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Proceedings of the Fifth Mediterranean Conference on Information Systems: Professional Development Consortium

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Proceedings of the Fifth Mediterranean Conference on Information Systems: Professional Development Consortium

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Abstract
Collection of position statements of doctoral students and junior faculty in the Professional Development Consortium at the the Fifth Mediterranean Conference on Information Systems, Tel Aviv - Yafo.

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The Fifth Mediterranean Conference on Information Systems
Professional Development Consortium
Tel Aviv, Israel
11-12 September 2010

Proceedings

Sprouts

General Co-Chairs
Michel Avital, University of Amsterdam
Nancy Pouloudi, Athens University of Economics and Business

Rev 01 Sep 2010

Program

	Chairs: Michel Avital and Nancy Pouloudi	

Saturday Sep 11	*Location*: tba	
07:00-09:00 pm	*Welcome drink and social mixer for students and junior faculty* *Organized by Ronit Purian and the local students*	

Sunday Sep 12	*Location*: Tel Aviv University, Leon Recanati School of Business (Room #407)	
08:30-09:00	*Registration*	
09:00-09:15	*Greetings:* Michel Avital *Welcome to Leon Recanati School of Business*: Vice Dean Moshe Zviran	
09:15-09:45	Plenary: *So You Want to Be an Academic?* David Avison	
09:45-10:00	Break	
10:00-13:00 4 groups	Thematic Workgroup Discussion: *Identifying the Seeds and Imagining the Fruits* • TWG-1: Strategic Views and Organizations (Room #403) Chairs: Karlheinz Kautz + Nancy Pouloudi • TWG-2: The IT Artifact and HCI (Room #404) Chairs: Angeliki Poulymenakou + Fons Wijnhoven • TWG-3: The Brave New World (Room #406) Chairs: Alessandro D'Atri + Andreja Pucihar • TWG-4: Distributed Cognition and Work (Room #408) Chairs: David Avison + Michel Avital	
13:00-14:00	Lunch	
14:00-15:00	Professional Workgroup Discussion: *The Light at the End of the Tunnel* • PWG-5: Dissertation work prior to data collection (Room #403) Chairs: Andreja Pucihar + Fons Wijnhoven • PWG-6: Dissertation work after data collection (Room #404) Chairs: Angeliki Poulymenakou + Karlheinz Kautz • PWG-7: Junior Faculty Development (Room #406) Chairs: David Avison + Alessandro D'Atri	
15:00-15:30	Break	
16:30-17:30	Panel: *If I Had to Start All Over Again* Chair: Michel Avital Panelists: David Avison, Alessandro D'Atri, Karlheinz Kautz, Angeliki Poulymenakou, Andreja Pucihar, and Fons Wijnhoven	
17:30-18:00	Conclusion: *Insights and Further Reflections* PWG Group reports: Our Best Ideas + Action & Commitments *Closing Remarks*: Nancy Pouloudi	
18:15-- 19:00-20:30	Departure of shuttle from consortium to reception *MCIS 2010 General Reception*	

Workgroups

10:00-13:00
Thematic Workgroup Discussion: *Identifying the Seeds and Imagining the Fruits*

TWG-1: Strategic Views and Organizations (Room #403)
Chairs: Karlheinz Kautz + Nancy Pouloudi

Acceptance of Enterprise Resource Planning (ERP) Systems > Shaul Levi, Bar Ilan University

Knowledge Management in Knowledge Intensive Business Processes > Meira Levy, Ben Gurion University

The Model of Factors Impacting on the Adoption of Software as a Service in SMEs > Marjeta Marolt, University of Maribor

Generativity and Collectivity: Unraveling Internet-Based Group Activities for Innovation and Collective Action > Wietske van Osch, University of Amsterdam

Risks in Enterprise-Systems Implementation: A Model and Empirical Validation > Orit Raphaeli, Tel Aviv University

Standardisation, Flexibility and Innovation in Outsourced Banking Operations > Myriam Raymond, Université de Nantes

Three Interdisciplinary Studies on IT Outsourcing > Sonia Gantman Vilvovsky, Bentley University

TWG-2: The IT Artifact and HCI (Room #404)
Chairs: Angeliki Poulymenakou + Fons Wijnhoven

Context-Adaptive Technology for the Efficient Allocation of Human Attention > Christine Bauer, Vienna University of Economics and Business

Computerized Personal Intervention of Reminiscence Therapy for Alzheimer's Patients > Vardit Sarne-Fleischmann, Ben Gurion University

The Richness of Computer-Mediated Communication > Yoram Kalman, The Open University

Virtual Reality Internet Retailing: Experimental Examination of Interactive Shopping Interface > Ioannis Krasonikolakis, Athens University of Economics and Business

Generating Creativity > Orr Mendelson, Tel Aviv University

Modeling a Framework for IT Assessment Based on Text Mining and Bibliometrics > Elan Sasson, Ben Gurion University

TWG-3: The Brave New World (Room #406)
Chairs: Alessandro D'Atri + Andreja Pucihar

The Role of Information Systems in Preventing the Potential Loss of Social Capital in West Bank > Mohammad Awad, World Vision

Social Entrepreneurship: From Idea to Venture > Zev Lowe, ESADE Business School

The Use of an E-Learning Specification in a Context Aware Mobile Service Oriented Architecture > Anna Mavroudi, Open University of Cyprus

Technophilia: From Entertainment to Digital Literacy and E-government: A New Multilevel Concept for Technology > Ronit Purian. Tel Aviv University

News and Information Media Business Models in the Networked Economy > Soley Rasmussen, Copenhagen Business School

E-Learning in the Workplace: Factors Affecting Employee's On-The-Job Performance > Ioanna Talanti, Athens University of Economics and Business

Towards Understanding the Adoption of Hedonic ICT > Sandra Weniger, University of Cologne

TWG-4: Distributed Cognition and Work (Room #408)
Chairs: David Avison + Michel Avital

Virtual Teams Leadership > Daphna Shwarts-Asher, Ort Braude College of Engineering

Supporting Massively Distributed Decisions: Assessing the Performance of Massively Distributed Decision Support Systems > Anat Goldstein, Tel Aviv University

A Shared Decision Support System (DSS): Theoretical Model Application for the Case of Prenatal Tests > Sivan Rapaport, Tel Aviv University

The Quest for Content: The Role of Product Networks and Social Networks in Ill-defined Exploration in Online Environments > Shachar Reichman, Tel Aviv University

From Bureaucracy to Peer Production: Organizations as Information-Processing Networks > Andrea Resca, LUISS Guido Carli University

Using Business Intelligence for IT Strategic Management > Arisa Shollo, Copenhagen Business School

14:00-15:00
Professional Workgroup Discussion: *The Light at the End of the Tunnel*

Self-select the proper workgroup based on your phase of research. If in doubt, seek the advice from the chairs.

PWG-5: Dissertation work prior to data collection, Chairs: Andreja Pucihar + Fons Wijnhoven
PWG-6: Dissertation work after data collection, Chairs: Angeliki Poulymenakou + Karlheinz Kautz
PWG-7: Junior Faculty Development, Chairs: David Avison + Alessandro D'Atri

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Position Statements

Page	TWG	Name	
6	4	Daphna Shwarts-Asher	Virtual Teams Leadership
14	3	Mohammad Awad	The Role of Information Systems in Preventing the Potential Loss of Social Capital in West Bank
16	2	Christine Bauer	Context-Adaptive Technology for the Efficient Allocation of Human Attention
23	2	Vardit Sarne-Fleischmann	Computerized Personal Intervention of Reminiscence Therapy for Alzheimer's Patients
29	4	Anat Goldstein	Supporting Massively Distributed Decisions: Assessing the Performance of Massively Distributed Decision Support Systems
38	2	Yoram Kalman	The Richness of Computer-Mediated Communication
42	2	Ioannis Krasonikolakis	Virtual Reality Internet Retailing: Experimental Examination of Interactive Shopping Interface
47	1	Shaul Levi	Acceptance of Enterprise Resource Planning (ERP) Systems
53	1	Meira Levy	Knowledge Management in Knowledge Intensive Business Processes
58	3	Zev Lowe	Social Entrepreneurship: From Idea to Venture
63	1	Marjeta Marolt	The Model of Factors Impacting on the Adoption of Software as a Service in SMEs
69	3	Anna Mavroudi	The Use of an E-Learning Specification in a Context Aware Mobile Service Oriented Architecture
76	2	Orr Mendelson	Generating Creativity
82	1	Wietske Van Osch	Generativity and Collectivity: Unraveling Internet-Based Group Activities for Innovation and Collective Action
89	3	Ronit Purian	Technophilia: From Entertainment to Digital Literacy and E-government: A New Multilevel Concept for Technology
91	4	Sivan Rapaport	A Shared Decision Support System (DSS): Theoretical Model Application for the Case of Prenatal Tests
97	1	Orit Raphaeli	Risks in Enterprise-Systems Implementation: A Model and Empirical Validation
105	3	Soley Rasmussen	News and Information Media Business Models in the Networked Economy
113	1	Myriam Raymond	Standardisation, Flexibility and Innovation in Outsourced Banking Operations
121	4	Shachar Reichman	The Quest for Content: The Role of Product Networks and Social Networks in Ill-defined Exploration in Online Environments
129	4	Andrea Resca	From Bureaucracy to Peer Production: Organizations as Information-Processing Networks
132	2	Elan Sasson	Modeling a Framework for IT Assessment Based on Text Mining and Bibliometrics
140	4	Arisa Shollo	Using Business Intelligence for IT Strategic Management
146	3	Ioanna Talanti	E-Learning in the Workplace: Factors Affecting Employee's On-The-Job Performance
154	1	Sonia Gantman Vilvovsky	Three Interdisciplinary Studies on IT Outsourcing
160	3	Sandra Weniger	Towards Understanding the Adoption of Hedonic ICT

VIRTUAL TEAMS LEADERSHIP

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ABSTRACT

More and more organizations are adapting the solution of e-teams - teams that can span distances and times to take on challenges that most local and global organizations must address. This experimental study examined leadership in the context of traditional teams using face-to-face communication and virtual teams using computer-mediated communication. Our research question is which leadership functions are necessary to promote virtual team performance. A model, suggesting that leader communication behaviors mediate the relationship between Virtuallity and Team's outputs will be presented, and a methodology to examine this model will be illustrated. Our preliminary findings show that face-to-face team's output is partially superior to a virtual team's output, and that social communication behaviors of face-to-face leaders are positive than social communication behaviors of virtual leaders. Virtual team is a common way of working, and will expand in the future. Thus, the importance of the theoretical and practical implementation of the virtual leadership will be discussed.

Keywords: Virtual teams, Leadership, communication behaviors, Team performance.

1 INTRODUCTION

The number of virtual teams is increasing in today's workplaces. In virtual teams, the members can have different cultural backgrounds; they often work in different countries and are professionals in their own fields (Sivunen, 2006). A virtual team has been emerging as an appealing, effective means to help organizations achieving their goals, because of its distinctive capabilities of overcoming traditional organizational barriers (e.g., cost, location, time, space, a lack of talents and expertise in an organization, etc.) to facilitate collaboration among different functions and establish strategic partnerships/alliances outside their boundaries (Eom, 2009). While there is a growing body of research on knowledge and information economy issues and the changing sociology of work, empirical work specifically on virtual team operation is embryonic (Horwitz, Bravington & Silvis, 2006). The unique aspects of virtual teams generate major barriers to their effectiveness. Are there ways in which these may be either overcome or mitigated?

Virtual teams present a new challenge to the concept and practice of leadership. The traditional ideas of leadership in teams are built on a foundation of face-to-face contact. Such leadership has a significant relational component, including building trust, handling conflict, and dealing with sensitive issues (Zigurs, 2003). As the wired world brings everyone closer together, at the same time as they are separated by time and distance, leadership in virtual teams becomes ever more important. Information technology makes it possible to build far-flung networks of organizational contributors, although unique leadership challenges accompany their formation and operation (Cascio & Shurygailo, 2003).

In light of this growing phenomenon, the traditional definition of "leadership" will be discussed, as part of the model that predicts the influence of the virtuallity on leadership processes, social and tasks, that effect team output. Finally a methodology will be illustrated to examine the research model and a discussion of preliminary finding. The research will contribute a better understanding of virtual teams' leadership in hope of improving the teams work in the virtual world.

2 VIRTUAL LEADERSHIP

The issue of leadership in virtual teams is an increasingly important one for many modern organizations (Carte, Chidambaram & Becker, 2006). Getting a group of people to work successfully as a team - communicating effectively, establishing trust, sharing the load, and completing tasks on time - is difficult even when the team members are all in the same location. When team members are spread out in various locations, it presents new obstacles for the team leader (Kossler & Prestridge, 2003). Virtual teams rely on computer-mediated communication, and team members have to find ways to deal with leadership using relatively lean media. Virtual team interaction occurs across the boundaries of geography, time, culture, organizational affiliation and a whole host of other factors. Many questions relating to virtual team leadership arise, including how well team members can express roles across distance and time, and what the role of facilitators is in virtual teams (Zigurs, 2003). As such teams communicate mainly through communication technology this raises the challenge for the team leader of how to unify the team and get the members to identify themselves with the team (Sivunen, 2006).

While the behavioral and trait approaches are dominant in explaining effective leadership, contingency leadership theories must be considered explaining effective virtual leadership. Purvanova & Bono (2009) results suggest that transformational leadership has a stronger effect in teams that use only computer-mediated communication (in compare to traditional teams), and that leaders who increase their transformational leadership behaviors in such teams achieve higher levels of team performance. Konradt & Hoch (2007) showed that middle managers compared to line managers perceived people oriented leadership functions (i.e., mentor and facilitator roles) as important whereas line managers compared to middle managers perceived stability leadership functions (i.e., monitor and coordinator

roles) as important. Nicholson et al. (2007) found that face-to-face and cross-cultural virtual team-members value different ingredients of leadership in different phases of the project.

Zaccaro & Bader (2003) examined the similarities and differences between virtual teams and face-to-face teams. They suggest that affective processes include the expression of emotion by e-team members, as well as the management of these expressions. Eom (2009) argued that trust is a key proxy for a virtual team's success, since trust enhances the performance of a virtual team. Carte, Chidambaram & Becker (2006) results suggest that high performing virtual teams displayed significantly more leadership behaviors over time compared to their low performing counterparts. Specifically, these teams displayed significantly more concentrated leadership behavior focused on performance (i.e. "Producer" behavior) and shared leadership behavior focused on keeping track of group work (i.e. "Monitor" behavior) than the lower performing teams.

There are aspects of virtual team leadership that may help overcome some of the potential process losses associated with virtual teamwork (Cordery & Soo, 2008). The most salient challenges for E-leaders of virtual teams are the difficulty of keeping tight and loose controls on intermediate progress toward goals (Cascio & Shurygailo, 2003). Kayworth & Leidner (2001/2002) suggest that effective team leaders demonstrate the capability to deal with paradox and contradiction by performing multiple leadership roles simultaneously (behavioral complexity). Specifically, it is discovered that highly effective virtual team leaders act in a mentoring role and exhibit a high degree of understanding (empathy) toward other team members. Sivunen (2006) study focuses on four virtual team leaders and their attempts to strengthen the team members' identification with the team through computer-mediated communication. The results show four different tactics employed in enhancing identification with the team: catering for the individual, giving positive feedback, bringing out common goals and workings and talking up the team activities and face-to-face meetings.

3 RESEARCH MODEL

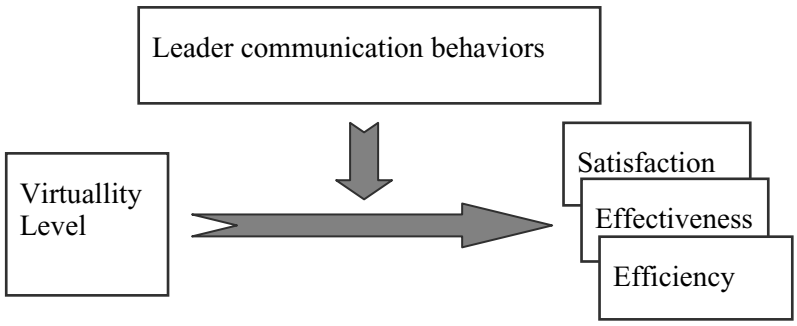

Figure 1. Research Model

The research model is depicted in Figure 1. According to the model the **virtuallity level** is an affecting variable, while the measurable (dependent) variables are the outputs of the team work: **efficiency**, **effectiveness** and **satisfaction**. The **leader communication behaviors** are variable which mediate the relationship between Virtuallity and Team's outputs.

4 RESEARCH HYPOTHESES

Hypothesis no. 1 – for an intellective task, social communication behaviors of face-to-face leaders are positive than social communication behaviors of virtual leaders.

Hypothesis no. 2 – for an intellective task, social communication behaviors of virtual leaders are negative than social communication behaviors of face-to-face leaders.

Hypothesis no. 3 – for an intellective task, task communication behaviors of face-to-face leaders include more answers than task communication behaviors of virtual leaders.

Hypothesis no. 4 – for an intellective task, task communication behaviors of virtual leaders include more questions than task communication behaviors of face-to-face leaders.

Hypothesis no. 5 – for an intellective task, face-to-face team's output is superior to a virtual team's output.

A visual summary of the hypotheses is described in Table 1.

		virtual leadership		face-to-face leadership
H1	Positive (Social) Leadership Level		<	
H2	Negative (Social) Leadership Level		>	
H3	Answers (Task) Leadership Level		<	
H4	Questions (Task) Leadership Level		>	
H5	team's output		<	

Table 1. Hypotheses summary

5 METHODOLGY

An experiment was designed, in which a team task was delivered to 75 undergraduate students in an academic college. The subjects, who were grouped into teams of three members, had to share information in order to complete the task. Each team was given a task that takes approximately 30 minutes to complete. The research design is a Between Subjects Factorial Design: the factor is the type of communication: virtual vs. face-to-face. The research design includes a total of two experimental conditions. The virtual condition was implemented on 13 teams, while the Face-to-face condition was implemented on 12 teams, as described in Table 2. Thus, the experiment included 75 subjects (2 conditions * 12-13 teams * 3 subjects).

	Virtuallity Level	N	Remarks
1	0	12	Face-to-face team
2	1	13	virtual team

Table 2. Experimental Conditions

5.1 Procedure

Subjects were invited in groups of three to meetings that were conducted using MSN-Messenger (virtual) or face-to-face (non virtual) communication. At the beginning of the meetings, the team members were asked to nominate a chairperson. The process of the experiment includes an intellective task. Each team member received a discrete and different piece of information, and only the aggregation of all the information revealed the whole "picture" and led to the correct solution.

5.2 Operationalization of the Dependent Variables and mediators

Efficiency- the time required to complete the task.

Effectiveness- the team's solution compared to the correct solution.

Satisfaction- team members' reaction to the t ask will be measured by their understanding of communication, and satisfaction of medium, results and process.

Leader communication behaviors

A textual (or au dio) r ecording was sav ed for each v irtual (or face-to-face) m eeting. T ask an d so cial communication b ehaviors of l eaders were measured by content analysis: The analysis, for each team leader (and a ctually f or each t eam member) at an y meeting, i ncluded the n umber of social p ositive phrases, so cial n egative p hrases, task q uestion p hrases and task answer p hrases, accordingly to Bales (1950) m odel. I n o rder t o u se r eliable measures, t he p hrase co unting was d one sep arately b y t wo independent judges. T he t wo j udgment an alysis was co mpared one t o t he o ther, an d i n a case o f different d ecision (concerning the p hrase category), a n ew agreed decision was taken. F our measures were calculated out of the above phrases counting:

Positive (Social) Leadership Level – Positive phrases p ercentage among al l phrases of the leader during the meeting.

Negative (Social) L eadership L evel – Negative p hrases p ercentage a mong al l p hrases o f t he l eader during the meeting.

Questions (Task) L eadership L evel – Question p hrases p ercentage a mong al l p hrases o f t he l eader during the meeting.

Answers (Task) Leadership Level – Answers phrases p ercentage a mong all p hrases o f t he l eader during the meeting.

Table 3 presents a summary of the Means and SD's of all the mediating variables above the experiment c ondition (Means a nd S D's b y t he i ndependent va riables a re d escribed i n t he f ollowing section).

Mediator Variables	*M*	*SD*
Positive (Social) Leadership Level	18%	6%
Negative (Social) Leadership Level	8%	8%
Answers (Task) Leadership Level	52%	8%
Questions (Task) Leadership Level	21%	4%

Table 3. Means and SD's of the Mediator Variables (Overall N=25)

Table 4 presents a su mmary of the Means and SD's of all the output variables above the experiment condition (Means and SD's by the independent variables are described in the following section).

Output Variables	*M*	*SD*
Success (Effectiveness)	83%	28%
time (Efficiency)	33.32	13.63
Satisfaction	3.80	0.38

Table 4. Means and SD's of the Output Variables (Overall N=25)

6 PERLIMINARY FINDINGS

Twenty five experiments where preformed (out of the 50 planned) among undergraduate students in an academic college.

Table 5 presents a summary of the Means and SD's by the independent variables.

Mediator Variables	virtual leaders (N=13)		face-to-face leaders (N=12)	
	M	*SD*	*M*	*SD*
Positive (Social) Leadership Level	15.06%	4.69%	22.23%	4.32%
Negative (Social) Leadership Level	9.94%	11.71%	6.50%	2.29%
Answers (Task) Leadership Level	21.80%	5.47%	19.84%	3.19%
Questions (Task) Leadership Level	21.80%	5.47%	19.84%	3.19%

Table 5. Means and SD's of the Mediator Variables by the independent variables

Table 6 presents a summary of the Means and SD's of all the output variables by the independent variables.

Output Variables	virtual leaders (N=13)		face-to-face leaders (N=12)	
	M	*SD*	*M*	*SD*
Success (Effectiveness)	86.54%	26.25%	78.47%	29.40%
time (Efficiency)	41.85sec	12.55sec	24.08sec	8.46sec
Satisfaction	3.66	0.45	3.96	0.26

Table 6. Means and SD's of the Output Variables by the independent variables

An initial statistical analysis was performed considering that the data will increase substantially in the future. The T-Tests conducted compared communication behaviors of face-to-face leaders to communication behaviors of virtual leaders, and face-to-face team's output is to virtual team's output. The initial analysis indicates, for each hypothesis respectively, that:

H1 – social communication behaviors of face-to-face leaders are positive than social communication behaviors of virtual leaders ($t = 3.96$; $p < 0.05$).

H2 – social communication behaviors of virtual leaders are not negative than social communication behaviors of face-to-face leaders.

H3 – task communication behaviors of face-to-face leaders does not include more answers than task communication behaviors of virtual leaders.

H4 – task communication behaviors of virtual leaders does not include more questions than task communication behaviors of face-to-face leaders.

H5 – face-to-face team's output is partially superior to a virtual team's output: face-to-face teams are not successful than virtual teams in completing the task, yet for virtual teams it takes longer time in carrying out the task ($t = -4.11$; $p < 0.05$) and the virtual teams members are lees satisfied ($t = 2.04$; $p < 0.05$).

7 INTERIM DISCUSSION

Collaboration in distributed settings has become a reality in organizational life, while information flows freely across organizational, geographic, and cultural borders. More and more organizations are adapting the solution of e-teams - teams that can span distances and times to take on challenges that most local and global organizations must address (Zaccaro & Bader, 2003). This experimental study examined leadership in the context of traditional teams using face-to-face communication and virtual teams using computer-mediated communication, in order to check what leadership functions are

necessary to promote virtual team success and performance, in light of Horwitz, Bravington & Silvis (2006) claims about the importance of leadership communication to virtual team performance.

Our results shows that face-to-face team's output is partially superior to a virtual team's output: while face-to-face and virtual teams are equally successful in completing the task, virtual teams takes longer time in carrying out the task and their members are lees satisfied.

Three out of four hypotheses concerning the team leader communication behaviors were refuted: social communication behaviors of virtual leaders are not negative than social communication behaviors of face-to-face leaders; task communication behaviors of face-to-face leaders does not include more answers than task communication behaviors of virtual leaders and; task communication behaviors of virtual leaders does not include more questions than task communication behaviors of face-to-face leaders.

Yet, it is possible that the significant difference between social communication behaviors of face-to-face leaders and virtual leaders can act as an explanation for the increased face-to-face team's output in compare to the virtual team's output. The results indicate that social communication behaviors of face-to-face leaders are positive than social communication behaviors of virtual leaders.

Existing theory and research reveals that constructive management behaviors are important to teams' success. Wolff, Pescosolido & Druskat (2002) contributes to existing theory by proposing that empathy precedes and enables those cognitive processes and skills by providing an accurate understanding of team and member emotions and needs. Rego et al. (2007) suggest that emotionally intelligent leaders behave in ways that stimulate the creativity of their teams. Tansley & Newell (2007) showed that trust is a necessary pre-condition for the development and exploitation of social capital, a significant influence on project success.

Though our findings are, in general, consistent with the existing literature, it strengthens the importance of positive social communication behavior as a specific leadership communication behavior, rather than any other type of behavior. It also implies that leadership positive social communication behavior can explain the difference between face-to-face team's outputs in compare to the virtual team's output.

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THE ROLE OF INFORMATION SYSTEMS IN PREVENTING THE POTENTIAL LOSS OF SOCIAL CAPITAL IN WEST BANK

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The intent of this paper is to continue the efforts made in the researcher's Ph.D. dissertation which completed in May 2010 from the University of Texas at Dallas - USA. The dissertation title is: *Volunteerism in Nonprofit Sector: A Case Study of Palestinian Non-Governmental Organizations (NGOs) in the West Bank.* The researcher in his study tested the null hypothesis which is as follows: International funding of projects to Palestinian NGOs and social causes has strengthened the development of social capital in the West Bank. The study groups are paid and non-paid volunteers, and leaders of NGOs which were selected randomly. The researcher used two methods of data collection. First, a survey of 320 self-administrated questionnaires was distributed to paid and non-paid volunteers, and 276 were completed and returned. The second instrument used was a focus group session attended by 21 leaders of NGOs in Palestine.

The researcher found that both age and level of education for the participants are statistically significant with respect to volunteering in Palestine. People of above thirty years of age are more likely to volunteer than those of age less than thirty. Also, people with higher levels of education, above high school, are more likely to volunteer.

The literature on social capital reflects two different approaches (Grootaert 2003). The first, "primary associated with sociologists Ronald Burt, Nan Line, and Alejandro Portes," concerns resources, such as "information, ideas, support," that individuals "are able to procure by virtue of their relationships" with other people. These social resources
are only achievable through and in these relationships (Grootaert 2003, 3). The second approach was introduced by "political scientist Robert Putnam," which deals with the "nature and extent of one's involvement in various informal networks and formal

civic organizations," where this sense of social capital "characterizes the many and varied ways in which a given community's members interact" (Grootaert 2003, 3).

Novotny (2000, 4-5) introduces "two broad understandings for thinking about social capital. The first involves the realm of associations themselves and their decline in membership. The second involves the attachments people have with these groups and with their communities more generally." Novotny (2000) notes that social capital is concerned with "involvement of individuals with organizations," and also strengthens "the values of trust and social connections" (Novotny 2000, 5).

The purpose of this qualitative research paper is to examine the role that IS can play in solving the previous research problem which is a decline in the social capital in West Bank. A focus group discussion with leaders of Palestinian NGOs, volunteers, and paid volunteers in the nonprofit sector is to be conducted; in order to discuss the importance of establishing an electronic online portal that will include: the names of Palestinian NGOs in West Bank, names of volunteers, fields of volunteering, initiatives currently taking place in different sectors, voluntary opportunity, donors …etc. It is important to note that there is no electronic portal in Palestine that can provide with information regarding the nonprofits in Palestine.

The findings of the focus group discussion will be a first step toward establishing a portal for the nonprofit sector in Palestine, if funds are available to conduct such an initiative. This database will increase the connections and relationships between individuals and the existing nonprofits; which will result in an improvement of the social capital in Palestine.

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CONTEXT-ADAPTIVE TECHNOLOGY FOR THE EFFICIENT ALLOCATION OF HUMAN ATTENTION

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Abstracts

Information abundance and overload have turned attention into an increasingly scarce resource. Technologies such as the World Wide Web, corporate networks, and mobile devices attack our desktops with a barrage of information. As employees, consumers, and private individuals, we face the increasingly difficult task of allocating our attention efficiently and in a way that maximizes the utility of our everyday transactions. In many circumstances – such as encountering e-mail spam – individuals are becoming so frustrated that they begin to avoid various services. Advertising effectiveness has suffered dramatically. Important corporate notices (such as security warnings) go unnoticed.

Against this background, this research project endeavour investigates context-adaptive technology for the efficient allocation of human attention. The main objectives are to investigate (i) which type of context information should be considered by context-adaptive services to serve all market players' needs alongside the value chain (e.g., suppliers, intermediaries such as advertising agencies, vendors, users), (ii) in which ways should systems ideally adapt to context, (iii) and what are sustainable business models for context-adaptive services. Research will particularly consider the whole picture of concerned parties since the advancement of context-adaptive technology and services is relevant for all market players of value chain.

My approach to serving these objectives is to work alongside three dimensions: technology, business, and users. The users' dimension (such as "How do users perceive and accept context-adaptive services?") serves as the basic dimension, which is treated from a technology and business perspective.

Keywords: Context-Adaptive Systems, Pervasive Computing, Contextual Advertising, Information Value.

1 POINT OF DEPARTURE

Information overload has turned human attention into a scarce resource. Developments in Information and Communication Technologies continuously increase the number of ways in which information is transmitted, received, and conveyed aurally or visually – e-mail, short message service (SMS), ringing phones, web portals, personal digital assistants (PDAs), personal computers (PCs), public displays, digital signage, acoustic alarms, visual blinking alerts, etc. With these technological possibilities the information load that surrounds people also increases tremendously. Amidst important public notices (e.g., security warnings), personally important information (e.g., reminder for medication), news, technical reports, and entertainment people are bombarded with advertisements. Since humans typically react to information overload with a natural filtering mechanism (e.g., banner blindness), they also filter out information that would be relevant to them. This situation is currently escalating as our surroundings become increasingly digitalised.

Intelligent systems that are able to recognise and adapt to context may remedy the situation since they allow filtering or targeting information (more) accurately according to context. Although context-adaptive technologies progressively advanced in the last decade, there is still a huge lack of knowledge regarding their effective application. Which context variables should be considered? How should information be delivered or displayed? What degree of personalisation is sensible and acceptable? What is the value of contextual information based on the hypothesis that context raises attention?

Accordingly my research endeavours will address these open questions, which are significant not only within the information systems and pervasive computing community but also for scholars in marketing, advertising psychology, attention research, and organisational psychology.

2 SCIENTIFIC GOALS OF THE PROJECT

Figure 1 illustrates the chain of context adaption that this research endeavour is based on. Essentially, the process of adaptation is an interplay alongside three dimensions: it has a human dimension that considers the users or people involved, a strong technology dimension as technology is an enabler for effective context adaptation, and a business dimension considering the business view of companies involved as well as a global economic view in the sense of creating economic wealth.

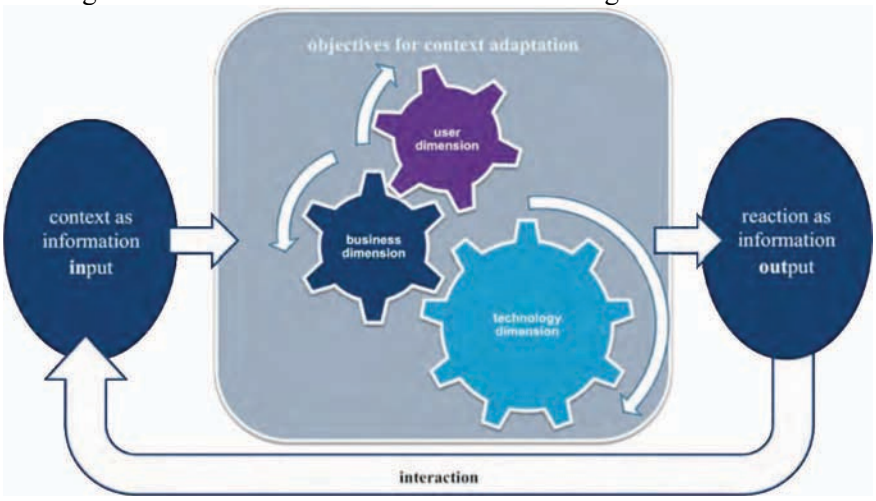

Figure 1. The chain of context adaptation

My research endeavour consists of three thematic blocks: technology perspective, business perspective, and envisioned scenarios of use (fields of application). In each thematic block the users' dimension (such as "How do users perceive and accept context-adaptive services?") serves as the basic dimension, which is treated from the particular perspective of the thematic block.

2.1 Technology perspective

This thematic block focuses on promising technologies for context-adaptive information systems. This project can build on well-established developments. Since 2000, many journals and conferences have published research related to context-aware computing (Hong, Suh and Kim, 2009). Major (frequently cited) work done before 2000 goes back to three main scholars: Bill N. Schilit, Anind K. Dey, and Nigel Davies. The work that first introduces the term "context-aware" focuses on communication issues in disseminating location-based information (Schilit and Theimer, 1994). CyberDesk is a software architecture that dynamically integrates software modules driven by a user's context (Dey, 1998). Davies' GUIDE project is an intelligent electronic tourist guide that presents city visitors with information tailored to both their personal and environmental context (Cheverst, Davies, Mitchell and Friday, 2000). A major contribution is the Context Toolkit (Dey and Newberger, 2003) that assists software developers in providing them with a set of abstractions to build context-aware applications.

Despite the increased number of publications in the field of context-aware computing, scholars focused on technology advancements such as architectures, prototypes, and toolkits (cf. Baldauf, Dustdar and Rosenberg, 2007; Hong et al., 2009). Still, more relevant than ever, we face challenges concerning (i) which type of context information to consider and (ii) in which ways systems should adapt to this context (Soylu, De Causmaecker and Desmet, 2009). This project will call on this by building on context-*aware* services and focusing on context-*adaptation* (context-*adaptive* services).

Early literature in context-aware systems research typically refers to context as location, and identities of users or nearby people (e.g., Schilit et al., 1994). (Schmidt, Beigl and Gellersen, 1999) use six categories (user, social environment, task, conditions, infrastructure, and location) to provide a general structure for context. (Dey and Abowd, 2000) refer to context as "any information that can be used to characterize the situation of an entity […] that is considered relevant".

Besides regarding users as entities, we can consider the human dimension of context on a deeper level. For instance, relevant context may be impersonal and independent from any person (e.g., temperature), person-related (e.g. number of persons gazing at a public display), or personal on an individual level (e.g., identity of a person). To the best of my knowledge, existing context-adaptive systems research has not made such a clear distinction. With regard to personalisation, we have to respect a person's individual privacy constraints (Kobsa, 2007) and consider privacy already on the technology level (Henricksen, Indulska, McFadden and Balasubramaniam, 2005).

The main research questions are:

RQ 1. Which type of context information has to be considered (and captured) by context-adaptive information systems (e.g., location, identity, brain activity, temperature, historic activities such as past purchases, etc.) to serve market players' needs (e.g., raising human attention)?
RQ 2. What matching techniques can be used to relate content, i.e., information to be displayed, to captured context?
RQ 3. In which ways should systems adapt to context (i.e. how should customisation and personalisation be undertaken)?

2.2 Business perspective

While the technology perspective focuses on technological possibilities (i.e. the state of the art of technology), the business perspective investigates the economic impact of context adaptivity as a means for raising human attention. The main objective is to investigate and establish sustainable business models (Chesbrough and Rosenbloom, 2002) for such context-adaptive information systems. Much research has focused on concepts, algorithms, and architecture of context-adaptive systems (cf. Baldauf et al., 2007; Hong et al., 2009), while the scope of applications discussed is very limited (e.g., laboratory, hospital, tourist guide) (cf. Hong et al., 2009). In addition, research addressing business models for context-adaptive systems is scarce, mainly limited to the field of location-aware mobile services (e.g., de Reuver and Haaker, 2009; de Vos, Haaker, Teerling and Kleijnen, 2008).

Against this background, this research endeavour will investigate the variables driving the market absorption of context-adaptive systems. Particularly, I hypothesise that the market does not make use of what technology already has to offer, which may be due to a lack of knowledge how to effectively apply it to satisfy business needs (Haaker, Kijl, Galli, Killström, Immonen and de Reuver, 2006; Hong et al., 2009; Soylu et al., 2009). Prime concern is investigating the economic value of context, which is the main variable for the establishment of sustainable business models. Based on an enhanced understanding and knowledge of which context variables actually drive human attention, the value of context, as well as the market dynamics and economics of context, I want to establish sustainable business models for context-adaptive services. Conflating findings from both the technology and the business perspective will result in models for effective context-adaptive services. Using these models and a scenario technique, effects of innovations will be analysed with a simulation approach.

The specific research questions are:

RQ 4. What is the economic value of context?
RQ 5. What variables drive the market absorption of context-adaptive systems?
RQ 6. What are sustainable business models for context-adaptive services?

2.3 Envisioned scenarios of use

Ultimately, this thematic block deals with economically relevant, domain-specific scenarios of use, interweaving the technology and the business perspective. The main concern is to investigate how market players (e.g., suppliers, intermediaries such as advertising agencies, vendors, users) react to such context-adaptive services and what effect such technologies have in the field.

As scenarios are domain-specific, it is necessary to undertake research within a specific field of application. From the current perspective, two promising fields of applications for context-adaptive information systems and services are *advertising* and the *experience economy*.

2.3.1 Contextual advertising

Due to information abundance, advertising effectiveness has suffered dramatically in the past years. Marketers are facing an increasing need to develop customisation and personalisation mechanisms that can break through peoples' information clutter.

One key factor is contextual advertising (Ranganathan and Campbell, 2002; Yuan and Tsao, 2003), which will greatly influence the way that people allocate attention to advertising in the future. Currently, this concept is mainly implemented on the World Wide Web with Google AdSense (Google, 2010) as the first major contextual advertising solution. Adopting this concept in ubiquitous advertising entails new challenges such as dynamic data exploitation and real-time adjustment to user behaviour (Eriksson and Åkesson, 2008). The scale of possible scenarios of using context-aware advertising seems versatile and promising: from implementing interactive advertising in the television environment (Kim and Du, 2006), over context-sensitive mobile marketing platforms (Albers and Kahl, 2008), to en passant collection of digital coupons (Ferscha, Swoboda and Wimberger, 2009), and context-adaptive digital signage (Müller, Exeler, Buzeck and Krüger, 2009). Yet, applications are still in an embryonic state and research on their effects only provides puzzle pieces.

I hypothesise that advertisers can use similarity effects (Al-Natour, Benbasat and Cenfetelli, 2005; Edwards, Lee and La Ferle, 2009; Van Vugt, Bailenson, Hoorn and Konihn, 2009) – presenting information in a manner that is personalised and similar in appearance to the viewer's immediate context – to increase an individual's attention as well as recognition and recall. Similarity is thereby *not mirroring* a person (Al-Natour et al., 2005; Van Vugt et al., 2009); rather, it is to be understood as *shared context* (i.e. environment, life situation). With regard to the possibilities that context-adaptive technology has to offer for personalisation (e.g., Kim et al., 2006) and the driving research question of which kind of context should be considered for context-adaptive services, I will investigate this particular issue in the very specific field of contextual advertising.

The main research questions in the field of context-adaptive advertising are:

RQ 7. How does "sharing context" with a person (considering context from the users perspective and displaying it) affect human attention?

RQ 8. In advertising, does environmental (i.e. impersonal) context (e.g. temperature), person-related context (e.g. number of persons gazing at a public display), or personal on an individual level context similarity (e.g., identity) more strongly affect a person's memory?

RQ 9. How should models for privacy-sensitive contextual advertising systems look like?

2.3.2 Context-adaptation in the experience economy

The concept of the experience economy (Pine and Gilmore, 1999) underpins that businesses need to orchestrate memorable events for their customers. The core argument is that due to increasing digitalisation and competition, services start to look like commodities and through experience undifferentiated products can be transformed to differentiated ones. Although the authors argue that any kind of product can be marketed as an experience, it appears obvious that certain sectors – such as entertainment, event management or tourism – subsist on customers' experiencing the offer.

Up to now, research concerning context-aware systems in and for the experience economy has barely been undertaken. The main contributions in the field analysed context-aware technology for interactive television (Kim et al., 2006), entertainment systems on flights (Liu and Rauterberg, 2007), and displays in taxis (Alt, Shirazi, Pfeiffer, Holleis and Schmidt, 2009). In recent years, research increasingly engaged with context-adaptive gaming, investigating a variety of aspects such as the use of electrooculography (EOG) goggles (Bulling, Roggen and Tröster, 2008).

Surprisingly, although there is high use of displays in pubs, clubs, and at other events, research does not pay attention to it. I hypothesise that market players currently do not use context-adaptive systems due to not knowing how to use these systems to satisfy their particular business needs. Against this background, this project will analyse how context-adaptive systems (particularly displays) can be used to sustain people's attention and enhance their experience and, thus, increasing customer satisfaction.

Interestingly advertising plays a significant role in recent research on context-aware systems in entertainment (Alt et al., 2009; Kim et al., 2006). Interweaving insights gained from the technology perspective, business perspective and contextual advertising, the project seeks ways to use context-adaptive advertising in the experience economy such that the memory effect (recall and recognition) is increased while simultaneously enhancing the customer experience.

The main research questions are:

RQ 10. How can context-adaptive system be used for experience enhancement?

RQ 11. How can context-adaptive advertising be applied in the experience economy such that advertising it is both subtle and effective and it simultaneously enhances user experience?

3 METHODOLOGICAL APPROACHES

My approach to investigating the role of context and adaptation for human attention and memory comprises is a mixed-methods approach (e.g., Kaplan and Duchon, 1988) that pursues three methodological orientations: a combination of surveys and experiments that build on prototypes, system modelling, and economic simulations.

In a combination of surveys and expert interviews I will investigate relevant context information for market players. The samples will include a representative selection of market players alongside the value chain (technology and system developers, intermediaries, system operators, users). Against the background of state-of-the art research in contextual advertising, I plan to conduct a number of lab experiments to investigate the ability of context variables to gain peoples' attention and drive their memory (recall and recognition) (dependent variables). For analysing user behaviour I will include innovative methods such as eye-tracking.

For investigating how digital visual experience-enhancing information is currently applied in the experience sector, I will deploy expert interviews with experts from leading companies in the field, including system providers and operators. Based on interview insights and against the background of state-of-the art research, I plan to conduct a number of experiments to investigate how contextual advertising can be applied in a subtle way such that it is effective and enhances the user experience.

Pursuing a design science research approach (Hevner, March, Park and Ram, 2004), I will contribute to efficient software architectures using Unified Modeling Language (UML) and Entity Relationship Modeling (ERM). Special attention will be paid to its components and connectors, considering information flows. I will compare the resulting architectures with other available approaches concerning cost and benefits.

A formalised graphical notation (Gordijn and Akkermans, 2001) will be used for the representation of business models. To represent and simulate the economic processes involved in context-adaptive advertising and investigating the influence of context variables, I will develop a discrete-event model (DEM) composed of variables such as involved entities (advertisers, space owners, consumers, etc.), the context that is relevant for context-adaptive advertising (e.g., weather, time, a person's preferences, etc.), and a valuation (pricing) of the respective context.

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COMPUTERIZED PERSONAL INTERVENTION OF REMINISCENCE THERAPY FOR ALZHEIMER'S PATIENTS

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Abstract

The aim of our study is to determine the efficacy of a personalized multimedia system developed for use by patients and their caregivers in the treatment of mild Alzheimer's disease (AD).

We have designed and developed a prototypical system and conducted a pilot study in order to examine the feasibility of using a personalized reminiscence system and evaluated its acceptability by patients and caregivers in Israel. Results from the pilot study indicate high satisfaction levels from those using the system as well as a strong tendency towards repeated use. There was also a clear preference for personal rather than general material when both were available. Based on these initial positive results with the prototypical system we are now in the process of designing a large scale study to further evaluate this system.

The research plan described here involves a collaborative effort involving two projects utilizing behavioral interventions based on computerized systems for patients with AD (personalized reminiscence therapy and cognitive training).

The reminiscence project which is the focus of this paper has two objectives: (1) Developing a personalized reminiscence system, which will enable independent use and administration for both patients and caregivers. (2) Evaluating the contribution of the system to the cognitive functioning and well-being of AD patients and its effects on family members and caregivers.

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Keywords: Alzheimer, HCI, Reminiscence Therapy, Cognitive Function.

1 RESEARCH MOTIVATION AND GOALS

Reminiscence therapy is a common non-pharmacological therapy used to treat Alzheimer's disease (AD). To date, there is no clear evidence regarding the impact of this treatment on the cognitive function of people in the early stages of the disease. Increasingly, computerized systems are being designed to support the administration of non-pharmacological therapies for patients with AD. We have designed a collaborative study involving two projects utilizing behavioural interventions based on computerized systems for patients with AD. We aim to evaluate the efficacy of treating patients with mild AD by means of either personalized computerized reminiscence therapy or computerized cognitive training as compared to controls. Within this broader framework, this paper focuses specifically on the personalized reminiscence system.

2 BRIEF THEORETICAL BACKGROUND

Alzheimer's disease (AD) is a degenerative brain disease that causes progressive damage to neurons and results in the deterioration of cognitive function over time. AD patients experience a decline in cognitive areas, such as memory, attention, language, communication, problem solving and reasoning. Average life expectancy from the onset of the disease is 8-10 years. Currently there is no cure for AD. The available therapeutic options include drugs, psychosocial and lifestyle interventions in order to relieve both cognitive and behavioural symptoms. Current pharmacological interventions have limited efficacy and are, at best, symptomatic (Birks, 2006; Burns et al., 2006; Courtney et al., 2004).

Recently, the potential benefits of using computer-based systems to support emotion-oriented treatments in Alzheimer care have been noted. A landmark in the efforts to provide computerized support for such an approach to the treatment of AD was project CIRCA (Computer Interactive Reminiscence and Conversation Aid). The project was designed in Scotland as a multimedia conversation aid system, which addresses the challenge of supporting reminiscence therapy by using contemporary technologies to provide a computer-based, user friendly alternative to the traditional process. The project had success in prompting conversations, in promoting a more natural and relaxed atmosphere, and in allowing the patients to interact with the system (Alm et al., 2004). The material included in project CIRCA emphasized vernacular content, which, of course, confines the usage of the system. In contrast, a project was initiated at the Baycrest Center in Toronto, Canada, in which a more personalized approach to content was adopted (Cohene et al., 2006).

Our research has two objectives:

(1) To develop a personalized computerized reminiscence system, allowing for independent use and administration of both patients and caregivers. The importance of a personalized system is especially salient in immigrant or in highly mobile societies, due to the heterogeneous background of the patients. This is reflected by the variety of locations, events and languages that can promote reminiscing in AD patients in these societies.

(2) To evaluate the contribution of the system on cognitive function in patients with AD, as well as on patient well-being, and its effects on family members and caregivers.

3 PILOT STUDY

We have developed a prototypical system and conducted a pilot study in order to examine the feasibility of a personalized reminiscence system and its acceptability by patients and caregivers in Israel (Sarne-Fleischmann and Tractinsky, 2008). Our system improved upon existing systems in several ways. Unlike Baycrest's study, we concentrated on open-ended, extensive personal content rather than on predefined life stories. In addition, we developed a web-based system with a more

flexible and intuitive user interface including a touch screen as the input device – rather than a remote control. This technology was similar to the one used in the CIRCA project. However, whereas CIRCA included only general content, our system also included personalized content according to patients' background and preferences.

The aim of the pilot study was to assess the suitability of the system for Alzheimer's patients and their caregivers. Since at that point we were interested in understanding the qualities of the interaction itself rather than the system's effects on the cognitive functioning of the patients, we used qualitative evaluation to identify relevant human interactions and processes. Our system was evaluated by 5 Alzheimer's patients from the Psychogeriatric Institute at the Tel-Aviv Sourasky Medical Center. Each patient completed 2 interactive sessions using the system with the support of a caregiver. The participants' behaviour during the sessions was observed and videotaped, and interviews were conducted with the patients and the caregivers.

Content analysis was performed in order to investigate the effects of the system on the patients, its usability, and the patients' satisfaction with using the system, as well as to identify any additional effects of the system on both patients and caregivers.

The results of the study indicated high user-satisfaction levels with the system and a strong tendency towards repeated use. The system was found effective in prompting conversations and in evoking personal memories; it was also helpful in facilitating patient–caregiver interaction. The results also showed a clear preference of personal over general material when both were available. Patients and caregivers alike recognized the advantage of using the system rather than traditional reminiscence methods, since it brought together various objects into one easily accessible system and improved the patient's self esteem as a consequence of being able to use a computer.

4 RESEARCH METHOD AND APPROACH

4.1 System Description

Our current system includes 2 main components- front-end and back-end. The former component will support the interactions during the therapeutic sessions. The design of this component is based on the prototypical system and the pilot study results described above. The latter component will facilitate addition and update of content. It is designed for the use of caregivers and family members. Our aim was to develop an internet-based system, which will allow the users to comfortably approach it from any location (e.g., medical institutions, clubs for the elderly, or the home of the patient or family member).

4.2 Sample

A total of 159 patients residing in the community with Alzheimer's disease according to DSM-IV criteria will participate in this study. The inclusion criteria will be: age (sixty years old and above) and mild stage of the disease (according to the Clinical Dementia Rating Scale). The exclusion criteria will be: visual and auditory impairments or any other physical impairment which may prevent the participants from using the computerized systems used in this study.

The participants will undergo a preliminary assessment in order to determine the stage of their illness. The assessment will be performed by the staff of a multidisciplinary Memory Clinic at the Beersheva Mental Health Center and will include a medical, cognitive and functional assessment using the following instruments:

- Mini-Mental State Examination for cognitive screening (Folstein et al., 1975).
- Clock Drawing test for cognitive screening (Freedman et al., 1994).

- Lawton and Brody's Instrumental Activities of Daily Living (IADL) for assessing functional capabilities (Lawton et al., 1969).
- Clinical Dementia Rating (CDR) scale as a global measure rating the severity of dementia (Morris, 1993).
- Mindstreams computerized cognitive assessment battery (Dwolatzky et al., 2003).

4.3 Experimental Design

The participants will be assigned randomly to one of the following 3 treatment groups:
1. Personal reminiscence therapy (using the computerized reminiscence system with personal contents for each participant)
2. Cognitive training (using the Savion software program [Melabev, Jerusalem]).

3. No treatment – This group will receive neither of the above interventions or any other similar interventions. In order to overcome the possible effect of the personal attention given to the participants in the other two groups, the participants in this group will be read a short story by a research assistant. This will ensure that, like participants in the treatment groups, the participants in this group also receive personal attention.

The randomized allocation to groups is aimed at reducing the effects of potentially intervening variables such as pharmacological therapies.

Sample size was determined for a fixed effects analysis of variance according to the parameters: Medium effect size (f = .25); Alpha level = 0.05; conventional power level (0.80); 3 groups. The calculation used the G*Power 3.0.5 software (Erdfelder et al., 1996).

4.4 Procedure

Patients receiving reminiscence therapy as well as those using the cognitive training program will participate in 2 sessions a week, each of 30-minutes duration over a period of 6 months, supervised by a research assistant. Each of the participants in the control group will meet a caregiver or research assistant for the same frequency. Taking the rate of recruitment into account, the study is expected to continue for a period of up to two years.

Each intervention session will be held in a quiet room to minimize disturbance to the subjects. The 2 computer-based interventions will start by a brief introduction to the system with an explanation of how to use the programs. In the reminiscence intervention the participant will be asked to select a topic and start navigating between the various components, while he/she will be encouraged to operate the system directly. If necessary, the system will be operated by the research assistant. Subjects in the control group will listen to a culturally relevant short story from a well known author read by a research assistant in the subject's primary language.

4.5 Measurements

4.5.1 Cognitive function assessment

The participants' cognitive function will be measured by the Mindstreams computerized testing battery. The assessment will be done at baseline, at one month, at 3 months and at study termination (t, t+1, t+3, and t+6). This will allow us to evaluate the efficacy of the interventions compared to controls with regard to cognitive function.

4.5.2 Patients' well-being

To assess behavioural outcomes we will use the NPI - Neuropsychiatric Inventory (Cummings et al., 1994). In addition we will use the Dementia Quality of Life (DQoL) instrument (Brod et al, 1999) to assess quality of life of the patients.

We will also conduct a qualitative assessment to find additional effects of the system on the patients. The qualitative methods will include observations during the use of the system, interviews with the patients at various stages during the research and interviews with caregivers and family members during the course of the research and at its completion. The qualitative assessment will concentrate on a sample of 8 participants.

4.5.3 Caregiver's burden

For the assessment of caregivers' burden and psychological morbidity we will use the short version of the Zarit Caregiver Burden Interview (Bedard et al., 2001).

In addition we will conduct qualitative assessment to evaluate changes in patient-caregiver relations. The qualitative assessment will include interviews with the main caregivers/ family members during the course of the research and at its completion. The qualitative assessment will concentrate on a sample of 8 participants and their main caregivers.

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SUPPORTING MASSIVELY DISTRIBUTED DECISIONS:

ASSESSING THE PERFORMANCE OF MASSIVELY DISTRIBUTED DECISION SUPPORT SYSTEMS

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Abstract

The new levels of computer-based connectivity bring with them more instances of massively distributed decision systems and corresponding computer-based systems to support them. From national and state online elections all the way to the selection of video contents in modern TV networks, massively large number of users makes joint decisions. The research outlined in this proposal recognizes this distinct type of a decision support system (DSS) – the massively distributed DSS. Specifically, the research examines the distributed computational architecture of this type of DSS and studies comprehensively its performance characteristics. Using a ground-breaking performance evaluation approach it explores the relationships between expected DSS performance and essential attributes of massively distributed decision situations such as decision pace, decisions interdependence, decision support complexity and number of users. This research builds on – and integrates – three distinct bodies of knowledge, namely DSS, distributed computational systems and performance evaluation of computational systems.

Keywords: DSS, performance evaluation, distributed systems, system design.

1 MOTIVATION AND GOALS

Technological innovations have allowed more and more decision makers to engage together and collaborate in online decision processes. Examples of such online decision processes with broad participation are e-commerce marketplaces such as e-Bay, where buyers / users decide whether and what to purchase; the consumption of television (video) content, where viewers decide on contents to watch; and election systems, where voters / citizens select collectively their candidates of choice.

What is common to all these decision systems is that they are massively distributed, binding together a large number of decision makers, who can, in some cases, be mutually dependent. We label such systems as Massively Distributed Decision Systems (MDDS). Technology enhancements also contribute to the emergence of computerized supporting capabilities to these decision processes, leading to a refined type of IT application, namely: Massively Distributed Decision Support Systems or in short MD2S2.

Since such DSSs support large number of users, a new challenge, that DSS research has so far been completely oblivious to, is raised – system performance. To date, the body of research on DSS architecture has focused mainly on single-computer (stand-alone) systems. Although the study of distributed DSS did address Group DSS in the past, only limited attention has been paid to it so far.

This research deals with the performance challenges by examining how different distributed architectures of decision support components – the independent variable in this study – affect total system performance – the dependent variable – in different decision support use-cases. We adopt the view that DSS are composed of three generic components, namely dialogue management, data management and model management. The distribution of these components over a communication network raises practical architectural dilemmas and has consequences in terms of complexity of application, response time, survivability, privacy protection, and cost of configuration.

1.1 Research Questions

This research of DSS architectures of massively distributed decision systems examines and evaluates the performance of a range of possible distribution designs of functional decision support components over a computer network.

Following prior research we define characteristic dimensions (i.e., attributes) of decision support situations: number of users, decision interdependence, decision support complexity, decision-making rate, and platform.

Allowing the values of each dimension to vary, yields different architectures, which are investigated in turn with respect to their performance. Consequently we are able to determine the most suitable architecture (in terms of performance) for different decision situations and platforms. This investigation is open-ended and exploratory. Specifically, we seek – at the outset – to answer the following questions:

- Does decision support complexity have an effect on performance and thus on the selected architecture? If so, what is the effect?
- What is the effect of decisions interdependence on MD2S2 performance for a given architecture?
- How does the number of users affect performance and thus the selected architecture (which optimizes performance)?
- Does decision pace have a significant effect on performance and thus on the selected architecture? If so, what is the effect?
- How do platform changes affect performance and thus the selected DSS architecture?

We finally confirm the model through its application in the concrete case of television under various decision situations. In this context, we seek to answer how should our general model be applied to "television DSS".

2 THEORETICAL BACKGROUND

2.1 Massively Distributed Decision Support Systems

MD2S2 extends the discourse of DSSs, but what defines MD2S2 as a special case of DSS? We follow the defining dimensions of DSS, identified in (Ariav and Ginzberg, 2006), as we systematically elaborate the concept of MD2S2. These dimensions are presented in Figure 1.

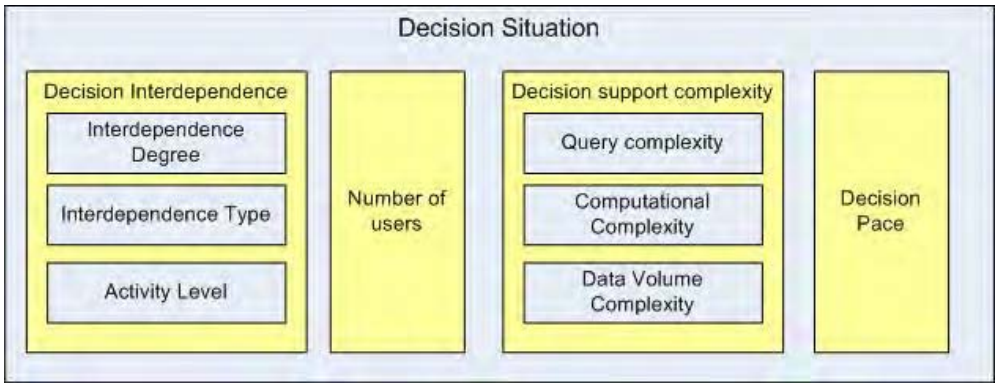

Figure 1. Decision Situation dimensions.

2.1.1 Decision Points Interdependence

Ariav and Ginzberg (1985) define task / decision interdependence as the degree in which a task / decision is related to other tasks performed in the organization. We adapt this definition to the context of MD2S2, and refer to the effect of one user's decision on other users in the system.

In the single-user DSS, decision points' dependence (i.e. dependence between different users' tasks) has limited or no meaning since each system has a single user and no other users are directly affected. GDSSs, in contrast, involve issues of decision interdependence as they imply mechanisms that enable group sessions, negotiations, group decision making, and other group processes designed to support distributed decision processes (Nunamaker 1989).

In MD2S2, a decision can affect other users on a range of different levels. At one end of this continuum, a decision taken by a user can directly influence many other users. For example, if an eBay user purchased a unique item from another user, no other user can still buy this item. At the opposite end of the continuum, decisions made by one user have no impact on other users. An example of independent decisions is illustrated in election voting systems. Of course, many decisions systems reflect an intermediate level of influence.

We distinguish among three elements of interdependence:

- Degree of effect - the number of users affected by the decision.
- Direct/Collaborative effect – are users affected directly or indirectly by a decision (example for the latter is the use of collaborative filtering algorithms).
- Active/Passive effect – do users act upon the decisions which affect them.

2.1.2 Number of Users

How many users use the DSS? While classic DSS is usually a stand-alone system with a single user and Group DSS (GDSS) supports a small number of users (typically within a single organization), MD2S2 supports a significantly large number of users. Concurrent users increase data traffic, load on file servers and database servers, and system processing (Laudon & Traver 2004). The very fact that MD2S2s are used by large number of users raises performance questions; Ideally we require that system performance will not degrade significantly as the number of simultaneous users increases.

2.1.3 Decision Support Complexity

Alter (1980) already identified several DSS types that provide users with different levels of support, ranging from raw data retrieval and display, all the way to DSS which suggests solutions. These levels of support are said to differ in their degree of model intensity (Ariav & Ginzberg 1985). This research investigates the effect of decision support complexity on MD2S2 architecture by distinguishing between three types of complexities:

- Computational complexity – how many computational steps are involved in a single task? (Giladi et al., 2003; Laudon & Traver 2008). We measure computational complexity as the average time to perform the required computations of a task.
- Data volume complexity – As the data volume increases, more time is required to transfer the data, all other resources being equal. Furthermore, data volume is affected by the type of data transferred: voice, video, text and by amount of data transferred (Laudon & Traver 2004). We measure data volume complexity as the time required to transfer the data.
- Query complexity – Query complexity depends on the number and size (measures by the number of rows) of the Database tables involved in the task (Lee et al. 2000). We measure query complexity as the average time to execute a query.

2.1.4 Decision Pace

How often do users make decisions? Ariav and Ginzberg (1985) defined decision pace as the natural rhythm for making a decision or accomplishing a task. We operationalize this characteristic as the number of decisions a user makes in a period of time, labeled as DMR – decision-making rates.

Our effort aims to understand how these dimensions affect each other and how they affect MD2S2 architecture and ultimately impact system performance.

2.2 DSS Design

A DSS includes three major – conceptual, generic – components (Ariav & Ginzberg 1985; Sprague & Carlson 1982): data management, model management, and dialogue management. Each of these components is composed of several functional components. For example, the Model Management component (Figure 2) is built of four sub-components: Command Processor, which receives requests from the Dialogue component; Model Execution component which retrieves and executes the model; MBMS which stores models and attains them for the model execution component; and the DB interface which retrieve required data for the model.

This research follows this definition and studies different distribution possibilities of these components. In principle, each distribution model of these components basically allocates the various generic components of a DSS to a computational component of the network, either a client or one of the possible servers. Each distribution model captures a distribution

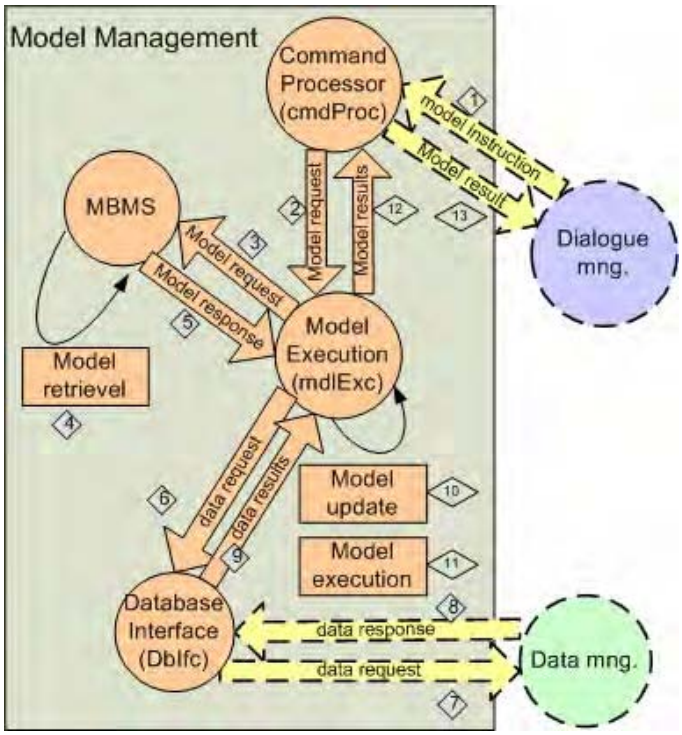

Figure 2. Model Management Component.

configuration and is eventually studied in order to determine which distribution works best (in terms of performance) for each decision situation. We study a range of distribution models, from a "Fat Client" architecture, where all components are located in the client computer, to a "Thin Client" architecture, where only the dialogue components are located in the client side (Sommerville, 2004, Ch. 12).

Performance issues are a major part of the distributed system design and management process. The performance of the system relies on the usage of its resources. According to (Laudon & Traver 2004), the most important factor affecting system/site performance is the demand that users place on the system or site. In MD2S2, millions of users create high levels of demand on the system and consequently affect performance.

2.3 Performance Evaluation

We measure performance using response time. Response time is defined as the average time that elapses between the end of a user's gesture to the beginning of the receipt of a response. We seek to model the behaviour of a system with respect this measure.

Performance may be analyzed using real environment experiments, simulation, analytical solution, or numerical solution. In this research we use Performance Evaluation Process Algebra, a numerical solution, abbreviated PEPA.

PEPA, developed by Hillston in the 1990s (Hillston 1996), describes a system as a collection of interacting components (agents). Each component can execute a set of actions, which "move" the component between states. Different components can engage in actions. PEPA is both a timed and stochastic extension of classical process algebras such as ACP (Bergstra & Klop 1984), CCS (Milner, 1989) and CSP (Hoare 1985). It can be regarded as a high-level model specification language for low-level stochastic models, which makes it suitable for extracting performance measures (e.g. response time) as well as deducing functional properties of the system (Ding et al. 2007).

The PEPA language is supported by a number of different tools offering a variety of analysis techniques. A list of the available tools can be found in PEPA Tools. This extensive support has motivated a growing number of system performance researchers to use PEPA. Specifically, we use the PEPA Eclipse plug-in tool, which is an addition to the Eclipse integrated development environment. The PEPA Eclipse plug-in contains a PEPA editor and performance (graphic) analyzers which use continuous time Markov chains (CTMC), ODE (ordinary differential equation) methods, or stochastic simulation.

The massively distributed systems that are the subject of this research are too large to be readily analyzed using Markovian techniques (which are suitable for up to 1,000,000 different states). In the MD2S2 case, solutions based on ODE or simulations are more appropriate. For more information on ODE and PEPA, see Hillston (2005b). The PEPA Eclipse plug-in supports ODE-based methods. When compared to other approaches, the PEPA ODE solution achieves superior results (in terms of run time) and scalability (Hillston 2005b), which eventually motivated our choice of PEPA. PEPA models have been developed for real applications and have amply demonstrated its validity. PEPA is extensively described in many papers and articles (Clark et al. 2007; Ding et al. 2007; Hillston 2005a). Figure 4 and Figure 5 exemplify the PEPA Modeling Language, as elaborated in the methodology section.

3 RESEARCH MODEL

The research model, presented in Figure 6, has two independent variables: decision situation and what might be labeled as "configuration", a combination of architecture and platform.

Our model (or model body) is a PEPA representation of DSS component distributions. The model is adjusted for each investigated architecture (distribution choice) and is set with suitable parameters (underlying Markov process rates) that represent the investigated decision situation and platform.

Our dependent variable is performance, which is measured by response time, as defined earlier.

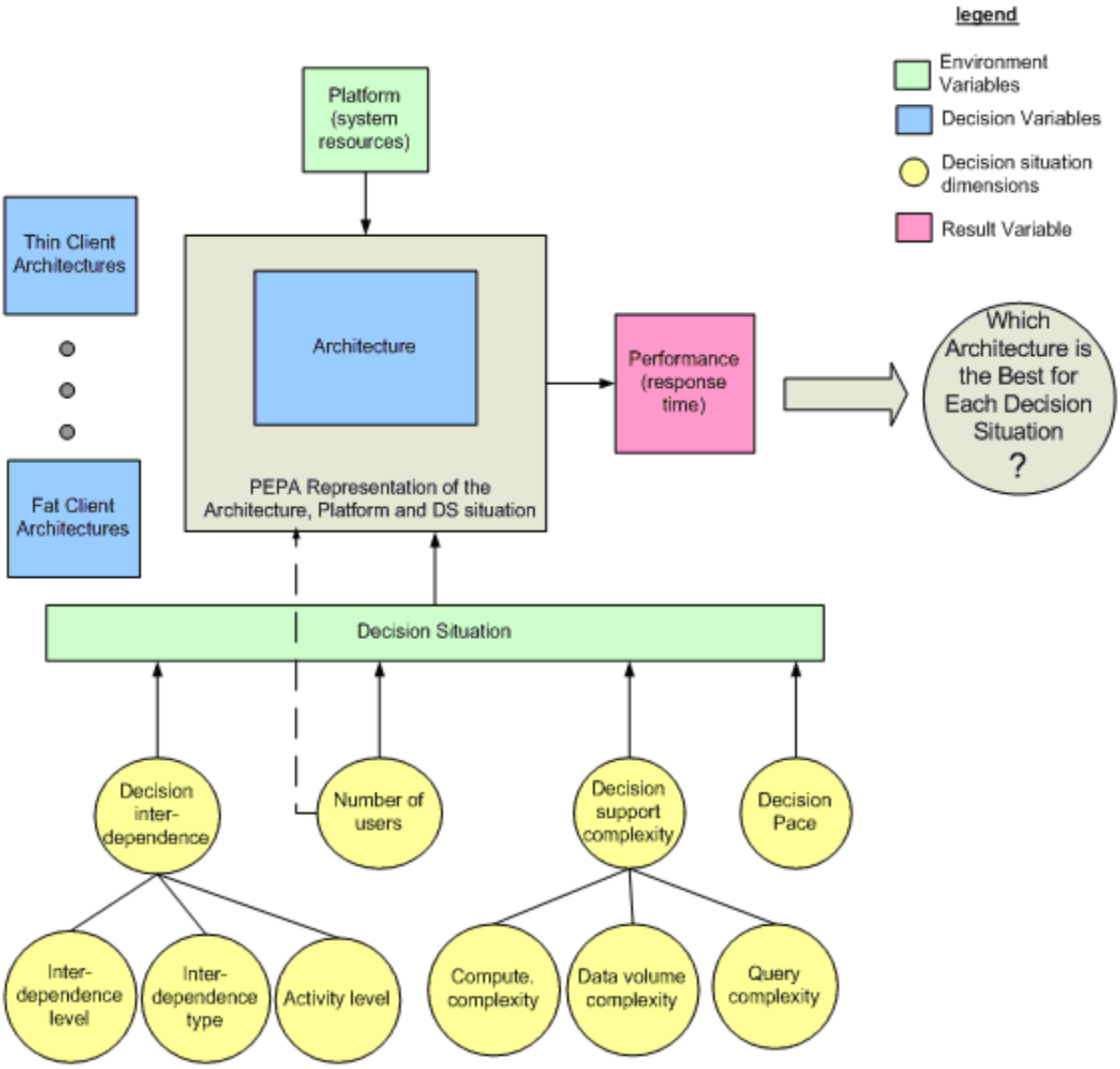

Figure 3. Research Model.

4 METHODOLOGY

This research investigates the effects of varying decision support dimensions over three types of architectures:

- Thin client – only the dialogue components are located on client computers
- Distributed model – the dialogue and model management components are located on client computers and the data management components are located on a central server.
- Fat Client – all components are located on client computers except for the DBMS.

Each of these architectures types is captured in a corresponding PEPA model. For each of these types we examine nine variations (determined by changing parameters in the PEPA model): four system sizes, measured by the number of end-decision-points (i.e., client computers), specifically 1 000, 50,000, 100,000 and 1 million end-points of decision; as well as three levels of server distribution, specifically 1, 2 and 4 servers. There is thus a total of 36 (3*4*3) architectures which are examined for each level of decision support complexity. The PEPA models were reviewed and approved by PEPA and DSS experts.

Figure 4 presents how the Model Management component is modelled using PEPA in the case of Thin Client, where the model management component is located on the server. This figure exemplifies the transitions between different states of the model management component. Each transition is caused by an action which occurs in a given rate, so that $P = (\bullet, r).Q$ means that action $\bullet$ occurs r times per second and causes a transition of the component from state P to state Q; and $P = (\bullet, r).Q + (\bullet, r).S$ means that the system can move from state P to state Q or to state S..

For each of the decision situation dimensions, we consider six possible value levels, and subsequently modify the evaluation model according to each set of possible values.

PEPA enables us to investigate parametrical variation quite easily. Each dimension is expressed by a rate or a set of rates in the PEPA model. Thus, we can study the effect of each dimension by changing the corresponding rates and measuring the results. For example, computational complexity is expressed by the r_MdlExc_mdl_exc rate (Figure 4). As the computational complexity rises, fewer computations can occur per second and thus we run our model with decreasing values of this rate.

Changing the number of decision end-points (i.e., users or clients) and the number of servers is also quite easily done when using PEPA. Figure 5 presents the system definition in PEPA, that is, the relations of the system components in the Thin Client case. Specifically, Figure 5 exemplifies a Thin Client configuration of two data management servers, two model management servers and 1000 users and the actions on which they cooperate. In order to change the number of users or servers we just change the corresponding numbers.

Using sensitivity analysis, we intend to study how changing each dimension value affects performance for each architecture configuration. Consequently, we will be able to determine the best architecture in terms of performance, for each set of dimension values.

After having completed the analysis of the generic MD2S2 case, we also intend to confirm our model through its application in an externally defined television content consumption scenario, using real data supplied by Orca Interactive.

```
// get request for model execution:
Mdl_Idle = (requestMdlDlg, infty).Mdl_CmdProcSendMdlExc;
// pass the request to te mdlExc:
Mdl_CmdProcSendMdlExc = (requestMdlExc, r_CmdProc_mdlExc_req).Mdl_MdlExcMdlRetrieval;
// request the model from the MBMS:
Mdl_MdlExcMdlRetrieval = (requestMBMS, r_MdlExc_mbms_req).Mdl_MbmsMdlRetrieval;
// the MBMS retrieves the model which may requires data or can be executed as is:
Mdl_MbmsMdlRetrieval = (retrieve, r_MBMS_mdl_rtrv).Mdl_MdlExcDataRetrieval +
                       (retrieve, r_MBMS_mdl_rtrv).Mdl_MdlExcMdlExecute;
// pass request for data to the DB interface:
Mdl_MdlExcDataRetrieval = (requestDB, r_MdlExc_get_data).Mdl_DbIfcDataRetrieval;
// request for Data from the DM:
Mdl_DbIfcDataRetrieval = (requestDataMdl, r_DBIfc_data_rtrv).Mdl_DbIfcDataWait;
// recieve data results:
Mdl_DbIfcDataWait = (responseDataMdl, infty).Mdl_DbIfcDataToMdlExc;
// pass the data to the MdlExc:
Mdl_DbIfcDataToMdlExc = (responseDB, r_DBIfc_res_to_mdlExc).Mdl_MdlExcMdlEnrich;
// enriching the model with the retrieved data:
Mdl_MdlExcMdlEnrich = (enrichMdl, r_MdlExc_enrich_mdl).Mdl_MdlExcMdlExecute;
// executing the model:
Mdl_MdlExcMdlExecute = (executeMdl, r_MdlExc_mdl_exc).Mdl_MdlExcToCmdProc;
// send the results to the CmdProc:
Mdl_MdlExcToCmdProc = (responseMdlExc, r_MdlExc_res_to_cmdProc).Mdl_CmdProcSendDlg;
// here we send the response back to the dialogue.
// if there is high interdependence degree then updates are sent to a number of
// dialouge components which cause the response rate, r_CmdProc_res_to_dlg, to be lower
Mdl_CmdProcSendDlg = (responseMdlDlg, r_CmdProc_res_to_dlg).Mdl_Idle;
```

Figure 4. *Model Management component of Thin Client configuration. Each row describe a transition between one state (left side of the equation) of the component to another (right side of the equation).*

```
UserIdle[1000]
        <gesture, getResult, displayErrUi, updTransDisp, updateMdlDlg>
Dlg_Idle[1000]
        <requestDataDlg, responseDataDlg>
DM_Idle[2]
        <requestMdlDlg, responseMdlDlg, requestDataMdl, responseDataMdl >
Mdl_Idle[2]
```

Figure 5. Components relations definition of Thin Client configuration. The numbers in the square brackets represent the number of instances of each component. In the angle brackets are the activities on which each two components cooperate.

5 PRELIMINARY FINDINGS

So far, we have focused on one dimension of the decision situation – computational complexity of the decision support. We investigated three types of DSS architectures, each with different numbers of servers and different number of users - creating a total of 36 different architectures. Six levels of computation complexities were investigated for each architecture.

The results show that for small number of users, architecture plays a little role in determining the response time. As the number of users increases architecture has larger effect on response time. On the other hand, as the number of users increases, the computational complexity stops affecting the response time. That is, the computational complexity has a clear effect on response time with small number of users, but has no effect when we reach a point where the number of users is too big.

The results strengthen our intuition that MD2S2 are a distinct type of a DSS, and show that the DSS size matters and reinforce the sense that MD2S2 need a dedicated attention. The results show that for different number of users, in given computational complexity values, the preferable architecture changes. Apparently the fact that the system is distributed between a significantly large number of users has strong implications on the effect of computational complexities.

6 CONTRIBUTION

Massively distributed systems in general and massively distributed DSS in particular become – and will inevitably continue to become – more and more common in the contemporary massively networked world. However, our understanding – and corresponding intuitions – of system performance at these scales are only preliminary. This study aimed at the development of a solid approach and modelling platform for the study of a particular type of information system application, the MD2S2.

This research uniquely connects distribution issues to the fundamental attributes of decision support. In its form it spans all the way from observable characteristics of a decision situation – "things" like decision support complexity that a DSS Analyst can observe directly during the system analysis stage – to "bottom line" performance characteristics of a planned DSS. We would like to submit that this is a desired framework in any IS implementation, let alone in challenging MD2S2 implementations.

In this research we have started the development of a tool for MD2S2 design. This tool considers decision situation attributes, platform characteristics, and various components distribution alternatives, and measures system response time. Using this measuring tool we are able to evaluate and compare different distribution alternatives of decision support components in various decision situations, where not only decision interdependence changes, but other decision situation attributes can change as well, for example, decision support complexity, decision making rate and number of decision makers.

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THE RICHNESS OF COMPUTER-MEDIATED COMMUNICATION

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Abstract

Text-based computer-mediated communication (CMC) has been portrayed as deficient in richness and in social cues. This proposal presents the evidence to the contrary, evidence showing that CMC is rich and capable of conveying complex and subtle messages. The proposal presents the analogy between the verbal and nonverbal components of traditional spoken communication, and suggests that CMC too has both verbal and nonverbal components. It then focuses on the nonverbal component (CMC cues), delineates two categories of CMC cues, and presents the past as well as ongoing research of the author. This work aims to deepen our understanding of chronemic CMC cues and of visual CMC cues.

Keywords: computer-mediated communication, cues, nonverbal.

Computer-mediated communication (CMC) influences individuals, organizations and society. It is transforming the way we live, and consequently, it is also transforming the way researchers can study the human mind, human communication, organizations, and society. CMC permeates every facet of everyday life, and since most of this digital communication can be captured and analyzed, researchers have a new window into the human mind, into the way people and organizations communicate, and into social interactions. This window is afforded by the constant creation of a stream of digital data created through Information Systems. These data augment the analog and mostly ephemeral behavioral and social information that the social and behavioral sciences traditionally used as a source for scientific inquiry. The digital data can be easily recorded, often in large quantities and unobtrusively, and be analyzed both qualitatively and quantitatively. Assuming these data are collected ethically, they can be used to readdress classical research questions using much larger datasets and modern analysis tools, as well as to tackle novel research questions.

1 THE RICHNESS OF TEXT-BASED CMC

The entry of text-based CMC into everyday life was closely followed by academic theories which labeled it as lacking in richness and in social cues (Daft & Lengel, 1986; Sproull & Kiesler, 1986). Despite this unwelcoming reception, text-based CMC media are constantly at the forefront of innovation, and are the most popular media for both organizational and personal use. From e-mail to Twitter, from SMS to Facebook status updates, simple text messages are used to convey complex messages, to carry out delicate tasks, and to mediate every category of social and organizational task.

The research of text-only communication described here tries to explore the mechanisms by which simple text messages can convey the richness and the social cues that enable them to carry out these tasks. The study of this richness is informed by the study of traditional spoken communication. Similarly to spoken communication which comprises both verbal and non-verbal components (Burgoon & Hoobler, 2002), CMC messages too contain both verbal and nonverbal content (Walther, 2006). Work by others on the verbal content of CMC messages showed how specific choices of words can influence and be influenced by variables such as trust, personality or mood (e.g. Gill, Oberlander, & Austin, 2006). The work described here focuses on the non-verbal content of text-based CMC messages. The term the author and colleagues have coined for this aspect of CMC messages is CMC Cues.

1.1 CMC cues

The information CMC cues convey cannot be extracted from the lexical or literal meaning of the words that comprise the message, and their creation and interpretation are context dependent and complex. These characteristics of CMC cues are reminiscent of the characteristics of nonverbal cues in traditional communication. These traditional cues have been defined (Burgoon & Hoobler, 2002) as "those behaviors that could reasonably function as messages within a given speech community. More specifically, it includes those behaviors other than words themselves that form a socially shared coding system" (p.244). The author and collaborators use the term CMC cues analogically to traditional nonverbal cues, to describe *those modifications of a CMC message that, within a socially shared coding system, modify the meaning of the message while preserving the words of the message and their sequence*.

1.1.1 Chronemic CMC cues

One category of nonverbal cues in CMC that has already been researched is chronemic cues. Chronemic cues are time related messages. The pioneering work on chronemic CMC cues was carried out by Walther & Tidwell (1995). Recent work by the author profiles the chronemics of e-mail response times in a large corporation (Kalman & Rafaeli, 2005), explore the distribution of response latencies in several

asynchronous media (Kalman, Ravid, Raban, & Rafaeli, 2006), and explore the consequences of long pauses and of silence in e-mail communication (Kalman & Rafaeli, in press).

1.1.2 Visual CMC cues

Visual CMC cues are non-chronemic CMC cues. The most researched category of visual cues is emoticons (Walther & D'Addario, 2001). Nevertheless, many more cues have been identified in text-based CMC: all uppercase spelling, asterisks, punctuation marks, repeated punctuation marks, spacing of letters and of words, repetitions of letters, typos, spelling mistakes, and more (Blackman, 1990; Carey, 1980; Spitzer, 1986). All of these cues modify the meaning of the message without altering the verbal content, and thus meet the definition of CMC cues. Several studies showed the impact of these cues (e.g. Lea & Spears, 1992). The goal of this research is to reach an in-depth understanding of their role in online communication, and the mechanisms by which they operate. Previous work by the author on this topic explores the role of letter repetitions and of punctuation mark repetitions in emails (Kalman & Gergle, 2009).

2 ONGOING AND FUTURE RESEARCH

Current research by the author on chronemic CMC cues looks at the chronemics of chat, linking personality traits to response times, as well as to the building of trust in online teams. Future research will extend this study to understand chronemic dynamics in other synchronous and asynchronous environments.

Current research by the author on visual CMC cues extended the 2009 Kalman & Gergle paper mentioned above beyond e-mail, and also included blogging and micro-blog (Twitter) posts. Future research will extend this study to experimentally study additional visual cues in various text-based CMC media.

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"VIRTUAL REALITY INTERNET RETAILING: EXPERIMENTAL EXAMINATION OF INTERACTIVE SHOPPING INTERFACE – STORE ATMOSPHERE EFFECTS ON USER-CONSUMER BEHAVIOUR"

Abstract

The objective of the present dissertation is to explore Virtual Reality as a new retailing channel through an interdisciplinary approach; Information Systems and Marketing. It is attempted to explore how new IS environments create new challenges for marketing and understanding online consumer behavior. The expected final outcome will be twofold. Primary, to provide evidence regarding causal relationships between Virtual Reality Retailing Store Atmosphere (VRRSA) components and Consumer Behaviour. Second, to provide evidence about how various types of store layout affect the shopping process. There is a great research interest on this new environment and is important to identify the components that constitute this environment as well as investigate consumers' habits in relation to the others retailing channels (traditional, Web).

Keywords: Virtual Reality Retailing, Store Atmosphere, Consumer Behaviour

1 INTRODUCTION

Web 2.0 users can be engaged in more activities as they can develop virtual communities and belong to a certain community and exchange ideas, enabling socialization and entertainment cues (voice chat, MSN, MySpace, Facebook, YouTube etc.). A virtual reality world is a 3D environment where users are engaged in numerous activities through their in-world representatives, the so-called "avatars". Simultaneously, they can talk with their friends (socialization) or find new friends, play electronic games (entertainment), build houses (interior and exterior decoration), develop furniture, buy and sell both virtual and real products (e-commerce) and numerous others activities.

There are more than a hundred of VWs at the time of crafting the present research.Indicatively, except "Second Life", "There" and "Cyworld" that are considered as leaders in the VRE (Shin,2008), "Toontown" is used by Disney as a mean for brand building purposes while "Whyville" and "Teen Second life" are geared for teenagers. A noteworthy VRE is "Sora City" which can only be visited by a mobile phone. Finally, "Myrl" is self-described as a cross-world entertainment platform that brings together inhabitants and the virtual worlds they inhabit. Specifically, there are already 19 "integrated" worlds to choose from and Myrl can be considered as a bridge to online gaming and virtual goods trading.

2 LITERATURE REVIEW

The technological developments which we have witnessed in recent years have formed new retailing channels (Browne, Durrett, & Wetherbe 2004; Thompson 2002). Shopping via the internet is considered that is growing rapidly and sales growth rates exceed shopping through conventional retailing (Levy & Weitz, 2001). Web retailing had been the descendant of brick- and- mortar stores and internet became the vaulting horse for other retailing channels such as mobile-commerce and TV-commerce. Virtual reality retailing (VRR) is growing rapidly and will account for a substantial proportion of retail sales in the future.

According to Lewison (1994), store atmosphere is the overall emotional and aesthetic effect which is created by a store's physical features as far as conventional stores are concerned. In this way, online retailers could provide an atmosphere via their website which can affect shoppers' image and experience in relation to the online store (Eroglu et al., 2000). Along these lines Vrechopoulos et al. (2000) introduced the term "Virtual Store Atmosphere" in Web retailing and Constantinides (2004), Vrechopoulos et al. (2004), Griffith (2005) and Dailey (2004) stated that Web site atmospherics, such as layout and product presentation, have the potential to engage consumers in unique and enjoyable experiences. As far as enjoyable experiences are concerned, consumers increasingly expect engaging experiences and not just a process to purchase goods and services (Pine & Gilmore, 1999; Postrel, 2003).

VREs have managed to acquire an ongoing consumer's acceptance and are becoming a promising retailing channel (Krasonikolakis & Vrechopoulos, 2009). Mazursky and Vinitzky (2005) stated that highly vivid interfaces such as 3D virtual stores provide motives, emotions, meanings and communication which are represented objectively. Along these lines Papadopoulou (2007) stated that the use of virtual reality for online shopping environments provides a superior customer experience in comparison with conventional Web1.0 stores. On the other hand, while retailing activity in the Virtual Reality Retailing context is quite active, research on designing the atmosphere of these stores is generally deficient (Apostolou, Koutsiouris & Vrechopoulos 2008).

3 KEY RESEARCH QUESTIONS & INITIAL RESEARCH HYPOTHESES

The main three key research questions that arose while studying the literature and conducting the initial research are:

- Which are the components of the Virtual Reality Retailing Store Atmosphere (VRRSA)?
- Do the VRRSA components affect consumer behavior?
- How the VRRSA components affect consumer behavior?

Elaborating on these research questions as provided through the literature review and the initial exploratory study (desk research) the following generic research hypothesis could be formulated:

H1: Virtual Reality Retailing Store Atmosphere (VRSSA) affects Consumer Behaviour.

4 PROPOSED METHODOLOGY THAT WILL BE FOLLOWED

The research methodology employed by the present PhD study in order to answer to the aforementioned research questions and test the corresponding research hypotheses is displayed in Figure 1.

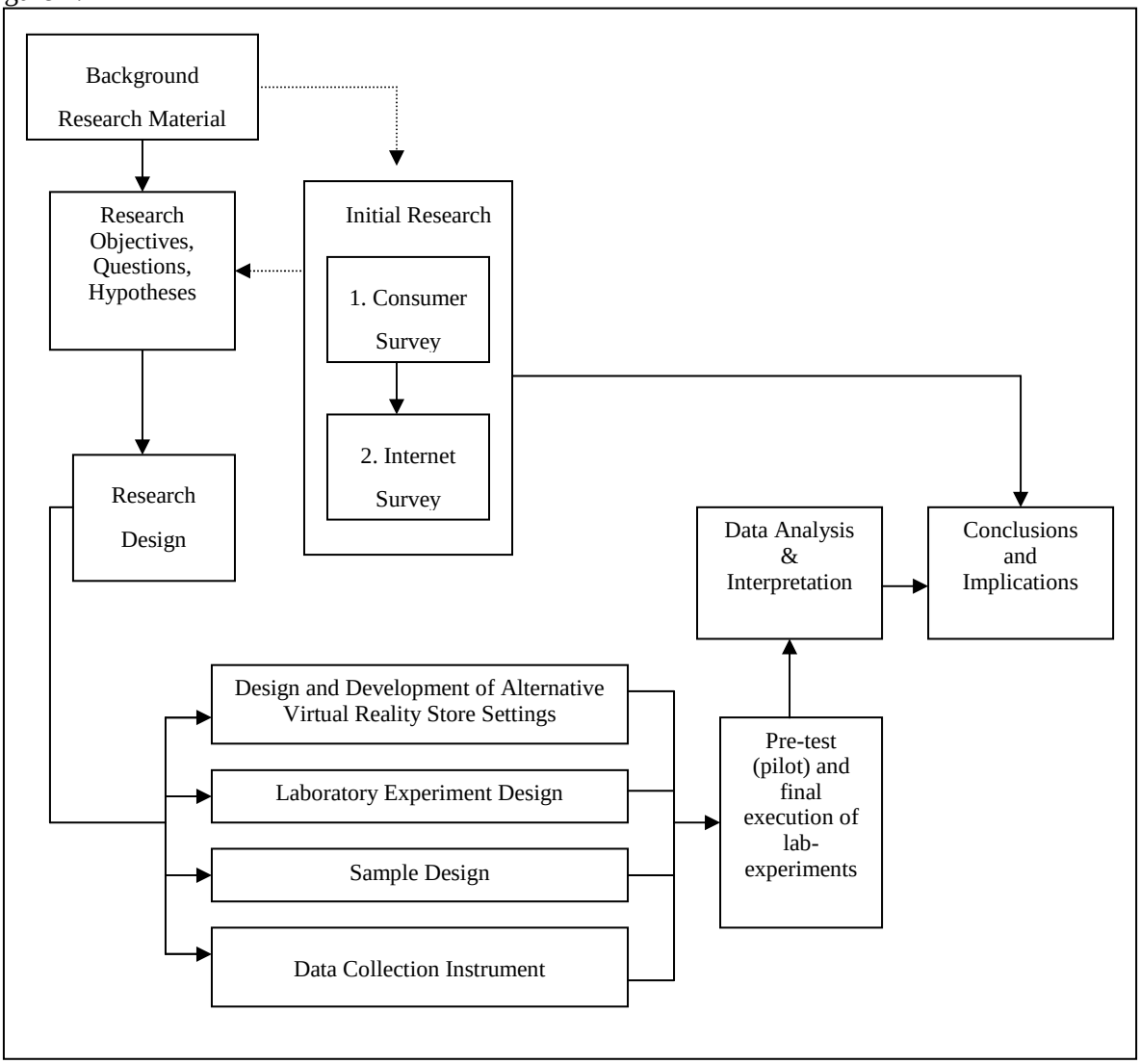

Figure1. Steps of methodology

Specifically, the first step we are going to follow is to define a broad statement of the general problem and identification of the specific components as far as virtual reality retailing store atmosphere is concerned. That could be accomplished by stating the factors that have an impact on the definition of

our marketing research problem, including past information and forecasts, recourses and constraints, consumer behavior and psychological, economic and legal environment (initial research-> interviews, internet surveys). In addition, we are going to follow probably an analytical model in order to accomplish an explicit specification of a set of variables and their interrelationships designed to represent our model in whole and/or in part. Afterwards, we are going to refine statements of the specific components of the problem, and in case that is essential we may have to break down some components of the statements into subcomponents or research questions. The next step we are going to follow is to design a framework detailing the necessary procedures for conducting the marketing research problem (research questions, objectives and hypotheses).

In order to test the specific hypothesis and examine specific relationships we are going to follow conclusive – causal research by implementing first the laboratory experiment design, sample design and data collection instrument. As far as the experiment design is concerned, first we are going to make a virtual store in virtual world in order to test subjects and how these subjects are to be divided in homogenous subsamples, to manipulate and measure specific independent variables or treatments. The following step would be data analysis and interpretation, using factor analysis or structural equation modeling and the final step conclusions, implications and guidelines for further research.

5 DISCUSSION AND POTENTIAL CONTRIBUTION

Shopping environment has been an important factor affecting consumers' attitude toward products and stores. There has been extensive literature, examining the role of store atmosphere in conventional and web retailing shopping environment. Virtual Reality Retailing represents an alternative and well promised retailing channel where there is not sufficient underline literature studying the characteristics of consumers that choose this channel for shopping and how their behaviour is affected by store' s atmosphere.

There has been extensive research about the three well known types of store layout which are grid, racetrack and free-form (e.g. Vrechopoulos et al. 2004 – Journal of Retailing). However, due to the ability of flying throughout a shop and can easily watch all, or most of the available products or services, without being necessary to fool around, the store layout may be of little importance. Probably, the types of store layout need to shake down in virtual reality era in order to be more discreet. To that end, there is a considerable challenge in this area for the researchers to define whether a specific store layout affects consumer's buying behavior or there should be introduced new innovative types of layout suitable for the new era. Similarly, there is need to emphasize more on characteristics such as telepresense, vividness, interaction and virtual object touch. In sum, there should be considerable research on all the cues that potentially could affect significant consumer behaviour variables (e.g. ease of use, perceived usefulness, intention to buy, entertainment, satisfaction, etc.).

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ACCEPTANCE OF ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS

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Abstract

The importance of enterprise resource planning (ERP) systems has been increasingly recognized by organizations of all kinds. Nevertheless the implementation of such systems has been proved to be difficult, demanding many resources with long duration. The following comprehensive research is based the examination of ten known information systems models: (1) technology acceptance model (TAM), (2) task technology fit model (TTF) , (3) a model combining the technology acceptance model and the task technology fit model, (4) Delone and Mclean IS success model, (5) computer self efficacy model (CSE), (6) Diffusion of Innovation model (DOI), (7) a model combining the technology acceptance model, task technology fit model and computer self efficacy model, (8) unified theory of acceptance and use of technology (UTAUT), (9) conceptual ERP model, (10) TIMES model.

This research aims to: (1) review the literature on information systems acceptance models generated by two different perspectives: individual (e.g. Technology acceptance model) and non individual (e.g. Task Technology Fit) characteristics, (2) empirically compare ten models and their extensions in the field of ERP systems, (3) examine the relationships among fundamental constructors (independent and dependant variables) and seek for patterns in order to understand the relationship between them, (4) examine the affect of moderators on these relationships such as: age, gender, education, experience, technological or business orientation, level of management and voluntariness of use, (5) develop, formulate and empirically examine a model that integrates elements across the ten models and best describes the acceptance of enterprise resource planning systems.

Keywords: Enterprise resource planning, Acceptance, models, Technology acceptance model (TAM), Task technology fit (TTF), Delone and Mclean IS success model, computer self efficacy (CSE), Diffusion of Innovation model (DOI), unified theory of acceptance and use of technology (UTAUT) , Conceptual ERP model, TIMES model.

1. INTRODUCTION

ERP systems are business IT suites designed to integrate business processes and functions based on a holistic view of a business by permitting the sharing of common data and practices in a real-time environment (Ifinedo & Nahar 2007). Therefore, many large and mid-sized organizations run all of their major functional and process operations using enterprise resource planning (ERP) systems (Peslak 2006). The high adoption and penetration of information systems in general and ERP in particular during the last decade have emphasized the importance of its acceptance evaluation. Organizations that allocate many resources on information technologies in general and enterprise resource planning system in particular, are first of all concerned with how their investment will influence organizational and individual performance and since the last depends on the IT acceptance and utilization user technology acceptance has been a focal research topic in the information system discipline (Sun & Zhang 2006).

The research in the field of Information systems have emerged two main research streams. The first stream focuses and examines the individual psychological characteristics that influence the technology acceptance. The second stream focuses and examines the technology acceptance as in overall due to the technological and organizational characteristics. Each of these stream make an important and unique contributions to the literature on user technology acceptance and implementation success and this research first of all aims to present the streams and correlated theories and models, comparing and synthesizing them.

2. LITERATURE REVIEW

The technology acceptance model (TAM) developed by Davis (1989, 1993) is considered to be the most well known model and has experienced improvements and refinement over the last two decades (Sun & Zhang 2006). The original technology acceptance model (TAM) is based on principles adopted from Fishbein and Ajzen's theory of reasoned action (TRA) model and is a specific adjustment to the field of information systems specifying the causal relationships between perceived usefulness, perceived ease of use, attitude toward using, intention to use and actual usage behavior. The TAM model is based on the perception that technology acceptance determined by the level of the individual acceptance and therefore was developed as a mean to measure user usage.

Although the TAM has experienced improvements and refinement, the existing research on TAM presents inconsistencies and offers relatively low explanatory powers, questioning the generalizability of TAM (Sun & Zhang 2006). TAM is based on behavioral elements, assuming that someone's intention to use an information system is free of limitations. In practice constraints such as limited ability, time, environmental or organizational limits, and unconscious habits will limit the freedom to act. Therefore, during the last decade of the former millennium, two other significant models of information technology (IT) utilization behavior have emerged in the MIS literature:

- Delone and McLean IS success model (Delone & McLean 1992, Delone & McLean 2003)
- Task-technology fit model (TTF) (Goodhue & Thompson 1995).

These models provided a theoretical framework for evaluating the explanatory power of the interrelated factors regarding the process of information system implementation and its implications on the performance, of the individual and in the overall. These models of fer different, though overlapping perspectives on utilization behavior. The TAM model focuses on perceived ease of use and perceived usefulness as predictors of attitudes toward and intention of using a particular IS. The Delone and McLean IS success model extends the scope with system characteristics on one hand predicting intention of using a particular IS and user satisfaction and gained benefits on the other hand. TTF focuses on the match between user task needs and the available functionality of the IT.

In extent to these models several theories have been developed and widely used in IS research that can assist in evaluating the success of implementation information systems. Such theories are:

- CSE - Computer self efficacy (Compeau & Higgins 1995a, Compeau & Higgins 1995b).
- DOI - Diffusion of innovation (Moore & Benbasat 1991, Moore & Benbasat 1996).
- ERP conceptual model (Calisir & Calisir 2004).
- UTAUT - Unified Theory of Acceptance and Use of Technology through a consolidation of the constructs of eight models in the MIS literature (Venkatesh et al. 2003).

The literature is full with researches that examine the explanatory power of each model alone to an information system implementation and utilization behavior. The literature, to much less extent, examines the explanatory power of an integrated model:

- Integrated model of TAM and TTF developed by Dishaw and Strong (1999),
- Integrated model of TAM , TTF and CSE developed by Dishaw et al. (2002).
- Integrated model of TAM and TPB developed by Mathieson (1991), Taylor and Todd (1995).

The incentive for the integration of models arose by the need to provide significant improvement of the explanatory power of information system utilization behavior over either model alone. For an example the findings of existing TAM research are far from conclusive as in some studies perceived ease of use (PEOU) generally has significant effects on behavior intention (BI) while in others the effects are not significant (Sun & Zhang 2006).

3. RESEARCH METHODOLOGY

In this study, the authors empirically compare ten models and their extensions in the field of ERP systems. This leads to the second goal; namely an analysis of what are the patterns of fundamental constructors (dependant and independent variables) based on the relationships among them. Both goals are examined also in light of moderators affect such as: age, gender, education, experience, technological or business orientation, level of management and voluntariness of use on such relationships.

For this purpose, a survey of ERP models is conducted these days with the appropriate stakeholders in organizations with a broad experience of implementing ERP systems.

3.1. Data sample

Ten different questionnaires, each for each model, were mailed to approximately 1200 potential respondents, classified into ten groups, where 530 responses were returned with a net response rate of 44.2%. Interviews with the respondents were conducted from January to May 2010, based on a mailed structured interview method which ensured that the answers could be reliably aggregated and that comparisons could be made with confidence between sample groups.

Each survey for each model includes several constructors for which several statements are presented. First, the respondents were asked to fulfill general characteristics such as: age, gender, education, experience, technological or business orientation, level of management and voluntariness of use. Next, the respondents were asked to assess to what extent they agree with the statements presented. The questionnaire was based on a 7-point Likert scale (plus " irrelelevant"). The overall assessments obtained in this study are presented in Table 1.

No.	model	Number of Respondents	Number of Statements	Overall statements reviews
1	Delone and McLean Information systems Success model (D&M)	50	42	2,100

2	Diffusion of innovation model (DOI)	50	40	2,000
3	Computer self efficacy model (CSE)	50	40	2,000
4	Unified theory of acceptance and use of technology model (UTAUT)	50	40	2,000
5	Technology acceptance model (TAM)	50	32	1,600
6	Task technology fit model (TTF)	50	43	2,150
7	Combined model of TAM and TTF models	50	42	2,100
8	Combined model of TAM, TTF and CSE models	80	40	3,200
9	ERP conceptual model	50	39	1,950
10	TIMES model	50	42	2,100
Overall reviews of statements				21,200

Table 1 The overall assessments obtained in this study

3.2. Data analysis strategy

First, reliability and validity tests were designed to empirically evaluate, validate and propose an enhanced survey that best describes each model. The reliability test determines the extent to which the measurements resulting from a test are the result of characteristics of the features being measured. In other words, it assesses the degree to which test scores for a group of test takers are consistent over repeated applications of a measurement procedure and hence are dependable and repeatable for an individual test taker. Measurement validity refers to the extent to which the questionnaire represents the overall dimensions of the measured items. Although a test is proven to be reliable, its' results may not be valid since stable results do not necessarily share validity. Thus, the research measurement instrument was examined for completeness and clarity in a series of interviews with two experienced ERP consultants. Based on their comments, a second examination was conducted after a pilot test, in which 10 different respondents, for each model, were interviewed and asked to assess the meaning of each statement in the model. After validation by the preliminary interviews and the pilot survey, it was administered to the respondents.

Next, we analyze whether we can reduce the number of statements in each model. Such an analysis helps to shorten survey filling duration since some of the surveys include large number of statements assessed by the respondents without damaging the survey or lowering its reliability and validity. This analysis is designed using three methods:

- First, performing an EFA (Exploratory Factor Analysis) on one half of the data and then test the generality of the extracted factors with a CFA (Confirmatory Factor Analysis) on the second half of the data.
- Second, using AMOS (structural equation modeling (SEM) software) that allows both confirmatory and exploratory modeling, meaning they are suited to both theory testing and theory development.
- Third, using PLS (Partial least square) that bears some relation to factor analysis, and yet is suited when the matrix of predictors has more variables than observations, and when a multicollinearity among X values is concerned.

Furthermore, several models share the same independent constructors, although sometime named in different terms, including the construct named "Intention to use". The literature presents intention and/or usage as the key dependent constructor in favor of predicting acceptance. The tem examined models share some independent constructors and "Intention to use" constructor. Table 2 presents the shared independent constructors for each set of models, the dependent variable and the number of respondents assessing their statements.

Independent variables	#Dependent variable	#Set of models	Number of respondents
PEOU + PU	INT	5 models: D&M, UTAUT, TAM, TAM+TTF, TAM+TTF+CSE	
PEOU + PU + SI	INT	4 models: UTAUT, TAM, TAM+TTF, TAM+TTF+CSE	
PEOU + PU + ATT	INT	3 models: TAM, TAM+TTF, TAM+TTF+CSE	
Task + Tech + TTF	INT	3 models: TTF, TAM+TTF, TAM+TTF+CSE	
Tech + IQ + PEOU + PU	INT	2 models: D&M, ERP conceptual model	
PEOU + PU	STF	3 models: D&M, ERP conceptual model, TIMES	
Org + Env + PEOU	PU	2 models: DOI, TIMES	

Table 2 Shared independent constructors for each set of models. PEOU=Perceived ease of use; PU=Perceived usefulness; SI= Social influence; ATT= Attitude; Tech= Technology; IQ= Information quality; Org= Organization; Env= Environment

Using the declaration of the shared constructors the authors examine the relationships among fundamental constructors (independent and dependant variables) and seek for patterns in order to understand the relationship between them. Moreover, the authors we examine the affect on these relationships by moderators such as: age, gender, education, experience, technological or business orientation, level of management and voluntariness of use. This analysis will be performed using two methods:

- Ordinary least square regression.
- Weka engine that is based on a collection of machine learning algorithms for data mining tasks that contains tools for data pre-processing, classification, regression, clustering, association rules, and visualization.

Based on the results of these analyses the authors will formulate and empirically examine a model that integrates the research insights and best describes the acceptance of enterprise resource planning systems.

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KNOWLEDGE MANAGEMENT IN KNOWLEDGE INTENSIVE BUSINESS PROCESSES

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Abstract

The emergence of knowledge economy has necessitated many organizations to recognize knowledge as a crucial resource, and created an intricate managerial challenge knowledge management (KM). In particular, KM has been recognized by many researchers as an essential component of knowledge-based organizations operating in dynamic, knowledge-intensive environments, for improving their work processes and creating value. One of the cornerstones of KM is improving productivity by effectively sharing and transferring knowledge. The organizational knowledge is embedded in people, systems, procedures and products. Knowledge workers are required to improve their work on a daily basis in a process that cumulates in a significant improvement in performance for the entire enterprise. However, in practice this may be time-consuming and often impossible. In this regard my research is focused on embedding KM within knowledge-intensive business processes and utilizing organizational knowledge for creating value. Specifically, I present KM studies that relate to decision-making processes, audit methodology, software reuse and knowledge modeling.

Keywords: knowledge management (KM), knowledge-intensive business processes, decision-making, KM audit, knowledge modeling

1 INTRODUCTION

Knowledge is considered as one of the main competitive organizational assets, enabling the organization to be productive and deliver competitive products and services, knowledge is embedded in people, systems, procedures and products. One of the Knowledge management (KM) goals is to improve productivity by effectively sharing and transferring knowledge, activities which tend to be either impossible or too time-consuming (Davenport and Prusak, 2000). KM has been recognized as an essential component of knowledge-intensive industries, which are characterized by technological uncertainty and a competitive environment (Lonnqvist, 2005). Over the past years, we have witnessed an increased focus on KM as a major part of organizational strategy in knowledge-intensive organizations and as a significant driver for business process design and reengineering in such organizations (Remus and Schub, 2003). KM enhances the ability of knowledge-intensive organizations to continuously learn and adapt, and to rapidly respond to changes in technology, market, and customer preferences (Lonnqvist, 2005), mainly by improving their knowledge-intensive business processes (KIBP).

2 MY KM RESEARCH

I have multidisciplinary education in Computer Science, Industrial Management and Education, which complements an extensive industry experience in software engineering and technical management. Both my academic education and work experience have been instrumental over the last three years for the research I have been involved with at Ben-Gurion University of the Negev, in two departments, and at the University of Haifa, encompassing both soft and hard perspectives of KM.

My research efforts are focused on knowledge engineering and management, both from human and technological perspectives. In my research I apply qualitative methodologies (Levy et al, 2010; Levy and Hadar, 2010; Levy, Pliskin and Ravid, 2010) as well as design science methodologies (Levy, 2009; Levy, Pliskin and Ravid, 2009; Shemesh, Glasser and Levy, 2010). Specifically, I have conducted research on methodologies for KM audit and requirement analysis; modeling and design of knowledge systems; embedding KM frameworks within business processes, including decision making; knowledge services; and identifying KM culture barriers. In the following sections I present several of these KM studies that relate to decision-making processes, KM audit, KM in software development processes and knowledge modeling.

2.1 KM and Decision-Making Processes

2.1.1 Studying Decision-Making Processes via a KM Lens

While the role of knowledge KM for decision support is well acknowledged, there is a gap between existing KM theory and actual KM practice in real-life decision-making. The research (Levy, Pliskin and Ravid, 2010) aimed to illustrate this gap by studying the report of the Columbia Accident Investigation Board, focusing on diagnosed pre explosion problems in decision-making processes, and prescribed post-explosion recommendations. The research's contribution is two-fold: 1) consolidating two KM frameworks to one research tool, to serve as lens for studying decision-making processes and 2) providing convincing evidence regarding the role of the KM perspective in organizational decision-making processes.

2.1.2 KM&DSS@BP conceptual model

KM may empower decision makers who face time pressures, risks, contradictions and information overflow under mission-critical decision scenarios involving prevention, event recognition, early and sustained response, and recovery. While the role of KM in decision support is acknowledged in theory, in the form of well-defined frameworks that embed KM components within Decision Support Systems

(DSS), there exists a gap between existing KM theory and actual KM practice in real-life decision making. Thus, one of the forthcoming challenges in the DSS area is to provide decision makers with a working environment that will enhance the rationality and transparency of decision-making processes by integrating data, information and knowledge into a collaborative space for communication and discussion amongst relevant stakeholders within business processes. To guide practical and systematic assimilation of KM and DSS within business processes, we proposed the KM&DSS@BP conceptual model and environment aimed at leveraging knowledge in support of decision making (Levy, Pliskin and Ravid, 2009). The proposed model integrates KM aspects within the existing DSS framework, while taking into account relevant business processes and stakeholders.

2.1.3 Research in Progress

As the business environment becomes complex, high-quality decision-making processes are critical for organizations. Business simulation games can support learning as well as research of decision-making processes from both human and technological aspects. This research-in-progress aims at developing advanced KM systems and studying their usability and performance within a simulation-game environment (Levy and Pliskin, 2010).

2.2 KM Audit

2.2.1 Studying KM Cultural Barriers

This empirical study (Levy et al., 2009) identified tacit perceptions and cultural barriers that may challenge KM initiatives in an organization, similar to other business process reengineering (BPR) efforts. Statements by interview participants, in a big global software organization, were classified according to KM lifecycle activities and infrastructure, as well as additional emerging characteristics. Further analysis exposed tacit perceptions, which in turn led to identification of cultural barriers that may influence the success of KM initiatives. In this studied organization, at the time of the study, access issues were most prominent. This research also suggested the need for embedding KM activities within the business processes, as well as the need to effectively communicate strong managerial support for the KM initiative. Interweaving a strategic KM plan with tactical involvement of the employees will greatly improve the likelihood of success. Moreover, embedding KM activities within their work routine can increase business process achievements as well as the employees' performance and professional development.

2.2.2 KM Audit Methodology

Knowledge-intensive organizations that carry out many KIBPs, seek to improve and enhance their KIBP for gaining competitive advantages. These organizations need to develop their KM infrastructure of KIBP, starting from knowledge audit that is a necessary first step in any KM initiative. As KM infrastructure integrates social and technological disciplines, we developed a combined Socio-Engineering Knowledge Audit Methodology (SEKAM) for a systematic audit of the KM infrastructure in the context of KIBP (Aviv, Levy and Hadar, 2009). The research addressed the conceptual framework of SEKAM and developed instruments to be used during its implementation.

2.3 KM and Software Development Process

2.3.1 Software Architecture Review Process

Software architecture is considered to have a significant influence on the final software product's quality. A critical phase in ensuring and validating the quality of a suggested architecture is architecture review, conducted by experienced architects. While many evaluation methods have been researched thus far in the context of architecture review, little attention has been given to the review

process and to the knowledge-related aspects embedded within it. The research (Sherman, Hadar and Levy, 2010) explored and analyzed the architecture review process based on literature as well as empirical evidence obtained in a case study conducted in a large software development firm. For the aim of enhancing the review process to a systematic and scalable process, as well as expending its value to future architecture in addition to the reviewed artifacts, this research investigated the knowledge aspects of the review process and suggested a conceptual solution for enhancing the review process and embedding KM within it.

2.3.2 Software Reuse

One of the main barriers to overcome when initiating KM processes within organizations is the structuring of a knowledge repository to disseminate and reuse knowledge throughout the organization. A core asset repository methodology (CARM) was developed (Shemesh, Glasser and Levy, 2010) for developing a knowledge repository that encompasses a set of components, which represent abstract design solutions for a family of related problems. The CARM was developed and implemented as a real-time core asset repository (RTCAR) for an actual software development department of a large high-tech organization. When building such repository technical, managerial and cultural aspects should be considered. The findings show that a knowledge repository constructed according to CARM is conducive to software component reuse, a shortened development cycle and improved software quality.

2.4 Knowledge Modeling

Another aspect of my research relates to knowledge modeling in a task model (TM) infrastructure for smart phone applications (Levy et al., 2010b). The infrastructure consists of a generic task model (TM) and software tool - TM Designer – which allow a modeler to create task models that support tracking smart phone users and analyzing their use of smart phone applications. Based on the tracked usage data, the service provider will be able to learn about the efficiency of the smart phone usage, predict the intentions of the users while operating the device, and provide appropriate help (Levy, Shoval and Shapira, 2010). In addition, the gathered usage information will enable discovering patterns of use of various applications, and predict users' interests in existing and new smart phone services and applications.

3 SUMMARY

In the former sections I presented several of my KM recent studies. I wish to participate in the MCIS 2010 Junior Faculty Consortium as attending the consortium will give me the opportunity to interact with distinguished IS researches as well as junior faculty members, for discussing teaching and research issues, and exposing to new research directions and methodologies.

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Social Entrepreneurship: From Idea to Venture
Extended Abstract

Research motivation and goals

Of late, Social Entrepreneurship has been growing as a subdiscipline within the field of entrepreneurship (Certo and Miller, 2008). However, the concept of social entrepreneurship is not yet well defined (Mair and Marti, 2006). Much like entrepreneurship in its early days, it is mainly phenomenon-driven, with uncertain and fuzzy boundaries, and lacking in any unifying paradigm (Mair, Robinson, & Hockert, 2006). There has not yet been a clear road map laid out from idea generation to new venture creation. Very little is known about the birth of social ventures, and theory regarding the creation of new social enterprises is still in its infancy. We seek to develop theory on new social venture creation using an inductive approach.

Research questions

Our main research question is: How are new social ventures created? Within that, we examine two other questions. First, how do social entrepreneurs redefine meanings towards their social goals? And second, what implications does this redefinition of meanings have on new social venture creation?

Brief theoretical background

(1) Entrepreneurship

Entrepreneurial process-based research has focused on two broad dimensions so far: opportunity recognition and information search, and resource acquisition and business strategies (Ucbasaran, Westhead, & Wright, 2001). Opportunity recognition and information search are often regarded as the first critical steps in the venture creation process (Shane & Venkataraman, 2000). Research in this dimension is often concerned with the issues of where opportunities come from, why, when and how certain individuals exploit opportunities (e.g., Floyd & Wooldrige, 1999; Hills, Lumpkin, & Singh, 1997). In the high technology area, Galbraith (1982) proposes a four-stage model involving a proof of principle stage, a prototype stage, a model shop stage and a start-up stage. Other studies have also attempted to examine resource endowments and resource acquisition strategies of entrepreneurs and how resources and assets (human, social, physical and organizational) affect venture failure, survival and/or success (Chandler & Hanks, 1994; Gimeno, Folta, Cooper, & Woo, 1997).

(2) Social Entrepreneurship

Within social entrepreneurship, research has focused more on characteristics of successful entrepreneurs and ventures than the specific stages of development of a nascent organization. Alvord et al. (2004) specified three forms that can be taken by successful initiatives: building local capacities, disseminating a package, and building a movement. In their analysis, they found that different organizations chose one or a combination of these three forms in approaching their social mission. In the first approach, social entrepreneurs build skills and resources within an underserved population to allow them to help themselves. In the second, those capacities are used

within a model, and in the third, the movement gathers momentum and changes the perspectives of society at large.
On the other hand, building on the work of Hayak, Kirzner and Schumpeter, Zahra (2008) identified three types of social entrepreneurs: Social Bricoleur, Social Constructionist, and Social Engineer. "Social Bricoleurs usually focus on discovering and addressing small-scale local social needs. Social Constructionists typically exploit opportunities and market failures by filling gaps to underserved clients in order to introduce reforms and innovations to the broader social system. Finally, Social Engineers recognize systemic problems within existing social structures and address them by introducing revolutionary change." (Zahra, 2008)

(3) Research Gap
The stage models developed in the larger field of entrepreneurship may not describe the gestation of nascent social ventures due to key differences between the tasks faced by social entrepreneurs and conventional entrepreneurs. We will bring in theories involving the social construction of technology and design-driven innovation to explore the ways in which social ventures differ from conventional firms, and delineate the implications of those differences on the stages of new venture creation. Finally, we propose a stage model that unites extant models within entrepreneurship with typologies of social entrepreneurs.

Research method and approach
The method of analysis used is an inductive case study of two social enterprises: Kiva.org, a four-year-old social venture based out of San Francisco, which pioneered the concept of peer-to-peer microlending, and Worldreader.org, a one-year-old social venture based in Barcelona, which gives students in developing countries access to books using electronic readers. The *how* and *why* questions relating to new social venture creation are highly specific to the organizational contexts to which they belong, making the case study research method particularly applicable (Yin 1999).

The data we used to support our analysis comes from several sources: direct empirical observation, in-depth interviews, and documents. Primarily, in our data collection effort, we spent the summer of 2009 working as a Kiva Fellow, which included one week of on-site training in San Francisco in which we had access to Kiva founders, staff and volunteers. From February 2010, we were the second person, after the two co-founders, to join Worldreader.org. Our participation began by documenting the growth of their organization, and has since grown to include lending a research-based perspective to their work.

Expected or preliminary results
Preliminary results show that the social ventures studied did not follow any of the stage model developed by scholars in the field of entrepreneurship. Furthermore, one of the most striking similarities of the organizations was that they both made radical "push" proposals that took on the difficult task of redefining social meanings.

Pinch and Bijker (1984) used the example of the development of the bicycle to point out that all technological developments are subject to interpretation by actors within society, and that the resulting meanings are in turn subject to negotiation. MacKenzie and Wajcman (1985) disaggregate "technology" into three layers – physical objects, activities or processes, and know-how.

Prior to Kiva.org, the processes of charity and of loaning money were entirely distinct. The former was an altruistic act, and the latter a commercial transaction. Kiva put forth a proposal to anyone in the world with access to the Internet and a credit card: Loan $25 to a specific person as far as halfway across the world, help them build their businesses and achieve their dreams, and receive your money back over time, without interest. Kiva put forth this vision of what could be without consulting either donors to charitable organizations, or individuals who routinely loaned money for interest income. Instead, they questioned the existing meanings of both giving and loaning money, and boldly pushed their modification of those contexts in what Verganti (2009) would call a design-driven strategy.

Worldreader.org did much the same with a physical object instead of a process. Prior to the organization's inception, electronic readers (like the Amazon.com Kindle, or the Nook) were luxury devices for relatively affluent purchasers in the developed world. E-readers were substitutes for paper books, and cannibalized publishing markets. Worldreader proposed using the e-reader to go to places – more specifically, to classrooms – where paper books are scarce, seeking to recontextualize the device from luxury to mass-market, the user from reasonably well-off person in a developed nation to a child in a developing country, and the business model from replacing paper book sales to opening new markets.

We believe that social entrepreneurs face unique challenges when making these bold, design-driven proposals that redefine how certain objects and processes are understood. Neither society nor its structures were ready for either Kiva or Worldreader – they faced social challenges in which they were outright dismissed as crazy. A teacher at the elite Lincoln Community School in Accra told the Worldreader team that what they were doing was tantamount to "putting spaceships in the classroom."

Laws were also not created with these social entrepreneurs in mind. As neither a charity nor a conventional investment mechanism, Kiva faced uncertainty about whether or not it would be regulated by the Securities and Exchanges Commission, and what laws would apply. Worldreader faced a similar conundrum when confronted with a Digital Rights Management systems that locked the licenses for electronic books to the owner of the credit card that paid for them, while neither the children who were using the devices and reading the e-books, nor their parents, had access to credit cards.

Taking into account the implications that these social and legal challenges have on new venture creation, we will develop a stage model for new venture creation within social entrepreneurship.

Research contribution

First, we bring insight into a new type of social entrepreneur that not only uses market forces to solve a social problem, but radically redefines social meanings towards the same goal. Additionally, by bringing theories from Social Construction of Technology (Bijker & Pinch, 1987) and Design-Driven Innovation (Verganti, 2009) to the field of social entrepreneurship, we propose a stage model for the creation of new social ventures.

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The model of factors impacting on the adoption of Software as a Service in SMEs

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Abstract: The research proposal focuses on investigation of factors impacting on the adoption of Software as a Service (SaaS) in SMEs. Recent studies have reported that SMEs are generally lagging behind large organizations with regards to the adoption and usage of ICT. However, SMEs as a major source of entrepreneurial skills and creativity cannot afford lagging behind large companies. In order to remain competitive, they need to exploit new technologies, SaaS being one of them due to the significant increase of the on-demand deployment model. In this phase of the study we investigate the SaaS model and the prevailing theoretical concepts. We draw on theories that have been applied several times in the past in similar outsourcing studies. Finally, we briefly present further research activities.

Keywords: *Software as a Service, SaaS, Small and medium sized enterprises, adoption factors*

Introduction

Traditional business software applications from main ICT providers are too complex and expensive generally for almost all small and medium-sized enterprises (SMEs). Even the largest companies with the best IT departments have difficulties to follow the development of information and communication technology (ICT). SMEs as a major source of entrepreneurial skills and creativity (European Commission, 2008) cannot afford legging behind large companies so there is a need to bridge the gap in ICT use between them. In a world where competence is dependent on the exploitation of technology SMEs can with the use of the on-demand software applications reduce time to market and easy adoption.

SMEs in Europe present 99 percent of all enterprises and two thirds of jobs in the private sector. SMEs cannot be classified as large scale enterprises because they have a number of specific characteristics that differ from larger companies. In addition to the size SMEs differ from larger companies in the area of deployment and use of ICT (Bouanno et al., 2005, Ramdane and Kawalek, 2009), because many SMEs are not aware of the advantages offered by the use of ICT, (Pucihar et., 2009, Kartiwi and MacGregor, 2007, MacGregor and Vrazalic, 2005, Cragg and King, 1993) limited financial ability as well as lack of appropriate technologies.

In spite of their major contribution to economy, studies focusing on adoption and diffusion of IS innovation among SMEs are underrepresented and they rarely appear in major IS journals (Li, 2009). In the report initiated by the European Commission to capture the development of cloud computing the specific recommendations for research and development in European Union were identified. One of the main points is a need to explore the legal frameworks and business models that will help identify ways to reduce barriers for SMEs to enter the market (European Commision, 2010).

Cloud computing defines three types, including Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (Iaas). These types have in common that they (directly or indirectly) enhance resources and services with additional capabilities related to manageability, elasticity and system platform independency (European Commision, 2010).

Partial results of a survey by the European Network and Information Security Agency (ENISA) which was launched in April 2009 and has run until June 2010 shows that SMEs major concerns for SMEs migration to the cloud computing includes safety and reliability of data (ENISA, 2009). The survey also shows that SMEs prefer the cloud computing category called Software as a Service (SaaS).

There is a broad spectrum of different types of software solutions offered by a third party provider, available on demand, usually accessible via Internet, e. g. office tools (Zoho Office, Google Aps), customer relationship management - CRM (Saleforce.com), enterprise resource management - ERP systems (Workday), human resource management - HRM services (HumanWave). The shorter time period required to install and implement new software applications Saas could be major advantage for SMEs that lack necessary ICT capabilities and organizational resources.

Most of the recent studies were focused on technical issues while research covering economical and organizational aspects of Saas is underrepresented (European Commision, 2010). Benlian et al. (2009) pointed out that although many research papers have theoretically explored the meaning of on-demand software applications there is virtually almost no coverage of the drivers of Saas adoption on a substantial empirical basis except Saas-adoption from a transaction cost theoretical lens.

The purpose of this research is to determine main factors impacting the adoption of Software as a Service in SMEs. More precisely, we will explore Software as a Service model and the prevailing theoretical concepts that define such a model. Upon the critical analysis, we will choose a combination of theoretical concepts and develop a research model. The model will be empirically verified.

Literature review

If we consider Saas as an outsourcing decision, we can draw on theories that have been applied several times in the past in similar outsourcing studies (Li and Li, 2009; Gonzales et al., 2006; Dibbern et al., 2004). Beside Transaction cost theory and Agency theory which are most widely utilized in the IS outsourcing studies (Gonzales et al., 2006) Knowledge-based theory, Stakeholder theory and Resource based theory have emerged as important. Table 1 summarizes these theories. Upon these theories we will expose the key variables.

Theory	**Previous research findings**
Agency theory	Consistent with these perspectives, the client firm represents the principal and the vendor represents the agent in outsourced IT projects. The agency problems are indeed more pronounced in outsourced software development projects relative to internal projects (Choudhury and Sabherwal, 2003). Each organization—principal and agent—pursues its own goals while being concerned about its own lack of complete project control and wary of opportunistic behavior by its partner (Earl, 1996; Lacity, and Hirschheim, 1993). Koh et al. (2004) have found that close project monitoring is an important antecedent to successful outsourcing outcomes especially when there is a lack of trust between involved parties.
Knowledge-based theory	This theoretical perspective suggests that outsourcing arrangements serve as a vehicle for utilizing vendors' complementary skills and expertise (Grant and Baden-Fuller, 2004). The first knowledge-based motivation for outsourcing is the desire to gain access to and exploit technical knowledge that the client firm does not possess (Levina and Ross, 2003). Greater technical knowledge increases the ability of clients to more precisely spell out contract terms and to effectively monitor rand supervise vendors (Kirsch et al., 2002), increasing their relative bargaining power. Later on, during the development process the effective software development requires project level integration of client domain knowledge and vendor technical knowledge (Tiwana and McLean, 2005).

Transaction cost theory	The main idea of this theoretical perspective is that organizational decision to purchase or manufacture goods and services is based on transaction costs. Transactions with high asset specificity are likely to be kept within firm boundaries, while the rest should be outsourced. (Williamson, 1991). Dibbern et al (2005) argue that in-sourcing is more cost efficient in creating strategic benefits through IS, if the provision of application services requires a high amount of firm specific human assets. According to Benlian and Hess (2009) application specificity is the most important driver of adopting Saas-based applications. The level of uncertainty is the major deterrent to outsource IT operation activities (Aubert et al., 2004; Benlian, 2009). Dibbern (2004) conceptualized environmental uncertainty in the IT outsourcing context as comprising business driven and technology driven uncertainty. Technology driven uncertainty captures the extent to which the required technical functions or features of the outsourced application may be changed over time (Benlian, 2009; Benlian and Hess, 2009).
Stakeholder theory	Organizational stakeholders are any group or individual who can affect, or is affected, by the achievement of organizational objectives (Freeman, 1984). Despite the different expectations and goals of key stakeholder groups there is a need of upholding the interest of these stakeholders to achieve successful IT outsourcing. Gottschalk and Solli-Sæther (2005) found stakeholder theory as second most important theory in the field of IT outsourcing. While there have been few research examining the employees impact on the outsourcing (e.g. Purcell, 1996), stakeholders beyond the company have been largely ignored especially when considering the pressure from large business partners.
Resource-based theory	Resource-based thinking considers that a company's resources include all assets, organizational characteristics, processes, aptitudes, information and knowledge controlled by that company and its employees (Barney, 1991). The most prominent use of the theory is in the preparation phase of the outsourcing process for defining the decision making framework and in the vendor selection phase for selecting an appropriate vendor (Perunović and Lindgaard Pedersen, 2007). For the sustainable competitive advantages firms are forced to rely on a multitude of outside suppliers for software and knowhow and in doing so gain access to valuable resources and external capabilities (Langlois, 1990). Kang et al. (2009) pointed out that case companies not only reduced cost but also enhanced their core business outcomes by utilizing high level of outsourcing at non critical items. The resource-based view in outsourcing builds from a proposition that an organization that lacks valuable, rare, inimitable and organized resources and capabilities, shall seek for an external provider in order to overcome that weakness (Barney, 1992; Petraf, 1993) and increase organizational flexibility. The level of organizational flexibility reflects the ability of the firm to anticipate, adapt or react to the changes in its environment (Volverda, 1998).

Table 1: Relevant theories

Further steps

Based upon prior research and above mentioned theories which are considered to be useful, we will develop a comprehensive research model for this study. Identified factors will be further on investigated in the form of an interview with several national and international ICT providers. In accordance to the research model the hypotheses and questionnaire will be developed. The questionnaire will be initially reviewed by the knowledgeable experts (Carmines and Zeller, 1979) and then a small pilot study will be conducted (Oppenheim, 1992). We will collect data using both, the web and paper-based survey. After revision of the

questionnaire the invitation letter will be sent out to several types of organizations using random sample of companies from Chamber of Commerce database. A reminder will be sent out two weeks after the invitation letter. To test whether non-response bias exists, the second reminder will be sent one month later. Such responses will be compared with earlier responses. This study will initially allow data collection from IT providers and later from people who are employed as top managers in SME who are also sufficiently informed to be able to determine the advisability of Saas for their organization.

Expected contribution to academic research is an empirically tested research model on the adoption of Saas which may be useful for future studies of SaaS adoption among SMEs. This study will also have implications for the practice. First, the findings will be interesting for SMEs who will consider SaaS adoption. They will learn which factors need to be considered to successfully select and adopt SaaS. The findings will be as well useful for SaaS service providers and system developers who will get insights on SMEs' needs as well as for the government who is responsible for setting up legal frameworks and public private institutions that are promoting the use of ICT among SMEs.

The research will be limited to Slovenia which may limit generalization of findings of the study. Our concerns about generalization are eased by the fact that Slovenia SMEs seem not significantly different from the overall European SMEs.

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THE USE OF AN E-LEARNING SPECIFICATION IN A CONTEXT AWARE MOBILE SERVICE ORIENTED ARCHITECTURE

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Abstract

This paper proposes a general-purpose (specific technology independent) service-oriented architecture of mobile learning (m-learning) systems. It deals with the following hypotheses, that: (1) educational technology advances much faster than education, but it remains both behind researchers' creativity and insufficiently robust for the purposes of the real world at system scale and (2) the pedagogical neutrality of a widely adopted e-learning specification (namely, IMS Learning Design) can serve as a basis for that particular pedagogy that a specific instructional designer wishes to employ in a mobile contextual learning setting. The latter e-learning specification contains a language designed at "pedagogy neutral" in order to enable a wider range of pedagogies to be supported. This research will contribute to advances in context awareness beyond the simple spatio-temporal level and will be based on Intelligent Adaptation (Educational QoS context) as a function of: an "Accessibility Field" (ICT infrastructure context), content-dependent accessibility and the levels of service defined in the architecture.

Keywords: mobile learning, contextual learning, Service Oriented Architecture, Learning Design.

1 RESEARCH MOTIVATION AND GOALS

Educational ideology, often against pedagogical science, idolized 'School' and treated anything else as second-class, including "learning on the go", learning with 'devices' or in absence of a teacher. Here we are interested in exploring the educationally unique opportunities offered by the fact that the learners are not tied down by organizational exigencies.

System-wide education, for all its social and educational advantages is at the same time a compromise for learning, which, while socially so deeply personal. A human teacher does provide certain individual attention, instruction, and resources –but will always be the N-bottleneck to personalization. Adaptation and context awareness are modern ways for technology-assisted learning systems to provide personalization.

The scientific objective of this research is the specification and design of an m-learning environment which, from an IT perspective will allow the accommodation of ever innovative technological developments without the need for redesign from scratch. This objective will be accomplished through the design of an appropriate context-aware SOA that will focus on the educational necessity and will include an Educational Quality-of-Service Layer. This framework will take the form of a System Architecture, based on the principles of OASIS (2006): Autonomy, Abstraction, Reusability, and Composability.

From a pedagogical perspective the mobility (of learners and teachers) will allow the integration of learning experiences which traditionally have been segregated: classroom, field, library and lab

learning. This objective will be accomplished through the introduction of productive and innovative combinations of modern cognitive and learning theories appropriately applied to the mobile (:across contexts) settings.

Finally, the added value of this paper is: (1) to set a new way for modelling context in mobile learning based in a well-known specification which is being supported by several Communities of Practice (such asRELOAD, LAMS, CopperCore,…), many organizations (for example standardization bodies, like: IMS, JISC, CETIS, …) and individual researchers and developers that are already using this specification and (2) to facilitate Learning Design (LD) players and editors in the field of mobile and contextual learning.

2 BRIEF THEORETICAL BACKGROUND

Previous research has shown that mobile phones are considered as boundary objects (Krogstie & Divitini 2007), in the sense that the teacher and the pupils see them from different perspectives in the classroom setting. For the students it is a personal device they use mainly for communication while for the teachers it is a tool that threatens the route of a predetermined learning process. On the other hand, it is also commonly accepted by researches that the rapid and accelerating move toward the adoption and use of mobile technologies could provide students and teachers with the ability to study away from the classroom and while on the move. Some of the state-of-the-art mobile learning reviews – for example, Frohberg et al (2009) and Naismith et al (2005) - have shown that m-learning could be an efficient, and innovative learning process if it is coupled with the suitable educational affordances (learning and cognitive theories, cognitive architectures, learning and communication tools, educational and activity scenarios, instructional design models, etc). Based on this rationale various pedagogical implications can be found in the recent literature, that actually facilitate instruction coupled with:

- theories of learning (such as: problem-based, case-based experiential, constructivist, informal and life-long, situated and contextual learning)
- cognitive theories (such as: cognitive load, cognitive flexibility)
- methods and techniques (such as: participatory simulations with "virtual world" metaphors technique, the 'scaffolding and fading' method,…)
- instructional design models, specifications and tool implementations (such as: the ADDIE model, socio-cognitive engineering, IMS- Learning Design)

About the LD specification: More specifically, Learning Design (LD) is an open technical specification that addresses the description of learning processes in a generic, formal way. It describes "who does what, when and with which content and services in order to achieve certain learning objectives" (Kopper 2005). It was initially launched by IMS Global Learning Consortium (IMS GLC 2003). Learning Design provides a generic and flexible language, a version of which is set out in the IMS- LD specification. While the Learning Design approach allows various kinds of learning strategies to be expressed, the language itself remains pedagogically neutral, in the sense that a system that has to interpret this language does not need to be aware of the pedagogical approach underlying the design, it only needs to instantiate it (IMS GLC 2003).

About context awareness: According to the classic definition by Dey and Abowd (2000), ''context is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves". One of the main requirements about building context aware applications that Dey (2000) identified was a need for suitable context model, which describes the relationships between different types and facilitates inference and abstraction of context.

The IMS- LD specification along with the ADDIE methodology is used in our research as the basis for the description of a mobile and contextual learning environment.

3 RESEARCH METHOD AND APPROACH

The main activities to be implemented will be based on an Instructional Design Model called ADDIE (Analysis - Design- Development- Implementation - Evaluation) (Tsai et al 2005).

In our research, the Analysis phase includes:

1. the identification of the educational problem which basically involves justification of the: (1) proper cognitive and learning theories and (2) the personalisation of the learning process through adaptivity to the context parameters (for example, the user characteristics)

2. its context, requirements and constraints as well as general orientations and functional and non-functional aspects of the system
- technical specifications for the SOA
- specification of the context awareness module
- the extension of the IMS Learning Design specification suitable for mobile learning

The Design phase includes the design of:

1. the system architecture at a high, abstract level
- design of the Information Model based on the IMS Learning Design specification
- design of the layers of the SOA

2. the system database
3. the context-aware model
4. the integration of the various pedagogies into the m-learning process (including use cases and pedagogical scenarios)

The development phase contains the development of:

1. the system database
2. the context-aware management engine

The implementation phase contains the implementation of:

1. the system database
2. the context-awareness engine
3. the SOA
4. the m-learning runtime environment, which will employ various components as web services (for example, an online Virtual World component in order to implement the didactic scenario that contains experimentation in a virtual lab)

Finally, the evaluation phase will contain conclusions of the didactic effectiveness and technical difficulties of the integration of the context- aware mobile service oriented architecture that will be based on the IMS LD Information model.
The UML class diagram of the proposed m-learning system is shown in the figure below.

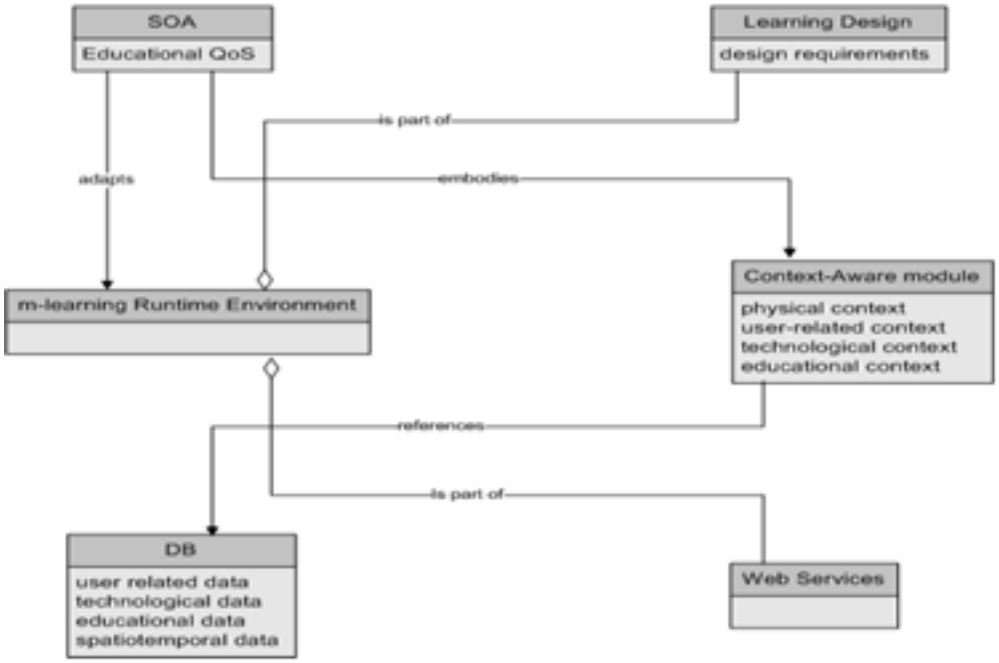

Figure 1 UML class diagram (Level 0 package diagram)

The context-aware model in our mobile learning system involves:

1. Physical context (spatiotemporal characteristics, including motion)

2. Technological context (characteristics of the ICT infrastructure such as bandwidth) and the device (screen size, battery, storage, connectivity etc)

3. User-related context (traditional user profile characteristics (like age, sex, existing knowledge etc) combined with more sophisticated characteristics (learning style, using the Felder-Silverman Learning Style Model)

4. Educational context (characteristics of the 'subject' being learned)

4 EXPECTED AND PRELIMINARY RESULTS

The initial research stage involved a literature review in order to identify the following:

- the types of mobile technologies (mobile web and wireless technologies, like GSM or/and UMTS or/and GPRS) and the learning/cognitive theories that are most suitable to support the mobile learning (Eteokleous & Ktoridou 2005, Eteokleous & Ktoridou 2009, Naismith et al 2005, Frohberg et al 2009, Sharples et al. 2002)
- the most commonly used models found in the recent bibliography for describing and modeling context (Strang and Linnhof, 2004) and
- any other similar research efforts (Siadaty et. al, 2008).

The next step involved the design of the Information Model. The scope of the information model includes the format of information that is exchanged (for example, the various multimedia datatypes), the structural relationships within the exchanged information (for example, data whose instance is time-dependent) and also the definition of terms used.

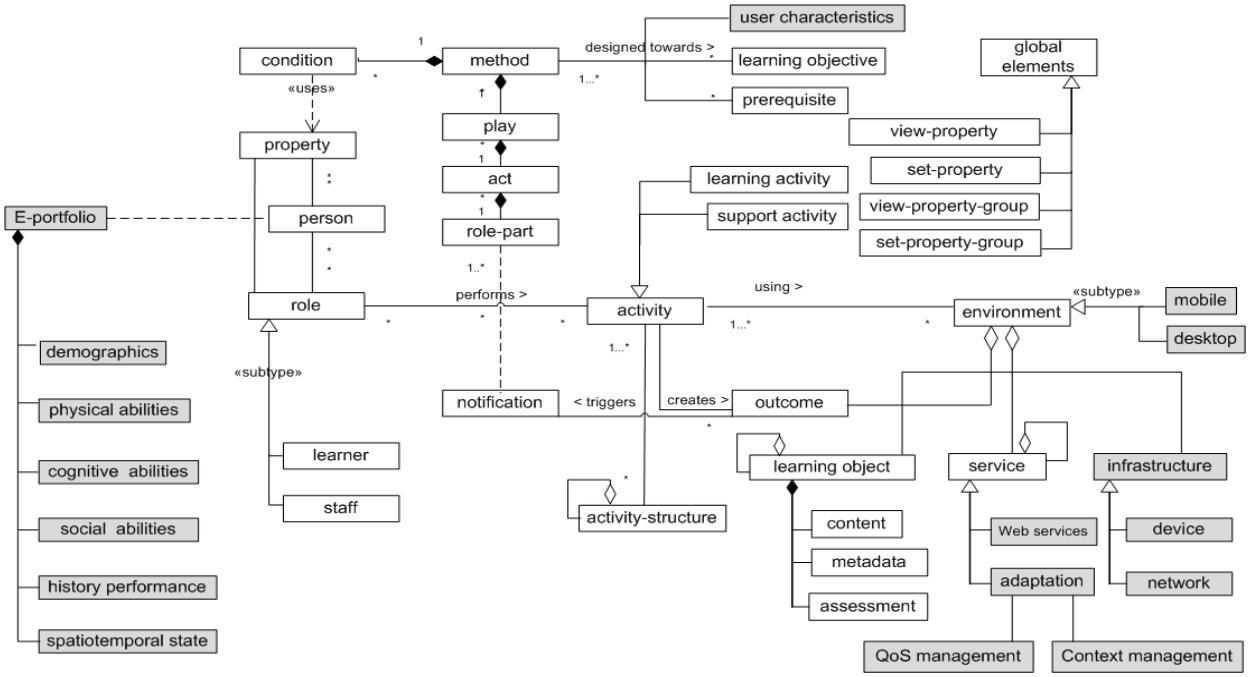

Figure 2 The context-aware m-Learning Design (cam-LD) Information Model

In the above figure above, the non-colored part of the UML diagram comprises the IMS LD information model which specifies learning activities to be performed within the context of an environment that contains merely learning objects and services. The colored parts of the diagram constitute our contribution: the extension to the conceptual design of this model, so as to include mobile, personalized and contextual learning. An 'intelligent adaptation' module will translate educational requests to the capabilities of current technological environment. The system will include adaptive content and user interface based on user (profile and interaction) personalization. Geographically distributed mobile learners interacting with educational resources call for a dynamic communication environment designed for handheld devices and taking into account fault tolerance issues and restrictions (bandwidth, screen size, etc). The 'QoS management' module will take into account the context–awareness rules and will adapt the behavior of the system services accordingly.

The Educational Services Oriented Architecture relates to balancing technological and pedagogical exigencies. The problem is how to utilize new technology without upsetting either 'the previous project' -designed without that particular technology available- or the current educational methodology -which is not likely to be abandoned (Mavroudi & Hadzilacos 2010).

Our research methodology will use as a basis this conceptual design to progress as follows: from the 'cm-LD' information model which extends LD for contextual m-learning, stem the corresponding (possibly more than one) ontologies. The review of the recent bibliography shows that the ontology-based approach is the most efficient method of context-aware modelling (Strang & Linnhof 2004) in conjunction with the following parameters: distributed composition, partial validation, richness and quality of information, incompleteness and ambiguity, level of formality and applicability to existing environments.

Since there is a plethora of LD-compliant editors and players already available in the market (most of them freely) suitable for desktop e-learning, we will examine in our research how to adapt these tools in order to include the case of mobile and contextual learning as well. Our wishful thinking is to promote interoperability in the m-learning field by promoting the use of an open technical specification and bring together communities from the research field (e-learning and m-learning) and the industry. While m-learning is still in its infancy, avoiding the spread of technical standards for m-learning is vital.

Context awareness and personalization techniques need to be integrated in the m-learning framework. Some examples that demonstrate this need in our case are mentioned below:

- an educational setting may include participants preferring (being able to communicate) in different languages. An educationally context aware system would use an automatic (for example, built-in VW environments) translator depending on the educational goal. For example if the educational goal is learning a 'foreign' language, then turning the translator on/ off is a different decision than if the educational goal is for two doctors to cooperate on assessing a cure for an illness in a post-graduate course.

- an image is transmitted from a learner (found in an art exhibition) to a classmate.

Depending on whether it was in the context of a history of art course, a painting course or a museum curator training session, the image quality that needs to be transmitted differs. Educational context (i.e. characteristics of the 'subject' being learned) has a central role in this approach and implies a number of design requirements.

The idea introduces the new notion of educational Quality of Service. Another example of the use of the educational QoS would be the relationship between the format type and the granularities of the LOs (Mavroudi & Hadzilacos 2010). Finally, the LOs should be accompanied with proper educational metadata suitable for mobile learning (Chan et al 2004).

The pedagogical framework of the proposed system (as in any system of technology enhanced learning) is inevitably affected by the underlying technologies. Our research aims at minimizing this effect by implementing a context-aware mobile architecture that promotes: (1) several learning strategies and (2) the idea of the Educational QoS (Mavroudi & Hadzilacos 2010).

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GENERATING CREATIVITY

CHALLENGING GENERATIVITY DESIGN PRINCIPLES IN THE GENERATION OF CREATIVITY SUPPORT SYSTEMS

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Abstract

Increasingly, managers use information systems that support decision making but only rarely do these systems support decisions that require creativity and inventive thinking. Such Creativity Support Systems are rare due to the complexity and unstructured nature of the underlying issue at hand, requiring specialized designs. I build on previous research that has proposed a set of Generativity Design Principles for information systems to better support creativity. I offer a platform to validate the feasibility and effectiveness of the Generativity Design Principles. This platform will help construct instances of Creativity Support Systems according to the principles, demonstrating their feasibility. I also demonstrate the effectiveness of the Generativity Design Principles by controlled lab experiments.

The platform I developed is the CAT-Factory, which constructs Creativity Assisting Tools (CAT), tools that include non-computerized tools to assist creativity and also computerized ones (Creativity Support Systems).

The CAT-Factory is developed following Design Science methodologies and will assist the user in creating the Creativity Assisting Tool for his specific environment.

Keywords: Generativity, Creativity, Inventive Thinking, Creativity Support System, Information Systems, Design Science.

MOTIVATION

Managers are being assisted more and more in making the right management decisions with many types of information systems. However, some management decisions require a faculty which is missing in existing software applications. This faculty is creativity. The faculty of creativity is considered to be the ultimate intrinsically human activity, a highly complex process, which is difficult to formalize and control (Goldenberg et al., 1999).

Nowadays there are different types of Information Systems that deal with Creativity and Inventive Thinking, however, as I noticed in my research, as most types of Information Systems (IS), Creativity Support Systems are domain specific and are designed for specific field of knowledge for specific types

of users. Moreover, unlike Information Systems that became commodities, the Creativity Support Systems are rare due to the complexity and unstructured nature of the underlying issue.
While focusing on the Creativity Support Systems world I found that the most effective approach for creativity is the Generativity that deals with the human side and the tool side to generate ideas. Hence, I was motivated to focus on Information Systems that support Generativity and on the design principles for such systems.
Therefore, the motivation driving this research is to validate the Generativity design principles and to enable better design for Creativity Support Systems and tools. This motivation brings me to build a platform, the CAT-Factory, which generates CAT (Creativity Assisting Tools) designs to assist the research, and hopefully in the future would also enable the common person to design his own CAT according to his own working environment and challenges.

RESEARCH GOAL

The study focuses on establishing a platform to validate feasibility and effectiveness of Generativity Design Principles. This goal is achieved by the following stages:

1. Design and implement the research tool - a platform that creates different types of Creativity Assisting Tools (aka The CAT-Factory).
2. Demonstrate the feasibility of Generativity Design Principles by design and implement new Creativity Assisting Tools using different combinations of these principles.
3. Study the effectiveness of chosen Generativity Design Principles by controlled lab experiments.

CONTRIBUTION

My research should contribute to both academia and practice. Within academic territory the research contributes to the research fields of Information Systems and Generativity by exploring the synergy they create and experiencing implementation of Generativity Design Principles.
The contribution of this research to practice is by enabling individual and organizations to create their own Creativity Assisting Tool to solve problems in their specific domain.

BACKGROUND

Creativity and Generativity

Computer systems nowadays are expected to enhance our creativity, reveal opportunities and open new vistas of uncharted frontiers (Avital and Te'eni, 2008). Creativity is considered the ultimate human activity, a highly complex process, difficult to formalize and to control (Goldenberg et al., 1999).

Generativity is generally defined as an ability or capacity to generate or produce something (Webster's Dictionary). According to Webster's Dictionary, to generate means to produce something concrete, to originate abstract concepts, to be a source or cause inspiration, or to reproduce. In sum, Generativity refers to a capacity for rejuvenation, a capacity to produce infinite possibilities or configurations, a capacity to challenge the status quo and think out-of-the-box.

Inventive Thinking

Inventive thinking methodologies were developed in order to model the inventive thinking process and qualities. Two of the leading inventive thinking methodologies are TRIZ and ASIT.
The research tool will investigate the usage of Inventive Thinking methodology as inventive algorithm in the CAT-Factory.

Creativity Support Systems

The term Creativity Support System is used in this study as a specific class of Information Systems that supports individual and organizational Creativity. A properly-designed Creativity Support Systems is an interactive system intended to help in compiling a problem and its environment (world of problem), and suggest possible solutions.
Avital and Te'eni (2008) introduced the concept of Generativity in the context of information systems design, and referred to Generative Capacity and Generative Fit in Information Systems. "Generative capacity" refers to the user's ability to reframe reality and subsequently to produce something ingenious or at least new in a particular context. "Generative Fit" refers to the extent to which an IT artifact is conducive to evoking and enhancing that generative capacity.
Deducing from Avital and Te'eni (2008) a Creativity Support Systems should answer Generative Capacity qualities as following: divergent cognitive process to cope with high ambiguity task's nature, open-ended task's boundary, unknown outcome's nature, creative or innovative desired action or process, orientation of open gaps outcome's, and differentiating or rejuvenating success criterion.

Design-Science in Information Systems Research

The design-science paradigm seeks to extend the boundaries of human and organizational capabilities by creating new and innovative artifacts. In the design-science paradigm knowledge and understanding of a problem domain and its solution are achieved in the building and application of the designed artifact. Design science creates and evaluates IT artifacts intended to solve identified organizational problems. Such artifacts are represented in a structured form that may vary from software, formal logic and rigorous mathematics to informal natural language descriptions. (Hevner et al., 2008).
The Design Science research methodology is used in this research to design the research tool, the CAT-Factory.

RESEARCH TOOL

My research tool is the CAT-Factory, which generates designs of Creativity Assisting Tools. Information Systems' design is usually based on structured processes, so in order to cover directions that are out-of-the-box, the CAT-Factory was built upon inventive thinking process. I chose ASIT methodology as the Inventive Thinking methodology to use since it is capable of handling different types of environments and fields of knowledge in an easy to implement manner.

The CAT-Factory's process includes the following stages:
(1) Input preparation: Arena, Human factor's attributes, and related Knowledge Base (I use the term Arena to describe an environment, in which an individual, or a team, are involved with solving problems related to a specific domain).
(2) System Design – including manipulating of Generative Design Principles, and defining creative algorithms, while calculating the first stage input's implications.
(3) Prioritizing CAT Designs.
(4) Giving user guidelines for the CAT instance implementation.

This CAT-Factory can produce different CAT designs per each Arena. The CAT types can have different values for attributes of: Implemented Generativity Design Principles, Inventive Thinking Algorithm, Technology, Instance design and implementation, Communication channels and Knowledge base.

RESEARCH METHODOLOGY

I use Design-Science methodology, as described by Hevner et al. (2008), as the research methodology that leads the development of the research tool, the CAT-Factory. This chapter describes the way this research answers the requirements of Design-Science methodology's guidelines.

The Design-Science Research includes the following guidelines:

(1) Guideline 1: Design as an Artifact - my research tool is the CAT-Factory, which generates designs for CAT instances. I will instantiate the CAT-Factory by software implementation and experiment it.

(2) Guideline 2: Problem Relevance - Creativity and inventiveness nowadays are relevant more than ever. Inventiveness assists enterprises to be competitive and successful by: cutting operational expenses and product costs, increasing throughput and revenues by innovative products and innovative marketing methods, and Enlarging products portfolio by inventing new products.

(3) Guideline 3: Design Evaluation – I will evaluate the CAT-Factory in terms of: functionality, performance, usability and fit with the organization.

(4) Guideline 4: Research Contributions: the CAT-Factory will be tested on producing CAT instances for different Arenas, and then I will test the CAT instances to produce solutions to problems in different Arenas; Novelty will be demonstrated by IS design process that is based on Inventive Thinking methodology; Generality is achieved by generalizing Generative Design Principles and several Inventive and creative methodologies and systems; Significance of designed artifact is based on system goal of assisting individuals and organizations to design their own CAT.

(5) Guideline 5: Research Rigor is demonstrated in this study by reviewing earlier researches of Generativity and Inventive Thinking support systems as a foundation for this study and evaluating empirically using experiment to test the artifact within an appropriate context.

(6) Guideline 6: Design as a Search Process: Implementation and iteration are central to this research. I will study prototypes that instantiate posed learned design prescriptions. I will iterate stages of design, implement, and test the application in order to arrive to satisfying CAT-Factory.

(7) Guideline 7: Communication of Research: the research results will be presented to a technical audience, researchers, and managerial audience.

The part of empirical evaluation (see guideline 5 above) includes a lab experiment with two types of CAT that were designed for the Arena of car designing. A second experiment will investigate the affect in the Arena of forest camping. These two experiments should explore two different sides of the scale of team and Arena attributes: from high technology and high level design skills of car engineers and car designers to no technology and basic skills of a common team of campers. These two experiments will demonstrate challenging Generativity Design Principles in two different worlds of problems.

PRELIMINARY RESULTS

The first prototype of CAT-Factory was already developed and enabled designing and implementation of three CAT types for the Arena of Cars industry.

These CAT types were experimented in May 2010 with the CMMN open car engineering group in Netherland (www.cmmn.org).

The CMMN experiment improved the concept of CAT design and by that improved the CAT-Factory design, e.g.: implications of order of users' usage of features that implement Generativity Design Principles, different features' contributions, and lessons regarding user friendliness.

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GENERATIVITY AND COLLECTIVITY: UNRAVELING INTERNET-BASED GROUP ACTIVITIES FOR INNOVATION AND COLLECTIVE ACTION

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Abstract

Analyzing how IT-induced collective action and mass innovation emerge against the backdrop of an increasingly connected world, we introduce the related concepts of generative collectives and collective generative capacity as a new theoretical lens for explaining the ability of groups to engage collectively in bottom-up acts of transformational change and innovation. In order to analyze what characteristics of a group increase collective generative capacity, i.e., make a collective highly-generative, this study will analyze several internet-based projects of mass innovation and collective action. Hereto, a mix of qualitative and quantitative methods is adopted as well as a positive lens to data collection, theory development, and system design. Combining the strengths of qualitative and quantitative methods can generate both in-depth, holistic insights as well as more generalizable results for understanding why some groups are more generative than others and how we can design systems that are conducive to their collective generative capacity.

Keywords: generative collectives, collective generative capacity, collective action, innovation, creativity

This submission of the doctoral research statement is supported by my supervisor Michel Avital, University of Amsterdam, Roetersstraat 11, 1018WB Amsterdam, Netherlands, Avital@uva.nl

1 STUDY BACKGROUND AND MOTIVATION

The ubiquity of mobile computing has resulted in a proliferation of internet-based group activities for innovation and collective action both within, across and outside conventional organizations. These groups perform a wide array of tasks and goals for instance networking, knowledge sharing and co-creation. In this study, we aim to construct a theory of "generative collectives" to describe *groups of persons with shared interests or goals who mutually engage in rejuvenating, reconfiguring, reframing and revolutionizing acts,* hence, this study focuses on those sets of internet-based collective activities that relate to generativity.

Any collective has the capacity to be generative, i.e. has "collective generative capacity", that is, *the ability of a generative collective to engage in acts of rejuvenating, reconfiguring, reframing and revolutionizing within a particular goal-driven context*. Nevertheless, the actual level of generative capacity of a collective—whether it is high or low—depends on its specific structural, cognitive, and affective configuration. Consequently, this study aims to develop and test a framework for analyzing how and why some collectives are more generative than others, by zooming in on those structural, cognitive and affective dimensions that affect collective generative capacity. Hence, the main research question underlying this study is: *what are the characteristics that make collectives highly-generative?*

The insights that emerge from answering this research question will enable us to understand why some organizations, communities, or collectives are more generative—i.e. more creative and innovative—than others by analyzing the factors that contribute to a group's collective generative capacity. Moreover, a thorough understanding of collective generative capacity as the root-cause of innovation and collective action by groups can help us answer the question *what design principles and features of an information system can enhance collective generative capacity*, that is, the potential of a group of persons for rejuvenating, reconfiguring, reframing, and revolutionizing.

2 RESEARCH OBJECTIVES

2.1 Practical Relevance

Collective generative capacity, as enabled through increased connectivity and mobile, ubiquitous computing, has radically changed our economic and societal landscape. It has shifted acts of innovation and collective action beyond the boundaries of conventional organizational forms, to collectives of distributed individuals who jointly and passionately engage in the pursuit of common goals. Understanding collective generative capacity and its resulting processes of rejuvenating, reconfiguring, reframing, and revolutionizing are essential for making sense of many socio-economic changes that we witness at present.

Through an understanding of the characteristics of collectives that increase generativity, our insights can inform the formation and continuation of groups and organizations as well as the design and development of information systems that evoke and encourage collective generative capacity.

2.2 Theoretical relevance

As aforementioned, we witness a new era of internet-based generativity that has hitherto primarily been addressed in popular literature, but which has received little scholarly attention to date. This study is therefore among the pioneering attempts to describe and understand these internet-based acts of generativity.

First, by defining and theorizing generative collectives and collective generative capacity, this study aims to provide a theoretical framework for analyzing and understanding how internet-based collectives engage jointly in generative acts. Such a framework represents a theoretical contribution to

those who wish to study internet-based collectives as well as for those who aim to understand the role of information systems in evoking and encouraging internet-based generativity.

Second, by adopting a highly interdisciplinary lens, based on organization, innovation, and information systems research, as well as a multimethod approach, this study attempts to provide both holistic as well as generalizable insights into the characteristics of groups that evoke and enhance collective generative capacity in order to explain why some collectives are more generative than others.

Third, through introducing the collective generative capacity lens, the traditional literature on both innovation and collective action can be approached from a new angle. To the innovation literature, this study contributes a perspective that looks at serendipitous, bottom-up processes of innovation by large groups of people, transcending conventional institutional, geographical, or cultural boundaries. With respect to the collective action literature, this study means a revival as well as a shift in focus from problems and issues associated with the provision of common goods to the positive synergistic effects of collaborative, grassroots, passionate action.

Finally, by explicitly addressing the question of how we can design and develop information systems that are conducive to collective generative capacity, this study attempts to combine both constructive and empirical elements and to generate a dialogue between technical and social theoretical frames, in an attempt to generate results that are clearly and constructively linked to practice (Lyytinen, 1999).

3 RESEARCH QUESTION

In line with the abovementioned objectives, the main question underlying this study is ***what are the characteristics that make collectives highly-generative?*** Moreover, based on knowledge of what characteristics of a group of people increase their collective generative capacity, we will also try to answer the question: *what are the design principles and features of an information system that are conducive to collective generative capacity?*

4 THEORETICAL BACKGROUND

This study builds on a review of a set of foundational conceptualizations on collectivity and generativity from multiple social science disciplines in order to delineate a set of common themes that provide the core underpinnings of our definition of generative collectives and collective generative capacity.

4.1 Collectivity

Table 1 provides a brief overview of the main theories of collectivity and community that we have reviewed, however, a full discussion of these theories is beyond the scope of this abstract. Therefore, here I merely summarize the common denominators in all these conceptualizations, namely: *shared* interests or goals; *collective* acts; and *mutual* engagement, interaction and exchange.

Table 1. Applications of the collectivity and community concepts in various disciplines

Theory	Discipline	Collective feature
Collective consciousness	Sociology (Durkheim, 1893)	A higher order consciousness shared by all members of (traditional) societies and is based on collective representations
Thought Collective	Philosophy of Science (Fleck, 1935)	A group of persons mutually exchanging ideas or maintaining intellectual interaction
Collective Unconscious	Psychology (Jung, 1953)	Encompasses archetypes—definite pre-existent forms in the psyche—that are shared and identical in all individuals.
Collective Action	Sociology, Economics (Olson, 1965)	The pursuit of a shared goal or set of goals, or the provision of public goods by a group of people.
Collective Mind	Organization Science (Weick & Roberts, 1993)	A pattern of heedful interrelations of actions and collective mental processes of a group of individuals
Collective Intelligence	Communication Science (Lévy, 1994)	A shared or group intelligence results in enhanced intellectual performance.
Creative Collectives	Organization Science (Hargadon & Bechky, 2006)	Creativity is the result of the (re)combination of ideas from individuals with shared interests who jointly engage in creative collectives.

4.2 Generativity

The concept of generativity has been used effectively in multiple disciplines as summarized in Table 2. The common denominators in all these conceptualizations are: producing new or altering existing configurations and possibilities (*rejuvenating* and *reconfiguring*); *reframing* the way we see and understand the world; challenging the status quo (*revolutionizing*).

In our attempt to conceptualize collective generative capacity, we primarily build on the notion of "generative capacity"[1], which comprises one's ability to produce new configurations and possibilities, to reframe the way we see and understand the world and to challenge the normative status quo in a particular task-driven context (Avital and Te'eni 2009), i.e. one's ability to generate creative ideas that lead to innovation or produce overall value.

We extend the notion of generative capacity beyond its original focus on the individual[2] and direct our attention toward those generative processes that occur within and between collectives.

[1] Generative capacity is inherently linked to creativity, yet, for a discussion of the fundamental differences between creativity and generative capacity, see Avital & Te'eni (2009)

[2] The notion of generative capacity has its origins in psychology and hence does not consider the collective as a unit of analysis.

Table 2. Applications of the generativity concept in various disciplines

Theory	Discipline	Generative feature
Psychosocial generativity	Psychology (Erikson, 1950)	A focus on productivity and creativity; the drive to rejuvenate and to reproduce
Generative grammar	Linguistics (Chomsky, 1972)	A finite set of rules that generate infinite syntactical configurations.
Generative metaphor	Organization science (Schön, 1979)	A figurative description of social events by which we gain new perspectives and reframe attitudes and behaviors
Generative capacity	Social psychology (Gergen, 1994)	The ability of the individual to challenge the status quo and to transform social reality and social action.
Generative schemes	Architecture (Alexander, 1996)	A set of simple instructions that allows anyone with basic skills to create a well-constructed artifact and gives rise to infinite variations.
Generative inquiry	Social studies (Zandee, 2004)	A recurring, reflective hermeneutic process that generates theoretical quantum leaps and offers a revitalization or reframing process of our epistemic stance.
Generative buildings	Organization science (Kornberger and Clegg, 2004)	An undefined space that invites its inhabitants to (ab)use and (re)define space in infinite ways.
Generative learning	Educational science (Yorks, 2005)	A form of learning that is necessary for transformational changes in practice, assumptions, and interpretive schema.
Generative fit	Information systems (Avital and Te'eni 2009)	An aspect of a system that enhances one's generative capacity; one's ability to produce novel configurations.

Source: Avital and Te'eni (2009) (adapted and extended)

4.3 Generative Collectives and Collective Generative Capacity

Based on the common denominators of collectivity and generativity from the previous section, we provide the following working definition of generative collectives and collective generative capacity:

Generative collectives: a group of people with shared interests or goals who mutually engage in rejuvenating, reconfiguring, reframing and revolutionizing acts.

Collective generative capacity: the ability of a collective to engage in acts of rejuvenating, reconfiguring, reframing and revolutionizing within a particular goal-driven context.

We consider collective generative capacity to be a *trait* of a collective. In this context, a trait is a habitual pattern encompassing behavioral, cognitive and affective elements, which is relatively stable over time, differs among collectives—i.e. some collectives are more generative than others—and influences behavior and action. The generative capacity of a collective is affected by the generative capacity of the individuals making up the collective; however, it is greater than the mere sum of the generative capacities of all individuals.

5 RESEARCH METHOD AND APPROACH

In the exploratory phase of this study (see Figure 1), a literature review has been conducted in order to come up with an initial theory about generative collectives and collective generative capacity. In the qualitative, descriptive stage (Stage 1), I will collect data through a number of qualitative methods—namely interviews, participant observation, project documentation (platforms and wikis), focus groups, as well as visual methods (photos, videos etc)—in order to establish a set of factors that influence the generative capacity of internet-based collectives. Hence, this main data collection stage serves to further extend the theory as developed during the literature review as well as to evaluate it.

In the explanatory, quantitative stage (Stage 2), we will use a survey in order to analyze the relation between the factors as delineated from the first stage and generative output and hence to test our theory about the characteristics of collectives that increase their collective generative capacity, hence, their generative outputs. Moreover, if feasible, an experiment (Stage 3) will be conducted to prescribe and test quantitatively the relation between a set of system characteristics—as derived from the characteristics of highly-generative collectives—and the collective generative capacity of groups.

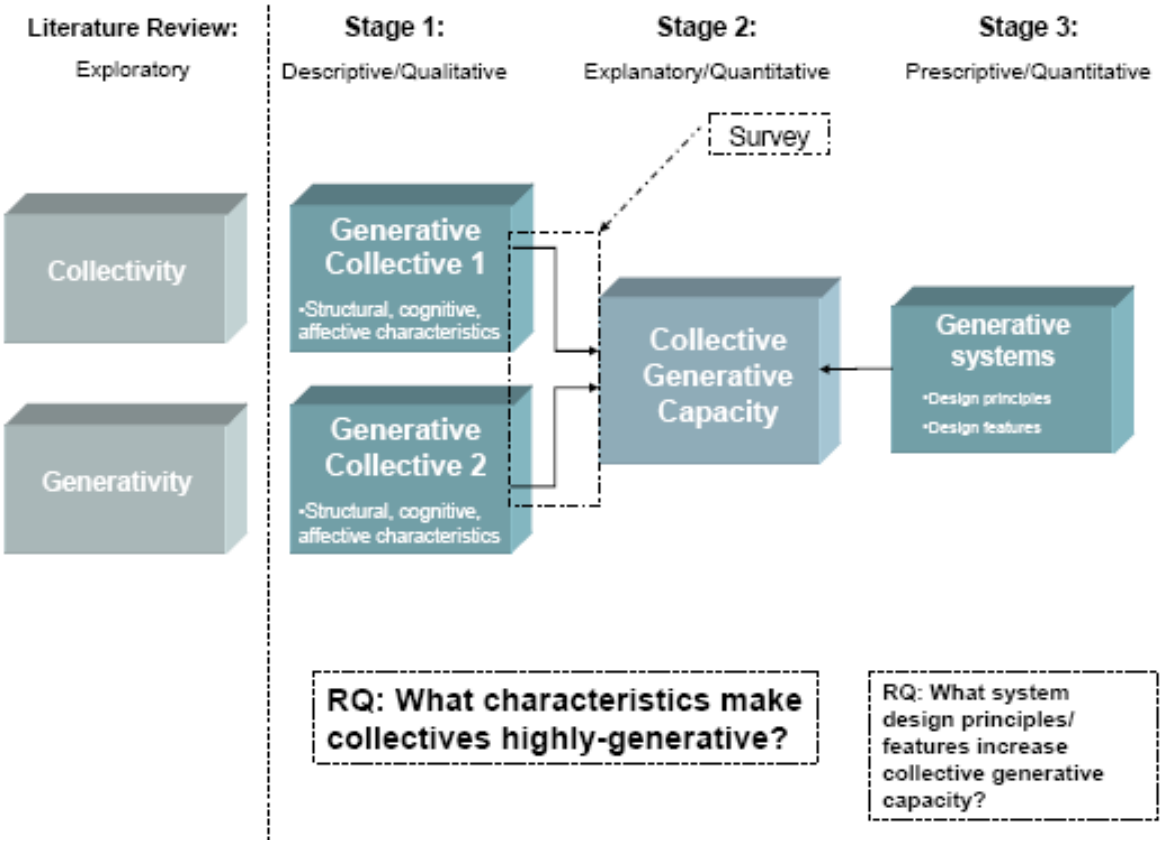

Figure 1. Research Model

6 EXPECTED RESULTS AND RESEARCH CONTRIBUTION

Based on the theoretical and practical relevance outlined in the beginning of this proposal, I anticipate several theoretical and practical contributions to result from this study.

First of all, the objective of this study is to develop a theoretical framework for understanding what characteristics of collectives enhance collective generative capacity, hence, the ability for generative acts and outcomes. Such a framework would be among the pioneering attempts to describe and understand the new era of internet-based innovation and collective action that we witness at present and which is as yet understudied.

Second, by combining an interdisciplinary set of perspectives, this study aims to generate in-depth insights into collective generative capacity that not only helps us to understand internet-based collectives, but also to shed light onto high-generative collectives of all sorts; within and outside traditional organizations.

Third, through employing a mixed method approach, this study combines the strengths of both qualitative and quantitative methods and hence, can generate both in-depth, holistic insights as well as

more generalizable results. Therefore, it allows for the development as well as the substantiation of a comprehensive theoretical framework of generative collectives and collective generative capacity.

Fourth, the insights of this study are relevant for IS researchers by disentangling the role of information systems in evoking, enabling, and enhancing collective generative capacity and by theorizing and potentially testing a set of system design principles and features that are conducive to collective generative capacity. Therefore, I submit that the theoretical framework this study aims to generate can contribute to designing and equipping systems and work environments that help collectives realizing their capacity to be generative and consequently be more empowered, creative, and innovative.

Given the proliferation of internet-based generative acts, a thorough understanding of generative collectives and collective generative capacity based on empirical research can provide useful insights into many relevant, but as yet unknown, issues of group-based, bottom-up problem solving, learning, creativity, and innovation occurring through internet-based platforms.

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TECHNOPHILIA: FROM ENTERTAINMENT TO DIGITAL LITERACY AND E-GOVERNMENT – A NEW MULTILEVEL CONCEPT FOR TECHNOLOGY ADOPTION

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Abstract

The new era of E-Government provides the opportunity to explore technology adoption by the individual, the organization or at the national level. The examination can be performed from various points of view: top-down processes of service supply and e-democracy; bottom-up processes of e-participation and e-consuming, and more.

This study follows two main lines: to propose a theoretical model suggesting a cultural factor that affects technology adoption, mainly the Internet media; and to provide empirical support for the viability of this theoretical model. This is done on individual and organizational levels with some look at the national level.

Online entertainment and communication are two types of Internet activity that are deeply analyzed in this study. By merging these activities into the field of Information Systems (IS) research, this study develops a new model for technology adoption: Technophilia. Technophilia, a term originally coined and developed in this study, is the desire to use technology and openly communicate and collaborate with others. Technophilia is expected to be linked with rewarded and knowledgeable technology adoption. Technophilia can be perceived as an opposite term to technophobia. In terms of IS theories a technophile Attitude is expected to be revealed in enjoyable Experience which is correlated with high Perceived Ease of Use, critical Perceived Usefulness, and adaptive Digital Literacy.

In its first part, the study portrays the technophile user. This is carried out by analyzing surveys results and reviewing studies and meta-analyses in the field. The findings at the individual level suggest a strict distinction between two types of users: technophile and non-technophile. Each one of them is closely related to digital literacy, but not to the other. The contribution of the enjoyable experience – online entertainment and communication – to digital literacy is higher for less technophiles users. This suggests that the enthusiasm towards using technology for communicating with others and enjoying its entertainment capabilities contributes to digital literacy especially when it is low – in the first steps of adoption.

The heavy dependence on entertaining experience, at the beginning of the adoption process, suggests a strong psychological approach-avoidance conflict. This stage is termed Techno-complex and is prominent among low socioeconomic status users. Enjoyment plays a key role in successfully solving the techno-complex.

The enthusiasm plays its role at the beginning of the adoption process; encourages the new adopter to gain experience. Yet, technophile users show a decline in enthusiasm, which is expressed in lower and more varied levels of Perceived Usefulness (PU). Perceived Ease of Use (PEOU) is higher for them, in comparison to non-technophile users. The decline in PU with experience and its increased variance – probably because of the ability to perceive usefulness in a more realistic manner – may reflect the acquired technological sophistication. The enthusiasm is much more selective and specific once the user becomes an expert.

This is the proposed profile of the experienced user, who has acquired a deep understanding of the technology and is not subjected to norms or easily impressed; and therefore does not necessarily tend to perceive it as highly useful.

In its second part, the study portrays the technophile manager. The organizational context is local e-government; a dynamic environment where the influence of decisions on information, communication channels or services supply is immediate and vast.

This part of the study includes a comparative evaluation of e-government in a large sample of municipal authorities; followed by a quantitative analysis; and finally interviews with managers in local authorities. The evaluative research provided the dependent (explained) variable: local e-government index, which includes four sub-indices. Demographic, socioeconomic and financial data could not explain the variance in local e-government development in Israel. However, the study exposes the black box of organizational decision making by combining the results of survey questionnaires with the outcomes of interviews with managers in local authorities.

The interviews revealed an individual and intuitive approach to Internet websites and to IS planning and implementation. The individual technophile attitude is expressed, in the organizational context, as technological sophistication and mindfulness; and leads to citizen-oriented e-government in local authorities in Israel.

Vast theoretical and practical implications are presented in this study. Those can be learned by IS managers as well as managers in general, and by policy makers. Is there a technophile user profile? What are its characteristics? What are its expressions at work? What should be the variables in evaluating citizen-oriented local e-government? To what extent can technophilia predict the quality of e-government services? The experienced user is expected to attribute to the technology its specific value of information, not subjected to management fashion or social contagion. The ability to be aware of new technologies and selectively perceive their usefulness and value – makes the subjective opinion a valuable datum. This dynamic nature of technophilia, termed Mindfulness, complements technological sophistication in characterizing the technophile individual.

The theoretical contribution of the study is expected to be meaningful in further analysis and understanding of concepts such as Human and Social Capital, Deliberative Democracy, Digital Divide, Productivity, and more. The practical contribution of this study is mainly in creating actionable managerial insights that can help organizations improve their competitiveness through worker engagement strategies.

A SHARED DECISION SUPPORT SYSTEM (DSS) THEORETICAL MODEL APPLICATION FOR THE CASE OF PRENATAL TESTS

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Abstract

The model of Shared Decision Making (SDM) was originally designed at the end of the 1990's as a means of conceptualizing and promoting patient-centered practice. A wide range of studies has been carried out in this field over the last three decades. This study focuses on Patient Decision Support (PDS) in the field of prenatal testing.

This study has three main objectives. First of all, implement and empirically test a new theory of Medical Decision Making (MDM) under uncertainty. Secondly, explore and empirically test the PANDA Bayesian model. Finally, merge between the two models to support more elaborate scenarios such as whether or not to perform a test (second model) and whether to choose private or public healthcare services(first model).

The first model which is a financial model implemented to support the choice between private and public physician to operate an invasive test (CVS or Amniocentesis) basing on medical data and personal monetary preferences. Structured online questionnaires used to gather the data. The second model implemented to support the core sequence of prenatal tests in Israel (Nuchal translucency, early ultrasound, triple test/quadruple test, amniocentesis and late ultrasound). Structured questionnaires used to gather the data. The second study was performed in collaboration with "Maccabi" health care services.

Keywords: decision making; shared decision making; medical decision making; normative models.

1 INTRODUCTION

Decision making is an important part of everyone's personal life. Decision making is the process of choosing a preferred option or course of action from among a set of alternatives. The decision making process often begins at the information-gathering stage and proceeds through likelihood estimation and deliberation, terminated by the final act of choosing. Many situations concerned with decision making involve tradeoffs between multiple attributes of different options. Medical Decision Making (MDM) is a case in point. There are many factors that may influence patients' preferences for treatment. The relationship between risk propensity, preferences and treatment decision making therefore warrants further investigation. Delineating such complex relationships may enhance the understanding of just one of the multiple influences affecting patients' treatment choices. (Gaskin, Kong, Meropol, Yabroff, Weaver, & Schulman, 1998).

Deciding whether to go through an invasive diagnostic pregnancy test, such as Amniocentesis or CVS, is a complicated question that involves taking into account many factors, including the risk that the fetus will have a chromosomal abnormality, the risk of pregnancy loss as a result of the invasive procedure, and the consequences of having an affected child if diagnostic testing is not done. (ACOG, 2007) Decision making is also an indispensable part of the healthcare professional's routine, and by no means an easy one. In addition to the imperfections of the clinical data and the uncertainty of treatment outcomes, trying to come up with an accurate evaluation of the patient’s state may require time-consuming, costly and risky diagnostic procedures that may produce misleading results. Therefore, physicians may be compelled to treat patients whose state is unclear to them. Many of the decisions made by physicians are based on knowledge that has been gained through collective experience, while some decisions are made on the basis of deductive reasoning or physiological principles. (Shortliffe, Perreault, Wiederhold, & Fagan, 2003)

In the last decade, the clinician-patient relationship has become more of a partnership.

Shared Decision Making (SDM) is a process within patient-centered consultation that involves both the patient and doctor discussing management options and coming up with joint management decisions (Thistlethwaite, Evans, Tie, & Heal, 2006).

Patient-centered decision making spans a wide spectrum of cases, from decisions made by individual patients to policy-level decisions about large populations. Individual patients face a very specific task while trying to find out what the 'best' decision for them is within a distinctive medical scenario. Individual-patient decision models use patient characteristics to determine the probability of specific outcomes, as well as individual patients' preferences for these outcomes. At the level of policy, which involves a consideration of populations of patients, the purpose is to identify the decision that is "best" for groups of patients. Models associated with populations of patients are concerned with general clinical settings, use representative indices of risks and outcomes for these populations and may involve additional outcome measures like the cost of examination. Examples of such studies include the cost and benefits of prenatal screening for CF (Garber & Fenerty, 1991) or the cost and benefits of prenatal diagnosis through Amniocentesis(Goldstein & Philip, 1989). Certain generic models have been suggested for common medical problems, which examine broader clinical questions in less restricted settings. Many of these models fall in the middle of this spectrum(Eckman, 2001). Well-known examples are Pauker and Pauker’s genetic counseling analysis of the decision to perform Amniocentesis (Pauker & Pauker, 1987b) (Pauker & Pauker, 1987a).

The term “Decision Model” may be defined in many ways: "a way of representing the complexity of the real world in a simpler and more comprehensible form" (Buxton, Drummond, Van Hout, Prince, Sheldon, Szucs, & Vray, 1997); "a representation of the available alternatives, events of interest and the combination of objective and predictable elements that produce a recommendation that is consistent with underlying data and assumptions" (Sanders, Nease, & Owens, 2000). That is, decision

models provide a normative analytic framework for representing the evidence, outcomes and preferences involved in clinical decision making.

Normative analysis is much harder to categorize. It deals with how idealized, rational, super-intelligent people should think and act.

Such normative analysis is marked by coherence and rationality, usually in terms of precisely specified desiderata or axioms: if the decision maker believes so and so, he should be expected to act in such and such a manner. As is often the case with mathematical systems, the power of any set of desiderata stems from their logical, synergistic implications.

In normative analytical models, axioms, basic principles and fundamental desiderata are determined by what investigators believe to be logical, rational and intelligent behavior. The second phase of this process involves variations on these themes in the same way that can be applied to mathematical systems: what happens if this axiom is dropped, or if the axiom is modified in such a way?

In these analysis models, there is a dynamic interaction between the real world, ruminations about the real world, and abstract mathematical systems.

1.1 Motivation of the Study

The US Office of Technology Assessment (OTA) defines defensive medicine as follows: defensive medicine occurs when doctors order tests, procedures, or visits, or avoid high-risk patients or procedures, primarily (but not necessarily solely) to reduce their exposure to malpractice liability. When physicians take measures – such as extra tests – directed primarily at reducing malpractice liability, they are practicing positive defensive medicine. When they avoid certain patients or procedures, they are practicing negative defensive medicine (OTA, 1994), The "US Office of Technology Assessment" Website.

According to the Israeli Medical Risk Management Company (MRM), over 8% of the events reported by insurance medical centers in Israel between 1991 and 2007 were related to the domain of obstetrics. Moreover, obstetrics is the medical field concerned with the highest financial risk (app. 34%) (MRM, 2007), The "MRM Statistics" Website.

The following account by (Chen, 2007), The "e-Magazine of Culture and Content" Website represents a position most Israeli gynecologists would agree with: "It is clear that the pregnant Israeli woman is willing to go through a lot of trouble in order to reduce her anxiety and fears. The fact that Israeli pregnant women are willing to take so many preliminary tests during their pregnancy, despite the large expenses involved, demonstrates that; from anatomical ultrasonography screening, Nuchal Translucency, alpha-fetoprotein, genetic testing, routine ultrasonography to Amniocentesis. In my estimation, there is no country in the world, even amongst the most developed countries, where women go through such a sequence of tests. In most other countries, some of these tests are very rare, if not unacceptable."

SDM's potential contribution to the improvement of the quality of the decision making process (Gravel, Legare et al. 2006) places it at the front of current MDM research (Joosten, Defuentes-Merillas et al. 2008). (Wirtz, Cribb et al. 2006) suggest that the range of treatment options available to or offered by the physician are likely to fall within a professionally agreed range, one of them refers to physician's knowledge and assumptions about the patient's values and preference.

This thesis consists of two studies that implement, evaluate and empirically tests two theoretical decision models for the case of prenatal tests. These models refers to tailored decision making at the individual level by taking into account personal medical and financial preferences, personal characteristics, and medical information.

This thesis try to serve a little step towards the Deborah A. Driscoll1 vision "Women need to be aware of all the different screening options that are available, including their detection rates and limitations, so that they can choose the test that's best for them." (ACOG 2004), The "American Congress of Obstetricians and Gynecologists" Website.

2 IMPLEMENTATION AND EVALUATION OF A NEW NORMATIVE MDM THEORY UNDER UNCERTAINTY

The theory of MDM under uncertainty (Karni 2009) is an axiomatic theory that sees the process of MDM as choosing among a course of actions, following a diagnosis of a patient's condition and consist from: the medical treatment itself, the facility in which it is to be administered and if perceived relevant, the individuals who administer it.

For example, a patient that diagnosed with prostate cancer given his specific personal characteristics (medical history, age, physical condition, and so forth), must choose among:

- Various treatments (e.g., radical prostatectomy, radiation therapy)
- Medical facilities in which he is to be treated (the local hospital, a medical center in another city)
- Physician who performs the surgery or administers the therapy of choice

As a normative model, the question that stands behind this model is how an informed patient should choose among the possible courses of actions.

The essence of this model is that patient's preferences are represented as an outcome-dependent expected utility function where each outcome is actually a possible patients' post-treatment state of health that includes the side effects of treatment, the associated pain and inconvenience, the direct monetary expenses and the potential loss of income.

2.1 Study questions

The study questions serves two main objectives: first, validity check of the model assumptions regarding human behaviour and second, as an assisting/supporting tool for the question that follows the decision to have an invasive diagnostic CVS or Amniocentesis test – choosing the best physician per woman to perform the examination and more specifically preferring between expert physician with better skills and higher cost and average physician with average skills and lower to zero cost (in case of fully or partly subsidized test).

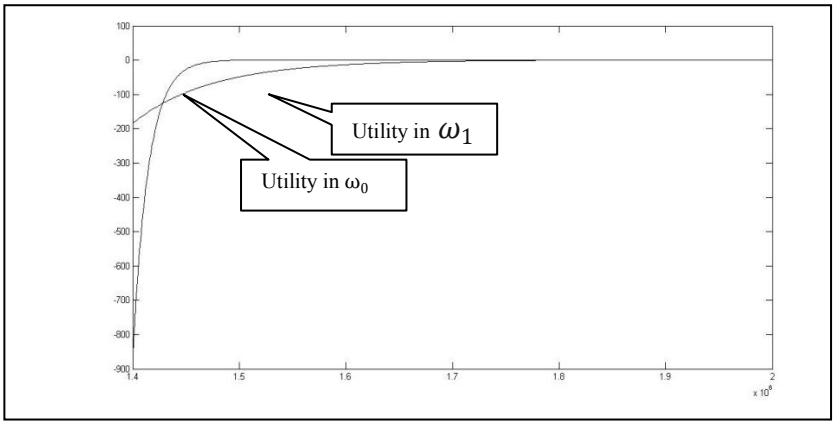
2.2 Partial Results

2.2.1 State dependent versus non-state dependent

Examination of the participants' Willingness To Pay (WTP) to avoid playing in a lottery game with 50% chance to win and 50% chance to lose a specific amount of money in two different health states (continued pregnancy and fetus loss), indicates that most women (70% in CVS, and 76% in amniocentesis) are non-state dependent. Among the state dependent women (30% in CVS, and 24% in Amniocentesis) two types were recognized. The first type (type 1) refers to women that are WTP more, to avoid playing in a lottery, in better health state, the second type (type 2) is vice versa.

[1] Immediate past chair of the ACOG's Committee on Genetics

2.2.2 Individual Utility Functions and Maximal Test Price



Data:
$x_0 = 1{,}500{,}000$
$x_1 = x_0 + 1{,}000{,}000$
$y_0 = 6{,}000$
$y_1 = 10{,}000$
$\pi(\omega_0) = 50\%$
$\pi(\omega_1) = 10\%$
Risk averse calc:
$r_0 = 0.32335$
$r_1 = 0.20781$
Alignment calc:
$p = 0.99$
$a_0 = 1.000031963$
$a_1 = 6.245084082$
$b_0 = 1.37867E + 40$
$b_1 = 5.2308E+296$

Figure 1. State dependent participant, type 1 ($\boldsymbol{r_0 > r_1}$)

Test price and physician skills simulations

Where:

Expert physician price	**4500 ILS**	**4500 ILS**
Average physician price	**0 (full subsidize)**	**570 ILS (partial subsidize)**

***p* Expert physician = 0.995, *p* Average physician = 0.99**

Maximal price calculation	3186.33 ILS	3670.73 ILS
Recommendation	Go to Average	Go to Average

***p* Expert physician = 0.9975, *p* Average physician = 0.99**

Maximal price calculation	4635.64 ILS	4500 ILS
Recommendation	Go to Expert	Go to Expert

***p* Expert physician = 0.999, *p* Average physician = 0.99**

Maximal price calculation	5463.96 ILS	4500 ILS
Recommendation	Go to Expert	Go to Expert

3 IMPLEMENTATION AND EVALUATION OF PANDA MODEL FOR PRENATAL TESTING IN ISRAEL

The PANDA model (Norman, Shahar et al. 1998) is a Bayesian influence diagram that implemented an analytic framework to recommend strategies for selecting and interpreting prenatal tests. Model recommends on the best strategies for individual woman after taking into accounts her particular preferences and disease risks that include her characteristics and her family history.

3.1 Study questions

The study questions serve two main objectives: first, empirical testing of the PANDA model for the core sequance of prenatl tests in Israel. Second, test the expanded model including the financial aspect of utility.

4 POTENTIAL CONTRIBUTION OF THE STUDIES

4.1 Scientific contribution

SDM's potential contribution to the improvement of the quality of the decision making process (Gravel, Legare, & Graham, 2006) places it at the front of current MDM research (Joosten, Defuentes-Merillas, de Weert, Sensky, van der Staak, & de Jong, 2008). Scott & Lenert, 2000 suggest two future lines of research in the field of PDS: the first aims to improve the usefulness of such systems by tailoring decision support to the patient's decision making style; the second focuses on helping patients overcome cognitive problems that impair complex decision making concerned with choosing between several risky alternatives. This study joins the first suggested line of research aiming to consider how several of the leading models and paradigms of the field can be used in combination with one another.

Both theoretical models are thus to be empirically explored, verifying their consistency vis-à-vis real-world scenarios and their potential use.

The MDM theory can also used for market analysis.

The financial aspect is now taking into account in the PANDA model

4.2 Practical contribution

The practical implications of this study relate to patients' ability to consider the healthcare alternatives available to them – specifically, women facing the options of prenatal testing, the end-result being – reducing unnecessary administration of prenatal tests.

By improving our knowledge of decision making considering prenatal tests, we mean to help reduce decisional conflicts and stress this process involves.

References available on request.

RISKS IN ENTERPRISE-SYSTEMS IMPLEMENTATION: A MODEL AND EMPIRICAL VALIDATION

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Abstract

The complex implementation of large scale Enterprise Systems (ES) (such as ERP and CRM) and their strategic importance has created a large body of IS research dealing with its success and failure. Most academic research in this area, including the "variance approach" and the "process approach" were qualitative in nature with little empirical attention. Moreover, most studies have not considered the role of uncertainty and the concept of "risk" in ES implementation projects. In this work, we focus on the relationship between risk and success in implementation of ES. We propose a multi-dimensional integrated research model, that relies on IS theories, to elucidate the sources of risk, the manner in which risks are realized and their impact on implementation success. The model is tested and validated based on data collected in two separate studies: a secondary research that was established by the European FP5 project known as the BEST project (2004), and a primary internet-based survey that was carried out in Israel. We use tools from data mining and Structural Equation Modeling (SEM) to offer a quantitative risk analysis of ES implementation projects. The results of this study will provide recommendations, based on the quantitative analysis, for management and IS professional to increase the likelihood of success of ES implementation.

Keywords: Enterprise Systems Implementation, Project Risk Management, Data Mining

1 RESEARCH MOTIVATION AND GOALS

The complex implementation of large scale Enterprise Systems, such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) has created a large body of research dealing with its success and failure in both IS academic and trade literature. Most academic research in this area, including the "variance approach" and the "process approach", were qualitative in nature with little empirical attention. Moreover, most studies have not considered the role of uncertainty and the concept of "risk" in ES implementation projects.

This research studies the threats involved in successful completion of Enterprise Systems (ES) implementation projects. These threats were dealt in Project Management Literature under the term "risk" that was defined as the exposure to the probability that an event with adverse consequences might occur (Ben-David and Raz, 2001). We rely on this definition, and investigate ES implementation risks by developing a conceptual multi-dimensional model of ES implementation risks and showing their impacts on implementation success. This model will be tested empirically. Specifically, this research focuses on the following three goals:

- Developing a research model that will comprehensively represent all aspects of risk and success in ES implementation projects, based on existing theoretical approaches in Information Systems (IS) literature and in Project Management (PM) literature.
- Using statistical methods and data mining techniques to empirically examine the relationships proposed in the research model, with the goal of identifying the relations between aspects of risk along the ES Implementation life cycle.
- Developing new tools to identify and analyze risk in ES implementation projects.

In order to describe the elements composing the term "risk", we distinguish between risk events and risk factors, in accordance with Ben-David and Raz (2001). A risk event is defined as a discrete incident whose occurrence can negatively affect at least one of the project goals. A risk factor is defined as a factor associated with the creation of a risk event and as an entity that affects the probability of the risk event's occurrence. Based on these definitions and the ES implementation success model outlined by Markus and Tanis (2000), we propose a conceptual framework. This framework, shown in Figure 1, consists of four theoretical dimensions: risk factors, risk events, project context characteristics and ES implementation success, representing the following sequence: Risk factors are expected to cause risk events which, in turn, affect the success of ES implementation. The project context characteristics affect risk events, as well.

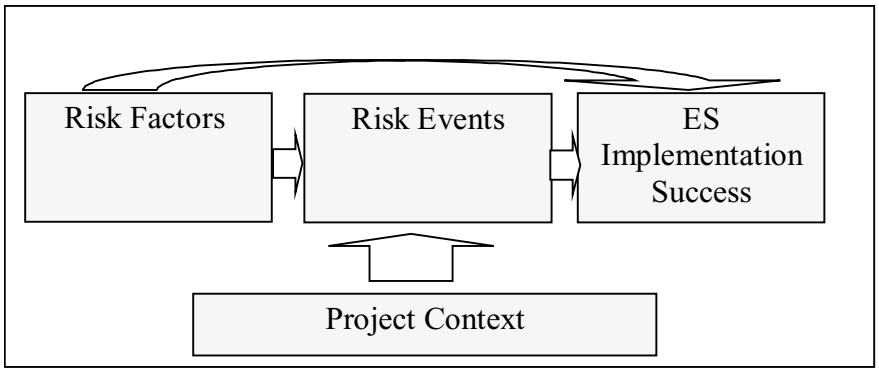

Figure 1: Conceptual Framework of Research Model

Based on this conceptual framework, we formulate the following four research questions, which we plan to investigate at the empirical stage of the research:

- Which risk factors or project context characteristics are associated with the occurrence of risk events at the different phases of the ES lifecycle?

- Can risk factors and project-context characteristics be used to explain different types of risk events?
- Which factors have the most predictive power in terms of distinguishing between different types of risk events?
- What is the affect of risk factors and risk events on ES implementation success?

2 BRIEF THEORETICAL BACKGROUND

In this research we draw on existing models to address IS success, adapted for the unique characteristics of ES, using the project risk management approach. As notes, the conceptual model of Figure 1 is based on the principles of the ES implementation success model (Markus and Tanis, 2000) which relied on the Structuration approach (Giddens, 1976). This model emphasizes the affect of unpredictable interactions between the members of the organization and the environments are responsible to problems which lead to suboptimal success. A suboptimal success, defined in a lifecycle perspective, correspond to the situation where a suboptimal success of one phase constitutes the initial conditions of the following phase.

We offer the research framework outlined in Figure 2 which consists of four dimensions corresponds to the dimensions in the conceptual model of Figure 1. In this framework, based on the work of Ives et al. (1980), the risk factors are affected by three environments – the organizational environment, the ES environment and the PM environment. The risk events in the middle are affecting three processes - acceptance process, alignment process and project process. The implementation success dimension is described in terms of information systems success and the project context dimension in terms of its contingent affect. This description relies on the underlying theoretical rationale of the IS research model (Ives et al. 1980) that system's success is affected by the environmental characteristics of the project and by the execution of processes which are, in turn, affected by environmental characteristics. The environment characteristics define the constraints and the conditions under which system development is carried out; The process variables reflects interactions between environmental variables and the information system; and the information system refer to the output of the development process. The sub-dimensions included in each dimension of the research model are based on the internal structure of the IS research model's components, as follows:

- The risk factors dimension relies on the three IS research model's environments (user, IS operations and development) replaced by the organizational, system and the project management (Wognum et al., 2004) respectively. The organizational environment relates to the characteristics of the organization in which the ES is being implemented, the system environment to the technological environment of the implementation and the project management environment to the temporary organization that is established in order to manage the implementation of the ES within the enterprise.
- The risk events dimension is described in terms the process whose performance was affected by the occurrence of the risk event. The processes are defined according to the three IS research model's processes (operational, use and development) replaced by the acceptance, alignment and project (Al-Mashari et al., 2003), respectively. The performance of the acceptance process is assessed by the organization's response to the ES implementation project, performance of the alignment process according to the level of correspondence between the solution achieved by the ES and the organization's needs, and the performance project process by the relative achievements of project goals in terms of planning, execution and control.
- The implementation success dimension relies on the information system subsystem in IS research model. Studies on ES success have noted the importance of considering success at more then one point in the implementation lifecycle by the perspective of different stakeholders (Markus et al., 2000). Thus we define implementation success in terms of process success and product success (Nimdumolou, 1996).
- The project context dimension reflects the contingency assumption embedded in the IS research model. ES studies have discussed the potential influence of the organizational context and the technological context on the implementation project (Sedera et al., 2003; Somers et al., 2003).

In order to enable a detailed description of the environments and processes, a socio-technical approach was incorporated. Previous IS research has emphasized that IS are socio-technical systems. They compose of machines, devices and "hard" physical technology, yet they require substantial social, organizational and intellectual investments to make them work properly (Laudon and Laudon, 2006). The implementation of ES has been referred as a socio-technical challenge (Kansel, 2006). Thus we rely on a socio-technical model to risk management, proposed by Lyytinen et al. (1998), including four interacting components: Actors, Structure, Methods/Technology, and Task with a change to any one component affecting the others. The first three aspects serve as variables in each of the risk factors environments. The "Structure" aspect refers to the format and hierarchical relationships; the "Methods" aspect refers to the methods that are used, and the "Actors" aspect refers to the characteristics of interested parties in terms of knowledge and social processes. The fourth aspect the "Task" refers to the accomplishment of expected results and is used to define the variables of the risk events processes.

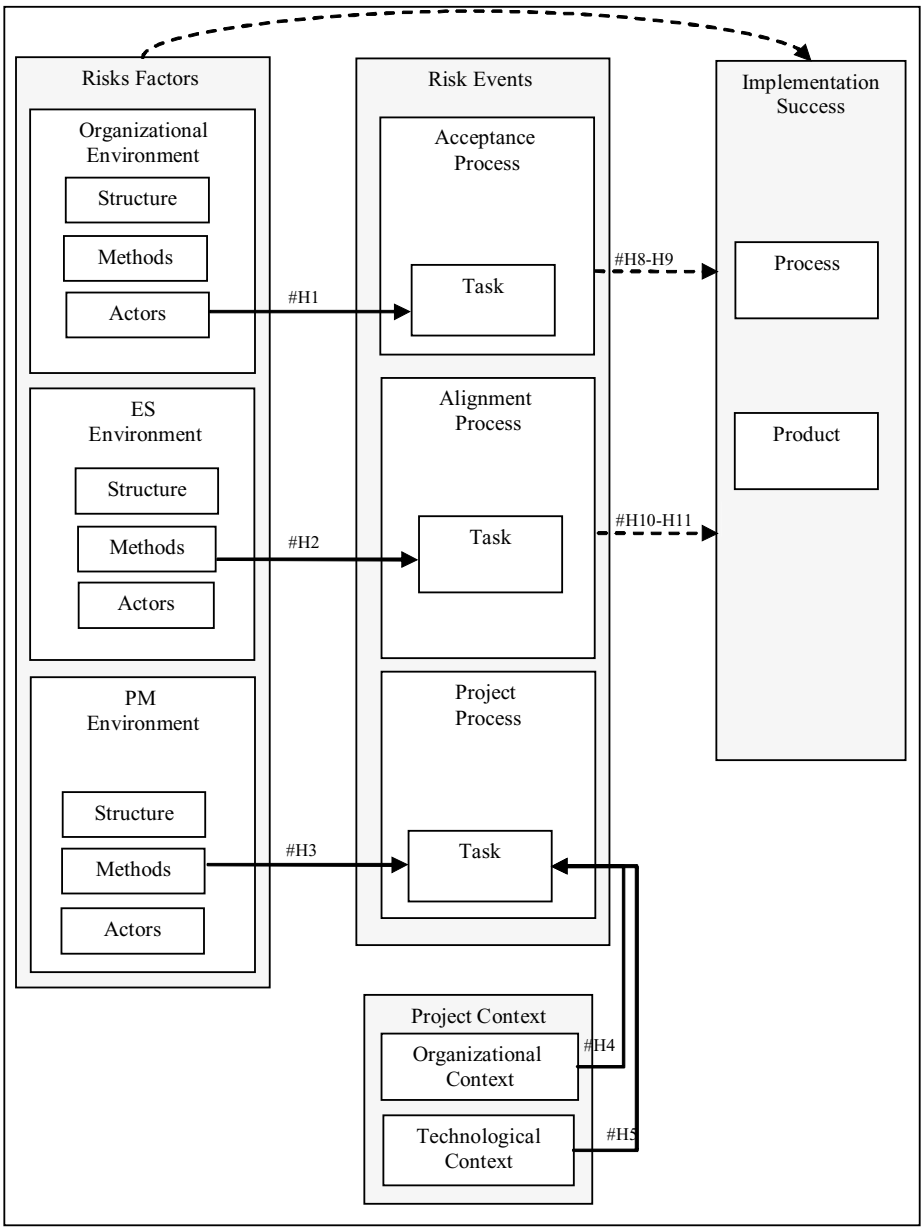

Figure 2: Research Model and Hypotheses

3 RESEARCH MODEL

The proposed research model provides a framework to examine the impact of risk factors and project context characteristics on risk events that occur during the ES implementation project lifecycle, and on the implementation success after the system goes live. The model's dimensions can be described as follows:

- The risk factors dimension consists of nine categories of implementation environments and socio-technical aspects, providing a classification scheme to risk factors. This scheme was populated with an extensive risk factors list offered by Aloini et al. (2007).
- The risk events dimension includes three process categories providing a scheme to describe a failure to achieve outcomes of three implementation processes. In order to define expected outcomes, we have used ASAP Methodology that specifies the work output at each stage of the project according to work packages with quantifiable outcomes (SAP, 1999).
- The ES implementation success dimension includes two success categories: process success which refers to the efficiency of project management (Yetton et al., 2000) and product success which refers to the system's success. This category is measured by "user information satisfaction" which, is considered as the most commonly used sole indicator of success, and reflects the extent to which users perceive the system as meeting their requirements (Somers et al. 2003).
- The project context dimension refers to organizational context and the technological context. The organizational context is defined in terms of the organizational size (Sedera et al., 2003). The technological context is defined in terms of the project complexity (Somers et al., 2003).

We introduce 11 hypotheses concerning the relationships between the four theoretical dimensions of the research model. The empirical examination of the hypotheses has been undertaken via two separate studies. The hypotheses focusing on the effects of risk factors and project context on risk events (marked in Fig. 2 in black arrows) are examined in the "Risk Events study". The hypotheses concerned with the impact of risk factors and risk events on the success dimension (marked in Fig. 2 in dotted arrows) are examined in the "Implementation Success study". The hypotheses in the first study focus on the relationships between risk events affecting the implementation processes and the primary implementation environment in which these procesess unfold. In each implementation environment we have focused on the socio-technical aspect which was mostly support by previous research identified critical success factors (CSFs) to ES implementation success. It should be noted that previous studies have not discussed risk elements as defined in this study. The five first hypotheses, and their results, are displayed in Table 1.

4 RESEARCH METHODS AND APPROACH

This research carries out two separate studies with the goal to empirically investigate the hypotheses presented in the research model. In the first study, the "Risk events study", we have used a secondary database that was established by the BEST (Better Enterprise SysTem implementation) project, which was carried out within the Fifth European Community Framework Program (FP5) during the years 2002 through 2004. This database was made available to researchers by KPA Ltd., which was one of BEST consortium partners. The database includes information about 157 risk events that took place during ES implementation projects in 24 organizations. These organizations were selected for inclusion in the database according to a sampling framework comprising four criteria, based on principles of experimental design. At each organization, interviews were carried out with a variety of people who fulfilled either functional roles or IS-related roles. In the second study, the "ES implementation success study" we have employed a field survey research approach. A field survey is part of a positivist research paradigm, in which an external observer attempts to establish relationships between phenomena (Orlikowski and Baroudi, 1991). The field survey design enables us to investigate a theoretical model in an organizational work environment and to generate a representative sample in order to quantitatively evaluate the research hypotheses. Survey research is a common design in IS research and was found to be the most widely used method between 1991 and 2001 (Chen & Hirschheim, 2004). The operationalization of the research model has been through questionnaire by

the adoption of existing instruments. The questionnaire was pre-tested through interviews with academics and practitioners and pilot-tested in a small internet survey. The final survey was distributed to approximately 1000 IS experts and 1000 users who were involved in ES implementation projects in Israel. We have collected 138 responses.

The use of data obtained from two different types of data enables us to broaden the scope related to risks in ES implementation projects that were examined in this research. The BEST database includes data specifying the sources of risk and the manner in which these risks are realized. It offers the potential to gain new and useful knowledge about the circumstances that lead to the occurrence of risk events in ES implementation projects. The empirical investigation of the data was carried out through a process of knowledge discovery, the goal of which is to identify patterns that advance the understanding of project risk. In the course of this process, we have pre-processed the database according to our research model variables and use Data Mining approaches including descriptive (such as Association Rules) and predictive models (Such as Multinomial-Logistic Regression and Decision Trees). Descriptive models focus on human-interpretable patterns describing the data and predictive models involves using some variables in the database to predict unknown or future values of other variables of interest (Fayad et al., 1996).

Furthermore, through the Internet questionnaire we collected information about risk events and their causes, as well as about the success of implementation. Thus, the analysis of the survey data enabled to investigate the combined effects of risk factors and risk events on implementation success. We plan to analyze the Internet survey data using a structural equation model (SEM). SEM is a broadly applied confirmatory statistical technique to test proposed models of relationships among variables. The models of SEM typically include latent factors that are indicated by observed variables and the relationships among the latent variables. SEM is mostly appropriate to analyze our research model since it enables the simultaneous analysis of several dependent variables (Vinokur, 2005).

5 PRELIMINARY RESULTS

We present the results of Multinomial Logistic Regression Model that was used to relate the occurrence of risk events at the implementation stage (the dependent variable) to risk factors categories and to the project context variables (the independent variables). The model resulted in good fit to the data (-2LL=35.7, $p< 0.001$) with 30% explained variance. The hypotheses test results are shown in Table 1.

#	Hypothesis Description	Results	Findings
H1	The presence of a risk factor belonging to the Actors aspect of the Organizational environment (Org-Actors) increases the likelihood of affected Acceptance process performance, compared to other processes.	Supported	Org-Actors significantly affects the Acceptance process compared to the Alignment ($p<0.01$)
H2	The presence of a risk factor belonging to the Methods aspect of the System environment (ES-Methods) increases the likelihood of affected Alignment process performance, compared to other processes.	Supported	ES-Methods significantly affects the Alignment process compared to the Acceptance ($p<0.01$) and to the Project ($p<0.1$)
H3	The presence of a risk factor belonging to the Methods aspect of the Project-Management environment (PM-Methods) increases the likelihood of affected Project process performance, compared to other processes.	Not Supported	NS ($p>0.1$)
H4	Wide project scope increases the likelihood of affected Project process performance, compared to other processes.	Not Supported	NS ($p>0.1$)
H5	A small-medium organizational size increases the likelihood of affected Project process performance, compared to other processes.	Not Supported	NS ($p>0.1$)

Table 1: Hypotheses Test Results

6 RESEARCH CONTRIBUTION

Our work addresses the convergence of two important topics in the field of IS: Enterprise Systems and Project Risk Management.

Previous studies offer limited generalizations about ES implementation success with no supporting empirical research. A call for subsequent research (Robey et al., 2002) has emphasized the need to incorporate a stronger theoretical basis and to utilize more rigorous research methods. In this study we contribute to these issues by offering a theoretical risk model elucidates the sources of risk, the manner in which risks are realized and their impact on implementation success. The model is empirically tested over data collected in two separate field studies. Thus the research findings are expected to establish current conceptual findings and to reveal novel knowledge. The empirical investigation relies on advanced statistical and Data Mining techniques, including some predictive approaches. The use of predictive models suggests a novel paradigm in IS research in the light of its scarce use in mainstream IS research (Shmueli and Koppius, 2007). Moreover, the work offers an innovative method to Project Risk Management, suggesting using the results of a Data Mining model as an input to a quantitative risk analysis technique. Quantitative risk analysis techniques, which are prevalent in the fields of engineering, have been rarely employed in project risk management approach (Edwards & Bowen, 2005).

Beyond the theoretical contribution, the identification of the relations between risk events and their sources, in a life-cycle perspective, has important practical implications. These results can be used both retrospectively and prospectively. A retrospective analysis is useful for tracing back problems at each phase to factors originating in earlier phases. Prospectively, the results can be used to identify potential problems that should be addressed in basic and contingency plans. It can also sensitize decision makers to consider plans and actions in the light of problems with in a given project context. Furthermore, the revealed relations between risk elements and implementation success can provide useful guidelines on how to increase the likelihood of success from the perspective of the adopting organization's executive leadership. These implications are highly significant in the light of the high failure rate of ES implementation projects and the enormous expenses that these projects typically require.

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NEWS AND INFORMATION MEDIA BUSINESS MODELS IN THE NETWORKED ECONOMY

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Abstract

The economic basis for publishing is challenged by new technologies and services that connect people and information to an extent never precedented, by convergence of sectors, markets, platforms etc., and by the new rules of the digital networked economy. The PhD project highlights the changing media landscape through a case-based study of new practices in a Danish media company. The project examines new business models based on user involvement and peer production through theoretical anchorages of the concepts 'Web 2.0' and 'Enterprise 2.0', and an analysis of the value creation taking place in so-called peer production. The overall objective is to develop an experience-based understanding of the value creation that Web 2.0 enables in the media sector in general, and in the media company JP/Politikens Hus (JPMedier), specifically. Thus, the project aims at developing a solid research-based understanding of the digital development, which can form the basis for a critical evaluative approach to future business development and investment in JP/Politikens Hus.

The project is an Industrial PhD project funded by the Danish media house JP/Politikens Hus A/S and the industrial PhD program of the Danish Ministry of Science and Technology/Forsknings- and Innovationsstyrelsen. The project is primarily associated with JPMedia, the unit for digital media at the newspaper Jyllands-Posten (one of the three major daily newspapers of JP/Politikens Hus).

Keywords: Newspapers, Web2.0, Social Web, Business models

1 AREA OF CONCERN AND RESEARCH QUESTION

The background for the project is the massive decline in distribution and advertising revenue that newspapers throughout the world are experiencing as consumers and advertisers are replacing print with Web. In Denmark print circulation dropped by more than 25 million in total in 2009, or more than 6% comparred to 2008 (Dansk Oplagskontrol). All though it is difficult to evaluate exactly how declining circulation affects revenues, as many factors affect the gross margin, it seems clear that future business models of newspapers will be web-based. However, few newspapers have succeded in charging for content, and even if some are experimenting with pay walls and the like at the moment, free content is still the norm. Though online adverting revenues are growing, until a few years ago Danish newspapers had almost no revenue online, and at the moment web advertising does not compensate for lost print revenues. At the same time the long-established business models of newspapers are disrupted by global providers of content and services, so-called New Media companies that enter the domestic markets. The New Media companies are Web natives like the non-profit Wikimedia Foundation (Wikipedia), and companies such as Google, eBay, Amazon, Facebook, Del.icio.us and Digg. They are redefining the standards of media as such. Search engines and social networks have long surpassed most national media websites in terms of unique users. Facebook is now the most used media in Denmark in terms of hours of use, and Google is expected to outperform TV2 as the largest advertising channel in Denmark in 2010.

Traditional media companies are facing the major challenge that informational and cultural goods are increasingly created in the global network that has arisen with a new generation of Web technology, the so-called 'Web 2.0' (O'Reilly 2005, 2006, Högg et al 2006). The Web 2.0 or the Social Web (Spivack 2006, Davis 2008) has introduced a new mode of producing and disseminating content - non-market or commons-based peer production (Benkler 2002). Due to the rapidly decreasing costs of the technologies involved in publishing, anyone with a computer and an Internet connection can create content, reach their peers, and address a global "audience". Throughout the industrial period the physical and financial costs associated with maintaining information and cultural expressions in a transmission medium (print-press, photo, cinema, radio, TV equipment, etc.) were so high that only companies and states had access to mass-communication. Today, cheap processors have replaced the mass media technologies of the industrialized society. Benkler argue that the significant cost reduction has enabled a radical reorganization of our information and cultural production system; a move away from a strong reliance on concentrated business models and towards greater reliance on business strategies, not based on intellectual property. In this system access to existing information is almost cost-free. Given also that the cost of information management and communications is falling, "the human factor" has become the primary "scarce resource", and as in the pre-industrial period the production of information and cultural goods no longer takes place on the market (Benkler 2002, 2006).

This has led some authors to argue that the only way for traditional media companies to survive is to invite users, or "the people formerly known as the audience" (Rosen 2006), to engage in their production and innovation processes. Tapscott & Williams (2006) argue that the traditional divide between producers and consumers is blurring, and stress that the power that self-organized prosumer communities are starting to get leads to particularly strong tensions in the media sector: "Media organizations that fail to see the writing on the wall will be bypassed by a new generation of media-savvy prosumers (...)". The philosophy of the blogosphere - knowledge should be free and available to everybody – leads individuals and organizations to demand control over their data and information flows (Anderson 2008). Hence, traditional producers and IPR owners need to adapt to conditions where open networks, open licensing, copying, re-mixing and even hacking is the rule rather than the exception. It is a world where content is not just 'user-centric', but produced, managed and controlled by users. A large number of other authors discuss similar ideas, e.g. Rheingold (2002), Surowiecki (2005), Turow & Tsui (2008), Vervest et al. (2008).

However, much of the literature on the economics of Web 2.0 is based on an implicit fundamental assumption; the equation between non-profit and commercial platforms in the Web 2.0 universe that leads to an uncritical alignment of producer interests with consumer benefits (Nieborg&Van Dijck 2009). As both the technologies and the social phenomenon connected with Web 2.0 and New Media, e.g. blogs, wikis and social networking, are widely adopted by Danish publishing companies (Rasmussen 2009), whether or not practices and research findings from non-profit projects can be transferred to commercial contexts, is of fundamental interest to the news- and information sector. A new study of Danish media use concludes that few people use the interactive features provided by online newspapers (Schroeder, 2009), and this 'participation gap' is supported Hargittai and Walejko (2008) who find that despite the Web's new opportunities for engaging in content creation and sharing, relatively few people are taking advantage of the new possibilities. While the general shift from mass media and uniform products to social media and personalized services is evident (PEJ 2008, Lenatti 2009), it is not clear how and to what extend Web 2.0 will offer managers and employees of traditional media companies new ways to create value for their companies.

For JP/Politikens Hus 'Web 2.0' and 'Enterprise 2.0' might imply that future competitive advantages are to be found in open networks of independent agents that interact with each other in order to improve journalistic content, research and editing processes, advertising products etc., and it might also mean that users need to be engaged in the company's innovation processes. However, there is a lack of empirical research on whether Web 2.0, user involvement and peer production can provide the foundation for value creation in traditional media companies. Therefore, this is addressed in the main research question of the PhD-project.

Main research question
How and to what extend can Web 2.0, prosumption and peer production form the basis for economically sustainable business models in news- and information media?

In order to answer the main research question five sub-questions will be treated. They will give individual contributions to a sustainable innovation strategy for JPMedier, and at the same time form the basis for the preparation of 3-4 peer reviewed articles, and constitute the basis for the mandatory business report (Erhvervsrapporten):

1. Definition of Web 2.0 and Enterprise 2.0
2. Who are the media users of the future?
3. Who are the advertisers of the future?
4. How does Web 2.0 affect the newspaper's business model?
5. Utilization of Web 2.0 in JPMedier: What business models and innovation strategies?

2 RESEARCH METHOD AND DESIGN

As discussed above the aim of this study is to develop an understanding of the value creation that Web 2.0 enables in the media sector in general, and in JPMedier specifically, in order to provide new insights on the digital development that can form the basis for a critical evaluative approach to future business development and investment in JPMedier. To achieve this the research questions are focused on developing an in-depth understanding of Web 2.0, and the impact it has on media "customers", i.e. users/readers and advertisers, and on the business models of the media sector, specifically those of newspapers.

As the project is an Industrial PhD project, the research questions focus on the case company. The overall methodology is a dynamic dialogue between adduction, deduction and induction (Shank and Cunningham 1996, Nöth 2000, Dinesen 2001, Paavola 2004, 2006, Cope 2005, Patokorpi 2006). The approach is primarily qualitative and case-based (Eisenhardt 1989, Flyvbjerg 2004), but includes elements of quantitative research (Krippendorff 2003). Engaged scholarship/action research approaches might be applied (Van de Ven 2007, Stephens et al. 2009, Adelman and Spivack 2009, Simonsen 2009).

A comprehensive literature review that identifies more in detail what specific research methods are appropriate, specifically how the case study approach should be applied, is yet to be conducted. Hence, the following outline of what methods are applied to address which research questions is preliminary. In practice, the individual case studies might be collapsed into one comprehensive study of users, advertisers, and media company, focusing on e.g. user comments or the adoption of Facebook or Twitter by JPMedier.

Research question 1 will be addressed by a cross-disciplinary literature review covering technologies, applications, and services related to Web 2.0 (/Social Web/Social Media/Social Computing etc. See the section 'Relevant theories')., while focusing on the social and cultural phenomena that affect the media sector, and in particular newspapers, e.g. peer production, collective/collaborative intelligence, cloud- and crowdsourcing. The aim of the review is 1) to identify analytical categories, 2) to outline the conditions for evaluating the value of business models based on Web 2.0.

Research question 2 and 3 will be addressed by an interpretive/phenomenological case study (Cope 2005, based on the adoption of Web 2.0 in JPMedier. The identification of the specific context will draw on the results of a survey of Web 2.0 adoption by Danish online newspapers that I have conducted in 2008 and 2009, as part of a Nordic research and innovation project, eMedia (Lindqvist et al. 2008, Rasmussen 2009), and intend to repeat in 2010 and 2011. This longitudinal study of Web 2.0 adoption will be qualified by the case study that maps and interprets (Hansen-Møller 2006) the details of the adoption in JPMedier. Thus, what and who to study will in part be determined by the quantitative study, and at the same time the 2010 and 2011 adoption studies will be informed by material from the case company.

In order to address question 4 a separate review of literature on existing newspaper business models and Web 2.0 business models is conducted. A case study will identify the business models in JPMedier, while seeking to determine the effects of the adoption of Web 2.0.

To address research question 5, a foresight method (e.g. an abduction-based approach (Paavola, 2006, Patokorpi, 2006, Patokorpi and Ahvenainen 2008)) will be employed to gain insight on the immediate and future potential of Web 2.0 for newspapers, and qualify the results of the case studies.

3 RELEVANT THEORIES

The concept of 'Web 2.0' was coined in a conference brainstorming session between O'Reilly Media and a marketing company in 2003 (O'Reilly 2005/2006a/2006b). While 'Web 2.0' quickly became a standard term in the global blogosphere, and in self description of many media companies, initially Web 2.0 was subject to relatively little academic attention. At present there are more than 35 million Google links on 'Web 2.0', and almost 1400 articles in the ISI WoS database (topic search). However, there are no standard definitions, researchers largely use their own definitions, or make use of different concepts for the same phenomenon, all though attempts to propose definitions do exist (e.g. Anderson 2007, Vickery&Wunsch-Vincent 2007, Thomas 2009). 'Web 2.0' is an umbrella term connected with a wide range of technologies, applications, service forms, and social and cultural phenomena, such as prosumption, collective/collaborative intelligence, cloud- and crowdsourcing. It is related to, and perhaps inseparable from, a number of other concepts, such as 'Social Web', 'Social Media', 'Social Computing', 'New Media', 'Participatory Media', 'Interactive Media', 'Many-to-many Communication' etc., while 'Web 2.0' could be considered the most technology oriented of these (Parameswaran and Whinston 2007). 'Web 2.0' and the related concepts often also designate a philosophy or a vision of the Web, of computing, and of media and communication. The increasing number of related concepts, and the conceptual inflation of existing ones, may be an example of the notion that the cultural digitization process is moving faster than our ability to analyze it (Castells 2001, Castells 2005, Beer & Burrows 2007, Thomas 2009). Deciding upon, and defining the right concept (/concepts) to use within this project will be addressed in the initial literature review, and re-addressed, revised and refined throughout the project period.

Parameswaran and Whinston (2007) note that research on current and potential business models associated with *social computing* "would need to touch on broad themes such as how business can

generate value through social networks, how communities in these initiatives can gain value, and how to assess the costs and benefits of social computing initiatives." Parameswaran and Whinston define 'social computing' as the broader concept, encompassing 'Web 2.0' and a number of other concepts. In a section on 'Motivational issues of participation' they note that investigating the lack of personal gain, i.e. behaviour not aligned with maximizing personal (economic) utility, is particularly relevant to social computing research, and suggest that "social-science models may have to be extended and used to investigate the nature of the motivating factors for social action in online communities". Hence, the project is based on interdisciplinary theories:

Castells' theory of the informational society: The business unit of the future is the network (Castells' 1995-98, 2001, 2005, Urry 2000, Slevin 2001, Stark 2008).

Phahalad&Krishnan's theory of innovation: N=1 and R=G. Companies need to focus on one consumer at a time; the resources are global (Prahalad & Krishnan 2008).

Benkler's theory of peer production and transaction costs: A new mode of production is emerging: Nonmarket-or commons-based peer production. Under certain circumstances peer production is an alternative to markets and hierarchy (Benkler 2002, 2006). Peer production begins to offer a rich texture in which to study the varied and multifarious nature of human motivation and effective human action (Benkler and Nissenbaum 2006). Heterogeneity of motivation is a key factor in open-source communities (David&Shapiro 2008).

David Stark's (2009) theory of heterarchies and worth: 'Worth' bridges the gap between the economic concept 'value' and the psyco-sociological 'values'. Stark uses the term 'heterarchy' for organizations that "create value by inviting more than one way of evaluating worth". Since 'heterarchy' identify a new organizational form that "embark on a radical decentralization in which virtually all units [of a firm] become engaged in innovation" in order to cope with the fact that "in an increasing number of areas many firms literally do not know what products they will be producing in the not so distant future" it is in good accordance with the thinking of both Castells, Prahalad&Krishnan and Benkler.

Max Boisot's theory of information spaces and social learning: Data, information and knowledge is equally important as labour and capital in the production of value of companies/networks (Austin&Devin 2003, Boisot 2007, Snowden 2007).

Theories of convergence between social and technological networks (Jenkins 2003, Kleinberg 2008, Spivack 2007, 2008, Davis 2008).

Theories of innovation models and business models in the informational society – focus on open and emergent models (Stacey 1996, 2007, Rogers 2003, Chesbrough 2005, Morris 2006, Ramirez & Arvidsson 2005, von Hippel 2006, Christensen et al. 2008, Osterwalder 2004, Krueger 2006, Gordjin & Akkermans 2006).

4 EXPECTED MAJOR FINDINGS AND CONTRIBUTIONS

The project examines how a media organization relates to and utilizes Web 2.0. Currently, there are no clear definitions or established methodologies in the field. The overall objective of the project is to develop an experience-based understanding of the value creation that Web 2.0 enable in the media sector in general, and for JPMedier specifically. The project will:

- Develop a comprehensive conceptual framework and methodologies for the analysis of value-creating in Web 2.0 network within the media sector;
- Create a comprehensive understanding of the dynamics of peer production in the media sector;
- Investigate and map business models related to Web 2.0 and evaluate their potential for Danish media organizations
- Investigate the potential paradox of the network society; that increased informational and social connectitiy leads to competition on the basis of cooperation in open networks. (This is the fundamental dilemma of D. Ronald Coase's transaction cost theory: economizing with labor and capital on the basis of hierarchy/competition or network/cooperation.)

5 PLANS FOR FUTURE RESEARCH

- Spring 2010 (Completed by June 30)
  - Literature study: Web 2.0 and Enterprise 2.0. Business Models. Methodology.
  - Internship in different parts of the organization (JP Medier)
  - Small study: Mapping the Danish online newspaper's use of Web 2.0 (repetition and amplification of my own earlier research)
  - Case study A: Survey of current use of Web 2.0 (internal and external networks) in JPMedier
  - Stay at the Norwegian University of Science and Technology (1 week)
  - PhD courses, Conference participation

  Milestones: Treatment of subquestion 1 (and preliminary 4)
- Fall 2010

Milestones: Treatment of subquestions 2, 3
Journal article: Literature Review: Web 2.0 Definitions - What is it? What is it Worth?
- Spring 2011

Milestones: Treatment of subquestions 2, 3, 4
Journal article: Literature Review: Web 2.0 Business Models - A Map
- Fall 2011

Milestones: Treatment of subquestion 4 (and preliminary 5)
Journal article: Adoption of Web 2.0 by Digital Newspapers - What is it Worth?
- Spring 2012

Milestones: Treatment of subquestion
Journal article: Peer Production as Innovation Model for Digital Newspapers
- Fall 2012 (Project completion Oct. 31)

Completion of thesis

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STANDARDIZATION, FLEXIBILITY AND INNOVATION IN OUTSOURCED BANKING OPERATIONS

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Abstract:

Business Processes Outsourcing (BPO) have been spreading in many sectors and have become a common practice, making it easier for customers to reach for new technologies and innovations. This has been particularly witnessed in the Egyptian banking sector. This paper attempts to investigate how flexibility versus standardization characteristics embedded in IS systems used by banks and their outsourced agencies promotes the usage of new technologies and pushes for a higher focus on innovation in this field.

Keywords

BPO – IS flexibility – Standardization – Innovation – Egyptian Banking.

1 RESEARCH MOTIVATION:

The strategic choice of some firms to outsource one or more of their business processes has gained large research interest. Besides being assisted with cost advantages, the BPO (Business Process Outsourcing) allows its adopters to tap into new technologies. A particularly rich field is the banking sector in Egypt. The Egyptian retail banking is considered by many as a dynamic segment in the financial sector (the first retail launch dates back to 1999 and most market entrants have accessed the market 3 to 5 years ago). In Cairo, Egypt's capital, with streets suffocating from heavy traffic, the mobility technology solutions are spreading fast, matched by the desire of ambitious banks to sell services and products in this promising emerging country. Growth in this sector has been estimated at 14% annually till 2011, primarily driven by the retail segment (Brand Principles, 2008). The rapid diffusion of innovations has been highly leveraged in the outsourced banking operations via the BPO executer. This study's main interest is the BPO system's operational features, of particular research concern we emphasize the flexibility and standardization aspects.

Wuellenweber et al (2008) debate that standardization of a business process has a direct positive impact on BPO success, while Ram L. Kumar (2000) debates that the more the IS system is flexible, the more it ensures a business success by the capacity of creating more of business value. In the first case, the researchers' position is based on measuring success through the lens of a cost curve analysis, while in the second; it is obvious that the sole business success factors its "capacity" of creating value. This conclusion is therefore highly dependent on the measure of success. Obviously, like Allen and Boynton (1991) remark so well, a tradeoff has to be reached between standardization and flexibility features in an IS system, since it is exactly the flexibility aspect of the IS that allows the business community to innovate and enhance on existing technologies, while it is standardization that ensures information homogeneity and that proper controls are in place.

1.1. Research Questions:

More particularly, we investigate BPOs that use intensive technological innovations. In respect to those, we ask:

1- **What IS flexibility degree versus standardization characteristics should be adopted and implemented in the successful BPO processes, with the purpose of creating a value?**
2- **How do innovations get adopted in the successful BPO processes?**

In particular, IS flexibility finds its decision origins when the outsourcers and their clients try to achieve objectives such as:

- Capitalizing on new technical capabilities
- Adaptation capacity to new needs formulated by either the bank or the market
- Creation of either new products or services.

By contrast, the standardization guarantees:

- A tighter control
- A greater knowledge of the output
- A more rigorous management of the costs
- A stabilization of the reporting tools

Therefore, how is this dilemma managed in practice? What are the resulting consequences of this decisional aspect concerning the IS and its peripheries?

2 THEORETICAL BACKGROUND:

2.1. Definition of an IS:

An information System could be defined as: "An organized set of resources: hardware, software, personnel, data, procedures ... to acquire, process, store, transmit information (as data, text, images, sounds, …) in organizations.

2.2. Outsourcing Literature:

Outsourcing is defined as: "making arrangements with an external entity for the provision of goods or services to supplement or replace internal efforts". (Hirschheim et al. 2009, p.3).

Barthélemy (1999, p. 12) proposes a distinctive definition of the externalization: "externalization consists in obtaining a product or service from a service provider that was formerly provided by the organizations' internal resources"

So a distinction is therefore detected between the two concepts that of outsourcing and externalization.

The literature on outsourcing is rich. Much of the research focuses on the interpretation of the outsourcing decision; many theories have been proposed to explain why some company's resort to outsourcing, from these, the most prominent are:

1. Principal-Agent Theory (Jensen and Meckling, 1976),
2. Transaction Cost Theory: TCT (Williamson 1979),
3. Political Perspective (Pfeffer, 1981)
4. Strategic Outsourcing

Recent studies (Malone and McLean, 1992, 2003) focuses on reasons of success and failure of the outsourcing business relationship (Lacity, Lee, Huynh, and Hirscheim), and falls under Outsourcing Relationship Management.

2.3. IT Innovation:

The link between IT innovation and the organization has also been studied (Orlikowski, Markus et al), and many IS researchers have proclaimed the importance of quickly adapting the IS strategy to the changing environment: known as “strategic agility” (Weill and Vitale 2001).

The relationship between technological innovation and developing new business models appears in a 2007 by Isabelle Bourdon-Ortega and Laurence Lehman title: Information systems and strategic innovation: a case study which aims to "illustrate the contribution of IS in strategic movements that are specific to strategic innovation, a particular form of breakthrough innovations and offer a better understanding of the relationship between new business model and IS.

We retain Alter's definition of ordinary innovation, which translates into: "transforming a discovery, whether it concerns a technique, product or design of social relations, in new business practices. " (Alter, 2000, p.7).

2.4 BPO literature:

Here the object of the outsourcing is more precisely a process that is undertaken by the outsourcing agency and is named a Business Process Outsourcing (BPO).

According to Click, R. L. et Duening, T. (2004), BPOs are defined as "a socio-technical phenomena, impacting the technical and organizational systems of the client and its vendor providing the externalized process".

2.5 IS Flexibility / Standardization Literature:

First, let us begin with what we understand by Information System Standardization and Flexibility.

Standardization is an “evolutionary process that includes a period with alternative proposals and incremental adaptations before the emergence of a standardized solution; later this solution may be challenged by a major product innovation” (Edquist, 1997). It could also be defined as the sense in making more homogeneous and freezing certain characteristics of intermediate products in the hope of rationalizing the use of resources and making it easier to communicate with customers, vendors and institutions.

Standardization of business processes aims at improving operational performance and reducing costs by decreasing process errors, facilitating communication, or just profiting from expert knowledge.

Tassey (2000) defines standardization as: “a set of specifications to which all elements of products, processes, formats or procedures under its jurisdiction must conform.”

Flexibility is defined in management literature as the ability of a resource to be used for more than one end product. The greater the flexibility of the resource, the more options the firm has for diversifying into less related end products (Ducan 1995).

Flexibility could be defined as: "the capacity to vary according to needs". (Reix, 1979), it could be either:

- ***Strategic*** if it allows the system to accept modifications or concept evolutions.
- ***Operational*** if it allows an adaptation to volume variations and options to treat.

The more the resource is flexible, the more the organization will have the options to diversify in less related products (Duncan 1995).

Few researchers studied the system standardization and /or flexibility facet required in BPO contexts. One rare exception is the construct found in Ram Kumar’s work (2000) to identify flexibility elements in an IS. Fimbel equally proposes an analysis model for IT flexibility, with distinct elements for consideration and measurement of the IS flexibility.

Some have also considered discussing the effect of IS flexibility on business success: In a study conducted on the German banking industry, it was demonstrated that: In uncertain and changing business environments, flexibility is a crucial aspect of success (Ybarra-Young and Wiersema 1999). IT plays a vital role in ensuring this ability to readjust and reconfigure. Accordingly, Byrd and Turner (2000; 2001) propose a direct link between IT flexibility and competitive advantage with IT flexibility consisting of technical infrastructure (choices pertaining to applications, data, and technology configurations) and human infrastructure (experience, competencies, commitments, values, norms of IT personnel).

3. RESEARCH METHOD AND APPROACH,

3.1. Research Background:

The Kodak effect (1987) well known to the practitioners in the field opened the doors to taking advantage of many opportunities existing outside of the firms' boundaries. Besides its cost advantages, outsourcing offers firms access to strategic resources not easily reached otherwise. Given the versatile aspect of technology, and the ICTs, it is becoming more frequent for firms to resort to outsourcing. Firms also outsource to access top of the line technological innovations that they cannot afford or to tap into the knowledge/expertise of the service provider. This enables the creation of new, unique capabilities by leveraging the competencies of both the company and its service provider. It has been suggested that outsourcing buys a company a core competence (Ducan 1995). BPO is therefore expected to not only offer greater efficiency but to also enable strategic advantages in the form of business innovation (Borman, 2006; Feeny, Willcocks, & Lacity, 2003; Gottfredson, Puryear, & Phillips, 2005; Mani, Barua, & Whinston, 2006; Willcocks et al.).

3.2. Research Design:

Yin (1994) defines a case study's field of research as follows: "A case study is an empirical inquiry that investigates a contemporary phenomenon in its real context of life, especially when the boundaries between phenomenon and context are not obvious" (p.13).

The case studies are useful when a phenomenon is vast and complex, an integrated approach, and an investigation is necessary, when a phenomenon can be studied outside the context in which it occurs (Benbasat et al. 1987; Bonomi 1985 Feagin et al. 1991; Yin 1994).

Closely guided by the directives of Dubé and Paré (2003) for a rigorous case study research, we have been focused on the following:

1. The research design including the nature of research questions, theoretical foundations, the unit of analysis, pilot case and the criteria adopted for selection of cases.
2. The collection of data including the choice of methods of data collection (qualitative and quantitative), different modes of implementation, reliability and validity.
3. The data analysis and research of characteristics across cases.

The researcher benefited from a working experience in a foreign bank operating in Egypt as a customer service manager in the first place then as branch manager. The policy of this bank was to outsource marketing activities, operations and sales. This trend was new for the banking sector in Egypt. In addition, she has consulted for an outsourcing agency for a period of nine months. In particular, this experience enabled her to identify the research field and issues of interest for the thesis. The observations made in this context were extremely useful for the construction of case studies, which allows conducting research. The network of contacts is also of prime importance to check that the triangulation of the results of his research can be validated.

3.2.1 Case Study Selection:

The research design begins with a selection of cases mainly from the company where the consultation took place. The choice of case studies is based on three criteria:

1. Cases incorporating outsourcing banking operations
2. The operation subcontracted incorporates extensive use of technology.
3. The BPO in question adopt innovations from non-bank players.

To cover the points mentioned above, we considered a method of collecting and analyzing as described below.

1. Include all BPOs that meet the above criteria.
2. Administer a survey to bank officials to be able to raise any other case studies that meet the same criteria.

3.2.2 Data Collection Process:

With an observation period of nine months which lasted from October 2008 until June 2009, the researcher was able to make an observation period of operations subcontracted at least 3 days / week. The nature of this consultation was to develop innovative business models that meet the criteria of the bank (client), investigate the establishment of the system, its development and use, problem solving between the parties involved in the process and the marketing of the services and technological capabilities of the service provider (vendor) to banks.

There is thus a repository of information observed by the system into its real context. However, and in order to complete a longitudinal look, a more comprehensive data collection process shall be carried out as follows:

- From both parties (i.e. client-side "bank" and vendor side "outsourcing service provider")
- For dispersed periods by detecting changes that occur in outsourced operations, IS features vendor/client relationships and contracts or SLA service.

3.2.3 Data Analysis Process:

From the indicators of flexibility of information systems and / or standardization proposed by Kumar, Reix, Rowe, Fimbel and Duncan, we propose to classify the elements of each system in its most appropriate category for a comprehensive understanding and better management of the characteristics of the IS outsourcing relationship.
The research is to be carried out on local, foreign and JV banks and their outsourcing agencies operating in Egypt in the period between Jan 2010 and Mar 2011. In accordance with research guidance (Dubé & Paré, 2003) for rigorous case study research, we propose to use both quantitative and qualitative tools combined in a multiple case study frame (Yin, 1994) to investigate the tradeoff between flexibility and standardization in the IS governing the BPO relationship.
We begin our study with a pilot case, followed by a control case to retrieve high level elements of system standardization/flexibility in successful BPOs and then -aided by the researcher's field notes, draw on propositions to be supported or unsupported by using semi-structured interviews and questionnaires scrutinizing S/F elements considered by banks and their vendors as enabling the technological innovation in the remainder of the BPO cases. The interviews and the questionnaires will be administered to (a) vendor managers (b) project managers at the vendor site (c) bank IT specialists and (d) banking management responsible for the BPO process.
With this methodology, we use a dichotomy in studying both the outsourcer and the outsourcing agency's perspectives on the issue. We subscribe our study within the dynamic capabilities theory allowing firms to adjust to the fast paced technological advances. After which we will quantitatively assess the impact of such features on IT enablement, the mobility usage and the push towards innovation.
We equally propose to complement this study by 2 Delphi sessions to be carried out separately with (a) bank representatives responsible for outsourcing relationships and with (b) vendor representatives to verify the accuracy of the data analysis process, and the conclusions drawn from the inter-case analysis.

4. EXPECTED RESULTS & RESEARCH CONTRIBUTION:

It is of prime importance to study the link between managers' decisions to standardize or to invest in flexibility features of on the success of the BPO. We intend to reveal this by closely inspecting multiple BPO case studies adopted in the banking industry.
The intent of the paper is to assist researchers in better understanding BPO's IS from an operational lens, and to offer practitioners the necessary tools needed to design and manage the IS governing the relationship between a customer and his service provider, and perhaps the opportunity to draw from the recent Egyptian banking BPO experience similar opportunities onto other industries and/or markets. By discussing each case study's details we hope to uncover IS management best practices and help in the dissemination of the experience we think is unique.
The research is still budding. It is worthwhile to discuss the theoretical foundations of such work or suggested frameworks and models to assist in the constructs of the researcher's evaluation.

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THE QUEST FOR CONTENT: THE ROLE OF PRODUCT NETWORKS AND SOCIAL NETWORKS IN ILL-DEFINED EXPLORATION IN ONLINE ENVIRONMENTS

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Abstract

Most content and commerce websites are organized as a collection of webpages, each featuring a product hyperlinked to similar items, creating a product network. Currently, a growing number of websites offer a combination of product and social networks, linked by hyperlinks, thus creating a dual network structure. I study this dual network, and its role in facilitating ill-defined exploration (i.e., exploration without a predefined target). Accordingly, my research questions are: (1) Understanding the structure of the dual network, and (2) What is the role of a dual-network structure in ill-defined content exploration?

I use data from YouTube.com to study structural differences between product and social networks and to understand the unique dual-network structure. I will use a simulation model to demonstrate the effects of different dual network topologies on ill-defined exploration. In order to examine how network structure may influence the exploration process, I have started an internet experiment in which consumers browse a YouTube-based website that offers video through different network structures.

The preliminary results show that user pages have unique structural properties and act as content brokers in the dual network. Using survival analysis it is possible to show that the dual network structure leads to faster access to "good" content and to overall higher satisfaction.

Put together, these preliminary results allude to the important role of social networks in reducing distances between products and easing the process of exploration.

Keywords: user-generated content; ill-defined exploration; product networks; social networks; dual-network.

1 INTRODUCTION

The variety and quantity of online content have increased substantially in recent years; this growth has been bolstered by the increasing popularity and prevalence of user-generated-content (UGC) [1]. Considering that online content is rarely accompanied by traditional marketing campaigns, a fundamental question in this context is, how do consumers find "good" content? Additionally, from the perspective of a website that offers content, it remains to be determined which website structures facilitate efficient and successful exploration of the content space.

In my research I focus on *ill-defined exploration* of the content space. Ill-defined exploration occurs when a consumer explores the space of options with no specific pre-defined target in mind. The exploration process continues until the consumer finds an object that matches his or her taste, or until search costs, typically time, reach a specific threshold level. While recent research has focused on improving keyword search, it seems that a substantial portion of online content consumption is a result of ill-defined exploration, where consumers simply browse the content space without a specific target, looking for "good" content. However, as the amount of available online content grows, consumers must sift through increasing quantities of potentially undesired products until finding one that matches their taste. This renders the ill-defined exploration process increasingly challenging.

In this work I describe a dual network structure that is characteristic of UGC websites, and study the effect of this structure on exploration efficiency and on the consumer's overall satisfaction.

Online content is often organized in networks. Some networks represent relationships among individuals who are friends, colleagues, or trading partners. Some networks, referred to as *electronic social networks*, can be described as collections of personal webpages, linked by hyperlinks (examples of such networks are Facebook and LinkedIn). Another type of network is the *product network*, which can be described as a collection of linked webpages, each corresponding to a distinct product (e.g., YouTube, where the products are short videos; Amazon, where the products are books). Product networks allow consumers to browse the wide variety of content in the product space. Thus, if an electronic commerce site is analogous to a traditional store, the network can be thought of as the online aisle structure. Moreover, in the online environment, both social as well as product networks are visible and can therefore be analyzed directly.

Recently, a growing number of websites have begun to offer a combination of product and social networks, linked by hyperlinks, thus creating a *dual network* structure (illustrated in

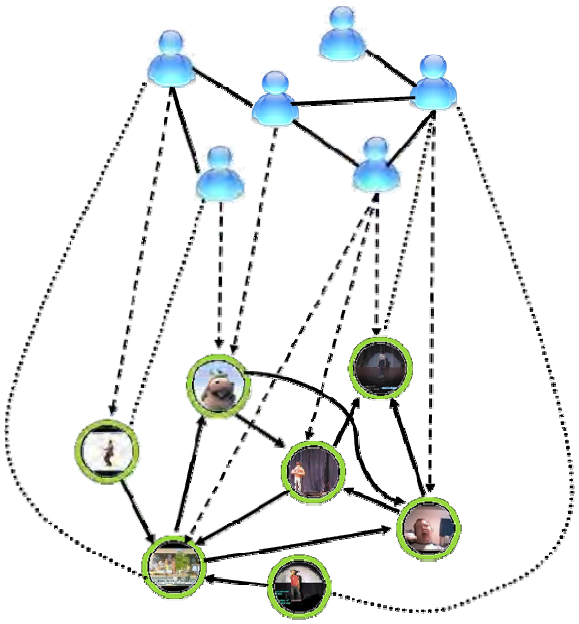

Figure 1. Illustration of the YouTube.com dual network. The dotted lines represent owner links between product nodes (circles) and social network nodes (icons); dotted arrows represent favorite links; solid lines represent social links between users; and solid arrows represent links between products - "related videos" links.

[1] User-generated content was featured in Time magazine's 2006 "Person of the Year" issue: http://www.time.com/time/magazine/article/0,9171,1569514,00.html. According to Alexa.com, 3 out of the 7 most viewed sites (by percent of global Internet users who visit the site) are UGC sites – YouTube.com, Wikipedia.com and Blogger.com.

Figure 1). Some e-commerce sites, such as Amazon.com, Netflix.com and Bestbuy.com, now incorporate social features such as communities and forums in which consumers can actively participate. To the best of my knowledge, however, dual networks are most prevalent on UGC sites, such as YouTube.com, Flickr.com, and Digg.com. Although the reason for the emergence of this structure has not been documented, it is plausible to assume that the motivation is related to increasing traffic and user involvement. It is my conjecture that: (a) the integration of social and product networks will facilitate ill-defined exploration of content; and (b) the exploration process is more efficient when the dual network structure incorporates a social network rather than an artificial random network.

My preliminary results show that user pages have unique structural properties and act as content brokers in the dual network. Using an internet experiment I show that the dual network structure leads to faster access to "good" content and to overall higher satisfaction. This work suggests that the integration of a self-organizing social network with product networks will improve consumers' exploration of the product space and will lead to higher consumer satisfaction.

2 RESEARCH OBJECTIVES

The appearance of the dual-network structure raises a fundamental question that needs to be answered - Does the inclusion of a social network in an electronic commerce website, alongside a product network, matter?

To answer this question, first I characterized the structure of this new dual-network. Then it is possible to proceed to study whether the dual-network structure facilitates the process of ill-defined exploration and what is the structure for each type of network that is optimally suited to content exploration. These questions form my research objectives. Specifically, I pose two research questions:

Research Question 1: Understanding the structure of the dual network

Specifically, I am interested in the following questions:

1.1. What are the structural differences between product and social networks?

1.2. Why would a product network look different from social network?

1.3. What is unique about e-commerce websites in which social networks complement product networks?

1.4. Can dual-network structure facilitate ill-defined exploration?

To provide answers to these questions, I will perform an empirical analysis of data collected from YouTube.com (details on the data collection are available in the Research Plan section and in the Appendix). In this part of my research, I will study the structure of the social and product networks. To do that, I will first define the metric to be used to measure distances in each network. This will require defining the following:

Distance between two products in the product network.

- Consumers' '*diameter of interest*'– A user's page often links to several products on the product network (content created by the user, content recommended by the user, and so on). These products provide input on a user's areas of interest, and therefore can be used to measure his 'diameter of interest.'
- '*Social diameter*' – Defining a user's diameter of interest will allow me to measure distances between peer consumers in the social network.

Research Question 2: What is the role of a dual-network structure in ill-defined content exploration?

Specifically, I am interested in answering the following questions:

2.1. Is a multiple-network exploration more efficient than a single network search?

2.2. What is the optimal network structure for a dual network design?

To answer th ese questions I will develop a si mulation m odel to dem onstrate t he effect s of different network topologies on ill-defined exploration using multiple networks. Since success and efficiency of ill-defined process are inevitably fuzz y, the model will include detailed definition of both the efficiency of the exploration as well as the success criteria.
I plan to conduct an inte rnet experiment to va lidate the sim ulation results . I have built an online environment where the content is presented in di fferent network structure based on the empirical findings. Using this experi ment I will examine th e users' exploration process as well as th eir overall satisfaction comparing the different network structures.

3 RELATED WORK

Typically, a web search includes submitting a key word query to a search engine and receiving a list of relevant web pages (Arasu et al. 2001). This type of search, in wh ich the user h as prior knowledge of what he is looking for and performs the search using search engine queries, is labeled here as a defined search. Unlike a defined search, ill-define exploratio n is a cogniti ve process of searching for vaguel y defined targets where users have not defined the specific desir ed content in advance (Saito and Ohmura, 1998). In this type of search, users do not know what exactly they are looking for, but as they search, their targets gradually become clearer.

Researchers in the fields of econom ics, co mputer science, and business have recently expressed growing interest in search engine desig n and use. T opics of inter est include i nformation c ollection techniques, storage issues , indexing a nd efficient retrieval, keeping inf ormation up-t o-date, an d ranking page relevancy to sear ch key words. In particular, the interlinked structure of the w eb and its role in improving search have been investigated in several studies (Barabási 2002, Barabási and Albert 1999, Kleinb erg et al. 19 99, Adam ic 1999; Scharn horst 20 03, studied the web topolo gy and i ts influences on web surfi ng and search; Brin an d Page 1998, and Kleinberg 1999, f ocused on incorporating the network structure properties to improve searches.).

Most papers about web search have focused on th e defined search. Ho wever, as point ed out by Rangaswamy et al. (2009), search engines still fail to meet the needs of users who do not have a cl ear idea of what they are looking for. Some studies ha ve investigated phenom ena si milar to ill-defined exploration o f content, in the context of electronic co mmerce. Moe and Fader (2004) st udied the conversion rate in online shopping, distinguishing between visits motivated by a planned purchase and visits associated with hedonic browsing, sim ilar to offline window shopping (see al so Moe, 2003). Saito and Ohmura (1998) studied the cognitive process of users who search the web for a gift, with no predefined target.

Recently, marketing and economics researchers have s shown much interest in the impact of networks, particularly social networks. Most relevant to our context is the literature that connects network structure properties to information disseminati on in networks (see among others: Valente 1996, Goldenberg et al. 2001, May zlin 2002, Hill et al. 2006, Young 2006, Kocsis an d Kun 2008, Katona et al 2009, Trusov et al. 2009). Specifically, the adva ntageous network position and structural properties of some nodes have been shown to facilitate the in formation dissemination process. For example, Burt (1992, 2005) showed that the important effects of structural holes in the flow of information are due to the fact that t hese holes separate non-redundant sources of information, sources that are m ore additive than overlapping. Individuals with higher betweenness can serve as brokers of inform ation and bridge those structural holes. Granovetter (197 3) provi ded evidence of th e informative advantages of weak ties in social networks. A weak social t ie may a llow a member of a relatively "closed" sub-network (e.g., close friends or coworkers) to acce ss ne w a nd unique information that exists in a different network. Goldenberg et al. (200 1) sho w that weak ties serve to enable information disse mination to sub-networks that are otherwise isolated.

The studies noted above focused on social networks. Surprisingly, little attention has been given in the literature to product networks. Work on product networks includes a study of the network of videos on YouTube by Oh et al. (2008) and a study of the network of blogs by Mayzlin and Yoganarasimhan (2008)[2]. Katona and Sarvary (2008) studied the strategic interaction between content sites, which can also be thought of as a product network. However, product networks were not explicitly mentioned in those studies. Oestreicher-Singer and Sundararajan (2008) studied the network of books on Amazon.com and quantified the incremental correlation in book sales attributable to the product networks' visibility.

To the best of my knowledge, the dual network structure has not been studied in the literature to date. A comparable network structure is the bipartite graph, which has two types of nodes, but in contrast to the dual network its edges run only between nodes of unlike types (Newman 2003). Goldenberg et al. (2005) study computer networks and cell phone networks and describe a structure consisting of a single set of nodes connected with different types of edges.

Several recent studies have explored the network structure of YouTube.com. Cheng et al. (2007, 2008) study the YouTube product network structure and find that it has small-world characteristics. Other researchers have studied the effect of the social network. Paolillo (2008) finds that users' social interactions influence their video uploading activity. A recent study by Baluja et al. (2008) presents a new method to offer recommendations of videos to users based on aggregation of co-viewed videos. Oh et al. (2008) studied the diffusion of videos and the relationship between the diffusion process and the video creator's social activity levels. My work is the first to study the dual network structure of the YouTube.com site and its association with content exploration.

Why would the social network and, specifically, social nodes contribute to the process of exploration within a product network? The answer may be found in Simmel's (1955) theory of 'intersection of social circles' (also referred to as 'The Web of Group Affiliation'). This theory is based on the notion that each individual may be part of several social groups. Each individual is situated in the intersection of several groups and can therefore facilitate information dissemination between groups. In the context of networked interaction, an advantageous network position may influence the social capital of a node within a network, which may result in better utilization or transformation of information. Applying this theory to the online dual network, it is possible to describe each individual user as situated in the intersection of different types of product circles. The different product circles represent natural groupings of the products (for example, based on product category). A single user may consume different types of products; therefore, the user bridges between products of different circles (different product categories, for example). In this sense, the dynamics of information search and information flow are quite similar, since in both cases the propagation takes place over the nodes of the networks. In the online environment, the visibility of the user webpage reveals the connections between different (product) circles and enables others to use these 'bridges' to experience greater variety.

4 OVERVIEW OF DATA AND PRELIMINARY RESULTS

Using data from YouTube.com, one of the largest existing dual network, I am able to conduct an in-depth analysis of the dual network structure. YouTube's core business is centered around videos, the website's "products". Each video has an associated webpage that is connected by hyperlinks to other video webpages, thus creating a product network. In addition to the product network, YouTube offers a social network in which each user has an associated webpage; these webpages can be linked to other user pages (creating a social network) and to video pages (connecting the product and social networks). Conceptually, this creates a dual network structure, as illustrated in Figure 1.

I have collected data on the YouTube.com product and social networks. Thus far the data set includes data on approximately 700,000 videos and 50,000 users connected by approximately 10 million

[2] The network of blogs can also be thought of as a social network.

hyperlinks. The hyperlinks are divided into three types as follows: (1) links within the product (video) network; these include directed hyperlinks appearing under the label "*Related Videos*" on a product's page and are based on co-consumption; (2) links within the social network, including undirected hyperlinks between each user and his or her friends, who are listed under "*Friends*" on the user's page; and (3) links connecting the product and social networks. These include two types of links: "*Owner*" (undirected links that link videos to their creator's page) and "*Favorites*" (directed links that link user pages to favorite videos).

4.1 The topology of the YouTube dual network

The first step in my empirical investigation requires an in-depth analysis of the YouTube dual network structure. I computed several indices that are commonly used in the literature to characterize network structures (Wasserman and Faust, 1994; Newman, 2003), including indegree and outdegree, clustering coefficient, distance between any two nodes in the network, betweenness centrality (a measure of the number of shortest paths to which the node belongs), and closeness centrality (the average shortest path between any two nodes).

	Product Pages	User pages
	Average	Average
Closeness	6.25	6.75
Betweenness	3.89E+06	12.8E+06
InDegree	14.25	3.97
OutDegree	14.50	4.49
Clustering Coefficient	0.20	0.10

Table 1. Indices of Videos and Users in the Dual Network

I compared the summary statistics of the social and the product networks and observed that the two networks were quite different in their structures (space limitations prevent us from reporting on all the results). Subsequently, I combined the two networks into a single network with two different types of nodes: videos and users. All the different types of links mentioned above were included in this network. I recomputed the above-mentioned network indices for each node in this integrated network. Then, I compared the node characteristics of the two different types of nodes (i.e., video nodes and user nodes). The results are presented in Table 1.

Surprisingly, even when both types of nodes are included in the same network, it is clear that compared with product nodes, user nodes have a significantly higher betweenness despite their significantly lower outdegree. Simply put, these findings suggest that user pages play an important role in increasing network connectivity. These results are even more striking when contrasted with the results concerning closeness centrality. There is a very small difference in the average closeness centrality of the video and user nodes. Taken together, these findings imply that although the user and the video nodes are located at equal average distances from all other nodes, user nodes play an important role in bridging different parts of the network and possibly facilitating faster exploration of the content space.

The question that should be addressed in this context is, is this bridging ability unique to user pages, or can increased connectivity be achieved simply by adding random links bridging different parts of the product network (this is often referred to as "rewiring").

4.2 Ill-defined exploration: An experiment

My empirical results show that user pages have a central position in the dual network and act as brokers between different parts of the product network. These results suggest that social nodes have an important role in facilitating ill-defined exploration. To test this conjecture, I constructed a YouTube-like website. The website provides video pages that can be viewed using a built-in video player. Each page contains ten links to other videos, enabling navigation through the site. The site offers more than 500,000 videos with about 10 million links connecting them. The videos and recommendations are taken from YouTube and are unchanged. Participants were asked to watch

videos for about 15 m inutes and assign a r ating from o ne star ("Poor") to five stars ("Awesome!") to each video the y watched. On ce a video had been watched, the participant was free to choose the next vi deo o ut of a list of reco mmendations. I assigned the participants into three treat ments: part icipants offered recommendations based on the pro duct network onl y ("related videos" as suggested b y YouTube); participants offered recommendations based on both the product network and the social network (a dual network); and participants offered recommendations based on the product network and r andomly suggested videos (labeled "featured videos"). To study the effects of the different o ffered struct ures, I u sed survival analy sis. Th e event was a successful conclusion of the exploration process (rating of "4" or "5"). The results are pres ented in Figure 2 and clearly show that consumers presented with a dual network find "good" content faster. I also find that their overall satisfaction with the website is higher.

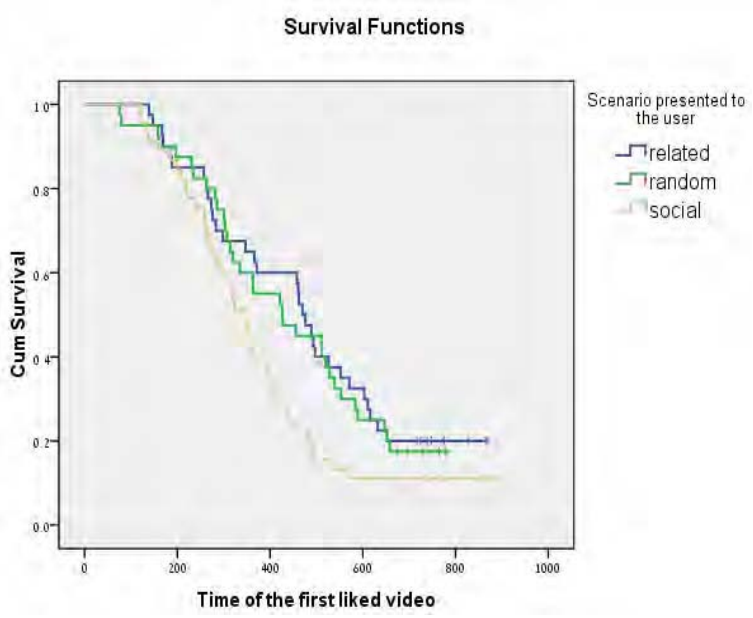

Figure 2. Kaplan-Meier Survival function

These re sults repres ent the structural variety of human ta ste and add to my previous findings by suggesting that user pag es are a valuab le as set to th e navigation process on the websit e. In dividuals seem to be interested in videos from different fiel ds and from different parts of the product network, and therefore the user pages play an important role in bridgi ng between videos and facilitating efficient exploration of the content space.

5 EXPECTED CONTRIBUTION

This work studies the dual network structure a nd its influence on ill-defi ned explorati ons. The presence of hyperlinked networks is one of the principal differences bet ween online and traditional content envir onments. Hy perlinked net works fac ilitate consu mers' foragi ng among products, for example by diminishing the physical limitations that affect a search for produc ts located in different stores. At the sam e time, as a result of the huge variety and number of products accessible i n online content environments, product searches have become much more complicated tasks.

My research explores the new and e merging structure of the dual network, the combination of social and product networks. This unique structure draw sc ant attention from scholars and my research aims to provide in-depth analysis of the network properties of this structure.

The research will provide both a theor etical model and em pirical analy sis on how people perform search and specifically ill-defined exploration in online environment. These model and analy sis follows the main stream of literature in IS d ealing with search, and extends it by focusing on ill-defined exploration process rather than keywords search.

The research uses theories and tools from physics (complex networks) , marketing(social network) and IS (product networks). This m ultidisciplinarity of the research will pr ovide known issues with additional methods that are in use for similar questions by scholars of other research areas.

My dissertation has many managerial implications as well:

- The question how online communities affect online consumptions is one of the most interesting subjects (and some may suggest opportunity), to online retailers and marketing practitioners. My research aims to provide new understandings on this reciprocal influence between the social and product network.
- By providing a theoretical model and empirical tools, this research may enhance the understanding of how to design an e-commerce site that will have better utilization of the unique characters of the dual network structure.
- Better understanding of how people perform ill-defined exploration will enable better design of the hyperlinked environment which may lead to higher rate of satisfaction and increase in consumption.

I anticipate that the results of the proposed research will contribute to the fields of information systems, marketing, and social science by providing new insights to the role of social networks in electronic commerce.

References available on request.

FROM BUREAUCRACY TO PEER PRODUCTION: ORGANIZATIONS AS INFORMATION-PROCESSING NETWORKS

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Abstract

Due to bounded rationalit y, human bei ngs have turn ed to market and bureaucracy because of their capability to manage information. Do t he proliferation of the internet and of information technology, as instruments for processing informati on, lead to new organizational forms other than market and bureaucracy? Peer produc tion can be considered in this regard and, under specific conditions, it results even more effective for managing information.

Keywords: Peer Production, Market, Bureaucracy, Information.

The perspective at the basis of this position paper considers individuals at the centre of the stage. The focus is posed on them and their actions rather than on roles, procedures, processes, organizational charts, etc. Following Simon, "it is only because individual human beings are limited in knowledge, foresight, skill, and time that organizations are useful instruments for the achievement of human purpose…." (1957, pp. 199). In this regard, the question at stake concerns solutions that individuals have at disposal in order to deal with these limits and market and bureaucracy are the two main devices that have been figured out. Why? Due to their capacity to manage information (Williamson, 1985; Galbraith, 1973).

At the basis of this statement, there is the idea that "as the degree of uncertainty increases, the amount of information processing during task execution increases" (Galbraith, 1973 pp. 9). If the task to be executed is simple, personal skills and capabilities are sufficient in order to face them. It is not the same if the task is complex. At this point, as suggested by Galbraith (1973), a solution is to follow specific rules or procedures in which the task can be subdivided into subtasks and necessary behaviours are specified in advanced. The subtasks can be assigned to different individuals who collaborate with each other in the task execution. The collaboration can acquire several modalities. One of them is represented by the hierarchy. When rules and procedures encounter an unexpected situation a new response has to be devised and a superordinate role in charge of exceptions can be an answer in this regard. Hierarchies are not only instruments to manage different levels of information but also to manage authority and reward power that contribute significantly to the behaviours of task performers. In case of an elevate number of exceptions executing tasks, the vertical channel risks to collapse. Superordinated roles becomes overloaded and task execution suffers this situation. The introduction of a divisional structure, lateral relations among the different divisions, and teamwork etc. contribute to outline more capable information processing networks.

So far, modalities through which products or services can be made or provided have been taken into consideration. But, in our societies, products and services can be bought as well. It will not be object of the present work to examine in detail when it is preferable the make solution or when, on the contrary, it is preferable the buy solution. Here, the point is to see market as an information processor based on prices. Following Hayek (1952), subjects, because of a spontaneous order, succeed to coordinate each other even if it is not the result of their deliberate decision. This is possible because the market mechanism permits to collect information and knowledge that are fragmented and diffused among subjects and concentrate them into prices. Prices, in fact, are the final result of a process in which entrepreneurs compare their production costs with each other in order to allure customers and gain a profit. Therefore they represent both the ability of entrepreneurs to combine the production factors and to satisfy, at the same time, customers' needs. Information processing, in the case of bureaucracy, is due to norms and procedures applied in an environment characterized by role differentiation according to a hierarchical order. In the case of market, information processing leads to the price system that governs economic actors.

Transaction costs approach scholars have determined further forms for governing transactions apart from market and bureaucracy. Ouchi (1980) added clan as the organizational form that emerge in presence of an high level of trust and shared values among organizational actors. Boisot (1995) added an additional form: fief. Fief, simplifying, characterizes organizational contexts in which traditional forms of authority rather than the legal-rational one typical of bureaucracy prevail.

The development of information technology has constituted an opportunity for the production and the spread of information. In this regard, from the half of the '90, the term information society is normally in use to define advanced societies. The question, now, is to see if this phenomenon can also lead to new devices in order to deal with human beings' inherent limits in knowledge, foresight, skill, and time. Peer production can be seen in this respect (Benkler, 2002). More precisely, Benkler (2002) maintains that four attributes constitute the basis of this new form for managing information: 1) information is a nonrival good (its consumption does not diminish its availability for use by any other person; 2) the physical capital costs of information production have declined dramatically; 3) individuals' creative talent is highly variable and need specific situations in order to be exploited appropriately. Only individuals themselves are aware about this and about motivations that lead them; 4) communication and information exchange across space and time are much cheaper and more

efficient than ever before. According to the combination of these four attributes it is possible to obtain both information gains and allocation gains in comparison with other forms of governance like market and bureaucracy.

Let's start from information gains. According to market principles, individuals decide to provide their workforce in exchange for a salary. However, the salary is only a suboptimal indicator of efforts and talent dedicated by a specific individual to a specific range of actions as it is determined by a series of factors out of the individual's control. The salary is a price and as such is subject to market forces and not only to his/her contractual capability. Furthe r, once the individual is employed in a specific organization, he/she has to follow assigned instructions in order to execute a specific task. It goes without saying that rules and regulations are constraints to the potential efforts of an individual. In other words, market and bureaucracy establish bonds to information spread and to what could have been done with the same amount of resources. Peer production is not characterized by these bonds. If information production is cheap and information resources are freely available it is no longer necessary to turn to "information-compression mechanisms like prices or managerial instructions" (Benkler, 2002, pp. 413). Of course, it is necessary that a large number of agents are involved in the same resources and opportunity set in order to create those conditions (information production) that allow to any agent to fit in with what can be done. Equally important is an effective communication platform that supports peer production processes. What is crucial is the design of the platform and modalities through which information exchanges are managed. Human beings are in charge of the latter and with the former constitute transaction costs of peer production organizational forms. In this regard and given the availability of opportunity for action by any agent, it is important to put under control undermining actions. Actions that usually are related to incompetence, incorrect self-assessment and defection. Therefore, it is under these conditions that "information production will better identify who is the best person to produce a specific component of a project" (Benkler, 2002, pp. 414) for example.

Moving from information gains to allocation gains of peer production means to focus on the combination of factors of production (resources, agents and projects). Market and bureaucracy are bounded by contracts and property rights. Resources and agents are available only through these instruments and it is intuitive the difficulty to mobilize these factors. In the case of peer production is not like this: "unbounded set of resources (are) available to unbounded set of agents, who can apply themselves to unbounded set of projects" (Benkler, 2002, pp. 415). In is in these conditions that there could verify an higher probability of superior productivity.

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MODELING A FRAMEWORK FOR IT ASSESSMENT BASED ON TEXT MINING AND BIBLIOMETRICS

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Abstract

In today's hyper-competitive business environment, companies depend heavily on technological innovation and decision makers must constantly consider investment in new emerging technologies and engage in technology assessment (TA) processes. However, because of information overload, the inability to manually process the abundance of data available on the Internet about a specific technology makes TA a tough challenge for decision makers. Information technology (IT) assessment involves an even greater challenge since new IT innovations occur at increasing speeds with shorter life cycles. The proposed research aims at responding to the TA challenge by developing a model and an automated decision support tool based on the proposed model - Technology Assessment Software Kit (TASK) - which is applied to a corpus of textual data collected on the Internet about an assessed technology. The proposed research draws on a unique and novel synergy of two well-established research fields: (1) information extraction (IE), using a text mining (TM) technique based on natural language processing (NLP) to derive a concept map, and (2) bibliometrics, using bibliometric search queries and publication counts as the bibliometric indicators to improve the concept map. Initial testing was already performed for the IT area of grid computing, demonstrating the applicability of the proposed model. From a theoretical perspective, the expected contribution of this study is a novel approach enhancing the traditional co-word analysis algorithm. Its practical contribution is in the development of an effective TA methodology and tool.

Keywords: Technology assessment, bibliometrics, text mining, information extraction, co-word analysis, concept map, natural language processing, web mining.

RESEARCH MOTIVATION AND GOALS

The motivation for this study stems from the need to engage in technology assessment (TA) processes in today's hyper-competitive business environment, where companies depend heavily on technological innovation and decision makers must constantly consider investment in new emerging technologies. However, because of information overload, the inability to manually process the abundance of data available on the Internet about a specific technology makes TA a tough challenge for decision makers. Information technology (IT) assessment involves an even greater challenge since new IT innovations occur at increasing speeds with shorter life cycles. The proposed research aims at responding to the TA challenge by developing a model and an automated decision support tool based on the proposed model - Technology Assessment Software Kit (TASK) - which is applied to a corpus of textual data collected on the Internet about an assessed technology. The study's goals are to make both theoretical and practical contributions. From the theoretical perspective, this study aims to provide a novel approach, enhancing the traditional co-word analysis algorithm. As for its practical goals, this study aims to develop of an effective TA methodology and validate it for the IT domain.

THEORETICAL BACKGROUND

Phaal et al. (2000) consider technology to be an important strategic asset for many firms, and see an increasing need to engage in technology assessment and include technological considerations in strategy and planning processes due to the strategic importance of technology in delivering value and competitive advantage. The ability of decision makers to foresee technological advances, especially disruptive technologies and to assess new and current technologies is, thus, essential for anticipating future developments, identifying upcoming innovations, as well as applying these insights to strategic business planning (Halsius & Lochen, 2001). According to Narin et al. (1994), counting the number of publications, articles, and patents, (i.e., bibliometrics indicator) by topical area, provides valid and reliable indicators of technology activities. White (2005) estimates that 85% of all stored data is held in unstructured format, doubling in volume every three months, and that without TM decision makers must focus on structured data alone. Therefore, the need for automated extraction process of valuable knowledge from unstructured textual data in order to assist human analysis is evident (Bolshakov & Gelbukh, 2004). Prado and Ferneda (2007), argue that the web holds an enormous amount of strategic information, and thus, the access and transformation of this information into knowledge as a basis for decision making in the corporate world have become crucial in the face of global competitiveness. Reducing the textual data into a specific representation of the essential information contained in the

data, enables revealing of patterns and trends in a specific discipline (Ding et al., 2001). Co-word analysis (Callon et al., 1986; Callon et al., 1991; Law & Whittaker, 1992; Courtial, 1994; Turner et al., 1988; Whittaker et al., 1989), which counts and analyzes the co-occurrences of keywords (word-word interactions) in a corpus of publications on a given subject, draws upon the assumption that a document's keywords constitute an adequate description of its content and keywords co-occurring are an indication of a link between the topics (i.e., concepts) to which they refer (Cambrosio, et. al., 1993). Concept maps, dynamic graphical maps that visually presents concepts and the relevant relationship clusters, have thus been proposed for capturing interrelatedness among concepts in a specific domain (Ruiz-Primo, 2000; Ruiz-Primo & Shavelson, 1996).

RESEARCH MODEL

In the present study, full-text analysis, IE, co-word analysis and traditional bibliometric method (e.g., number of publications) are combined to improve concept mapping applied in the TA decision-making process. The proposed TA approach begins by fetching from diverse web sources a corpus of unstructured textual data about a specific technology. Then, IE is applied to the corpus using NLP-based TM techniques, followed by co-word analysis and similarity coefficients algorithms, to create a concept map in order to uncover hidden patterns in the corpus. The extracted concepts are processed for further validation through a series of bibliometric search queries using a search engine.

The novel idea in the proposed research is to sequentially apply in the TA process two major sub-tasks, IE and bibliometrics, where the concepts in the concept map constructed by the IE sub-task are used as input to the bibliometrics sub-task. Before the two sub-tasks are applied, a text corpus is created by fetching over time text documents about a specific technology from various diverse web sources. Then, IE is applied to the corpus using NLP-based TM techniques, followed by co-word analysis and similarity coefficients algorithms, to create a concept map in order to uncover hidden patterns in the corpus. The extracted concepts are processed for further validation through a series of bibliometric search queries using a search engine such as Google, amplifying silent information (e.g., tacit data) and reducing noisy information (e.g., outlier data).

The bibliometrics sub-task, in which numbers of related documents (i.e., bibliometric indicator) returned by the search set of bibliometric queries are combined with the traditional co-word cluster weighting analysis, affects only the weights assigned by the traditional co-word analysis, contributing no new concepts other that those extracted during the IE sub-task. Consequently, the *SLV* (i.e., *Equivalence Index* defined by Callon et al. (1991) calculation of co-occurrences is composed of three computational cycles: (1) *A-priori* co-occurrence analysis denotes as $aSLV_{ij}$, (2) *Bibliometric* co-occurrence analysis denotes as $bSLV_{ij}$ and (3) *Combined* co-occurrence analysis denotes as $cSLV_{ij}$.

In Step 1 of the new method proposed here, described in Figure 1, the IE sub-task using NLP-based TM tool extracts from an open corpus of text documents (e.g., PDF, Office documents, HTML files etc) significant semantic concepts by named entities (such as person, company, location, product) and *a-priori* co-occurrence clustering indexes are calculated (i.e., $aSLV_{ij}$). Then, in Step 2, the same exact concepts are used by the bibliometrics sub-task as a series of queries in a web search engine (e.g., Google), and the search results retrieved by the search engine for each combination (e.g., concept *i,* concept *j,* and concepts *i+ j* using the AND Boolean operator) are used for the *bibliometric* co-occurrence clustering indexes (i.e., $bSLV_{ij}$). Finally, both a-priori and bibliometric indexes are synthesized into *combined* co-occurrence clustering indexes (i.e., $cSLV_{ij}$) in Step 3:

$$cSLV_{ij} = f\left(aSLV_{ij}, bSLV_{ij}\right) = f\left(\left(\frac{aC_{ij}{}^2}{aC_i * aC_j}\right), \left(\frac{bC_{ij}{}^2}{bC_i * bC_j}\right)\right)$$

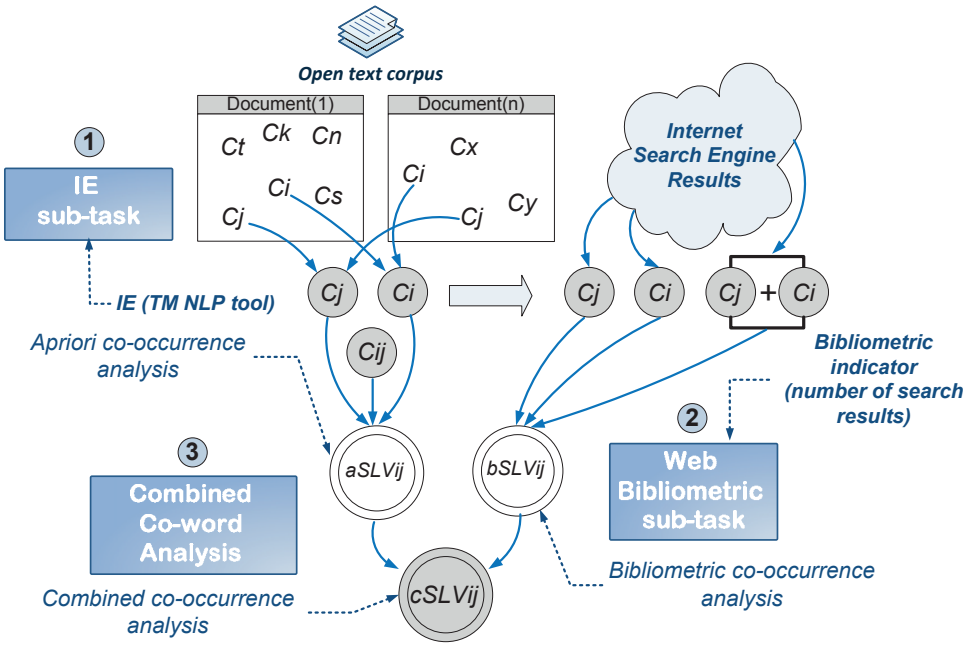

Figure 1: A conceptual workflow describing the combined co-word process

RESEARCH METHOD AND APPROACH

A web-based tool, entitled the Technology Assessment Software Kit (TASK), should be developed in order to automate the proposed model-driven approach, starting with the data collection phase and providing an advanced interactive user interface to allow exploration of the extracted knowledge by

users. The TASK platform components architecture is shown in Figure 4. Steps 1 to 15 provide an overview of actions in the TASK execution plan process.

On a functional level, TASK follows the general model provided by some classic TM and data mining applications (e.g., CRISP-DM), and is thus roughly divisible into six main stages: (1) temporal domain-oriented text collection, (2) preprocessing tasks, (3) core processing operations, (4) post-processing analysis, (5) presentation layer components and browsing functionality, and (6) evaluation and refinement techniques.

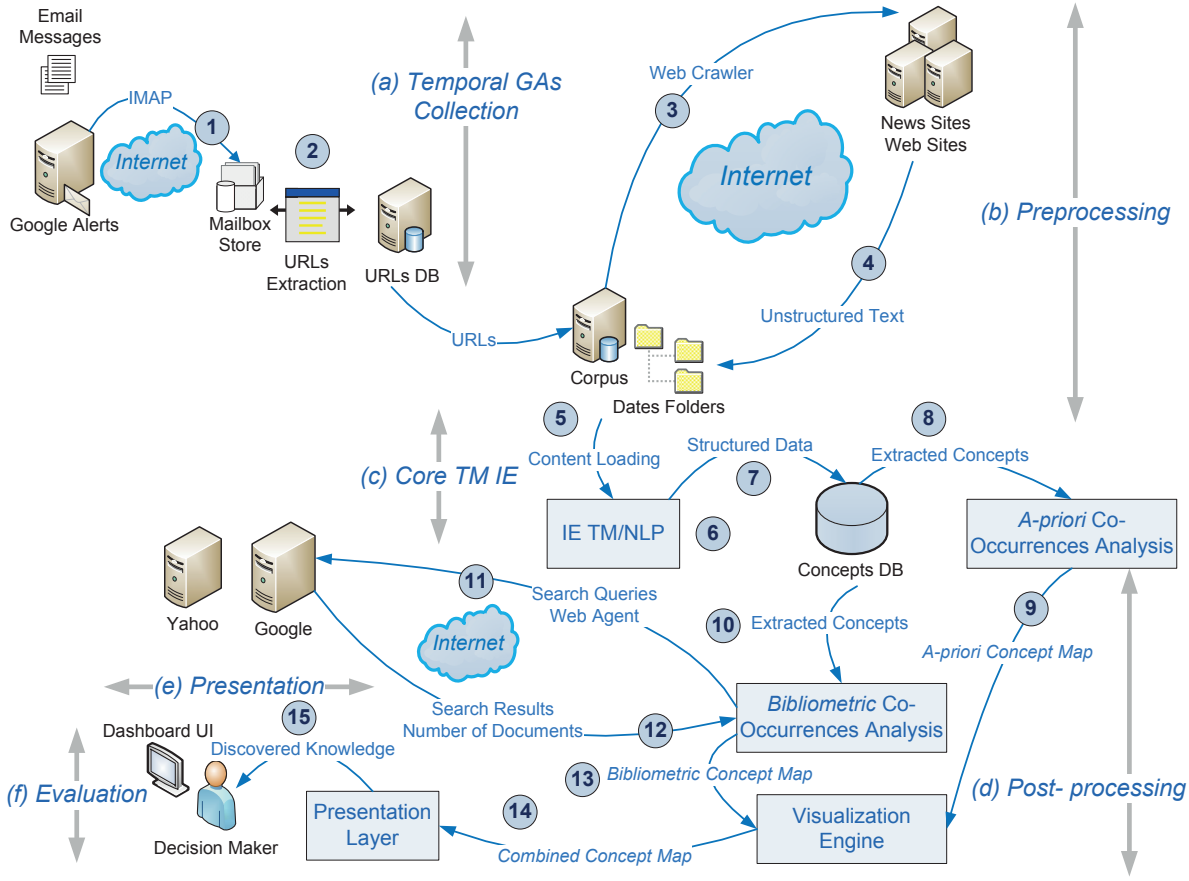

Figure 2: The TASK Architecture

PRELIMINARY RESULTS

Initial testing was already performed to demonstrate the applicability of the proposed model for the IT area of grid computing. Since the TASK platform has been only partially prototyped, some processes were manually performed while others used the TASK prototype. To create the open corpus for the initial testing, 1,226 Google Alert (GA) updates about grid computing were manually collected by subscribing to the GA service. For executing the IE sub-task, text mining was applied to the 1,226

HTML files using SPSS's *LexiQuest Mine* Version 3.1, creating a concept database with hundreds of grid computing concepts such as company names, product names, terms, people names, and locations. During the dynamic concept mining process, the key concepts and relationship clusters were extracted, presenting concepts and relevant relationship clusters in a format of concept map.

RESEARCH CONTRIBUTION

1.1 Expected Theoretical Contribution

The innovation in this research is expected in the form of a novel, customizable TA paradigm that goes beyond a conventional NLP-based TM process applied to textual data for IE on a specific technology. The innovation is manifested not only in the acquisition of all data from the Internet, but also in the robust concept mapping for identification and selective extraction from the web-based textual corpus of *significant* concepts *co-occurrence*, powered by applying bibliometrics to the results of a conventional keyword search in a web search engine (e.g., Google). Decreasing the number and the dimensionality of extracted concepts, and displaying only *significant key concepts* and *key themes* improves the visualization of the resulting concept map, thus bettering and enhancing the understandability of such map by the decision maker. The innovation expected in the proposed research can be best described in two complementary modes of *filtering* operations applied to the concept map generated by conventional IE using NLP-based TM tools: (a) a *denoising filter* of outlier concept *co-occurrences* that the conventional *co-word analysis* process (i.e., *a-priori* co-occurrence analysis) extracts from the corpus and, mistakenly presents them as *significant* concepts to the decision-maker, and (b) an *amplification filter* that enables the discovery of the presence of the elusive relationships not detected by the conventional *co-word analysis* process, due to the weak signal yields by the algorithm and thus, missing out important, although hidden, concepts relationships to the decision-maker.

1.2 Expected Practical Contributions

The first potential contribution expected from the proposed research is the development of a new model of using co-word clustering analysis in the creation process of a concept map based on texts collected on the web. The proposed model has the potential to present a more solid and precise picture of the technological reality a decision maker are faced with.

The second potential contribution expected from the proposed research is the implementation of the web as primary source of temporal unstructured or semi-structured textual data used in the TA process. The proposed approach will benefit tremendously from the emerging standard of the Semantic Web such as Web 3.0 and Web4.0. The third potential contribution expected from the

proposed research is the design, development and implementation of an innovative automated tool for technology assessment, morphing itself into a managerial decision process in the enterprise.

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USING BUSINESS INTELLIGENCE FOR IT STRATEGIC MANAGEMENT

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Abstract

The latest financial crisis revealed not only a need for business efficiency but more than ever a need for effectiveness. Wrong or poor decisions could easily threaten a company's survival in this fragile environment. As a strategic partner, the IT organization has an obligation to seek for necessary changes, reorganize its strategies and plans to provide the organization with competitive advantage and ultimately survive the crises without big losses. This chain of events drives stakeholders to require from the IT managers greater transparency about development and operation costs, plans and decisions. Nevertheless, it seems the IT organizations were not prepared for these demands either because they do not have the required information or due to the lack of processes and tools to make informed decisions. The purpose of this project is to understand and support the decision-making processes in the IT development organization of Danske Bank (Shared Service Center; SSC) by integrating business intelligence from different domains. My interest lies first in investigating the relationship between business intelligence (BI) and organizational decisions and second how business intelligence can be applied or used to support strategic management and decision making processes in an IT development organization. Specifically, I seek to develop a BI framework or a prescriptive theory of BI that will help IT managers make better, informed decisions. A qualitative approach is selected to investigate the issue and a case study fits best the nature of the problem.

Keywords: Business Intelligence, Organizational Decisions, Strategic Management, Performance Management,

1 INTRODUCTION

The latest financial crisis revealed not only a need for business efficiency but more than ever a need for effectiveness. Wrong or poor decisions could easily threaten a company's survival in this fragile environment. Hence, managers are required to make high quality decisions that will drive businesses out of the crisis and maybe thrive. To support decision making humanity has developed processes, techniques and tools of collecting and analyzing intelligence from ancient time, especially, during wars (Kinsinger 2008; Gilad & Gilad 1986). In the 1970s, a new era began for decision support, the first decision support system were developed based on the premise that access to better information and knowledge would lead to better decisions (Shim et al. 2002; Davenport 2010). However, as information systems pervaded organizations a new need for collecting and integrating data and information from different IT systems became obvious.

In recent years, business intelligence has acquired a wide recognition in the business world, due its capacity of collecting, analyzing and transforming large amount of data into information and information into knowledge. The term business intelligence was coined in the 1990s to convey the idea that the information in the IT systems can be exploited by the business itself. Looking up the Oxford English Dictionary we find the definition of the words business and intelligence separately. In the dictionary, 'business' is defined variously as 'a matter that concerns a particular person or thing; concern; a matter with which one has the right of interference; dealings, intercourse; a commercial enterprise as a going concern; occupation, serious occupation. "Intelligence" refers to the faculty of understanding, the action or fact of mentally apprehending something; understanding, knowledge, comprehension of something. Mutual conveyance of information; communication, intercourse; a relation of intercourse between persons or parties; the obtaining of information; the agency for obtaining secret information; the secret service.

As we can see above, the meaning of intelligence can be understood as an item for consumption (understanding, knowledge) and as a process (mutual conveyance of information, communication, and intercourse). Because intelligence is infinite in scope (for anything) the word 'business' functions to narrow the quantity of intelligence as a product; so business intelligence is intelligence for a matter that concerns a particular person or a thing (organization).

In practice, managers use this knowledge or intelligence developed from business intelligence processes in decision making. With the development of new technologies and tools the potential of business intelligence increases and with it also the crucial role that business intelligence plays in organizational decision making. Thus, it is important to study business intelligence due to its direct effect on decision making and in consequence, managerial work.

The purpose of this project is to gain an understanding and support the decision-making processes in the IT development organization of Danske Bank (Shared Service Center; SSC) by integrating business intelligence from different domains and performance management strategies. My interest lies in how business intelligence can be applied or used to support strategic management and decision making processes in an IT development organization. I want to understand and investigate the relationship between business intelligence and actual organizational decisions and find ways how to support organizational decisions by using business intelligence. Specifically, I seek to develop a BI framework or a prescriptive theory of BI that will help IT managers make better, informed decisions.

The SSC is in charge of standardizing, automating processes and of developing IT systems to enhance efficiency in the entire Danske Bank Group. Seventy percent of the activities in the Shared Service Center are IT development projects that support both internal development of IT tools and end-product development. The rest comprises of maintenance activities and other operations. The term initiative is used here to refer to all projects, maintenance and operations in the development organization.

2 AREA OF CONCERN AND RESEARCH QUESTION

Today the IT departmental managers and development directors at Danske Bank report that to manage, prioritize and evaluate initiatives they require information from different domains. However, the information they currently receive it is not organized, nor systematic or holistic. Because the information is scattered in different static reports (excel sheets format), the IT managers are not able to see the overview and monitor the performance of the departments in an efficient (are we doing it in the right manner?) and effective (are we doing the right thing?) way. They state that it is difficult if not impossible for them to have a clear overview of the performance of their departments and even more to see the impact of their performance towards the organizational objectives.

Since our focus is to support the decisions of IT managers, we should first look the prerequisites of making a decision. The basic elements of making a decision are the existence of an intention, change or goal that will be achieved if the decision is implemented and the availability of relevant information, here intelligence, to the decision maker. The intention or goal could be to solve a current problem or exploit a rising opportunity (March 1991). This drives our investigation on finding first what are the information needs of the IT managers and second how do we structure this information and link this information to organizational decisions.

As mentioned before one of the basic elements of decision making is the availability of relevant timely information. Thus, the study of business intelligence is directly relevant to this project. Business Intelligence is an umbrella term used for concepts, technologies, tools and processes of collecting business related data which are placed in a context and transformed into information which is further analyzed through reasoning and reflection into knowledge (Golfarelli et al. 2004; Tu, Y-M & Cnag, L-C. 2007). The technologies used include Data Warehouses where the data are collected, transformed and stored from different sources across all organization. Once in Data warehouse the data are placed in a context that makes sense and provided in different views, dimensions and reports. However, there is frequently no correlation between the information generated (reports) from the BI systems and a strategy that is being implemented by an enterprise (Tu, Y-M & Cnag, L-C. 2007; Olszak and Ziemba 2003) or the organizational decisions that need support.

On the other hand, we have the IT managers trying to make decisions that will achieve organizations' goals and strategies. Strategic Management involves the formulation, implementation and evaluation of cross-functional decisions that will facilitate the organization in achieving its long term objectives (David 1989). In an IT organization, effective strategic management would reflect quick response to new business challenges and replace outmoded ideas, technologies and applications. The management, control and monitoring of goals and their achievement in an effective and efficient manner is referred as IT strategic performance management. Most of the strategic performance management frameworks proposed, with the most popular the Balanced Scorecard, have as a condition the existence of clear, well defined goals and precise measurement of relevant metrics to assess the performance of IT resources according to these goals. Although, IT performance management is useful as a basis for IT management it is limited in the sense that ignores the possibility of ill/defined, ambiguous goals, a reality undeniable within an organization and especially among the different units or departments (March G. 1991).

While the entire academic world is demanding clear and well defined goals the industry fails to do so. An explanation to this problem could be the way that the organization behaves. Looking into the behavioral aspects of organizations and how managers in organizations make decisions we are confronted with the popular decision making models. It is essential to look into the organizational decision making processes by which IT organizations direct their resources because this will influence the structure, mix and type of intelligence provided to the IT managers. An understanding of the organizational decision making behavior is useful in managerial decision making (Dillon et al. 2005) as we can structure, organize and provide IT managers with better intelligence once we acknowledges the organizations' behavior.

Hence the research question under investigation is: *How can we use business intelligence to support IT strategic management in decision making in IT development organizations*?"

3 RESEARCH METHOD AND APPROACH

This study, due to the focus on actual decision making, the relationship between actual organizational decisions and business intelligence, and the complexity of this relationship, requires a careful research design. Based on the research knowledge and activity framework proposed by (Mathiasen 2002) I split the research question in two main sub-questions, as I pursuit to gain an understanding of the problem under investigation and create knowledge on how to support practice.

- How can we understand the use of BI in decision making processes?
- How can we support the decision making processes using BI?

According to Mathiasen (2002), to achieve understanding, one needs to engage in interpretations of practice by collecting data and interpret them. While to develop new knowledge to support practice we need to develop an artifact or normative propositions.

To address these questions I select two different methods: I will carry out a literature review and a case study see Table 1. The literature review contributes mainly on gaining the support knowledge and thus addresses the second question while the case study contributes primarily to gain the understanding of the phenomenon under investigation and explore the relationship between BI and organizational decisions, thus the first question.

	Literature Review	Case Study
Understanding the Use of BI in Decision Making Processes	Conceptualization of BI and Decision Making Processes	Insights Decision Making Processes at Danske Bank. Type, Source and structure of intelligence used for DM
Supporting Decision Making by using BI	BI Framework by synthesizing previous work in the field. Linking BI with organizational decisions	Propositions on the type, sources and structure of BI according to DM processes & BI technologies

Table 1. Research approach

More specifically, from the case study I will gain an understanding of the decision making processes through an investigation with open – ended and semi-structured interviews and document analysis of the current practices of the IT development organization (SSC). Observations of different meetings, where IT managers are required to produce decisions, will follow to increase validity by data collection triangulation. In this phase, I address the role of business intelligence (information) in decision making processes in an IT development organization. This will give us insights about the practice and helps me in designing useful propositions.

The second question will be addressed by synthesizing both the existing literature on business intelligence and the insights gained by the empirical data, resulting in propositions on the type, sources and structure of BI according to decision-making processes & BI technologies.

In the next paragraphs I describe the activities that I planned for each semester.
I will investigate during the first semester the academic literature on Business Intelligence and Strategic Performance Management theories and applications. In parallel participant observation methods will be undertaken during this period when I am at the site, such as informal interviews, direct observation, participation in the life of the organization, collective discussions, and analysis of personal documents produced within the organization. Finally, an interview guide will be created that will drive the work in the next semester.

Through the third semester the collected data from the previous semester will be analyzed. After the data analysis I will integrate the theoretical findings from the above literature exploration with the results from the analysis of the collected data. This will result in a business intelligence and strategic management framework which will be documented in a paper (conference or journal).

The fourth semester involves studying abroad in a foreign university to evaluate, with state of the art researchers in the field, the theoretical concept that lies under the developed framework.

The framework will be evaluated empirically in the IT development organization of Danske Bank. I will carry out a pilot study to evaluate the proposed framework during the fifth semester.

4 RELEVANT THEORIES

To interpret the decision making processes at the company we will use three different models:

The rational model: The rational decision making model describes the organization as possessing one single major goal and where all the efforts are directed towards achieving this goal. The model assumes a rational behaviour where the actors gather relevant information; develop a set of alternative actions, and select the one that maximizes the goal.

Garbage can model: The " garbage can model" emerged as part of a critique of rational decision making models by Cohen, March, & Olsen (1972). In this analysis, the decision making in organizations is not a result of rational choice. Rather the organization is described as a mix of problems and possible solutions handled by different participants where decisions do not solve always problems. The mix reflects how many decision areas are handled by the organization, how people have access to the organization, the decision load of the organization, and the organization's level or resources, time, energy, and attention. In a garbage can model, choices may be made based on the solutions available and the allocation of attention.

Political model: In a political model organizations are viewed as alliances of people with opposite interests. Even though in a high level these people share the same goals, they also disagree in some issues. In this model, decisions are a result of power games between different coalitions where the most powerful wins. As such, “decisions follow the desires and subsequent choices of the most powerful people “(March 1962).

We will use the 3 models as an analysis framework in our study. We will describe the organization from 3 different models and will try to see the implications of each model, in an IT development organization, in terms of the intelligence provided to the IT managers in different levels of the organization. From the first round of interviews will become obvious which model dominates and on what levels. This model then will be investigated thoroughly in the next round of interviews.

5 EXPECTED RESULTS

In a theoretical level, the study will explore the relationship between BI and organizational decisions, in parallel with the use of the 3 different models in a centralized IT development organization and their implications. The contribution of the project will be the artifact that will be produced, the business intelligence framework. Moreover, the new developed framework will be distributed by the university to the rest of the world and used by other IT development organizations.

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E-LEARNING IN THE WORKPLACE: FACTORS AFFECTING EMPLOYEE'S ON-THE-JOB PERFORMANCE

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Abstract

E-learning has become a leading practice and an alternative mode of employee training and development. As this practice is growing, several questions emerge regarding its effectiveness in the context of human resource development initiatives and in organizational terms in general. Training has no value for organizations if employees are not able to transfer what they have learned in a training program back to their job tasks. Transfer of training and employee on-the-job performance improvement must be included in any effort taken to evaluate e-learning effectiveness in the workplace. Although, several studies have been conducted to understand the transfer of training process and related factors in traditional training contexts, there is little empirical research on transfer of training in the e-learning settings. The main objective of this study is to identify the factors (characteristics) of a training system that enhances effectiveness of workplace e-learning. E-learning effectiveness is studied in terms of individual on the job performance improvement by both reviewing factors that affect offline training and identifying and/or defining factors affecting online training (e-learning). A multistage research approach is adopted including extended literature review on e-learning effectiveness, information technology in organizations, transfer of training and employee performance issues, exploratory case studies in authentic contexts and the conceptual model creation and testing. Preliminary results are coming from the literature review and an interim list of potential factors that affect employee transfer of training and performace in the context of e-learning is created. This study is expected to contribute to the design and development of a comprehensive transfer framework which incorporates e-learning characteristics and will be able to explain the e-learning effectiveness in organizations in terms of employee on-the-job performance.

Keywords: employee training and development, e-learning in the workplace, transfer of training,on-the-job performance

1. INTRODUCTION

In recent years organizations have been urged to adopt and use advanced and flexible methods related to employee training and development as they have realized that the most important asset are employees (Pfeffer, 1994; Davenpot, 2006) and their performance is the key for organization success and competitiveness. In this direction, information and communication technologies have led to an increased use of technology supported learning (e-learning) as an alternative training delivery mode in the workplace (Simmons, 2002; Suqrue and Rivera, 2005, Bersin, 2005). Usually, organizations use e-learning alongside traditional training methods (Young, 2002) mainly to keep up with increasing employees' learning needs, and thus to improve their performance and their contribution to organizational results in general.

According to Paradise and Patel (2009) in the ASTD 2009 State of the Industry Report, 'workplace learning and performance has withstood the challenges of the difficult economy. Although investment in training was stable in 2008, organizations achieved positive outcomes and successfully contributed to their employees' development with more formal learning opportunities while using fewer resources'. In addition, this report revealed that investment in employee learning and development remained steady through the end of 2008. Although the average annual learning expenditure per employee fell from $1,110 in 2007 to $1,068 in 2008 – a 3.8 percent decrease – it was not large by any means.

The fact that e-learning is a growing practice in organizations (Laurillard, 2002) raises many questions about its effectiveness. The ultimate goal for designing and conducting e-learning programs is to improve individual and organizational performance (Cantoni et.al., 2004; Driscoll, 2002; Rosenberg, 2000). Particularly, transfer of training is an important issue related to e-learning effectiveness in the human resource management field (Cheng and Ho, 2001). In the traditional training environment, research has revealed that transfer of training, as a result of training, varied from 10 to 30 % (Baldwin & Ford, 1988; Broad & Newstrom, 1992; Tannenbaum and Yulk, 1992). This result has significance for both the learner and the organisation. Transfer of training can be defined as the application of knowledge, skills and attitudes gained in training to the job and subsequent maintenance of them over a certain period of time (Baldwin and Ford, 1988). Transfer of training is a fundamental issue between the individual behavior change and the organizational objectives. Kirkpatrick (1994) emphasized the importance of the change in behavior as a training outcome and noted that no final results may be expected unless a positive change in behavior occurs. When employees are not able to transfer what they have learned in a training program, they will not improve their performance.

Although, many researchers and practitioners claim that e-learning can improve employee on the job performance, there is no adequate empirical evidence to support it. Several studies have been conducted to understand the transfer of training process and related factors in traditional training, but models and factors related to transfer of training in e-learning settings are limited. Also, these studies only included factors related to the transfer of training in general and not factors that are expected to be particularly associated with e-learning. Clearly, there is a need to define transfer of training in terms appropriate for eL based training and to justify the e-learning initiatives in the workplace in terms of human resource management (performance) as well as in terms of organizational results.

The aim of this thesis is primarily to identify the factors (characteristics) of a training system that enhances effectiveness of workplace e-learning. It is worthy of note that workplace e-learning effectiveness is studied in terms of individual on the job performance improvement by both reviewing factors that affect offline training and identifying and/ or defining factors affecting online training (e-learning). Also, this research aims to explore the mediating role of transfer of training construct on individual on-the-job performance in the context of e-learning based training.

In terms of Information Systems research, e-learning in organizations constitutes a type of information system in the Human Resources Management area and more specifically in employee training and development practice. Like any information system used in other organizational areas (e.g. production, inventory, marketing), e-learning's objective is firstly to improve individual performance and secondly to improve organizational results. In order to meet effectively the objectives of this study, it is needful to review extensively related theories proposed in the IS research discipline which focus on the individual level of analysis and behavioural changes (performance improvement). For example, task-technology fit theory may be serve the purposes of this study as it proposes that IT is more likely to have a positive impact on individual performance and be used if the capabilities of the IT match the tasks that the user must perform (Goodhue and Thompson, 1995). Further review of these IS theories is required.

2. THEORETICAL BACKGROUND

This thesis focuses on three main areas such as e-learning in the workplace, transfer of training and employee on the job performance. E-learning in the workplace constitutes a leading practice in employee training and development as it provides organizations significant benefits ranged from costs reduction to employee performance improvement (Rosenberg, 2000). In the related literature there are several definitions for e-learning. This study adopts the definition suggested by Goodyear (2002) who states that e-learning is "the systematic use of networked multimedia computer technologies to empower learners, improve learning, connect learners to people and resources supportive of their needs, and to integrate learning with individuals' performance and with organisational goals".

Transfer of training can be defined as the application of knowledge, skills and attitudes gained in training to the job and subsequent maintenance of them over a certain period of time (Baldwin and Ford, 1988; Tannenbaum and Yulk, 1992; Xiao, 1996). Broad and Newstrom (1992) define transfer of training as the effective and continuous application of knowledge, skills and attitudes learned in training program to the workplace. According to Broad and Newstrom (1992), transfer of training must be included in any effort taken to evaluate training effectiveness. Evaluation is a key process to examine and measure training and e-learning effectiveness.

Based on Kirkpatrick's (1994) established four-level evaluation model, transfer of training is the third level of training program evaluation and measures the degree to which learners apply what was learned on the job (behaviour/ transfer of training). Level 1, reaction measures how trainees react to the program (satisfaction), level 2 measures trainees' achievement of training objectives (knowledge, skills and attitudes change) and level 4 measures the organizational change resulting from the trainees' participation in the training program (results). Kirkpatrick's model has been used as a basis in several studies which validate empirically the relationships among the four levels (Allinger and Janak, 1989; Noe & Schmitt, 1986) or expand/ refine the model (Holton, 1996; Kraiger, 2002; Phillips, 2003; Kaufman and Keller, 1994; Tannenbaum et al., 1991). Although this model was developed to assist instructors and practitioners in determining training outcomes, in practice only level one and level two are assessed by organizations in the context of e-learning (Piccoli et al., 2001).

In the transfer literature, several transfer of training models have been proposed and have highlighted various factors that affect the transfer of training (Baldwin and Ford, 1988; Holton et al., 2000, Mathieu et al., 1992; Xiao, 1996). Among these models of transfer of training, Baldwin and Ford's model is the most widely used model of the transfer process. This model suggests that transfer requires learned behaviour to be generalised to the job context and maintained over a period of time and provides three sets of factors as training inputs in transfer process including design of the learning programme, characteristics of the learner and work environment characteristics. In general, the factors that affect directly or indirectly transfer of training are categorized in three groups: learner characteristics, training/

course characteristics, and work/organizational environment characteristics. Many researchers study transfer of training and some of them have extended the work of Baldwin and Ford (1988) (Holton and Baldwin, 2000; Ford and Weissbein, 1997; Kontoghiorghes, 2001, 2002, 2004; Noe and Ford, 1992; Tannenbaum and Yulk, 1992).

Concerning transfer of training in workplace e-learning there is scarce empirical research. Some researchers have reviewed transfer of training with relation to distance education and e-learning (Berge and Mrozowski, 2001; Khan, 1997; Lee et al., 2004). In one study, it was suggested that technology-based training that is available just-in-time, or that can be accessed once the participant is back on the job may enhance transfer (Dulworth & Shea, 1995). Bates et al. (2000) investigated the factors affecting the transfer of computer-based training in an industrial setting. Park & Wentling (2007) investigated the effect of factors associated with e-learning, particularly computer attitudes and usability, on transfer of training in workplace e-learning courses. Lim et al. (2007) examined online training program design factors such as ease of interaction, computer self-efficacy, motivation, contents of training and communication with trainer, seniors' support and continuous learning culture to improve learning performance and transfer performance. Based on Baldwin and Ford's (1988) model, their research incorporates design factors from traditional offline training and online training. Kim & Park (2008) developed a scale for learning transfer in corporate e-learning environments which consisted of four factors of learning transfer: learners' internal characteristics, learning contents and design, support of peer and supervisor, and organization environment.

3. RESEARCH METHOD AND APPROACH

Although literature indicates some factors that affect employee on the job performance, the fact that most of them have been identified in the traditional training environment necessitates a multistage research approach in order to ensure the validity of the findings. Thus, the first stage of this research approach is an in depth exploration of basic concepts in order to elicit groups of factors mentioned in the related literature (offline and online training literature). The second stage includes exploratory case studies in different work environments such as bureaucratic service organization, flexible innovative organization and public organization. The case study analysis will filter the factors identified in the related literature and create a list of the most important factors affecting employee's on the job performance in the context of e-learning in the workplace. Stage one and two will formulate the conceptual framework of this study. In the third stage, the appropriate research instrument (questionnaire) will be developed and delivered to the population in order to examine and validate the conceptual framework. The proposed framework is presented below (figure 1).

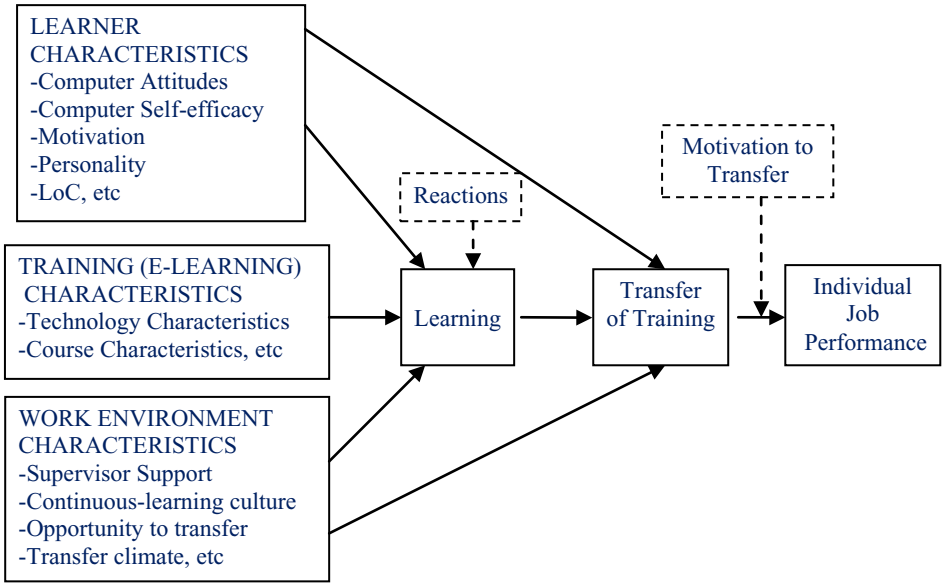

Figure 1: Proposed Conceptual Framework

4. PRELIMINARY RESULTS AND RESEARCH CONTRIBUTION

The preliminary work of this thesis focused more on transfer of training in the context of workplace e-learning and an interim list of potential factors that affect transfer of training was created. Table 1 presents the list of factors which are categorized in the three groups mentioned above and the related measures.

Learner/ Employee Characteristics	**Training/ e-learning Characteristics (Course and Technology dimensions)**	**Work Environment Characteristics**
Motivation to learn (Keller, 1983, 1987b, 1989)	Usability (Zaharias et al., 2002; Anjaneyulu et al., 1998, Nielsen, 1993)	Social support for training (Facteau et al., 1995; Tracey et al. 1995)
Locus of control (Trice, 1985)	Interaction (Fulford and Zhang, 1993; Garrison, 1993; Moore, 1989)	Transfer of training climate (Facteau et al., 1995; Tracey et al. 1995)
Computer Self-efficacy (Murphy et al., 1989; Langford and Reeves, 1998; Davis and Davis, 1990; Harrison and Rainer, 1992; Harrison and Rainer, 1997; Gist et al., 1989; Burkhardt and Brass, 1990; Compeau and Higgins, 1995;)	Training Content (Grove and Ostroff, 1991).	Continuous learning culture (Facteau et al., 1995; Tracey et al. 1995)
Computer Attitudes (Loyd and Gressard, 1984; Al-Jabri and Al-Khadi, 1997; Wilson and Daubek, 1992)	Learner Control (Piccoli et al., 2001)	Task constraints (Facteau et al., 1995; Tracey et al. 1995)
	Hypermedia (Piccoli et al., 2001)	
	Technology Availability (Piccoli et al., 2001)	
	Technology Quality (Piccoli et al., 2001)	

Table 1: List of potential factors affecting transfer of training in workplace e-learning setting

This study seeks to extend the existing research concerning the factors that affect transfer of training and employee on-the-job performance in the context of e-learning in the workplace. Given currently the little empirical research on the factors that influence transfer of training in e-learning environments, it is expected this study to contribute to the design and development of a comprehensive transfer framework which incorporates e-learning characteristics and will be able to explain the e-learning effectiveness in organizations. Also, this study is important because it will explore and empirically test the mediating role of transfer of training in the e-learning setting.

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THREE INTERDISCIPLINARY STUDIES ON IT OUTSOURCING

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Abstract

Although information technology outsourcing (ITO) is a well developed subject of IS research, there are still notable gaps in understanding some ITO related phenomena, especially those that lie on boundaries with other disciplines and research fields. The three papers comprising my dissertation address some of these gaps while bridging IS with three other research fields: public administration, sociology and accounting.

The first study is devoted to ITO in public organizations. I describe public ITO as an interdisciplinary research area and build an analytical framework based on fragmented existing literature. The framework will be tested and expanded with an exploratory analysis of a uniquely rich and comprehensive data set. This study lays a systematic foundation for future development of public ITO research.
The second study uses boundary spanning conceptual approach to investigate the impact of a client organization's communication culture on two types of communication in complex outsourced projects: internal communication with project's stakeholders and communication between the client and the vendor. This is a valuable theoretical contribution to outsourcing and boundary spanning research. Developing a survey instrument for measuring complex qualitative concepts and further structural equation modeling makes an original methodological contribution.

The third study approaches control in outsourcing projects from an unusual angle of compliance with recently changed reporting requirements. I use auditing internal control framework CobiT to assess the usefulness of communication tools in out sourcing projects for control purposes. This unique interdisciplinary approach makes a contribution to both IS and accounting literature.

Keywords: outsourcing, interorganizational collaboration, knowledge exchange, IS development, project management, boundary spanning, boundary objects, public sector, internal control, CobiT

THREE INTERDISCIPLINARY STUDIES ON IT OUTSOURCING

Information technology outsourcing (ITO) is a complex and well studied phenomenon. Dozens of papers on ITO are published every year by researchers representing Information Systems (IS) and management research communities. Several in-depth literature reviews have analyzed and summarized the rich and diverse ITO research (Dibbern, Goles, Hirschheim & Jayatilaka, 2004; Hätönen & Eriksson, 2009; Lacity, Khan & Willcocks, 2009). Three main directions of inquiry can be derived from these summarizing works. One direction is toward understanding the antecedents of sourcing decisions. Another stream is concerned with issues of contract management. Finally, the most recently emerged research area is focused on communication between a client and a vendor and building interorganizational relationships. My dissertation consists of three papers representing these three main directions of ITO inquiry. Data analysis in the first paper is focused on the decision to outsource in public organizations; the second paper proposes a model for ITO relationships viewed through the boundary spanning conceptual lens; control, which is an important component of contractual governance, is the main theme of the third paper.

Although ITO is a well developed subject of IS research, there are still notable gaps in understanding some ITO related phenomena, especially those that lie on boundaries with other research fields. Three studies that comprise my dissertation create interdisciplinary connections between the traditional IS-rooted research on ITO and other fields of study. The first study bridges the IS and Public Administration disciplines; the second one builds on the boundary spanning paradigm initially developed as a sociology theory; the third paper introduces an accounting perspective.

In the following subsections, I will provide a brief overview of each study, describing their motivation, methodology, and contribution to the literature and practice.

1 IT Outsourcing in Public Organizations: Lessons from Public Safety Networks

The first study of my thesis addresses the unique traits of ITO in public organizations. I describe public ITO as an interdisciplinary research area comprising IS, management and public administration disciplines. I perform an in-depth analysis of the geographically scattered academic literature across these domains, and consolidate the findings in an analytical framework capturing issues and concerns that are unique for IT outsourcing in the public sector. I map the unique and special traits of public ITO with the three main areas of ITO inquiry - sourcing decisions, contract management and relationship management, and classify them as "internal" - coming from the nature of the public service and its organizational culture, and "external" - coming from policies and regulations developed by higher authorities. My framework is not meant to replace models and frameworks that have been developed and tested by the general ITO research; it is intended to be used in a combination with any of them. It will need to be tested empirically, expanded and refined as public ITO research develops.

The empirical part of the study is an exploratory analysis of data on eighty public safety networks (PSNs) - collaborative initiatives created to facilitate communication and information sharing among first responder agencies at different governmental levels and geographies. These data were collected as part of a large scale project funded by National Science Foundation grants NSF-0852688 and NSF-0534877, and include comprehensive information about PSNs' history, organizational characteristics and governance practices. This rich dataset provides an exceptional opportunity for analyzing organizational characteristics that have not been taken into account by previous ITO studies, but, in line with the analytical framework, are especially important in the public sector. The data analysis will be focused on, but not limited to, organizational characteristics that affect sourcing decisions and the impact of collaborative experience on different aspects of an organization's ITO behavior. For example, the unexpectedly high ITO success rate noted in our dataset may be rooted in the collaborative nature of PSNs and their prior experience in interorganizational relationships.

This work lays a foundation for future development of public ITO research area by identifying the distinct characteristics of public ITO and providing an analytical framework that may serve as a starting point for systematic public ITO inquiry. Moreover, the organizational characteristics that affect public ITO management and outcomes are not necessarily unique in the governmental context. Therefore, a deeper understanding of their impact on the patterns of organizational behavior may contribute to outsourcing research in general and potentially to the research on interorganizational relationships in general. The study also makes an important contribution to practice and can be used by public officials and by outsourcing vendors who do business with governmental agencies.

2 The Role of Client's Boundary Spanning Culture in Outsourced ISD Projects

The second study is the main part of my dissertation. There is a consensus in outsourcing research about the importance of quality communication between outsourcing clients and vendors, especially for knowledge-intensive projects. Communication with system stakeholders and understanding their needs has been also recognized as critical for ISD projects. However, these two types of communication have not been brought together to build upon their conceptual commonalities. The unique contribution of this study is in investigating the connection between internal and external communication during an outsourcing project, as well as between routine internal communication in a company and its outsourcing behavior.

I use the boundary spanning approach to analyze client's communication patterns in three different contexts: routine internal communication in the company, internal communication for the purposes of an outsourced project and communication with an outsourcing vendor. The boundary spanning approach views communication as spanning boundaries between "communities of practice" – groups of people who share practices and working context (Wenger, 1998). My high level proposition is that organizations with developed boundary spanning culture are capable of communicating more effectively, both internally and externally, during an outsourced ISD project. I also propose that the extent of boundary spanning in the project positively affects the overall quality of the outsourcing relationship, and, in turn, the success of the whole project.

The data for this study will be collected with a survey instrument and analyzed with the structural equation modeling technique. I draw on previous, predominantly qualitative, literature for building a research model and developing measurements for complex boundary spanning phenomenon. I opted to measure boundary spanning in three different contexts as three formative constructs capturing the intensity of boundary spanning, its quality and the level of boundary complexity (Carlile, 2002, 2004). The intensity measurement considers the use of various tools that may serve as boundary objects. I compiled a list of the tools after analysis of the extant literature and informal interviews with practitioners. For the quality dimension I use criteria provided by Levina (2005) and Levina and Vaast (2005) who distinguish between nominated boundary objects and spanners and boundary objects and spanners in practice. Finally, I subscribe to Carlile's (2002, 2004) argument that boundaries can be perceived and approached at different complexity levels. I show that communication for the outsourced projects may be more challenging for some companies than for others depending on the boundary complexity level of their routine internal communication. Additional quantitative techniques, such as modeling second-order reflective constructs and reducing an multidimensional measurement to one variable with factor analysis, will be employed for modeling the formative variables. Constructs for quality of relationships and project success were operatinalized by several previous authors. Following thier works, I measure the quality of outsourcing relationship in terms of trust, understanding, cultural compatibility and successful conflict resolutions (e.g., Goles, 2001; Lee and Kim, 1999). Project success will be assessed as combination of product and process quality (Gopal and Gosain, 2009). My research model is presented in Figure 1.

There are several contributions this work can make to scholarship and practice. First, it expands the analysis of the roots and antecedents of successful ISD outsourcing collaborations by highlighting

previously overlooked boundary spanning organizational capability. This capability is based on the boundary spanning culture in the organization and can be leveraged when the organization faces novel and challenging types of boundaries. Second, this study makes a contribution to further development of the boundary spanning conceptual approach. Almost all contemporary work on boundary spanning use qualitative methods of data collection and analysis. These methods provide deep and rich insights compared to quantitative statistical methods; at the same time, their generalizability is relatively limited. Providing quantitative support to theoretical developments of the boundary spanning approach is another research contribution of this study. Third, I develop an instrument for measuring complex qualitative concepts: extent of boundary spanning, boundary objects and boundary spanners in practice as opposed to nominated ones, and conceptual approach to boundary complexity. Operationalizing of these concepts for quantitative modeling is an original methodological contribution. Finally, uncovering the implications of client boundary spanning capabilities in the outsourcing industry, estimated at about $35 billion in 2007 in cross-functional application development alone (Gopal & Gosain, 2009), is of great value for practitioners, both those who manage an outsourcing project and those who are considering undertaking one. Findings from this study will aid in the assessment of projects' risks and clients' maturity. It will help practitioners make more informed decisions when choosing a vendor, forming an outsourcing team, investing in communication with various stakeholders and developing governance mechanisms for an outsourcing project.

3 Boundary Objects and Internal Control in Outsourced ISD Projects

The third study in my thesis contributes to the contract management dimension of ITO research. The issue of control in IT projects is discussed in the literature of several research disciplines. The auditing literature is concerned with compliance and provides detailed frameworks (such as COSO and COBIT) for establishing and maintaining a system of internal control for IT projects. The IS literature on outsourcing is also concerned with control but does not provide the level of structure found in the accounting control frameworks. An original contribution of this study is in bringing these different fields together to achieve a better understanding of possible ways to implement high quality (effective, flexible and efficient) internal control in complex outsourced IT projects.

Extant literature suggests that the system of control in outsourced projects should be flexible (Choudhury & Sabherwal, 2003), leave enough room for vendor's innovativeness (Levina & Ross, 2003), and be "built in versus bolted on" (Gelinas & Dull, 2007, p.218). Drawing on these findings, I propose that tools ("boundary objects") used for an ITO project management may be also used for internal control of the project.

To test this proposition, I will expand the survey instrument developed for the second study of my dissertation to include several additional questions. I use selected control objectives from COBIT, a well structured framework for evaluating internal control of IT (ITGI, 2007), to measure the use of boundary objects in outsourced ISD projects for the purposes of internal control.

An original contribution of this study is in bringing the Accounting and IS disciplines together for better understanding of possible ways to implement high quality (effective, flexible and efficient) internal control of complex outsourced IT projects. The internal control literature is dominated by normative and opinion papers; most empirical work is based on qualitative methods of analysis. The proposed study is positivist and based on quantitative analysis, which makes it a valuable addition to accounting research. This work will also make a contribution to practice by indicating communication tools that may be recommended for practitioners as especially efficient. Auditors can also use this information for assessments of internal controls in ITO projects.

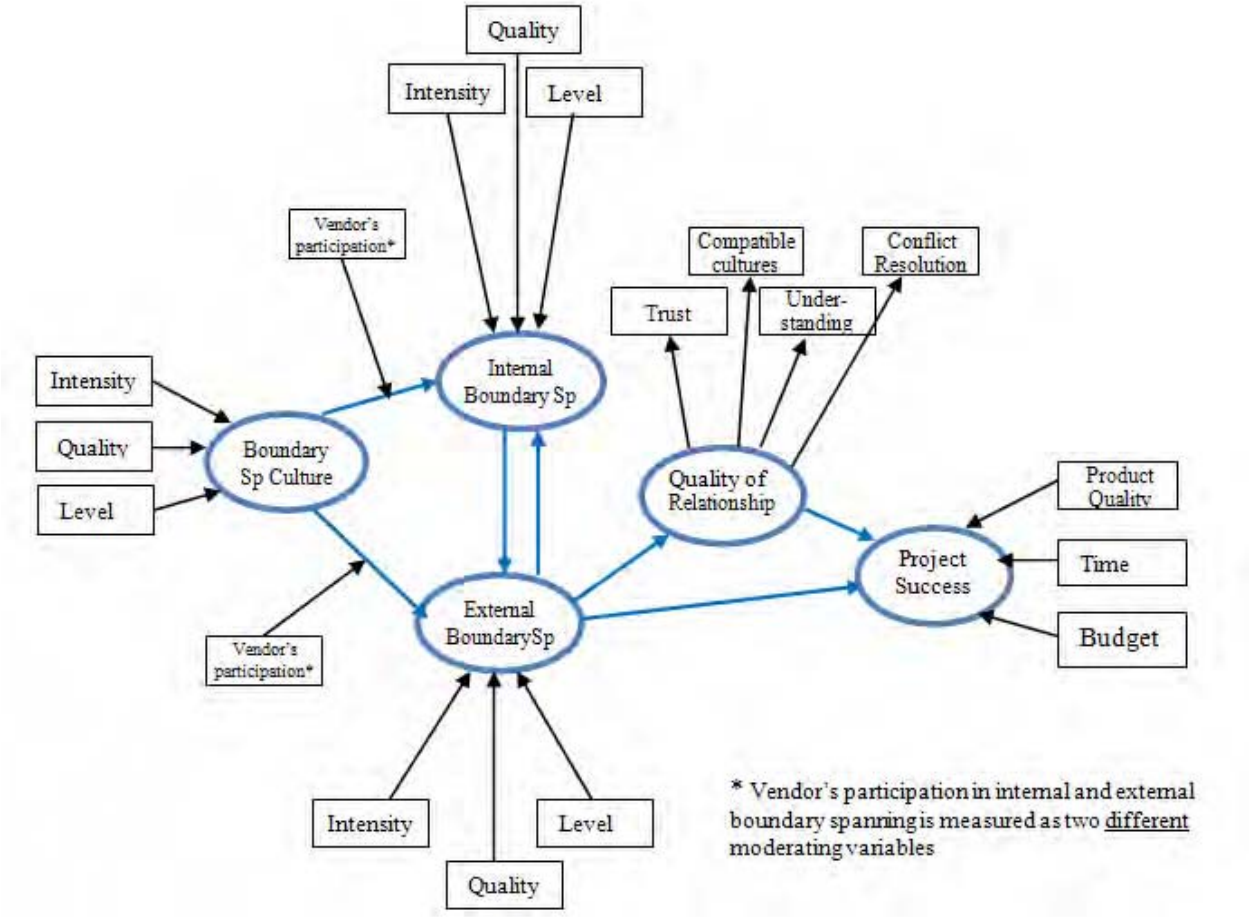

Figure 1. *"The Role of Client's Boundary Spanning Culture in Outsourced ISD Projects", research model*

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TOWARDS UNDERSTANDING THE ADOPTION OF HEDONIC ICT

MCIS 2010 Doctoral Consortium Proposal

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Research Motivation and Goal

This research is motivated by (1) the lack of research on hedonic information and communication technologies (ICT) in IS and (2) the success of ICT industries. So far, research on the adoption of ICT has substantially focused on organizational settings and utilitarian purposes (e.g., Davis 1989; Davis, Bagozzi & Warshaw 1992) whereas only little attention has been paid to investigate why people adopt hedonic ICT. At the same time, however, hedonic ICT have become prevalent in the marketplace and represent a lucrative business opportunity. Not only social web applications, Google books, and the new iPad dominate the press.

The research goal is to contribute to a better understanding of user adoption of hedonic ICT. Hedonic ICT, thereby, refers to pleasure-oriented ICT, mainly used in non-organizational (non-work-related) settings.

Theoretical Background

This research builds upon prior technology adoption research (e.g., Agarwal & Karahanna 2000; Davis 1989; Lin & Bhattacherjee 2010; van der Heijden 2004), it is adapted to the specific characteristics of hedonic ICT and its expected adoption patterns.

Prior research models mostly incorporate perceived enjoyment or related constructs such as involvement, playfulness, satisfaction, trust, and social norms (e.g., Holsapple & Wu 2007; Lu et al. 2008). Nevertheless, the majority of earlier studies considers individual ICT adoption and use in particular settings (e.g., Dickinger et al. 2008; Holsapple & Wu 2007). Except for a research model proposed by Lin and Bhatterjee (2010) that is based on the theory of reasoned action, there is a lack of a general ICT-independent model for studying the adoption of hedonic ICT.

Research Method and Approach

I have developed a research model that builds upon prior technology adoption research (for presentation during the consortium). I will estimate the model on the basis of two to three different genres of hedonic ICT: For each genre, I will conduct a web-based survey covering reflective and formative variables which I have operationalized via item-based Likert-scales; and then I will apply Partial Least Squares (PLS) as Structural Equation Modeling (SEM) technique.

Research Design: Open Issues

As result of ongoing pretest activities, two main issues need clarification: (1) How to appropriately sample for the survey in light of small numbers of actual users (early adopters / insiders) and the resulting non-random samples. (2) To what degree to work towards one adoption model more for all hedonic ICT genres. Would the more general research contribution outweigh the rather unspecific insights regarding - even in the era of convergence - somewhat different hedonic ICT sectors?

Expected Contribution

This research is assumed to contribute to a better understanding of user adoption by providing insights regarding the question "what drives user adoption of hedonic ICT" and thus to expand the IS research territory. Moreover, this research is supposed to encourage interdisciplinary research endeavors, e.g., the integration of approaches and insights from neighboring research disciplines such as marketing and psychology. Finally, I expect being able to develop practical recommendations for providers of hedonic ICT.

Status Quo and Schedule

I have developed the research model and conducted first pretests. By September 2010, I should be able to present empirical pretest results and hope to gain feedback and guidance with regard to further sharpening my research approach.

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