstly the results of crosstabulation of gender and occupation with one of the survey questions, along with the Chi-square significance values for that crosstabulation. Below these results are the significance values for GLM analyses of the combined influences of gender and occupation on responses to the same survey question, with statistically significant GLM results shown in yellow (light yellow for results very close to statistical significance).

As discussed at the start of this Appendix, results that show or discuss positive responses only are shaded in grey.
### Table A.15: Gender–Occupation 1 — Total sample by gender and occupation

<table>
<thead>
<tr>
<th>Gender</th>
<th>Occupation group</th>
<th>Males and females</th>
<th>Interviewee population: n=320</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ideas &amp; Machines</td>
<td>%</td>
<td>Males and females within each occupation group</td>
</tr>
<tr>
<td></td>
<td>Hands &amp; Machines</td>
<td></td>
<td>n</td>
</tr>
<tr>
<td>People</td>
<td>Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>77.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>22.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chi-square*</td>
<td>&lt; .0001</td>
</tr>
</tbody>
</table>

* Significance of difference in proportions of males and females within different occupation groups (df=3).
### Table A.16: Gender–Occupation 2 — (a) Influence of gender and occupation on interest in the history of large technology objects; 
(b) Influence of gender and occupation on interest in technical specifications

**(a) Interest in the history of large technology objects: n=286**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ideas &amp; Machines</th>
<th>Hands &amp; Machines</th>
<th>People</th>
<th>Data</th>
<th>Total¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>95.3</td>
<td>94.1</td>
<td>81.0</td>
<td>88.9</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>100.0</td>
<td>100.0</td>
<td>98.4</td>
<td>92.3</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>41</td>
<td>64</td>
<td>17</td>
<td>32</td>
<td>168</td>
</tr>
<tr>
<td>F</td>
<td>10</td>
<td>7</td>
<td>61</td>
<td>36</td>
<td>118</td>
</tr>
</tbody>
</table>

Chi-square* 1.000 1.000 .013 .704

**GLM †**

<table>
<thead>
<tr>
<th>Single factor</th>
<th>Gender (df=1)</th>
<th>Occupation (df=3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single factor</td>
<td>.069</td>
<td>.614</td>
</tr>
</tbody>
</table>

* Significance of difference in proportions of males and females within different occupation groups who were interested in the history of large technology objects (df=1).
† Generalised linear modelling showed that neither gender nor occupation were significant in determining whether people were interested in the history of large technology heritage, though gender showed a trend towards significance that might have been confirmed with a larger sample.
‡ Total interested and not interested.

**(b) Interest in technical specifications: n=282**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ideas &amp; Machines</th>
<th>Hands &amp; Machines</th>
<th>People</th>
<th>Data</th>
<th>Total¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>83.3</td>
<td>80.9</td>
<td>61.9</td>
<td>57.1</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>60.0</td>
<td>71.4</td>
<td>40.3</td>
<td>32.4</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>35</td>
<td>55</td>
<td>13</td>
<td>20</td>
<td>166</td>
</tr>
<tr>
<td>F</td>
<td>6</td>
<td>5</td>
<td>25</td>
<td>12</td>
<td>116</td>
</tr>
</tbody>
</table>

Chi-square* .190 6.22 .128 .057

**GLM †**

<table>
<thead>
<tr>
<th>Single factor</th>
<th>Gender (df=1)</th>
<th>Occupation (df=3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single factor</td>
<td>&lt; .0001</td>
<td>&lt; .0001</td>
</tr>
</tbody>
</table>

* Significance of difference in proportions of males and females within different occupation groups who were interested in technical specifications (df=1).
† Generalised linear modelling showed that both gender and occupation were significant in determining interest in technical specifications. There was a gender effect because, even though occupations were skewed towards certain genders, in occupations containing more women a higher percentage of men than women were still interested in technical specifications. There was also an occupation effect because the technologically trained people in both genders were more interested than the non-technologically trained people in their respective genders.
### Table A.17: Gender–Occupation 3 — (a) Influence of gender and occupation on interest in how the object was made; (b) Influence of gender and occupation on interest in how the object worked

<table>
<thead>
<tr>
<th></th>
<th>Gender</th>
<th>Occupation group</th>
<th>Data</th>
<th>Total‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ideas &amp; Machines</td>
<td>Hands &amp; Machines</td>
<td>People</td>
</tr>
<tr>
<td>(a) Interest in how the object was made: n=266</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males and females within each occupation group who were interested in how the object was made</td>
<td>%</td>
<td>M</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>90.2</td>
<td>87.3</td>
<td>84.2</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>37</td>
<td>35</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Chi-square⁺</td>
<td>.026</td>
<td>.072</td>
<td>.092</td>
</tr>
<tr>
<td>GLM⁺</td>
<td>Single factor</td>
<td>Gender (df=1)</td>
<td></td>
<td>Two factor parallel</td>
</tr>
<tr>
<td></td>
<td>Single factor</td>
<td>Gender (df=1)</td>
<td></td>
<td>Two factor parallel</td>
</tr>
<tr>
<td></td>
<td>Single factor</td>
<td>Gender (df=1)</td>
<td></td>
<td>Two factor parallel</td>
</tr>
</tbody>
</table>

⁺ Significance of difference in proportions of males and females within different occupation groups who were interested in how the object was made (df=1).

⁺⁺ Generalised linear modelling showed that gender was a stronger influence than occupation in determining interest in how the object was made. More males than females were interested in how the object was made.

† Total interested and not interested.

<table>
<thead>
<tr>
<th></th>
<th>Gender</th>
<th>Occupation group</th>
<th>Data</th>
<th>Total‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) Interest in how the object worked: n=265</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males and females within each occupation group who were interested in how the object worked</td>
<td>%</td>
<td>M</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>97.6</td>
<td>93.8</td>
<td>94.4</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>40</td>
<td>60</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Chi-square⁺</td>
<td>.331</td>
<td>.414</td>
<td>.055</td>
</tr>
<tr>
<td>GLM⁺</td>
<td>Single factor</td>
<td>Gender (df=1)</td>
<td></td>
<td>Two factor parallel</td>
</tr>
<tr>
<td></td>
<td>Single factor</td>
<td>Gender (df=1)</td>
<td></td>
<td>Two factor parallel</td>
</tr>
<tr>
<td></td>
<td>Single factor</td>
<td>Gender (df=1)</td>
<td></td>
<td>Two factor parallel</td>
</tr>
</tbody>
</table>

⁺ Significance of difference in proportions of males and females within different occupation groups who were interested in how the object worked (df=1).

⁺⁺ Generalised linear modelling showed that gender was a stronger influence than occupation in determining interest in how the object worked.
### (a) Interest in stories about people connected with the objects: n=280

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ideas &amp; Machines</th>
<th>Hands &amp; Machines</th>
<th>People</th>
<th>Data</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>73.2</td>
<td>82.1</td>
<td>61.9</td>
<td>88.2</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>80.0</td>
<td>100.0</td>
<td>88.7</td>
<td>86.8</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>30</td>
<td>55</td>
<td>13</td>
<td>30</td>
<td>163</td>
</tr>
<tr>
<td>F</td>
<td>8</td>
<td>7</td>
<td>55</td>
<td>33</td>
<td>117</td>
</tr>
</tbody>
</table>

Chi-square* = 1.000, .590, .018, 1.000

GLM†

<table>
<thead>
<tr>
<th>Single factor</th>
<th>Gender (df=1)</th>
<th>.034</th>
<th>Two factor parallel</th>
<th>Gender (WALD)</th>
<th>.041</th>
<th>Two factor interacting:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single factor</td>
<td>Occupation (df=3)</td>
<td>.318</td>
<td></td>
<td>Occupation (WALD)</td>
<td>.269</td>
<td>Not fitted</td>
</tr>
</tbody>
</table>

* Significance of difference in proportions of males and females within different occupation groups who were interested in stories about people connected with the objects (df=1).
† Generalised linear modelling showed that gender was a significant influence but occupation was not in determining interest in stories about people connected with the objects. More females than males were interested in stories about people connected with the objects.
‡ Total interested and not interested.

### (b) Interest in objects being restored to look new again: n=238

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ideas &amp; Machines</th>
<th>Hands &amp; Machines</th>
<th>People</th>
<th>Data</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>25.0</td>
<td>35.8</td>
<td>31.3</td>
<td>26.5</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0.0</td>
<td>50.0</td>
<td>23.1</td>
<td>18.8</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>9</td>
<td>19</td>
<td>5</td>
<td>9</td>
<td>139</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
<td>3</td>
<td>12</td>
<td>6</td>
<td>99</td>
</tr>
</tbody>
</table>

Chi-square* = .169, .661, .523, .561

GLM†

<table>
<thead>
<tr>
<th>Single factor</th>
<th>Gender (df=1)</th>
<th>.019</th>
<th>Two factor parallel</th>
<th>Gender (WALD)</th>
<th>.232</th>
<th>Two factor interacting:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single factor</td>
<td>Occupation (df=3)</td>
<td>.175</td>
<td></td>
<td>Occupation (WALD)</td>
<td>.285</td>
<td>Not fitted</td>
</tr>
</tbody>
</table>

* Significance of difference in proportions of males and females within different occupation groups who were interested in objects being restored to look new again (df=1).
† Generalised linear modelling showed that gender was a significant influence but occupation was not in determining whether people wanted to see objects restored to look new.

Table A.18: Gender–Occupation 4 — (a) Influence of gender and occupation on interest in stories about people connected with the objects; (b) Influence of gender and occupation on interest in objects being restored to look new again
<table>
<thead>
<tr>
<th>Gender</th>
<th>Ideas &amp; Machines</th>
<th>Occupation group</th>
<th>Data</th>
<th>Total‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>Hands &amp; Machines</td>
<td>People</td>
<td></td>
</tr>
<tr>
<td>Males and females within each occupation group who were interested in objects being made to work again</td>
<td>%</td>
<td>86.1</td>
<td>86.3</td>
<td>89.5</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>80.0</td>
<td>100.0</td>
<td>74.4</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>31</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>4</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Chi-square*</td>
<td>.567</td>
<td>1.000</td>
<td>.310</td>
</tr>
</tbody>
</table>

GLM†<br>Single factor Gender (df=1) .350 Two factor parallel Gender Not relevant Two factor interacting:<br>Single factor Occupation (df=3) .496 Two factor parallel Occupation Not relevant Not fitted

* Significance of difference in proportions of males and females within different occupation groups who were interested in objects being made to work again (df=1).<br>† Generalised linear modelling showed neither gender nor occupation was a significant influence in determining whether people wanted to see objects made to work again.<br>‡ Total interested and not interested.

(b) Interest in touching large technology heritage objects: n=263

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ideas &amp; Machines</th>
<th>Occupation group</th>
<th>Data</th>
<th>Total‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>Hands &amp; Machines</td>
<td>People</td>
<td></td>
</tr>
<tr>
<td>Males and females within each occupation group who were interested in touching large technology heritage objects</td>
<td>%</td>
<td>60.5</td>
<td>54.7</td>
<td>55.6</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>88.9</td>
<td>83.3</td>
<td>52.6</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>23</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>8</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Chi-square*</td>
<td>.138</td>
<td>.228</td>
<td>1.000</td>
</tr>
</tbody>
</table>

GLM†<br>Single factor Gender (df=1) .529 Two factor parallel Gender Not relevant Two factor interacting:<br>Single factor Occupation (df=3) .585 Two factor parallel Occupation Not relevant Not fitted

* Significance of difference in proportions of males and females within different occupation groups who were interested in touching large technology heritage objects (df=1).<br>† Generalised linear modelling showed neither gender nor occupation was a significant influence in determining whether people wanted to touch objects.

Table A.19: Gender–Occupation 5 — (a) Influence of gender and occupation on interest in objects being made to work again; (b) Influence of gender and occupation on interest in touching large technology heritage objects
A.5 Interaction between gender, age and childcare status

The tables in this section report the results of crosstabulation and GLM analyses of the interactions between gender and childcare status, age and childcare status, and the influence of these demographic categories on visitors’ responses to two survey questions.

Statistically significant GLM results are shown in yellow. As discussed at the start of this Appendix, results that show or discuss positive responses only are shaded in grey.
<table>
<thead>
<tr>
<th>Demographic group</th>
<th>Childcare status</th>
<th>Total</th>
<th>Chi-squared p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adults only</td>
<td>Adults with children 0-18</td>
<td></td>
</tr>
<tr>
<td>(a) Total sample by gender and childcare status: n=319</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males and females with and without accompanying children</td>
<td>% M</td>
<td>80.5</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>64.9</td>
<td>35.1</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td>149</td>
<td>36</td>
</tr>
<tr>
<td>GLM Single factor (df=1)</td>
<td></td>
<td>.002</td>
<td></td>
</tr>
<tr>
<td>(b) Total sample by age and childcare status: n=319</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People of different age groups with and without accompanying children</td>
<td>% 19–25</td>
<td>86.8</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>26–35</td>
<td>57.1</td>
<td>42.9</td>
</tr>
<tr>
<td></td>
<td>36–45</td>
<td>34.6</td>
<td>65.4</td>
</tr>
<tr>
<td></td>
<td>46–55</td>
<td>83.1</td>
<td>16.9</td>
</tr>
<tr>
<td></td>
<td>56–65</td>
<td>91.5</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>&gt; 65</td>
<td>91.8</td>
<td>8.2</td>
</tr>
<tr>
<td>n</td>
<td>19–25</td>
<td>33</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>26–35</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>36–45</td>
<td>18</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>46–55</td>
<td>54</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>56–65</td>
<td>54</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>&gt; 65</td>
<td>45</td>
<td>4</td>
</tr>
<tr>
<td>GLM Single factor (df=5)</td>
<td></td>
<td>&lt; .0001</td>
<td></td>
</tr>
</tbody>
</table>

* Exact method unless otherwise noted

Table A.20: Childcare status 1 — (a) Total sample by gender and childcare status (b) Total sample by age and childcare status
### Table A.21: Childcare status 2 — Influence of gender and childcare status on interest in technical specifications

<table>
<thead>
<tr>
<th>Demographic group</th>
<th>Childcare status</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adults only</td>
<td>Adults with children 0-18</td>
</tr>
<tr>
<td>Adults only</td>
<td>M</td>
<td>75.4</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>46.5</td>
</tr>
<tr>
<td>Adults with children 0-18</td>
<td>M</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>33</td>
</tr>
<tr>
<td>Chi-square* (df=1)</td>
<td></td>
<td>.353</td>
</tr>
</tbody>
</table>

Influence of gender and childcare status on interest in technical specifications: n=281

<table>
<thead>
<tr>
<th>Males and females of different childcare status who were interested in technical specifications</th>
<th>%</th>
<th>M</th>
<th>F</th>
<th>Gender (df=1)</th>
<th>Two factor parallel</th>
<th>Gender (df=1)</th>
<th>Two factor parallel</th>
<th>Two factor interacting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>104</td>
<td>19</td>
<td>&lt; .0001</td>
<td>.007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>33</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significance of difference in proportions of males and females with and without accompanying children who were interested in technical specifications (df=1).
† Generalised linear modelling showed that gender and childcare were interacting influences on visitors’ interest in technical specifications, but that gender was the stronger influence. The presence of children reduced the likelihood of being interested in technical specifications for both males and females, but females were much less likely than males to be interested in technical specifications in any case.
‡ Total interested and not interested.
Childcare status

<table>
<thead>
<tr>
<th>Age group</th>
<th>19–25</th>
<th>26–35</th>
<th>36–45</th>
<th>46–55</th>
<th>56–65</th>
<th>&gt; 65</th>
<th>Total‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults only</td>
<td>57.9</td>
<td>77.8</td>
<td>64.3</td>
<td>75.0</td>
<td>47.9</td>
<td>64.1</td>
<td></td>
</tr>
<tr>
<td>Adults with children 0–18</td>
<td>40.0</td>
<td>57.9</td>
<td>25.0</td>
<td>40.0</td>
<td>75.0</td>
<td>50.0</td>
<td></td>
</tr>
</tbody>
</table>

Influence of age and childcare status on desire to touch objects: n=263

<table>
<thead>
<tr>
<th>Adults of different age groups and childcare status who were interested in touching objects</th>
<th>%</th>
<th>n</th>
<th>Adults only</th>
<th>Adults with children 0–18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Adults only</td>
<td>Adults with children 0–18</td>
</tr>
<tr>
<td>Adults only</td>
<td></td>
<td></td>
<td>57.9</td>
<td>40.0</td>
</tr>
<tr>
<td>Adults with children 0–18</td>
<td></td>
<td></td>
<td>77.8</td>
<td>57.9</td>
</tr>
</tbody>
</table>

Chi-square∗ (df=1)

| Chi-square∗ (df=1) | 0.630 | 0.199 | 0.019 | 0.056 | 0.610 | 1.000 |

GLM†

<table>
<thead>
<tr>
<th>GLM†</th>
<th>Single factor</th>
<th>Age (df=5: 0-18 excluded)</th>
<th>Two factor parallel</th>
<th>Age (df=5: 0-18 excluded)</th>
<th>Two factor interacting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single factor</td>
<td>Childcare status (df=1)</td>
<td>&lt; .0001</td>
<td>Two factor parallel</td>
<td>Childcare status (df=1)</td>
<td>.037</td>
</tr>
</tbody>
</table>

∗ Significance of difference in proportions of adults of different age groups who were visiting with and without children and who were interested in touching objects (Fisher exact test, df=1).
† Generalised linear modelling showed that age and childcare status were interacting influences on visitors’ desire to touch large technology heritage objects. 36-45 year olds were more likely to have children with them, and less likely to want to touch the objects.
‡ Total interested and not interested.

Table A.22: Childcare status 3 — Influence of age and childcare status on desire to touch large technology objects
Appendix B

Questionnaires and consent forms
INFORMATION SHEET

TO BE KEPT BY PARTICIPANT

Dear participant,

My name is Alison Wain. I am a researcher from the Research School of Humanities at the Australian National University, studying the management and display of historic large technology objects.

My research involves interviewing people to find out why they are, or are not, interested in historic large technology and how they think it should be preserved and displayed. Through this research I want to examine what aspects of large technology are interesting to different people, and what display methods would help them to enjoy seeing and learning about historic large technology more.

If you would like to participate in this study, you will be asked for oral consent to be interviewed. If you are the parent or carer of a child who is asked to be interviewed, both you and the child will be asked for oral consent. Each interview will last about 5-10 minutes, although it depends on how much you want to say. The interviews will be recorded so they can be analysed in more detail. Your name will not be recorded in the interview, and therefore any information you provide remains confidential.

At any time in the interview you have the right to refuse to answer questions or to stop the interview. If at the end of the interview you would prefer not to be involved, I will erase the recording in your presence. Should you wish to discuss any ethical issues about my research or conduct please contact the Human Research Ethics Committee, Research Office, Chancellry 10B, the Australian National University, Canberra, ACT, Tel: (02) 6125 7945, Email: Human.Ethics.Office@anu.edu.au.

If you would like to add anything to what you have said to me in the course of the interview or have any further questions, you can contact me or my research supervisor through the details below:

Alison Wain  
Research School of Humanities  
The Australian National University  
Canberra, ACT 0200, Australia  
alison.wain@anu.edu.au  
Tel: (02) 6125 3131  
Fax: (02) 6125 2438

Supervisor: Dr Paul Pickering  
paul.pickering@anu.edu.au

Thank you for your assistance
B.2 Visitor Questionnaire

VISITOR FIELD DAY QUESTIONNAIRE 11.05.09
Date: Consumer number: Place/event: Object being discussed:
I am doing a survey to find out what interests people, or doesn’t interest them, about big machinery—boats, steam engines, cars etc. Would you like to answer a few questions?

Is it OK with you if I use a voice recorder?

Is there anything about any of the machines here today that has particularly grabbed your/fascinated you?

Are you into this hobby yourself?

Which do you find more appealing – the overall look and feel of the machine or the structure and workings?

What do you think is the most important time in this object’s life?
  - brand new
  - when it was working/used
  - a special event in its life
  - any other period

Do you think objects like this should be restored to look new again? Why?

Do you think objects like this should be made to work again? Why?

How interesting for you are the following things about this object? (Vary order of list).

<table>
<thead>
<tr>
<th>Interesting</th>
<th>Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>• How it worked?</td>
<td>1</td>
</tr>
<tr>
<td>• Its history?</td>
<td>1</td>
</tr>
<tr>
<td>• People connected with it?</td>
<td>1</td>
</tr>
<tr>
<td>• Technical information like how fast it went and how much it could carry?</td>
<td>1</td>
</tr>
<tr>
<td>• How it was made?</td>
<td>1</td>
</tr>
<tr>
<td>• What it was used for?</td>
<td>1</td>
</tr>
</tbody>
</table>

Would you like to be able to touch it? What would you do if you could?

What does this object make you think about or feel?

Postcode: Gender: M F
Age group: <12 12-18 19-25 26-35 36-45 46-55 56-65 >65
Job/interests:

<table>
<thead>
<tr>
<th>What was your last year of school?</th>
<th>Before Year 12</th>
<th>Year 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post school training?</td>
<td>Trade apprenticeship</td>
<td>Tertiary</td>
</tr>
</tbody>
</table>

Would you like to have an information sheet?

Group description:
VISITOR QUESTIONNAIRE

Date: Consumer number:
Place/event: Object being discussed:

Non-interest questions:

Well- that’s great because I would also really like to know more about people who are not interested in big machinery, and why they are not interested. Would you mind talking about that?

Is it ok with you if I use a voice recorder?

What are the sorts of things you are interested in? What do you really enjoy seeing?

So for you, what makes large technology objects different from the things you like seeing? What makes them less appealing?

If you do look at large technology objects, do they make you feel or think about anything?

Do they remind you of anything?

Postcode:
Gender: M F
Age group: <12 12-18 19-25 26-35 36-45 46-55 56-65 >65

Job/interests:

What was your last year of school? Before Year 12 Year 12
Post school training? Trade apprenticeship Tertiary

Would you like to have an information sheet?

Group description:
B.3 Producer Consent Form

Dear participant,

My name is Alison Wain. I am a researcher from the Research School of Humanities at the Australian National University, studying the management and display of historic large technology objects.

My research involves interviewing people to find out why they are interested in historic large technology and how they think it should be preserved and displayed. Through this research I want to examine what aspects of large technology are interesting to different people, and what preservation and display methods have proved most effective. I expect each interview to last about an hour, although it depends on how much you want to say. The interviews will be recorded so they can be analysed in more detail.

If you agree to be interviewed, I need you to sign a consent form. This form will also allow you to confirm whether you are happy for your name and opinions to be acknowledged in the study, or whether you would prefer to remain anonymous. For privacy and anonymity (where requested) your name and contact details will be kept separately from the interview and you will be given a code number as identification.

At any time in the interview you have the right to refuse to answer questions or to stop the interview. If at the end of the interview you would prefer not to be involved, I will erase the recording in your presence. Should you wish to discuss any ethical issues about my research or conduct please contact the Human Research Ethics Committee, Research Office, Chancellry 10B, the Australian National University, Canberra, ACT, Tel: (02) 6125 7945, Email: Human.Ethics.Officer@anu.edu.au.

If you would like to add anything to what you have said to me in the course of the interview or have any further questions, you can contact me or my research supervisor through the details below:

Alison Wain
Research School of Humanities and the Arts
The Australian National University
Canberra, ACT 0200, Australia
alison.wain@anu.edu.au
Tel: (02) 6125 3131
Fax: (02) 6125 2438

Supervisor: Dr Paul Pickering

Thank you for your assistance
B.4 Producer Information Sheet

MANAGING LARGE TECHNOLOGY AS HERITAGE
INTERVIEW CONSENT FORM

I, the undersigned, have read, or had read to me, my copy of the Project Information Sheet for this study and have had an opportunity to discuss any queries with Alison Wain, the primary investigator. I agree to be a participant in the research project. I understand that I may withdraw from the study at any time without penalty.

Confidentiality (circle whichever is applicable):
I am happy for my name and opinions to be acknowledged in the study YES NO
I am happy to be contacted for further information as the study proceeds YES NO

Contact details (optional):
Name: --------------------------------------------------
Telephone: --------------------------------------------------
Email: --------------------------------------------------

Demographic details (optional):
Organisation where I work or volunteer:--------------------------------------------------
My role in the organisation: --------------------------------------------------
Postcode:------------------ Gender: M F
Age group: 12-25 26-35 36-45 46-55 56-65 >65
Job/skill background:--------------------------------------------------
What was your last year of school? Before Year 12 Year 12
Post school training? Trade apprenticeship Tertiary

Signature: --------------------------

Date: -----/-----/200

Code number:--------------------------------------------------
B.5 Producer Questionnaire

PRODUCER QUESTIONNAIRE
Producer number/name: 
Date: 
Object/display/event being discussed: 

What were you trying to achieve by putting this large technology object on display/organising this event?

Do you think it has achieved what you wanted?
  • How have people responded to it? Is there anything that has surprised you?
  • What has been the most successful thing about it?
  • What has been the biggest problem with it?
  • Is there anything you would like to change about it?
  • For objects: What maintenance do you do on it?

Do you belong to a club/share activities/share a site?

Do you prefer the overall look and feel of large technology objects or the structure and workings?

Do you think objects like this should be restored to look new again? Why?

Do you think objects like this should be made to work again? Why?

You can highlight many different sorts of information about a large technology object. Do you personally find the following types of information interesting or not interesting?
  • How it worked?
  • Stories about its history?
  • Stories about people connected with it?
  • Technical information (eg how fast it went, how much it could carry)?
  • How it was made?
  • What it was used for?

What has inspired you to collect/exhibit large technology objects?
  • Have you altered the way you exhibit large technology objects over the years? If so, how? Why?
  • Have you changed any other aspects of the way you manage large technology objects, either in storage or on display? If so, how and why?

How do you personally judge how significant a large technology object is?

What do you think is the most important time in an object’s life (eg brand new, used, at a special event in its life)?

Large technology objects are serviced and updated throughout their lives, and parts are regularly replaced. With this in mind, what do you think is a good definition of the word "original"?

Tell me about the approach you have taken when restoring an object to one period or configuration of its life has meant destroying physical evidence of other periods.

If an object has to be repainted because it is really damaged or rusty, is it better to leave the new paint looking new, or to recreate a used look by adding wear marks and dirt and stains?

What does this object/these objects make you think about or feel?

Thankyou for your time.
Appendix C

List of Dialogue Methods

The following is a brief list of methods that hold particular promise for helping stakeholders to find a balance between the different values they see in large technology heritage. This list is, however, very selective, and large technology heritage practitioners are encouraged to investigate dialogue methods further to find the particular method, or combination of methods, that best suits their needs.

- **Most significant change technique**

  *Relevance:* useful for assisting integration of ideas between powerful and weak players, and helping decision makers to recognise both the outcomes of their programs and the values those outcomes reflect.

  *Process:* stories are generated by knowledgeable stakeholders about significant changes to a program, and the effect of those changes on program outcomes. The most significant of these stories are passed up the organisational hierarchy, being read, discussed and further selected at each level, with feedback being passed to lower levels on why each story has been passed up or set aside. The refined story set is used by high level stakeholders to inform further strategy development.¹

• **Citizens’ Jury**

  *Relevance:* useful for canvassing the ideas and values of the public with respect to a particular subject or project. It is particularly effective for gaining insight into the views of people who are not already known to be interested in the subject under consideration, and who do not have specialist knowledge in the area. The process was developed by the Jefferson Center in the USA, and has been used successfully in heritage by the UK Heritage Lottery Fund to evaluate the outcomes of its funding process from a public and community point of view.²

  *Process:* 18–24 randomly selected members of the public act as a jury to consider the matter in question. The jury members hear evidence from a balanced selection of witnesses, before questioning the witnesses, deliberating on the information they have heard and preparing a decision and recommendations.³

• **Soft systems methodology**

  *Relevance:* useful for finding common ground amongst differing, and sometimes conflicting, world views. This method assists people to come to a shared judgement about the nature and origins of a problem, how it can be addressed, and the key goals they need to work towards.

  *Process:* participants develop a “map” of the problem and the environment in which it exists, through discussion and drawing (thus gaining verbal and visual information). Systems affecting the problem are identified, with the world views behind these systems explicitly identified. These systems are then discussed from the point of view of different people and situations. Models of these systems are constructed, usually in terms of mapping the activities needed to make the systems operational, and the relationships of these activities to each other. These models are compared with the original map of the situation, with debate aiming to find changes to systems and activities that improve the situation in

---

ways that are both practical and culturally acceptable.4

• **Principled negotiation**

  **Relevance:** useful for identifying both shared and conflicting interests, and finding solutions that will, as much as possible, accommodate the interests of all parties. Areas of difference or conflict are framed as shared problems, which require shared solutions to enable the group or project to move forward.

  **Process:** Group members are encouraged to be specific about their interests and how important these are to them (explicitly considering five core motivations — appreciation, affiliation, autonomy, status and role — can help tease out underlying interests.). Areas of shared and conflicting interest are defined, and techniques such as brainstorming are used to identify a variety of possible solutions to problems. The possibilities are then evaluated, with all parties expected to commit to finding a solution that is fair and reasonable.5

• **Values history**

  **Relevance:** useful for teasing out how the values imputed to an object have changed over time and might change in the future given different ownership and use scenarios. This method can help to clarify the key values and meanings that need to be preserved and enhanced by processes of conservation and interpretation.

  **Process:** a grid is created that lists different periods and events in an object’s life, along with possible values. The object is given a rough “score” against each type of value at each period of interest (for example high, low, increasing, decreasing) with the final scores helping to guide decisions about the object in its heritage role.6

• **Crew Resource Management (CRM)**

  **Relevance:** a general approach for improving error management within teams,

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especially those working in situations where safety is critical. It is particularly helpful in providing a framework and clear language for lower level team members to support the decision making of team leaders or senior managers by communicating information that they have missed or failed to act on. Originally developed in the USA for the aviation industry, it has since been adapted to the cultures of other countries and areas of work, one of these being the New South Wales Rural Fire Service (NSWRFS) in Australia. The NSWRFS version has potential for use in large technology heritage work, as it is readily accessible in Australia, has been adapted to the work culture of Australia, and is oriented towards similar challenges of complex equipment, “one-off” situations, diverse teams and a high level of volunteer involvement. It has particular potential where work practices are being used which are unsafe either for the people or the objects involved.

**Process:** CRM takes the position that error is normal, and that errors should be detected and corrected rather than denied, hidden, or punished. The three key aspects of CRM are:

- Techniques to avoid error.
- Techniques to detect and trap error.
- Techniques to reduce the impact of error.

With regard to supporting the decision making of senior managers, CRM suggests the use of respectful but clear key-word phrases to alert team leaders or managers to important information without undermining their authority. In a normal situation a team member might offer relevant information through a simple observation. If the team leader fails to take appropriate action, the team member can use the phrase “Are you aware that…” to draw attention to the issue more formally. If the team leader still takes no action, the use of the phrase “I am concerned that…” indicates that there is imminent danger and action needs to be taken urgently. If people are in danger and no action is being taken
by the team leader, a team member may have to take that action themselves, and should report this as soon as possible to the team leader and the line manager using the words “I have taken action to…”.

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7 This description is drawn from the NSWRFS manual on Firefighter Safety. This is a practical and well-researched document that is well worth reading in full, as it covers in clear and logical terms the importance of mental and cultural attitudes to safety, techniques for working successfully in teams, improving communication and error detection, and the response of the body and brain to stressful situations. It may be particularly helpful as a standard to which all professionals and volunteers, coming into work with large technology from diverse fields, are required to adhere. NSW Rural Fire Service, AF/1 – (2003) Firefighter Safety — The Human Factors. Version 1.0, New South Wales Government, New South Wales, 2003, See especially Support for Safe Decision Making on pp. 62–4, and the extended discussion of CRM and its applications in Chapter 7 (pp. 66–94). An overview of the development of the CRM methodology can be found in Robert L. Helmreich, Ashleigh C. Merritt and John A. Wilhelm. “The evolution of crew resource management training in commercial aviation”. International Journal of Aviation Psychology 9, no. 1 (1999): 19–32.
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