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Exploring Technology Use in Reminiscence for Elderly Knowledge Recall

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ABSTRACT

Transferring knowledge from the older generation to the younger generation is crucial for organisations' sustainability and competitiveness. This is due to the "aging population" phenomena that will eventually increase the number of retirements and subsequently cause loss of organisational knowledge. However, the knowledge transfer is a complicated process. Before a story can serve as knowledge transfer, it must be constructed or assembled. The assembly of a real story is the process of recalling knowledge of past events that have occurred. Recalling knowledge from elderly increase the challenges due to cognitive decline experience by themselves. Therefore this research attempts to review issues in elderly knowledge recall and propose how technologies can be used to support elderly knowledge recall. Since knowledge recall involves psychological part of human being, we also studied research done in the area of social psychology and explore their applicability in elderly knowledge recall. We consider social psychology to be a discipline from which theories, models, and research results can be harnessed for knowledge recall. To achieve this, we reviewed and examined research papers in various issues related to elderly knowledge recall, knowledge recall theories and suitable technologies to support elderly knowledge recall. We strongly believe with the introduction of the remarkable variety of technologies today, older people with cognitive impairment could be assisted and would be able to benefit from it. Therefore, with the integration of knowledge recall theories and suitable technologies, we aim to provide a technology supported platform for elderly knowledge recall that subsequently will contribute to the success of the intergenerational knowledge transfer.

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INTRODUCTION

As the world's population is aging, the increase number of retirement has become a concern to most organisations. The increase of retirement number also means lost of an organisation's knowledge which is costly to be replaced. Lack of appreciation of the value of tacit knowledge and lack of planning to capture retirees' knowledge before they leave put many organisations in a position to suffer a loss of intellectual knowledge that may prove fatal. According to International Data Corp., a marketing firm, Fortune 500 companies relinquish over \$31.5 billion a year because they fail to distribute knowledge (Babcock, 2004). U.S. organisations fail to capture critical knowledge and experience from older employees nearing retirement, and only few organizations transfer the knowledge to younger employees (Srikanth, Benton, & Herrera, 2005).

Transferring knowledge from the elders to the younger generation known as intergenerational knowledge transfer, could help to preserve and retain the knowledge which is crucial in every organisation and society. Knowledge transfer involves the passing of knowledge from one person to another person or from a group of people or organisations to another group of people or organisations (Gupta, Sharma, & Hsu, 2004). Knowledge transfer also involves the sharing of knowledge from the knowledge source and the acquisition and application of knowledge by the recipient (Wang & Noe, 2010). On the other hand, intergenerational knowledge transfer refers to the passing of knowledge from older to younger members of a kinship group or members of an extended family (Cavalli-Sforza & Feldman, 1981). Ballain, Fischer, Main, & Waters (2012) defined intergenerational knowledge transfer as any interaction whether one-on-one, in a group, or through written communication in print or online that conveys facts, context, connections, processes, or other insights between two generations. The passing can occur by oral or by multimedia means. Multimedia means of transfer, on the

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other hand, involve written or inscribed means for their reproduction, and include images, sound, hypertext, and cinematic means (Caquard, Brauen, Wright, & Jasen, 2008; Ong, 2002). However, knowledge transfer has a further significant meaning beyond the transmission of knowledge. It is concerned with the processes of information transcending of knowledge in another person or group of people (Wathne, Roos, & von Krogh, 1996). Often, the knowledge that needs to be transferred exists in a person's mind which is known as tacit knowledge and sticky therefore hard to articulate. Capturing tacit knowledge is challenging because it is not logical and strictly documented.

Capturing tacit knowledge from elderly increase the challenges due to their cognitive decline which lead to difficulties in recalling the knowledge. Most of the time, we fail to transfer our knowledge because we fail to recall the knowledge (Carminatti & Borges, 2006). Therefore, elderly knowledge recall is part of crucial process of intergenerational knowledge transfer.

Methodology:

This study adopted a systematic review method in order to explore technology use in reminiscence for elderly knowledge recall and propose a concept to provide a platform for elderly knowledge recall. We adopt a systematic literature review method following a rigorous, transparent and reproducible process, which aims to identify, select, appraise, analyse and synthesize, in a systematic and comprehensive way, research evidence on a specific research topic (Becheikh, Ziam, Idrissi, Castonguay, & Landry, 2010). This method was chosen because it is widely considered as the least biased and the most rational way to synthesize research evidence. It is also known as a powerful tool to provide the best available knowledge for decision making. For this purpose, we followed the basic steps suggested by Becheikh *et al.* (2010) which include: 1) formulate research questions, 2) determine criteria for literature inclusion and exclusion, 3) search for relevant studies, 4) select the research based on the inclusion and exclusion criteria, 5) assessing the selected studies, 6) synthesize and summarize study results, and 7) interpreting the review results.

This study sets out to answer the two following research questions: 1) what are the elements and activities in elderly reminiscence and memory recall? 2) how can technology support elderly reminiscence and memory recall? To answer these questions, we conducted a literature search on online databases in the field of knowledge management and social psychology using keywords that we have defined earlier. We retrieved peerreviewed papers as well as journals, conference proceedings, research reports and books section that could provide us insights on the research topic. A total of 367 papers appeared as a result of our keyword searches in various online databases. We skimmed through the title and abstract and downloaded 129 papers that looked relevant to our study. After a thorough evaluation, 49 papers that are related to our research were retained for further review and synthesis. The results of our review are written in subsequent sections as elements of reminiscence and memory recall and possible technologies that could support knowledge recall.

Intergenerational Knowledge Transfer and Elderly Knowledge Recall:

Intergenerational knowledge transfer involves the passing of knowledge from the older generation to the younger generation. In order for tacit knowledge to be transferred, it must be converted into elements that anyone can understand (Desouza, 2003) i.e. explicit knowledge. The conversion of tacit knowledge into explicit knowledge involves processes such as recall and assembly of knowledge. During the conversion process, people and organisations frequently need to recall their past which, for some reason, were not adequately documented when they occurred. The knowledge recall process is a complex process. It is not a straightforward task and involves a lot of psychological and cognitive aspects of a human. It also depends on a positive and collaborative attitude from the knowledge holders; which in our study refers to the elderly. The recalling of relevant knowledge must rely on the people, rarely a single individual, who witnessed the events or participated in them (Carminatti & Borges, 2006). Memory failure and incomplete information caused by lapses in memory and the lack of key facts are commonplace in the recalling process especially when dealing with older people. Cognitive decline which has been identified as the third area of concern in an aging population affects older people's ability to think, concentrate, formulate ideas, reason and remember. The declining of cognitive function in older people would hinder the recalling process and eventually make the capturing of knowledge hard to be achieved.

The process of recalling the knowledge often followed by the assembling the knowledge in an explicit form. The successful reconstitution of past events depends on several variables, such as how long ago the event occurred, and whether key people are still available to tell what they know. Although it is sometimes difficult to restore all known events, an adequate recalling and assembling process can get closer. Knowledge usually resides in people's mind in a form of a story. This explains the phenomena of knowledge transfer during the old days, where knowledge transfer was usually done in an informal way through storytelling. Stories are a powerful communication mechanism which serves numerous purposes, such as entertainment, teaching or knowledge transfer. A story can also be told by a group of people: the group constructs the story collaboratively piece by piece, where each piece helps participants remember facts and feelings, and stimulates further contribution. Organisations in general have employees working on collective activities. In order to propagate the

experiences of a team that worked on some activity, we could ask that team to tell a story of what happened (Borges & Vivacqua, 2010). Since knowledge transfer and knowledge recall involve psychological and cognitive aspects of the elderly, we believe it is important to consider some theories in psychology area and consider harnessing them in proposing suitable technologies to be used for elderly knowledge recall.

The Reminiscence Theory and Collective Recall:

In order to address the issue of recalling and cognitive decline, we studied the reminiscence theory which sometimes also referred to as the process of *recalling* or *remembering*. Lin, Dai, & Hwang (2003) defined reminiscence as the process of recalling personal events or experiences from one's past that are memorable to a person. Dempsey *et al.* (2012) considers reminiscence as a process of recall and interaction which involves recalling or telling of early events or a memorable early experience which may occur with or without specific purposes. The concept of reminiscence has been studied by many researchers, especially for the elderly where reviewing memories can be used to revive interest, self-esteem and improve quality of life.

The reminiscence theory has been criticized when Butler (1963) first introduced it as non-purposive, escapist and impulsive behavior of elderly life review. Later, Butler (1974) introduced the concept of life review as a therapeutic intervention. In his research, he suggested that taking an extensive autobiography could help older adults with the developmental task "to clarify, deepen and find use of what one has already obtained in a lifetime of learning and adapting". Reminiscence later on has been introduced as a technique that could be implemented to help patients think and talk about their lives (Stinson, 2009). Reminiscence has been studied for various purposes among all is to determine its effect on cognitive functioning (Goldwasser, Auerbach, & Harkins, 1987; Hopper *et al.*, 2005; Pittiglio, 2000). This technique can be implemented in a structured group, in an unstructured group, or on an individual basis. Webster, Bohlmeijer, & Westerhof (2010) in their research suggest that humans have a capacity and need to retrieve, articulate, and disseminate self-narratives from memories which lay in a form of the building blocks of these narratives. This process must be initiated by some factors, which one of them a component that is called *triggers*. This study is similar to research carried out by Meudell, Hitch, & Boyle (1992) and Meudell, Hitch, & Boyle (1995) who believe that information recalled by others in the group may provide cues to help individuals remember items that they would not recall if working alone. This process is known as *crosscuing*. Even though they believe crosscuing in group recall might help a person to recall better, they also argue that collaborative recall may result in the process loss such that the interacting group suffers a decrement. For example, the group activity may interfere with individual performance, or some individuals may slack off in the group.

In reminiscence therapy, triggers or crosscuing involves the discussion of past activities, events and experiences with another person or group of people, usually with the aid of tangible prompts such as photographs, household and other familiar items from the past, music and archive sound recordings. Reminiscence therapy typically involves group meetings in which participants are encouraged to talk about past events. Life review typically involves individual sessions, in which the person is guided chronologically through life experiences, encouraged to evaluate them, and may produce a life story book (Woods, Spector, Jones, Orrell, & Davies, 2009). With the advancement of technology, researchers started to explore reminiscence therapy using technology such as multimedia that bring together suitable digital content through a web-based service and display it on a laptop, TV screen or tablet (Quigley & Risborg, 2003).

With respect to the question of group productivity, some studies of group versus individual recall have been reported in the literature. For example, it is commonly believed that "two heads are better than one". Weldon & Bellinger (1997) reported that research indicates that when people collaborate to recall an event the group does remember more than individuals working alone. It is also possible that information recalled by others in the group may provide cues to help individuals remember items that they would not recall if working alone. The sharing of personal reminiscence in a group can be seen as a process of turning intrapersonal reminiscence into interpersonal memory exchanges. Group members begin to explore, to gradually confront and to reconsider specific memories that over time form the thematic and interactional content of their experience together (Getzel, 1983).

As literature shown, the recalling process may take place as a social activity that involves more than one individual. Literature has also shown that people can collaborate to recall events where different individuals' memory are recollected (Webster *et al.*, 2010; Weldon & Bellinger, 1997). This collaboration is known as the group memory. Group memory is often expressed within a social context as the social setting suggests a particular group identity and also indicates particular goals and norms that guide the process and content of retrieval. Across different situations, the social setting also promotes to prescribe the style and contents of the recall that are appropriate to the setting. Apart from that, social setting also characterized who speaks when and whose recollections receive the most weightage and varies in the purpose of the recollective activity. Thus, the properties of the social setting will influence how past events are reconstructed. Therefore, as a social process, remembering may display many interesting properties that are overlooked when it is studied as an individual cognitive activity (Weldon & Bellinger, 1997). Remembering is also considered as social in the sense that it is

situated within a larger culture or group which, in the practice of its activities, teaches its members to use memory in a particular way. Bartlett (1932) argued that social groups are organized units with tendencies and characteristics that exist only as the group exists and disappear if the group dissolves. In line with Bartlett (1932), Wegner (1986) mentioned that the group usually exists within the same domain and have a long standing and not impromptu. Information may be shared collectively among all of the individuals in a group such that each person possesses knowledge in common, or alternatively, information may be distributed or divided among individuals. Wegner, Giuliano, & Hertel (1985) have discussed the possibility that group processes may result in shared memories that are different from individual memories and supported by Meudell, Hitch, & Boyle (1992). Thus, collective memory may have evolving criteria that are not predictable from individuals alone. Furthermore, the distinction between shared and distributed memory is meaningful because the dynamics of retrieval may be very different for these two types of collective representation. Apart from that, collective memory also has important social, cultural, and political implications because it affects people's perceptions of individuals, groups, and events, and has consequences for actions and reactions toward them. Shared memories have a significant impact on the construction and communication of events, interpersonal relations, group histories, and government and social policy, as well as the characterization of groups and institutions. However, literature shown that there have been arguments as to whether group recall is better than, equal to, or worse than the sum of the individual recalls.

Reminiscence serves a purpose beyond simple recall. They function to allow a person to achieve some psychosocial goal. In other words, reminiscence serves particular functions. Finally, remembering our pasts for a specific reason produces an outcome, such as strengthening a person's sense of mastery or self-esteem. From the literature that presented above, we believe that reminiscence concept can be applied not only in reviewing elderly's memories but also in recalling their experience and knowledge. Therefore, we intend to explore the trigger and crosscutting component in Webster *et al.* (2010) and Meudell *et al.* (1992, 1995) model of reminiscence which also will be used to recall knowledge that resides in elderly's mind.

Exploring Technology Use For Elderly Knowledge Recall:

The world recently has been reported experiencing dramatic demographic shifts known as the 'age-quake' or the 'demographic time bomb' which lead to the increase number of elderly in most countries. The growing number of elderly has made them the focus of much research designed to improve all aspects related to them. A new multidisciplinary field of research combining gerontology and technology field known as *Gerontechnology* has been introduced focusing on study of elderly people and of the social, psychological and biological aspects of the ageing process itself, and the utilisation of technological advancements to improve the health, mobility, communication, leisure and environment of elderly people effectively allowing them to remain living independently in their own homes for longer. Stanley & Cheek (2003) discuss what is understood by the 'wellbeing' of the elderly in their comprehensive literature review. Therefore gerontechnology is heavily concerned with the ways in which elderly people interact with computers and technology, and substantial research is being conducted in this area. We therefore are more inspired to explore the use of technology to support elderly in recalling their knowledge.

The information technology revolution has changed the role of knowledge in the economy as it has given cheap and worldwide access to some types of information. It has also offered new tools both for handling information and for advancing processes of knowledge creation and innovation. Therefore it is not surprising that knowledge management signifies the use of advanced software, the codification of tacit knowledge and knowledge sharing through information systems (Lundvall, 2006). Gebauer (2008) and Mallenius, Rossi, & Tuunainen (2007) in their research reported that there was a clear consensus among the interviewees that elderly people are interested in using mobile phones and services, but these services need to deliver real value for them. The real value can stem on one hand from extended possibilities to communicate with relatives and other reference groups, and on other hand from critical services, such as emergency and health information services, as well as municipal services, such as reminders of doctor's appointments and book returns to library. All these services together can provide real benefits for the elderly, in form of more social, active and meaningful life, as well as in allowing them to live independent life longer. However, considering the physical limitation of the elderly, future studies in the impact of changing functional capacity in different user groups is expected to result in a better understanding on adoption and use of mobile devices and services.

In the earlier sections, we analysed the reminiscence theory and collective recall and discussed how the theory could be harnessed to support elderly knowledge recall and subsequently support intergenerational knowledge transfer. We also analysed the activities and elements in reminiscence and collective recall from previous research which we believe could be supported and enhanced with the use of technology advancement. Table 1 and 2 below illustrated the combined mechanisms, elements and activities in elderly reminiscence that have been mapped with possible technologies that could support them. This tables also serve as the basis of our framework in developing a platform for intergenerational knowledge transfer.

Table 1: Reminiscence mechanisms and possible technologies to support them

Reminiscence Mechanisms	Reminiscence Activities	Technologies to Support Reminiscence
Storytelling (Borges & Vivacqua, 2010)	<ul style="list-style-type: none"> • A story can also be told by a group of people; • The group constructs the story collaboratively piece by piece, where each piece helps participants remember facts and feelings, and stimulates further contribution. • For discussion of general memories or of more specific autobiographical memories as might be involved in creating a life-story book; • Organisations in general have employees working on collective activities. In order to propagate the experiences of a team that worked on some activity, we could ask that team to tell a story of what happened. 	Digital Storytelling (Carminatti & Borges, 2006)
Social activities (Bartlett, 1932; Wegner et al., 1985; Weldon & Bellinger, 1997)	Remembering is done through socializing within a larger culture or group which, in the practice of its activities among group members, teaches its members to use memory in a particular way.	Mobile technology (McCarthy, Kevitt, Mctear, & Sayers, 2007) Collaboration technology (Zigurs & Munkvold, 2006)

Table 2: Reminiscence elements and activities and possible technologies to support them.

Reminiscence Elements	Reminiscence Activities	Technologies to Support Reminiscence
Trigger (Webster et al., 2010)	The recollection of memories from the past can take many different forms and can be aided by various types of technologies and physical artefacts such as photos, diaries, letters, television, and radio.	Multimedia (Quigley & Risborg, 2003)
Crosscuing (Meudell et al., 1992, 1995)		
Collective recall (Getzel, 1983; Weldon & Bellinger, 1997)	A group of members collectively engage in the types of activities that they chosen: <ul style="list-style-type: none"> • Recall of past events – members recall and discuss common past events that they shared • Thinking and telling – member think on a topic and give opinion on the topic • Life review - members are encouraged to interpret (reframe) life experiences in a more resourceful manner and to integrate both positive and negative experiences. 	Mobile technology (McCarthy, Kevitt, Mctear, & Sayers, 2007)
Group memory (Meudell et al., 1995; Webster et al., 2010; Wegner et al., 1985; Weldon & Bellinger, 1997)		Collaboration technology (Zigurs & Munkvold, 2006)

From our analyses above, we believe by combining these technologies, we would able to provide a platform for elderly knowledge recall by imparting mechanisms and activities used in reminiscence therapy.

A. Storytelling technology:

Human being communicates and socially interacts with each other, and uses stories as a way of exchanging and disclosing ideas and knowledge. In every culture, different stories exist and have been used to preserve and pass on knowledge from one generation to another generation. Stories are known to be attractive and interesting in many ways. With some purposes and meaning behind it, storytelling could be one of effective tools in transferring knowledge. In the old days, stories are being told from a grandfather to his grandchild through undocumented narration. It usually contains knowledge or life experiences that happened in the past and have a special meaning to the person. Davenport & Prusak (2000) claim that the most efficient way of transferring knowledge is through a convincing narrative. People prefer to talk, in a way they tell stories to exchange knowledge therefore, narratives are used in order to transfer the complex contents of tacit knowledge. These stories are usually communicated informally within group of people. According to Snowden (2005) purposeful stories will be able to capture and hold the attention of the audience. They are rooted in truth and are self-propagating. He distinguishes between two kinds of storytelling: 1) storytelling as a knowledge disclosure mechanism and 2) storytelling to create meaning and understanding that can be a helpful tool in getting hold of the valuable tacit knowledge of members within the organisation. Storytelling to create meaning and understanding creates metaphors to transfer knowledge in a more transparent way (Snowden, 2005).

Carminatti & Borges (2006) in their research mentioned that storytelling can be an individual or a group task depending on whether the story fragments are remembered by one or more individuals. In the latter case, members of a group contribute to creating a story collectively, synchronously or asynchronously, in the same place or in a different place. This technique is called *group storytelling*. The idea of using a group storytelling mechanism is not a simple one. It depends on the existence of a knowledge management culture as well as that of a collaborative culture. It can also require technological support. There are several ways of registering a story. Among them are texts, photos, audio, video, or a combination of them. Video and audio help bring ideas to life by adding more non-text clues, including body language, graphic illustrations, and sound effects or music. This helps activate many more parts of the brain than text alone, increasing most people's ability to pay attention and

to recall what they have heard. It also draws in people who are not as comfortable in purely text-based communications (Ruggles, 2013). However, these technologies require richer production as well as skills that people generally do not have, like the definition of a good script, a good voice, a good characterization, and high quality pictures. The group storytelling approach has been used in many works for different purposes (Carminatti & Borges, 2006).

B. Mobile technology:

The advancement of mobile technology currently has given a huge impact not only to the professionals, but also to individuals. This has affected their personal lives, from the way they do their daily works and how they get connected with their family and friends. The introduction of mobile devices has improved tremendously over the years in terms of their size, weight, functions and well as their performance. Mobile devices, such as smart cell phones, personal digital assistants (PDAs), and laptop computers can free their owners of the need to remain close to a wired information system infrastructure that is provided in a stationary office environment, and provide the opportunity to perform tasks in a wide variety of use contexts (Gebauer, 2008). It has also offered new tools both for handling information and for advancing processes of knowledge creation and innovation. Therefore it is not surprising that knowledge management signifies the use of advanced software, the codification of tacit knowledge and knowledge sharing through information systems (Lundvall, 2006).

Mobile technologies have the potential to enhance the lives of elderly users, especially those who experience a decline in cognitive abilities (McCarthy *et al.*, 2007). This could be done through their various features for example 1) improved onsite efficiency and accuracy; 2) flexible, environmentally friendly content delivery; 3) improved interactivity and informed content; 4) expanded networking for attendees; and finally 5) persistent audience engagement platform.

Reminiscence plays an important role in the lives of elderly people by recalling the past events and experiences. Memory prompts and mobile technology have potential to be harnessed as a tool to assist elderly in recalling their memory. During reminiscence activities, elderly recall their memory which is triggered by something or someone. Triggers could happen by looking at something, talking to someone, or just recalling memory on their own. This could happen at anytime and anywhere the elderly is. Due to the known benefits of reminiscence among the elderly, McCarthy *et al.* (2007) in their research suggested that a mobile companion will be able to assist the elderly in recalling their own past life events and memories.

C. Collaboration technology:

The idea of collaboration technology was first introduced based on the idea of collaborative group's task. It implies means the process of two or more people working together on a common task (Zigurs & Munkvold, 2006). Collaboration technology is designed to assist two or more people to work together at the same place and time or at different places and/or different times (Dennis, George, Jessup, Nunamaker, and Vogel 1988; DeSanctis and Gallupe 1987) and comprises one or more computer-based tools that support the communication, coordination, and/or information processing needs of two or more people working together on a common task (Zigurs & Munkvold, 2006).

	Same Time	Different Time
Same Place	Group support system Electronic meeting system	E-mail Document management system Calendar and scheduling system Workflow management system Electronic bulletin board Collaboration production suite
Different Place	Audio conferencing Video conferencing Data conferencing Instant messaging Chat room Integrated team support technology E-learning system	E-mail Distributed group support system Document management system Calendar and scheduling system Workflow management system Electronic bulletin board Collaboration product suite Web-based team/project room Integrated team support technology E-learning system

Fig 1: Time/Place Typology of Collaborative Systems by (Zigurs & Munkvold, 2006).

As of today, there are many different types of collaboration technology that provide different capabilities to its users (Eden and Ackerman 2001), but in general, collaboration technology is a package of hardware, software, people, and/or processes that can provide one or more of the following: (a) support for communication among participants, such as electronic communication to augment or replace verbal communication; (b) information processing support, such as mathematical modeling or voting tools; and (c)

support to help participants adopt and use the technology, such as agenda tools or real-time training (Dennis, Wixom, and Vandenberg, 2001; DeSanctis and Gallepe, 1987; Nunamaker, Dennis, Valacich, Vogel, and George, 1991; Zigurs and Buckland, 1998). Zigurs & Munkvold (2006) suggested that type of collaboration technologies can be categorized into time/place typology and functional typology as shown in Figure 1 and Table 3 below.

According to Zigurs & Munkvold (2006), the time/place framework provides a very concrete view of the capabilities of certain tools. However, organisational work is seldom restricted to one of these cells, but rather involves combinations of different time/place interactions as suggested by Grudin and Poltrock (1997). The evolution of technology has been toward increased flexibility and Web-based options, thus making “any time, any place” a common goal of most tools. This trend is reflected by the appearance of some technologies in more than one cell, for example, integrated team support technology and collaboration product suites that support both synchronous and asynchronous interaction. Clearly, typologies based on underlying technology are difficult to keep current, given the rapid developments of the last few years. For example, collaboration support is becoming increasingly embedded as part of traditional office support tools (Zigurs & Munkvold, 2006).

An alternative to technology-based typologies is a functional typology, which classifies technologies based on the types of tasks or activities they support. Although characterizations of technologies along functional dimensions do vary, there are four consistent broad group tasks or activities that can be identified: communication, information sharing, process support, and coordination. The trend towards integration of features for supporting different collaborative tasks complicates this classification. As illustrated in Figure 7.1, one technology may support various forms of interaction and tasks. Yet, it is normally possible to identify which dominating feature serves as the core functionality of a product, and then classify according to this feature (Grudin and Poltrock, 1997).

Table 3: Functional Typology of Collaboration Technologies (Zigurs & Munkvold, 2006).

Functional Category	Examples of Technology
Communication technologies	Email Instant messaging Chat room Audio conferencing Video conferencing
Information sharing technologies	Document management system Data conferencing Electronic bulletin board
Process support technologies	Group support system Electronic meeting system
Coordination technologies	Workflow management system Calendar and scheduling system
Integrated technologies across functional categories	Collaboration product suite Web-based team Project room Integrated team support technology e-learning system

In reminiscence therapy, research shown that group or collective recall is more effective than individual recall (Borges & Vivacqua, 2010; Carminatti & Borges, 2006; Harris, Keil, Sutton, & Barnier, 2011; Weldon & Bellinger, 1997). Group recall also is said to be more effective because of the usage of external memory that act as trigger to memory recall (J. E. Harris, 1978; Wegner *et al.*, 1985; Wegner, 1986). Collaboration technology should be able to support these activities and enhance knowledge recall among elderly.

D. Multimedia technology:

The introduction of multimedia technology allows the use of different media in computer-based applications. Multimedia technology refers to interactive, computer-based applications that allow people to communicate and exchange information using digital and print elements. Multimedia technology applies interactive computer elements, such as graphics, text, video, sound and animation in development of various applications that serves different purposes. The use of multimedia technology could be use to enhance activities carried out in reminiscence therapy when involving crosscuing or trigger to help recall. This involves discussion of past activities, events and experiences with another person or group of people, usually with the aid of tangible prompts which consist of different media elements such as photographs, household and other familiar items from the past, music and archive sound recordings (Woods *et al.*, 2009). According to Fox-turnbull (2007), the use of multimedia sources in recall sessions as suggested by Sime (2006) and Slough (2001) by has the benefit of replaying and reintroducing cues that were present used in a task known as “Stimulated Recall”. The various media elements combined together in a computer-based application could be valuable tools that could be used in helping the elderly in recalling their memory and knowledge hence support intergenerational knowledge transfer.

Conclusion:

The characteristics of the source of knowledge, the recipient, the context, and the knowledge itself has been own to affect the knowledge transfer success. These factors varied over stages of the transfer process. Factors that affected the perception of an opportunity to transfer knowledge, such as the reliability of the source, predicted difficulty of transfer during the early initiation stage. Apart from that, the knowledge transfer also depend on factors that affected the execution of the transfer, such as the recipient's ability to absorb knowledge, affected difficulty during the implementation phases. (Szulanski, 1999).

Knowledge recall is part of important process in knowledge transfer that relate to the reliability of the source. Many research has been carried out on knowledge transfer but very little consider the involvement of psychological aspect of people especially the elderly when transferring knowledge (Sabri, Haron, & Jamil, 2014). Therefore, we believe it is important to consider the psychological part of human in making the knowledge transfer success by harnessing the two theories together. We explore knowledge transfer and reminiscence theory and study their elements and activities. These elements and activities are then mapped together when we further researched on possible technologies that could be used to support them. With these findings, we hope to be able to provide a platform for elderly knowledge recall and consequently support intergenerational knowledge transfer.

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