

Electronic meeting systems – what they are and how they could benefit Australian government organisations

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Executive Summary

Meetings are very important in any organisation and Australian public sector organisations are no exception. Unfortunately, meetings are costly and time consuming, and often are ineffective and inefficient. After a meeting, participants are regularly left with feelings of dissatisfaction.

Electronic meeting systems (EMS) were first developed in the United States in the 1980s using computer technologies to make meetings more effective and efficient. Since then they have been developed to be more user-friendly, are now internet-connected and support multimedia. However, EMS have not been adopted to the extent that could be expected.

This study draws from an extensive literature review supplemented by three case studies of Australian companies that provide EMS products and services (Global Learning Pty Ltd, Grouputer Pty Ltd and Zing Technologies Pty Ltd).

There are three overlapping terms that are used in the literature on collaborative technologies that are relevant to this study: group support systems (GSS); group decision support systems (GDSS); and electronic meeting systems (EMS). These three terms are often used interchangeably and the findings from this study have come from the combined GSS/GDSS/EMS literature.

This study posed six questions about EMS:

What are electronic meeting systems (EMS)?

An EMS is a way of conducting meetings supported by computer technologies. In a standard meeting room, individuals or small groups of people sit at tables and use computers that are inter-connected via a local area network or the internet. There are one or more public screens that can display multimedia presentations, other relevant information and the combined electronic contributions of the participants. EMS provide a large variety of tools and features, including the ability to support access to outside information, parallel input, idea generation, information sorting, voting, analysis, decision making and document management. EMS meetings often include a facilitator.

The benefits of using an EMS depend on people and process factors as well as the technology, so that is more appropriate to discuss an EMS as a system rather than just a technology.

What is the evidence that using an EMS does improve meeting productivity (efficiency and effectiveness) and satisfaction?

The study found very strong evidence that using an EMS can significantly improve the effectiveness and efficiency of and participant satisfaction with meetings.

Are there other benefits from using these systems?

The study revealed a range of other benefits from EMS. Perhaps the most important is the ability of EMS to support large groups of people in meaningful and effective meetings, and deal with complex tasks, which is particularly difficult in traditional meetings.

An EMS can produce a “level playing field” for all participants and can greatly increase engagement and “buy in” by the participants to the meeting outcomes.

Other advantages of EMS supported meetings compared to conventional meetings include:

- improved communication, information exchange and accuracy; transparency and accountability, objectivity, flexibility, group focus and cohesiveness;
- increased knowledge and knowledge sharing, number of ideas generated, and speed of processes;
- the ability to reach a greater depth of analysis and understanding, and the ability to deal with complex tasks;
- immediate availability of meeting records, action plans and outcomes which will facilitate post meeting follow-up and actions;
- improved staff work/life balance, and
- reduced carbon footprint.

How does the use of an EMS bring about these improvements in meetings and group collaboration?

EMS address the many problems of meetings by providing structure and support to both the meeting processes and the tasks.

Figure 1 provides a graphical representation of the EMS key features and mechanisms that can result in improved meetings and collaboration.

What factors need to be managed in order for the organisation to obtain the most benefit from these systems?

The critical factors that need to be managed for a successful meeting include:

- having the appropriate tools and flexibility for the task
- early and professional pre-planning and design of the event and for the use of the technology
- the use of a facilitator and proper training for the facilitator so that they can get the best out of the group and the technology
- good leadership
- not letting the technology dominate the meeting, and
- cultural issues of participants which may effect their willingness to collaborate.

Could EMS be used to improve meetings and business processes in Australian (including state/territory) government organisations?

EMS could be used to great benefit to improve meetings and their outcomes for an enormous range of purposes that are carried out in all levels in the Australian public sector. The case study executives reported that their EMS have successfully supported meeting sizes from two people to 700, however an even larger number of participants is possible.

Apart from supporting large meetings, using an EMS can provide significant benefits for organisations undertaking complex and challenging tasks. For example, the critical task of strategic planning can be carried out using EMS in far shorter periods, with increased buy-in, faster, more accurate documentation and enhanced follow-up than conventional meetings. Traditionally difficult processes such as organisational change management programs and community and stakeholder consultations can be transformed using EMS. EMS can also provide significant advantages to large and complex ongoing projects.

Public sector managers who wish to improve their meetings and collaborative tasks would do well to consider using an EMS. EMS can be easily trialed in any type of meeting with no on-going commitment.

Key abbreviations

EMS	Electronic Meeting System(s)
GSS	Group Support System(s)
GDSS	Group Decision Support System(s)
LAN	Local area network
SaaS	Software as a service

Part 1 Findings from the literature

1.1 Introduction

“Media influence the course of a meeting because they interact strongly with participants’ resources for communication and memory. Chalkboards, for example, provide a shared and focused memory for a meeting, allowing flexible placement of text and figures, which complements our human capabilities for manipulating spatial memories.

However, space is limited and items disappear when that space is needed for something else, and rearranging items is inconvenient when they must be manually redrawn and then erased. Handwriting on a whiteboard can be illegible.

Chalkboards are also unreliable for information storage: they are used by many groups and text and figures created in one meeting may be erased during the next.”
From Stefik et al. (1987:32).

Read “whiteboards” for “chalkboards” and the 1987 quote above still describes the classic small group meeting in 2010, although there is the small improvement in record keeping provided by electronic whiteboards (if you do not lose the printouts). You only need to add the facts that a small number of people dominate the conversation; you have to wait in turn to get a chance to air your views (if you can ever get a word in); and you usually leave the meeting wondering what has been achieved. Large group meetings can be even worse, with break-out groups and butcher’s paper, dominance by the boss or whoever has the pen, and report-backs from each group that do not always make sense. After the meeting you rarely hear of any outcomes, and what has been written on the butcher’s paper is never seen again.

Meetings are important in any organisation. No one person has the experience, resources or knowledge to make all the decisions required to accomplish many tasks alone (Nunamaker et al. 1997). Apart from decision making, meetings are necessary in organisations for a wide variety of purposes, such as sharing information, problem solving, idea generation and organisation, drafting policies and strategies, building and sharing organisational vision, building consensus, managing change, producing reports and accepting reports (Nunamaker et al. 1991; Romano & Nunamaker 2001).

Meetings support many key business processes of relevance to the public sector and private sector alike including strategic planning, business planning, project management, change management, knowledge management, team building and cohesion, and leadership development to name but a few.

Meetings are costly and time consuming. Romano & Nunamaker (2001) concluded that several decades of research on meetings in organisations confirmed that meetings are very expensive both in terms of time and financial cost. They also found that, while meetings are essential to many tasks in organisations that cannot

be carried out by individuals, most meetings are actually low in productivity, wasteful of resources and often leave participants feeling dissatisfied. Fjermestad & Hiltz (2001) also found that many meetings are inefficient and may be ineffective, and participants are often left with little satisfaction about the process, outcome or participation.

Technology has supported meetings for many years. Lind et al. (2006) outline some key types of meeting technology. These are presented generally in time order of development, commencing with non-computer technology such as flip charts and overhead projectors, which support one-way communication to small or medium groups. One way or “one-to-all” communication to medium to large groups is supported through Powerpoint and video projector computer technology for presentations. Video- or teleconferencing allow two-way (all-to-all) connection of small remote groups via voice using telephone and/or computer technology. Keypad polling systems provide all-to-all communication for polling only. Laptop PC “groupware” systems allow all-to-all dialogue for large groups and polling on preset questions. Laptop PC groupware systems have been used for twenty years for large group meetings Lind et al. (2006).

Electronic meeting systems (EMS) were developed to make group meetings more effective, efficient and satisfying by using computer technology (Nunamaker et al. 1991; Pervan et al. 2004; Rains 2007).

EMS have been in existence for over two decades, yet their adoption in most organisations has been limited (Pervan et al. 2004; Bandyopadhyay and Paul 2007; Lewis et al. 2007).

This study aims to investigate:

- What are electronic meeting systems (EMS)?
- What is the evidence that using an EMS does improve meeting productivity (efficiency and effectiveness) and satisfaction, as they were designed to do?
- Are there other benefits from using these systems?
- If so, how does the use of an EMS bring about these improvements in meetings and group collaboration?
- What factors need to be managed for the organisation to obtain the most benefit from these systems?
- Could EMS be used to improve meetings in Australian (including state/territory and local) government organisations?

1.2 Methods

A review of international literature on EMS and similar group support systems (GSS) was undertaken. This information was supplemented by using a case study approach to obtain qualitative data from three Australian providers of EMS systems and services. These companies are Global Learning Pty Ltd, based in Canberra, Grouputer Pty Ltd and Zing Technologies Pty Ltd, both based in Sydney. Information was obtained from discussions with and questionnaires filled out by the CEOs of these companies.

The study interrogated the literature for evidence of whether using an EMS:

- improves meeting effectiveness and efficiency and participant satisfaction
- provides any other benefits, and
- the theoretical reasons for these outcomes.

This information was supplemented by the case studies. The study focused on the use of EMS in face-to-face situations although the use of EMS to for remote participants was raised in the case studies.

The study drew on the literature and the case studies to investigate which factors in the deployment of an EMS are most likely to contribute to the success of EMS supported meetings, including factors that can be actively managed and controlled. This was followed by a consideration of whether EMS could be used to benefit in Australian public service organisations, and, if so, which situations and business processes would be most likely to benefit from EMS.

While it is not considered to be within the scope of this project to report in detail on the level of take up of EMS in Australian government departments, anecdotal information about the take up of EMS was sought from the three companies surveyed for the case studies. This information is presented and some of the possible barriers to the take up of EMS in these organisations are briefly discussed.

1.3 Collaborative computing

Collaboration is increasingly becoming a necessity in modern organisations and there has been an increasing focus on group and team work (Bajwa et al. 2005; Lewis et al. 2004). This, combined with advances in technology, has resulted in the evolution of information technology systems to support this collaboration (Lewis et al. 2004; DeSanctis et al. 2008).

In order to understand EMS, it is important first to have some knowledge of the broad range of collaborative computing technologies and systems available.

Collaborative computing is broadly defined in Bafoutsou and Mentzas (2002:281): “the field of collaborative computing encompasses the use of computers to support coordination and cooperation of two or more people who attempt to perform a task or solve a problem together.” Bafoutsou and Mentzas (2002) provide a very comprehensive review of the available commercial products at that time and the research on classifying these products. Collaborative systems that they reviewed included email, workflow management, audio/video conferencing, non-real time conferencing, chat, bulletin boards, white boarding, electronic newsgroups, electronic classrooms and computer-mediated meeting rooms (the technological aspects of EMS). One of the primary classifications distinguishes systems by time and place, ie Same Time/Different Time, Same Place/Different Place. Computer-mediated meeting rooms (or EMS) fall into the Same Time/Same Place group. The only other technology identified for this situation was electronic classrooms (Bafoutsou and Mentzas 2002).

Bafoutsou and Mentzas (2002) use a graphical representation to define different types of collaborative tools through their functionality for communication (on one axis) and their document handling facility (on the other axis). This method leads to them identifying four major categories of collaborative tools: group file and document handling; computer conferencing; EMS and electronic workspaces. There is some overlap of these categories, for example computer conferencing shares some of the functionality and document handling attributes as electronic workplaces and EMS. Bafoutsou and Mentzas (2002) listed some of the key functionalities of EMS as: whiteboard; discussions; multimedia; screen sharing; polling; meeting minute, meeting scheduling and presentation capability, they do not, however, include the distinguishing features of EMS which are the ability of the systems to support idea generation, information analysis and decision making.

Bajwa et al. (2005) and Lewis et al. (2004) look at seven groups of collaborative information technologies (CIT) which they divide into: stand-alone email; teleconferencing (two way audio); videoconferencing (two-way audio and video); dataconferencing; web-based collaborative tools (eg intranets); proprietary groupware tools (eg Lotus Notes) and Electronic Meeting Systems.

Collaborative computing systems are also sometimes known as “groupware”. Bandyopadhyay and Paul (2007) define groupware as a collective term for technologies that support group work in organisations, and includes emails, video and audio conferencing systems and GSS. Bouras et al. (2009) define groupware as software that makes use of and emphasises the multiple user environment so that users can see the work of others while the software also avoids conflicts with other users. A key attribute that distinguishes groupware from other software is that the user knows that he/she is part of a group.

Bouras et al. (2009) provide a recent review of classification systems for computer supported collaboration systems, which they term “e-collaboration” tools, which again uses slightly different categories. They confirm that the time/space matrix is often used to categorise these systems and make use of some terms that are often found in the literature: “synchronous” and “asynchronous” for the time dimension and “face-to-face” and “distributed” for the place dimension.

Bouras et al. (2009) classify e-collaboration systems into eight different types of products. As with the classification of Bafoutsou and Mentzas (2002) there is some overlap of tools and functionality but it does provide a useful approach which can assist us with understanding the multitude of e-collaboration systems available, including some recent developments in collaborative virtual environments (see Table 1).

Table 1. Some of the main types of integrated e-collaboration systems

(After Bouras et al. (2009) with additions from Munkvold (2005) and Pervan et al. (2004) and some industry sources *)

Category	Description/tools included	Examples
Collaborative product suites. Proprietary groupware tools.	Email, group calendar, threaded discussions, document management and workflow.	Lotus Notes; Lotus Domino; Microsoft Exchange; Microsoft Outlook; Novell Groupwise.
Collaborative portals.	Instant messaging, presence awareness, team workplaces, people finder, e-meetings and document management.	IBM Websphere portal; Microsoft Sharepoint.
Desktop/Web conferencing systems. Dataconferencing	Instant messaging/chat, audio conferencing, presence awareness, videoconferencing, application sharing, shared whiteboard, polling, voting and recording of meeting information.	MSN Messenger; Interwise ; Centra 7; WebEx Meeting (Cisco); Microsoft Live Meeting; Virtual Room; Adobe Connect Pro; NetMeeting; Evoke; Videoconferencing System (VRVS).
Web-based team/project rooms.	Group calendar, contacts, notes, tasks, file sharing, email, chat, pinboard, project management, document management, threaded discussions, brainstorming, voting, timesheets, telegram, evaluation, and scheduler.	TeamSpace; Documentum eRoom; Conference XP; Lotus Workplace; Collaboration.
Collaboration peer to peer systems.	Instant messaging/chat, presence awareness, threaded discussion, file sharing, project management, group calendar, group outliner, and meeting management.	Groove Virtual Office.
Electronic meeting systems (EMS) Group (decision) support systems GDSS, GSS.	Agenda, brainstorming, categorisation and organizing, voting and prioritizing, action planning, surveys, shared whiteboard, meeting log and chat, decision support tools, structured reporting.	GroupSystems; Facilitate.com; TeamFocus; VisionQuest SAMB (Software Aided Meeting Management) ThinkTank; WebIQ; MeetingWorks, Meetingworks Connect; Grouputer; Imeet!; Zingthing and Anyzing.
E-learning systems.	Email, presence awareness, calendar, threaded discussion, learning objects repository and course administration.	Blackboard; Centra 7; Aspen; Lotus Workplace; Collaborative Learning; WebEC Training Centre; WebCT; Moodle; Adobe Connect.

Category	Description/tools included	Examples
Collaborative virtual environments .	3-D based e-collaboration tools such as representation by avatars, presence awareness, text chat, audio chat, intelligent agents, bubble chat and 3-D representation of the collaborative space.	Flash Communication Server; MX; Blaxxum; ActiveWorlds; Parallel Graphics; Adobe Atmosphere.

* Industry sources: Adobe; Cisco WebEx; GroupSystems; Groupenter; iMeet!; Microsoft; WebIQ; Zing Technologies.

1. 4 Terminology

There is some inconsistency in terminology in the literature on collaborative information technology. This needs to be somewhat unraveled in order to obtain the most information from the EMS literature.

Nunamaker et al. (1991:41) first coined the term electronic meeting systems (EMS). They describe EMS as “a new form of meeting environment” “which strives to make group meetings more productive by applying information technology.”

While other researchers sometimes use this terminology (eg Bajwa et al. 2005, Lewis et al. 2007, Rains, 2007) most of the research on EMS uses the more generic terms group support system (GSS) or, less frequently, group decision support system (GDSS).

DeSantis et al. (2008), who describe an extensive, predominantly laboratory based 20 year program of research on GDSS, define GDSSs as: “computer-based technology designed to help committees, project teams and other small groups with activities such as problem identification and analysis, decision making planning, creativity, conflict management, negotiation and meeting management”, and state that: “GDSS combine communication, information, and decision support technologies in a integrated environment” (DeSantis et al. 2008:552).

Bandyopadhyay & Paul (2007) define GSS as a technology that supports decision making. Bragge et al. (2007) consider that GSS are Decision Support Systems that have been designed for use by groups, and that GSS are also known as GDSS or EMS, with the three terms often used interchangeably. I note that even the “father” of EMS, JF Nunamaker Jr, more often uses the term GSS in his later papers (Dennis et al. 1997; Nunamaker et al. 1997).

Dennis & Wixom (2002) describe a useful way to classifying GSS by categorizing them as Level 1 or Level 2. Level 1 tools are those which “primarily support the exchange of information” (Dennis & Wixom 2002:238). These provide discussion spaces and ways to organise and store information (for example, Lotus Notes). Level 2 tools include the same functionality but also allow for “information analysis to aid decision making” through tools that “quickly and easily organize, model, change and rank information” and “transform data from individual contributions to shared team information” (Dennis & Wixom 2002:238). This

classification, which originated in DeSantis & Gallupe (1987), is used in the key GSS review papers of Fjermestad & Hiltz (1999) and Fjermestad & Hiltz (2001).

Unfortunately, many researchers use the broad term “GSS” to include products that are only Level 1 tools and therefore do not specifically support decision making functions and are not EMS.

I have adopted the term “electronic meeting systems” or EMS for this paper because I consider that it best describes what it does in a way that does not sound too technical, and is still often used in the literature today. I build on the definition of EMS as “a broad class of computer-based technologies that support meeting functions such as decision making, idea generation, and problem solving” (Rains 2007:100). This includes group decision support systems (GDSS) or the more general group support systems (GSS) where these are used to support meetings. While some, but not all, of the papers quoted in this paper include research on a variety of GSS types, I have only drawn conclusions from those papers where the great majority of uses were Level 2 GSS used in face-to-face meetings, so that the findings are applicable to face-to-face EMS.

Even though papers often refer to these systems as “technology” many authors have emphasized the importance of considering more than just the technological aspects of EMS and more broadly e-collaboration (Bouras et al. 2009; Lind 2004; Kock & Nosek 2005). Colman and Levine (2008) consider that there are three critical factors that determine the success of technology-supported collaboration: people, process and technology - in that order of importance. Even the papers that refer to the EMS or GSS as being “technology” often include factors such as facilitation and group behaviours, which clearly fit into the people and process categories.

Therefore the present study, and in fact most of the literature on EMS and GSS, considers the total EMS system, which includes people, process and technology.

The focus of this study is the use of EMS for face-to-face meetings.

Table 2 incorporates the key terms in the EMS/GSS literature with examples of definitions and/or explanations.

Table 2. Some of the key terms used in the EMS/GSS literature with examples of a definition or explanation of the term.

Term	Explanation or definition	Reference	Notes
Collaborative computing	"the field of collaborative computing encompasses the use of computers to support coordination and cooperation of two or more people who attempt to perform a task or solve a problem together."	Bafoutsou and Mentzas (2002:281)	
Collaborative information technologies (CIT)	Technology that has "the capability to enhance collaboration and facilitate group decisions in task accomplishment by enabling better communication, sharing of information, ideas, expertise, and evaluating alternatives, irrespective of time and distance barriers."	Bajwa et al. (2005:130)	These include email; teleconferencing; videoconferencing, dataconferencing (eg application sharing, data presentations); proprietary groupware tools (eg Lotus Notes); electronic meeting systems (EMS).
Computer mediated communication (CMC)	"a system designed primarily to support text-based and generally asynchronous group discussion such as computer conferencing or bulletin board systems, that may or may not have GSS tools included".	Fjermestad & Hiltz (2001:117)	This can be a simpler technology than GSS and can even include email (Fjermestad & Hiltz 1999) p 40. However sometimes used as an alternate terminology to GSS eg Mejias (2007).
Computer supported collaborative work (CSCW)	"Computer assisted coordinated activity carried out by groups of collaborating individuals". A generic term which "combines the understanding of the way people work in groups with the enabling technologies of computer networking and associated hardware, software, services and techniques."	Bouras et al. (2009:4)	
Electronic Meeting System (EMS)	1. "A new form of meeting environment" "which strives to make group meetings more productive by applying information technology."	Nunamaker et al. (1991:41)	Term first coined in Nunamaker et al (1991). Commenced with purpose built meeting rooms to support same time/same place meetings with a series of networked micro-computers arranged around a table. The system included a meeting facilitator.

Term	Explanation or definition	Reference	Notes
Electronic Meeting System (EMS) (cont.)	2. “electronic tools for structuring meetings in a face-to-face usually networked environment”	Bajwa et al. (2005:131-132)	Examples are Group Systems, MeetingWorks, TeamFocus, VisionQuest.
	3. “EMS can be viewed as a special class of (collaborative technology) tools that provide electronic support for groups engaged in accomplishing tasks through meetings or other forms of collaboration that may involve negotiations, consensus seeking, and conflict resolution.”	Lewis et al. (2007:382)	
	4. “a broad class of computer-based technologies that support meeting functions such as decision making, idea generation, and problem solving.”	Rains (2007:100)	
Collaboration	“the act of working together on a common task or process.”	Bouras et al. (2009:3)	
e-collaboration	“collaboration among individuals engaged in a common task using electronic technologies”	Kock & Nosek (2005:1)	A broad term that is not restricted to computer technologies but can include telephone etc.
E-collaboration technologies	“denoting all types of information and communication technologies (ICT) supporting communication, information sharing, and coordination”.	Munkvold (2005:78)	
Global e-collaboration	“the use of e-collaboration technologies for supporting collaboration among organisational members in two or more countries”	Munkvold (2005:78)	
Groupware	1. Groupware is a collective term for technologies that support group work in organisations, and includes emails, video and audio conferencing systems and group support systems (GSS).	Bandyopadhyay & Paul (2007:2)	Groupware refers to the technology. GSS, GDSS and EMS are subsets of groupware.
	2. “Software that integrates work on a single project by several concurrent users at separate workstations.” Software that makes use of and emphasizes the multiple user environment so that users can see the work of others while the software also avoids conflicts with other users.	Bouras et al. (2009:4-5)	Bouras et al. (2009) also uses the equivalent term of “collaborative software”.

Term	Explanation or definition	Reference	Notes
Group Support Systems (GSS)	1. "GSS are interactive computer-based technologies that support coordinated team effort toward completion of joint tasks".	Nunamaker et al. (1997:165)	EMS are a subset of GSS. However some researchers use the terms interchangeably or lump the Level 1 and Level 2 tools together (see text).
	2. "A GSS consists of a set of software, hardware, and language components and procedures that support a group of people engaged in a decision-related meeting. This definition can be expanded to include communication and information processing".	Pervan et al. (2005:2)	Pervan et al. (2005) present another way of looking at the relationship between GSS, GDSS and EMS; they consider that GSS are usually implemented as EMS or group decision systems (GDS).
Group Decision Support Systems (GDSS)	1. "A GDSS is a computer-based technology designed to help committees, project teams and other small groups with activities such as problem identification and analysis, decision making planning, creativity, conflict management, negotiation and meeting management". "GDSS combine communication, information, and decision support technologies in a integrated environment."	DeSanctis et al. (2008:552)	Consider that GDSS are also known as group support systems (GSS).
	2. GDSS are e-collaboration tools "aimed at improving the efficiency of synchronous, same place group meetings."	Kock & Nosek (2005:2)	Here is an equivalent term to EMS.

1. 5 What are electronic meeting systems (EMS)?

An EMS is a system of meeting support consisting of specialised software and processes. In an EMS supported meeting, each person has a computer that is networked to all the others and one or more public screens that can display multimedia presentations, relevant information, and the combined electronic contributions of the participants. For larger meetings, each group of 3-10 people will have a computer. The specialised software allows synchronous and parallel input from participants and includes a suite of tools to support the meeting. It is common to have a facilitator who works with the meeting organizer to set the agenda and deliverables, run the EMS and keep the meeting focused and on track.

Networking was originally hard-wired, by way of Local Area Networks (LAN). The advent of the internet led to the use of internet enabled networking with the first web-based systems becoming available in the 1990s (for example, Facilitate.com) (Bragge et al. 2007). Some modern EMS make use of either technique depending on the situation (S. Colman, Global Learning Pty Ltd, pers. comm.).

One of the key distinguishing features of an EMS is the synchronous and parallel input of information and comments, so that participants' contributions are available for all to see, either on everyone's computer screen or on a larger screen visible to the whole group. In many EMS the comments are anonymous although, there is the option to identify the person or group by a coding next to each comment.

The software includes a wide range of tools including agenda formulation; brainstorming; idea organizing; real-time voting (or polling); issue analyzer; survey/questionnaire, matrix; stakeholder identification; policy formulation; action planning; meeting log and chat; group-memory; decision support tools; and recording of minutes and meeting outcomes (Bafoutsou and Mentzas 2002; Bouras et al. 2009; Nunamaker et al. 1991). Modern EMS can of course support multimedia (Bafoutsou and Mentzas, 2002) so that presentations can be supported by MS Powerpoint, and audio and video files can be incorporated.

In a real life situation people can, for example, discuss agenda items, make considered input, sort, analyze, prioritise material, and then choose a course of action all in the one meeting. All comments and outcomes are available to all participants in real time. To speed up the process, if desired, groups of participants can work on different agenda items at the same time, with the voting and consensus making brought back to the whole group to perform as required.

1.6. Evolution of EMS

Nunamaker et al. (1991) first coined the term electronic meeting systems or EMS. The paper describes how, in the early 1980s, a team of people at the University of Arizona started to develop tools and systems to improve the productivity of group activities, initially to support groups of analysts in the construction of information systems. The EMS commenced with purpose-built meeting rooms to support same time/same place meetings with a series of net worked micro-computers arranged

around a table. The system included a facilitator and other audio visual support, such as whiteboards and overhead projects. The research group quickly discovered that this system was effective at other tasks, for example strategic planning. The group developed the software GroupSystems, which consisted of a variety of tools. These included tools to assist with developing the meeting agenda, generating ideas (electronic brainstorming tool), collecting simultaneous input from all users and displaying these to everyone, idea organisation, and prioritization (eg voting tool). A key feature of the system was that the inputs were anonymous and there was usually a facilitator (Nunamaker et al. 1991).

GroupSystems was not the only GDSS or GSS developed in the 1980s. Other early GSS were TeamFocus and MeetingWorks (Kock & Nosek 2005). IBM was one of the early adopters of EMS with their product TeamFocus (Bragge et al. 2007). In the mid 1980s, researchers at the University of Minnesota gradually developed a purpose built GDSS laboratory with a GDSS called Software Aided Meeting Management (SAMB), which was specifically developed for research on GDSS. This system supported groups from three to 16 people (DeSanctis et al. 2008). Pervan et al. (2005) provide a brief history of GSS research.

The EMS/GSS products changed and expanded with advances in computer technology and the development of the internet in the 1990s. The first web-based competitor to the LAN networked GroupSystems became available in the mid 1990s. One example was Facilitate.com (Bragge et al. 2007). These web-based systems allowed more flexible and distributed collaboration and enabled extensive development of “any-time anywhere” group work and the use of virtual meetings and virtual teams (Bragge et al. 2007:9).

The continued development of information and communication technology has meant that today there are quite a few EMS or GSS on the market. These are available in a variety of formats, such as software only, packages of software and hardware and as “software as a service” (SaaS) which comes as a package of hardware, software and facilitation support and may be hosted by the company’s servers. A list of some of the EMS/GSS including the some of the early systems and some currently available systems is presented in Table 2.

1.7 What has EMS been used for?

Nunamaker et al. (1991) categorised the broad range of tasks or activities supported by EMS as: exploration and idea generation; idea organisation; prioritising; and policy development and evaluation.

One of the earliest uses of EMS was strategic planning (Dennis et al. 1997; Fjermestad & Hiltz 2001; Nunamaker et al. 1991). Early successful uses of EMS included development of a mission statement, evaluations of senior managers, and planning of information systems (Nunamaker et al. 1991). Fjermestad & Hiltz (2001) analysed 54 different published implementations of GSS in the field. Apart from strategic planning, there was a wide variety of tasks that included cost benefit analysis, marketing and human resources tasks, complex and urgent resource allocation tasks, business process reengineering and contract negotiation. GSS and

EMS have also been used for educational applications since at least the 1990s (Briggs et al. 1998; Limayem et al. 2007; Nunamaker et al. 1997). This paper only investigates the education application briefly, as it is one of the uses for EMS in which Zing Technologies Pty Ltd, the subject of one of the case studies, has specialised.

1.8 Take up of EMS in organisations

Despite the many years that EMS have been in use and extensive literature that has shown that they can greatly increase the efficiency, effectiveness and member satisfaction of meetings (see below), it seems that the adoption of EMS in most organisations is limited. GSS have predominantly been deployed in the United States and in particular by large corporations, parts of the US Army, universities and some consulting companies (Bragge et al. 2007). Bandyopadhyay and Paul (2007) reported that, while many groupware technologies have been widely adopted, the adoption of GSS has been limited except in large businesses and government in North America. Lewis et al. (2007) also found that EMS had a limited adoption in all of the four regions they investigated which were the United States, Australia, Hong Kong and Norway.

Pervan et al. (2004) investigated the adoption and use of EMS in large Australian and New Zealand business organisations. The results indicated that the take up of EMS was limited, with most organisations not using EMS.

While EMS were found to be the least utilised of the collaborative information technologies investigated, EMS was found to have been adopted by 32% of the companies surveyed in Australia. This was less than for the USA companies, at 42%, with Hong Kong at 21% (Bajwa et al. 2005).

1.9 Evidence for EMS improvements to meetings and group activities

The published literature on EMS and GSS is extensive and includes a very large number of laboratory based studies and field and case studies (Bragge et al. 2007; Fjermestad & Hiltz 1999; Fjermestad & Hiltz 2001; Nunamaker et al. 1997; Pervan 1998).

The first articles appeared in the early 1980s and the number of GSS publications peaked between about 1994 and 2002 (Bragge et al. 2007).

The following reviews some key papers in the literature for evidence of the benefits of EMS.

Nunamaker et al. (1991) reviewed research studies using both laboratory and field research of EMS in many different organisations, and concluded that these EMS, which often used GroupSystems software and included a facilitator, could significantly improve the outcome of meetings. In most cases EMS improved the effectiveness, efficiency and satisfaction, however the actual outcome did depend on the specific situation. As an example, the authors quote the figure of 88% of participants saying that the EMS meeting was more effective than previous

meetings which were conducted without EMS and state that this was typical of their research in both laboratory and field studies (Nunamaker et al. 1991).

In 1992 an article in Fortune magazine praised the advent of electronic meetings using PCs (Kirkpatrick & Losee 1992). This article provides a number of early examples of how EMS increased efficiency and productivity of meetings in firms. In one case, a US telecommunications company used IBM's TeamFocus to develop a new customer relation's strategy, which it successfully completed in seven weeks, compared to the year it would have taken using the firm's normal methods of focus groups and employee surveys.

Nunamaker et al. (1997) summarise the results from the previous 12 years of research on GSS. This included case and field studies and some laboratory experiments. Most of this work was with face-to-face meetings in both public and private organisations. In terms of the benefits provided by GSS, they concluded that:

- GSS can reduce labour costs by more than 50% and project time by up to 90%.
- GSS can increase the number of ideas generated.
- Meeting participants will be active rather than passive, which leads to increased group energy and focus.
- Anonymity encourages participants to evaluate ideas more objectively
- Anonymous criticism using GSS improves the quality of ideas generated.
- GSS can result in increased "group cohesiveness" improved problem solving and a greater range of high quality solutions.
- GSS can increase ownership and "buy-in" to the final result of the collaboration effort, and
- GSS can successfully support multi-language meetings (Nunamaker et al. 1997).

They also confirmed that the success of a GSS implementation depends on both the design of the system and tools used and the manner in which they are used (Nunamaker et al. 1997).

Briggs et al. (1998:6) reviewed the GSS literature and state that "research from both the field and laboratory has shown that teams using GSS can be far more productive than would otherwise be possible".

Another key review paper is Fjermestad & Hiltz (2001). The authors carried out an extensive analysis using 54 peer-reviewed case and field studies of GSS research dating from 1980 to mid 2000. Most of these used GSS Level 2 in synchronous situations and would also be classified as EMS. They revealed that, for the large majority of studies which investigated these aspects, the groups found that efficiency, effectiveness, usability and meeting satisfaction of the GSS supported collaboration was above that for conventional methods. For example, 93% of the studies that measured efficiency of the GSS found improvements, and 89% of the studies that measured effectiveness found improvements. In some cases the improvements were great. One study, where the product TeamFocus was used in a major manufacturing firm, reported improvements in effectiveness as producing savings of \$432, 260 and efficiency as 71% of labour saved over 64 sessions (Fjermestad & Hiltz 2001).

Fjermestad & Hiltz (2001) compiled a list of the aspects of collaboration that, in the majority of cases, improved with GSS. These included: process structure; process support; task structure; information exchange; communication; number of ideas; the ability to deal with task complexity; cohesiveness; flexibility; improved focus; reduced stress and increased knowledge and knowledge sharing.

These strong positive results contrast with their previous analysis of laboratory-based GSS research Fjermestad & Hiltz (1999), which only found a 16% increase in meeting productivity. This highlights some concern with the use of laboratory studies in this field. Nunamaker et al. (1997) quote studies that revealed frequent differences between laboratory and field results and, more recently, Bajwa et al. (2005) highlight that there has been criticism in the collaborative information technology literature about the emphasis in the USA on laboratory studies and their disconnect with reality. Munkvold (2005) also discusses the benefits of experimental research compared to real life situations (such as field and case studies) in collaborative technology and points to the fact that while most research on virtual teams is experimentally based, several studies indicate that these are in many ways not representative of real situations.

A number of authors point to there being some inconsistency in the research results for studies of GSS, with some papers reporting benefits in terms of idea generation, decision quality, time savings and meeting satisfaction while others report nil benefits for some or all of these (Briggs et al. 2006; Dennis et al. 2001; Dennis & Wixom 2002; Rains 2005). These inconsistencies have been variously explained.

Dennis et al. (2001) point out that field studies have shown more positive results than laboratory studies. They do not, however, consider that the field versus laboratory factor is the reason for these differences. Their research indicates that the way the GSS is used is the determinant of whether the GSS results in positive outcomes or not. If the particular task is appropriate for the GSS, the tools available to the group have been restricted to those necessary for the task, and the group receives appropriate support in the form of facilitation and training, then the use of the GSS will increase the number of ideas generated, take less time and result in a greater level of participant satisfaction than for groups where no GSS was used. They consider that, using this framework, GSS research results are not inconsistent (Dennis et al. 2001).

These general results are similar to the findings of Limayem et al. (2006) although they used an experimental, laboratory-based approach. Their results also support the contention that the manner in which a GSS is used influences the outcomes and benefits it produces. Their findings are also consistent with Nunamaker et al. (1991) and Nunamaker et al. (1997).

Dennis & Wixom (2002:236) considered that it may be more appropriate to ask: "under what circumstances does GSS use improve performance?" rather than "whether GSS use improves performance?". They used meta-analysis to investigate the importance of five key factors that, based on previous research, are

likely to influence the effects of GSS use. A meta-analysis is a statistical method that can be used to examine findings across a number of research studies which makes it possible to draw conclusions from a body of research (Rains 2005). Dennis & Wixom's (2002) meta-analysis included both Level 1 and Level 2 GSS (Level 1 tools only support the exchange of information whereas Level 2 tools support decision making). From this study they again concluded that the use of GSS in different situations will result in different "performance outcomes". Nevertheless, they found that Level 2 tools (such as EMS) did result in better decision making and that facilitation resulted both in improved decision quality and participant satisfaction (Dennis & Wixom 2002).

Rains (2005) investigated the effects of GSS on influence variables of importance to GSS outcomes. He also points to some inconsistencies in some, but not all, findings from GSS research and also uses a meta-analysis to resolve these inconsistencies. He carried out a meta-analysis using 48 GSS experimental studies obtained from the literature dating from before 1998. From the information provided in his paper it seems likely that these are all laboratory-based experiments with the majority Level 2 GSS. His results indicated that GSS did indeed result in increased participation equality, increased influence equality, increased production of new ideas, and reduced member dominance. He considers that his analysis has helped to resolve inconsistencies in previous GSS studies (Rains 2005).

Lewis et al. (2007) consider that the usefulness of EMS in group collaborative work has been documented by many researchers and list the general benefits to organisations that derive from adopting EMS as:

- more effective and efficient meetings;
- the ability to work with large groups of people;
- increased participant satisfaction; and
- a greater equality of participation.

DeSanctis et al. (2008) present some key findings from a 20 year research program into GDSS at the University of Minnesota. Most of the studies were laboratory-based and used purpose-built "decision rooms", which could accommodate three to 16 participants, and the purpose-built GDSS, SAMM. There were also two large field studies. Their results for the laboratory studies also indicated that Level 2 GDSS can lead to superior decision making and engagement outcomes but only under the right circumstances. Further study of these circumstances led to further conclusions including that:

- groups did better with training and guidance on the use of the GDSS, and
- groups with a facilitator achieved better outcomes than those without.

The field studies also used the SAMM software. Among the many findings from these studies are that the GDSS led to greater equality of participation, and that facilitation improved the effectiveness of the GDSS. The use of the GDSS was not, however, shown to always result in a greater number of ideas being generated in these two field studies.

Thus, it can be concluded that EMS *can* greatly improve the effectiveness, efficiency and member satisfaction with meetings as well as provide other benefits such as

equality of participation and the ability to support large meetings however a number of factors should be managed to get the most out of the EMS.

1.10 Why do these benefits arise?

The research on EMS and GSS has included theorising and investigating about how the systems produce the reported effects on meeting productivity, outcomes and satisfaction.

One of the most comprehensive discussions is provided by Nunamaker et al. (1991). They consider that EMS benefits, such improved efficiency, effectiveness and meeting satisfaction, depend on a range of factors that vary between implementations. Four areas where the particular characteristics all contribute to the meeting outcomes are identified: the group; the task; the context; and the technology. Group characteristics include group size, composition (for example, whether they are peers or include superiors) and group cohesiveness. Task characteristics depend on whether the task is, for example, an idea generation task or a decision making task and whether it is simple or relatively complex (such as the development of a strategic plan). They point out that therefore, it is not very useful to make generalised statements about all EMS and that a more meaningful approach is to investigate why and how the EMS can positively affect group processes (Nunamaker et al. 1991).

EMS can be very effective because they provide support to groups and group dynamics through four mechanisms: process support (for example, the technology that facilitates communication); process structure (includes the rules that direct this communication, for example an agenda or process methodology); task support (includes access to relevant external information and tools such as calculators); and task structure (which includes models for analyzing information, computer decision support tools and voting tools) (Nunamaker et al. 1991). They consider that it is the unique and convenient packaging of all of the features in an EMS and the flexibility of the EMS toolkit which allows these mechanism to operate successfully (Nunamaker et al. 1991).

By applying theories of group dynamics, Nunamaker et al. (1991) consider that the features of an EMS discussed above can result in “process gains” and “process losses”. EMS work by supporting process gains and reducing process losses. For example, the process support allows parallel and synchronous input of contributions, which reduces potential process losses from air-time restrictions. This feature, combined with the computer assisted access to external information, produces a process gain of more information available for analysis and decision making. Process structure provides discipline and logic to the meeting, which can reduce process losses due to coordination problems and time wasted on non-essential tasks. When the process gains from EMS exceed process losses, the EMS will result in increased productivity and better outcomes than non-EMS meetings. Table 3 draws directly from their list of potential group process gains and group process losses (Nunamaker et al. 1991).

Table 3. Major sources of common group processes gains and losses (from Nunamaker et al. 1991)

Group process gains	Group process losses
<i>More information</i> (a group has more information and skills than any individual)	<i>Air time fragmentation</i>
<i>Synergy</i> (a participant uses information in a different way from others because of his/her different knowledge and skills)	<i>Attenuation blocking</i> (participants are preventing from contributing when they want and forget or suppress these later)
<i>More objective evaluation</i> (groups are better at critical analysis and identifying errors than the person who contributed the idea)	<i>Concentration blocking</i> (fewer comments are made because participants need to remember the ones that have been made rather than thinking of new ones)
<i>Stimulation</i> (working as a part of a group can stimulate individuals to perform better)	<i>Attention blocking</i> (participants must always listen to others and do not have time to think)
<i>Learning</i> (participants can learn skills and knowledge from others which will improve performance)	<i>Failure to remember</i> (participants miss or forget verbal contributions)
	<i>Conformance pressure</i> (pressure to go along with the ideas or opinions of the group or dominant members of the group)
	<i>Evaluation apprehension</i> (fear of negative evaluation from other members of the group)
	<i>Free riding</i> (participants rely on other to do the task)
	<i>Cognitive inertia</i> (discussion moves along one train of thought because participants do not contribute comments that are not related to the current conversation)
	<i>Socializing</i> (non-task activities)
	<i>Information overload</i> (information is presented faster than it can be processed and used by participants)
	<i>Coordination problems</i> (difficulty in coordinating all the information provided or available)
	<i>Incomplete use of information</i> (incomplete access to and use of data that is necessary to successfully carry out the task)
	<i>Incomplete task analysis</i> (can result in poor understanding and outcomes).

Nunamaker et al. (1997) provide further insight into how EMS (which they now call GSS) affect group dynamics to produce more productive meetings. The structure of the GSS provides a “road map” for the group so that they can work more efficiently and effectively. Tools influence group dynamics by “improving communication, structuring and focusing problem solving events, and establishing and maintaining an alignment between personal and group goals” (Nunamaker et al. 1997:165). They consider that the features of supporting access to information, simultaneous work, anonymous brainstorming, group writing and voting enables the groups to quickly identify and then resolve the key issues, which can then lead to positive outcomes. They also consider that the shared understanding that results from these processes is likely to also lead to improved commitment to the outcomes by participants (Nunamaker et al. 1997).

While few other papers provide such a comprehensive analysis of the features and mechanisms of EMS, many other papers discuss how one or more different features of EMS that produce the reported benefits. Key features that are often identified in the literature include:

- parallel and simultaneous entry of responses
 - anonymity
 - group memory
 - a variety of tools that support information exchange and analysis, idea generation and information organisation (such as brain-storming, categorizing, modeling and ranking, decision support)
 - the ability of participants to assess outside information, and
 - the ability to provide structured reporting/minutes
- (Bragges et al. 2007, Lind et al. 2006; Nunamaker et al. 1991; Nunamaker et al. 1997).

I have focused on the first three of these for a more detailed discussion. The first two particularly have been extensively covered in the literature.

1.10.1 Parallel and simultaneous entry of responses

EMS allow parallel and simultaneous input of responses. Each participant, or small sub-group of participants, has a keyboard and can simultaneously key in comments and responses as required. These can be seen by the whole group, usually in a shared screen at the front of the room.

This key characteristic of EMS allows a larger number of inputs and therefore a broader range of input from meeting participants. It allows a greater number of people to be productively involved in a meeting. In normal face-to-face meetings the amount of “air time” for any one participant is limited by the fact that only one person can (effectively) talk at once and the time must be shared around those wishing to contribute. For example, in a two hour meeting with 20 participants, each person on average only has 6 minutes of air time. This is called “air time fragmentation” by Nunamaker et al. (1991). The fact that people need to wait for others to finish before they contribute is called “production blocking” by Dennis & Wixom (2001) as they may lose their train of thought or never get the chance to contribute. EMS mitigate these production losses (Nunamaker et al. 1991).

In most meetings usually 20% of the participants dominate 80% of the time (Nunamaker et al. 1997; Burdett 2000; and personal observation). The simultaneous entry of input via the EMS, especially when combined with anonymity of input, allows everyone who wishes to participate equal opportunity and reduces dominance (Nunamaker et al. 1991). This has been termed as providing a “level playing field” for participants and produces more democratic processes (Rains 2005). This democratisation has been supported by a number of studies. As discussed above, Rains’ (2005) meta-analysis of GSS research studies showed that the use of a GSS did result in greater participation and influence equality (Rains 2005). He considers that the ability to provide simultaneous input is one of the many reasons for this. Another reason may be that the cues available in face-to-face communication are reduced in the GSS environment, which means that participants feel less inhibited and less constrained and are less affected by differences in hierarchical status or by dominant participants (Rains 2005).

Burdett (2000) found that EMS can remove or reduce some of the aspects of mixed-sex meetings that she finds disadvantage women participants. These include male conversational dominance and gender related stereotyping. The joint EMS characteristics of simultaneous and anonymous input can allow women, and other minority groups in organisations, to increase their participation and increase gender equity in decision making. Burdett also emphasises that the way in which the technology is used and management of the processes are critical to ensuring that this is the case (Burdett 2000).

1.10.2 Anonymity

Anonymity is another key characteristic of EMS that is also often claimed as contributing to its success. Much has been published on this aspect (Rains, 2005; Rains, 2007). Some of the earliest discussion is provided by Nunamaker et al. (1991) who state that anonymity reduces the impacts of participants’ fear of being evaluated and reduces pressure to conform to norms or expectations of superiors or peers. This means that issues can be discussed more freely. People who normally do not speak up can input their comments online without fear or embarrassment. In a conventional meeting people who feel that they are less skilled may remain inactive and people do not contribute because they know that their opinion may differ from that of their boss or peers. Participants can correct errors in information that is put forward without being put down for this. Nunamaker et al. (1991) make the distinction between *process* anonymity, which means people do not know *who* are contributing, and *content* anonymity which refers to the fact that no one knows *what* any person contributed.

Kirkpatrick & Losee (1992) also point out that the anonymous nature of the systems gives those participants that are often silent because of low rank or worries about what peers or bosses will think the opportunity to add their ideas to the mix. The same principle applies to the voting tools of EMS, which are also generally anonymous and can therefore allow participants to vote in an objective and considered manner rather than voting how they are expected to.

While agreeing with these considerations, Briggs et al. (1998) consider that it is sometimes useful to identify contributors if there is a need to know the credibility of the source and when individual accountability is important.

More recent articles too refer to the positive consequences of the EMS characteristic of anonymity. Rains (2005) highlights the following mechanisms by which anonymity benefits group processes in EMS:

- mitigation of status differences
- releasing participants from fears of retribution and ridicule, and
- reducing the effects of group pressure on participants.

Lewis et al. (2007) suggest that the anonymity feature of EMS allows participants to focus on content and merit of ideas and information that is contributed, rather than focusing on the person who made the contribution. It allows the meeting to be somewhat removed from the influences of personalities and power play. This allows ideas and contributions to be considered on their merit. Lind et al. (2006) also champion the benefits of anonymity. They consider that people are freed to say things that they otherwise would not and that these sentiments can often be shared by many others. Thus anonymity allows critical issues to be aired quickly and consequently dealt with constructively (Lind et al. 2006).

Rains (2007) provides a review of papers that have discussed this anonymity in EMS. He highlights the following mechanisms by which anonymity benefits group processes in EMS:

- mitigation of status differences
- releasing participants' from fears of retribution and ridicule, and
- reducing the effects of group pressure on participants (Rains 2007).

He considers that these characteristics are required for "an egalitarian communication environment that promotes effective discussion and decision making" (Rains 2007:101).

A smaller number of papers discuss how anonymity could work against group processes. Baltes et al. (2002) cites two papers which have reported some negative group behaviours due to this feature where the reduction in inhibition has increased what is known as "flaming", (being behaviours that inflame the amount of criticism of other participants). Nunamaker et al. (1997) report that, while this might be expected to be the case, in their extensive experience this rarely happens because the systems help to make people more objective and constructively critical.

Rains (2007) considers that anonymity may have negative impacts on the receivers of the information (as opposed to the contributors who generally benefit). He carried out an experiment, using students, which indicated that EMS can undermine the credibility and influence of the source of inputs. I consider the most useful part of his paper is his discussion of implications for practitioners. Among his recommendations are that the EMS practitioner (who could be the group leader or facilitator) should use anonymity strategically, where it is likely to benefit the outcomes of the meeting. He also considers that if

anonymity is to be used then the use of this feature should be discussed with the participants prior to commencement of the task, and that its use could be accompanied by training to ensure that group members are aware of the purpose and potential benefits of anonymity so that the feature can be used more effectively.

Misappropriated anonymity is where the anonymity feature is actively used by a position in power to increase their dominance or change the group behaviour, for example, by one person putting in many comments and pretending these are from a variety of participants. Fjermestad & Hiltz (2001) list misappropriated anonymity as a factor that will act to reduce the success of a GSS implementation.

1.10.3 Group memory

Parallel input will increase the total amount of contributions and can therefore enhance discussion and meeting productivity. There is, however, a limit to how much information people can take in. If not carefully managed, this feature could lead to information overload for some participants (eg Nunamaker et al. 1991).

EMS manage information and information overload by recording and displaying the inputs and findings, called “group memory” by Nunamaker et al. (1991). Group memory refers the functionality of the system to record all of the electronic communication, which can therefore be used during and after the meeting (Dennis et al. 1997). “Group memory enables members to queue and filter information” according to Nunamaker et al. (1991:48). This can give people more time to assimilate and think about the information if they require it, and go back and jog their memory, rather than only hearing the information once, as when it is presented orally as in normal meetings. Group memory also reduces production losses due to failure to remember and attention blocking (Dennis et al. 1997; Nunamaker et al. 1991).

Rather than further discussing the findings from the literature about the ways that EMS can influence behaviours and improve meetings I have summarized, in a flow diagram, the major features and mechanisms that are reported to produce these benefits (Figure 1). I have developed Figure 1 from information in the following sources: Bragge et al. (2007); Dennis & Wixom (2002); Dennis et al. (2001); Lewis et al. (2007); Lind et al. (2006); Nunamaker et al. (1991); Nunamaker et al. (1997); Rains (2005); and Rains (2007).

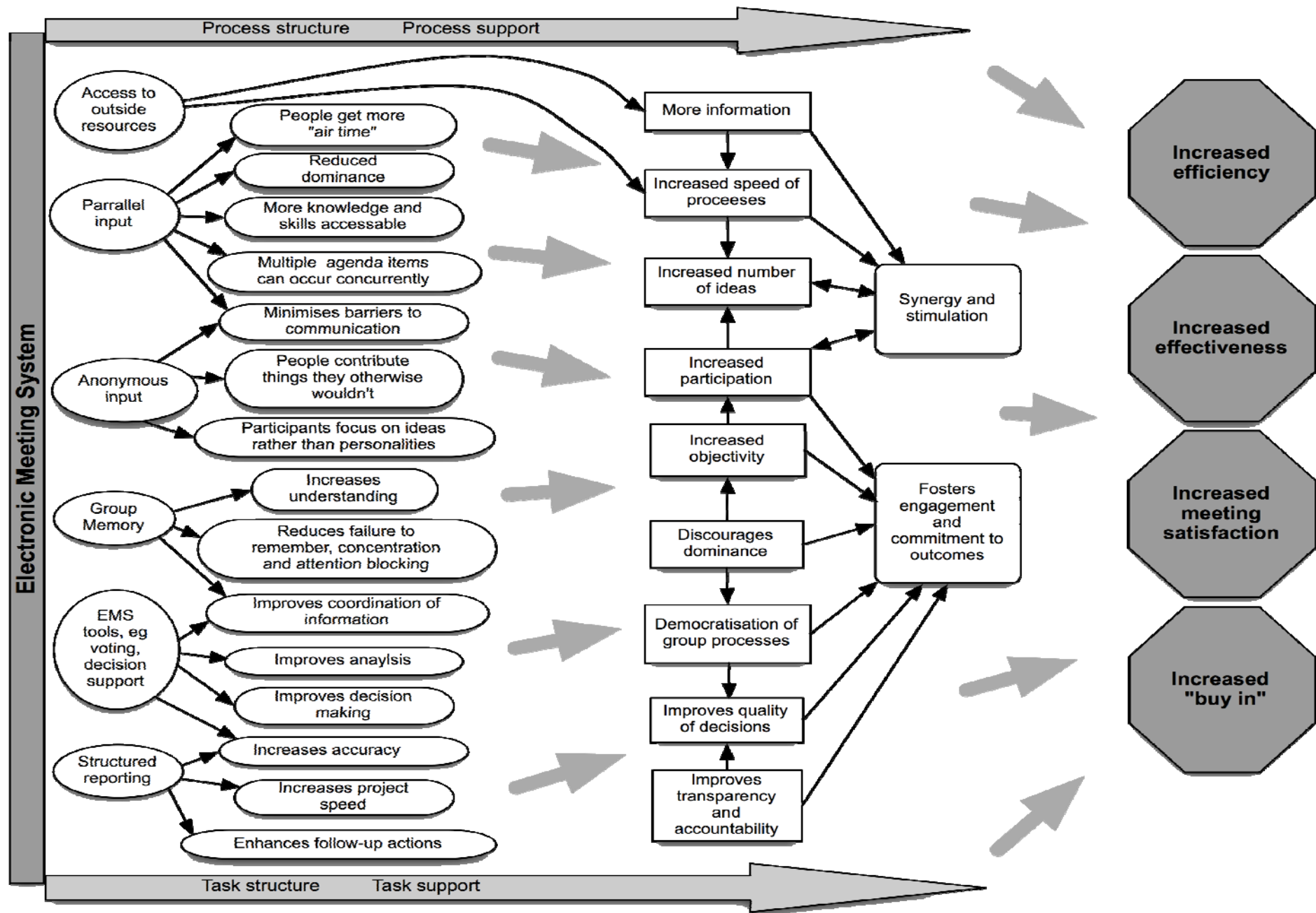


Figure 1. Flow diagram showing how EMS can affect meetings and improve outcomes

1.11 Factors which influence the successful use of EMS

As discussed above, the effects and benefits produced by an EMS will depend on its implementation (Lewis et al. 2007; Nunamaker et al. 1991). The literature provides information on a number of important factors in the implementation of an EMS to support a meeting or group task that will influence its success and the benefits that it produces. Fjermestad & Hiltz (2001) developed a list of characteristics of successful and unsuccessful implementations. Those relevant to EMS implementation are reproduced in Table 4.

Table 4. Characteristics of successful and unsuccessful GSS implementations of relevance to EMS (After Fjermestad & Hiltz 2001)

Successful GSS implementations	Unsuccessful GSS implementations
Facilitator	No facilitator
Leadership	A domineering or unenthusiastic leader
Many sessions	Few sessions
Training on the technology	No training on the technology
Complex tasks	Trivial tasks
Permit verbal and electronic communication	Discourage verbal communication
User defined approaches	Limited approaches
Culturally sensitive implementations	Culturally insensitive implementations
Anonymity	Misappropriated anonymity
High trust	Low trust

Some of the more important factors identified in the literature as important for successful EMS implementation are discussed below.

Meeting planning

Any successful meeting must be properly planned, designed and run and EMS meetings are no exception. Meetings tend to be chaotic and result in a great deal of wasted time if they are not managed in a planned manner (Niederman et al. 1996). Briggs et al. (1999) consider that among experienced GSS users it is well known that proper pre-planning is critical to the success of a GSS supported meeting. EMS can assist with meeting preplanning, for example by setting a meeting agenda and mapping the specific tasks to specific GSS tools. While an EMS can greatly improve a meeting, in a poorly planned meeting the EMS can make the meeting outcomes worse than they would have been without the EMS (Nunamaker et al. 1997).

The following discussion assumes that good meeting planning and practice is undertaken.

Facilitation

Facilitation is another stand out factor that significantly contributes to, and is often considered critical to, the success of an EMS supported meeting (Dennis & Wixom 2002; Fjermestad & Hiltz 2001; Niederman et al. 1996; Nunamaker et al. 1997). While a GSS can assist with improving group processes in meetings, it is important to ensure that there are sound meeting practices and a facilitator is one way of promoting this. Sound meeting practices which includes activities that are carried out before, during and after meeting (Niederman et al. 1996). Lind (2004) considers that EMS expand and magnify the positive effects a facilitator will have

on meetings. Dennis & Wixom (2002) found that facilitation resulted in both higher quality decisions and higher meeting satisfaction than non-facilitated GSS meetings.

The facilitator must provide support for the meeting structure, processes and tasks. He/she may also need to provide technical support for the EMS if technical support is required (Nunamaker et al. 1991). In complex EMS products the technical role can be carried out by a separate person, sometimes called a “guide” (Lind 2004).

The roles of the facilitator can include:

- technical support such as initiating and terminating the appropriate software tools, and generally guiding the group through the technical aspects of the system
- chairing the meeting
- facilitating and supporting group interaction
- encouraging full participation
- setting the ground rules, enforcing protocols
- fostering inclusive solutions
- assisting in meeting design and agenda planning, with the meeting leader or relevant executive, and
- administering group knowledge (for example, often has the capacity to delete or edit the public information) (Lind et al. 2006; Nunamaker et al. 1991).

Ideally the facilitator will work with the meeting organiser or leader to ensure that the goals of the meeting are clear and achievable.

Leadership

An EMS does not replace good leadership (Nunamaker et al. 1997). It is the role of the leader to define the goals and deliverables to be achieved from the meeting. The facilitator can then assist in making this happen and enable the group to see where they are headed and how each session is getting them towards that goal.

Leadership is important to ensure that individuals have incentive to contribute to group effort (Nunamaker et al. 1997). Again the facilitator should assist in this process.

A key role of the leader is to ensure there is appropriate follow-up of a meeting to ensure that staff stay engaged. The EMS and facilitator can both assist with this by providing and making available meeting outcomes, such as reports and action plans. It is up to the leader, however, to distribute these to staff and action these if required.

A dominating or unenthusiastic leader will increase the likelihood of an unsuccessful EMS implementation (Fjermestad & Hiltz 2001).

EMS design and tools selected

It is important that the EMS that is used is suitable for the task (Dennis et al. 2001; Nunamaker et al. 1997). It should have a group of tools that are suited to the

particular task (Dennis et al. 2001). It must have a high degree of usability by participants. Tools should require little time to master and the learning curve should be short. Computer interfaces should be simple to help reduce needless distractions (Nunamaker et al. 1997).

Perhaps surprisingly, software restrictiveness has been shown to positively influence GSS outcomes and success (Dennis et al. 2001). This is where the facilitator or provider of the GSS will restrict the EMS tools that are available in a particular meeting to that which will assist the meeting purpose and structure. This reduces time wasted in non-productive activities (Dennis et al. 2001).

Task

Fjermestad & Hiltz (2001) concluded that GSS support was more successful when used for complex tasks compared to trivial tasks. Simple tasks include idea generation tasks and more complex tasks include decision making tasks (Dennis & Wixom 2002), strategic planning and business process engineering (Fjermestad & Hiltz 2001).

Group

Characteristics of the group can affect the outcomes and success of an EMS supported meeting. These include but are not limited to the characteristics discussed briefly below:

Group Size

EMS can be used for groups sizes ranging from small, through to medium and vary large. GSS can meaningfully support larger and more heterogeneous participants than non-GSS meetings (Nunamaker et al. 1997). Some research indicates that meetings of more than five people already suffer from the problems of production loss, for example, due to having to wait to talk and that process losses due to size quickly overtake process gains that are due to group size (such as increased skills and knowledge) however GSS can significantly reduce the production losses due to size through features such as parallel input and a high degree of process structure (Dennis & Wixom 2002; Nunamaker et al. 1991).

The way the EMS is used will be slightly different for small-medium and large group meetings. For small-medium groups every person can have their own computer. For large groups this is rarely practicable, for example, due to constraints of the cost of providing sufficient hardware and meeting space. It is common practice for each group of 3 to 10 people to share one computer and provide a sub-group input, such as comments and voting.

I consider that the features of EMS that are particularly important in medium to large groups are those which:

- allow parallel and simultaneous processes (from input of comments to whole processes that can be carried out at the same time for different agenda times)
- reduce disincentives for members to participate (such as dominance and pressures to conform with norms or expectations)
- facilitate the processing of large amounts of information, and
- support complex decision making.

Other features of EMS are also useful for small group meetings, such as: increased meeting structure; ease of management of meeting information; access to external resources and structured reporting. These features can produce large productivity gains for small as well as large groups.

While some of the earlier GSS were restricted to use by small groups in a specially designed meeting room (DaSantis et al. 2008; Nunamaker et al. 1991), modern EMS products are suitable for both large and small group meetings. Fjermestad & Hiltz (1999) considered it is well known that GSS provides the greatest benefits for large groups.

Group attitudes to the technology

Bandyopadhyay and Paul (2007) review the literature on user acceptance of GSS and consider that the group's perception and expectations about the technology, and their intention to use the technology, can have a positive or negative effect on the GSS implementation.

Groups who have feelings of dissatisfaction towards a computer-supported meeting are quite likely to stop using this technology even if it has been demonstrated to provide positive benefits (Briggs et al. 2006).

Other characteristics of groups

Other characteristics of groups that can influence group outcomes include group proximity, group composition (peers or managers, professional, military), group solidarity (Fjermestad & Hiltz 2001; Nunamaker et al. 1991) and culture (Nunamaker et al. 1997; Lewis et al. 2007).

Training

Training of participants in the technology has been considered an important factor to improve success of GSS meetings (Fjermestad & Hiltz 2001; Dennis et al. 2001). Some modern EMS are more user friendly and there is no need to train participants however training of facilitators can be critical (D Hudson pers. comm.).

Anonymity

The importance and the effects of anonymity have been dealt with extensively in the literature (see section 1.10.2). Anonymity is often discussed as a characteristic feature of EMS and other GSS however it is an optional feature and it is not always used. In fact, Fjermestad & Hiltz (1999) found that anonymity was used in only 31% of the 200 experimental studies that they analysed.

If used, it is important to use this feature with care and strategically and it may be a good idea to discuss the use of this feature with participants prior to commencing the task (Rains 2007).

Other factors

It is important to encourage verbal communication as well as electronic communication (Fjermestad & Hiltz 1999; Lind 2004; Nunamaker et al. 1997). In

fact, Lind (2004) states that verbal communication should be the majority of the communication. Participants should discuss issues together (possibly in subgroups) before making the inputs on the computers.

Nunamaker et al. (1997) share their “lessons from a dozen years of group support systems research”. From this work I have listed below some of the factors that the authors have identified as contributing to successful implementation and which can be managed in the meeting planning, set up and implementation.

Provide both structure and flexibility

One of the ways EMS assist meetings is to provide structural support, however the agenda of the meeting should be able to be changed if the direction of the meeting suggests that this would result in better outcomes for the task.

Address interpersonal issues

Interpersonal issues can be addressed through facilitation. Putting individuals or subgroups on tasks to which they may be better suited has been shown to be helpful in some situations.

Use electronic polling if appropriate

Electronic polling or voting can be very useful in a variety of ways: polling can assist with group processes in many ways including focusing discussion to most useful paths; revealing patterns or areas of agreement and allowing closure in some areas, and aggregating opinions to an agreed position.

Lighting is critical

Lighting quality can affect the mood and the performance of workers, however the use of computers makes getting the lighting right more difficult. The lighting must be right to see the shared public screen(s) as well as individual computer screens and any paper work that participants may want to refer to.

Ventilation is appropriate

Ventilation should be adequate and quiet.

Meeting set up and configurations can be important

Table set-ups should allow for the planned activities, there should be room for paper material, participants should be able to have line of sight to some other participants because non-verbal cues can still be important. It is useful to have information space for social interactions.

Change modes of group interaction from time to time

Organisers should allow for verbal as well as electronic communication and alternate between large and smaller groups now and then in order to keep people interested and reduce monotony and tiredness (Nunamaker et al. 1997).

Part 2 Case Studies

Three case studies were used to further investigate EMS by drawing on the knowledge and experience of senior executives of three Australian based companies that have used EMS very successfully for more than a decade. The information provided below relates predominantly to the companies' products and services in relation to EMS, with little information about other products and services the company may provide being considered.

The information below comes directly from the companies' responses to a questionnaire, from the company websites and discussions with the company Chief Executive Officers (CEOs) (S. Colman, Global Learning Pty Ltd, iMeet! website; J. Findlay, Zing Technologies Pty Ltd, Zing Technologies website, and D. Hudson, Grouputer Pty Ltd, Grouputer website) ¹.

The questionnaire sent to the three companies is at Appendix 1.

2.1 About the companies

2.1.1 Global Learning Pty Ltd

Global Learning Pty Ltd is a consulting company specialising in the areas of leadership, change and teams. To support this work, Global Learning developed iMeet! and its online and face-to-face meeting and decision making processes.

Global Learning Pty Ltd has been working with EMS products and services since 1996. The development of their own proprietary product (iMeet!) began in 2000.

iMeet! is a "software as a service" application (SaaS) with application and process designed, developed and built by Global Learning Pty Ltd. It is deployed in both face-to-face and virtual meetings and conferences ("same time, different place" and "different time, different place"). iMeet! is hosted from servers owned by Global Learning Pty Ltd. For face-to-face meetings, Global Learning provides a "turnkey" operation whereby it supplies and operates all associated iMeet! technology. Typically, this involves a networked computing device for each table group, a custom wireless network, servers, administration computers and data projector(s).

The company provides facilitation services for meetings using iMeet!

¹ Note: This section (Part 2) includes direct quotes from the questionnaire responses and minor changes to responses where there was a need to change the grammar to fit the context or to improve clarity. Other findings are consolidated from the responses. Because the whole section relies on the opinions of these executives and in the interests of privacy, I have not individually marked direct quotations or specifically referenced statements in this section.

Unique characteristics or attributes of the EMS identified by the executive in response to the questionnaire

iMEET! is specifically designed as a decision making tool and process. It is unique in its capacity to move quickly from a range of ideas, into grouping and categorising these ideas, ranking them, and taking action (what, how, who, when, resources needed etc). As part of the overall EMS service, iMEET! offers surveys, a virtual library for storing and sharing documents, project templates, quiz templates and tools, all within a self-contained client website. The system is highly scalable and suitable for very large groups.

iMEET! requires no user installation of any software (other than a standard web browser). Most other EMS require “plug ins” or are platform-specific (eg Windows only). As well as personal computers, it is designed for use on smart phones and iPads. It is available for use in face-to-face events or in virtual environments.

iMEET! has a very simple interface which can be understood by participants with minimum instruction or guidance. Most require absolutely no training in the use of the interface and Global Learning Pty Ltd considers this to be a key iMEET! advantage.

Further information about Global Learning Pty Ltd and iMeet! is available from <<http://globallearning.com.au>> and <<http://imeet.com.au>>.

2.1.2 Grouputer Pty Ltd

Grouputer Pty Ltd is an Australian developer of advanced collaboration technologies. Grouputer Pty Ltd develops and markets two products:

- “Grouputer®” – a general purpose EMS, and
- “SigmaSense” – an EMS specifically for Lean / Six Sigma teams.

Grouputer and SigmaSense are among the first of a new generation of EMS applications to integrate a suite of web conferencing tools with a group decision support system (GDSS). Together, these tools provide teams with the capability to conduct complex problem solving and planning in workshops, meetings, training, seminars and surveys.

The Grouputer remote client operates on PCs with Microsoft Windows® XP, Vista and Windows 7 operating systems, with Internet Explorer 6, 7 or 8 browsers or Firefox browser. Apple products are also supported, provided they have Intel chipsets and VMWare Fusion or Parallels to run native Windows and Internet Explorer.

Grouputer Pty Ltd provides consulting and training services relating to its products to clients and resellers, and has alliances with partners to provide meeting facilitation and other local services.

Grouputer and SigmaSense are available as a hosted service (SaaS) and also as a perpetual license for installation of the application on client server(s) behind client network firewalls.

Grouputer Pty Ltd has developed its own software since the early 1990s, and their products are protected by US Patent.

Unique characteristics or attributes identified by the executive in response to the questionnaire

Grouputer offers users a unique combination of advanced collaboration tools that combine web conferencing with group decision support tools. Together these tools enable participants to effectively collaborate in any of the four time/space modes (same or different time, same or different place) in order to: meet; train and learn; conduct complex workshops; run seminars; and conduct surveys.

Uniquely Grouputer technology supports optional meeting process templates to allow facilitators to create, reuse and share their own meeting methodologies or use standard templates. Meeting process templates free the facilitator to focus on leading the meeting rather than the technology. Templates include content such as presentations, documents, agenda topics, web site links, etc and can be navigated sequentially like a play list using hyperlinks.

Further information about Grouputer Pty Ltd, Grouputer® and SigmaSense is available from <<http://www.grouputer.com>>.

2.1.3 Zing Technologies Pty Ltd

Zing Technologies Pty Ltd makes and distributes EMS and team creativity tools for business (including government business), education and consulting purposes. These include the Zing complex adaptive learning system. The company offers a range of hardware and software options either directly or through consultant partners. There are two “families” of software. Zingthing software can connect groups or an entire organisation into training events or delivers courses and consulting services via the internet. Anyzing software can convert a laptop computer into a “portable meeting room” for activities such as conferences, seminars and team meetings.

Hardware options range from portable kits for consultants and conferences organizers to fixed systems for conference rooms, schools and universities and networked meeting areas.

Zing Technologies Pty Ltd sells systems, provides a free public hosting system for customers to trial the web applet version, and works with consultant partners in Australia and America to offer hosted services. Services include facilitator training for online or face-to-face events, design and support for conferences, seminars and workshops, consulting, and research into new ways of interpersonal interactions.

Unique characteristics or attributes identified by the executive in response to the questionnaire

Zing Technologies Pty Ltd identified four components as being unique attributes:

- Software and hardware: the software and hardware create a learning or decision environment for structured, open and simultaneous collaboration.
- Thinking and decision methods: the methods from leading thinkers and strategists or the learners themselves can be used by anyone after a few hours training.
- A relating method or etiquette: the Talk/Think-Type-Read-Review etiquette integrates the use of the technology with normal human communication processes. Zing also makes use of other relating models such as Yes-and Experiment-Type-Read-Sensemaking.
- A facilitation technique: the technique provides structure at the start of the meeting, freewheeling creativity in the middle and thoughtful resolution of the issues at the end.

Users of the system employ a facilitation model that ensures novices can conduct sessions involving complex thinking or decision processes after only a short period of facilitator training. The ability to view all the ideas as they are created brings them to the attention of all participants and promotes assimilation, orchestration and integration. As learners' thinking and narratives are shaped and revealed they become triggers or scaffolds for further ideas.

Further information about Zing Technologies Pty Ltd, Zing and Anyzing can be found at <<http://www.anyzing.com>>.

2.2 Consolidated information from the case studies

1. Period that the company has been using EMS products and services in Australia

The three companies have been using EMS in Australia since the 1990s, with Grouputer Pty Ltd the first to enter the market in the early 1990s. Grouputer was listed by Bafoutsou & Mentzas (2002) in their list of collaborative systems that they reviewed in their paper.

The first versions of Grouputer supported up to 12 keyboards in face-to-face modes. The current, second generation systems all have internet options system which can support same time/same place through to different time/different place meetings.

2. Range of group sizes supported

All three companies' systems can support a wide range of group sizes ranging from two to 700 (across multiple locations), in some cases depending on the software selected by the client. Global Learning Pty Ltd and Grouputer Pty Ltd advised that, at the top end, the number of participants could be limited by hardware and server limitations. For one company at least the number of potential users depends on the number of licenses purchased by the client.

3. Range of clients that have used their EMS

All three companies reported that they had supported a wide range of clients from Australian local, state/territory and federal government, the private sector consultants and educational institutions, as well as international clients.

Grouputer Pty Ltd advised that their clients tended to be the large public and private sectors organisations from Australia or overseas with distributed workforces, or other mid to large sized companies. Industry sectors have included the energy, pharmaceutical, food and beverage, engineering and aerospace sectors. Zing Technologies Pty Ltd also often uses their systems to support educational activities and events and work with primary and secondary schools and universities as well as the public and private sectors.

4. Types of activities

The companies reported that their EMS were highly capable and flexible and had been used in an extremely wide variety of ways. Their systems have supported both face-to-face and distributed events – meetings, workshops, seminars and conferences and training events. The systems have been used for relatively simple tasks such as information gathering through to very complex tasks such as strategic planning. The applications have included:

- strategic and business planning
- policy development and formulation
- idea generation
- public consultation
- surveys
- community development
- product demonstration
- organisational change programs and culture transformation
- leadership and team development
- innovation
- business process redesign and process improvement
- project management including involving distributed group members
- interactive training
- requirements analysis and capture
- after-action reviews
- sales forecasting
- social and market research
- collaborative document review, and
- joint story writing.

The systems have also been extensively used for educational purposes, supporting learning from kindergarten to university in all major areas from mathematics to music and drama, as well as for training workshops and educational retreats.

5. Key benefits of using EMS compared to traditional meetings and workshops

For all of the companies, their EMS are an integral part of their businesses.

The CEOs reported that the uses of their systems typically result in:

- improved quality of decisions
- rapid consensus

- immediate results
- increased understanding
- discovery of new meanings through shared decision making processes
- full and accurate documentation
- substantial savings in time and costs
- greater engagement of participants and commitment to the outcomes
- reduced carbon footprint, and
- improved work/life balance (particularly in the case of online meetings which reduce the need for travel to face-to-face meetings).

These are consistent with the positive findings from the literature.

All companies have reported very positive feedback from client evaluations.

6. Main reasons for these benefits

The reasons put forward by the company CEOs were consistent with each other and also consistent with the findings in the literature as described in Part 1 of this paper. These include the following:

- Inefficient traditional tools of flipcharts and butchers paper are replaced by integrated EMS tools which allow all participants to have a real chance to equally contribute and have an equal say in an environment where the contributions are more important than the status or position of the person.
- The use of simultaneous table (sub-group) or individual participant keyboard input allows contributions to be more accurately captured and allows a greater depth and breadth of analysis than with whiteboards and butchers paper.
- The resulting increased engagement and participation contribute to a greater “buy in” to the outcomes because everyone has had a chance to contribute meaningfully to the outcomes of the meeting and they can see the processes by which decisions have been reached.
- The speed of reaching consensus and the ability to produce immediate outcomes arise because of the increased participation and parallel input combined with the EMS tools which allow the participants to, for example, capture, sort, prioritise and vote on ideas or proposals and strategies at the same meeting as these were developed, and
- Processes are streamlined and activity can be further accelerated through pre- and post-meeting support using the software.

Additionally, the documentation and reporting capabilities of the systems allow full documentation to be available at the end of the event. This enables immediate action and facilitates increased buy in by participants. It also produces efficiencies in any follow up meetings because minutes, action plans, reports and outcomes are accurate and quickly and easily available.

The case studies support the finding from the literature that the way that the EMS is used is also important for getting these results. Global Learning Pty Ltd stresses that the meeting processes are even more important than the technologies. The right technology can, however, aid the processes and in fact lead to different and improved processes. Pre-meeting planning, including planning the particular

meeting processes to best leverage the benefits of their technological tools, is critical. Global Learning Pty Ltd generally provides the facilitator and pre-meeting planning and follow up as a part of their Software as a Service model.

Grouputer Pty Ltd's systems require a facilitator and the company provides training for the facilitators. The company considers that training is not necessary for the participants.

Zing Technology Pty Ltd agrees there are both people issues and processes which need to be properly managed to achieve successful meetings, and that the way the meeting is run is critical for getting the most benefit from the technology.

7. Types of events/purposes that the companies have had the most success with public sector clients

Most of the uses for EMS listed in point 4 above are relevant to public sector organisations. The CEOs identified a number of areas with which they have particular success using EMS. These were:

- high-stakes strategic and business planning events
- events with fifty or more participants where the ability to rapidly capture the thinking, agree on ideas and themes and make decisions is critical to the success of the activity
- face-to-face events involving a number of stakeholders who are considering and making decisions about complex issues, and
- community development and stakeholder engagement.

8. Rate of take up of EMS by Australian and state and territory government organisations

On a five point scale from very low to very high, all three executives considered that the take up of EMS in Australian government organisations is low.

9. Types of events/purposes of relevance to the Australian public sector that the company executive considered would most benefit from EMS

The CEOs considered that their EMS products and services would provide positive benefits to all of the events listed in points 4 and 7 above. They also considered that the following additional activities would benefit from the use of EMS:

- regular team meetings involving on-site or remote participants, and
- managing big, complex projects in a rapidly changing and ambiguous environment.

With many state and Australian government departments having distributed networks the use of EMS for remote meetings, and the use of EMS to respond to the increasing emphasis for collaboration in government were also highlighted.

10. Other potential uses of the EMS product and services

The CEOs revealed that their clients are often surprisingly innovative in the way that their products are used. For example, one company's product has successfully been used to assist with negotiation of a native title land treaty in Canada. They identified the following emerging uses for EMS:

- virtual meetings
- multi-player games and tools used for learning, and
- organisational change management programs.

11. Keys for success

The factors set out below are those that the CEOs considered to be critical to the success of their EMS in addition to the unique characteristics and attributes that they identified in section 2.1.

The top three keys to success reported by Global Learning Pty Ltd were:

- the design of their system combined with facilitation
- the very high degree of reliability, and
- a high degree of adaptability and flexibility.

The iMeet! system was designed using a facilitation framework and was not designed merely as a technology tool. Global Learning Pty Ltd advised that, unlike many other EMS platforms, iMeet! has the capacity for the technology to adapt to the event's needs, even during the course of the event.

Grouputer Pty Ltd reiterated the points that were presented in 2.1.2 as the unique attributes of their systems to be also the key factors in the successful implementation of their EMS. These were their particular and unique combination of advanced collaboration tools that combine web conferencing with group decision support tools and the availability of their flexible meeting process templates which optimise meeting processes and also allow the facilitator to concentrate on the meeting rather than the technology. Another critical feature is the flexibility to support real time and asynchronous meetings as well as meetings in a variety of remote locations.

3. As well as the unique features that they had already identified, Zing Technologies Pty Ltd highlighted the rich variety of up-to-date methods and the way the company accesses the "world's best thought leaders" in their systems in addition to the attributes presented in 2.1.3.

12. The main issues with, or factors that need to be controlled, for a client to get the most out of an EMS supported meeting

The key issues identified by the CEOs were:

- Early involvement of the company in the planning and design of the event is required to get the best outcomes for all stakeholders and the participants.
- This includes planning the use of the technology.
- It is important to ensure that the technology does not dominate the event and should require little or no attention at the meeting.
- Facilitation and facilitator training are critical.
- A willingness of the participants to collaborate, and that this can depend on cultural aspects of the group.

13. Factors and barriers that the CEOs considered reduce or influence the adoption of EMS, particularly in Australian and state/territory government organisations

These included the following:

- lack of awareness and understanding of the benefits EMS can provide
- reluctance to change from traditional face-to-face meeting tools of flip charts, post-it notes and manually prepared minutes, to more advanced electronic tools

- perceptions around the additional costs of EMS, combined with lack of funding
- IT areas of organisations blocking the uptake of EMS because it sits outside their domain of control
- departmental executives not wanting to have the transparency in decision making that EMS can offer, and
- the inability of some government organisations and educational institutions to leave behind old mindsets and ways of doing things.

One of the CEOs considered that the use of very old political and governance structures and practices by some organisations limits the use of EMS.

Where/what do the CEOs see EMS as being in 5 years time?

Out of interest, I asked the CEOs where and what they see EMS as being in five years time.

They considered that, as technology develops, virtual collaboration including EMS will be improved and play a greater role in organisations to the point that they will be standard features. Virtual collaboration will be supported by improved video and audio functionality, be more simple and develop improved participation and decision making capacity. Teleworkers will be more common.

There will be increased use of “cloud computing” for electronic collaboration. This means that all content will be stored remotely rather than being stored on an individual computer or on the premises.

There will be increased integration with social networking technologies.

On a more pessimistic note, one of the CEOs considered that EMS and its future development could still be used in a limited manner and still only by the early adopters.

Part 3 Discussion and conclusions

This study has enabled me to answer the questions that I posed in the introduction.

What are electronic meeting systems (EMS)?

EMS are a way of conducting meetings and other group collaboration supported by specific and flexible collaborative information technologies featuring a variety of tools, including decision support tools, which can facilitate communication, positively affect group dynamics and manage meeting documentation. EMS were developed to make group meetings more effective, efficient and satisfying by using computer technology. Rains (2007:100) describes EMS as “a broad class of computer-based technologies that support meeting functions such as decision making, idea generation, and problem solving”. EMS are sometimes known as group decision support systems (GDSS) and group support systems (GSS). While these terms are often used interchangeably in the literature, some types of GSS do not include decision support so this can be somewhat confusing.

This confusion highlights one of the difficulties in investigating the literature on EMS, being the inconsistent use of terminology. A minority of papers use the term “EMS” while many others either use the term “GSS” or “GDSS” to refer to the system that I have defined as EMS. At the same time, many of the papers that aim to reach conclusions from the GSS literature have a wider understanding of GSS. Many of these investigate and discuss both those products which only have Level 1 (which primarily support the exchange of information, such as email) and Level 2 products, which include many other tools including decision support tools (Dennis & Wixom 2002; DeSantis & Gallupe 1987).

In this paper I have drawn conclusions from the combined EMS/GSS/GDSS literature but have focused on findings that have come from studies that have investigated collaborative systems that do include decision support tools and can be considered as EMS, and predominantly face-to-face situations.

Many of the papers consistently refer to “the technology” however key authors conclude that the outcome and benefits of using EMS also depend on people and process factors. These include the characteristics of the group, the task, the way the technology is deployed, and the context (Fjermestad & Hiltz 1999; Nunamaker et al. 1991). This contention is supported in the case studies. Therefore I generally prefer to the use of the term “the system” rather than “the technology”.

What is the evidence that using an EMS does improve meeting productivity (efficiency and effectiveness) and satisfaction?

The literature strongly supports the conclusion that EMS and Level 2 GSS can increase meeting effectiveness (for example, high quality ideas and/or decisions), efficiency (for example, speed to outcomes), and satisfaction and to a very high level. These effects can produce substantial savings in resources including time and financial resources.

Some of the most definitive evidence in the literature for improvements from by EMS is provided Fjermestad & Hiltz (2001) whose analysis over two decades of field and case studies revealed that (Level 2) GSS does improve meeting effectiveness, efficiency and satisfaction over traditional methods. Many other researchers support significant improvements in meeting productivity and satisfaction arising from EMS, including Briggs et al. (1998); Nunamaker et al. (1991); Nunamaker et al. (1997); Lewis et al. (2007) and Rains (2005).

In the literature some authors have pointed to negative, or inconsistent findings in GSS research (Dennis et al 2001). Researchers have concluded that inconsistencies among GSS findings can be explained by:

- differences in results between laboratory studies and case and field studies (Bajwa et al. 2005; Nunamaker et al. 1997; and Fjermestad & Hiltz 1999 vs Fjermestad & Hiltz 2001)
- intrinsic problems with the laboratory-based research (Fjermestad & Hiltz 1999)
- manner of deployment (Dennis et al. 2001; Dennis & Wixom 2002; Lewis et al. 2007; Nunamaker et al. 1991; Nunamaker et al. 1997), and
- using meta-analysis to determine statistically significant results averaged across a number of studies (Rains 2005).

The first of these highlights another issue for someone who seeks to investigate the literature for EMS/GSS benefits being the extensive use of laboratory studies, and the differences that have been observed between results from laboratory compared to case and field studies (Bajwa et al. 2005; Dennis et al. 2001; Nunamaker et al. 1997). Fjermestad & Hiltz (1999) has been often cited as showing that GSS do not increase meeting productivity, or that this is one of GSS's inconclusive results (Dennis et al. 2001). It is important to note, however, that Fjermestad & Hiltz (1999) had quite a few criticisms of the methodology of the 200 published studies that they analysed. They point to some "worrisome" problems with this body of research. They were concerned about the lack of task complexity used in most of the experiments and they considered that most of the technology was outdated. Fjermestad & Hiltz (1999:27) considered it problematic that while "we know that GSS is generally most helpful for large groups" most of the experiments used five or fewer subjects. Over 90% of the studies used undergraduate students for their experiments with the vast majority of studies also using ad-hoc groups, as opposed to established groups (Fjermestad & Hiltz 1999). I would add that many of the GSS were only Level 1 tools group support tools and therefore the findings may not be applicable to Level 2 GSS, group decision support systems or EMS. In fact Fjermestad & Hiltz (1999:17) considered that 10 of the studies used tools that were so "poverty stricken" that they categorised them as "Level 0".

Therefore, in order to make my findings in relation to EMS as accurate as possible, I have used the results from those papers that draw upon research where the majority of studies were EMS-like (ie GSS Level 2), face-to-face situations and field or case studies (as opposed to laboratory experiments) unless I have stated otherwise.

The findings from the case studies also confirm the effects of EMS of increased effectiveness (highlighting increased understanding by participants and improved quality of decision making), and efficiency (highlighting increased speed of processes and reduced time to consensus and savings in costs). The questionnaire did not have a specific question on participant satisfaction. In their responses the case study CEOs reported improved participant engagement and buy-in to outcomes. In addition, in discussions with the CEOs they reported that, particularly over the last few years, they have consistently received very positive responses both verbally and in post-event evaluations meetings (S Colman; D Hudson; and J Findlay, pers. comm.). This was qualified by the comment that positive responses can depend on the systems being used properly, as discussed above.

Are there other benefits from using these systems?

Both the literature and the case studies reveal other important positive benefits of properly deployed EMS. A common finding is that GSS can increase in the number of ideas generated (Briggs et al. 1998). Another often cited benefit is the “democratisation” of the group processes. EMS produce an environment where all participants can have an equal say and their contributions will be given weight based on their merit rather than based on others’ perceptions about the contributor (Burdett 2000; Rains 2005). Increased buy in, or commitment, to the results by the participants (who are likely to be key stakeholders) is another important benefit (Lind et al. 2006). I consider that the fact that all participants can meaningfully contribute to the discussions, be involved in decision making and see how the outcomes came from the meeting processes contributes to this outcome. The case studies also report that increased engagement by participants due to the EMS results in increased commitment to the outcomes and that this is one of the particular advantages of using the EMS.

Overlaying this advantage is the ability of EMS to support very large as well as medium-sized and small groups of people in meaningful meetings as reported in the literature (Fjermestad & Hiltz 1999; Lewis et al. 2007, Lind 2004; Lind et al. 2006) and the case studies). I consider this to be one of the most important benefits of EMS.

Other benefits that were revealed in the case studies included an increased understanding of the issues and depth of analysis that is fostered by EMS. They also highlighted the benefits that come from the structured recording and reporting functionalities of EMS. Accurate and comprehensive documentation of the meeting, such as minutes, outcomes and actions arising can be available at the conclusion of the meeting. Post-meeting follow up is facilitated, which also improves outcomes.

While the focus of this study is on face-to-face meetings, the modern internet connected EMS can and do facilitate meetings with remote participants, known as “virtual meetings”. This flexibility of their EMS to improve remote collaboration, as well as face-to-face events, was identified as an important benefit by the company CEOs.

A number of benefits were brought up in the case studies that I had not come across in the literature and reflect issues that have recently become more important to the modern organisation. The first is the benefit of EMS in improving work/life balance (which can accrue from the EMS efficiencies as well as from the options of remote participation). The second is the reduction in an organisation's carbon footprint, which also can result from the same factors. The immediacy of results that can be produced through the EMS, which is highlighted in the case studies, is not a new benefit but is one that is particularly important for the modern organisation.

The fact that these three successful Australian companies have used EMS for more than a decade as an integral part of their business is further evidence to support the many benefits of EMS.

How does the use of EMS bring about these improvements in meetings and group collaboration?

Meetings can have many problems. Romano & Nunamaker (2001) identified some of the commonly reported problems of meetings. These include getting off the subject; lack of goals or agenda; inadequate preparation; disorganisation; poor leadership and irrelevance of the information. Other problems, which were identified by Nunamaker et al. (1997) with respect to teams and are also applicable to meetings, include participants lacking focus, people not understanding the aims of the project, hidden agendas, fear of contributing, dominance by some members, and incorrect interpretation of people's verbal contributions or body language.

Large group meetings are necessary when an organisation wants to communicate to its staff about such things as new strategies and implementation of changes (Lind et al. 2006). However large groups create more problems than small. Key difficulties include the fact the most participants do not have a say; keeping people's attention; leaders not knowing if participants are understanding; awareness of hidden resistance which might lead to project failure; and gaining commitment to changes and outcomes (Lind et al. 2006).

EMS address the problems of meetings by providing both support and structure for meeting processes and tasks. These characteristics provide increased discipline and reduce time wasted due to lack of goals or agenda, inadequate preparation and disorganisation. They help to keep the participants focused and the meeting on track. Task support can include access to outside information, analysis and decision support. EMS can affect the mechanisms leading to group process gains and group process losses. They improve communication and provide more equality in participation. If the systems are used properly, there will be a net gain resulting in the range of benefits discussed above (Dennis et al. 1997; Nunamaker et al. 1991; Nunamaker et al. 1997). This is all particularly important in medium to large groups.

The key features of EMS that jointly result in these benefits that have been discussed in the literature include:

- the ability to provide increased process and task structure and support (as discussed above)
- parallel and simultaneous entry of responses
- anonymity (if used)
- group memory
- a variety of tools that support information exchange; idea generation; information organisation and decision support (such as brain-storming, categorizing, modeling and ranking, decision support tools)
- the ability of participants to assess outside information (part of task support), and
- the ability to provide structured reporting/minutes
(Dennis et al. 1997, Nunamaker et al. 1991; Nunamaker et al. 1997).

The importance of all of these features in producing EMS benefits was confirmed through the case studies, with the exception of anonymity, which was not mentioned and may not be used. As well as increasing participation and equality, the case studies revealed that ability of the systems to support parallel entry of responses produces a capacity to divide the group into different tasks so that more than one agenda item can be undertaken simultaneously. Among the critical features that were highlighted by the CEOs are the ability of the systems to improve pre- and post-meeting support and the ability to immediately produce comprehensive appropriate documentation. These features can improve streamlining of processes and effectiveness of the meeting and improve the effectiveness and speed of follow up actions.

What factors need to be managed in order for the organisation to obtain the most benefit from these systems?

A recurring theme in the literature is that the particular effects and outcomes of an EMS supported meeting will depend a number of factors, which include the design of the system, how it is deployed and the context in which it is used (Dennis et al. 2001; Lewis et al. 2007; Nunamaker et al. 1991; Nunamaker et al. 1997).

This was a fact that was also stressed by all of the case study executives – the use of the technology alone will not necessarily result in improvements. Technology is not a substitute for good meeting management.

The critical factors identified in the case studies that need to be managed to ensure success of the EMS meeting include:

- early and professional pre-planning and design of the event and for the use of the technology
- the use of a facilitator and proper training for the facilitator so that they can get the best out of the group and the technology
- not letting the technology dominate the meeting, and
- cultural issues of participants which may effect their willingness to collaborate.

The stand out factors that need to be managed that I drew from the literature were: having the appropriate EMS with the appropriate tools and flexibility for the

particular task; proper planning and design; and high quality facilitation and leadership.

Could EMS be used to improve meetings and business processes in Australian (including state/territory) government organisations?

The findings from the literature, combined with information from the case studies, reveal that EMS could be used to great benefit to improve meetings and group collaboration for an enormous range of purposes that are carried out in all levels of the Australian public sector. Regular team or divisional meetings would benefit from the increased equality of participation, increased structure and discipline and the availability of ongoing records of outcomes and actions. Idea generation tasks have been shown to be highly likely to benefit from EMS. An increased number of quality ideas is likely to be generated, with the added advantage that these ideas can be sorted and voted on and accurately documented in the one meeting.

Meetings where there are a large number of people are likely to derive the most advantage from EMS support because they have the greatest process losses. Parallel input, which allows meaningful participation by many people, process and task structure, access to outside information, tools that assist with analysis and decision support, and the documentation features of the systems all contribute. The information from the case studies shows that the three companies' EMS have been used to support meeting sizes ranging from two through to 700 participants and across multiple locations. The number of participants may be only limited by the requirements of hardware and capabilities of the servers.

EMS also provide particular benefits in complex tasks. Strategic planning is one of the first complex tasks for which EMS was often used (Dennis et al. 1997). Strategic planning is improved because the systems can support complex decision making, in far shorter periods, with increased buy-in and faster, more accurate documentation and follow-up than traditional meetings.

Lind et al. (2006:411) consider that interactive technology for meetings provides greatest advantage when "the meeting's outcomes are deemed critical, when agenda time is short, and when engaging the hearts and minds of participants will make all the difference". They consider that use of this technology is cost-effective for groups over about 30 to 40 people.

Community and stakeholder consultations are other complex and critical tasks that are undertaken by public sector organisations. EMS can allow these to be more easily and effectively undertaken with increased engagement, participant satisfaction and commitment to the outcomes. The increased transparency of EMS supported meetings delivers the added advantage of being able to reduce post-meeting arguments about what outcomes and/or actions were agreed, which can be a source of conflict in these situations. There is also an increased accountability that arises from the transparency, which is an important by-product that is rarely discussed in the literature. The increased efficiencies and effectiveness will naturally produce savings in human and financial resources. Change management programs, where all the key stakeholders are able to participate, should also benefit from EMS. These are situations where it is often very difficult for the

people affected by the organisational change to arrive at a point of understanding and acceptance. Again, the abilities of EMS to produce increased participation, understanding, engagement and commitment to outcomes are particularly relevant in these situations.

Another area where EMS can provide significant advantages is in managing large and complex ongoing projects, particularly those which are undertaken in a rapidly changing environment. These projects would benefit from, among other things, the increased structure and discipline, support for complex decision making and the ability of the systems to provide accurate immediate documentation. This latter feature is particularly critical in an environment where accountability for decisions is very important – which is the case in many situations in both the public and private sectors.

Barriers to take up of EMS

Despite the fact that EMS have been available for around 20 years and the large range of benefits it has been shown to produce, the case study executives considered that take up of EMS in the Australian public sector is low. This is consistent with the findings of Bajwa et al. (2005) and Lewis et al. (2007) for Australian firms although no quantitative comparisons can be made here.

The case studies provided useful insight into some of the reasons for this low take up. These included lack of awareness of EMS and their benefits, perceptions that use of EMS would result in higher costs, and resistance to change from traditional meeting methods. The CEOs considered that there can be resistance by an organisation's executives who are reluctant to be exposed to the increased transparency offered by EMS. They reported that the take up of these systems can also be resisted by departmental Information Technology (IT) areas because it sits outside their control. I would add that I have noticed a strong resistance by IT areas to support "non-standard" IT applications.

Lewis et al. (2007) investigated the barriers to adoption and use of EMS in firms in four regions: the USA, Australia, Hong Kong and Norway. Barriers that they identified as being most important in Australian firms that are in addition to those mentioned above included the difficulties of actually measuring the benefits resulting from EMS; lack of organisational incentives for the increased productivity that can result from EMS use and that EMS may be incompatible with the "cognitive styles" of the executives (Lewis et al. 2007). Briggs et al. (2006) point to the fact that if people have felt dissatisfaction with technology-supported collaboration they would be less likely to use it in the future even if other benefits were clearly demonstrated.

Concluding remarks

This study is predominantly a desk top analysis based on the international EMS/GSS literature, supplemented by surveying three CEOs who use EMS as an important and integral part of their businesses. The study makes a good case for public sector managers to consider the use of EMS, particularly for large meetings where complex decisions have to be made and planning meetings or consultations

where there are a large number of stakeholders and a commitment to the outcomes is critical.

Further study could be undertaken to better quantify the benefits of using EMS in public sector organisations. Research could also be undertaken to further investigate barriers to adoption of these systems in the Australian public sector and how these barriers could be addressed. However public sector managers and meeting organizers do not need to wait for this research. There is already strong evidence that EMS could be used to great benefit in a wide variety group collaboration events in the public sector, and EMS can be easily bought in and trialed for one-off events, with no large outlay of costs or on-going commitment.

Public sector managers who do wish to improve their meetings and collaborative events would do well to consider the lessons that have been learnt about the most effective use of EMS as presented in the literature and the case studies and summarized in this paper.

The fact that a new generation of workers is already coming into the workforce who are very technology savvy and seemingly hardwired to their laptops and electronic devices, is something that public service managers should also consider when wishing to engage with these staff.

If, as Briggs et al. (2006:586) consider, “collaboration is a ubiquitous feature of modern organisational life” we should do everything we can to make it more effective, more efficient and more satisfying.

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Appendix

Questionnaire sent to Global Learning Pty Ltd, Grouputer Pty Ltd and Zing Technologies Pty Ltd.

Study of Electronic Meeting Systems (EMS)

Please do not include any information that you consider Commercial-in-Confidence.

Questions

1. Name of company
2. Company address and contact details in Australia
3. Name and a contact phone or email of person filling in the questionnaire (for purposes of clarification if required)
4. Date
5. Please briefly describe the general nature of the company's business, and the range of EMS products and/or services provided.
6. How many years has your company been using EMS products and services in Australia?
7. Briefly describe the EMS products provided by your company. Include in general terms hardware, software and any support services provided, such as meeting facilitation. Do you use commercially available software or your company's own product? Do you provide both hosted and unhosted products/services?
8. What types of clients use your EMS products and services? For example, do these include public sector (Federal; state/territory; local government), private sector, and/or educational institutions?
9. What is the range of group sizes that your EMS product and services are used for, or could effectively be used for? (eg 5-10 people; 30-50 people; 50-100 people; > 100 people)?
10. What types of events and purposes are your products used for (eg face-to-face meetings/workshops, with the purpose of strategic planning, information sharing, idea generation, policy formulation, change management, product demonstration, leadership or team development etc)?
11. Which of types of events/purposes do you have the most success with public sector clients?

11 a) Which types of events/purposes of relevance to the Australian public sector organisations do you think would most benefit from EMS?

12. Specifically, what would you consider to be the key benefits of EMS in these situations, as compared to traditional meetings and workshops?

13. In your opinion what are the reasons for these benefits?

14. What would you consider to be the key characteristics or attributes of your products that make them useful for Australian public sector organisations and why?

15. What do you consider to be unique attributes or characteristics of your product/services?

16. What do you consider to be characteristics of your EMS product/services that are essential to its success?

17. What other types of activities could your EMS product and services be used for that it is not currently the case?

18. What are the main issues with, or factors that need to be controlled, for a client to get the most out of an EMS supported meeting?

19. Based on your knowledge and experience, how would you rate the take up of EMS in Australian and state/territory government organisations using the rankings below.

◇ Very low ◇ Low ◇ Moderate ◇ High ◇ Very high

20. What factors/barriers do you consider reduce or influence the adoption of EMS, particularly in Australian and state/territory government organisations?

21. Where/what do you see EMS as being in 5 years time?

22. Are there any other comments you would like to make or further information that you would like to provide?