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*Building a Research Agenda for the 21st Century*

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It's my pleasure to welcome you to the Second Annual Conference of Applied Management and Decision Sciences sponsored by the Walden University School of Management. The goal of this year's conference is to address important problems facing managers in today's dynamic international business environment through applied research.

The conference complements our online peer-reviewed journal within the School of Management, The International Journal of Applied Management and Technology (ISSN 1544-4740), which focuses on topics aligned with the academic programs offered within the School of Management. The most recent issue of the journal can be found at <http://www.ijamt.org>.

The journal and conference were created with three specific objectives:

- 1) To encourage collaborative and multi-disciplinary examinations of important issues in business and technology management,
- 2) To engage scholars and scholar-practitioners in a dynamic and important dialogue, and
- 3) To contribute original knowledge and expand understanding in the fields related to the program offerings of the School of Management.

Please take a look at the conference web site at <http://www.amdsconference.org>. If you have any questions or suggestions please contact Dr Larry Beebe ([lbeebe@waldenu.edu](mailto:lbeebe@waldenu.edu)) or Dr Raghu Korrapati ([rkorrapa@waldenu.edu](mailto:rkorrapa@waldenu.edu)). AMDS Doctoral students Mr. J P McLaughlin and Mr. Daniel Parrell are the graduate assistants who worked on the Proceedings version.

John Vinton, PhD  
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# **Use of the Case Study Method in Studying Engineering Design Management**

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## **Abstract**

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Twelve engineering design situations were studied in a multiple case study design to determine effectiveness of integration of model based simulation (MBS), quality function deployment (QFD), and environmentally conscious design (ECD). Given that the cases each represented a different complex design process, the issue was whether use of the multiple case study design could yield useful results. The “meta study” showed that, given careful data collection and analysis, the multiple case study design was efficient and provided important results. The study is important to engineering management, as it shows that projects often deemed not comparable can be compared using this method.

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## **Introduction**

The case study usually refers to an intensive examination for understanding of complex issues such as PFS projects. Case studies involve measuring what is there and how it got there. In this sense, it is historical. However, it can enable the researcher to explore, unravel, and understand the problems, issues, and relationships. Singleton and Straits (2005, p. 51) stated that the research findings would depend largely on what particular relationships are anticipated. In social research, the case study method might have some ambiguities and opportunities (Verschuren, 2003,

p.121). Verschuren reiterated that according to some quantitative social researchers, the results of a case study are of poor quality due to misconceptions and ambiguities. From a general methodological point of view, there is difficulty with the case study approach as it is used in many social science disciplines. There appears to be a tendency to define it mainly as the study of one single object or a few objects, rather than as a methodological approach or a research strategy. Verschuren (2003, p.137) stated that a case study as a research strategy is feasible for looking at only a few strategically selected cases, observed in their natural context in an open-ended way, explicitly avoiding all variants of tunnel vision, and making use of analytical comparison of cases or sub-cases.

There is consensus among influential authors (Creswell, 1998; Ragin, 1989; Stake, 1995) that the objectives of case studies for cases highly complex in nature are unique and thus not comparable with other cases. The situations in automotive projects are complex. In the underlying study, experiments in complex engineering projects were conducted to validate the results of model based simulation (MBS) with the results reported as mini-case studies. Moreover, in order to generalize the findings, this “meta study” used the multiple case study method described by Yin (1994) to evaluate certain features of engineering management of manufacturing organizations in the auto industry. Twelve cases based on design of paint finishing systems (PFS) in the automobile industry were used to compare effectiveness of MBS in combination with quality function deployment (QFD) and environmentally conscious design (ECD). Finite element modeling (FEM) incorporated specifications from QFD and ECD as part of the design process in some of the cases but not in

others. In some cases, MBS was used to test the design after the FEM process and before final installation for the client. The variables in this research were selected to determine relationships between two quantitative variables, i.e., the performance of the case study company with and without integration of MBS, QFD, and ECD methodologies. In this paper, the authors describe the use of the cases and the effectiveness of the case study method for evaluating the design process.

### **Problem Statement**

The problem that underlies this research was whether the integration of MBS, QFD, and ECD could enhance efforts to improve engineering management of very complex projects, particularly in the American automobile industry. The study involved twelve cases, each based on a different design problem, some with the integrated techniques and some without. The over-arching problem addressed by this paper, that is, the “meta study”, was whether case study really is an efficient method for addressing such complex problems.

### **Purpose of the Study**

The purpose of this study is evaluation of the case study method for investigation of complex engineering design problems.

### **Research Design and Results**

The theoretical basis for the present research is illustrated in Figure 1. It is found largely in the works of certain NSF research teams: Beard (2003), Cook, Malkus, and Pelsha (1989), Cook, Malkus, Pelsha, and Witt (2004), Lee, Pan, Hathway, and Barkey (2005), Mackerle (2000), NSF (1995, 2000, 2002, 2004), and Taylor (2000) for MBS; Akao (1997), Ferrel and Ferrel (1994), Kanyamibwa (1997), Sevki (2003), and Tadashi

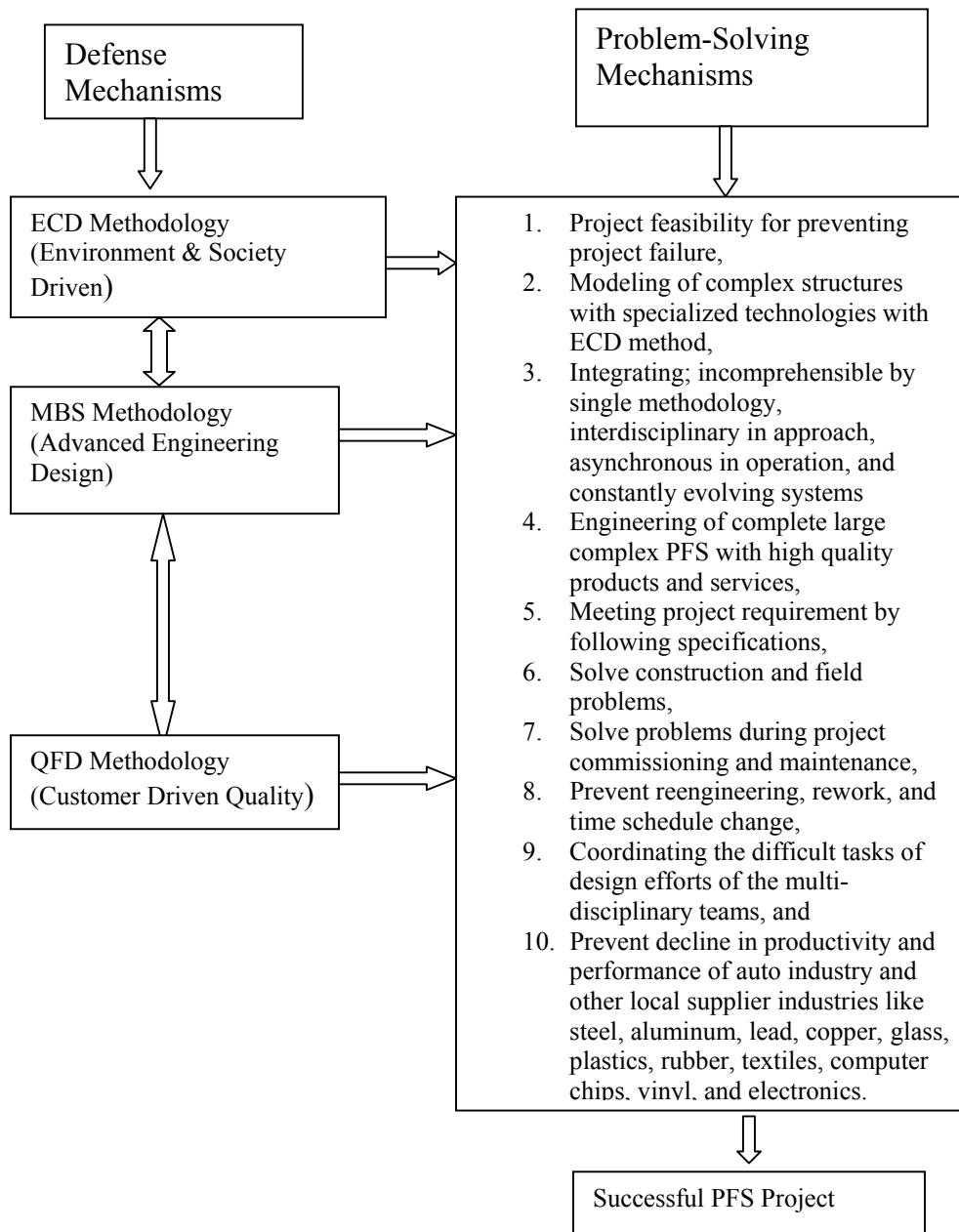
(1997) for QFD; and Dang , He, and Hui (2002), and Goan (1996) for ECD. The research focused on the key issues by using a multiple case study method (Yin, 1994) for solving problems of the auto industry. The general scheme of a design study is shown in figure 1. Each of the twelve case studies to be discussed here involved all or some of this general scheme. The projects studied are summarized in Table 1.

Table 1

Lists of PFS Projects to Compare Performances by MBS and QFD

Case study No	Project	Year of Implementation	Type of auto Industry	Type of Study	Data Collection
1	Mercedes Benz, Inc.(MBUSI)	2002-2004	Material Handling	Partially integrated	MBS, QFD,ECD Performance
2	Mercedes Benz, Inc.(MBUSI) .	2002-2004	PFS	Integrated	MBS, QFD,ECD Performance
3	Tower Belleview Tower Automotive	1999-2001	GFS	Integrated	MBS, QFD, performance
4	Freight Liner Tower automotive	2004-2005	GFS	Integrated	MBS, QFD,ECD Performance
5	Hyundai Motor Manufacturing (Gen. Assy.)	2003-2005	Material Handling	Integrated	MBS, QFD,ECD Performance
6	Hyundai Motor Manufacturing (Body Shop)	2003-2005	Material Handling	Integrated	MBS, QFD Performance
7	GM Moraine, Dayton, Ohio	1996-1998	PFS	No MBS, QFD	Performance
8	FORD St. Thomas, Ontario, Canada	2000-2001	PFS	FEA only	Performance
9	Tower Corydon, Tower Automotive	1999-2000	GFS	Only FEA	Performance
10	Toyota Motor Manufacturing, Canada	2001-2002	PFS	FEA only	Performance
11	Plastic Omnium, Plastic Industry	2004-2005	Plastic Parts	Integrated	MBS, QFD,ECD Performance
12	MOBIS Plastic Industry	2003-2004	Plastic parts	Integrated	MBS, QFD, ECD Performance

Legend: Auto-automotive PFS- paint finishing system, GF- General finishing of automotive parts. FEA is finite element analysis. From Amin (2005, Table 3, p. 193).



*Figure 1.* Theoretical basis of research integration of MBS, QFD, and ECD. From Amin (2005, Figure 3, p. 26).

The twelve cases were compared on the basis of performance, with reduction of building cost the ultimate objective. Typical case data are provided in Table 2; these data are from case study number 2, the vario shuttle design for the Mercedes-Benz paint shop.

Table 2

Integrated MBS, QFD, and ECD Study on Building Cost Reduction

Description of Items	Height (ft)	Length (ft)	Width (ft)	Area ft <sup>2</sup>	Weight Lb	Numbers	Unit cost (\$)	Total Cost US\$
Size of Building	45	700	150	105,000	-	1	\$106/ft <sup>2</sup>	11,130,000
Immersion Tanks (6 mm thick) with incline	12	55	11	2300	30,000	9	\$3/lb of steel	810,000
Total Length of Inclines and declines		12*2*9=216		374	4862	9	\$3/lb of steel	131,274
Revised Immersion tank without incline	12	55	11	2190	28470	9	\$3 /lb of steel	768,700
New size of reduced building	45	700-216=484	150	72,600	-	1	\$106/ft <sup>2</sup>	7,695,600
Total costs before VS Technique								11,940,000
Total costs after VS Technique								8,464,300
Total Savings								3,475,700.00
Annualized savings over life of project (20 years)								214,00.00

From: Amin (2005, Table 17, p. 288).

Amin (2005) described the twelve cases in detail, with the final comparisons as shown in table 3. These results show that integration of MBS, QFD, and ECD can

Table 3

Lists of PFS Projects to Compare Performances by MBS, QFD, and ECD  
(Cost in \$1000) (Data from Eisenmann Corporation)

Case Study	Projects Name	Sales Price	Extra Field Cost	MBS QFD	Engineering Hours	Actual Completed Cost	Profit %	Loss %
1	MBUSI, material handling,	16,228	4,489	154.0	8380	16510		1.73
2	Mercedes Benz, Inc.(MBUSI)-PFS.	135,000	9,468	650.0	94680	117,000	15.4	
3	Tower Belleview Automotive	7,800	650	0.75	4,800	8,000		2.5
4	Freightliner, Tower Automotive	2,502	194	0.25	780	1,981	26.3	
5	Hyundai Motor Manufacturing (Gen. Assy.)	63,306	8,708	5.0	20,795	59,968	5.57	
6 *	Hyundai Motor Manufacturing (Body Shop)	13,053	6,098	5.0	23,863	Work in progress		
7	GM, Moraine, Dayton, Ohio	65,075	9,525		43350	56,246	11.7	
8	FORD St. Thomas, Ontario, Canada	71,685	8,166		42525	68,971	3.94	
9	Tower Corydon, Tower Automotive	12,000	1,200		4,300	10,600	13.2	
10	Toyota Motor Manufacturing, Canada	13,742	3,823		14,380	15,298		11.3
11	Plastic Omnium, Plastic Industry	18,200	4,513	150	6,835	18,013	1.0	
12	MOBIS Plastic Industry	23,118	2,815	165	7,330	19,351	19.47	
1 to 5, 7 to 12	<b>Overall Performance</b>	428,656	53551 (12.5%)			391938	<b>9.36</b>	
1 to 5, 11, 12	<b>Integrated</b>	266154	30837 (11.5%)			240823	<b>10.52</b>	
7 to 10	<b>Not integrated</b>	115627	17702 (15.3%)			112882	<b>2.43</b>	

From: Amin (2005, Table 21, p. 409).

help to reduce the cost of building complex systems. MBS, QFD, and ECD integration helped to minimize the cost of rework and reengineering in the field in case studies 2 to 6, 10, and 11. In case study 1, with partial integration of MBS, QFD, and ECD methodologies, loss was limited to 3 months production.

In case study 7, in the absence of MBS, QFD, and ECD, the cost of production lost for 1 ½ years was US \$1.8x10<sup>9</sup> in profit. Cases 8 and 9 used finite element analysis only and the cost of reengineering reworks for those cases was US \$900,000.0 and US \$125,000 respectively. In addition, for case 8, lost production of 1.5 months was US \$242x10<sup>6</sup>. With the integrated MBS, QFD, ECD approach, all defects in the fabrication and quality of work were corrected in the design shop, eliminating downtime in production.

### **Conclusions**

The case study method allowed the first author to compare outcomes of twelve complex engineering design projects. Clearly, the multiple case approach can be used for studying such projects if the variable of interest are carefully defined and data are collected carefully. It should be noted that these conclusions are consistent with the theoretical requirements of social science case study research.

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# **An Analysis of Socio-Personal Factors Affecting the Adoption and Use of Information and Communication Technologies (ICTs) In Ethiopia**

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## **Abstract**

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This mixed-method descriptive study will investigate socio-personal factors as a barrier to the adaptation and use of ICTs among the different social groups of ICT non-users in Addis Ababa City, Ethiopia. To date, most of the research emphasis has centered on socio-economic barriers. Socio-personal elements have been largely neglected. This study may provide a clear understanding of socio-personal factors that restrict the use of ICT and how these might be overcome in order to narrow the digital gap. The purpose is to uncover awareness, acceptance, understanding and knowledge, and level of interest of ICT non-users in Ethiopia. A survey instrument with yes/no, Likert-type, and open-ended questions will be used to measure responses from a random sample of 183 men and women who are living in Addis Ababa, Ethiopia and who are non-users of ICTs. Chi-square analyses will be performed on Likert-type questions to assess non-users' level of interest, awareness, understanding and knowledge, and acceptance of ICT. Content analysis will be used with the open-ended questions to determine any further factors reported by the participants in relation to the adaptation and use of ICTs. This study is work-in-progress as part of Doctoral Study program.

## **Introduction**

In developing countries, a diverse number of differences exist between social groups who are non-users of ICT. These non-users may be differentiated according to their socio-economic and socio-personal status. Previous researches on the adoption of new technology issues have focused on an individual's socio-economic characteristics, the perceived attributes of innovations, technology clusters, situational factors, and the characteristics of innovations that influence adoption (Rogers, 1995; Zhu & Zhou, 2002). These studies suggested that those who adopt new ICTs are more upscale, better educated, and more affluent than non-adopters (Dutton et al., 1987; Garramone et al., 1986; James, et al., 1995; Lin, 1998; Rogers, 1995).

While it is difficult to distinguish whether socio-economic or socio-personal factors are more salient in explaining the digital divide, (Morales-Gomez, Daniel, and Melesse, 1998) argued that socio-personal factors such as level of interest, awareness, understanding, and acceptance of ICTs have more significance than socio-economic factors in developing countries. Enders and Seekins (1999) supported this idea by presenting their analysis of the digital divide in developing countries. According to Enders and Seekins (1999), 49% of adults living in developing countries and who have never used ICTs claimed that they have not done so because they are not interested. A similar figure is reported by the ONS (2000), which claims that 43% of non-users are not interested in using ICTs. Furthermore, in a complementary study, Gary (2005) presented that 39% of non-users in developing countries stated that nothing would encourage them to use ICTs.

### **Problem Statement**

The problem addressed in this study is the investigation of the socio-personal factors as a barrier to the adaptation and use of ICTs among the different social groups of non-users in Ethiopia. A considerable amount of literature (Choudhury and Wolf, 2002; Fink, et al. 2002; Kenny, 2001; Venables, 2001; Warschauer, 2003) exists regarding the underline causes of the digital divide in developing countries like Ethiopia. Most of these literatures indicate that socio-economic factors such as low income (Choudhury and Wolf, 2002), low level of education (Venables, 2001), low skilled jobs (Kenny, 2001), unemployment (Fink, et al. 2002), lack of technology, and lack of computer skills are the major factors for the gap (Warschauer, 2003). However, to the best of this researcher knowledge and effort, research was not found that explored socio-personal factors as an obstacle for the adaptation and use of information and communication technologies in Ethiopia. According to Ulfeder (2002), substantial amount of resources have been invested in achieving a more thorough understanding of socio-economic barriers and to develop robust policies capable of overcoming these barriers. However, our literature review (Albaugh, 1997; Foley, et al. 2002; Jeffres & Akin, 1966; Norris, 2001; Wilhelm, 2004) suggests that complementing knowledge of socio-economic barriers with a more thorough understanding of socio-personal barriers will provide a more holistic understanding of factors that restrict the use of ICT and how these might be overcome. As a result, an empirical investigation is needed to examine the impact of socio-personal factors such as level of interest, awareness, understanding, and acceptance of information and communication technologies related to age, gender, and educational level on the process of bridging the digital divide in Ethiopia.

### **Purpose of the Study**

The purpose of this study is to investigate the significance and implication of socio-personal barriers related to attitudinal and behavioral issues in Ethiopia. The study will focus on issues such as level of awareness, interest, knowledge, and acceptance of ICTs by different social groups to achieve a deeper understanding of the extent of the digital divide in Ethiopia. A further objective is to determine which social group is more affected by the divide and how developing and implementing effective policies can enhance ICTs adaptation and usage in Ethiopia. The goals of this research are as follows:

1. To determine the degree of socio-personal barriers of ICTs among the different non-users social groups in Ethiopia,
2. To determine which socio-personal barriers influence non-users decision to adapt and use ICTs and how non-user's issues can be addressed,
3. To determine which social group is more affected by the divide and how it can be addressed, and
4. To make recommendations on how to tackle socio-personal barriers for government officials who formulate and implement policies, industrial experts and consultants, representative of development banks, and selected middlemen who purchase and distribute ICT products.

### **Methodology**

This mixed-method descriptive study is designed to collect data from participants in order to measure the socio-personal barriers affecting non-users of ICT in Ethiopia. Data from this population base has not been measured in past national surveys to

determine the socio-personal factors affecting the adaptation and use of ICT. The study will use a sample of ICT non-users in Ethiopia. Data will be collected through the administration of a survey to gather information about attitudinal and behavioral issues related to ICT non-users. The responses will be utilized to measure the impact of socio-personal factors to the adaptation and use of ICT process in Ethiopia. The data will be limited to information supplied by survey respondents.

### **Conclusions**

Over recent years there has been a proliferation of academic analyses of the digital divide focused on countries with developed and developing economies (Anderson, & Melchior, 1995). The nature of such studies has ranged from detailed empirical analysis to popular articles examining the nature and scope of the digital divide. According to Anderson, & Melchior (1995), most of the academic analyses of the digital divide have been driven by two key objectives. Firstly, the identification of the extent and nature of the digital divide from socio-economic prospect and secondly, the inference of socio-personal barriers to narrow the digital divides.

Review of such studies reveals that little attention has been given to countries with underdeveloped economies such as Ethiopia (Anonymous, 2000). There is also indication that the lack of detailed analysis of the underlying socio-personal factors of the digital divide and the inference of policy prescriptions on the basis of such analysis is insufficient. This lack of extensive attention to the underlying socio-personal barriers of the digital divide has the potential to significantly limit the effectiveness of policy prescriptions put in place to narrow the digital divide, due to the possibility that the

policy prescriptions are not effectively dealing with the underlying socio-personal factors of the digital divide.

In Ethiopia, a clear analysis of the nature and extent of socio-personal factors of the digital divide has been hampered by the absence of a clear measurement for determining the level and extent of the digital divide. Available researches tend to be based on socio-economic and separate indicia of the level and extent of the divide, which leads to difficulties in establishing any meaningful picture of the nature and scope of the digital divide. The underlying problem with this mono-topical approach is that the different indicia are measuring different elements of the divide, which makes it difficult to reach a meaningful comparison of all aspects of the gap.

Any analysis of the digital divide that does not take account of the socio-personal factors is likely to provide an inaccurate picture of the digital divide. This is a concern noted by Norris (2001) when he stated, “it seems to me that an important starting point in our joint exploration of which countries are more advanced as information society-and which will be in 2002-is to get clear as to what are measuring”. Since there is a real danger of the digital divide perpetuating social and economic inequality between those people and communities who can make effective use of information technology and those who cannot, it is significant to address the socio-personal factors of the divide and to address the question of what needs to be done to narrow, bridge, and eventually close the digital divide between different social groups of the society.

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# **Leadership Is As Leadership Does**

**Brian W. Bridgeforth**

**Walden University / Development by Design**

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## **Abstract**

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Utilizing Bass' (1990) recognition of leadership as an active relationship of a demonstrated capacity to carry cooperative tasks to completion this article reviews a sampling of the literature to propose a competency framework of leadership as study and practice. Several new avenues for research are discussed.

## **Introduction**

Rost (1991) may be accurate in his description of the state of confusion regarding the study of leadership. This author disagrees, however, that we have not advanced and risks facing his criticism of perpetuating the myth that leadership's ambiguity lessens with time. Ignorance is the shroud of mystery. Perception is the empowerment of illusion. Enlightenment is autocatalytic interdependence of mapping, modeling, mimicking, comprehension, inquiry, and proposition. There is no complexity so great as to be beyond human imagination. In summary, the fact that collectively we are confused is a statement that collectively, we are paying attention and learning. Mapping began with trait theory. Efforts to model took the form of behavioral studies. Shadowing and training are venues for mimicry. Teaching and mentoring facilitate comprehension. Inquiry has generated many debates. Trait, behavior, power-influence, transformational, and situational propositions continuously trade places in popularity and study (Watt, 2003). This autocatalytic debate continues because there is no agreed upon working definition of

leadership or what good or effective leadership should be (Smith, Mantagno, and Kuzmenko, 2004). While Bass (1990) proposed leadership to be a relationship dependent activity in which acquisition of leadership status is through active relations wherein the leader demonstrates capacity to carry cooperative tasks to completion, Barker (1997) called for a shift from viewing leadership as a relationship concept to a process of complex relationships. Both Bass and Barker fail to tell us and empirical research has yet to unveil simplistically and coherently the construction and composition of these relations or the process of how leaders acquire and demonstrate this capacity. The objective here is to participate in the autocatalytic loop from an alternative angle by asking, as an emergent relationship dependent phenomenon, what does a leader do in the act of leadership?

### **Problem Statement**

The recognition of leadership as an emergent phenomenon lacking appreciable and employable definitions in various cultural, organizational, social, and interpersonal influence situations is the result of the fallacious presupposition that leadership is existential. Leadership is a social construction. Consequently, its empirical reality exists solely and temporally in the collective subjective experience. Conjecture and explorations acknowledged by Bass (1990) and Stogdill (1981) are leadership as the center of group processes, personality, compliance induction, affect, effect, behaviors, persuasion, power, goal achievement, role differentiation, structure initiation, and combinations of the aforementioned. Academic inquiry into leadership is a legacy of seeking understanding of leadership as construct and role in social systems relative to human and societal development contexts. It is with this recognition that this researcher inquires into the

future of leadership theory development. Bass' (1990) summarized the literature as suggesting leadership as an active relationship of a demonstrated capacity to carry cooperative tasks to completion. However, while conjecture and research as to what leaders do grows in volume, there is no unified framework for systemically cataloguing consistent scholarship and practice development.

### **Purpose of the Study**

This work proposes the historical literature of leadership research and practice offers an identifiable and measurable skill set. The purpose of this study was to identify a competency framework for cataloguing the collected historical body of theory and empirical research, to aid future theory providing fertile soil for future avenues of research, and guide future leadership assessment and development.

### **Methodology**

This study utilized a literature review approach for identification of common competencies in leadership practice and applied Bridgeforth's (2005) treatment of systems and chaos theory to social systems to model the inter-relations of the identified competencies.

### **Research Question**

In this study, examination of Bass' (1990) phraseology of "a demonstrated capacity to carry cooperative tasks to completion" focused on the following research question: What constitutes this demonstrated capacity that differentiates leaders from followers in terms of social relations and the social context? While much speculation and conjecture is available for review in the literature, no uniform systemic study has fully addressed leadership practice as a set of interdependent competencies.

### **Conclusions and Recommendations**

The six (6) competencies of leadership are change, influence, credibility, systems, politics, and power. Change is the perceived necessity, actuality, and process. Influence is the act of stimulating without apparent force or authority. Credibility is the belief of the observer in the trustworthiness of an actor derived from the actions thereof. The appreciation for the composition and interdependent construction of the whole and behavior of systems relative to the environmental context is the competence of systems. Competence with power is its appropriate exercise as authority or control affect in the context of the participants and the social system. Politics is the art and science of competition for authoritative direction or control of a social system.

There are numerous possible research paths to extend this work in terms of the theoretical and the practical. First, there is the possibility of applying the framework to catalogue the collected literature for the purposes of further defining each competency by a universal and uniform structure. Second, there is potential for the empirical investigation of the interdependent relations amongst the competencies. Specifically, utilizing Bridgeforth's (2005) social systems model as an archetype offers the exploration of leadership as a three-dimensional construct. Third, utilizing chaos theory as a theoretical base offers the possibility of exploring leadership as a strange attractor. The question at issue in exploring leadership as a strange attractor is identification of non-linear dynamical equations. If identification is possible, this then opens the potential for examining past leadership figures for their respective patterns and discerning societal shifts relative to these leaders collective competence. In terms of the practical, reassessment of previous theory for its contributory value to leadership practice and

development is a consideration. Moreover, with the identification and potential qualification and quantification of competence according to a unified framework, leadership assessment and development becomes more empirical and consistent.

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# **A Study of Student Acceptance of Computer-Mediated Communication**

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## **Abstract**

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This study examines students' perception of computer-mediated communication tools based on their experiences, gender, and age as actors on the technology acceptance model and how their perceptions may assist the institution's decisions to select and acquire those technologies. A quantitative research design using a questionnaire is used as the primary means of data collection. A combination of *t* tests, ANOVAs, chi-squares, and Pearson's product-moment correlation coefficients is used to analyze the data. The results of this study may be beneficial to administrators at the university level when making decisions about technologies that may affect the teaching and learning process.

## **Introduction**

Higher education, like many industries, realizes the importance of technology for organizational growth and survival. "There are many organizations that spend a large portion of their budget on information technology to improve [student] performance or overall organizational performance" (Klaus, Gyires, & Wen, 2003, p. 106). Organizations examine and leverage the opportunities advances in technology (hardware and software), the Internet, and greater digital speeds represent to increase customer contact and profitability. Universities are leveraging advances in computer-mediated communication

(CMC) tools for course delivery to enhance existing courses as well as full degree programs.

Adoption of these technologies should not be made simply because competing institutions have adopted similar technologies. Rather, knowing the customers or student's perception of and behavioral intention to use technology should be key in the decision-making process. Determining a strategy to integrate CMCs into course delivery generates a number of questions:

1. How will the CMC strategy affect the reputation of the university?
2. Will an aggressive CMC strategy result in higher or lower enrollments?
3. How will students and potential students view CMCs in their coursework?
4. What is the reaction of area employers?
5. How will the academic community (faculty, potential faculty, accrediting boards, etc.) view the integration of CMCs?

Student perceptions of CMCs in their course work are very important. They represent the main source of funding and if their view of CMCs is negative then they are more likely to seek their education elsewhere (Walker, Vaz, & Kujawa, 2004). It is important to understand student attitudes toward courses enhanced by or delivered completely with CMCs (Liaw, 2002). The absence of knowing students' perception of CMCs can have a profoundly negative impact on enrollment and overall funding for the institution.

### **Problem Statement**

The problem addressed in this study is the students' perception of, attitudes toward, and behavioral intention to use CMCs, specifically Blackboard, and how that

information may influence institution decision making. Institutions considering CMCs may be able to predict the value of those technologies by better understanding the students' perceptions, attitudes, and behaviors toward the systems and how the students' past learning experiences influence those variables. CMC tools can be conceptualized as a problem of aligning the relationship between the organization's strategic goals, the educational objectives of the students, and the technologies themselves to take advantage of their opportunities and capabilities (Reich & Benbasat, 2000). The value of the investment in CMCs can be derived from the use it receives (Lederer et al., 1998). Administrators facing lower enrollments and budgetary constraints need to rely more on data to determine whether the investments in these CMC technologies as well as supporting activities should continue or be curtailed, changed, eliminated, or increased.

### **Purpose of the Study**

The purpose of this quantitative survey research study is to test TAM (Technology Acceptance Model) to describe the perception of students relative to CMC technologies, specifically Blackboard's Course Management System. Blackboard's system examined student perceptions of CMC technologies using TAM (with independent variables of perceived usefulness and perceived ease of use; mediating variables attitude toward use and behavioral intention; and a dependent variable actual use) and independent variables of age, gender and learning style (as measured by through Kolb's (1984) LSI) to assist senior administrators in decisions regarding information technologies that will be or are used by students in support of an institution's strategic goals.

Relationships between the variables will provide administrators with important information that may assist future decisions and provide a method of evaluating future technologies. Ensuring the targeted population at a university, in this case students, use the technologies will help administrators answer to their boards of directors or trustees regarding the value or potential value of a new system. The study was conducted at a small private university in southeastern Michigan using students enrolled for the Summer 2005 semester with the College of Management. Only students from the main campus were surveyed.

### **Methodology**

This quantitative study focused on the perceptions of higher education students at a Midwestern university's College of Management pertaining to CMC technologies, specifically the Blackboard Course Management System. The students were asked to evaluate their overall experiences with this technology. This study explored the relationships and interrelationships between independent variables (age, gender, and learning style) and independent variables (perceived usefulness, perceived ease of use, attitude toward use, behavioral intention, and use). The independent variables of age, gender, and learning style were selected to determine the influence any or all have on the independent variables embedded within TAM.

Age and gender are included with no a priori expectations. Although much of the research of the 1990s suggested women of all ages had fewer opportunities and less skill using technology than males, information since then indicates the lack of access, lack of computer literacy, and skills issues are diminishing (Gunn, McSporran, Macleod, &

French, 2003). They are included in the study as moderating variables to determine whether they influence the dependent variables of TAM and student learning styles. The independent variable learning style is included to determine the various learning styles that may exist within the population. It will provide a picture of the influence those learning styles has on the actual use or acceptance of CMC technologies, as an external variable of the technology acceptance model.

The independent variables of perceived usefulness, and perceived ease of use along with the dependent variables of attitude toward use, behavioral intention, and actual use make up Davis (1989) technology acceptance model (TAM). TAM was constructed to predict user acceptance of information technology (CMC) founded upon a belief–intention–behavior theme (Lederer et al., 1998). Belief, whether positive or negative, will lead to a type of attitude or intention that develops into a behavior or action.

This study only included those students who were actively taking classes at a 4-year private college in southeastern Michigan. The data collection took approximately 1 week by visiting classes in the undergraduate, graduate, and doctoral programs of the College of Management. A sample size of 171 participants was determined to be sufficient for this study. A combination of *t* test and Pearson's product-moment correlation coefficient was used to analyze the data.

### **Conclusions and Recommendations**

Based on the data analysis and hypothesis results, the investigator is able to respond to the research question: How do age, gender, and learning style differentially influence attitude, behavioral intention, and use of computer-mediated communication technologies? The data analysis did not find a statistically significant difference for age,

gender, and learning style influencing attitude, behavioral intention, and use of CMCs. This suggests that, for this study, past experiences with and skills acquired or transferred from the workplace or similar course work experiences have helped participants develop skills and comfort in using CMCs. “While, as software products, the emergence of these systems has been a recent development, in concept they simply represent an integration of functions that previously have been performed by separate products” (Inglis et al., 2002, p. 13). Therefore, for this study, age, gender, and learning style have little or no influence in the overall perception of CMCs.

The study found no statistical significance between gender and the variables of TAM, specifically perceived ease of use and usefulness, thus supporting the null hypotheses for 1a and 1b that the average score for males and females would be the same for either perceived usefulness or perceived ease of use, and suggesting gender has little or no influence upon either perceived usefulness or perceived ease of use. The study found no statistical significance between age and the variables of TAM, specifically perceived ease of use and usefulness, thus supporting the null hypotheses for 2a and 2b respectively that the average score for both age groups would be the same for either perceived usefulness or perceived ease of use. This again suggests that age had little or no influence upon either perceived usefulness or perceived ease of use. The integration of CMCs is neither new nor alien to students (Peters, 1998). The ubiquity of applications designed to promote collaboration and communication in the workplace may contribute to the lack of difference between the age and gender groups. Organizations rely upon the use of a myriad of technologies to connect with virtual team members and perform project work without the luxury of connecting face to face.

Based on the results of this study, several recommendations may be made. First, this study was conducted using College of Management students only. For the results discovered in the study to have greater generalizability, other studies should be conducted using populations from other colleges as well. It would be beneficial for future studies to draw from different majors, education levels, and colleges.

Second, an experimental study may be undertaken to determine what contributes to students' perception of and overall acceptance of CMC tools. Without further study the effect learning style, age, gender, or some other factor(s) may have on student acceptance of CMC tools cannot be determined. Factors that could be considered include motivation, prior knowledge or experience, computer and technology literacy, economic status, employment situation, and employer support.

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# **Growth of Facility Management**

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## **Abstract**

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Facility Management as a service industry reflects the individualized corporate centered facility designs. Yet, similarities exist and priorities are diverse. Coordination of the physical workplace and the ability to customize that workplace for the differing users is the challenge of the Facility Manager. Life cycle of the workplace is reflected in measurements of churn rates, occupancy rates and square footage. This report will evaluate the management of facilities as a methodology to adapt engineering management principle, identify new technology to manage facilities, the need for strategic planning and determine the trends in facility management.

## **Introduction**

According to the International Facility Management Association (IFMA), the purpose of facility management is to coordinate and customize the investment in the facilities in an effective manner. Facility managers and facility engineers balance customer's project requirements within the allowable budget for an individual or group of facilities. Corporations and Government agencies often see facilities as tangible assets that require maintenance. Change in the view of the management of corporate real estate began in the early 1980's when in response to a survey by Harvard Real Estate Inc. of corporate real estate executives and chief operating officers indicated that fewer than

20% of the corporations responding managed their real estate holdings as a profit center (Zeckhauser and Silverman, 1983).

Some corporate executives reported that real estate equated to 25% of the corporate assets (Zeckhauser and Silverman, 1983). The need for controlling of maintenance cost was reported in 1983 with an example of a 30% reduction in operation of the facility when the cost was managed.

A further study of corporate real estate trends in 1987 by Massachusetts Institute of Technology (MIT) as reported by Veale (1989) identified that as much as 50% of the corporate net assets are involved in real estate. The MIT survey indicated that 86% of the respondents to their survey had real estate departments (Veale, 1989). Veale equated the management of the property assets as 31% of the MIT survey respondents as accounting for the assets as a profit center.

Zeckhauser and Silverman (1983) and Veale (1989) stated that United States (US) corporations are in general under managing their real estate assets in two areas. First not controlling maintenance costs in operation of the facilities and secondly not identifying real estate unit assets as methods for increasing profitability.

The 1994 IFMA identified that 70% of the facilities were owned rather than leased by the occupants (Weis, et al., 1994). The 1997 IFMA study identified the ownership as being 62% of the facilities were owned by the occupants and that many of the facilities supplemented some of the space a leasing area (Claar, et al., 1997). By 2002 the IFMA study identified that the owner occupied facilities decreased to 44% and that the majority of the occupiers being and combination of owners and lease's (Epstein, et al., 2002).

## Discussion

Building projects often are the largest capital investment made by the corporation. But, maintaining budget and time constraints are not now the only required functions for the corporate real estate or facility manager (Thurm, 2005). Analysis of the maintenance cost of the facility and the functionality of the building to evolve means addition of new technology in order to save on energy and maintenance costs of the building (Thurm, 2005).

The facility manager has evolved recently driven by the business trends that of the last 25 years. The rise of the chief financial officer (CFO) in the organizations has driven cost accounting and asset management. Information Technology and automation has driven strategic scheduling techniques by the facility manager. Pay-off on investment, cost reduction and quality movements have driven the need to have efficiently operating facilities in order to reduce energy costs (Cotts, 1999)

In order to accommodate the needs of the clients the facility design is critical to be accommodating to the function of the facility. The design may be derived from a functional utility of the facility. The inventory dependant retailers design the facility to accommodate the application. The facilities associated with transportation applications are located in areas that allow access to the needs of the transportations system. Facilities that are designed to function to serve people are designed to support the specific business utility. Cotts (1999) defined facility management, “the practice of coordinating the physical workplace with the people and the work of the organization.” The facility management institute identified the function of facilities as intersection purpose, place and people (Cotts, 1999).

Wireman (1994) reasoned the primary functions of the maintenance department as being the existing equipment, equipment inspection and service, equipment installation, maintenance storekeeping and craft administration. The maintenance organization must develop attainable objectives to be effective. This should include, keeping maintenance costs as low as possible, maintain quality requirements, maintain corporate critical equipment to insure availability, facility safety guidelines are met and non critical equipment functions properly with lowest possible cost.

Many managers in the past seen that facilities (or real estate) are more to do with the cost of doing business rather than part of the strategic plan. Teicholz and Ikeda (1995) stated that the trend to have a strategic facility plan for facilities was needed that reflects the business direction. The move towards a strategic corporate facility plan provides the facility manager a corporate or agency voice in the overall strategic plan.

The normal strategic planning time table looks at a five year planning cycle with annual updates (Teicholz and Ikeda, 1995). To support the technology and market changes that are rapidly changing a constant acclimation is needed in a strategic facility plan. A properly balanced and stable work load is required. The facility manager must determine what maintenance work is required safety related, customer service, emergency or breakdown, preventive or predictive and enhancement. Monitoring the performance and operation of these tasks as well as the facility equipment records becomes the role of the facility maintenance manager. All these elements eventually feed into the facility strategic plan (Wireman, 1994). To meet the major objectives of the strategic plan the need for allocation of resources is necessary.

Early in the 1990's downsizing of the white collar workers changed the management of the facility infrastructure. Downsizing according to Techolz and Ikeda (1995) looks at the facilities and maintenance staff to reduce headcount since they are often considered as an overhead organization. Technology became a means to supplement and replace staff in the facility organizations. The computer aided facility management (CAFM) systems began at this time to track maintenance cost, to properly allocate the manpower resources efficiently, and perform scheduling. The maintenance supervisor spends a majority of their time on job allocating and maintaining manpower resources to support customers (Teicholz and Ikeda, 1995). The maintenance shop supervisor needs to assign personnel, control job interruption, prevent work delays and respond to real-time requests.

Wireman (1994) identified the primary functions of the maintenance department as being maintenance of existing equipment, equipment inspection and service , equipment installation, maintenance storekeeping and craft administration. These are the basic requirements for a CAFM to be measured and deployed. The maintenance organization must develop principle objectives for the maintenance department to obtain in order to be effective. They are:

1. To keep the maintenance cost as low as possible
2. Maintain quality requirements
3. Maintain critical equipment to insure availability
4. Maintain non-critical equipment with lowest possible cost

In order to meet the above major objective resources are allocated as established by priority. To properly allocate the man power resources effectively the facility

managers priority schedule the labor hours available within the strategic facility plan. The maintenance shop supervisor assigns the proper personnel to the task, control job interruptions, and prevent work delays in order to accomplish the work. The maintenance shop supervisor should not be preparing or prioritizing work order schedules, controlling inventories of materials, and gathering or recording information for or on work orders.

The effectiveness of a maintenance department is determined from the maintenance backlog. The maintenance backlog indicates problems in work order planning, record keeping, and scheduling. There are four key questions of the maintenance backlog to be asked according to Wireman (1995).

1. "Does the backlog forecast the required downtime?"
2. "Is the work prioritized for each craft?"
3. "Are the priorities properly applied and reliable?"
4. "Is the backlog used to control the size of the workforce?"

The above questions are used to answer and reflect the condition of the maintenance backlog. The work schedules should be planned everyday and reflect facility / work priorities, work order completion dates, and availability of man power, materials and equipment. The main scheduling concepts are priority, completion date and availability (Wireman, 1995).

In order to accomplish maintenance tasking there are several critical support positions needed. The key position for the department is the Planner/Scheduler who receives and approves all work orders. The Planner/Scheduler daily plans all work orders for one week based on priority, completion date and availability. The Material

Coordinator who must control inventories of shop stores, tools, and equipment availability based on the shop schedule. The Material Coordinator inputs directly into the shops plan information which affects the performance of work orders based on the material inventory. The Shops Clerk who must daily record and process the work orders. It is critical that the recording of the work happens as soon after the work is complete. The Maintenance Engineer who initially receives the work request, gathers the appropriate manuals, or blueprints/sketches, develops the work performance plan, establishes the facility or system priority and reviews the maintenance repair records or check sheets.

Harold Kerzner (1998). Established when planning a project the work must be structured into small work elements that are:

- **“Manageable**, in that specific authority and responsibility can be assigned.”
- **“Independent**, or with minimal interfacing with dependence on other on going elements.”
- **“Integrate**, so that the total package can be seen.”
- **“Measurable**, in terms of progress.

In the terms of planning with the CAFM the work breakdown structure (WBS) of the maintenance department should be separated into the individual work elements. In some cases maintenance tasking will need to be divided in further WBS divisions.

NASA Facilities Handbook (NASA, 1994) Identified that the “primary value of computers in Facility Management is the ability to store, retrieve, and

manipulate data rapidly and accurately and output information according to rules and parameters set by the programmer/user.” The key data elements are:

1. Accuracy of the Data
2. Structuring of the data to establish relationships
3. Process the data to support equipment maintenance
4. Data information understandable to the users

The purpose of facility management is to coordinate and customize the investment in the facilities in an effective manner. Facility managers and facility engineers balance customer’s project requirements within the allowable budget for an individual or group of facilities. The facility managers have responsibility for maintaining the budget within the allowable guidelines. The facility management department identifies the needs of the customers and designs major projects. The facility competes with other facilities for operational capability and the customerization needs to cater to the client (Cotts, 1999).

The evolution of the Facility Manager or Real Estate Management is on going. The change of corporation’s vision as capital investment as a profit center rather than a cost center the need to have an organization for Real Estate Management occurred. Veale (1989) reported that the respondents to the MIT survey indicated that 37% had a vice president in charge of the Real Estate Management organization. The facility manager may be organized into the corporation from a director to a manager dependant upon the requirements of the organization (Cotts, 1999). The IFMA (Epstein,et al.,2002) reported on the strategic facility plan as a function of the project management benchmark. The approval of the strategic facility plan was made by the CEO 35% of the time.

Facilities planning activities are now incorporated into the entire organizational system. Churchman (1968) in a discussion on a system approach to the corporation identified that having warehouses full on idle inventory is inefficient. The key concept is a system approach to the strategic plan. Dr. Deming is quoted by Walton (1986), "Unless it (a process) is stable, nobody knows who is going to need what or when he'll need it." This comment was made in an explanation of Just in Time (JIT) production. JIT production and design has dominated the world of consumer goods. Parts are ordered and strategic stock is maintained according to the needs of the system. This means that facilities and facility maintenance is now driven by JIT processes. Pull systems and transportation of goods define the flow of goods (Chase, 1998). Preventive maintenance plans are incorporated into the operational flow of the system. Facility maintenance departments use the processes of root cause analysis; solve permanently problems, team approach, emphasis on improvement and tracking of trends.

### **Conclusion**

All types of engineering discipline are involved with the design construction of facilities much research is made in system like lighting and heating ventilation & air condition (HVAC) systems. In the process of construction and design civil engineering identifies the building plot plan, Mechanical engineers (structural) layout the building support structure, Electrical engineering design electrical distribution and Industrial engineers identify the functional layout of the internal equipment in support of the process. (Cotts, 1999)

Cotts (1999) concluded that the lack of engineering after construction of the facility is a severe organizational problem. Often organizations do not employ engineers

from the various engineering disciplines either as consultants or staff engineers. The problem manifests itself in a lack of engineering support in oversight of maintenance plans, strategic policy setting and new requirements setting. Cotts (1999) further identifies that the lack of staff engineers is causal to the failure of many facilities to have properly documented as-built drawings of the systems. Cotts (1999) considers the shortfall of many organizations to employ staff engineers increase long term cost in the organization.

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# **A Study of Attack Tree Analysis Using a SQL Based Simulation**

**Michael S. Pallos**

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## **Abstract**

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This research evaluated the effectiveness of attack tree analysis incorporated into an information system computer security risk assessment methodology by evaluating the effectiveness of using attack tree analysis to assist with costing decisions, probability analysis, and the viability of using structured query language (SQL) computer program simulation model developed as part of this research. A pre- and post-assessment instrument was developed to ascertain the effectiveness of using attack tree analysis. The data gathering technique included a purposeful sample of 56 computer security experts and leading academic authorities of attack tree analysis. Many facets of society that utilize complex systems, such as Public Policy and Home Land Security efforts, may benefit from this research.

## **Introduction**

Businesses such as insurance and financial institutions once had the luxury of maintaining control over their business and client data by dictating how that data could be used and accessed (Rosall, 2002). The ubiquitous presence of the Internet and the customer demands and regulatory requirements for doing business via the Internet have forced most businesses and entire industries to change their paradigm in order to remain competitive. This paradigm has created a lucrative target for hackers and other

information “thieves,” while at the same time giving these individuals an entirely new set of access points into corporate databases. Information managers are challenged with incorporating risk assessment and threat analysis models as a baseline to assist with identifying potential penetration points. Unfortunately, most risk assessment models (Andrews & Moss, 2002) such as fault tree analysis (Elliott, 1998; Ericson, 1999; Helmer et al., 2000) and failure mode and effect analysis (Elliott, 1998; Huang, Shi, & Mak, 1999) were created to identify failure points within a system, or to perform postmortem analysis of catastrophic events.

What information systems managers appear to be lacking is a methodology which takes a holistic perspective of a system’s penetration points, including, but not limited to, access points external to the system (Schneier, 2000). An example of a system attacker who uses more than the Internet as a means of gaining sensitive corporate data is a hacker who rummages through an organization’s dumpster searching for documents containing vital information. One risk assessment model that considers the holistic perspective of system penetration points is attack trees.

Schneier (1999, 2000) first introduced the concept of attack trees in a paper co-authored with the National Security Agency (Salter, Saydjari, Schneier, & Wallner, 1998), and expanded on the notion in an article in Dr. Dobbs Journal the following year (Schneier, 1999). Attack trees provide a process for identifying penetration points throughout all components of a system.

### **Problem Statement**

This study researched the ability to perform calculations based on costing and probability claims made by Schneier (2000, p. 323) regarding the uses of attack trees in

risk assessment and security analysis in an attempt to partially fill this gap. The literature review did not produce a link between application and theory with attack trees (Ellison & Moore, 2001, 2003; Salter, Saydjari, Schneier, & Wallner, 1998; Schneier, 1999, 2000). This research attempted to address the perceived application and theory chasm. Its focus included risk assessment costing analysis, quantifying system vulnerabilities using mathematical formulas, the automation of attack tree costing, and vulnerability assessment built algorithms contained in a software application. Risk assessment costing analysis provided a computer program for information managers as they decide where to invest their budget in order to achieve the greatest benefit from that expenditure. The use of mathematical formulas provided a similar tool for these same managers to identify critical components of their system and efficiently allocate countermeasures in the form of time, money, and human resources. Finally, the use of the software application provided an automated means to implement these methodologies in order to make the process accurate and efficient.

### **Purpose of the Study**

The purpose of this study was to research the effectiveness of attack trees, using costing and probability, incorporated into an information system computer security risk assessment methodology. This research evaluated the effectiveness of using a computer program incorporating attack tree analysis to assist with costing decisions and probability analysis. To assist information systems managers with the above-mentioned process, a deliverable from this study included the creation of a computer program that assisted with the costing and probability decisions information systems managers made with the use of attack trees.

## **Methodology and Results**

A pre- and post-assessment instrument was developed to ascertain the effectiveness of using attack tree analysis. The data gathering technique included a purposeful sample of 56 computer security experts and leading academic authorities of attack tree analysis. The hybrid methodology incorporated quantitative data analysis using the chi-square test of homogeneity and the test for the equality of proportions; while qualitative data analysis include the use of grouping of data creating bar graphs, discussions, conclusions, and other narrative components.

The quantitative research findings suggested a strong support base for attack tree analysis ranging from 71.4% to 92.9%. While only 21.4% to 28.6% of participants are considering implementing attack tree analysis. The qualitative data suggests the transition from theory to implementation may not be achievable.

## **Conclusions and Recommendations**

This study has added to the existing body of knowledge for the risk assessment of computer security systems by providing an academic evaluation of attack trees whose viability and usefulness may extend to information systems managers, government agencies, military organizations, and private citizens who have home computers connected to the Internet. As requested by Salter, Saydjari, Schneier, and Wallner (1998, p. 2), this study provided a step in bridging the gap and facilitating “dialog among academia, industry, and government toward securing the global information infrastructure.”

The process of developing attack trees was automated by a computer program that housed the mathematical properties contained within computer algorithms that

incorporated probability, Boolean algebra, and cost benefit analysis that may have aided information systems managers and security consultants in system analysis (Schneier, 1999, 2000). This program and process may aid in the ability to run countermeasure scenarios and “what-ifs” also adding to the security of information systems.

Further research is required to evaluate the use of attack tree analysis in a large complex setting. The data indicated that attack tree analysis added value as a risk assessment model assisting with costing and probability analysis; however, the data also suggested that attack trees, though useful in theory, may reach a point of uselessness in large organizations. A large attack tree implementation is required to explore this hypothesis.

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# **An Investigative Study of Distance Student Preference for Technology-Based Support Services**

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## **Abstract**

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This is an investigative study of distance student preference for technology-based support services. Colleges and universities that offer distance-based education are involved in advancing the use of technology yet they have limited knowledge or understanding of student preference for the method(s) of receiving student support services remotely. Student support services, in the context of this study, are defined as the non-academic exchanges between the student and the institution (e.g. enrollment, admissions, registration, financial aid, billing, records management, and advising). Access to student support services is a high priority issue for institutions offering distance-based programs because it contributes significantly to distance student persistence and overall academic success. This study is work-in-progress as part of Doctoral Study program.

## **Introduction**

The institution of higher education is undergoing a radical transformation though not by its own design or of its own choice (Newman & Couturier, 2004). The pressure being exerted from the external environment, as a result of converging forces for change, demands that universities and colleges reevaluate long-standing policies and practices for

delivering student support services, especially for distance-based programs (Kretovics, 2003; Beede & Burnett, 1999). The evolution of the Information Era, the emergence of a market driven industry for higher education, and changing learner expectations represent the chief influences driving the need to amend the system (Distance Learning Policy Laboratory, 2002; Beede & Burnett, 1999). Individually these phenomena denote significant implications for higher education. Collectively they imperil the institution itself. While academia has been traditionally insulated from outside environmental pressures it must now contend with these external forces that aim to dictate how the institution will operate and ultimately how successful it will be (Laudon & Laudon, 2002; Beede & Burnett, 1999). “The needs of the information age are different from the needs of the industrial age, and this dramatically affects how colleges and universities do the work they do.” (Rowley, Lujan, & Dolence, 1998).

As a way to combat the competition and increase the likelihood of success through service excellence, businesses began investing heavily in Customer Relationship Management (CRM) strategy and technology (Milliron, 2001). A CRM strategy helps companies understand their customers and develop programs to provide appropriate levels of customer service across the customer population (Peppers, Rogers, & Dorf, 1999). Addressing the student support services problem in distance education mandates action by administrators and the direction for success may well lie in lessons garnered from the commercial sector through the application of a CRM strategy enabled by technology to enhance student support service delivery in distance education (Grant & Anderson, 2002). It begins with understanding learner needs with respect to the delivery of student support services at a distance. This approach is consistent with the essential

philosophy of CRM and best practices in business that endeavor to listen to the voice of the customer and take a customer-centric approach to service the customer in a way that will please the customer and build loyalty.

### **Problem Statement**

This study will address this problem: Although colleges and universities that offer distance-based education are involved in advancing the use of technology, they have limited knowledge or understanding of student preference for the method(s) of receiving student support services remotely. Student support services, in the context of this study, are defined as the non-academic exchanges between the student and the institution (e.g. enrollment, admissions, registration, financial aid, billing, records management, and advising).

### **Purpose of the Study**

The purpose of this study is to ascertain and analyze the **References** of remote learners for how student support services are delivered at one distance-based university. Student support services, in the context of this study, are defined as the non-academic exchanges between the student and the institution (e.g. enrollment, admissions, registration, financial aid, billing, records management, and advising). This study is intended to test the hypothesis that distance students have a significant preference for technology-based support services (e.g. Web, fax, phone, email) over traditional face-to-face interaction. Further, it is designed to expose learner **References** for specific delivery methods by type of service. The end goal is to illuminate the needs and wants of this population of students so that the service practices of this university can be strategically evaluated against a business model for best practices in service delivery. It

culminates in recommendations for what level of change in delivery approach might be appropriate to better meet distance learner needs.

### **Conceptual Framework for the Study**

Conceptual support for the study emanates from strategies for service delivery excellence in the business sector and trends in student support services delivery in distance education. In this study the researcher will examine business-based models for service delivery founded on a CRM strategy and attempt to draw a parallel to the need for a similar approach to provide flexible, convenient, and easy-to-use technology-based student support services. Trends in student support services delivery in distance education will be examined as a way to discover emerging practices that might lend credence to the notion that best practices in service delivery in business may serve the academic institution as well.

### **Summary and Significance of the Study**

The method of delivery of student support services to distance learners is an issue for institutions of higher education. The case was built for studying the perceptions of students regarding the delivery of student support services as a way for administrators to gain a better understanding of their needs and to design strategies to better serve the learner. Best practices in service delivery in business were introduced as an emerging paradigm for addressing the student support services problem in education. Thoughts about trends in student support services delivery in distance education were touched upon as conceptual support for proposing the adoption of business practices for service delivery in education. The significance of this study will result from the quantitative analysis of student support services delivery capabilities at one distance-based university.

The benefits to the university include a greater understanding of the needs of its student population relative to the delivery of student support services and empirical support for the perceived value of alternative methods of support services delivery. With this knowledge the administrators of the University will be in a better position to strategically evaluate its delivery of student support services and determine what level of change in its delivery approach might be appropriate to promote student satisfaction.

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# **The Role of Spiritual Leadership in Meeting Organizational Challenges**

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## **Abstract**

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This study used a grounded theory approach to examine the definition of spiritual leadership within organizations and the ways in which spiritual leaders apply and develop spiritual leadership to increase their organizations' capacities to adapt and change. Thirty-one spiritual leaders were interviewed regarding their views on spirituality, religion, spiritual leadership and organizational change. NVIVO software was used to analyze interview transcripts, and nodes were coded and developed related to the research question and according to the grounded theory method that included open, axial, and selective coding. The results indicate that spiritual leaders impact their organizations by developing their own spirituality on an ongoing basis and then applying their spiritual knowledge to the leader-follower relationship, developing desirable qualities in their employees, and overtime in their organizations.

## **Introduction**

Today's corporate environment poses unique challenges for its workers. The impact of globalization, widely publicized incidences of failed leadership, an uncertain economy, and the threat of terrorism have left their marks on employees at all levels. In this climate of change, employees have begun to question their identities and functions in the workplace (Wohl, 1997). Focusing on the bottom line has led to a loss of trust,

causing employees to experience dissatisfaction and alienation (G. W. Fairholm, 1997). At the same time, work is becoming increasingly central in people's lives (Brown et al., 2001). Work is taking more time away from family, friends, religion, and other outside activities (G. W. Fairholm), and employees are longing for a greater sense of meaning and accomplishment from their work (Marko, 2002). Research has indicated that the integration of spirituality into the workplace and the addition of spiritual leadership in particular are necessary to instigate organizational change and restore social balance (Block, 1993; G. W. Fairholm; Jacobsen, 1994; Lewin & Regine, 2001; Marcic, 1997; Palmer, 1994; Vaill, 1998).

Researchers have become cognizant of global integration increasing the interdependence between companies worldwide and transforming the rules of trade (Goldsmith, Greenberg, Robertson, & Hu-Chan, 2003). A new type of leadership able to meet the demands of the 21st century is being sought (Cacioppe, 2000; Goldsmith et al.). Although leadership is being widely acknowledged as the most important factor to institute organizational and social change successfully, the type of leadership necessary is disputed. The term leadership is being associated with countless adjectives that attempt to stress its most important factors, such as charismatic leadership, transformational leadership, and servant leadership. More recently, the term spiritual leadership has increased in popularity as a concept that subsumes all the positive characteristics of alternate styles of leadership under one umbrella (G. W. Fairholm, 1997).

### **Problem Statement**

This study addressed the problem that research on the impact of spiritual leadership on organizational change is incomplete. Although research in this area is slowly increasing,

it is predominantly theoretical and lacks a strong evidence base (Mitroff & Denton, 1999b). In addition, a large portion of the related literature stems from a religious perspective (Koenig, 1997). Researchers have found, however, that a substantial group of people view themselves as spiritual, but do not consider themselves religious.

### **Purpose of the Study**

The purpose of this study was to investigate the ways in which spiritual leaders implement spirituality as a way to create positive organizational change. Further, this study examined spiritual leaders' views of spirituality and religion, as well as the values they place on their roles as promoters of organizational change, allowing the challenges of the 21<sup>st</sup> century to be met. Although literature about workplace spirituality and spiritual leadership is increasing, there is still a limited evidence base supporting its viability as an essential strategy for modern organizational change. Corporate disasters such as Enron and WorldCom have decreased people's collective faith in organizations as places where they can develop themselves at all levels. Organizational change plays a role in social change; therefore, a loss of trust and a decline of corporate ethics in organizations can lead to increased social imbalance (G. W. Fairholm, 1997).

### **Methodology**

A grounded theory approach, as described by Creswell (1998), was used so that a theory could emerge from actual data. A grounded theory approach, as described by Creswell (1998), was used so that a theory could emerge from actual data. The study participants were selected through a snowball sample, and an initial set of questions for leaders was tested and refined in a pilot study. Leaders were asked open-ended questions, and results were analyzed as data were collected. Specific hypotheses were not suggested

prior to the study in order to allow a theory to emerge naturally from the data. Through analysis, categories were formed and adjusted, and a theory was constructed.

### **Research Question**

In this study, the phenomenon of spiritual leadership was examined with a focus on the following research question: In what ways are spiritual leaders able to apply and develop spiritual leadership in order to increase their organizations' capacities to meet the challenges of a rapidly changing global environment? Although theories of spiritual leadership have been formed, this question has not been fully addressed in a grounded theory investigation.

### **Conclusions and Recommendations**

Through their own spiritual development, spiritual leaders are able to increase their wisdom, develop their relationship with a Higher Power, and become more in tune with the common good for the organization and for society. In practice, spiritual leaders use their unique worldview to deepen the leader-follower relationship, which they view as a dynamic form of give and take in which roles shift as necessary. Leaders value followers, provide guidance and empathy, model the appropriate behavior, and create opportunities for the growth and development of followers. Practices used to develop followers include leading by example, participating in workshops and retreats, providing for their needs, encouraging prayer and faith groups, and building relationships. This leads to followers becoming more open and adaptive to change, taking greater responsibility in the workplace, deriving meaning from their work, assuming a leadership role responsibly, and better foreseeing and meeting the challenges faced by a rapidly changing internal and external environment.

More research could be done in this area by examining this relationship more closely and how spiritual leaders act and make decisions in the workplace, as compared to other leaders. A case study approach or a comparative study between organizations that do or do not utilize spiritual approaches could be a valuable way to examine this important relationship between spiritual leadership and organizational change. A quantitative study may also help senior managers to understand more clearly the benefit of applying and developing spiritual leadership in their organizations.

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# **Improving the manager as coach: A model for advancing developmental skills in supervisors through High Performance Coaching**

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## **Abstract**

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The ability to effectively coach, mentor, and encourage subordinates appears more and more to be a necessary skill for successful business leaders. This coaching style of influence has gained recognition in recent years as a popular occupation among consultants of organizational effectiveness. An original, iterative ideal is introduced as the *High Performance Coaching* model. Containing five interdependent skills or elements, the model is to be initially introduced to a target audience of frontline managers by way of a training intervention, described in detail. The intervention is intended to improve the interpersonal management skills of its target population in order to affect a measurable increase in overall employee satisfaction and productivity.

## **Introduction**

Coaching business managers to be better leaders is becoming a favorite occupation for consultants in the field of organizational effectiveness. Born out of the need to better organize employee and manager efforts toward a common goal, coaching is, believes Hudson (1999), a new field or discipline in which the client can be led to “discard, the old, fixed, constricting rules and begin to follow new rules that give [him or her] the strength to thrive” in a variety of situations. (pp. xviii-xix)

The ability to coach, mentor, and encourage subordinates appears more and more to be a necessary skill for successful business leaders to develop within themselves, in order to realize and sustain success, today and into the future. In other words, leaders need to be more effectively taught to develop others.

### **Comparing Theory and Application**

#### ***Shifting Paradigms***

Much of the sentiment toward what type of leadership behavior is appropriate and effective in the workplace has shifted from more command-and-control oriented theories to arguably more modern methods that tend to nurture, support, and overtly respect the individuality and potential of employees. (Covey, 1990; Goleman, Boyatzis, & McKee, 2002; Hersey, 1984; Kouzes & Posner, 1987; McGregor, 1960) To remain consistent with the findings of recent studies on coaching and its effectiveness (Bacon & Spear, 2003; Brocato, 2003; Ellinger & Bostrom, 1999; Ellinger, Ellinger, & Keller, 2003; Hudson, 1999; Richards, 2003), this author wishes to present an iterative model for coaching behavior in the workplace that, when followed, can be said to potentially advance the relationship between manager and his or her employees, as well as promote employees' overall job satisfaction and productivity. This original model, it is expected, will reflect current paradigms of what is considered good leadership practice as it is tested in the workplace.

#### ***Merging New Theory with Practice***

During their research on coaching behaviors of managers in learning organizations, Ellinger, et al. (1999), clarified that the type of coaching behaviors that

proved most effective were derived from a paradigm of empowerment, rather than directing, controlling, and prescribing. This led to “coaches becom[ing] enablers of the learning process with the intent to help employees learn and develop.” (pg. 760) It is from this same paradigm that this author wishes to apply his iterative model of coaching in the workplace, particularly, in a classic high-rate manufacturing factory. The model and its associated training are expected to drive an improved pattern of behavior on behalf of managers in the proposed setting. It is also expected that the application of this model will, in part with other management initiatives, help to improve productivity, safety, and morale among affected employees. This model has only been beta tested with a small sample class of only 16 managers. It’s design and intended application are described herein.

### **Method of Application**

#### ***An Iterative Model***

From Bacon and Spear (2003) suggest that trust between coach and coachee is not automatic and that effective coaches must demonstrate ongoing credibility in order to win that trust. (pg. 15) However, the authors also attempt to illustrate the differences in levels of coachability by describing behaviors commonly demonstrated by people who are ready and eager to be coached and those who are not.

This researcher refers to the model presented herein as iterative in that it has been derived out of the repetitive process of analyzing others’ approaches, outlining original concepts and models, testing their practicability in the workplace, incorporating feedback from those who use the model, and adjusting it to reflect that experience and feedback--a somewhat casual application of grounded theory research.

It is primarily the combination of works on the subject of coaching from Ellinger, et al. (1999, 2002), Bacon and Spear (2003), Bell (1996), and Hudson (1999) that suggest the potential success of this new model, called *High Performance Coaching*. This moniker was chosen by the researcher to exemplify the desired outcomes manifest by increased employee discretionary effort that is expected to result from the improvement in coach-like behaviors from employees' managers. The model of *High Performance Coaching*, as illustrated in Figure 1, consists of five, mostly consecutive, steps. These specific *keys* were chosen and arranged based on their consistency with other paradigms and their representation of an evolved style of modern leadership.

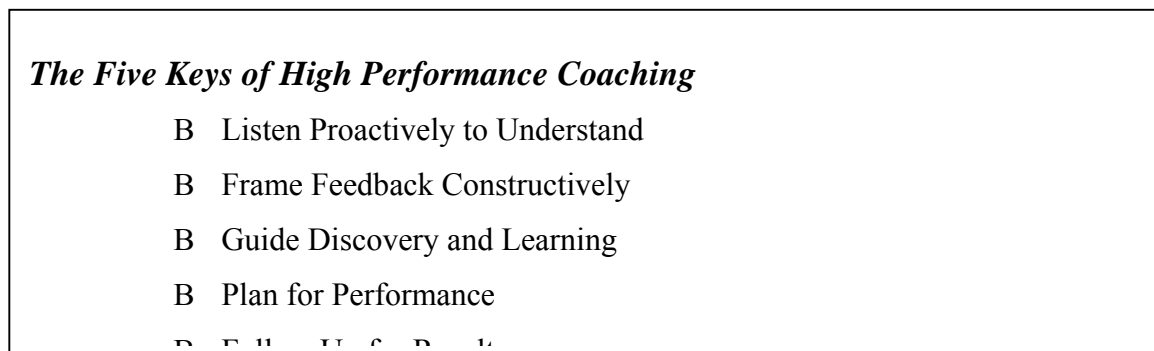


Figure 1.

It is argued, therefore, that a manager from most any industry can expect improvements in the quality and quantity of employee discretionary effort when managers consistently apply all five elements of *High Performance Coaching* as an intrinsic part of the manager-employee working relationship. Additionally, it is proposed, that such behaviors that lead to increases in *productivity* will also have a net positive effect on the overall *satisfaction* of employees who are subject to such coaching behaviors.

### ***Training Intervention***

The central method upon which this proposal relies to transfer the primary coaching behavioral skills to management is a training intervention and related follow up activities. They are intended to provide participants with the opportunity to study and practice the subject behaviors in a safe, classroom environment, prior to attempting to demonstrate them in the workplace.

The course outline includes a self-assessment, designed to accomplish two primary purposes, (a) to provide participants with an increased awareness surrounding their current ability and propensity to utilize the coaching behaviors (or rather lack thereof), and (b) to illuminate a felt need and motivation to improve upon these skills.

#### ***High Performance Coaching – Training Outline***

- A. Introductions and Objectives
- B. Coaching: What and Why?
- C. Self-Assessment
- D. Getting By--A Case Study
- E. The Five Coaching Keys
- F. Planning Questions
- G. Practice Scenarios
- H. Tools in Action
- I. Inspiring Commitment

Figure 2.

A practical outline of events in this approximately four-hour session is illustrated in Figure 2. The purpose, method, and rationale for each mode of training contained in the outline are explained below, yet grossly reduced in detail in order to accommodate an appropriate length for this forum.

**Introductions and objectives.** Participants are given the opportunity to introduce themselves and share certain aspects of their background and experience. This is the first

of many opportunities they are given during the training to validate what they already know about coaching and to share any relevant experience.

Introductions among dyads or small groups will be first handled at each table cluster and then be expanded to include brief individual introductions before the entire class. It is expected that this will also serve as an icebreaker that can help participants to be more willing to share and fully engage in the learning to follow.

The course objective is to help participants master the use of critical coaching behaviors in the workplace that will potentially, (a) increase employee commitment to organizational goals, (b) enhance open communication and dialogue, (c) facilitate employee retention, (d) develop greater bench strength (i.e. qualified subordinates who can more readily assume the manager's role), (e) improve working relationships, and (f) reinforce the manager's credibility and effectiveness as a leader.

**Coaching: What and why?** Intended to increase participants' awareness around the definition and purpose of coaching, the discussion will turn to the desired outcomes, as outlined in the previously mentioned objectives and benefits. A working definition for coaching will be given as follows: *The process of equipping people with the tools, knowledge, and opportunities they need to develop and become more effective in their jobs.*

**Self-assessment.** This researcher has compiled a self-assessment that is designed to give participants a cursory, qualitative impression of their coaching strengths and weaknesses. It contains categories of questions that correspond to the Five Coaching Keys, described previously. Participants are encouraged to pursue additional feedback surrounding areas of weakness or that lack information and to consider ways of

improving their ability and tendency to engage in healthy coaching behaviors on a more consistent basis.

**Getting by: A case study.** Small groups of four or five participants shall be asked to read and analyze a workplace scenario that portrays a manager who struggles with the interpersonal skills that are characterized as good coaching. The case also highlights the ills that plague managers who have not empowered capable employees with increased responsibility and oversight.

The smaller groups will then be asked to share their analysis of the case with the entire class, including a list of things the hypothetical manager could and should do to improve his interaction with employees. The name of the case study is, "Getting By."

**The Five Coaching Keys.** At this point the coaching keys that have been previously introduced (see Figure 1) shall be explained by the instructor and further defined by outlining specific "Attitudes and Actions" that characterize the keys themselves. A sample of keys, attitudes, and actions for the second coaching key, *Frame Feedback Constructively*, are listed in Table 1.

<b>Frame Feedback Constructively</b>	
Attitudes	<ul style="list-style-type: none"> <li>- The focus of change is the behavior, not the person.</li> <li>- There may be other information that I don't have.</li> <li>- I genuinely wish to help this person be successful.</li> <li>- Ignoring the gap in performance is not an option.</li> </ul>
Actions	<ul style="list-style-type: none"> <li>- Convey your positive intent.</li> <li>- Specifically state the behavior you have observed.</li> <li>- State the behavior's impact on the desired outcome.</li> <li>- Allow the other person to respond.</li> <li>- Ask for suggestions for improvement.</li> </ul>

Table 1.

Participants are then given the opportunity to outwardly agree or disagree with the attitudes and actions, as they are listed. Since their inclusion in this format was research-based, it is expected that most participants will concur with their importance as predecessors to the effective execution of each coaching key.

**Planning questions.** Participants will be asked to focus on improving their coaching abilities in ways that directly enhance their current working relationships. For this purpose the course provides participants with specific prompts in the form of planning questions that allow them to prepare for the real interaction with coworkers, subordinates, and others outside of the class. These questions force participants to think thoroughly about the situations, interactions, opportunities, challenges, and obstacles they face when engaged in coaching activities. The answers to these planning questions also serve as a guide during the practice scenarios (similar to role-play) in which participants will engage later on in the training.

**Practice scenarios.** This potentially represents the most profoundly beneficial portion of the training, whereas participants experience first-hand what it means to coach according to the prescribed model. They will practice, observe, offer and receive feedback, and recognize what challenges they yet face before taking their new skills back to the workplace.

The salient results of the self-assessment, illustration of a negative coaching example in the case study, and the contemplative nature of discovery that comes from analyzing the planning questions all combine to create a deeper felt need in the participant to want to improve his or her coaching ability. Therefore, at this point in the training, it is recommended that participants be given the opportunity to actually practice

the skills that are fresh in their minds.

Participants are divided into groups of three or four persons. Individuals in the group respectively assume the roles of *coach*, *scenario partner*, and one or two *scenario guides*. Over the course of three or four rounds each participant will have had the opportunity to fulfill all three roles at least once. During a single round, the person practicing will use one of the five previously prepared coaching scenarios provided to him or her by the instructor.

All rounds are followed by feedback where each person in the group is permitted to share observations about what the person practicing (coach) did well and where room for improvement still exists. Many more explicit instructions to successfully facilitate the practice scenarios are provided than have been explained here.

**Tools in action.** Towards the conclusion of the course, participants will be asked to read through a prepared list of possible activities they can engage in outside of class that will help them improve their coaching ability and awareness of coaching opportunities. They will then be asked to record two or three goals from this list and other learnings during the class with which they plan to follow-through.

**Inspiring commitment.** To punctuate the classroom experience, it is expected that the instructor will close the session by sharing a personal story that features the coaching he or she received from another leader or mentor that made a positive difference in his or her own career. The instructor will then challenge each participant to become that same type of coach to his or her employees. The course is expected to require approximately 4 hours to complete.

### ***Measures***

The optimal structure for this training intervention will include the administration of a pre- and post-course, multi-rater instrument designed to give participants an increased level of awareness surrounding their coaching abilities and tendencies. The assessment should closely approximate the behaviors described and statement contained in the course's self-assessment and will include only feedback from the participants' subordinates. It is this coaching relationship, most of all, that the training is intended to improve.

Participants will be informed of the intention to repeat the instrument approximately 6 to 12 months following the training. The expectation, of course, is to realize an improvement in a participant's score over his or her baseline assessment.

### ***Expected Results***

The results of each manager's multi-rater surveys will be analyzed only by himself or herself and his or her immediate manager, to be leveraged strictly as a developmental reference point. The aggregate scores by department and plant will be used to assess whether overall improvements in coaching have been realized. This is the first level of measurement--an indication that managers are or are not exercising coaching skills to a greater degree.

Additionally, the researcher would expect to see an increase in overall employee satisfaction as a result of improved coaching practices. At one location targeted by this researcher, the Lake City Army Ammunition Plant in Independence, Missouri, the results of a recently completed employee satisfaction survey may serve as a baseline for this metric, and a previously scheduled follow-on survey could potentially illuminate

improvements in satisfaction scores, some of which will be influenced by the coaching intervention. Further qualitative and quantitative design and analysis would be necessary in order to measure the impact of the intervention more directly.

## **Discussion**

### ***Limitations of the Application***

It is acknowledged that potentially positive findings from this intervention are not generalize-able across all business settings. Additionally, the complex nature of the employee satisfaction surveys and the multi-rater manager assessment instrument cannot definitively attribute improvements (or failure, for that matter) to any specific part of the intervention described in this work. The establishment of a more reliable causal relationship may require the isolation of several variables that aren't easily isolable and the introduction of control groups.

### ***Implications for Intervention***

This endeavor to teach and measure coaching skills among a group of managers may represent a potentially negative impact to an organization on the whole. Organization-wide surveys tend to tax respondents if they are too lengthy or occur too frequently. Managers may also view the intervention as just another flavor-of-the-month approach among other management improvement fads of which they've been a part. Time must be spent assessing the potential risks posed by this implementation in order for it to be carefully, systematically, and responsively carried out.

### ***Conclusions***

The application, *Coaching for High Performance*, is an attempt to systematize specific coaching behaviors that have been studied by this researcher. To the extent that it

is possible to teach these skills and reinforce and recreate their associated behaviors to an improved level in managers, it is argued that working relationships, job satisfaction, and productivity all improve. The model (The Five Coaching Keys) that has been synthesized here represents a formula that supports the thinking of many seminal contributors to management theory and is aligned with recent research on the subject of coaching.

This researcher recognizes that there are other related areas of inquiry and encourages fellow scholars to more closely examine, for example, the nuances of variant coaching models that may prove successful in settings other than manufacturing. Whether the list of recommended coaching behaviors might be different for peers wishing to coach peers, although equally intriguing, is yet another question that shall be left to another's scrutiny.

Overall, the manager-as-coach approach appears to be the most positive and productive style of influence that business leaders are able to adopt and employ in a plurality of situations they face with employees. It is expected that the implementation of the treatment described herein will support this assertion. Initial, limited testing of the *High Performance Coaching* workshop and model is promising.

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# **Creating Positive Social Change with Long Distance Learning: The Impact of Online Learning on Education on Traditional School System**

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## **Abstract**

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This study examines the insurgency of the Internet and the World Wide Web (WWW) relative to the way it changed the traditional school classroom paradigm. Briefly, the Long Distance Learning (LDL) is described, which enumerates the use of the Internet, including the WWW. The perspectives of online education and technology, relative to traditional schools within the academic environments are examined. The insurgency of the Internet and the WWW has changed the traditional classroom paradigm. Microcomputers, Internet, and the WWW are shaping the current generation of distance learning, virtual reality, artificial intelligence, and knowledge systems may be next generation of classrooms setup (Sandra, 1996).

## **Introduction**

The Internet efficacy brought new breeds of learning opportunities where scholars can use modern interactive technologies asynchronously to obtain a degree from prominent online institutions. The Internet and the WWW has eliminated the geographical, time, and space barriers confronting traditional school systems. The Internet never closes. Internet sites are open all the time (Haag et al., 2003). One

advantage of online is that it has the ability to be accessed anywhere that has computer and Internet accessibility. The growth of the Internet has brought on a whole new breed of learning options, whereby students can obtain degrees online. It is now possible to earn a bachelor's, masters, or even a doctoral degree entirely online (Education Planning, 2005). Walden University is a good example of a prominent and accredited online institution, where a student can obtain a college degree.

The Internet and the WWW has changed the phenomenon of dropouts' students who cannot continue their education because of family engagement. Accordingly, an online education allow individual to pursue and advance their learning process via Internet, without messing up their professional responsibilities and duties with education by presenting a variety of solutions and subjects beyond the scope of traditional education (Online Certification, 2002). Illiteracy is been eliminated gradually because "now anyone is potentially a distance learner, a concept that has implications for the organization of educational institutions and for teaching" (Sandra, 1996).

The Internet and the WWW are the main factors that have profoundly change the delivery of education via the Internet. Nevertheless, an individual might have never dreamt of earning a degree without stepping into a campus, meeting the professors and classmates face-to-face. The truth with online study is that you can earn a degree from your home without going to the college or university residing in any part of the world (Online Certification, Education and Distance Learning, 2002).

### **Problem Statement**

This study addressed the problem that if you want to get a degree, you must leave town, stop working, and live in a dorm, but we are way past that (Noone, 2004). In the

olden days, a student must leave home, go to a brick-and-mortar structure to go to school or obtain a lecture. Historically, higher education has taken a one-size-fits-all mentality: The insurgent of Internet technology opens a new education avenue that is unprecedented in human history. LDL is the method conducting education online.

### **Purpose of the study**

The purpose of this study was to investigate the ways the impact of long distance learning on traditional education as a way to create positive social change. Some people define distance education as the use of print or electronic communications media to deliver instruction when teachers and learners are separated in place and/or time (Eastmond, 1995; Sandra, 1996). Also in the olden days, many students cannot further their education because of issues such as job and family responsibilities. Fortunately, distance learning opens the door for many students to continue their education. Courses are now delivered over the WWW and this promising education delivery method gives students the flexibility of accessing lessons any time and any place.

The Internet never closes. Internet sites are open all the time (Haag et al., 2003). Consequently, the LDL comprises of computer hardware and software applications, such as word processors, databases, spreadsheets, and teleconferencing, that are not present in the school campuses twenty years ago (Gibbs, 1997). This unprecedented information feature facilitates successful online education protocol.

### **Methodology**

The interactive method of online education makes teacher and students interact more than traditional school; therefore, isolation is eliminated. Mulrean (2005) affirmed but self-motivation does not have to mean isolation. You might be surprised to learn that

some online programs are set up so that you actually have more interaction with the teacher and other students than you would by sitting in a lecture hall. The Internet helps student cultivate creativity; enhance communication, and educational productivity. Online education facilitates effective participation. It is easier to dodge participation or participate at minimal level in the traditional school setting. But the asynchronous setting of online education makes it mandatory to participate effectively and efficiently. In order for students to interact with one another, modern online blackboard is embedded with unique front-end with interactive interface that allows users to retrieve specific features that is associated with their class. The online classroom allows students to access information resources. It reduces cost because students can access their class discussions and associated class activities anywhere, and any time.

### **Research Question**

In this study, the occurrence of long distance learning was examined with a focus on the following research question: What are the Impacts of LDL on traditional school relative to traditional education? Although, theories of LDL have been formed, relative to continuous education but this question has not been fully addressed with respect to educating the illiterates.

### **Conclusions and Recommendations**

The Internet has created a positive LDL didactic methodology of achieving qualified degree without going to a physical building. You will not have to spend time traveling to and from class (Education Planning, 2005). As pedagogical transformations are instigated by the rapid advent of computer technologies, Internet educational reform becomes unavoidable. The cost of online education is promising. An online education

cost less than traditional education system. A student did not have to travel in order to go to school. Everything is done online. Online education appears to be a complement of traditional school system. Besides, it is often cheaper when compared to the cost a student spends on boarding, traveling, etc., to attend regular classes physically.

Irrespective of someone's age, online learning helps to increase the education experiences irrespective of age and geographical diversity (Montgomery College, 2005). Distance education is gaining importance because of positive social changes, technological advancements and economic fluctuations, which greatly necessitated the advancement of distance learning. There are numerous attributes associated with successful completion on distance learning classes (Montgomery College, 2005). Technical abilities and time management is crucial to be successful in LDL.

The Internet technology has revolutionized education phenomenon. Internet has made possible online education through which a person is able to study without moving from his home or office. Thus, time is saved because he or she "can study from anywhere and at anytime he wishes without any restrictions" (Montgomery College, 2005). Online education is a more flexible form of distance education since it enables the workers to coordinate their work timings and study hours. Students never miss the lectures because of illness or busy work schedule or business tours.



Figure 1. An online classroom (Botelho, 2004)

The traditional schools are losing students to online institutions. Conversely, losing students is losing money. Therefore, the traditional institutions now employ the saying; if you cannot beat them, join them. Therefore, most top ranking traditional schools have inculcated distance learning (DL) into their programs. The "INTERNET WORLD's" October 1995 issue gives examples of The Internet in Education, including online degree programs offered by traditional institutions such as Penn State and Indiana University as well as nontraditional entities such as University Online and the Global Network Academy (Wulf, 1996).

Online education facilitates the students to study from any place, anywhere in the world. There is no restriction to a particular place, location, or particular degree. The flexibility ability of online education is unprecedented. Attend classes at a specific time is eliminated. Thus, online education motivates the employees to enroll themselves for higher degrees and attain them without much tension.

Currently, more students are registering in school that can provide online education; therefore, more people are obtaining higher degrees that could have been impossible if there is no online education. New jobs are created thus creating more jobs for lecturers. Consequently, more people are making more money as a part time facilitator. A good

example of a successful online institution is Walden University. Students all over the world are attending the school because of its unprecedented flexibility without compromising their professional obligations.

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# **Collaboration: Avoiding Misconceptions to Ensure Success**

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## **Abstract**

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The history of collaboration goes back thousands of years. However, even with such a rich history there still seems to be misconceptions, which cause breakdown in collaboration and failure. We have seen this recently with different events that have taken place within the world we live in. This paper will provide insights into what some of those key misconceptions are of collaboration. I will also provide some key components to ensuring that these misconceptions can be avoided and successful collaboration will occur. There is still much research that needs to be done surrounding collaboration; this paper provides some direction on future research opportunities.

## **Introduction**

Although collaboration is by no means a new word or concept, it has become a major buzzword and hot topic of late. One of the reasons it has become such an important topic is we are seeing a lack of execution with true collaboration. “Throughout history, progress and even survival, have at times depended on collaboration ([www.communitycollaboration.net/id20.htm](http://www.communitycollaboration.net/id20.htm)).” The efforts of FEMA following Hurricane Katrina, the War in Iraq, the use of steroids in professional sports and the rating of video games are all areas where we are and have seen major breakdowns in collaboration.

### **Problem Statement**

This paper takes a high level look at what are some of the key misconceptions of collaboration that can impact success. Collaboration is more than people getting together to decide on something, it is engagement, interaction and execution. To often people feel collaboration is consensus, it is not and that is just one misconception.

### **Purpose of Study**

If I can provide a clearer understanding of the misconceptions of collaboration, I can begin to provide a clearer understanding of what must be done in the future to ensure that collaboration is a successful process. To help understand what collaboration is I would like to provide my own definition after reading a number of articles. Collaboration is a process by which two or more individuals provide their insights, expertise and observations to a selected leader or group to come up with a solution or outcome that provides the greatest benefit to that group's needs. According to an official definition of "collaboration", it means to work together, especially in a joint intellectual effort, to cooperate reasonably, as with an enemy occupation force in one's country (<http://dictionary.reference.com/search?q=Collaboration>).

As I read article after article, I found that collaboration is one of those concepts where many have laid out what the keys are to successful collaboration. However, I did not find a lot written about the misconceptions about collaboration. I am not sure if this is because people do not want to talk about it or they just assume people know what they are doing when it comes to collaboration. I found that where the word "collaboration" was mentioned, you often would find the word "community." Thus, it is absolutely critical

that we speak about and understand the misconceptions of collaboration or else we put this whole concept of community in jeopardy.

### **Methodology**

As stated earlier, after conducting some preliminary research, I wanted to get a more realistic understanding of what people think about collaboration today. Thus, I created a quick question survey that allowed a wide range of people to provide me with their insights about collaboration. Here are the key misconceptions that I came away with after reviewing all of their responses:

- Collaboration equals consensus
- Collaboration saves time
- Collaboration is easy
- Technology is the answer to successful collaboration

These misconceptions are often labeled as barriers to collaboration. I found that in the responses that I received from the small questionnaire that I sent out, these were the key misconceptions that people mentioned. This was one of two questions where there was consistency across the board. It is important to understand a little more about each of these misconceptions.

According to Wikipedia, consensus has two common meanings. One is a general agreement among the members of a given group or community. The other is as a theory and practice of getting such agreements. We can have successful collaboration without having consensus but it is very difficult to have successful consensus without collaboration. For that reason, it is vitally important that when deciding whether or not

collaboration needs to occur, there must be a commitment to those who will be collaborating by key leaders. The leaders final decisions must be supported and understood. Leaders do need consensus on the expectations otherwise you are setting collaboration up for failure. There cannot be turf wars if collaboration is to be successful. If you have consensus, consider it a bonus, not an expected outcome of collaboration. There must be clear expectations set before that actual collaboration takes place.

Although leaders within an organization or community would like to think that if they collaborate, they would save time, they are often disappointed when timelines come and go. The fact of the matter is that time is not necessarily saved or extended, what is improved is the likelihood of the right outcomes. Timesavings can be realized after collaboration, when that actual implementation occurs. Thus, setting the expectation of a collaborating team that it is to save time would be detrimental right from the beginning. One of the common items that repeatedly came up either in articles or answers from the questionnaire is that conflict will happen with collaboration. In order to ensure that there is successful collaboration, you must allow for some time to resolve the conflict.

The misconception that collaboration is easy really has no validity and shows a lack of understanding of what true collaboration is. In reality, collaboration can provide lots of frustration and can expose barriers to success. The key to ensuring that collaboration does not create levels of unnecessary frustration is to ensure that expectations are clearly defined upfront. There are assumptions that the reason that collaboration maybe easy is that you are only including a few people. The reality is that as you include more people in a process, the complexity increases. With this complexity there comes feelings of uneasiness and frustration. This can open the threat of failure within collaboration.

There has been a very serious push for technology to come to the rescue of collaboration. The reality is that in some ways technology has caused enormous barriers in collaboration. Collaboration depends on the very human aspect of coming together. Collaboration must be set-up, designed and executed all by humans. Technology can and will help to facilitate collaboration efforts but it is not the answer in and of itself. The problem is that people can really hide behind technology. This hiding can lead to disastrous results. The other important part about this misconception is that there is the potential that not all those involved have the same capabilities when using technology. For example, they're maybe a couple of team members who have worked with software such as Microsoft's, Live Meeting. They will be proficient in how this type of technology can help to facilitate the collaboration process. On the other hand, there may be a couple of members who have just recently become familiar with how to use email. This can cause collaboration to potentially take longer and potentially force a change in who is involved. As I mentioned before, collaboration itself is not a time saving process so any extra training for those who are less technological inclined would simply need to be a part of the expectations and plan.

### **Research Question**

The study has provided an opportunity to now dial down on different aspects of collaboration to begin to create theories and practice that can help improve success rates of collaboration. This study was in response to the following question: Why is it that often times collaboration fails? There are many reasons why collaboration can fail or succeed. Understanding what to watch out for and prepare for can increase the potential for success.

## **Conclusions and Recommendations**

The first component is to ensure that there are clear expectations for the collaboration that must take place. With the setting of these expectations comes the ability to set the proper message and direction for the collaboration team. Goals or “expectations” reflect the combined power of participants to achieve the desired result. They need to be clear, measurable, mutually agreed upon and broken down into both short-term and long-term targets (Gaining Momentum part 2). Identifying these expectations ensure, that those involved understand the difference between consensus and collaboration. It ensures that people understand the time commitment involved and that it is not a destination but rather a journey. Setting expectations should also provide a clear picture that the road to success with collaboration will not be easy. Research has demonstrated that the process of agreeing upon collaborative goals can be extremely difficult because of the variety of goals and constraints that different organizations and their individual representatives bring to a negotiating table (Eden, Huxham, & Vangen, 1996).

The next component of a successful collaboration is a conflict resolution process.

Most companies respond to the challenge of improving collaboration in entirely the wrong way. They focus on the symptoms rather than on the root cause of failures in cooperation: conflict. The fact is, you can’t improve collaboration until you’ve addressed the issue of conflict. (Weiss and Hughes, pg 93, 2005)

One of the common responses that I received from my questionnaire was that conflict is and should be a part of collaboration. This is a sign that people are free to speak their minds and share their inputs and insights. The importance of understanding that conflict will arise and being prepared to manage through it is critical. It can provide opportunities

to make real improvements and create solutions that have dramatic impact. If conflict is not managed correctly communication begins to break down. When this breakdown occurs, people begin to pick sides and this is not healthy for collaboration. This breakdown can also cause for the organization to lose precious time and money. An interesting thing about conflict is how technology can either be a great help or an extreme negative especially with collaboration. It is important to not allow for technology to be the driving force behind conflict resolution. Emails and chat rooms are the easy way out. Face to face meetings and even the use of videoconference are truly important to ensure that there is common ground and immediate responses can be provided. Technology has really hampered the conflict resolution process on many collaboration projects.

One of the areas that there must be more research on is the component surrounding the leadership within collaboration. For the most part what has been written is that the key to having a successful collaboration is to have a skilled leader. Collaboration success comes with a skilled leader who can truly manage the different relationships within the collaboration group. This leader must also be able to manage conflict without influencing the group into a place of consensus.

All participants in the initial group have a stake in leadership and in the outcomes. As the collaboration grows, new participants need to feel a sense of responsibility for the success of the group, even if they choose not to take a leadership role. (Community Collaboration Manual, 1991)

I want to make it very clear that there are many other key components to ensuring successful collaboration takes place. My goal was to provide context around the misconceptions of collaboration. Within this context I wanted to provide some key

components that will help to ensure these misconceptions of collaboration are eliminated. Getting collaboration right promises tremendous benefits: a unified face to customers, faster internal decision making, reduced costs through shared resources, and the development of more innovative products (Weiss & Hughes, p. 93, 2005). We see almost on a daily basis throughout the world both the importance of collaboration and the failure when it is not done correctly. I have truly found that watching the suffering of those who have been impacted by some of the failures of collaboration at the highest levels of government, education and business has caused me to want to clearly understand and be a leader within a collaborative community. This is not an easy task but it is worth doing. As I continue my research on collaboration there is one area that I want to explore in-depth. That area is around accountability.

Accountability means specifying results anticipated at the outset, and then continuously monitoring progress so mid-course corrections can be made. An evaluation of collaboration efforts and results should be planned from the outset to help collaborators decide how various efforts should be modified, expanded or dropped. (Community Collaboration Manual, 1991)

I look forward to the opportunities that I will have in the future to participate in collaboration. I know that as I become more educated on this process, I have an obligation to educate others.

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# **Evolving a Model for Probability of Detection within a Search Box for a Search and Rescue Mission Parallel Sweep Search**

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## **Abstract**

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Most search and rescue missions take place on terrain that has vegetation. The next logical step for evolving a model for the probability of detection that was originally developed using minimally vegetated (desert) areas is to use the existing methodology simulating an actual field experiment that took place in vegetated area. Work done at the Chief Logan State Park in 2002 provided the actual field experiment. The results from the model simulating the search object placement of the field experiment show that the model can be evolved into terrain with vegetation.

## **Introduction and Problem Description**

The greater number of search and rescue missions take place on vegetated terrain. The next logical step for evolving a model for the probability of detection (using simulation) that was originally developed by Wardlow (2005) on minimally vegetated (desert/above timber line) areas is to use the existing simulation methodology with the Digital Elevation Models (DEMs) for the terrain on which an actual field experiment took place in vegetated area. A literature search found an actual field experiment that was conducted by Robe and Frost (2002) at Chief Logan State Park in West Virginia. This experiment provided the vehicle for this next step in the evolution for the Wardlow model.

The use of this actual field experiment addressed the following research questions:

1. Does the resultant 40-meter (131-foot) probability of detection from a parallel sweep search exceed the benchmark result established in the Wardlow (2005) study?
2. Does a difference exist between the resulting 40, 100, and 150-meter line spacing probability of detection during a parallel sweep search when modeled on a digital elevation model?
3. Does the static placement pattern (with a 400-meter grid interval) probability of detection and a 40-meter sweep width probability of detection in a parallel sweep search equal to or less than five percentage points?

### **Literature Review**

The first approach to detection was work done by Koopman during World War II for the U.S. Navy. “Koopman postulated that the instantaneous or one-glimpse probability of detection was inversely proportional to the cube of the range from the sensor to the search object” (Cooper, Frost, & Robe 2003, p. 53). This is the “inverse cube” model of visual detection and thoroughly described by Frost (1996) in *The Theory of Search: A simplified explanation*.

According to Cooper et al. (2003) the next major research is done by Kelly in 1973. Then in 1974, Wartes conducts an experiment with searcher spacing in line abreast formation (Cooper et al. 2003, p. 56), but becomes known in work done by Syrotuck (1974/2001). This is the parallel sweep method with the focus on the interval distance between searchers (sweep width). Cooper et al. also presents that Perkins in 1989 and Colwell in 1992 published further works that use sweep width.

The definition of detection plays a key role in sweep width based search. Frost states “to succeed in finding an object, it is necessary to both detect the object and recognize it as the object being sought (1996, p. 1-5). Wardlow (2005) presents that “detection occurs when the searcher’s senses indicate the presence of an object and recognition requires interpretation of these senses to determine if it is the subject sought (p. 29).

Robe and Frost conducted an actual field experiment at Chief Logan State Park in West Virginia during 2002. The terrain for the field experiment was wooded with light to medium understory. “There was very little ground vegetation” (Robe & Frost, p. 28). The cross track slope profile was an average slope of 37% (Robe & Frost, p. 29).

This field experiment used 21 search objects. The search objects were placed from one to 37 meters from an identified trackline pattern. The search objects were of two types: 1. Orange gloves and 2. Black 55-gallon garage bags filled with balloons. “These data were collected under limiting circumstances and are not intended to produce field-test sweep-width values” (Robe & Frost 2002, p. 33). The very little ground vegetation meets the condition of limited vegetation of the Wardlow (2005) study and provides similar visibility conditions. A comparison between the results of the simulation and the results of the field experiment on sweep widths could not be performed because of the limitation noted above.

### **Background**

Wardlow (2005) in an effort to develop a new tool for search managers pursued a model for determining probability of detection within a search box for a search and rescue parallel sweep search. He focused on terrain with minimal vegetation, primarily

desert terrain and some terrain above timber line. A benchmark was established at 40 meters. Then simulations using 40, 100, 150-meter sweep width and a static placement pattern were conducted and the results were compared.

By using terrain visualization software to simulate a search team's tract, the software's viewshed function was used to determine what the search team could see. A grid was overlaid on the search box to assist in analysis. The assumption in the study was that if the object was visible it was detected. Icons representing the search objects were then randomly picked and placed in the search box. The number of search subject icons that were in the visible portion of the searcher's tract was used to generate probability of detection.

This study continued the Wardlow (2005) use of the one-half-mile by one-mile search box. This is equivalent to an 804.69 by 1609.69-meter search box which after being rounded to the closest 100-meter interval is an 800 by 1600-meter search box.

The closest probability of detection to 40 meters noted by Syrotuck is 30.48 meters (100 feet). The next step is to use a one-kilometer by two-kilometer search box rather than an 800 by 1600-meter (one-half-mile by one-mile) search box because the grid on most 1:50,000 maps is a one-kilometer by one-kilometer square. At this point, analyses can be performed for varying sweep widths and static placement patterns (Wardlow 2005, p. 8).

### **Methodology**

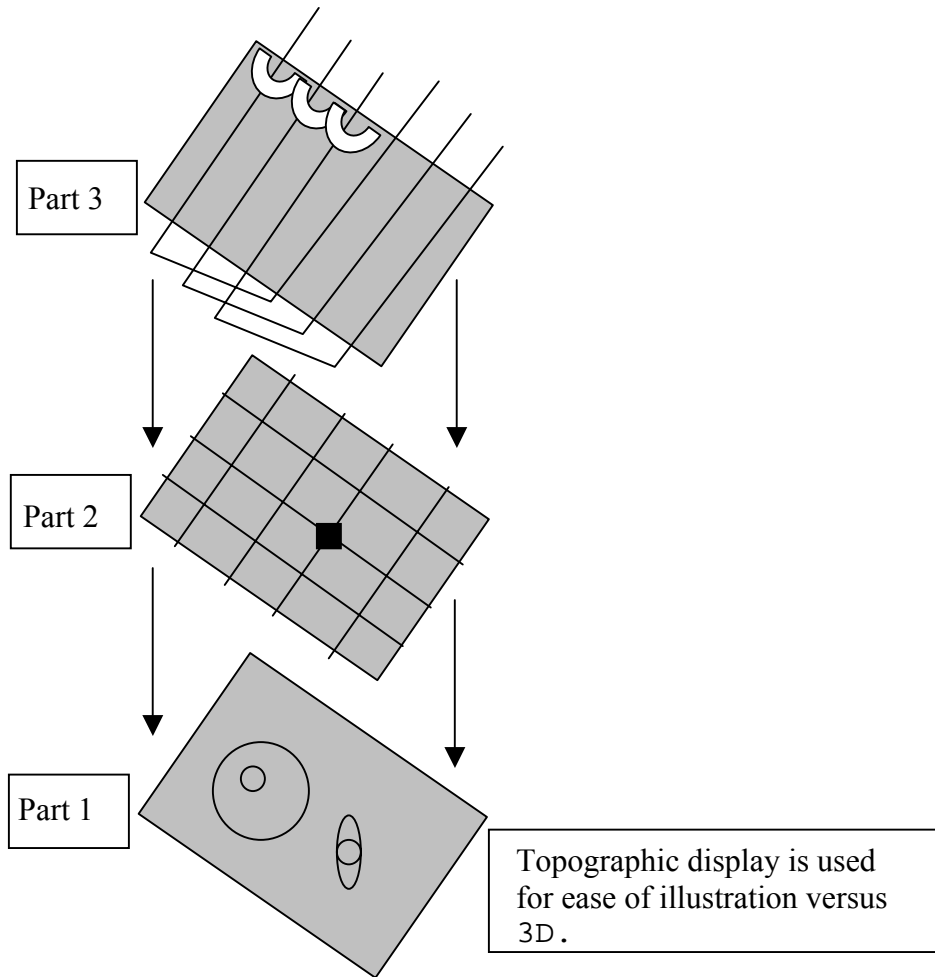
Using Wardlow's (2005) three part experimental study, the same analysis was performed for Chief Logan State Park.

The first part was the simulation of detecting a search object during a parallel

sweep search with a sweep width interval of 40 meters for benchmarking. The second part was the same simulation except for changing the sweep width interval to 100 and 150 meters between the searchers. The third part was the simulation of the search team going straight to points that correspond to the static placement pattern points. The static placement pattern is similar to the “six” pattern on a domino. The probability of detection (POD) was then determined from the number of simulation search objects that are within the viewshed of the simulations runs (Wardlow 2005, p. 40).

As with Wardlow’s (2005) simulation, each search box was also accomplished in three parts:

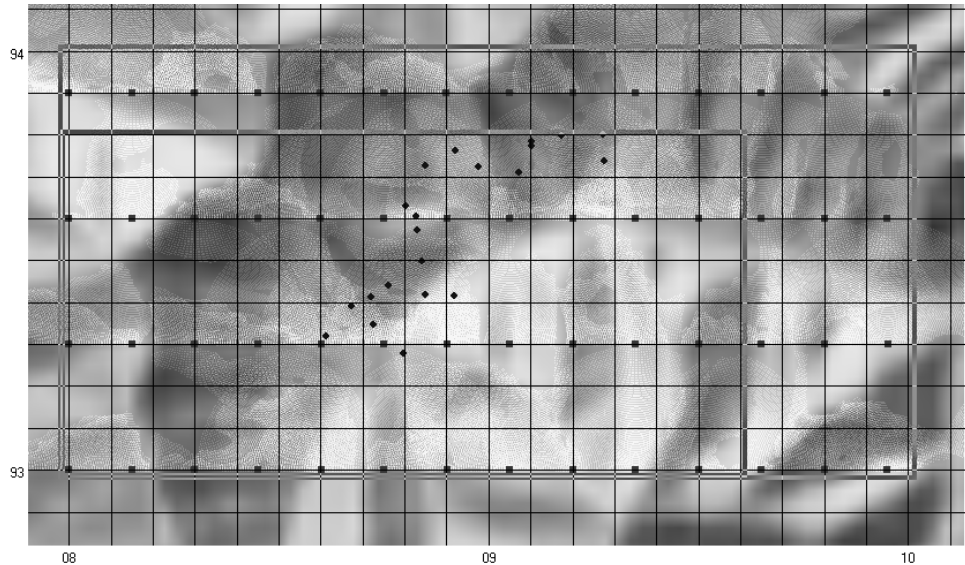
1. Loading of a terrain model (DEM) for the search box.
2. Instead of randomly picked points, to replicate (simulate) a search object in the search box, for this simulation in the Chief Logan State Park, the search objects were those that were placed on the ground during the field experiment. Each search object was identified in the search box a diamond.
3. The compiled viewshed of the search sweep along the route was depicted in the search box (see Figure 1).



*Figure 1. Compiled Viewshed*  
(Source: Wardlow, 2005, p. 42)

For the viewshed analysis a subsearch box of 800 meters by 1600 meters (one-half mile by one mile) was marked in each one-kilometer by two-kilometer search box (see Figure 2). The sub box was identified as the small box and the search box identified as the large box. Analyses were performed to determine how many 100-meter grid squares were observable (visible) in each search as opposed to the total number of squares that could have been observed (visible) in each search box. The number of

observable (visible) squares for the small search box is 128 grid squares and 200 grid squares for the large search box.



*Figure 2. Large and Small Search Box (150-Meter Sweep Width for Chief Logan, State Park, West Virginia)*  
(Source: Screen Capture)

## Results

Table 1 displays the probability of detection results for the 40, 100, and 150-meter sweep widths along with the static placement pattern probability of detection results:

Table 1 Probability of Detection Results		
	Small Box (800m x 1600m)	Large Box (1000m x 2000m)
40 meter	1.0000 (100%)	1.0000 (100%)
100 meter	1.0000 (100%)	1.0000 (100%)
150 meter	1.0000 (100%)	1.0000 (100%)
Static	0.9048 (90.48%)	0.9048 (90.48%)

A systematic look at the three research questions, their respective hypotheses forms, and analyses follows:

1. Does the resultant 40-meter (131-foot) probability of detection from a parallel sweep search exceed the benchmark result established in the Wardlow (2005) study?

$H_0$ : Null hypothesis: probability of detection in the model from the simulated searcher's point in the search box using a sweep width interval of 40 meters in the model is equal to or greater than the probability of detection using the sweep width interval of 40 meters from Wardlow's (2005) benchmark.

$$POD_{40m} \geq POD_{40m \text{ bench mark}} \text{ (Wardlow's 95.15\%)}$$

$H_1$ : Alternative hypothesis: probability of detection using sweep width interval of 40 meters is less than the probability of detection using a benchmark sweep width interval of 40 meters.

$$POD_{40m} < POD_{40m \text{ bench mark}} \text{ (Wardlow's 95.15\%)}$$

A  $t$  test of the two means for each POD at the 5% significance level provided the following results from Minitab:

TWOSAMPLE T FOR POD40m VS PODbench

	N	MEAN	STDEV	SE MEAN
POD40m	21	1.00000	0.00316	0.00069
PODbench	36	0.9515	0.0711	0.012

95 PCT CI FOR MU POD40m - MU PODbench: ( 0.02437, 0.073)

TTEST MU POD40m = MU PODbench (VS LT): T= 4.08 P=1.0 DF= 35

The benchmark was 0.9515 (95.15%) for the Wardlow study. The Chief Logan State Park result is 1.00 (100%). The resultant P-Value is 1.00 and larger than the stated significance, 0.05, there is insufficient evidence to reject the null hypothesis.

2. Does a difference exist between the resulting 40, 100, and 150-meter line

spacing probability of detection during a parallel sweep search when modeled on a digital elevation model?

$H_0$ : Null hypothesis: probability of detection between line spacing of 40, 100, and 150 meters is equal (no difference).

$$POD_{40m} = POD_{100m} = POD_{150m}$$

$H_1$ : Alternative hypothesis: probability of detection between line spacing of 40, 100, and 150 meters is not equal.

$$POD_{40m} \neq POD_{100m} \neq POD_{150m}$$

A one way ANOVA test of the three means for each POD at the 5% significance level provided the following results from Minitab:

MTB > AOVOneway 'POD40m' 'POD 100m' 'POD 150m' .

#### ANALYSIS OF VARIANCE

SOURCE	DF	SS	MS	F	p
FACTOR	2	0.0000000	0.0000000	0.00	1.000
ERROR	60	0.0006000	0.0000100		
TOTAL	62	0.0006000			

#### INDIVIDUAL 95% CI'S FOR MEAN BASED ON POOLED STDEV

LEVEL	N	MEAN	STDEV	-----+-----+-----+-----
POD 40m	21	1.00000	0.00316	(-----*-----)
POD 100m	21	1.00000	0.00316	(-----*-----)
POD 150m	21	1.00000	0.00316	(-----*-----)
				-----+-----+-----+-----
POOLED STDEV =	0.00316			0.99920 1.00000 1.00080

A one way ANOVA test of the three means for each POD at the 5 % significance level provided a P-value of 1.00 and is larger than the stated significance level, 0.05, there is insufficient evidence to reject the null hypothesis. The resulting Tukey intervals (pairwise differences between levels means) contain zero and thus, the levels are not

considered different.

3. Does the static placement pattern (with a 400-meter grid interval) probability of detection and the bench mark 40-meter sweep width probability of detection in a parallel sweep search equal to or less than five percentage points?

$H_0$ : Null hypothesis: probability of detection difference between static placement (on a 400-meter grid interval) and line tracking at 40 meters is less than or equal to five percentage points.

$$\Delta\text{POD} \leq 5 \text{ percentage points}$$

$H_1$ : Alternative hypothesis: probability of detection difference between static placement (on a 400-meter grid interval) and line tracking at 40 meters is greater than five percentage points.

$$\Delta\text{POD} > 5 \text{ percentage points}$$

A paired  $t$  test checked for the percentage POD differences that were greater than five percentage points at a 0.05 significance level.

TWOSAMPLE T FOR % Static VS % bench

	N	MEAN	STDEV	SE MEAN
% Static	21	90.5	30.1	6.6
% bench	36	95.15	7.11	1.2

95 PCT CI FOR MU % Static - MU % bench: ( -18.6, 9.2)

TTEST MU % Static = MU % bench (VS GT): T= -0.70 P=0.75 DF= 21

The P-Value of 0.75 reflects that there is little indication that the static placement pattern percentage is greater than the 40-meter sweep percentage.

### **Conclusions and Further Research**

The results of this study showed that the 40-meter sweep width is closer to the bench mark developed by Wardlow (2005) than to Syrotuck's (1974/2001) POD. The check for a difference of means between the 40, 100, and 150-meter sweep widths showed that like the Wardlow study, computing the in-between interval of these three sweep widths will result in limited value in furthering research of the model. The results of the check for less than five percentage point difference indicates, like Wardlow (2005), the search manager could use static placement instead of a parallel search and not significantly lower the probability of detection for the search box.

The researcher offers four recommendations for further study:

1. Replicate the field experiment or Robe and Frost tackline search in the simulation with and without the man made structures. This will refine the model, specifically the simulation, and lead to greater use of the model.
2. Replicate this study for Robe and Frost field experiment with the higher 10-meter resolution DEM.
3. Conduct an experiment where the simulation is performed first with a random placing of search object, actually place the search object on the same spot on the actual terrain and conduct the search. Then compare the results.

In conclusion, this study shows that Wardlow's (2005) model can be evolved to vegetated terrain where there is limited ground vegetation with trees. Further work with this model will provide search managers with a valuable tool. A tool both for probability of detection, but also for showing visually the search team what they should be able to see from selected points on the ground that coincides with the 300-meter segments of the

simulated search tract.

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# **Neural Networks as a Means for Knowledge Discovery and Predicting Student Success in Developmental Mathematics Courses**

**Cameron I. Cooper**

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## **Abstract**

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For many colleges and universities, developmental mathematics courses have historically had some of the highest drop-withdraw-fail (D-W-F) rates (40%+) of any courses. For the purposes of this paper, developmental mathematics courses are defined to be below the College Algebra level. Determining how to better serve the large number of students that are not successful in these courses has become a significant concern for many colleges and universities. This paper describes the use of neural networks as a means for identifying these students at the beginning of the course. Upon identification, one can determine the salient features of these students used in identification and subsequently suggest pedagogical interventions that would most likely benefit these students.

## **Introduction**

College and universities have numerous information systems in place collecting and disseminating information about prospective students and current students. These information repositories contain invaluable information that can be utilized to benefit students in their academic pursuits. Appropriate data analysis techniques, however, are

typically not in place that can successfully leverage this information in order to create meaningful knowledge that could in turn better the organization's operation.

This paper demonstrates and advocates the use of a data mining technique in the form of neural networks to derive meaningful and actionable knowledge from these information repositories. This paper describes the use of a neural network as a means for knowledge discovery from an information repository. The results of the knowledge discovery process automatically create additional demand for new knowledge that can ultimately lead to innovation. For this particular case described in this paper, the information repositories are the information systems at a college, and the results of the knowledge discovery process are the identification of "at-risk" students and the attributes characterizing these students in a developmental mathematics course, Intermediate Algebra.

### **Background**

As mentioned in the Abstract, developmental mathematics courses at colleges and universities have become extremely problematic due to their high D-W-F rates. Fort Lewis College is no exception. Fort Lewis College is a public liberal arts college located in Southwestern Colorado that serves approximately 4,000 full-time students. The Intermediate Algebra course at Fort Lewis has consistently had an approximate D-W-F rate of 40%, which is consistent with rates ranging between 40% and 60% for similar courses found at other institutions (Small, n.d.).

The lack of success of students in this developmental mathematics course at Fort Lewis College is especially troublesome since nearly one fourth of incoming students (freshmen and transfer students) are placed into the course (Smith, 2003). Students are

required by the State of Colorado to complete a quantitative requirement before graduation. Since College Algebra is the lowest college credit bearing class that satisfies the quantitative requirement, College Algebra and its remediation prerequisites (i.e., Beginning Algebra and Intermediate Algebra) have become the primary means for satisfying this requirement. Thus, the developmental mathematics courses such as Intermediate Algebra have effectively become a graduation roadblock for many students.

Determining the characteristics of “at-risk” students in developmental mathematics courses has hence become an imperative. If one can determine these characteristics, then pedagogical interventions can be prescribed to increase the chances of success. Additionally, the overall retention rate of the school is likely to increase, which ultimately has financial implications for the school. The long-run benefits of increasing the success rate of students in developmental mathematics courses are significant and difficult to quantify.

### **Related Studies**

The use of neural networks as a data mining and/or classification technique has had success in many fields other than education (Cho & Ngai, 2003; Davis, 2004; Zanakis & Becerra-Fernandez, 2005). The cited literature only gives a very small sample of available research that has successfully employed neural networks for data mining and/or classification purposes.

Researchers have also found utility for neural networks in higher education settings. For example, Hardgrave and Wilson (1994) successfully implemented a neural network that could predict success of students in a graduate program. Neural networks have also been employed to predict student success in an Information Systems

Management program (Sexton, Hignite, Margavio, & Satzinger, 2001) and in an MBA program (Naik & Ragothaman, 2004). In all these higher education examples, neural networks provided effective means for prediction. Thus, neural networks were found to be viable alternatives to more traditional statistical analysis.

The cited higher education studies dealt primarily with homogeneous student bodies. The neural network for predicting student success in Intermediate Algebra in this study addresses a much more diverse student body. As a general education course, students from all majors and backgrounds take the course. Successful implementation of a neural network to predict student success in Intermediate Algebra will demonstrate the adaptability of neural networks to accommodate a more diverse student body.

### **Methods**

As a technology, neural networks basically provide linear and nonlinear functional mappings depending upon the network topology. Neural networks can solve a variety of problems including function approximation, time series prediction, classification, and data mining. For the purposes of this project, given that a desired output was already known, a classification neural network was chosen to be implemented. The chosen network topology follows the feedforward-backpropagation paradigm. In a feedforward-backpropagation neural network all of the outputs of one layer are inputted into all of the neurons in the subsequent layer. No feedback connections are allowed. Backpropagation occurs when the error, which is calculated after the output layer, is backpropagated to the previous layers for weight updating purposes. An input layer, hidden layer(s), and an output layer comprise all basic

feedforward-backpropagation networks. Implementation of this neural network paradigm requires that these three primary components be defined.

### ***Neural Network Implementation***

The design and implementation of the neural network used for predicting student success required several steps. First, data/information to be used for training and testing the neural network needed to be obtained. Second, inputs into the neural network needed to be determined. Finally, the optimal neural network for predicting student success needed to be found. For the actual creation of the neural network, NeuroSolutions developed by NeuroDimension Incorporated was used. NeuroSolutions is a comprehensive software package used for constructing neural networks.

*Data/Information Acquisition.* The first step of designing and implementing the neural network is the determination and acquisition of the knowledge/data to be entered into the neural network. This data is used for training and testing of the neural network. The data entered into the neural network originated from two primary sources, student surveys and student records. In regards to student surveys, measures concerning beliefs about mathematics, feelings about mathematics, problem solving habits, and learning style were obtained. The data was then coded and entered into the neural network. In regards to student records, numerous metrics were obtained from the college's information systems and entered into the neural network for processing. A partial list is given below: high school GPA, college GPA (if applicable), ACT score, number of credits completed, gender, age, and ethnicity.

*Input Determination.* In all, the number of inputs into the neural network totaled over 60. It is recommended that one minimally have  $40 \times N$  rows of data where N is the

number of inputs (NeuroDimension, 2001). Given that the data set for the neural network had 200 rows, this guideline would only allow for a maximum of 5 inputs. For extremely small data sets, this guideline in practice could be stretched to  $20 \times N$  rows of data (Lynn, personal communication, 2005). Thus, it was decided to limit the number of inputs to 10.

Two methods for input determination were employed. First, simple linear correlations between the inputs and the desired output were calculated. The top 10 correlations (negative or positive) were then found. Second, a sensitivity analysis was performed for each input. Sensitivity analysis for an input basically sets all other inputs at their mean and varies the input in question plus and minus one standard deviation. The variation in the network output is then measured. Sensitivities for varying network architectures were found.

There was a substantial amount of agreement between the correlation analysis and sensitivity analysis. In fact, there was a 70% overlap of inputs appearing in the top 10 of each input set. In order to determine which input list to go with, each input set was run with several neural network architectures in order to determine the better input set.

Testing the input sets with various network architectures required setting aside a training set and a testing/cross-validation set. The training set is used exclusively for training the neural network which is the process of modifying the network weights to obtain a desired output. The testing/cross-validation set is used to gauge how the neural network performs on a data set that was not used in the training process. Given a sizable data set, typically 20% of the data is randomly chosen and set aside for testing (Turban et al., 2005, p. 676). In this case, due to the limited size of the data set, 15% of the data was set aside for testing/cross-validation purposes.

A series of network architectures were developed in which the number of hidden layers and the number of PEs in each layer were varied. Each network was run on the testing/cross-validation data set 250 times in order to determine the architecture that resulted in the best mean squared error (MSE). Error regarding a given neural network is reported as the MSE between the network output and the desired output. Multiple runs for each given network architecture are needed since transversal of the error surface can result in a local minimum depending upon the initial random values of the weights. After running the various architectures 250 times, the top 10 inputs determined via correlation analysis outperformed the top 10 inputs determined via sensitivity analysis. Of the architectures tested on the inputs determined via correlation analysis, the best seen neural network had two hidden layers, three PEs in the first hidden layer, and one PE in the second hidden layer, denoted as 2-3-1.

### **Results**

Using the 2-3-1 network as a basis for determining the optimal neural network for predicting student success, the network was run over 100 times in order to find the best predictive accuracy of the network. As mentioned earlier, neural networks must be run multiple times since their ultimate configuration is dependent upon the initial random weights of the network.

The best network resulting from this process predicted student success correctly 92% of the time and failure correctly 78% of the time. In this case, Failure was defined to be a grade of C- or below. While a C- is sufficient for passing the class, students earning this grade should be classified as Failures for the purposes of the neural network since they are “at risk” of not passing the class. The results from the 2-3-1 is compared

to a neural network with no hidden layers and a linear transfer function in the output layer, which effectively emulates multiple regression, that predicted student success correctly 100% of the time and failure correctly 75% of the time.

The disparity between predicting student success and failure can be explained by the difference in the number of students for each set. Approximately 65% of the students in the data set were classified as successes, whereas only 35% of the students were classified as failures. In such cases, the neural network learns to classify better student success. Fortunately, rows within the data set can be weighted in order to provide more equitable treatment of the categories. After weighting the rows to provide more emphasis on student failure, the best 2-3-1 weighted network predicted student success correctly 92% of the time and failure correctly 92% of the time. This is compared to its weighted multiple regression counterpart that predicted student success correctly 83% of the time and failure correctly 85% of the time.

### **Conclusion**

Clearly, the weighted 2-3-1 neural network provided a significant improvement in predictive power over both multiple regression and weighted multiple regression. Using the weighted 2-3-1 allows an instructor to accurately predict student success approximately 9 times out of 10. Basically, an instructor can effectively identify nearly all of the “at-risk” students at the start of each semester. Pedagogically, the instructor can then utilize the efforts put into the input determination process of this project to determine effective teaching strategies that can hopefully have a positive impact on the students classified as “at-risk.” The inputs that offer pedagogical insight are displayed in Table 1 below.

Table 1. Inputs offering pedagogical insight.

Input	Description
Feelings_7	Measurement of how often one feels “Involved.”
Problem_Solving_8	True or False answer to “I will not stop working on a problem until I get an answer.”
History_6	Indication of how difficult the student perceives “Problems involving percents.”
History_5	Indication of how difficult the student perceives “Solving for an unknown.”
Belief_6	Measurement of how one agrees with “I try to learn the math being taught in class.”
History_4	Indication of how difficult the student perceives “Problems involving fractions.”

As an instructor, one might try making “at-risk” students more involved, helping “at-risk” student increase their frustration tolerance, and providing tutorials for “at-risk” student on the identified topics given by the history inputs. The results of the neural network analysis of the information repository clearly give instructors some operable knowledge that they can immediately use to make pedagogical changes in their instructions.

This project essentially took unused information stored in the school’s information systems and coupled it with a simple survey to provide instructors with a decision support system for identifying “at-risk” students and pedagogical starting points to improve these students chances of success. Given the ability of neural networks to be augmented by new data, the developed system can easily be integrated into a continuous improvement process such that instructional efforts are specifically geared toward the current student body of the school.

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# A Study in Organizational Adaptation

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## Abstract

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This study is of a subsidiary of a multinational franchise company that adapted to market changes by realigning its purpose and relationship with the parent. Founded as a *for-profit* organization, exigencies in the marketplace found the subsidiary performing a *not-for-profit* support function for the parent company. The subsidiary subsequently transformed itself to a service entity and now provides an auxiliary function for the parent company. This is a study of how the environment shaped the organization, and how the organization turned a threat into an opportunity through the transformation of its vision, strategy, and focus.

## Introduction

In most industries, traditional notions of organizational performance were grounded in an individualistic performance structure. This was because the nature of the business environment was more oriented to manufacturing than services. Thus, the goals were well defined and companies' organizational structures strove to be in alignment with manufacturing requirements as formalized processes. Performance and effectiveness benchmarked against well-defined standards that were mostly quantitative. Scott (2003) defines these rational systems as, "Organizations are collectivities oriented to the pursuit of relatively specific goals and exhibiting relatively highly formalized social structures"

(p. 27). According to Scott (2003), it was not until the mid-1940s that the study of organizations was recognized in Max Weber's analysis of bureaucracy (p.9).

As the business environment changed and shifted more into production and service industries, organizational paradigms took on a different form and began to include human behavior. This anomaly perpetuated a crisis in the paradigm, and industry was ripe for a Kuhnian revolution (Kuhn, 1996). This is the point where indicators of a coming paradigm shift in organizational theory began integrating more of the human aspect, fostering a broader vision that soon began to include the role of the external environment. As the business environment evolved, goals became more complex, and with the increased volume of information and communications links, flexibility became critical in order to adapt to change.

Emerging notions and theories in organizational effectiveness have experienced a paradigm shift, and the comparison of natural organizational systems to human biological structures has led to parallel modeling. The notion of open systems and cybernetic systems whereby the internal organizational structure of a company is in symbiosis with its external environment and that one cannot survive without the other was inspired by Prigogine's study of the second law of thermo-dynamics (Irsigler, 1994). Scott (2003) argues, "Open systems are capable of self-maintenance on the basis of throughput of resources from the environment" (p. 89). Wheatley (1999) addresses another emerging notion of the *self-organizing system* stating, "There are increasing reports of organizations that have given up any reliance on permanent structures. They have eliminated rigidity — both physical and psychological — in order to support more fluid processes whereby

temporary teams are created to deal with specific and ever-changing needs" (p. 82).

Relocation is a good case study in these emerging paradigms. (Harkins & Hollihan, 2005).

This paper examines the organizational performance and transformation of RE/MAX Relocation, Inc., a subsidiary of RE/MAX International, Inc. We look at how the various organizational relationships reacted to a major external threat and engaged in a transformational process, turning the threat into an opportunity, and how this reaction affected the measurement of internal effectiveness.

The relocation subsidiary was created to meet the needs of client corporations moving employees from one geographical location to another. In the 1980s, corporate relocation was a lucrative market and most large real estate firms boasted a corporate relocation division that distinguished itself by offering tailor-made solutions for each corporate client.

Historically, corporations spent large amounts of money to transfer employees. In the 1980s, it was common for costs of relocating a \$70,000 per year employee to exceed \$100,000 (D.L. Jespersen, personal communication, October 12, 2005). In the last few years of the 20<sup>th</sup> century, in an effort to cut costs, corporations significantly decreased the number of employee moves and sought alternative solutions. As organizations sought less expensive methods of relocating employees, relocation companies had to increase referral fees charged to real-estate agents for referring business. In some cases, employee relocation companies charged real estate firms 35-45% of their commissions in order to maintain a profitable status, which frequently caused real estate firms to refuse their business.

### **Problem Statement**

This study addressed the problem of the disposition of a well-developed corporate subsidiary that, due to environmental changes, could no longer sustain itself through its own revenues. As is frequently the case in developing markets, the parent company preferred to use its already developed assets rather than withdrawing from that domain in the industry, and allowed the subsidiary the freedom to re-define itself as a valuable asset to the parent organization.

A comprehensive literature review revealed that a normal organizational response to such a situation was either complete reorganization of the subsidiary, or the dismantling and cannibalization of the entity. We found no other instances of entities allowed the latitude of transforming their existence from *for-profit* to *non-profit* status while still maintaining their functionality in the market, and with the parent organization. This study is important because it demonstrates how one firm answered a question of changing environments, and is of benefit to researchers, business analysts, and transformational leaders who lead, or wish to lead, transformational organizations.

### **Purpose of the Study**

The purpose of this study was to investigate how RE/MAX International, Inc. answered the challenge of a changing market, and transformed a potential financial burden into a competitive advantage. While many relocation organizations began to downsize and reduce relocation services, RE/MAX Relocation, Inc., chose to redefine its existence. The organization created relocation teams that were larger and fewer so that each team could handle a greater number of transactions and multiple

clients simultaneously. The organization made no other physical changes in its operating paradigm. The true change was in the focus and mission.

The internal impact of this reaction is that Relocation is no longer a for-profit entity. However, the value it contributes to the RE/MAX organization is in increased referrals for affiliated sales associates, the benefit to corporate clients of a professional, separate relocation service, and relocation services for their own employees. Relocation's vision is to continue with this new business model, focusing on custom solutions for corporate clients at a cost basis.

### **Methodology**

The Case Study method was chosen for this study because the problem, and subsequent solution, was of a specific phenomenon over a brief period. Data collection for this case was through personal interviews with employees, board members, and the review of corporate documents. Supporting documentation was retrieved from both external sources and authors, and internal sources such as public relations releases and website postings.

### **Research Question**

This study focused on answering: How did a change in the business environment that relegated a once profitable subsidiary to an unprofitable service organization evolve into a situation wherein a subsidiary was allowed the flexibility to redefine itself? Jantsch (as cited in Wheatley, 1999) points out “. . . the more freedom in self-organization, the more order" (p. 87). Wheatley (1999), argues that "Effective self-organization is supported by two critical elements: a clear sense of identity, and freedom" (p. 87). Relocation has a clear sense of its identity and a strong

belief in the value of its services. In addition, the parent allowed the subsidiary to direct the transformation itself.

In order to reach a high level of effectiveness, Harder (2004) suggests that organic organizations must pay ". . . more attention to their impact on the larger system in which they are embedded" (p. 84). In contrast, "Bureaucratic organizations tend to be rather myopically self-interested, focusing on the environment almost exclusively in terms of how it affects them" (p. 84). Harder (2004) is a proponent of the thesis that if each part of an organization focuses on only enhancing its own well-being, it will not be the most effective solution for the whole of the company. Relocation's reaction to the change in the marketplace transformed its business internally, and externally it triggered a series of reactive events. Moderating commissions charged to real estate agents caused a reaction, and thus the impact of Relocation's action created a wave of change in the external environment. Harder (2004) addresses this process by stating ". . . systems evolve along with their environments in a mutually reinforcing pattern of influence. The various parts of a living system engage in continuous input-transformation-output cycles (p. 82).

### **Conclusions and Recommendations**

Relocation, created as part of a natural development of RE/MAX's organic growth, developed the characteristics of an open system whereby the organization lives by the continuous exchange between its external and internal environment (Scott, 2003). Harder (2004) posits, ". . . the mechanistic bureaucratic model of organization is being replaced by a new form of organization that reflects the characteristics of a living being" (p. 79). These characteristics enabled Relocation to

identify external changes, and had the flexibility to react, not as an exercise in adaptation, but rather one of transformation. Compartmentalized modifications would not have sufficed.

Wheatley (1999), points out that when an organization is forced to change ". . . it always changes in such a way that it remains consistent with itself . . . Change is never random; the system will not take off in bizarre new directions" (p. 85). Relocation is continually redefining itself, while retaining focus on its core competence of corporate employee relocation, and by seeking creative approaches to client corporate needs. The RE/MAX organization had undergone a similar paradigm shift early in its development when it began franchising its operations due to recognizing a change in the environment, and modified its operations accordingly. (Harkins & Hollihan, 2001).

Although the relocation organization has evolved as an organic paradigm, and was self-organizing, it was important that the changes contribute positively to the entire RE/MAX system. As Harder (2004) points out ". . . it is clear that healthy systems are those in which the parts interact in ways that contribute to, rather than detract from, the well being of the system as a whole" (p. 85). In order to enhance Relocation's organizational effectiveness, our suggestions include creating an awareness of systemic thinking, intuitiveness, encouragement of developing emotional intelligence, and continuously scanning the marketplace for signs of change.

Understanding the RE/MAX business model, and how Relocation fits into it, is crucial for employees to contribute positively. An understanding of transformational leadership is important for all employees, not just the leaders, so

that they can support their leadership and have a deeper understanding of their company's transformation. (Cherniss & Goleman, 2001; Cooper & Sawaf, 1998).

As the redefined relocation entity will be interacting more with RE/MAX sales agents, and vice-versa, it is important that each division understands the other to better support the other's business. Currently, there appears to be a gap in the knowledge and understanding of how other departments and subsidiaries function, and the specific needs they may have. Relocation should understand the function of a sales agent, how he or she thinks, what his or her needs are, and the needs of his or her customers. The real estate agent needs to understand how relocation professionals interact with their corporate clients and how they handle the business. The sales person has to answer to his customer, the buyer or seller of real estate, and Relocation has to answer to its customer which is the corporation relocating the employee. By understanding one another's roles, they can develop efficiencies not yet explored. (Pfeffer & Sutton, 2000).

In today's business environment, the human aspect has taken on a bigger value, and as Harder (2004) argues, ". . . intellectual capital, at both the individual and the organization level, has become the most critical asset for many organizations . . . there is growing recognition that the development and maintenance of intellectual capital requires high-quality, trusting, collaborative relationships" (p. 89). As Relocation continues its transformation, it will be essential that it also reinforces its organizational relationships and maintains the effective channels of communications it has built over the years. In the *white water* of the business world (Vaill, 1996), one never knows what the future will bring, and corporate relocation organizations could

once again come into vogue as profit-making entities.

Since income is no longer a measure of effectiveness for the subsidiary, other criteria need to be identified and measured or assessed. During the course of a year, thousands of referrals are made to sales associates throughout the world due to the efforts of RE/MAX Relocation. Nichols (1997), who studies measuring organizational effectiveness in non-profit organizations, stresses the importance of measuring because it ". . . provides a focus to help organizations and the topic of measuring intangible assets has taken on importance over the last few years. Accenture studied the importance and measurement of intangible assets. ". . . 96 percent said that managing intangible assets is important to the success of high performing businesses" (Accenture, 2004, p. 18). As important as it is perceived however, ". . . 95 percent of respondents currently do not have a robust system for measuring the performance of intangible assets; 33 percent have no system at all" (p. 18).

The transformational process of Relocation was unique, and created a major internal shift in terms of evaluating effectiveness: Relocation was no longer generating sustainable revenue, yet contributed valuable income potential for RE/MAX. The leaders of RE/MAX recognized that departmental and organizational effectiveness could not be examined on their own. They are part of a bigger context that includes the entire organization and its interaction with the external environment. Organizational effectiveness is dependent on the socio/economic characteristics of its time, and the RE/MAX organization recognized the valuable contributions that Relocation was making in terms of referrals and

market recognition. As Drucker (1998) points out “No century in human history has experienced so many social transformations and such radical ones as the twentieth century” (p. 213). Since change is always *becoming* rather than remaining *static*, organizational structures need to adopt a transformational process in order to maintain their competitive advantage.

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# **Crossing the Digital Divide: The Application of Effective and Efficient Technology Strategies for Graduate Students**

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## **Abstract**

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There is a wide array of technology available to graduate students to enhance and support effective learning and development. In pursuing a graduate degree, a graduate student's success is essentially based on acquiring several technical skills before entrance. However, there is a growing digital divide between available technology and actual graduate user adoption. Graduate students often question why technology is so important in their research. Effective and efficient graduate and postgraduate work attributes itself from a working knowledge of available technologies that enable the researcher to optimize their time and organizational skills and concentrate on the research and writing component aspect of their studies instead of the tedious management of files, bibliographies, research documents, and time.

## **Introduction**

There is a wide array of technology available to graduate students to enhance and support effective and efficient learning and development. In pursuing a graduate degree, many technical skills have become essential to a graduate student's success. However,

there is a growing digital divide between available technology and actual adoption by the graduate student. John O'Neil, Contributing Editor for Educational Leadership magazine, observes, "With all this equipment and capability in students' hands, experts emphasize that the key to unleashing technology's power in schools is a commitment to new views of teaching and learning" (O'Neil, 2000, para. 5).

Graduate students face a proliferation of new and improved technology that can simply overwhelm even the most technologically skilled. Factors such as modest or inadequate computer skills and fears of seemingly unending learning curves can greatly influence the acceptance and value an individual will derive from any given technology. Furthermore, these fears can adversely affect one's eventual success in graduate school. This paper is a conceptual review of a potential framework for developing excellent graduate researchers through technology. Effective and efficient graduate and postgraduate work attributes itself to a working knowledge of available technologies that enable the researcher to optimize their time and organizational skills and concentrate on the research and writing aspect of their studies instead of the tedious management of time, files, bibliographies, and other research documents.

Effective graduate studies coupled with user acceptance of technology are common themes among many studies that maintain successful technology acceptance and effective strategic use within are driven by the users' perceived ease of use along with perceived usefulness of any given application (Burton-Jones & Hubona, 2005; Gefen & Ridings, 2003; Mathieson, Peacock, & Chin, 2001). It is argued that the path to effective strategic use of technology within graduate studies begins with the clear identification of an application's usefulness along with persevering through unavoidable learning curves.

To realize the potential value-added benefits of technology generally and application tools specifically, it is urgent that users “must be prepared to replace old habits, pervasive in their daily activities, with new habits (Blair, 1974)” (Nelson, Kattan, & Cheney, 1991, p. 179).

The challenges and time barriers imposed by early learning curves are trivial when compared to the general benefit of graduate skill enhancement. Becoming an effective technologically skilled graduate-level researcher reduces the time spent on the mechanics of research allowing greater cognitive focus on information synthesis and codification.

Ultimately, the nature, value, and realization of technology adoption for enhanced graduate study lies with the student. Weidong Xia and Gwanhoo Lee provide an important overview of the user’s experience when approaching innovative technology,

In this process, an individual passes from initial awareness and knowledge of the innovation, to forming a favorable or unfavorable attitude to it, to a decision to adopt or reject it, to putting the innovation to use, and to finally confirm or reverse the initial adoption decision (Rogers 1995). In any stage, an individual may decide to stop the adoption process or to discontinue using the innovation. Innovation adoption is, not a one-time decision, but rather an iterative decision process (Leonard-Barton 1988) (Xia & Lee, 2000, p. 372).

### **Strategic Word Processing and Presentation Standards**

In America’s secondary classrooms today, word processing is the new pencil and it is questionable that the skills being propagated at the high school level are effectively translated into usable skills at the college level. In a recent word processing survey of 75 undergraduate students at Notre Dame de Namur University (Young, 2005, 3), 95% of these students could perform a basic set of word processing commands in MS-Word and

did not know how to create “table of contents,” “indexing of documents,” or create a table within an existing document.

Word processing is the “digital collection point” for every graduate student. It is this centerpiece of technology that the fledgling graduate student must concentrate his/her skill building time before entering any program of value in today’s education landscape. The student must appreciate the value of the following major tenants of any word processing program (e.g. Microsoft Word, Word Perfect, Office X, etc) including templates and add-ins; track changes; automated procedures like table of content, indexing, and grammatical assistance. Moreover, because the word processing program has become this digital collection point, practitioners must become fluid in the integration of spreadsheet information, art and pictures, movies and slide shows, and the inclusion of seamless navigation elements that allow the reader to roam a paper and feel comfortable about their journey.

However, using the word processor as the digital collection point is only part of the issue. Presentation skills in this digital age are also sorely lacking. Presentations can either seriously help or hinder the presenter; graduate students should have “mastered” their presentation skills by the end of their studies. The graduate student of tomorrow must hone these skills to include information flow-through, simple animation, use of fonts, sizes and colors, and timing. To be successful, each student must make an impression that lasts and take the focus off him or her. Preparing a presentation with the suite of applications will prove effective and impressionable to the receiver. As with the other applications listed in this paper, it is important to decide which technology (e.g.,

hardware, software, and processes) is comfortable and works best for the graduate student.

Finally, the student of tomorrow must be willing to experiment in such areas as multimedia production, use of hardware as an extension of their studies, and the telecommuting collaboration that is ubiquitous in corporate America.

### **Value-based Approaches in Statistical/Spreadsheet Applications**

Spreadsheets have become a tool of statistical genius in research. If graduate students have a presentation, research report, or journals that include statistics, using a spreadsheet can take usually dull stats and make them more appealing to the audience. As graduate students, we want our research to appear clear and precise, but most of all, attractable. However, frequently this can be stressful and time-consuming. This is why the graduate student needs to take advantage of the software and applications available to make their research catch the attention of and prove their findings to the viewers or readers. Some examples include but are no way limited to the following; Microsoft Excel, SPSS, XL Statistics, XL Mathematics, Statistical Process Control (SPC), StatTools, @Risk, or EZAnalyze.

Several statistical packages currently on the market increase the value of students' research while simplifying the processes. Since there are so many numeric tools available, the graduate student must understand and appreciate their varied and versatile uses before plunging into them.

When the students compare and contrast the application packages that are in the market place, they are not necessarily looking for software to do the work, but software

that will assist. However, they do require software to be efficient and productive. As Korthari and Lackner express in their article titled “A Value-Based Approach to Management,” “Customer’s do not buy products or services. They buy value, the total package of product performance, access, experience, and cost” (Korthari & Lackner, 2005). Students, like the previous customers, are managing their studies, so why not apply the types of resources that consumers are using by doing management and technology skills?

In deciding which software to use, it is important to have a better understanding of the differences between qualitative and quantitative research. It is for the student to determine which analytical approach they will take. As described in Ronald M. Weiers, Introduction to Business Statistics textbook, the qualitative variables, are “indicating that the person or object belongs in a category” (1998, p.8) and the quantitative variables, “enable us to determine how much of something is possessed, not just whether it is possessed” (1998, p.8). There are many software applications available to assist in spreadsheet development, to create tables, or describe calculations so students can focus on the interpretation of the data – allowing the technologies to complete the heavy lifting.

Scholars of tomorrow must be able to manipulate and confirm his/her use of numeric tools. The skills required in this area extend well beyond the simple spreadsheet. They should also include statistical analysis, charting, simulations, and modeling and using some of the earlier mentioned programs will greatly help with this process. These types of technologies will not complete the paper or project for the student, but they will greatly assist the student in saving time and making both the presentation and analysis more credible and pleasing to the eye.

### **Effective use of Application Tools within Empirical Research**

Besides the very common, but rarely used, technological tool for backing up computer files and the regular use of virus software, there is a plethora of tools available for students to make their information-processing existence much easier throughout their graduate studies. As “colleges and universities are planning to increase their use of internet based instruction - students will need to increase their knowledge of available technology to keep pace with the curriculum demands” (College Blue Book, 2002, p. 6).

Graduate students often question why technology is so important in their research and once shown express an unbounded interest in technology and start bringing newfound technology to the awareness of their peers (Konzen, 2005).

James Palmer, an associate professor in the Department of Educational Administration and Foundations at Illinois State University, questions “is it the mastery of job skills or the development of general intellectual skills applicable to a wide range of situations?” (1996). Both are vitally important and early mastery of basic technical skills in a graduate program not only better prepares the student for their academic pursuit but also better prepares them for other postgraduate work or additional career choices. “Technology is just a tool, a means to an end, and it can be learned” (College Blue Book, 2002, p. 16) and “adult learners can avoid some of the potential disruption that study can bring to the rest of their lives while enhancing their professional and academic qualifications” (Coleman, 2004, p. 9). Consider the experience of a librarian at Rutgers University who was resistant to technology and change and stated, “I was too computer-illiterate at that time. However, I quickly found that the technical skills required were

really not onerous at all and that I could master them easily... If I can succeed... anyone can” (College Blue Book, 2002, p. 16).

Learning to use information technologies will not just assist the graduate student in their studies, but will “add additional value throughout their professional career” (Fee, Russial, & Auman, 2003). “Many employers agreed that “computer literacy is important to all,” and that “if a student graduates without any [skills], he/she will have a distinct disadvantage in the workforce” and “the more skills they exhibit, the more attractive they would be” to potential employers (Davis, 1997).

The Associate Director of the Center for Learning and Educational Technology at the University of Maryland in College park, Dr. Kathleen Fulton, emphasizes that “the effect of computer-based learning technologies in facilitating student learning and performance is seen only when participants have the knowledge and skill to use the technology” (1998). This knowledge and skill are essential in their graduate studies and enables the graduate student to concentrate on understanding their research problems, the theorists in their area of study, and the recent literature on their study, instead of the mundane task of performing, categorizing, formatting, and managing their research. Further, “as noted by a report of the National Council for the Accreditation of Teacher Education (NCATE), information technologies are having a profound effect on society, and a growing research base supports the potential of technology as a resource for contributing to students’ learning” (Adams, 2005).

Royal Van Horn, professor of education at the University of North Florida states, “The more time I spend learning about powerful academic tools like those discussed here, the more I believe it is unconscionable for university graduate programs not to use these

tools in teaching their students to write theses and dissertations” (2003). David Kochalko, President of Thomson ISI ResearchSoft, adds, “Web research has emerged as an essential component of scientific and academic research” (Personal communications, March 16, 2005).

Even basic tools such as email are taken for granted by many, including graduate students, and are used to collaborate and network with students and faculty both in and outside research interest areas. Obviously, the Internet is a well-known source of information but graduate students need to grasp all available technologies and exploit this resource. Beyond word processing and statistical software lie additional technological tools that enable researchers to perform exceptional tasks. These tasks include, but are not limited to, the following:

- Dictating their work into software programs via automatic transcription,
- Creating, searching, and managing bibliographies,
- Citing **References** directly into working documents on-the-fly,
- Researching wider areas of interest to visualize major themes and then focus on specific topics within that research,
- Automatically summarizing articles and other documents,
- Having text read back to the researcher, and
- Data indexing, searching, and theorizing of non-numerical unstructured data.

### **Bibliography Software**

Bibliography software such as EndNote, ProCite, RefMan, RefViz, WriteNote, and others, along with some of the research tools can be used to search multiple databases

for solid **References** and automatically download them into a bibliographic software database (Thomson ISI Researchsoft, 2005). This instant bibliography process greatly reducing the time it takes the graduate student to do research and eliminates poor outdated methods of collecting and sorting research. Once the **References** are stored in a bibliography software library the graduate student can use a feature called cite-while-you-write (CWYW) that instantly adds a citation as well as a reference at the end of the paper (in the proper manuscript style, e.g., APA).

The instant creations of bibliographies and the auto creation of various manuscripts for publication among thousands of academic journals enable the graduate student to change manuscript formats easily for submission of their research to a journal's prescribed format. Bibliography software also enables the graduate student with the ability to create, change, and format annotated bibliographies in a matter of minutes instead of hours, therefore greatly reducing the time and stress in keeping research up-to-date.

### **Research Tools**

The utilization of software to read hundreds of books, journals, and other **References**, sorting them by keywords and major themes/ideas reduces the time it would take if the graduate student were to do the same work and further reduces researcher bias to specific journals or content. Tools such as Onfolio enable the graduate student to capture information from the web and comment, add keywords, flags, highlight sections, and access it later even if it is removed from a site. Copernic simultaneously searches multiple search engines (1000+) and provides the graduate student with the ability to organize and save the results; WebFerret is similar to Copernic and validates the

pages before viewing. RefViz is data analysis and visualization software that instead of narrowing a search, it enables the graduate student to look at a larger number of

**References** from a much broader field in a shorter time. The software works as if it were a graduate research assistant that reads all the article titles, abstracts, and notes and then groups them by thematic content and associations. However, it does this in a matter of a minutes instead of hours, weeks, or months (Copernic, 2005; iRider, 2005; OnFolio, 2005; Thomson ISI Researchsoft, 2005; WebFerret, 2005).

Questia.com is a subscription web service that has a broad selection of scholarly books and journals that are always available and although the graduate student may read them cover to cover, the beauty of this software tool is that it shows the graduate student exactly which pages their search terms are on and then highlights the terms on the pages. Additionally, it has note-taking and writing tools that enable the graduate student to write notes in the margins and save the books to a bookshelf for later access (Questia, 2005).

### **Productivity Tools**

Software tools such as TextAloud was originally developed to assist individuals with impaired eyesight, but are starting to gain awareness with the public as it converts text to spoken audio via voice synthesis, enabling the graduate student to have their computer read files or save text files to MP3 for listening via portable audio players. This technology enables the graduate student to proofread their own writing by having it read back to them, listen to journal articles while driving, exercising, or performing additional research, hence, more productivity and reduced eye strain (TextAloud, 2005).

Additionally, summary software uses artificial intelligence to extract key concepts by reading and summarizing “texts in English, French, German, or Spanish from various applications, producing instant summaries” (Copernic, 2005).

Besides being able to open and close applications and verbally navigate the desktop, Dragon Naturally Speaking enables the graduate student to dictate instantly into a word processor or other Windows-based application or to dictate into a digital recorder and have it automatically transcribed into word processor later, drastically reducing the time it takes to get information onto paper.

### **Conclusion**

Graduate students must enter a program being masters of available technical resources instead of expecting to be taught these skills and processes during the tenure of their study. Although initial learning curves may seem overwhelming, the fortitude to work through this natural learning process will most definitely pay off in more efficient and effective abilities that will support an entire academic career. The technologies of today will change in 12 months and a new set of skills; modification of older skills, and adaptations of processes will be the norm – not the exception. The ability for a graduate student to articulate an idea using a word processor, manipulating data and expressing the results, and integrating these elements into a presentation for faculty and colleagues to review is omni-important and must be reemphasized as one begins their path of graduate study and research.

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# **Managing website quality: techniques for auditing visibility, usability, and accessibility**

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## **Abstract**

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This paper introduces a non-technical three-step model for managing website quality. Techniques for measuring website quality included in this article involve auditing visibility, usability, and accessibility. Each of these factors provides an indication of website quality that is universal enough to apply equally to public, private, and nonprofit organizations.

## **Introduction**

Websites are increasingly visible reflections of organizations. In the next five years, management will be responsible to provide a certain degree of information technology accountability to ensure website quality. Globalization pressures and the advent of the information age are increasing online competition by exponentially increasing the amount of internet content available on websites (Kamarck & Nye, 2002). From a management perspective, auditing technology requires finding ways to determine if current technology investments are achieving organizational goals (Asgarkhani, 2005). For managers the challenge is finding a set of simple techniques that anyone in the organization can use to evaluate website quality and recommend potential areas for improvement. Successfully producing results and striving for positive organizational

change requires strategies that focus on making technology work for the organization (Bretschneider, 2003).

The goal of this paper is to translate technical expertise to a series of straightforward techniques for managing website quality. Within the organization, technology oversight can focus on a set of outcomes the benefit the organization instead of specific technologies or processes. All of the research and findings presented in this article focus on the use of commonly available resources and techniques that do not require extensive technical knowledge, consultants, subscription services, or capital expenditures for managing website quality. Managers can respond to website quality challenges by bringing together a diverse collection of techniques (Brinck, Gergle, & Wood, 2002).

Each individual technique needs to identify factors that do not require extensive technical expertise to implement. Factors also have to be universal enough to apply equally to public, private, and nonprofit organizations. Management should specifically focus on visibility, usability, and accessibility factors that are indicators of the quality of a website. By combining visibility, usability, and accessibility, managers can implement a non-technical three-step model for measuring website usability. Each of these factors will help managers proactively propose ways to evaluate outcomes instead of focusing on the technical details of implementing technology.

### **Step 1: Auditing Visibility**

Measuring website visibility can be as simple as using the major search engines like Google, Yahoo, and AltaVista to search for the organizations name. Managers have to view visibility from the context of website design. Visibility is an important factor in

getting the organizations message out to the public. Website design is a primary factor in how an organization communicates messages to the public. Every organization has different expectations for how much visibility is necessary. Determining how much visibility is necessary creates a scenario where evaluation requires developing reasonable expectations for the organization. From a leadership perspective, management has to take a proactive roll in setting an organizational agenda that encourages increased website visibility. Organizations benefit from getting the message out to the public and can potentially use visibility to achieve organizational goals and objectives (Holmes, 2001).

A little background information on how search engines work is relevant at this point to enhance the discussion of auditing website visibility. Consider that search engines can only evaluate the available text on a webpage. Graphics with embedded text might have aesthetic value, but search engines can only read the text available on the page. Take a moment and use a major search engine to determine the visibility of a website by searching for the organizations name. Management can use this technique to audit website visibility and recommend changes in how the information technology department or relevant part of the organization monitors website visibility.

Organizations have to work within the search engine system by understanding how basic search engine algorithms work. Making sure relevant keywords, phrases, and categories are on a webpage in text form will allow search engines to index a website in the proper context. Search engines generally evaluate a website by the quality of the code, weight of external links, and the content available. For example, if the organizations name only appears embedded in a logo or image at the top of a website, then the search engine evaluating the available text on the page never sees the

organizations name. Search engines require quality code to be able to interpret what the website is presenting. The algorithm a search engine uses to evaluate a webpage follows a very specific set of instructions that interpret the code one line at a time.

### **Step 2: Auditing usability**

After measuring the visibility of the website, the second step involves auditing website usability. Access the website and determine from looking at the website what the organization is trying to accomplish. Determine what the website is intended to do for the organization. The website should clearly provide the user with a sense of what the organization is trying to accomplish. By looking at organizational goals, management should be able to determine what the website needs to do for the organization to achieve the organizations goals and objectives. Website usability is an issue that requires both management and marketing perspectives to achieve results. Both content presentation and the substance of the content contribute or detract from website navigation.

Organizational goals should define what outcomes are necessary from website usability. A manager visiting the website should be able to find relevant content and easily accomplish relevant tasks. Website design experts believe that relevant content should be attainable within three clicks. The design of a website needs to provide a usable interface for the end user (Boersma, 2005). Employees throughout the organization including management should be familiar with the website. Actually using the website to access information and accomplish tasks will help audit website usability and ensure sustained website quality.

Consider for a moment that website usability can run into significant challenges form organizational interdependencies that require seamless integration of content

generated by multiple parts of an organization. Websites that depend on complex organizational interdependencies have to understand potential limitations and minimize potential usability challenges. In this case, the need to develop frameworks for evaluating implantation also requires understanding the external impacts websites have on the organizations reputation (Evans & Yen, 2005).

### **Step 3: Auditing accessibility**

After auditing website visibility and usability, the third and final step involves auditing the websites accessibility. Organizations can improve website quality by increasing diversity awareness and complying with requirements associated with the American Disability Act. Different users access a website in different ways and different users have different website navigation needs (Becker, 2004; Sobie, 2003). The World Wide Web Consortium (W3C) provides a set of free online tools that can check website code for standards compliance at <http://www.w3.org/>. For example, internet accessibility devices rely on websites complying with internet standards to function correctly the W3C Markup Validation Service can without any cost check website code for compliance.

The same standards that are necessary to meet the requirements of the American Disability Act are also the same standards that search engines rely on to index pages and determine page rank. The W3C provides detailed explanations of various policies relating to web accessibility online at <http://www.w3.org/WAI/Policy/>. For an organization, building an accessible website allows the largest number of potential users, and helps resolve the digital divide by providing instead of limiting access (Molina, 2003). Managerial oversight is necessary to ensure that accessible website content is part of the organizations long-term strategy.

## Conclusion

The quality of an organizations website and online services influence the organizations reputation (Joan, 2003). Each individual step represents a recommendation for evaluating and potentially improving website quality. By implementing the non-technical three-step model managers can develop a method to derive an accurate measure of website quality. Managing website quality requires providing a degree of oversight at the managerial level by using techniques for measuring website quality. Combining visibility, usability, and accessibility provides a set of factors that can determine the quality of the organizations current website. Quality in this case refers to a measurement of how well the website meets the organizations goals and objectives through visibility, usability, and accessibility. From a management perspective, allowing decision makers to audit website quality and provide technology oversight. Developing a collection of techniques for managing website quality is a responsible course of action. Management can focus using the three-factor model to measure factors that influence the quality independent of technology driven reviews and audits. This model should allow managers to focus on improving outcomes instead of the process of implementing technology.

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# **A Study of 21st Century Spirituality, Beliefs, and Values among College Students**

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## **Abstract**

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This paper will be a comparison study in 21<sup>st</sup> century spirituality, beliefs, and values among selected college student populations in South Carolina. Applied quantitative methodology commences with identifying student populations that attend dissimilar types of colleges in South Carolina. A validated questionnaire will be administered to a representative sample of 1,920 student volunteers enrolled in three selected colleges and universities in the state. Subsequently, comparisons will be statistically described alongside nationwide trends about spirituality and college students published by the University of California Los Angeles. Data analysis may yield findings with regard to how various college students' beliefs and values integrate with their academic expectations while preparing for personal and professional advancement. The social impact of this study could encourage higher education to develop responsive learning environments where students' spiritual needs are better met. This study is work-in-progress as part of the Doctoral Study program with Walden University.

## **Introduction**

Higher education in the 21<sup>st</sup> century could be unwittingly engaged in a veritable values-renaissance, or *mêlée*, contrasting “the material and the existential” (Astin, 2002, p. 3). Today's college students may be grappling with a range of intellectual and

emotional contradictions; some stirring an “awareness and honoring of wholeness and the interconnectedness of all things” (Tisdell, 2003, p.28) together with more external aspirations. Some researchers described this phenomenon as spirituality, ironically rising up from within a culture where an individual’s sense of well-being may be legitimized in terms of financial prosperity (Astin, 2002, DiConti, 2004, and Tisdell, 2003).

Alexander Astin (2002) argued that academic institutions must become concerned with development of the “student’s interior life” to prepare them better to face social diversity and cultural pluralism that undeniably exists (p. 4). Nonetheless, many graduates who view the world in a more holistic or spiritual manner may be unprepared or unwilling to embrace the culture of organizations that fail to demonstrate a commitment to spiritual ideologies in lieu of profits addiction, or that may be remiss in recognizing the inherent value in collaboration. Individuals who possess authenticity, a quality often associated with spirituality, may experience uneasiness within autocratic or fragmented workplace environments (Astin, 2003). Koth (2003) agreed that authenticity through spirituality “is the exploration of one’s deeper sense of purpose and the subsequent action to pursue that purpose” (p. 3). Authenticity is likewise recognized alongside legitimacy, integrity, principle, and morality; characteristics associated with democratic and egalitarian forms of social expression (Allix, 2000). It is possible that some schools may simply be unaware of available data that explains how adverse repercussions might surface in the long term when spiritual development within academia is not sponsored (DiConti, 2004). Astin & Schroeder (2003) argued notwithstanding matters of business and politics, institutions of higher learning must grant adequate

attention to student spirituality as a “holistic approach to student development and learning...” (p. 15).

### **Problem Statement**

Studies on spirituality of college students have been conducted primarily with liberal arts colleges on a national level. Given the nature of curriculum at many liberal arts schools, students are exposed to variables that may be linked to spirituality. Because technical schools have not typically been part of spirituality studies and students may not be exposed to related variables, it seems important to determine how students at a technical college would view spirituality. The problem is there is a lack of data representing views of students who attend a technical college with regard to their spirituality. Further, there appears to be no comparisons of spirituality between technical college students and liberal arts students from within the same geographic area. It is also important to determine how students value spirituality as a component of their personal, social, and professional worldview. Further, higher education may be remiss in having conducted adequate research on the topic of spiritual awareness so that they might become “more responsive to facilitating student development in this realm” (Lindholm, 2004, p. 6).

### **Purpose of the Study**

The purpose of this study will be to contribute to the scientific body of knowledge new information about spirituality through data gathered from students who attend selected technical, religious affiliated, and non-religious affiliated colleges and universities in South Carolina. In doing so, decision makers involved with improving higher education along with individuals or groups in the community that are empathetic

to the needs of its students and faculty might find utility in analyzed data. Regardless of mounting interest among college students about issues that pertain to authenticity, meaning, purpose, and spirituality within higher education, few studies have been conducted that examine their significance (Lindholm, 2004). Results obtained will be described so that the reader might recognize the importance of spirituality to the mission of participating colleges alongside personal and professional aspirations of their student populations. Additionally, the purpose will be to gain a better understanding about beliefs and values held by students who attend a technical college; moreover, to discover if similar characteristics correspond with students who attend non-technical academic institutions on both local and national levels.

### **Theoretical Framework for the Study**

This study is based on theoretical frameworks developed by J.M. Burns (2003) and transformational leader-follower synergy; L. Kohlberg (1981) and the Theory of Moral Reasoning; A. Maslow (1987) and hierarchical developmental stages; P. Senge (2000) and correlated Systems Theory. Most profound to this study, however, is the ongoing research conducted by A. Astin and a team at UCLA that has provided decades of theory and evidence linking higher education to specific attitudes and behaviors by students across the United States; among them, spirituality and authenticity. Common themes that theoretically support spirituality as an element of human interaction appear to be shared by a number of researchers. “College is also a time when initial probing commitments are made and remade, when the emerging sense of inter-dependence is tested, and when there is opportunity to experience one or more mentoring communities” (Love, 2001, p.13).

### **Research Design**

A descriptive design that relies on survey methodology will principally be used during the course of this study so as “to describe the distribution within a population of certain characteristics, attitudes, or experiences” (Singleton & Straits, 2005, p. 223). Validated questionnaires that measure aspects or factors of spirituality among college student populations will be made available for trial in three statewide venues. These instruments have yielded interesting and useful data that support mounting reports regarding spirituality trends in higher education on a national scale.

Information gathered post-administration of the local surveys distributed to a selected state supported technical college and two selected liberal arts universities, (one state assisted and the other a privately sponsored sectarian university), will be analyzed and parametrically compared with research conducted nationwide. Quantitative analysis may conclude if comparable trends exist between each sampled population. A qualitative technique will be introduced in the form of an open-ended question intended to authenticate vague or disproportionate responses about how students perceive the impact of their educational experience.

### **Summary and Significance of the Study**

The significance of this study may not be realized without some passage of time. “This process is too new to have produced definitive answers and even if it had, the process of exploration may be more important than arriving at conclusions” (Laurence, 1999, p. 15). An additional aim of this study will be to raise awareness through research that a number of individuals allege that simply achieving a higher education may not be gratifying unless the soul is likewise nurtured. Further, technical college students may

not be among populations currently recognized for holding like values emerging from a heightened sense of spirituality compared with non-technical or liberal arts academic institutions. Perhaps each generation of students who learns to acknowledge their spiritual *self* as equivalent to their academic achievements may find ways to enhance society and promote positive social change. Through strong, poignant, and authentic leadership, organizations led by individuals from spiritually grounded educational venues may emerge as visionaries. Moreover, upon embracing transformational ideologies, they may draw “energy and direction from the good intentions of current organizational members who put their intellects, hearts and souls into shaping a vision for the future” (Bhindi & Duignan, 1997, p.119).

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# **A Survey of Operating System Options for Server and Client Side Computing**

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## **Abstract**

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When a business or individual is considering switching operating systems or determining which operating system to run, they should be aware of the possible alternatives. Many times management and individuals only consider the popular or main stream operating systems as choices, however there are other options that may suite the business or individual needs better. With the advancements in operating system research and the option of open source, the choices of operating systems have increased greatly over the last several years. This survey contains an overview of some of the operating systems available to business and individuals.

## **Introduction**

An operating system (OS) is a computer program that acts as the middleman between a computer's hardware and the applications running on it. The operating system is the manager of the computer's resources (hardware and software). Dang Van duc, Vu Duy Loi, and Vu Duc Thi (2005, Chapter 1, Definitions Section, ¶ 9) define an operating system as "a group of programs designed to serve two basic purposes: To control the allocation and use of the computing system's resources among the various users and tasks, and to provide an interface between the computer hardware and the programmer

that simplifies and makes feasible the creation, coding, debugging, and maintenance of application programs”.

Operating systems consist of many components such as: processing management, memory management, storage management, input and output management, file management, networking, security, command interpreters, kernels, services, and systems. ComputerHope.com (2005) divide operating systems into five categories: (1) graphical user interface (GUI), (2) multi-user, (3) multiprocessing, (4) multitasking, and (5) multithreading. Some operating systems actually fall into more than one category based on the components contained within the OS.

This survey provides businesses and individuals a sampling of alternative operating systems. This information should help management and individuals determine which OS they should consider to best meet their needs.

### **Literature Review**

The CERT Coordination Center (1999) urges users to understand their needs before evaluating and selection an operating system. Users’ needs include topics like availability, internal and external technical expertise, support, usability, customer interfacing, and budgeting.

#### *Commonly Known operating systems*

Microsoft’s Windows is a widely used operating system that offers a lot of applications, software, resources that first appeared in 1983. Even though Microsoft has openly admitted that its operating systems have design faults, many businesses and individuals are still opting to run the Windows operating systems. The latest version Windows XP is an operating system that Microsoft (2005) claims to have combined all

the best features of its earlier operating systems. These features include standards-based security, manageability, reliability, plug and play, easy of use, manageability, online support, multiple versions, consolidations, visual attractiveness, fast user switching, grouping, web views, digital media support, greater application and hardware compatibility, auto-play installation, dynamic link libraries, ease of web document publication, offline file encryption, digital video disk (DVD), NetCrawler, networking, faxing, mobile computing, and system roll-back features (Microsoft, 2005). Beside known vulnerabilities of the Windows operating systems, windows users are faced with having to upgrade continuously when new systems are released since Microsoft stops supporting older releases after a given period of time. Windows Vista due out in 2006 will target the gaming user and will require more powerful systems. Microsoft is also working on the Blackcomb version due out in 2008 (Hoisington, 2005). Windows OS is available for servers and clients. However, there are software products available to run Windows on other platforms which allow Microsoft to market their operating system as multi-platform.

The UNIX OS has been around for three decades and was originally provided by Bell Labs. UNIX can run on multiple platforms from microcomputers to supercomputers, while including a portability function (Lucent Technologies, 2002). Lucent points out that UNIX is a time sharing OS that uses interconnecting tools to offer users multi-tasking and multi-user capabilities, portability, hundreds of integral utilities and tools, email, application libraries. Tanenbaum (2001) states that the UNIX operating system consists of basically three parts: (1) the kernel, (2) the shell, and (3) the tools and applications. The UNIX operating system is generally used on server computers.

Mac OS X or Tiger is built upon an UNIX architecture. Apple (2005) states that it's latest release provides a stable platform which includes security, ease of use, organizational tools, web functions, email enhancements, digital media tools, faxing, 64-bit and 32-bit application support for simulations play, web services, resource sharing, and open source foundation. One major disadvantage to (Macintosh) Mac OS X is that it is proprietary and it runs on proprietary hardware. One nice feature of this operating system is that with the use of open source, a computer running Mac OS X can almost seamlessly function on a network with Windows OS based computers (Apple, 2005).

Linux is built from the UNIX operating system and uses the portable operating system interface (POSIX) and Single UNIX Specification compliance (Kernel.Org, 2005). Linux was designed to run on 32-bit x86 personal computers (PCs). One of the major reasons that Linux is considered and is widely known is that it was a pioneer in the area of free applications. The application is downloaded from the Internet, with free updates, no registration fees, and the source code is available for operating system customization. Machtelt Garrels (2003) points out that Linux is known for its security and versatility along with scalability. Another advantage of this operating system is the fact that debugging and error correction times are short in comparison to the Windows operating system because of the access to the source code, any user can correct the problem instead of users having to rely on a small group within a single company. Garrels points out that Linux has three major disadvantages: too many different distributions, not user friendly, and lack of trustworthiness. In comparison many businesses and individuals trust Microsoft's Windows operating system and Microsoft tries to control its distribution outlets by requiring licenses.

### *Alternative Operating Systems*

Ubuntu is a Linux based operating system that includes user support from not only the actual programming developers but also several business supporters and users. Ubuntu (2005, ¶ 3) states that they provide free security updates and application fixes for at least 18 months after a new release and the company is on a 6 month release schedule. Ubuntu is functional in a client or server environment and can also run on Apple computers. Ubuntu (¶6) states that the Ubuntu OS “includes more than 16,000 pieces of software, but the core desktop installation fits on a single compact disk (CD). Ubuntu covers every standard desktop application from word processing and spreadsheet applications to internet access applications, web server software, email software, programming languages and tools and of course several games”. The Ubuntu company offers two other versions of operating systems, the Kubuntu and the Edubuntu. Both of these operating systems are free also with the differences being Kubuntu includes the K Desktop Environment (KDE) instead of the GNU Object Model Environment (Gnome) and Edubuntu is for education facilities that may be considering other educational operating systems such as Mac OS X.

Debian GNU/Linux is an open source operating system based on the Linux operating system. The Debian organization (2005, Ports section) states that this OS actually works with the Linux kernel and will run with x86, Moterola 68k, SPARC, Aplha, PowerPc, ARM, MIPS, PA-RISC, IA-64, s390; but will not work with AMD64, ppc64, SuperH, armeb, m32r, DebianGNU/Hurd, Debian GNU/NetBSD, and Debian GNU/kFreeBSD. Besides working in individual and business environments, the operating system comes bundled with over 15,000 applications. By this being an open source OS,

the user is completely free to customize it to better suite their needs. Because of the way Debian is licensed, a user can freely make copies of the applications and distribute how they see fit (Debian, 2005).

FreeBSD is an operating system based on the BSD Unix architecture developed at the University of California Berkeley designed for client and server computers (FreeBSD.org, 2005). FreeBSDs name is misleading as this operating system must be purchased from a limited number of suppliers. The FreeBSD organization states that this operating system has a merged virtual memory and file system buffer cache, soft updates, file system snapshots, Internet protocol security (IPsec), ttransmission control protocol/internet protocol (TCP/IP), Ipv6 support, Multi-threaded symmetric multiprocessing (SMP) architecture, strong security, TrustedBSD MAC Framework, Netgraph pluggable network stack, kernel queues, allows applications to push functionality into the OS kernel to improve performance, share file systems with a network file system (NFS), distribute network information with a network information services (NIS), remote logins, remote simple network management protocol (SNMP) configuration and management, file transfer protocol (FTP), host names resolution with a domain name services and the Berkeley Internet name domain server (DNS/BIND), multiple interfaces packet routing, and Internet protocol (IP) multicast services.

Mandriva Linux is an operating system that is available for many platforms and is marketed to individuals and businesses. “Mandriva Linux includes many graphical administration assistants & wizards that make it intuitive and fun to use while providing all the power and robustness of other Linux systems” (Mandriva, 2005, Community Users Download section, ¶ 1). This operating system is customizable because it is built

on the open source principle and contains over a hundred applications. The commercial version has to be purchased, however there is a free version that is downloadable for individual users.

AmigaOS 4.0 is an operating system for Original Equipment Manufacturer (OEM) solutions. This operating system has been around for over 20 years, but until recently has not been considered a player due to several design flaws. The AmigaOS offers scalable Graphical User Interface (GUI) capabilities, runs on low end hardware (e.g.: kiosk), easily customized, system wide scripting, modular coding, hardware flexibility. One nice feature of the AmigaOS is that it has a feature called RAM disk that is similar to a folder in the Windows OS. The difference is that when the Amiga system is shut down the items stored in the random access memory (RAM) disk are lost. This would be equivalent to using a software package like Deep Freeze. Faronics' Deep Freeze application that uses a reboot to restore technology to reset system settings to defaults that were defined by the system's administrator (Faronics, 2005).

Other possible operating systems are the GEM, Suse, NetBSD, Slackware, Knoppix, Fedora, Solaris, GNU, Linspire, ReactOS, Nachos, GeekOS, Minix, OS/161, Choices, Pebble, (FSF 2005, Christopher 1993, Holland 2002, Hovenmeyer 2004, Tanenbaum 1997, Denys 2002). Many of the open source and/or free source operating systems are based on the Linux or Unix operating systems, however there are some that compete with MacOS and Windows.

### **Methodology**

The methodology used for this sampling of operating systems was to briefly discuss the four most commonly used operating systems and to list other operating

systems that an individual or business might want to consider based on the needs and requirements that should have been clearly defined up front. This survey does not include all possible operating systems in existence; it is merely a sampling of what is available in operating systems free and for purchase.

### **Conclusions and Further Research**

An individual or business needs to clearly define their needs in respect to an operating system. Once these needs are identified, the operating system evaluation process can occur. The goal of this survey was to alert individuals and business decision makers of choices beyond that of the four commonly known operating systems. For example, a business with a limited budget may opt for a free operating system, by saying the risk of using the free OS is less than the value of debt the business will take on to use one of the more popular operating systems. A more customizable operating system may be sought, in which case one of the alternative open source operating systems would be the best selection. If the risk of using an open or free system is acceptable and funding is not an issue then the best selection would be one of the more widely used operating systems.

To further this survey would be to conduct a detailed investigation of the listed operating systems and determine to a greater extent what types of businesses would benefit from which operating system. Another way to further this survey would be to rank the advantages and disadvantages of each operating system and then apply a statistical approach to determining which operating systems are best in different environments.

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# **A Study on Terrorism, Risk, and Insurance on the Social Changing Effects**

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## **Abstract**

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This study provides a perspective on the social changing effect of acts of terrorism such as experienced in the United States on September 11, 2001. Companies were ill prepared to respond to acts of terrorism. Difficulties included assessing the impact of terrorism, assessing associated risks, and providing adequate insurance coverage. The terrorist activities of September 11, 2001 changed the way American business by forging new paradigms for anticipating the risks associated with terrorism, spurned new business activities, and left compelling questions on where resources should be applied to improve understanding and management to of terrorists acts and their likelihood of occurrence in order to contain the affect of terrorism.

## **Introduction**

September 11, 2001 brought a heightened level of concern for terrorism to the United States and exposed areas of vulnerability and lack of preparedness weaknesses within the country. On that fateful day, the United States was subjected to the second most heinous attack in its history. The affects of the catastrophe in New York, Pennsylvania, and Washington, D.C. on that date were similar to the affects of the unexpected attack on Pearl Harbor by Japan, some sixty years earlier. Americans were outraged on both occasions and were dismayed that such cowardly acts of aggression

could be carried out on its soil. A major difference between the two attacks is that the perpetrators from Japan were distinguishable by their uniformed national identity, whereas the perpetrators of the attacks in the United States on September 11, 2001, herein referred to as 9/11, were only distinguishable by their extremism, their hatred of the United States, and perhaps their distorted belief in the tenants of Islam. Since 9/11 the United States has been embroiled in a determined military effort to bring those who were responsible for those events to some form of justice, and to find a middle ground for world peace in the process.

### **Social Impact of Terrorism**

The extended military action to bring the perpetrators to justice has included incursions into Iran, Afghanistan, and Iraq but to this observer, seems to be far from reaching a conclusive event to end the discord. The fallout from 9/11 initially included an almost paranoiac response by Americans to the many heightened alerts to possible acts of terrorism. While the entire country justifiably shared the paranoia, recent frequent elevations of alerts from condition yellow to condition red as an example, seem only to generate paranoia in the affected regions. Elevated alerts in locations such as New York City caused immediate preventive responses while other Americans appeared to go about business as usual in other parts of the country. This could be evidence that there is a growing numbness in the United States to likely acts of terrorism because of the number of occasions that Americans have been called to respond to high level alerts only to have nothing occur. Though the current spate of terrorist acts are horrible with their seeming disregard for human life, what seems to be happening in the United States is similar to that of individuals in other parts of the world who are constantly subjected to such acts.

Though outrageous, a type of numbness to terrorism is settling in among peoples who are constantly subjected to it. The risks associated with terrorist acts are abundant and regardless of our disdain, or other points of view, the current spate of terrorism is effecting social change. Noticeable among social changes are those that affect economies.

Evidence of social change is manifested in the marketplace where new industries are growing as the result of the proliferation and magnitude of outbreaks of terrorism in the world. In past years, industries only had to be concerned with staying abreast of innovative changes in the marketplace, and may have had to plan responses and prepare for occasional natural disasters such as floods and violent storms to protect their fiscal livelihoods. Today however, things are different. The marketplace has recognized first-hand, the disastrous impact of acts of terrorism on economies, and is woefully aware that in most cases, peoples and industries are not prepared to either combat or respond to such acts.

### **Risk and Insurance**

The insurance industry as an example has invested billions of dollars to get its arms around the real costs of reparations resulting from acts of terrorism. A 2004 survey of its members by the Risk Insurance Management Society (RIMS) found that terrorism insurance was limited and difficult to obtain (Terrorism, 2004). RIMS reported the reason for the dearth of terrorism insurance was that prediction of terrorists' acts was so difficult. As a result, insurance coverage was inadequate when available, and was also prohibitive in cost.

Groves (2003) stated that according to the Computer Security Institute's 2002 Computer Crime and Security Survey, 503 computer security practitioners representing

90 percent of respondents to the survey reported that they had detected security breaches in the previous year and half of the respondents reported combined losses in excess of \$455 Million. Groves, whose report only addressed the insurance impacts of cyber insurance, went on to describe the annual cost of cyber insurance as ranging from \$10,000-\$50,000 for a \$1 million policy to as high as \$200,000-\$500,000 for coverage of \$10 million. In addition to the high costs of basic coverage, the policies also came with deductibles that could range into the millions of dollars.

When costs of other classes of terrorism are added such as Internal Terrorism, Cyber Terrorism, and Foreign Terrorism, the magnitude of the potential negative economic impact on the United States' economy could be exponential. The fact that the United States Treasury Announced the Terrorism Insurance Act of 2002 underscores the importance placed by the government on the potential impact of terrorism on the United States' economy. The act provides a temporary stop gap for shortfalls in commercially available insurance to help protect industries and the economy. However, the benefit of the act, where the United States government shares the risks associated with verified acts of terrorism, expired on 31 December 2005. Unless the act is extended past the end of the year, the burden of insuring against catastrophic losses falls totally on commercial resources (Treasury, 2003).

In November of 2005, John Phelps, the Chairman of RIMS announced at an organizational summit on Enterprise Risk Management (ERM), that RIMS had launched initiatives to become one of the nation's premier resources for ERM. The goal of the November summit, which was attended by risk management professionals from various industries, was to provide a forum for discussions on implementing an ERM program.

However, future evolutions of the summit could provide the impetus for discussion and extended efforts throughout industry to develop effective strategies to anticipate future acts of terrorism and to contain their affect (New, 2005).

Chanen (2002) discussed some of the challenges faced by independent and small-firm law practitioners in New York City due to the September 11, 2001 terrorist attacks. Chanen described the value of copying litigation documents; financial consequences of a lack of business interruption insurance; and closure of law offices. These are just a few aspects of how some in the legal community were affected because of their beliefs that their buildings were indestructible. Factor in the value of knowledge lost due to the potential loss of life associated with terrorists attacks and the associated cost in the legal industry alone grows exponentially. Many firms, large and small, in many industries struggled in the aftermath of 9/11 as the result of inadequate preparation for an unimaginable event.

The enormity of insurance issues incurred following 9/11 are addressed by Smith (2001) while commenting on families getting help from lawyers and the city of New York over insurance issues. The legal issues addressed by Smith in his role as a lawyer, constitute a small number of issues related to a single event but illustrate the enormity of insurance related issues following such terrorist events. Smith referenced the need for lawyers to represent tenants and landlords who were displaced by the collapse of buildings and massive damage to surrounding buildings. Smith also noted other legal issues which included loss of use of rental premises, distribution of insurance proceeds, and application of force majeure clauses in leases. Lawyers also had to deal with

problems caused by the destruction of millions of legal and business documents in file cabinets and computers in the Trade Center and surrounding offices.

### **Conclusions and Recommendations**

As normal life is perceived to go on, the focus of government and business has changed to recognize and develop strategies to combat or at least compensate for the reality of its vulnerability to terrorism. In the United States, the Department of Homeland Security was established to coordinate and focus the efforts of the nation on this new reality of terrorism. Terrorism has been around us for many years, but never at the current sustained magnitude.

The affects of the recent spate of terrorism provide new fertile areas for inquiry. Many new questions abound such as:

- Where should resources to prevent terrorism be concentrated?
- Are compensating strategies for the affects of terrorism sufficient?
- What are the reasons for terrorism and how can they be mitigated?
- Can a model for managing terrorism risk be developed?

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# **Using Expert System Design Concepts as and Effective Cognitive Learning Methodology for Teaching Accounting Information System Students**

**Kenneth Guyette, Walden University**

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## **Abstract**

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The Accounting Profession is under increased pressure to have Information system technology trained, knowledgeable auditors for evaluating the adequacy of Information Technology (IT) Internal Control since the passing of Sarbanes Oxley (SOX) legislation (Moeller, 2004). University accounting learning outcomes, curriculum, and teaching methods have not adequately recognized this real world requirement. Prior research has shown that there is an accounting practioners information systems skills gap compared to university learning outcomes (Greenstein, 2004). This GAP needs to be addressed by making the learning outcomes of accounting courses more relevant and effective in teaching Information technology skills required by practitioners. This research will concentrate on the methods which may be best suited to teach Information system skills for Internal Control risk assessment. Expert System development requires the application of critical information techonlogy skills such as database design, SQL language, and concept mapping (Changchit, 2004). In addition the expert system deveelopment requires the desginer to interview the expert such as a practicing external auditor (Novak, 1998). Applying these theories and cognitive tools for increasing accounting learning outcome relavancy and effectiveness has potential

value for the accounting student, university, as well as local businesses. This study is work-in-progress as part of a Doctoral Study program.

### **Introduction**

The accounting profession has fallen behind in its use of information technology. In the past accounting was the main objective of information technology primarily data automation and database design (Zeff, 2003). Now the information technology systems revolution has changed the accounting profession's standing from primary to one of many information sources needed by the investor and creditor for decision making (V. S. Arnold, S.G., 2002). The profession has found itself in the awkward position of having to work with or even evaluate accounting systems which the accountant may not have adequate formal training and expertise in (Taylor, 2001). This has contributed to the profession losing credibility with the users of financial statements and to the steady decrease in accounting majors (Zeff, 2003). Graduating accounting students are being trained in traditional accounting theory and procedures absent of many of the relevant information technology systems theories and tools necessary to be qualified for positions in enterprises competing in the highly competitive business technology environment.

Expert systems have been used as learning aids in the higher learning environments as well as continuing education for practitioners. The results have been mixed with relative success and often depends on the level of interest and previous exposure and success in the subject matter (V. C. Arnold, N&Collier, S.&Leech, S.&Sutton, S., 2004). However the application of expert system design in an academic environment has not been evaluated for cognitive effect of learning information technology skills (Fordham, 2005).

### **Problem Statement**

This study will address this problem: The Accounting Profession is under increased pressure to have Information system technology trained, knowledgeable auditors for evaluating the adequacy of Information Technology (IT) Internal Control since the passing of Sarbanes Oxley (SOX) legislation . University accounting learning outcomes, curriculum and teaching methods have not adequately recognized this real world requirement and a new innovative method reflecting active learning cognition and real world practioner interaction needs to be incorporated into the accounting curriculum.

### **Purpose of the Study**

The purpose of the study is to demonstrate that incorporating expert system desgin methodology in an Accounting Information System course will increase relevance and cognition of critical information system skills for Internal Control assessment. Information technology has been one of the most strategic and dynamic body of knowledge for businesses enterprises and auditing practioners. The study should provide valuable data for closing the acadamic and practioners information technology skills gap.

### **Research Methodology**

Quasi-Experimental Design will be used due to the low number in the population. Four accounting classes, four accounting system courses will be in the experiment. Due the low number of students available, all students will participate in the experiment. Matched pairs will be identified bases on MIS courses, GPA, and number of accounting courses taken. One half of the students will be randomly selected to be treated ( participate in expert system design development) and all students will be pre and post tested. The student matched pairs and will be analyzed for test results for the information systems technology skills for

internal control assessment at four specific stages of expert system development. All students will be provided course content and case application based on current internal control IT skills identified by Control Objectives for Information and related Technology (COBIT) which is directly linked to the internal control standard issued by the SOX appointed US Public Company Oversight Board (PCAOB).

### **Conceptual Framework for the Study**

Conceptual support for the study emanates from the increased pressures of the accounting profession to be information systems technology skilled due to not only the general trend of business processes becoming more automated and dependent on the Internet and information systems but on the increased emphasis of Sarbanes Oxley Legislation on assessing Internal Control which depends on these information systems for accuracy and security. The accounting profession and particular academic curriculum have remained conservative to change resulting in an academic – practitioners information system skill gap. Expert system development not only incorporates the hands on application of critical information skills, it requires the interaction and expert knowledge acquisition of practitioners. This study will examine the cognitive learning success for four stages of expert system development as well as the impact to the relevancy of information system technology learning outcomes.

### **Summary and Significance of the Study**

Using effective methodologies for teaching relevant information system technology skills to accounting students is a key strategic objective for universities and the accounting profession. The significance of this study will result from the quantitative analysis of student cognitive success in learning critical information systems skills for the

first accounting information systems course in a private university. The benefits to the university could include increase reputation for graduating accounting major ready for real world tasking and the ability to update curriculum based on practitioners expert knowledge. Increasing the relevancy and effectiveness of the accounting program should have positive impact to enrollments and value to the local business community.

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# **A Shared Reality Based on a Perceived Phenomenon: The Effective Characteristics of Cross-cultural Virtual Teams**

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## **Abstract**

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The problem is that cultural diversity has a potential negative impact on cross-cultural team effectiveness in the virtual working environment, which requires organizations to have a higher understanding in order to manage cross-cultural dynamics effectively. Although the increased trend of business globalization increases the usage of cross-cultural virtual teams in order for organizations to reach cost-effectiveness, there is a disconnection between theory and reality. Therefore, a phenomenological study will be conducted in order to understand the phenomenon from international practitioners' perspectives based on their perceived experiences. The researcher will use an open-ended interview approach to collect data, which will help participants to conceptualize and explicate their perception in regards to the phenomenon under investigation. This study is work in process as partial fulfillment of the Ph.D program at Walden University.

## **Introduction**

Global economy has created the inevitable interdependency between organizations across time, geographical, cultural, and functional boundaries (Kettani & Oral, 1998; Kayworth & Leidner, 2001; Tian & Emery, 2002). Many companies have outsourced their products or core product-development process in order to reach business

efficiency and effectiveness. This factor has forced companies to be more specialized in their selected core competencies, which include having concentrated investments in their specialties that create the interdependence between businesses as virtual corporations (International Journal of Physical Distribution & Logistics Management, 1996).

In addition, with the geographical extensions of businesses, many companies heavily depend on utilizing virtual teamwork to access shared information, knowledge, and functional expertise in a timely manner at a lower cost (Lipnack & Stamps, 1999). Companies build virtual corporate structures with their strategic partners with the purpose of having unlimited growth and flexibility (International Journal of Physical Distribution & Logistics Management, 1996) and construct internal or external virtual teams to maximize the wealth of knowledge, skills, and expertise. However, the use of virtual teams requires international leaders to develop cross-cultural skills in order to be successful (Sizoo & Serrie, 2004), which provides the capacity for individuals to be adaptive and flexible to the external environmental demands for social and intellectual interaction.

The contribution of virtual teamwork has an indispensable value to the contemporary business development because of the increasing international business competition and cooperation that has been developed because of the modern global economy (Davidson, 1994; Malcolm, 1996; Roy, 2001). However, the increasing global economy has triggered more cross-cultural challenges (Matveev & Nelson, 2004) in cross-cultural virtual teamwork, which requires leaders to understand the effective characteristics of cross-cultural virtual teams in order to manage virtual teams effectively across nations (Malcolm, 1996; Croasdell, Fox, & Sarker, 2003; Cant, 2004).

Many international corporations have been implementing the business strategy of virtual teamwork to increase operational efficiency and cost effectiveness in order to sustain their competitive advantages (Bell & Kozlowski, 2002; Pauleen & Yoong, 2001; Stough, Eom, & Buckenmyer, 2002; Sarker, Valacich, & Sarker, 2003; Straub, 1997; Holton, 2001). Virtual teamwork provides a low cost communication strategy with a real time application from the virtual time (Roberts, Kossek, & Ozeki, 1998), and it provides the business solution of sharing cost, skill, and core competence for organizations to access the global market that otherwise would be impossible (Hardwick & Bolton, 1997).

### **Statement of the Problem**

The problem is that the cross-cultural characteristics of individuals potentially have a negative impact on virtual team efficiency, effectiveness (Kiduff, Angelmar, & Mahra, 2000; Piccoli, Powell, & Lves, 2004; Shachaf, 2005), and collaboration (Holton, 2001; Iles & Hayers, 1997), while these characteristics may generate divergent thinking that enhances creativity and innovation. Cross-cultural virtual team success requires a description of the effective characteristics, such as the elements of cultural diversity (DiStefano, & Maznevski, 2000; Milliman, Taylor, & Czaplewski, 2002), cross-cultural virtual team composition, and intercultural communication and adaptation (Kim, 2001). Successful cross-cultural teams demand an effective managerial skill of individuals to manage personality, culture, knowledge, skill, and functionality diversity (Miller, Fields, Kumar, & Ortiz, 2000).

### **Purpose of the Study**

The purpose of this phenomenological study is to explore the effective characteristics that contribute to the success of cross-cultural virtual teamwork in order to

facilitate international leadership development in the field of cross-cultural management. The researcher will conduct 12 to 20 interviews with international business leaders who have experienced an extensive amount of working experience in cross-cultural virtual teamwork. For the purpose of the study, the geographic location will be defined as international because of the dispersed locations of the cross-cultural virtual teams.

### **Conceptual Framework**

The theories regarding teams and the intercultural communication competency constitute the conceptual framework for this research. The researcher uses the theory of teams (Belbin, 1981; 1993) to set the groundwork for this study in order to arrive at the understanding of virtual team dynamics, in terms of teams' personality and functional compositions. Although virtual team dynamics create a higher level task environmental complexity, a solid understanding about the effective characteristics of non-distributed teams creates a foundation to understand cross-cultural virtual team dynamics. In addition, the theory regarding intercultural communication and adaptation (Kim, 2001) in the study of cross-cultural management completes the conceptual rationale in this qualitative study. Both intercultural communication competency and intercultural adaptation are the key elements to facilitate the understanding of cross-cultural effectiveness when dealing with cross-cultural challenges.

### **Methodology**

A phenomenological design will be used for this study. Sanders (1982) argued, "Phenomenology seeks to make explicit the implicit structure and meaning of human experiences" (p.354). The author further stated, "The point of phenomenology is to get straight to the pure and unencumbered vision of what an experience essentially is" (p.

354). Sanders (1982) argued that a phenomenological study is an intentional analysis, which reflects the internal belief of the subject. Husserl (1927-1931) used the word “intentionality” to explain the correlation between the subject and the appearance of the subject to consciousness. Phenomenology is a process and function to continuously carry and transcend meaning from consciousness. The functionality and importance of this method is the intent to make explicit the implicit knowledge that lies in human consciousness in order to capture the given meaning that is derived from an immediate experience. In addition, an intentional analysis intends to identify a complete rationalization of an experience (Kockelmans, 1967). With this intention, the research hopes to identify knowledge from the practitioners’ perspective based on their individual awareness of the phenomenon.

### **Research Questions**

The non-manipulated independent variables in this qualitative study are the cross-cultural characteristics, such as intercultural communication competency and adaptability and cultural as well as personality diversity. The dependent variable is the cross-cultural virtual team effectiveness. This qualitative phenomenological study explores the perceptions of individuals, who have experienced the cross-cultural virtual team dynamics. The study primarily focuses on three questions:

1. What are the effective characteristics of team behaviors that contribute to the success of cross-cultural virtual teams?
2. What are the perceived personality traits that help individuals to manage cross-cultural differences in order to be effective at the virtual team level?

3. How do teammates resolve cultural differences at the virtual team level to reach effectiveness and coherence?

### **Summary and Significance of the Study**

As business globalization continues its momentum (Tian & Emery, 2002), international business inevitably increases the dependence on the virtual team strategy in order to leverage worldwide knowledge resources, functional expertise, time efficiency, and operational effectiveness (Zakaria, Amelinckx, & Wilemon, 2004). Therefore, it is critical for organizational leaders to understand the effective cross-cultural virtual team characteristics in order to manage intelligently (Randel, 2003) in the cross-cultural virtual team environment.

A phenomenological research approach provides the researcher with an opportunity to explore the subject matter in depth by conducting extensive interviews with cross-cultural virtual experts. International organizations will be benefited by the results of this study for training and hiring purposes when forming cross-cultural virtual teams. The nature of most cross-cultural virtual teams is self-managed and cross-functional; therefore, the success of the teams is essential for organizational success. Organizations cannot afford to fail when products and services need to succeed globally.

In addition, the results of the study can be used as guidelines when training or hiring individuals to form cross-cultural virtual teams. In some cases, the information can help international organizations in the process of choosing their international strategic partnerships in the virtual working environment. International organizations can measure and evaluate their choices based on the results of the study.

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# **A Case Study of the Leading Role of United Way of America in United Way's Transformation**

**Hwangji S. Lu, Walden University**

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## **Abstract**

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In response to the changing environment, United Way of America started leading transformation approximately four years ago. Given that the system transformation seems to fall behind the expectation, accelerating the transformation becomes the top priority on the agenda. It is important to examine the current status as to how United Way of America is leading the transformation and what challenges and opportunities that United Way of America may face. A holistic single-case study was employed, in which multiple sources of evidence were collected for in-depth understanding of the case. The findings confirmed the strong leadership role of United Way of America in United Way's transformation. However, local United Ways were not satisfied with the support and services provided by United Way of America. Making improvements in communication and customer services would enhance the leadership role that United Way of America plays. As a result, Community Impact United Ways will improve lives by mobilizing the caring power of communities.

## **Introduction**

The emergence of advanced technology, economic force, social demand, public policy, and global competition constantly redefines the external environments in which organizations operate (Nadler & Heilpern, 1998). Most organizations are experiencing profound upheaval and continue encountering even greater rates of change through their

dynamic environments. Transformation occurs when organizations recognize things cannot continue in the old way of operations in achieving the business strategies required to succeed in the fundamentally different environments (Ackerman-Anderson, 2001; Felkins, Chakiris, & Chakiris, 1993; Francis, Bessant, & Hobday, 2003; Miles, 1999).

For over 100 years, United Ways have endeavored to tackle the most pressing needs in communities by raising money to support agencies and programs that have served those needs. Nearly all United Ways have a long tradition of independent functions of fundraising and fund distribution. The advance of technology, global economy, growth of nonprofits, changes in the workforce, and many other issues have already affected the bottom line of United Way. The United Way old business model that worked for those days is facing challenges at the dawn of the 21st century.

Approximately four years ago, United Way of America (UWA), which is United Way national office, realized that the United Way system was operating in silos, initiating to pursue a major reorganization. The United Way system started with the transformational journey by reexamining the mission and vision to ensure that the all-embracing principles reflect a change from the traditional focus on filling resource gaps to a new mission around Community Impact leadership. Community Impact is about improving people's lives affected by the community's issues and can be attained by influencing groups, networks, sectors, and systems that play a role in improving lives in the communities. In this sense, the United Way system's mission is to improve lives by mobilizing the caring power of communities. Since then, United Way is moving from a history as a fundraising organization to a new leadership role as a Community Impact

organization. This transformation to a Community Impact organization has changed how United Way operates significantly.

### **Problem Statement**

Transformation requires a different level of focus and commitment. Transformation demands new way of thinking, new skills, and new competencies—and new structures may be needed to support the new business model. Transformation, in fact, is a strenuous and challenging endeavor for local United Ways. Given that, United Way of America has taken on the leading role, orchestrating a number of cross-functional team efforts and undertaking numerous initiatives to help local United Ways transformation. However, the progress of system transformation has fallen behind expectation. Accelerating the transformation becomes the hottest topic in the United Way system. Thus, it is important to examine the leadership role of United Way of America in United Way's transformation. The objectives of this study were (a) to assess the extent to which employees at United Way of America understand the importance of transformation; (b) to examine how well various teams in United Way of America support the national movement; (c) to ascertain the current status as to how United Way of America is leading the transformation; and (d) to identify challenges and opportunities that United Way of America may face.

### **Methodology**

This was a holistic single-case study design, in which the boundary was set within United Way of America. The data were gathered from multiple sources of evidence to provide an in-depth examination of the case. The sources of data consisted of (a) documentation, including written reports of events, progress reports, and articles

appearing in the mass media; (b) archival records, for instance survey data; (c) participant observation; and (d) interviews with 23 key informants at various departments of United Way of America.

### **Significance of the Study**

The United Way system includes approximately 1,340 community-based United Ways across the United States. Governed by a volunteer board which is composed of corporate, labor, and community leaders, each United Way is a local and independent entity, serving a specific geographic locale and working to improve lives within that community. The complex community's needs are demanded for a more holistic approach to solving community's problems and for a new model of leadership that engages in all stakeholders and brings all resources together as collaborative efforts. Strengthening the quality of support and services from United Way of America would facilitate the transformational process of local United Ways toward the Impact organizations. Consequently, the United Way system as a whole would make an immense impact on improving Americans' lives and communities across the country.

### **Conclusion**

Employees at United Way of America viewed that the Community Impact mission is a right movement as well as an excellent goal for local United Ways to strive for. By performing their daily duties, employees at United Way of America felt that they are helping local United Ways walk on the transformational journey. On the other hand, local United Ways showed strong support for United Way of America's leadership and the Community Impact mission. Local United Ways also concurred that United Way of America is taking the direction that will enhance the future of the United Way system.

Nevertheless, the satisfaction with services, tools, and resources provided by United Way of America in 2005 was lower than the levels in the past few years. Apparently, there was a disparity between the services or products provided and received. Communication and customer services seemed to be two major challenges that United Way of America faced. Improvement made in these two identified areas would fortify the leading role of United Way of America. Further research is needed for identifying the major obstacles in communication and customer services.

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# **A Study of Employer Perceptions of Technology Graduates From Historically Black Colleges and Universities (HBCUs)**

**Terence D. Jackson, Walden University**

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## **Abstract**

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This is a descriptive quantitative study of employer perceptions of technology graduates from historically black colleges and universities (HBCUs). Education is viewed as the great equalizer in America. Today, more than ever before, education is the dividing line between those who will prosper in the technological and information age and those who will not. Many see the rapid increase in business school graduates as a reflection of the needs of that economy. This research will focus on the schools of business at four Historically Black Colleges and Universities. Business school graduates from HBCUs desire the same career opportunities as business graduates of traditionally white universities. This study is a work-in-progress as a part Doctoral Study program.

## **Introduction**

In the 1954 Brown v. Board of Education of Topeka, Kansas, decision, The Supreme Court of the United States declared that separate education of young people by race was contrary to the best interests of a democratic society. In so doing, it identified several primary functions of education: cultural assimilation, preparation for participation in the political process, and training for the economic opportunities that were available (Turnbull & Turnbull, 2000). According to the National Center for Education Statistics (1996), a college degree can more than double the earning potential for men and triple the earnings of women. African American and white graduates receive earnings more than 50

percent higher than those of high school graduates. Given the importance of an education, the salient issue the court addressed in the case was how to ensure that equal educational opportunities would be available to all American students. Up until that time, a number of colleges and universities had been established to provide education for young people who had been denied admission to institutions because of their race. Ten years later, 102 institutions of higher education that served primarily African Americans joined to form the Historically Black Colleges and Universities (HBCUs) to provide higher educational opportunities for the freed descendants of enslaved Africans in America (Lemelle & Tilden, 2000).

The role HBCUs have played in providing higher educational opportunities for African Americans has been virtually ignored (Redd, 2000). HBCUs have been the primary providers of postsecondary education for African Americans in a social environment of racial discrimination. In 2002, HBCUs enrolled 14% of all African Americans attending college. Graduates from HBCUs are prominent in medicine, education, government, the military, business, arts, the law, and many other fields. Prominent graduates from HBCUs include former Supreme Court Justice Thurgood Marshall, blood plasma inventor Dr. Charles Drew, the Reverend Jesse Jackson, talk show host Oprah Winfrey, the Reverend Martin Luther King Jr., billionaire attorney Willie Gary, and former U.S. Ambassador Andrew Young. Education is considered to be the single, most important element that equalizes social and economic opportunities, and it remains the path to equality and opportunity. HBCUs, through their long service to African American students, have become central to the national commitment to

improving education of all citizens. HBCUs continue to provide a large segment of the American population with the opportunities they might not otherwise have access to.

The transition from the campus and the adult world is becoming an issue of increasing interest within education, business, and industry. Issues such as finding a job are no longer outside of the mission of higher education. According to Redd (2000), it is important to know if African Americans who graduate from HBCUs have similar employment opportunities and potential for equal incomes as European Americans. The graduate is the product of both the university and his personal preparation. In general, readiness for the workplace is affected by the degree to which students' college expectations are met (Pascarella & Terenzini, 1991). Research about African American students on HBCU campuses, such as how they are viewed by industry, however, is limited.

According to Pascarella and Terenzini (1991) literature on the unique expectations of these students is sparse. Research that does exist has focused on student attributes and persistence, not on their college and career expectations. Even administrators of HBCUs have little information on how graduates are perceived by potential employers. College graduates, naturally, expect a job market that will assess them on their preparation and ability, not race or school. This study will assess HBCU students on how well prepared to enter the job market.

### **Problem Statement**

This study will address this problem: Employer perceptions of technology graduates from HBCUs. The job market in the United States has been recognized for many years to be biased against African American workers (Chima and Wharton, 1999).

Discriminatory hiring practices were once widespread and legally sanctioned. According to the National Council Economic Education (2005) the unemployment rate for African Americans is 10.1% compared to 4.4% percent for white Americans. African Americans make up 12.3% of the United States population. Discrimination has been gradually diminishing, but it still exists. It might be the case, additionally, that employer perceptions of graduates from HBCU Schools of Business are also biased. According to Cedrone (2003), employers frequently share the larger society's perceptions of the underclass, associating crime, illiteracy, drug use, and a poor work ethic with the African American population.

### **Purpose of the Study**

The purpose of this research is to assess employer perceptions of business graduates from historically black colleges and universities. This research may help employers understand their perceptions of graduates from HBCUs. This research may also help employers and HBCUs understand how these perceptions impact the recruitment and hiring of HBCU business graduates by employers. The researcher's goals are to (a) make a contribution to the body of knowledge that exist about HBCUs, (b) investigate employer perceptions of HBCU graduates, (c) inform the employers and students of any negative perceptions that may exist about HBCU graduates and (d) to assist HBCU's and employers in developing a dialogue to understand the perceptions, if any exist. This research may enable corporations to review their social responsibility and diversity policies to include and increase the level of recruiting at HBCUs.

### **Theoretical Framework for the Study**

The theoretical framework for this study is derived from Social Cognitive Theory which states that all human behavior is guided by stereotypes and perceptions which human are not aware. In this study the researcher will examine employer perceptions of technology graduates from HBCUs and determine if these perceptions have an impact on HBCU technology graduates. The literature on SCT further indicates that favorable traits are subconsciously assigned to the individual's own group, and unfavorable traits are assigned to others. Perceptions of human beings impact how rewards are allocated.

### **Summary and Significance of the Study**

Education is considered as the most important vehicle to success in America, but the same college degree from different institutions does not guarantee the same opportunities. The expectations of HBCU business graduates are the same as graduates from traditionally white institutions: employment that enables HBCU business graduates to utilize the business education they earned and be paid commensurate with their knowledge and ability to perform. This study will be important to social change as it will investigate and analyze employers biased perceptions of business graduates from HBCUs.

Unless their preparation is not equivalent to graduates of institutions with a longer tradition of successful business school graduates, equal opportunity for HBCU business graduates remains limited. Without the perception that their preparation is as good as that of a graduate of other business schools, African Americans will not have the same access to economic and social success as their European American counterparts. Differences in pay affect quality of living of all people. This research will elucidate the factors that have

led to the disparities in the opportunities of HBCU graduates and those of institutions which are historically attended by white Americans.

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# **An Investigative Study of Five Decades of Sociocultural Theories Focusing on Burnout During Transformational Organizational Change**

**Geri Puleo, Walden University**

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## **Abstract**

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This investigative study focuses on sociocultural explanations for employee burnout during transformational organizational change. Representative sociocultural theories of employee adaptive responses to workplace stress over five decades were compared and contrasted; the five theorists analyzed are Abraham Maslow (1950s through 1970s), Frederick Herzberg (1960s), Herbert Freudenberger, who coined the term “burnout” (1970s through the mid-1980s), and Christina Maslach (1980s through 2000). Although direct inquiry into the burnout phenomenon is not found in the literature until the mid-1970s, because burnout is often precipitated by individual and/or organizational responses to acute workplace stress that frequently demoralize workers and decrease motivation, the research of earlier theorists into organizational culture and employee motivation provide important insights into the precipitating factors that create greater individual and organizational propensity to burn out during transformational organizational change. Based on these historical and current theories on the causes of change-related employee burnout, a survey instrument was developed to determine the validity of hypotheses regarding individual employee perceptions and organizational policies that contribute to burnout during transformational organizational change.

## **Introduction**

This investigative study limits its discussion of the burnout phenomenon to that arising in the context of transformational organizational change – an area of inquiry that has been insufficiently addressed in the literature. Transformational change is defined as change that modifies the core values, beliefs, and strategic objectives that influence short-term operational activities; because it is long-term and seeks to change the essence of the organization or individual, the nature of transformational organizational change is inherently stressful. First identified by Herbert J. Freudenberger in 1974, burnout was described as a condition in which individuals deplete themselves, exhaust their physical and mental resources, or wear themselves out by excessively striving to reach some unrealistic expectation imposed by themselves or by the values of society or the organization (Freudenberger, 1980). Although not specifically identified until the mid-1970s, the writings and findings of mid-century sociocultural theorists provide valuable insight into determining which individuals and organizations may be susceptible to burnout during transformational organizational change. These scholars' findings were analyzed according to their relevance in a stressful work environment and have been adapted according to the identifiable characteristics and challenges presented by a transformational organizational change initiative.

## **Problem Statement**

The problem addressed in this study is to determine the individual and organizational factors that more greatly predispose employees to burn out during a transformational organizational change initiative.

### **Purpose of the Study**

The purpose of this study is to develop pragmatic interventions that can be implemented throughout the initiative in order to avoid or reduce burnout during transformational organizational change.

### **Conceptual Framework for the Study**

Conceptual support for this study is found in sociocultural theories regarding employee motivation through Maslow's Hierarchy of Needs, job satisfaction based on Herzberg's Motivator-Hygiene Theory, the general findings on burnout victims as introduced by Freudenberger, and the more recent research on burnout in the caring professions conducted by Maslach.

### **Summary and Significance of the Study**

Freudenberger described burned out workers as

[a] devastating sight...only crumbling reminders of energy and life...Indeed, the outer shell may seem almost intact. Only if you venture inside will you be struck by the full force of the desolation (Freudenberger, 1980, xv).

When an organization is introducing a transformational organizational change initiative, the energy, knowledge, creativity, and commitment of the entire workforce is critical in order to ensure that the desired change is incorporated into the culture of the organization. Such transformation requires immediate realization of short-term goals in order to ultimately achieve a result that is often several years in the future; transformational organizational change presents both acute and chronic environmental factors that can precipitate burnout. Burnout can either present as an acute condition specifically related to a major, short-term life event (e.g., the pressure to meet a specific project deadline in the change initiative's timeline) or as a chronic condition that

develops slowly (e.g., constant anxiety emanating from fear of one's place in the as yet unknown transformed organization). When chronic, burnout is rarely identified in its early stages because "most Burn-Outs are competent, self-sufficient...and...hide their weaknesses well" (Freudenberger, 1980, 13). Although Freudenberger provided insights into the symptoms and potential causes of the phenomenon, his remedial interventions are not only antithetical to the employee requirements in a transformational organizational change but also to the proactive adaptive responses necessary in a modern constantly changing, global business environment: he advises workers to "have a good time" (Freudenberger, 1980, 209) and "teach yourself to care less about your job" (Freudenberger, 1980, 175).

In contrast, Maslow's theories of 50 years ago have been affirmed in the business environment through this simple hypothesis:

Managers who treated their subordinates with trust and respect created a more supportive, more productive, and more creative work situation (Maslow, 1987, originally published 1954, xxxix).

The core of Maslow's humanism is a single holistic principle that binds together the multiplicity of human motives by recognizing that the tendency for a new and higher need to emerge is predicated on the fulfillment or gratification of a lower need (Maslow, 1968). Arranged prepotently within the Hierarchy of Needs are the five levels of basic human needs: physiological, safety, love or belonging, esteem, and self-actualization. While essentially cognitive in nature, Maslow emphasized the importance of conative needs in understanding human behavior: conative needs "have a striving character" and are found in the desire or need to know and understand, with the desire to know prepotent over the desire to understand (Maslow & Stephens, 2000, originally published 1943). Cognitive capacities (e.g., perceptual, intellectual, learning) comprise a set of adjustive

tools functioning to satisfy basic needs; their psychological importance rests on the act's direct contribution to the satisfaction of basic needs. When any of these needs are in danger of being unsatisfied, the individual will perceive a psychological threat to his or her well-being; specifically, this perceived psychological threat occurs when either the thwarting or possibility of thwarting of these five basic human needs is present, danger to the defenses that protect these needs arises, or conditions upon which these needs rest are changed. Most compelling in the study of burnout during transformational organizational change, these psychological threats create general emergency reactions in the individual which are characteristic of burnout (Maslow, 2000, originally published 1943).

Herzberg (2003) noted in *The Motivation to Work* that “worker satisfaction comes chiefly from achievement and growth in the quality of the work itself.” Burned out workers are characterized by a psychological and physiological inability to perform at peak productivity levels; because their quality of work diminishes, overall job satisfaction and the motivation to put forth the extra effort needed to move the organization toward its transformational change objectives also decline. Therefore, although the burnout phenomenon was not specifically identified until 15 years subsequent to Herzberg's seminal research, the role of motivation and employee satisfaction in predicting the propensity of an individual to burn out cannot be underestimated.

The significance of this study will result from the identification of key individual perceptions and responses as well as specific organizational policies and procedures that are conducive to burnout during transformational organizational change; from this insight will emerge a pragmatic organizational intervention to maintain productivity and performance during the change initiative through the amelioration of employee burnout.

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# **An alternative approach for increasing relevancy in web searches**

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## **Abstract**

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Retrieving relevant information from web sources is a vital part of most research efforts. However, it is often very time consuming to find the key piece of information when limited to a single text search function. Web searching tools can be optimized to produce more relevant results through the use of a threefold process having: 1) a master schema defined in a relational database, 2) an advanced web data parsing and saving process into the master schema stored in a relational database using schema matching (Rahm, E., Bernstein, P. A. 2001, pg. 340), and 3) a user interface that allows for query creation and use with the master schema data. This new method is based on previous doctoral level research pertaining to each of the individual methods.

This research defines a single method for retrieving unstructured web data based on combining three existing web retrieval methods and applying them to a web search engine. The first web retrieval method, a mediated schema (Pottinger, 2004), will be introduced to establish structure in unstructured web data. The second web retrieval method, a process of retrieving unstructured web data using Natural Language Processing

and Computational Linguistics techniques, will be applied. The third web retrieval method, storing the data into a relational database, will be demonstrated.

A web search engine will be developed for interaction with the captured web data to examine and compare the new method against existing methods for relevancy. A survey will be distributed to research participants for a comparison of the new web search engine versus a leading web search engine (google.com). The goal is to prove increased web data retrieval relevancy using the new methodology.

### **Introduction**

One major benefit of the Internet is its ability to exchange information rapidly. However, using a simple search engine can prove costly in time because users must sift through the results for that one meaningful piece of information.

Web data retrieval systems exist today to offer assistance in finding information however they bring the problem of irrelevant results. The results may not be best because users might need to manually sift through the results. Further, there are complex differences in web data systems that create problems for seamless exchange and retrieval (Adams, K., 2001, ¶ 1).

For example, some web retrieval systems offer limited searches and functionality (Arocena, G. O., Mendelzon, A., O., Mihaila, G. A., 1997, p. 1). Other web data retrieval systems lag in platform independency (Chamberlin, D., 2002, p. 597).

This research will prove that combining three web retrieval methods into one can increase relevancy. While many methods exist to retrieve information from the web, none clearly stands out (Wang, 2004, pg. 2). One reason for having so many web retrieval methods is they are limited in the scope of their task. Another reason is there is

no organizational agreement – many vendors are making different web retrieval methods based on their interpretation of the problem.

### **Problem Statement**

The problem is web searches produce many irrelevant results and thus take more time for users to determine what they need (Pottinger, R., 2004, pg. 2-3). Potential improvements by combining existing web retrieval methods have not been realized.

Research needs to be done on how to populate a relational database having the schemas with unstructured web pages.

### **Significance of the Study**

A significant contribution of this research to the body of knowledge will be increased relevancy in web searches for web users. Increased web search engine relevancy will ultimately lead to increased productivity for web users.

### **Research Design**

The methods to be used in this study consist of combining existing web search methods, a working tool based off the new method, and a survey to report the results. The problem to be addressed is to reduce the amount of irrelevant web pages. Narrow web searches can be more focused and offer more accurate results if more web search functionality is offered.

The new method will retrieve web data using NLP and CL into master schemas. The new method will be a combination of other methods including Topic Detection Tracking (TDT), Hypertext Induced Topic Selection (HITS), and Information Extraction based on Pattern Discovery (IEPADS) (Chang, C. and Lui, S, 2001). The method will

combine TDT, HITS, IEPADS, and schema matching, and codify the formulas into the computer language Microsoft Visual C# .NET© 2003.

Following is a list of formulas for each of the methods to use in the web data extraction process:

#### *Topic Detection Tracking (TDT) Formula*

Formula:  $U = Wrel R - NR$   
 Where:  
 R = number of relevant stories retrieved  
 NR = number of non-relevant stories retrieved  
 Wrel = relative weight of relevant vs non-relevant  
 (set to 10, by analogy with CMiss vs. CFA weights for CDet)

Figure 1: Topic Detection Tracking (TDT) Formula (Fiscus, J, Wheatly, B, 2004)

#### *Hypertext Induced Topic Selection (HITS) Formula*

Formula:  $PR(A) = \frac{PR(B)}{L(B)} + \frac{PR(C)}{L(C)} + \frac{PR(D)}{L(D)} \dots \frac{PR(Z)}{L(Z)}$   
 Where:  
 PR = PageRank  
 A, B, C, D ... Z = Web pages  
 L = Links

Figure 2: Hypertext Induced Topic Selection (HITS) Formula (The Free Dictionary, 2005)

#### *Information Extraction based on Pattern Discovery (IEPADS) Formula*

Algorithm:  
 TextClasssifer(to;C;CO; n)  
 to: the unknown text object  
 C: the set of classes  
 CO: the set of class objects returned by HCQF  
 n: the number of target categories  
 1: for all co 2 CO do  
 2:  $r(to; co) = \text{sim}(vto; vco)$   
 3:  $Rk(to)$  the k class objects co 2 CO with highest  $r(to; co)$  scores  
 4: for all c 2 C do  
 5:  $rkNN(to; c) = 0$

```

6: for all co 2 Rk(to) do
7: for all c is a class of co do fa class object co may enrich
multiple ancestor classesg
8: rkNN(to; c) rkNN(to; c) + r(to; co)
9: return top-ranked n classes in C according to the
decreasing
order of rkNN(to; c)

```

Figure 3: Information Extraction based on Pattern Discovery (IEPADS) Formula (Chang, C. and Lui, S, 2001)

#### *Schema Name Matching*

Name-based matching matches schema elements with equal or similar names. Similarity of names can be defined and measured in various ways, including:

- Equality of names.  
An important subcase is the equality of names from the same XML namespace, since this ensures that the same names indeed bear the same semantics.
- Equality of canonical name representations after stemming and other preprocessing. This is important to deal with special prefix/suffix symbols (e.g., CName → customer name, and EmpNO → employee number)
- Equality of synonyms. (E.g., car ≈ automobile and make ≈ brand)
- Equality of hypernyms. (E.g., book is-a publication and article is-a publication imply book ≈ publication, article ≈ publication, and book ≈ article)
- Similarity of names based on common substrings, edit distance, pronunciation, sound ex (an encoding of names based on how they sound rather than how they are spelled), etc. [BS01]. (E.g., representedBy ≈ representative, ShipTo ≈ Ship2)
- User-provided name matches. (E.g., reportsTo ≈ manager, issue ≈ bug)

Figure 4: Schema Name Matching algorithm and definition (Rahm, E., Bernstein, P. A. 2001, pg. 340)

The data will be saved in a relational database using identified schemas. Sources of the schemas will be retrieved from the Electronic Commerce Code Management

Association (ECCMA). The ECCMA schemas are located at

<http://www.eccma.org/downloads.php3>

The data will have a web interface that allows users a way to define and run common SQL which is defined in the ISO-IEC 9075 document.

The relational database schema will be based on existing master schemas identified during the research. The process of web retrieval will use Topic Detection Tracking (TDT) to retrieve web data and save data it into a database. A web search engine will be coded that allows users to run SQL against the database housing web pages retrieved into the master schema. Several hundred web users with an interest in web data extraction will be surveyed to compare web pages for improvements in relevancy on the proposed method versus the current method used by a leading search engine (google.com).

### **Conclusions and Recommendations**

A new web search method will be created based on existing web search methods. It can significantly improve the relevancy of web data retrieved by providing more robust features for narrowing searches. Users will be able to select fields, join data across websites, and perform standard SQL analysis afforded of a schema-based data storage system with a full relational database.

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# **A Theoretical and Empirical Study of Predicting Powers of Potential Income versus Credit History for Loan Repayment**

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## **Abstract**

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This study investigates the predicting powers of potential income as an additional independent variable to credit history to predict loan repayment. Potential income has raised an interesting issue of legislative concern, that of its appraisal for taxation purposes. Little analytical work has been done in this area of credit rationing, and limited literature and restrictive proprietary rights to information constrains this study to be undertaken using approximation techniques. This is a deductive study, and it employs the quantitative research design, using survey data collected from lending officers to test a multiple regression model that permits the assessment of the relationship between one dependent variable and several independent variables, and it is particularly suitable for prediction. The study will enhance lenders understanding of the most important factors in making credit decisions, in order to reduce loan default experiences. This will allow for increased consumer spending, and lead to more stimulating effects on macroeconomic activities. This study is a work-in-progress, forming part of a doctoral study program.

## **Introduction**

While the concept of using income as complementary to credit history in predicting loan repayment may have been floating around for quite sometime (e.g., Paroush, 1976; Weston & Brigham, 1993; Thompson, 2003; Avery, 2004; Shenn, 2004),

there appears to be little, if any, analytical studies into the use of potential income as a factor in predicting loan repayment. For example, such factors as a credit consumer's level of education and the economic strain that marital divorce may cause through alimony and/or child support payments on a borrower's ability to repay a loan are rarely considered in traditional loan-granting decisions. This, by implication, points to the fact that the credit evaluation system does not fully explore all available predictors of loan repayment, which necessarily makes the credit rationing system deficient as a tool for predicting loan repayment.

Effective allocation of credit to consumers increases consumer spending and investments, and stimulates macroeconomic activities across contemporary credit-centered economies (Stanhouse & Sherman, 1979). But the problem is that there is no effective credit rationing system that minimizes loan default experiences in order to permit consumer spending and investment to have full stimulating impact on macroeconomic activities of contemporary times (Stanhouse & Sherman, 1979; Timmons, 2002; D'Silva, 2004). The reason being that in the presence of loan defaults, lenders are more likely to be over hesitant in granting loans that will end up as bad debts. This lack of effective credit rationing system should naturally immerse management in the dilemma: "Credit history is an inadequate forecaster of an applicant's ability to repay," and should raise the corresponding management question: "What indicator can better tell us if a borrower will repay?"

### **Problem Statement**

This study analyzes, from both loan officers' and academic researchers' perspectives, whether using loan applicants' potential income as additional independent

variable will yield a more reliable indicator of loan applicants' ability to repay than using credit history exclusively. Lenders traditionally place more emphasis on the use of loan applicants' past use of credit to the apparent neglect of potential income, which equally may offer a good, if not a better, predictor of loan repayment.

The idea of categorizing potential income as tangible income, that is, income that is capable of being appraised as taxable income has come under consideration recently. For example, U. S. Senator Tom Daschle (1999) introduced legislation in Congress that was intended to levy "tax on Americans based not just upon their income, but also their 'potential income'" (as cited in Free Republic, p. 1). As the senator noted:

It's high time that Americans with great earning potential pay [paid] their fair share of America's tax burden. For far too many years these people have been able to use current loopholes to avoid paying what they should.

Our bill will close those loopholes. (as cited in Free Republic, 1999, p. 1).

If the senator's bill were to pass into law, it would expand the powers of the Internal Revenue Service (IRS) to evaluate potential income in terms of, for example, looking at home owners with vast backyards that could have earned income if cash crops had been planted, instead of leaving the backyard to lay fallow. IRS could also be vested with "the power to identify citizens with rich relatives and then determine the amount of money a person could have received had the rich relative died" (as cited in Free Republic, p. 1). Thus, if the notion has been created that potential income could be a real and taxable income that must be seriously considered as any other earned income, why then cannot it be seriously considered as income that could also be used to predict loan repayment?

### **Purpose of the Study**

The purpose of the study is to investigate, from theoretical and empirical perspectives, the relative advantages of the predicting powers of potential income versus credit history for loan repayment, so as to help minimize loan default experiences. This will permit more investment capital to be released to credit consumers, increase consumer spending, and stimulate the overall macroeconomic performance.

### **Methodology**

The study utilizes the quantitative tradition, using a field survey that is targeted at bank loan officers, and thus it will offer the advantage of participants who are knowledgeable about the phenomenon under study. Because credit history, potential income, and loan repayment are variables that may contain several or even infinite sets of operational definitions, they are continuous variables, and a straight line is fundamentally the best approach to model the relationship between these continuous variables (Cooper & Schindler, 2003, p. 580). The study uses SPSS statistical software to analyze the data, and employ a multiple regression model given by,

$$Y = f(C, P) \quad (1)$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \epsilon \quad (2)$$

### **Significance of the Study**

The lack of the potential income coefficient in the credit-scoring model may essentially deprive the Fair Isaac Corporation (FICO) credit-scoring system (the most widely used credit-scoring system) of total effectiveness in its loan repayment predictive capabilities. This happens because the weight that could be assigned to the potential income factor is completely left out for different lenders to consider, if they would at all,

leading to a non-uniform application of predictive factors of loan repayment that essentially deprive the FICO system of any uniformity and fairness. As Quinn (2000) noted, “differing scoring models may reach broadly different conclusions” (p. 4). The resultant effect is that those customers possessing better capability to repay loans may be denied credit access because the potential income complement was not factored into the evaluation system. What then occurs ultimately is an under appreciated use of investment capital, which in turn, generates macroeconomic underperformance that may become detrimental to the well being of society.

### **Conclusion**

Undoubtedly, lenders consider two broad issues before approving loans. These are (a) applicants’ ability to repay the loan, which are determined by credit history, and (b) income. But the limited way by which the income factor is considered leaves much to be desired. It does not consider potential income, and this constitutes a major focus of this study. While it does not make economic sense for any lender to advance funds to a borrower who does not demonstrate the capability to repay as measured by income, it appears that lenders stop short of exhausting the full potential of the income factor by taking a relatively short-term view of income, rather than the longer-term view. In other words, it is the intention of this study to explore the longer-term effect of income as a determining factor of loan repayment. This long-term effect manifests as potential income, an issue that in 1999 raised national legislative interest, spearheaded by U.S. Senator Tom Daschle, who proposed a bill that argued that “potential income” should be appraised as taxable income. This line of reasoning, by extension, raises the logical parallel reasoning of seeing potential income as *real* income that must be considered in the credit evaluation process.

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# **Post-implementation Assessment of Knowledge Management Programs at Government Organizations: The GSA Case**

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Sherrie Householder

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## **Abstract**

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This paper examines the causes of failure in post-implementation of knowledge management programs at large government organizations, specifically the case of the Goods and Services Agency (GSA) as knowledge management strategy embodies a long-standing scheme involving not only technology integration but also considerable investment in change management and business process design. The paper further suggests that KM programs in traditional government organizational structures often fail to deliver results in complex, multi-enterprise organizational structures because KM initiatives seek to transform the entire understanding of work processes, which causes workers to avoid utilizing KM systems effectively. Findings in this paper concludes that several elements contributed to the failure of implementation of KM programs at large government organizations, reasons seen as; lack of strategic direction and/or leadership, organizational environment and culture, the silo effect, and technology enabler and disabler, can greatly hinder KM initiatives.

## **Introduction**

The size of an organization has direct bearing on its agility to share knowledge. Organizations with fewer than 150 associates have an easier time-sharing knowledge than

larger ones. In smaller organizations, people tend to know one another and therefore they have a higher rate of inter-organizational interaction. In such organizations, workers typically tends' to share a strong sense of connection and trust, which facilitates knowledge sharing and implementation of knowledge management systems (Denning, 2000).

The dynamics of organizations change dramatically once they exceed 150 people. As organizations grow larger, people organize into groups, which creates barriers for knowledge sharing as in the case of GSA and other government agencies. Some scholars argue that the human element within the organization do not usually operate as a team (Doorewaard, Van Hootegeem, Huys, 2002), workers do not have the tendency to know one another well, if at all, and consequently, have little or no trust within modern organizational structures, which ultimately constricts knowledge sharing.

Organizational structure is particularly curtail in the knowledge management mix as it represents the set of arrangements among the resources of the organization (Chender, 2005), these resources may be people, facilities, technological, or financial can be very conceptual. The issue of how resources are related to each other and especially their influence on human culture and human relationships within large organizations, influences organization's performance, and organizations' ability to learn and change. Whether an organization rejects external change or embraces a change and, through learning, strives to adapt or influence those changes is heavily influenced by both structure and culture.

The hierarchical and controlling structure nature tend to prefer stability and minimize the learning and close collaboration needed to meet significant change or

paradigm shifts. Weak structures that have a culture of sharing and collaboration can often facilitate learning and allow the freedom to change. However, clear direction and coordination is needed, otherwise the resulting actions will be diverse and the lack of focus prevents the ability to support major organizational objectives.

If KM initiatives are implemented in large governmental organizations for the wrong reasons, it will be incapable of providing value to the workers and the organization. Thus, knowledge management effort that creates and manages a structure to correlate higher collaboration between employees and concomitantly focus on the outcome of the KM application can produce value. This can be achieved by integrating organizations' strategy, structure, and workforce by using knowledge as the common denominator and organizations' strategies as the guidepost (Denning, 2000), too much limitation on knowledge focus however can create an inability to respond to trends and major environmental paradigm shifts.

### **Problem Statement**

Large government organizations, that exceeds 150 employees with retiring workforce tends to struggle in their implementation of KM systems. Threatened by the loss of valuable information it is crucial to determine the underlying reasons in success or failure of knowledge management implementation programs.

### **Methodology**

The research methodology process was based on data analysis provided by the Goods and Services Agency, which offered a basic method to accurately limit, analyze, and present findings of organizational performance at various stages.

The data collected through a multiple methods: structured interviews, documentation review, and observation. Interviews included frontline workforce, middle management, and executive level. The population sample was 32% of the workforce at GSA. The data collection method and technique used for this study is especially valuable for the purpose of organizational process designs, as it helps in presenting various perceptions, provides information on rising concepts, allows for validation of concept design, and generates better confirmation of hypothesis (Eisenhardt, 1989; Glaser and Strauss, 1967; Pettigrew, 1990).

Data collection emphasized the relationship between people, technology, and process change, as information focused on number of elements including: organization objectives, structure, culture, technical capabilities, size, locations, budget, and regulations that takes in government standards, policies, procedures, the viability and applicability of KM tool to obtain, implementation approach, scheduling, management assurances, available technical knowledge, and changes linked to the use of KM system tools.

### **Significance of the Study**

This paper makes three major contributions. First, it depicts on large government organizations' experience with KM implementation. Second, the paper generates an understanding of the factors involved in causing post-implementation failures. Third, the results presented in this paper contribute to the general body of knowledge of knowledge management systems implementation in relation to government institutions. Such concepts not utterly present in contemporary research and practice that is concerned with KM implementation programs at large organizations.

## Conclusion

It is a mistake for large organizations to assume that an effective KM program can be planned and implemented in just a few years rather the understanding should be that implementing knowledge management strategy embodies a long-standing scheme involving not only technology integration but also considerable investment in change management and business process design. The same understanding should extend to the belief that the main challenges to implementation of KM systems stalk from the lack of culture of sharing that is embedded in the culture of large organizations', which obstructs KM initiatives. Large government organization can benefit from the experience of the Goods and Services Agency (GSA) by address these post implementation challenges through careful change management, higher managerial involvement, and process redesign that forces primary components of KM initiatives into the daily functions of workers early in the implementation stages. Although the focus on organizational culture and change may extend the timeframe for a KM program, however quantifiable benefits justify increased period and cost. Those benefits include better preparation for implementation and the ability to take advantage of advanced technology.

Unless deliberately provoked, most organizational structures tend to become rigid over time, this is especially true in large government organizations tat exceeds 150 employees. To prevent such rigor mortis, and to keep the workforce flexible and open to personal and professional change, government organizational learning and knowledge management needs to encourage the use of flexible and changing structures, at the same time retaining the capacity to focus and correlate local knowledge and activities. Organizational policies such as rotating workforce to broaden their experience and

revitalize their challenges, continuously bringing new people into the organization at all levels and deliberately changes organizational relationships thus, catalyze and perpetuate both individual and organizational learning (Denning, 2000).

The findings presented in this paper that was based on organizational performance, and data analysis of the implementation of knowledge management program at GSA, suggests that traditional government organizational structures and project management methodologies often fail to deliver results in complex, distributed, multi-enterprise organizations because KM initiatives seek to transform the entire understanding of work processes. Some of the reasons attributed to such complex variables at government organizations that includes' organizational politics, reporting structures, and funding and budgetary issues. This study also finds that traditional government agencies structures were designed to facilitate delivery of a single service and not to facilitate cross-organizational collaboration. Furthermore, as the organization resources gets reallocated, there is increasing dependency on collaboration to optimize government efficiency as opposed to organizational efficiency. Post-implementation of KM programs at government organizations should emphasis the unification and simplification lines of business to better meet the needs and demands of organizational objectives, federal government, organizational partners, and clients. It is imperative to understand that the very purpose of initiating and implementing KM system at government organizations was to eliminate lack of communications, divergent interests, unclear decision-making processes and poor governance that hinders inter-organizational efforts at all levels.

However, while more empirical work is needed to reinforce the findings in this paper, it is our conclusion that several elements contributed to the failure of implementation of KM programs at large government organizations, which can be seen as:

- Lack of strategic direction and/or leadership: Government organization may change their overall strategy and objectives but fail to communicate this information well to everyone within the organization. Poor communication between management and knowledge workers, lead to staff feeling that their opinions or time spent engaging in KM activities is not valued. Management plays a crucial role in the process of transferring knowledge. Since lack of management involvement caused lack of perceived need, this also lead to the allocation of inadequate time and resources to the implementation initiative.

- Organizational Environment & Culture: Government organization's culture is not set up to adequately promote, recognize, and reward knowledge sharing efforts with appropriate incentives caused additional impediment to the process. Individuals hoard knowledge rather than shared it. A non-nurturing environment lead to associate turnover, which further weakened the knowledge transfer chain.

- The silo effect: Large government employees find it difficult to share knowledge within a "silo" organization, where knowledge is stored in a variety of different formats and repositories, and departments operate independently. Especially government agencies where they have traditionally segmented information into different systems in distinct departments, keeping clients and partner's information separate from

other important related information. Government organizations have also created distinct groups of people with differing beliefs and assumptions about the best way to work, so knowledge transfer requires great amount of effort.

- Technology enabler and disabler: The use of new technologies in the form of Intranets and KM systems enabled knowledge transfer efforts; however, systems were too complicated, and therefore they were not used as they initially intended to.

Knowledge management systems must be present at the design stage so that using the system will become ingrained in their everyday work processes.

Finally, although this paper addresses tangible reasons for impediments and failure of implementation of KM programs at government organizations as process of transferring knowledge, the process doesn't end there. It is important to continually measure the outcome of KM initiatives at large organizations. Such initiatives can be expensive, but could draw more support if an organization implementing KM program can demonstrate economic value and/or competitive advantage. However, because of the intangible nature of what is being measured, it is suggested that choosing an appropriate quantitative and qualitative metrics is necessary for benchmarking in order to measure the true value of knowledge management.

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# **Development of measurement scales for project complexity and system integration performance analysis**

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## **Abstract**

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This quantitative study of the constructs of project complexity and system integration performance seeks to generate tools for the researcher and practitioner. While many projects have been labeled as complex, no other label has attained such widespread use without robust scales and empirical research, that this research addresses the need to add to the body of knowledge by devising a theoretical framework for the construct and validation through statistical analysis of survey data. The social implication from the findings of this study may have far reaching effects by redefining project management resource decisions for affirmative actions based on gender, age, culture, or education. This study is work-in-progress as part of Doctoral Study program.

## **Introduction**

The use of technology as a competitive advantage has been a hallmark in business since the invention and proliferation of the computer since the 1950s (Bassellier & Benbasat, 2004; Beattie & Tull, 2002; Eppinger, 2001; Evans, 2004; Lee & Shu, 2005). The increasing performance gains in computing technology has been estimated by Moore to continue to double the number of components for the same circuit at the same cost every year since 1965 (De Jager, 2004; Moore, 1965). Along with the gains in

processing power have increased the data volumes and number of connection points for networks leading to ever more complex systems. The Internet network has connected millions of computer networks across the globe (Haag, Cummings, & McCubbrey, 2004) and electronic commerce has generated global commerce and transaction processing on a continuous basis (Turban, King, Lee, & Viehland, 2004).

The prospect of higher volume transaction processing, resource sharing, and lower manufacturing costs from the use of robotics, no or low inventories, and e-commerce has transformed economies on a global basis. The number of globally operating companies has increased steadily since the 1980s and the integration of information systems for every aspect of a company's business has evolved into enterprise resource planning (ERP) systems while taking advantage of economies of scale. Electronic real-time systems exist not only for the ordering, manufacturing, and accounting of products and services, but also for marketing, delivery, and electronic customer service. The task of administering a multitude of systems within organizations has sparked consolidation and integration efforts to thwart off rising maintenance and development costs and is expected to "raise industrial productivity for years to come" (Papatheodorou, 2003, p. 11).

With an industry estimate of at least 15% IT project failures and project cancellations prior to completions, the total losses are conservatively estimated with over \$5 billion for the year 2003 annually (Iacovoc & Dexter, 2005; Ramnath & Landsbergen, 2005). The failures add not only financial costs to organizations, but also require efforts and resources to restore operational stability, repair credibility, and take up time for organizational learning (Iacovoc & Dexter, 2005). The exorbitant costs associated with

these failures are attributed to the need to upgrade technology, added interdependence between systems and projects.

Current information and transaction processing demands are expected by consumers and businesses to be processed in real-time across time zones and continents. Data security, accountability, reliability, and accuracy have led to increased demands on systems and workers. The growth in integration efforts, technical standards, and issues has kept pace analogous to the technical development, as the growth of team leadership and group based management practices has spurred the advancement of project management.

According to Meredith and Mantel Jr. (2003) “leading researchers and scholars perceive the twenty-first century as the upcoming age of project management” (p. 34). The specialization of professionals within the information technology arena has led to the creation of new information knowledge positions governed by team leadership with project based foci. This study is concerned with the performance of system integration analyses and the assessment of project complexity. A correlation of a number of sources for project complexity exist, such as number of stakeholders, regulations, knowledge requirements, technology, funding, time, taxes, security, customs, ethics, and culture. The composition of the project team members, proximity of stakeholders to project management, project size, and frequency of interaction between project members may all add to the level of complexity for a project.

Despite the frequent use of the word and label of complexity for projects and system integration in research literature and information technology industry, the constructs of system integration and project complexity have yet to defined and measured

consistently (Bani Ali, 2005; Ivory & Alderman, 2005). This study seeks to add to the body of knowledge by devising robust measurements for the constructs of project complexity and system integration.

### **Problem Statement**

The uncertainty and failures surrounding information technology (IT) projects and system integration efforts have led to an increased classification of projects as complex (Ivory & Alderman, 2005). Despite the increase in use of the construct, a lack of valid and stable measurement scales for project complexity and system integration have been identified by Bani Ali (2005). Therefore, the problem to be addressed in this study is to develop measurement scales for project complexity and system integration performance analysis. Researchers and management practitioners assume that project complexity is positively related to project failures, however empirical support for the relationship between project outcome and project complexity is absent (Ivory & Alderman, 2005; Roberts, Cheney, Sweeney, & Hightower, 2004).

Project success factors and project success criteria have been established and will be examined against project complexity assessments as part of this study. Criteria establish the benchmarks for the outcome of projects against which they are measured, while success factors are requirements conditions that influence the outcome during the project. This study will seek to verify a correlation between project success factors and criteria with the newly created theoretical framework of project complexity. The study will also seek to unveil a difference of project complexity perception based on gender, age, and culture.

Additionally, this study will establish a construct for system integration and seeks to validate its application. Although system integration projects have received a lot of white paper and industry attention, only limited empirical studies have been conducted to delineate system integrations from other projects and information system issues (Bani Ali, 2005; Ivory & Alderman, 2005). The problem of lack of scientific information will be addressed directly through this study by offering quantitative data in respect to system integration performance and project complexity.

### **Methodology**

For this quantitative study a mix of survey methods will be used to validate the measurement constructs. Upon completion of the theoretical framework for project complexity and system integration performance, this study will embark on the exploring the robustness of the constructs in a pilot survey, followed by an across industry survey of current projects. The constructs will be generated based on multi-dimensional scales from Thurstone, Likert, and Guttman in order to adequately represent the semantic difference in the constructs (Trochim, 2001). The statistical analysis of the relationships and correlations between the measurement variables will utilize descriptive and Campbell's multitrait-multimethod matrix, as well as other applicable, advanced statistical methods.

### **Significance & Purpose of the Study**

The purpose of this study is to create a tool for researchers and practitioners that will improve operational gains, working efficiency, and adds empirical data for the research body of knowledge. The inclusion of project complexity scales and system integration performance constructs can potentially renew how program and project

management will decide on resource selection. Empirical data from the study may reveal new human resource staffing needs for integration projects and will shed light on success factors and can help establish success criteria depending on gender, culture, education, or age. As an ancillary outcome of the study, the social implications for closing a growing 'digital divide' may be countered by adding support for diversity and affirmative actions in project management.

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# **Critical Aspects of Communication in Cross-Cultural Project Management**

**Rosario Robinson**

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## **Abstract**

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This study used a phenomenological approach to examine the critical aspects of communication in cross-cultural project management. Many companies are standardizing project management tools to yield consistency for implementation and delivery of projects. Because many phases of projects overlap, multiple business roles are involved and project team members are geographically dispersed, a collaboration tool is often desired to handle daily communication. With this in mind, cross-cultural environments, management methodologies along with collaboration tools are examined to determine the effects of computer-mediated technologies closes the gap in project communication. This study investigates the use of open-source project management tool to strengthen communication complexities in cross-cultural environments. This is an on-going investigation for a knowledge area module requirement of a doctoral program.

## **Introduction**

The successes or failures of many projects are due to various components. Management practices and theories are important elements in execution of any project. Many theories and methodologies are created to handle many management situations and to help control any problems that may arise. In addition to the management challenges, especially with globalization in the forefront, managing in a cross-cultural environment is

demanding in itself. The key to executing, maintaining and producing successful cross-cultural projects is the communication component of project management. However, communication in this day and age can encompass computer-mediation, cross-cultural communication theories and phenomenological approach. Globalization has many project teams dispersed across country and overseas, communication is challenging in cross-cultural environments, not only in business roles but cultural as well. Computer-mediated technologies such as collaboration tools are used currently on many projects. These collaboration tools consist of emails, intranet project sites, Instant Messaging tools, etc. There are many open source tools available today that large corporations are considering as standards for their project management landscape. Why open-source? “The basic idea behind open source is very simple: When programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. This rapid evolutionary process produces better software than the traditional closed model.” (Open Source Initiative)

### **Purpose of the Study**

The purpose of this study is to investigate how computer-mediated technology has impacted the project management community. Its affects on project control and management has truly engaged managers with their internal and external customers to complete a project successfully. According to Johnson, Boucher, Connors and Robinson (2001), within the last ten years, project success rates have increased while the failed projects have declined. Projects’ landscape for execution has changed drastically and improved significantly due to many factors. One major factor is the computer-mediated technologies available to manage projects’ cost, schedule and quality. Additionally,

communication is vital to a successful project. Collaboration tools have made an enormous impact on management methodologies and communication theories. Collaboration tools are most common in many corporations as a PM tool to assist organization, management and completing tasks to meet project goals. Collaboration tools are the evolutionary of traditional project management tools such as Microsoft Project (MP). Traditional project management encompassed traditional management framework. Most managers must be at the applicable location where project was implemented, all projects members were located at the same location, and communication was traditional face-to-face meetings. However, in today's industries where implementation is a struggle in a cross-cultural environment and project team members geographically dispersed, any assistance in project management the success rate will continue to increase especially applicable in globalization.

### **Conceptual Framework**

A phenomenological study will be the approach for this study. The author will present "phenomenological data analysis proceeds through the methodology of reduction and the analysis of" (Trochim p. 52) management and communication theories from an individual's experiences. The discussion will further scrutinize the most recent project management methodologies and the inclusion of technology as a vital component of success. Through analysis, management methodologies along with communication theories are examined while utilizing various open-source project management tools to determine if in fact a collaboration tool does improve the overall execution of a project.

### Significance of Study

Often times, there are many projects that fail because requirement objectives are not met or misinterpreted, schedules are missed, cost is over budget and the quality of products or services are inadequate. However, all components require direct and clear project communication at all phases of the project. This study examines how computer-mediated technology contributes to the success of a global implementation project, in particular, critical aspects of communication in cross-cultural project management. With an abundance of project management tools and methodologies, the Open Source Initiative encourages an open approach to managing projects. The significance of this study will encourage the Project Management community to develop a standard communication tool that can utilize many methodologies in any industry.

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# **Defense Management: A Paradigm Shift in One-size-fits-all Education**

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## **Abstract**

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One of our nation's largest and oldest organizations prepares to radically transform traditional advancement practices. In FY2011, the U.S. Navy will require that certain senior enlisted personnel (mid-level managers) attain specific educational requirements prior to promotion to the next higher pay grade. Concurrently, the Department of Defense (DoD) faces numerous management challenges, which the federal Government Accountability Office (GAO) attributes to inefficiencies across DoD's major business areas, resulting in billions of dollars of wasted resources annually. This paper discusses a proposal potentially saving the DoD billions of dollars annually through education, organizational alignment, and opens the door for further research.

## **Introduction**

According to an administrative message released in August of 2005 (NAVADMIN 203/05, 2005), potentially eligible active and reserve Navy Chief Petty Officers (CPOs) shall complete a relevant associate's degree prior to November 2009 in order to be eligible for advancement to Senior Chief Petty Officer (SCPO) during FY2011.

The enlisted rank structure within the U.S. Navy and personnel quantities (active duty only) is made up as follows: (Department of Defense [DoD], 2005)

<b>Paygrade</b>	<b>Name</b>	<b>Quantity (as of September 30, 2005)</b>
E-1	Seaman Recruit	15,986
E-2	Seaman Apprentice	51,972
E-3	Seaman	16,137
E-4	Petty Officer Third Class	60,927
E-5	Petty Officer Second Class	73,274
E-6	Petty Officer First Class	53,277
E-7	Chief Petty Officer	23,759
E-8	Senior Chief Petty Officer	7,426
E-9	Master Chief Petty Officer	2,977
		<b>305,735</b>

Note: Naval Ready Reserve numbers as of October 31, 2005 were 139,987 and Navy Department civilian employees as of November 30, 2005 were 176,595 (United States Navy [USN], 2005)

There were 25,977 E-7s and 59,095 E-6s who may need to complete an associate's degree before November 2009. Additionally, there were 7,314 E-8s who would need to start pursuing a bachelor's degree prior to 2013 (you could add in others as that is four years farther down the road although the total number remains fairly consistent).

Paygrade	Total	Associates	Bachelors	Masters	PhD	Total w/ed
E-6	59095	1950	2293	146	8	4397
E-7	25977	1639	1822	196	5	3662
E-8	7314	604	687	103	3	1397

Therefore, prior to November 2009, 22,335 E-7s (86%) will have to complete their associate's degrees; by 2013, 6521 E-8s (89%) will have to complete their bachelor's degree; and this doesn't include almost 54,700 E-6s (92.6%) who will need to complete degrees in order to move up and be competitive.

Since the proposal has been implemented, that leaves a little more than three years for an E-7 to complete an associate's degree by 2009. If an individual had no transferable credits (highly unlikely), he or she would need 60 semester hours (on average) to complete the degree. If an E-7 took one five credit course per semester, that would be only 10 hours completed per year and would take six years to complete the 60 credits needed for the associate's degree.

Navy Tuition Assistance (TA) has a fiscal year credit limit of 12 semester hours or 18 quarter hours per individual. Payment for tuition and fees will not exceed the following caps:

- \$250.00 per semester hour
- \$166.67 per quarter hour

If an individual relied solely on TA, it would still take five years to complete the associate's degree! One also needs to consider the type and quality of education available to fall within these limits without dipping into personal funds. Also, keep in mind that TA only covers tuition – no books, fees, residency costs, etc.

If all the E-6/7/8s (not including reservists who also fall under this new guideline) decide to start taking courses now that the degrees are required – that adds up to more

than 83,500 students – who, if they maxed out TA each year would be more than a quarter billion dollars a year.

And furthermore, if this education requirement was adopted by the entire DoD, military alone, it would affect almost a million senior enlisted (E5-E9) personnel.

### **Problem Statement**

#### The Need for Business/Management Education

The Government Accountability Office (GAO) is an agency that works for Congress and the American people. Congress asks GAO to study the programs and expenditures of the federal government. GAO, commonly called the investigative arm of Congress or the congressional watchdog, is independent and nonpartisan. (Government Accountability Office [GAO], 2005)

The GAO has conducted numerous studies of the DoD's business practices. The findings are less than stellar and indirectly note the need for increased education in business and management education at all levels.

Some of the findings include:

“DOD survey results and analysis of GAO focus groups and survey data have shown that servicemembers are dissatisfied and harbor misperceptions about their pay and benefits in part because DOD does not effectively educate them about the competitiveness of their total compensation packages” (GAO-05-798, July 19, 2005).

“DOD's senior civilian and military leaders are committed to transforming the department and improving its business operations...However, overhauling the financial management and related business operations of one of the largest and most complex

organizations in the world represents a daunting challenge” (GAO-04-941T, July 8, 2004).

“Although senior DOD leaders have shown commitment to transformation as evidenced by key initiatives such as human capital reform, the Business Management Modernization Program, and the Financial Improvement Initiative, little tangible evidence of improvement has been seen in DOD's business operations” (GAO-05-140T, November 18, 2004).

“GAO has reported that DOD continues to confront pervasive, decades-old management problems related to business operations that waste billions of dollars annually. These management weaknesses cut across all of DOD's major business areas” (GAO-05-629T, April 28, 2005).

“DOD's business and financial management weaknesses have resulted in billions of dollars wasted annually in a time of increasing fiscal constraint” (GAO-05-381, April 29, 2005).

“GAO's reports continue to show that fundamental problems with DOD's financial management and related business operations result in substantial waste and inefficiency, adversely impact mission performance, and result in a lack of adequate accountability across all major business areas” (GAO-05-723T, June 8, 2005).

“Business transformation is much broader and encompasses planning, management, structures, and processes related to all key business areas. As DOD continues to evolve its transformation efforts, critical to successful reform are sustained leadership, structures, and a clear strategic and integrated plan that encompass all major business areas” (GAO-06-234T, November 9, 2005).

Therefore, what may be needed is a multi-level management education program that can be made available to all levels of government employees. The model should have the following characteristics:

- Associate's, bachelor's and master's degree levels
- Include basic as well as advanced management and leadership courses
- Incorporate best practices of existing public and private sector education
- Learner-friendly to even the remotest individual
- Economically feasible
- Trackable for promotion and advancement purposes
- The degrees be accredited, relevant, and easily recognizable

There are many opportunities for government employees to pursue education, but there is a lack of a single unified program that meets the requirements above and contributes to the overall mission accomplishment of the Department of Defense.

#### Government Leaders

Although technical training is often necessary in the military, the advantages of management education can be seen from this not all inclusive list of DoD leaders, who held the following management related degrees on September 24, 2004:

President George W. Bush - MBA (Harvard University)

Secretary of State Colin Powell - MBA (George Washington University)

Secretary of the Navy Honorable Gordon R. England - MBA (Texas Christian University)

Secretary of the Air Force Honorable James G. Roche - DBA (Harvard University)

Secretary of the Army (Acting) Honorable Les Brownlee - MBA (University of Alabama)

Chairman, Joint Chiefs of Staff Gen. Richard B. Myers (USAF) - MBA (Auburn University)

Vice Chairman, Joint Chiefs of Staff Gen. Peter Pace (USMC) - MBA (George Washington)

Chief of Naval Operations Adm. Vern Clark - MBA (University of Arkansas)

Army Chief of Staff Gen. Peter J. Schoomaker - MA in Management (Central Michigan University)

Air Force Chief of Staff Gen. John P. Jumper - MBA (Golden Gate University)

Commandant of the Coast Guard Adm. Thomas H. Collins - MBA (University of New Haven)

### **Purpose of the Study**

#### **Further Implications and Opportunities**

In the last decade there has been an increase in the size and scope of ‘joint’ operations, those involving the collaboration of many government organizations and often foreign counterparts (House Armed Services Committee, 2005; Scales, 2004). The advantage of having a consistent ‘language’ across these groups would be highly beneficial (Bosworth et al., 2004, 4). Individuals at all levels – military officers, enlisted personnel, civilians and other government employees – in numerous organizations could benefit from a consistent, learner-centered, accredited management education program.

If one were to extend this same program DoD-wide, excluding civilians, the potential audience exceeds 2.2 million personnel and almost seven billion dollars in

potential educational expenses (DoD civilians would bring the potential number of 'students' to almost three million). The bottom line is that if a per individual cost of approximately \$3000 per year at the lowest level of federal 'tuition assistance' is used for generating a baseline, the cost savings are incredible, not to mention the potential benefits of 'jointness,' collaboration, and economies of scale resulting from a simple, but highly effective management program consistent across multiple government agencies and foreign allies.

#### Post-service Benefit

The actual education a military member receives is often called into question by post-service. "Many companies fear that military people, although good leaders, lack the business savvy to contribute immediately" (Michel, 2004).

Michel (2004) also notes that management education and experiential training is necessary in both the military and corporate environments. With a recognizable degree from an accredited institution the prospective employee would be more valuable to the outside world.

"In addition to enhancing on-the-job performance, these "revolution in training" programs are making it easier for those in uniform to translate their training and skills into college credit and marketable qualifications" (Michel, 2004).

### **Conclusions and Recommendations**

#### A Proposed Defense Management Education Model

The Navy has had recent success with the implementation of CD-Rom based leadership training. Through a company called Ninth House, newly promoted CPOs were required to complete five courses prior to being advanced. The completion of the courses

was automatically entered into the individual's 'electronic training jacket;' via the Internet (Naval Personnel Command [NPC], 2005).

"The CPOs who completed the Ninth House program increased their knowledge and retention of leadership course material from 63 percent to 91 percent and demonstrated a "significant" behavioral change in key leadership areas" (Learning & Training Innovations [LTI], 2005)

The actual behavioral change is more important than merely getting a grade or finishing a degree. "[The] quality of the program is the single most important metric and can only be measured in what is learned by each and every person" (Bosworth et al., 2004, 5)

The mandatory completion of the courses ensures that all new CPOs receive the same kind of training and learning. The expansion of this concept to other business and management areas could have similar results.

The Ninth House online training also brought cost savings of 94 percent less over traditional classroom training and can be completed in one-tenth of the time. Additional savings occurred as a result of less travel time. The Navy may realize a potential cost savings of more than \$2.7 million per year (Learning & Training Innovations [LTI], 2005).

Another potential model for the multi-level management program is 'tutorial learning' as discussed by Professor Alfred Bork. Bork points out numerous benefits of this type of training (Bork, 2001).

In a typical tutor program a person works with a very small group of students. "Learning with this approach has been spectacularly successful (Bork, 2001)."

However, by replacing the ‘human’ tutor with a computer, costs can be decreased and it can reach a large number of students. “We can reach in the near future almost everyone on earth with such learning. (Bork, 2001, p. 142)” Once the course is designed, the larger the student base, the lower the cost becomes. “Again large numbers are a key to low costs, reducing cost per student if the delivery system is scalable. (Bork, 2001, p. 143)”

The actual development and distribution costs for a single management course will need to be determined. Nonetheless, with potential student numbers upwards of 100,000 per course the associated costs should be economically feasible. As discussed earlier, approximately 20 courses would need to be developed for the associate’s degree, but much of the courses’ content could be taken from existing sources. The same would apply to the bachelor’s and master’s degrees.

The author drastically reduced the amount of literature reviewed and also the amplifying background information available to address the need and the benefits for a one-size-fits-all DoD-wide management education program. One area investigated, but not discussed is a unique portable computing device, which contains all the course material and acts as the portal between the student and a DoD learning management system (LMS). The device, as envisioned by the author, would contain the courses, the reference material, background information, and be completely portable so that even deployed military personnel in any environment could pursue their education.

As discussed previously, there are many duplicative education systems currently in place and used by the U.S. government. This paper only plants the seed for further

research as to what courses would be needed, the most effective distribution system, the total cost of development, and the value-added by such a 'simple' program.

Although it holds great promise, Bork (2001, p. 143) notes that "very little highly interactive computer-based tutorial learning has been developed. Further extensive research is needed. Only empirical data, not discussion or political considerations will demonstrate the usefulness of the system proposed."

The question may arise as to why have three million people all thinking alike. They would not be 'thinking' alike. The advantage would be they all speak a similar 'business or management' language and therefore, just like no two people's thought processes are the same; each would be able to express their 'different' problems, thoughts, and solutions in a common language recognized by many.

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# **Knowledge Management for Market Dominance**

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## **Abstract**

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This study analyzes and evaluates knowledge management, theories, and their applicability that enables the creation, distribution, and exploitation of knowledge to create and retain greater value from core business competencies. Knowledge management and theories in the literature focus on individual knowledge, the knowledge of the learning organization, and knowledge management value proposition. This study used the epistemologist (theory of knowledge) to analyze, and cognitive theory of learning to understand differences in learning styles of adults. Furthermore, draws on this knowledge to develop knowledge management.

## **Introduction**

Knowledge management dominance (Knowledge Market Leader) is often unstated but real goal of every business. It is dream that every business want, but difficult to achieve. Knowledge Market Leader is known internationally for the lines of their business. Knowledge Market Leader organization or institution embrace knowledge and keep knowledge worker. Knowledge workers know how things should work. They are business expert, liaison to the customer, quality control analyst, and managers of other people (Haag, Cummings, & McCubbrey, 2004). Haag et al. (2004) and Tiwana (2002) defined knowledge as a “fluid mix of framed experience, values, contextual information, expert insight, and intuition that provides an environment and framework for evaluating

and incorporating new experiences and information” (p. 4). Davenport and Prusak (2000) stated “Peter Drucker has identified it as the basis of competition in post capitalist society and Stanford Paul Romer has called knowledge the only unlimited resources, the one asset that grows with use” (Introduction, p. xxii). Whitten, Bentley, and Dittman (2004) stated that “knowledge is data and information that is further refined based on the facts, truth, beliefs, judgments, experiences, and expertise of the recipient, and ideally information leads to wisdom” (p.766). Knowledge is explicit (transferred) or implicit (acquired). Knowledge is made up of experience, intelligence, judgment, truth, culture, values, assumptions, and beliefs (Tiwana, 2002).

According to the authors, the ability to retain the knowledge workers of any organization will help the organization to stay ahead of competition, thereby increasing the efficiency and productivity. Higher efficiency and higher productivity will increase organization annual profits more than the organization that does not embrace knowledge management. In addition, an organization with more constant profit will become a market leader.

### **Problem Statement**

The general problem that underlay this research was to determine whether the long histories of knowledge management found in an organization’s knowledge workers had make an organization a market leader. If found, then, what did knowledge management added to an organization to make an organization a market dominance firm?

### **Purpose of the Study**

The purpose of this study is to investigate empirically whether knowledge management (KM) enables the creation, distribution, and exploitation of knowledge to

create and retain greater value from core business competencies. This study will also examine if KM addresses business problems particularly to a firm business and whether it is creating and delivering innovative products or services: managing and enhancing relationships with customers, partners, and suppliers; improving work processes. The potential significance of this research is to facilitate opportunistic application of fragmented knowledge through intergation. This study explore enterprise excellence and optimized relationships. Through the data collected to solve todays's problems and explore future opportunities; employees will be the great assets; pursue excellence and innovation by engaging everyone.

### **Methodology**

A case study approach, as described by Cresswell (1998) with stratified random sampling, as described by McMillan and Schumacher (1997) was used. The sample population was divided divided into subgroups, or strata, on the basis of chosen variables (gender, marital status, age, level of education). Then, samples drew randomly from each subgroup. The number of subject drawn is non-proportional. Proportionality was based on the percentage of the population that is present in each stratum.

In brief, the country was divided into small primary areas, and each consisting of a state. Each of the selected state was divided into towns (smaller sections), and towns to counties. Using open-ended questions, through SurveyMonkey.com results were analyzed as data were collected.

### **Competitive Intelligence Tools**

Knowledge market leader uses competitive intelligence tools that provide the knowledge workers with access to multidimensional analytic databases, information

visualization features, and knowledge evocation capabilities. Moreover, competitive intelligence tools enhance knowledge workers to understand changes in the environments of their organization (Heinrichs and Jeen-Su, 2005, p. 622). However, knowledge is not a rigid structure that excludes what doesn't fit; it is complex problems, and with no simple answers (Davenport & Prusak, 2000, p. 9). Moreover, the Knowledge Market Leader cannot ignore the essential factors. Davenport and Prusak (2000) stated, "Being both certain and wrong is common occurrence, but in sense-making in organizations, it takes a complex sensing system to register and regulate a complex object (Cited Karl Weick remarks) (p. 9). Visualization tools aids in knowledge creation and strategy formation by linking data representation with the decision-making task.

### **Research Question**

In this study, the component of KM was examined with the following research questions: In what way accumulation are skills related to the growth of knowledge. Did companies that staff with knowledge workers develop knowledge management? Moreover, did company that fully embraced knowledge management created from core of business competencies dominate the market of products being produced?

### **Summary and Significance of the Study**

Knowledge is the central productive and strategic asset, and it increases the ability of organization to learn from it environment (Laudon & Laudon, 2002). Knowledge Market Leader organization or institution embraces knowledge and keep knowledge worker. Knowledge workers know how things should work. They are Knowledge Market Leader's business experts, liaisons to the customer, quality control analysts and managers

of other people. Knowledge managements market dominant (that also known as market leader for this paper) know their competition, their customer, work closely with their business partners and know how each and every part of their organization to provide best products and services (Haag et al., 2004, p. 5).

The idea discussed in this article is subject for further investigations. How do the knowledge management components such as values, information, supply chain, intelligence tools, and cultures affect the revenues of Knowledge Market Leader organization? Is a subject for further investigations?

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# **Essential Leadership and Management Competencies as Perceived by Highly Effective Chief Information Officers**

**Michael Sebastian**

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## **Abstract**

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This is a proposed investigative study of the perceived competencies necessary for effective governance of information technology organizations. The role of the chief information officer (CIO), the person responsible for leading information technology efforts, is rapidly evolving to one of strategic importance. Study participants will be selected from two independent populations, high-functioning CIOs and CIOs randomly selected from a leading association comprised solely of information technology managers. Electronic surveys will be sent to CIOs and analyzed to determine if a relationship exists between effective CIOs and the competencies selected on the survey

## **Introduction**

From humble beginnings in the back rooms of large data centers, information technology leadership continues to emerge as a topic of considerable debate in many medium and large organizations (Byrnes, 2005). Since the mid-1980s, the person in charge of information technology operations has typically been labeled the “Chief Information Officer” or CIO (Bock et al. 1986). As business dependence on information technology, both operationally and strategically, has increased, the CIO has gained

acceptance as a member of the executive team (Sauer and Willcocks, 2002). The functional head of IT organizations is often on the "hot seat" to address concerns about an organization's ability to identify and exploit opportunities presented by emerging technologies, respond to those opportunities in a timely manner, and achieve demonstrable results from IT investments (Ross & Feeny, 1999). Many CIOs today struggle with short tenures, a lack of credibility within the executive team, and a problematic relationship with the chief executive officer (Rothfeder & Driscoll, 2002).

Once strictly a technical position, a CIO's ability to be effective is largely dependent on his or her ability to strong leadership and visionary capabilities (Earl, 2004). Clearly dramatic technological changes and a growing dependence on technology have transformed IT from a backroom utility to a strategic organizational resource. What is not clear is the ability of many CIOs to embrace and be effective with these realities. Therefore, CIOs today stand at a fundamental crossroads. Will these executives possess many of the required leadership and visionary skills, or will they function as what Broadbent and Kitzis (2005) call the "IT mechanic," a CIO who concerns him or herself primarily with daily operations?

As organizations depend increasingly on various types of technology, and timely deployment of key technologies result in a strategic advantage, the questions facing CIOs are increasingly important. Moreover, an organization's ability to select effective CIOs is rapidly increasing in importance.

### **Problem Statement**

While research in CIO leadership is slowly increasing, this study will attempt to determine the primary competencies perceived to be important to success by CIOs

acknowledged to be highly effective, and those competencies as perceived by a randomly selected sample of CIOs.

### **Purpose of the Study**

The purpose of this study will be to discover the essential success competencies as perceived by highly effective CIOs. Because of the disparate findings, in academic and industry literature, this study will attempt to ascertain the data needed for a comparative analysis of two populations. The intended hypothesis of the study is that highly effective CIOs place a premium on specific IT-related leadership qualities. The ultimate goal of this study is that the research data, and comparative analysis of the findings, can be useful in emphasizing the importance of making permanent competency shifts that reflect new realities in the CIO role.

### **Conceptual Framework**

The genesis of this study is the disparate findings, in academic and industry literature, about crucial CIO competencies. The researcher will investigate twenty-five CIO competency factors categorized as technical, business, or behavioral competencies. The end goal is to determine if, and/or how, CIOs value specific success factors. An expressed goal of the study is to determine “best practices” by high-functioning CIOs, and be able to establish relationships between effective IT leadership and the selected CIO competencies. CIOs noted as highly effective are honorees of CIO Magazine’s CIO 100 List, and Information Week’s IW500 – both lists acknowledge CIOs who engage in best practices (McFarlan, 2005).

### **Methodology and Study Limitations**

The survey will be a cross-sectional design as described by Singleton and Straits

(2005). Study participants will be selected from a multistage cluster sample. Participants who are identified as being on two specific lists of effective CIOs, CIO Magazine's CIO 100 and Information Week's IW500, will be ascertained through the sampling process. A second population will be selected randomly from the Society of Information Managers (SIM), one of the largest CIO associations in the United States. Participants in both populations will be asked to rate twenty-five CIO competencies on a five-point ordinal scale.

While this study will indicate current CIO competency indicators, data is collected at a single point in time. This study limitation could be ameliorated with longitudinal surveys as described by Singleton and Strait (2005); studies that might more accurately establish causal relationships between perceived competencies and CIO effectiveness.

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# **An Investigation of the impact of the surrounding environment with regard to overall Telecommuter Satisfaction**

J. P. McLaughlin, Walden University

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## **Abstract**

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This research will investigate the efficacy of certain urban environments to support the overall satisfaction of telecommuters better than traditional suburban neighborhoods. In this study a telecommuter will be defined as an individual that works in a larger organization but does so predominantly from home. The goal is to discover whether certain characteristics of the built environment impact the overall job satisfaction of telecommuters. Throughout history settlement patterns have been responsive to the needs and desires of the settlers. This study is a work-in-progress as part of a doctoral study program.

## **Introduction**

From the middle of the nineteenth century, and continuing for approximately the next one hundred years, urban settlement patterns in the United States remained very consistent. Paradigm shifts of both technical and social characters did little to alter these patterns of settlement until the first full decade following World War II. Beginning with the G.I. Bill shortly after World War II, political and social forces began to reshape city and town settlement patterns. The G.I. Bill's insistence upon new construction coupled with the advent of financing reforms that made automobile ownership available to the majority of citizens were catalysts for a major shift in settlement patterns. The United

States became a nation of suburbs, low-density settlements characterized by a dependency upon automobiles and public roads for transportation (Kunstler, 1993).

The changes in settlement patterns eventually lead to equally profound changes in the workplace. As workers became more and more removed from the communities they lived in, social institutions began to shift toward the office or the plant. The critical mass—the density of humans in a given area—were frequently no longer viable in the communities where people lived. People sought out associations within the workplace because it frequently offered the only viable, densely populated affinity group available to them (Gallagher, 1993).

This pattern remained the dominant one until information technologies introduced the concept of *locationless* work in the 1990s. No longer was it necessary for workers from a myriad of professions and jobs to perform the work in the same physical location everyday. The telecommuter was born and settlement patterns began to be dictated not by proximity to places of employment but instead based on esthetic, demographic, or physical factors to the liking of the telecommuter. Communities that were built as places to spend off-hours are now being used by telecommuters as both homes and offices. Additionally, many telecommuters have turned into telecommuters, individuals that spend the majority—and sometimes all—of their time working outside of the office (Castells, 2001). However, these new adaptive uses are more akin to community design and use prior to World War II (Duany, Plater-Zyberk, & Speck, 2000). Ironically, information technologies are providing a means to return to living and working patterns more analogous to the late nineteenth and early twentieth centuries than the twenty-first century we now inhabit.

This research study is built around the concept that all built environments are not created equal for teleworking. Businesses of all sizes have used various means by which to rate the desirability of a location for an office or plant. Traditional measurements have included the quality of schools, the rate of crime, funding for the arts, good roads, professional sports franchises, and a host of other factors (Walmsley, 2001). But these factors presume that a worker is going to live somewhere near the place of employment and, just as importantly, spend an almost equal amount of time between the waking hours at home and the workplace. When this balance changes, as when a telecommuter shifts to spending three or four days at home and one or two days at the office, the characteristics of the idealized place to live changes as well (Kerrin and Hone, 2001). This shift becomes even more pronounced when the telecommuter lives nowhere near the office and spends the majority of the time at home. If a combination of readily available and pervasive information technologies and telework are changing the definition of a desirable community then there are substantial implications for social change if a 1950s-style mass migration from one dominant settlement pattern to another is about to take place.

#### Problem Statement

The purpose of this research is to discover whether the built environment a telecommuter lives in impacts their job satisfaction. In this study, the focus will be on a comparison of similar settlement patterns found in new urban communities or traditionally-planned towns against those of suburban developments. Specifically, this research seeks to:

1. Investigate whether the residential environment a telecommuter lives in can have a measurable impact upon their job satisfaction.
2. Identify specific variables that impact a telecommuter's satisfaction with the built environment around them.
3. Measure the degree to which the amenities of the built environment impact a telecommuter's satisfaction with and intent to continue in that lifestyle.
4. Recommend further research to extend the findings of this study and its applicability to both community design and organizational strategic vision.

### **Hypotheses**

1. Telecommuters experience greater job and lifestyle satisfaction when they live and work in a new urban or a traditionally-planned communities when compared to those that live in a suburban community.
2. Telecommuters that live in new urban or a traditionally-planned communities are aware of the variables that describe the communities and have made conscious choices to live in those communities because of them.
3. Telecommuters in new urban or traditionally-planned communities are more likely to want to continue to telecommute than telecommuters living in suburban communities.

### **Research Questions**

1. Do telecommuters actively seek to move to or stay within new urban or traditionally-planned communities because they perceive them to make a positive contribution to their personal and professional lives?

2. What aspects of new urban or traditionally-planned communities are identified as key variables in their satisfaction with their teleworking lifestyle?
3. What aspects of new urban or traditionally-planned communities are identified as key variables in their dissatisfaction with their teleworking lifestyle?
4. Are telecommuters in new urban or traditionally-planned communities more likely to want to maintain that lifestyle than their counterparts in suburban communities?

### **Significance of the Study**

There is limited scholarship available in regards to the impact of the built environment upon the satisfaction of telecommuters. Current available research focuses on the impact of the office environment and the surrounding amenities as variables in the satisfaction of employees (Krall, 1999). The increasing number of telecommuters suggests a need to broaden this research to cover the extended reach of the office made possible by information technologies—namely, the telecommuter. Therefore, businesses of all sizes as well as society as a whole would benefit from a study of the impact of community design and a sense of place in the overall satisfaction telecommuters feel in their lifestyle. A survey of telecommuters within and outside of the target environment will be conducted to determine the impact the built environment with regard to overall telecommuter satisfaction. This study is a work-in-progress as part of a doctoral study program.

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# **Building Information Sharing System for Administrative Services in a Charter School**

**Robert J. Konopka**

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## **Abstract**

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This case study research will investigate the effects of using integrated information sharing model to improve non-academic, administrative services used in a charter school system. The public school system in Los Angeles County is considered one of the weakest in the state of California. The gap is often filled by the charter schools that provide, within the matrix of public education, more customizable approaches to public education. The very essence of charter school is based on using technology as curriculum delivery, application delivery, or communication. Such multilayered use of technology must connect and integrate multiple locations within the state or even the entire country, without affecting performance or strictly academic aspects of school operations. This research will evaluate a connection between effectiveness of knowledge delivery and the new strategy to create data centric operations, where all information is available from the central data repository.

## **Introduction**

Advancements in Information Technology, the Internet, or other means of providing reliable communication are changing the society from “global village” to the new concept of a “global information sharing”. The idea of moving from publicly controlled public education to other forms of K-12 learning environment has been slowly

gaining public approval. The charter school system is a partial answer to the question regarding whether public education can be provided outside the well established public education system controlled by the state. The analysis of the unlimited opportunities for growth that exist in the education and knowledge industry shows that there has been a surge in companies targeting these markets.

As education is a foundation of the society, more and more influence from any public educational system will impact the modern society. Most public school systems are created to build stronger relationships with the local community, understand state history and traditions, and appreciate American values and life style. Los Angeles Unified School District (LAUSD) has outgrown any means of management, education delivery, or a reliable knowledge transfer. The last mayoral election in Los Angeles focused on poorly performing public education and the continuous rising cost of K-12 education.

Community leaders and state officials on all levels agree that the only way to properly manage academic integrity is that the LAUSD must be separated into smaller, more agile academic entities (Beck & Segrest-Purkiss, 2004). The solution is more difficult to see or predict. Some academic researchers point at the equal value of the public education and use it as the universal currency (Stromquist, 2005). Some scholars point at the education being more important than the system delivery solution and argue that the only way schools can improve is by focusing the entire process to include individual students and focus on one-on-one relationships (Christensen, Aaron & Clark, 2005). The problem of education is not a lack of qualified teachers and instructors but

lack of an integrated policy on how to manage the process facing critique from parents, lack of funds from the state, and decreasing grades among students.

As discussion continues without much solid evidence on either side, one aspect remains unchanged, charter schools have a solid position in the public school universe and they are here to stay. The most recent study conducted and publicized by American Federation of Teachers (AFT) found charter students lagging behind their peers in regular public schools. On the other side of dispute, a comprehensive research paper conducted by Hoxby, a Harvard University economist finds charter schools to do a better job of producing proficient students (Hoxby, 2004).

### **Problem Statement**

The problem addressed in this study is how effective is application of Business Process Reengineering (BPR) methodology applied during the creation of an information sharing system strategy for administrative services in a charter school system. Research problem that is going to be introduced by this study is lack of common, unified, functional, and approved data sharing models used in a public school system.

### **Purpose of the Study**

The purpose of this study is to analyze and examine, how administrative services in a charter school can benefit, from a formal information sharing policy. One of the biggest advantages of using a management company that controls and manages school system is the ability to achieve the same or comparable academic results with a significantly lower per student cost (Lieberman, 2004; Bohte, 2004). The secondary purpose of this case study is to investigate the most appropriate model in applying well established management methodologies and techniques in a school administration and

non-academic management. The use of technology is no longer perceived as any form of a competitive advantage. It is a cost to enter the “educational service” market and be able to deliver the service at the acceptable level. The role of Information Technology and how teachers view learning and technology for use in the classroom is still evolving and changing. The IT industry is currently trying to establish technology to be “plug and play” for teachers to use and implement. Teachers often see technology as represented in Figure 1 as a front end element that they can see and manipulate.

### **Conceptual Framework for the Study**

Conceptual framework of this research is based on the perception and use of technology as the administrative element of providing supplementary, administrative services in a school institution developed by Kalay and Chen (2002), Walk (2003), Clinchy (2004), Roberts (2003), and Steward (2002). The service-like element introduced by these authors, separates the use of technology as strictly academic and use of technology as strictly administrative. The early work of Kalay and Chen (2002), points out at the typical-for-business-environment advantages that technology can bring. Such advantages or management practices, as decision support system (DSS) are a common place in a business domain and slowly are being introduced in an academic domain.

The properties of Information Technology (IT) developed by Walk (2003) are being used to demonstrate that market rules of centralization and economies of scale can also be applied in a school environment. “Management companies also reap advantages from centralization and economies of scale. Most management companies have developed their own curriculum for their client charter school to use, which avoids the expense of having each school or school district develop its own curriculum” (p. 252).

Providing managerial service to school institutions will use the same principles as managing any other business. Clinchy (2004) uses a term education management organization (EMO) and argues that such a strategy will benefit not only the school itself but quite possibly the entire public education system as such management companies will use well established management practices. This point of view is in lieu with the movement in the early 2000s to introduce vouchers and to privatize public education. The idea to allow parents to make their own choices regarding education is later used as free market-like environment for a public education.

### **Summary and Significance of the Study**

This study separates the purely administrative side of running school operations from the strictly academic aspect of K-12 school environment. There have been a number of studies about the proper application of Information Technology as a delivery of knowledge in a K-12 school system. This study contributes to the overall understanding how the administrative side of the school system can influence the academic environment and vice versa. Previous work in the field of application of school technology is related to this research as the real value of any technology must be verified by its use to deliver better quality knowledge to all students. This study further develops previously discovered relationships and theories and extends them with the latest research in the K-12 education. As the first objective, it uses the concept of managing school environment as equally important to the knowledge delivery. Second, it examines the relationship between managing the Information Technology aspect of a school system and managing academic effectiveness of such a system. Third, it extends prior academic research to examine if there is a connection between applicability of

well established different industries management methodologies and their applicability on school environment. Fourth, it uses the latest concept of treating information with its global properties to better understand the advantages and disadvantages of its use and management.

This research uses an advanced theoretical understanding of Information Technology, its use of centralized data repository, and its use of well established management methodologies. This approach will allow correlating effectiveness of business-academic operations with a practical use of technology. Information Technology managers can use such research to understand differences between presented model and their own operations and how such differences can position and change their own IT operations.

There is one aspect of the research that will undoubtedly take priority on the list: application of the BPR and its benefits in creating global IT strategy. The understanding of how data is being collected, manipulated, modified, and finally retired. It is important to understand that every phase in information lifecycle is equally important and as such should be managed. According to Hoxby (2004), successful Information Technology changes will create a productivity increase. If we adapt technology as a primary educational input, the results of any global IT strategy change can be later measured in increased test scores, reduced drop-out rate, or increased student satisfaction. K-12 school often lacks the necessary IT vision and this research will point at the causal relationship between administrative, educational, and technological aspect of running educational institution.

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# A Framework for the Ontological Representation of Organizational Memory

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## Abstract

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Traditional information systems focus on representation and structure of explicit knowledge elements leaving tacit knowledge subject to loss as employees depart the organization. This case study investigated the creation process and potential structure associated with one organization's tacit knowledge. The results of this study provide a basic framework which may be used in development of increasingly sophisticated information management systems capable of supporting both tacit and explicit organizational knowledge. This study identifies an organizational memory framework comprised of *memory states* and *exchange events* through which tacit knowledge is created. This investigation further suggests elaboration of these findings in support of an organizational memory theory and application of an organizational memory framework for use in development of better information sharing systems.

## Introduction

The collective knowledge of an organization, both tacit and explicit, is referred to as organizational memory. Organizational memory, also known as corporate memory, is an element of the larger knowledge management discipline. In general, knowledge management represents the acquisition, creation, usage, representation, and evolution of both types of knowledge. Failure to apply systematic and collective management of an

organization's memory results in the loss of corporate knowledge and limits decision making ability. Proposed solutions include a shared conceptualization for representing organizational knowledge. These high-level conceptualizations are called *ontologies*.

The inability to implement consistent methods for the capture and reuse of organizational knowledge is the basis for the evolution of organization memory research (Anand, Vikas, Manz, & Charles, 1998; Vasconcelos, Kimble, Gouveia, & Kudenko, 2000). In examining the case of Archer Pharmaceuticals, Brown and Woodland (1999) found the organization to have no systems in place to retain knowledge of those individuals who left the company. Additionally, they determined the organization's management generally accepted the loss of knowledge as employees leave.

There is consensus among researchers (Casselman & Samson, 2005; Levina, 1999; Olivera, 2000) that organizations lack methods to capture and maintain organizational memory and limited research exists that specifically address this issue. This study investigated, for purposes of identification, the method and structure of organizational memory in one organization.

### **Problem Statement**

Organizational knowledge remains largely unstructured and informal resulting in inefficient and ineffective application. Organizations concentrate on management and structure of explicit knowledge only, allowing the larger percentage of intangible knowledge resources to remain in mind of the individual employee and subject to loss. Collectively, this *tacit knowledge* represents one component of the organization's memory. Despite much research linking decisions, knowledge management, and ontology theory as methods for formalizing organizational memory, few studies

specifically identify those elements that define an ontology of organizational memory. This study examined the structure of organizational memory based on its creation in the social context of the organization.

### **Purpose of the Study**

The purpose of this study was to identify a basic framework for representing organizational memory in support of increasing the efficient and effective use of an organization's tacit knowledge. Specific to this purpose, this study investigated the degree to which common high-level knowledge elements occur when decision teams share tacit knowledge and if the identified elements are comparable to a form of ontological framework for organizational memory. Further objectives included the determination of the relative importance placed on specific knowledge elements and how those elements are introduced and potentially influence the decision process. The results of this study are intended to provide insight into how organizations may better use their tacit knowledge to improve the decision process and increase overall organizational effectiveness.

### **Conceptual Framework for the Study**

The foundation of this study is based on three researcher's views of knowledge. First, Polanyi's (1966) categorization of knowledge as either tacit or explicit, second, Nonaka's (1994) supposition that all organizational knowledge is created through social interaction, and third, Gruber's (1993) assertion that all knowledge is subject to conceptualization. Expressly, this investigation attempted to identify and classify organizational memory elements, their relationships, and the role ontologies may play in the structure of organizational memory.

The conceptual basis for this study is grounded in the Theory of Knowledge Creation as proposed by Nonaka and Takeuchi (1995). Fundamentally, their work based the creation of organizational knowledge on the constant integration of tacit and explicit knowledge occurring dynamically through social dealings among people. Their theory is intended to provide understanding of how organizations create knowledge and includes a distinct ontology based on levels of knowledge creating entities

### **Research Questions**

The collective research described identified a number of challenges relative to both tacit knowledge creation and organizational memory maturity. These served as a basis for the development of the research questions investigated through this study. The design of this research is focused on the following questions:

1. How is tacit knowledge created?
2. How do tacit knowledge elements relate to organizational memory?
3. What is the structure of an organizational memory ontology?

### **Summary and Significance of the Study**

This study indicates tacit knowledge creation occurs through exchange events comprised of a knowledge source, potential targets and a medium of exchange. The research proposes three classifications of factors possess the potential to influence the creation of tacit knowledge. The research further revealed a number of knowledge types associated with knowledge exchange events of which the researcher developed three knowledge classifications. The researcher asserts these knowledge types may exist in either tacit or explicit form, what distinguished one form from the other is the degree of

variability or change relative to organizational memory. This assertion leads to the subsequent conclusion that tacit knowledge is comprised of knowledge types that represent a variable component of organizational memory.

The interpretation of this studies findings result in the specification of an ontological framework of organizational memory. Consistent with ontological descriptions, the proposed ontology is defined in terms of objects, properties, and relationships. In addition to the preceding conclusions, the findings indicate the case organization is in an evolutionary state of knowledge management, operating on largely tacit knowledge specific to information technology functions and activities.

An organization's ability to understand and manage its knowledge is crucial to its success. Stollberg et al. (2004) identified limitations of knowledge management as the inability to differentiate between tacit and explicit knowledge and lack of appropriate techniques for representing and managing knowledge structures. The significance of this study comes in the form of responses to both of these limitations. Further significance of this study is derived from its attempt to define a framework of organizational memory retention structures to address the lack of a common methodology in retaining an organization's memory.

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# Digital Forensics- A Technical Report for Layman

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## Abstract

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Digital forensics collects evidence concerning dates and times are an important complex process. Law enforcement officials are drawn to forensics digital style because rules of evidence are concerned with concrete evidence rather than hearsay (Boyd, 2004). Scholar practitioners acknowledge the usefulness of tangible evidence but intuition and the soft sciences must be used to successfully prosecute the digital forensics cyber criminals such as the P2P bandits. Digital Forensics in real life is not as glamorous as on TV.

## Introduction

Forensics is the analysis of a system with the purpose of finding evidence of a specific activity (Solomon & Chapple, 2005). A security matrix is created when the security system is installed. The CIA, Confidentiality, Integrity, and or Availability is designed to make forensics easier in case of a security breach. Security practitioners use various forms of detection methods to determine what went wrong in a security breach or incidence, there are written logs, camera surveillance of the affected area, phone logs, and of course fingerprints. The most important tool available to security people in the 21<sup>st</sup> century IS, Information System workplace is digital forensics.

## Problem Statement

System foot printing is one security method which is a process of extracting and documenting the state of a computer system that may include digital forensics. But what is digital forensics exactly? Digital evidence is evidence that is stored on or transmitted by computers (Casey, 2005). In the public domain, digital forensics is important in solving a wide range of crimes that include but are not limited to homicide, rape, abduction, child abuse, solicitation of minors, child pornography, stalking, harassment, fraud, theft, drug trafficking, computer intrusions, copyright infringement, espionage, and terrorism (Casey, 2004).

Within a private domain digital forensics is a method or process that allows a system administrator or security person to review specialized log files on a regular basis or on an incident basis within the IS. This review should include login log, sulog, aculog, xferlogs, and chksum files (Garfinkel, 2003). A good time to collect a system foot print is right after the system is fully configured, tested up and running (Garfinkel, 2003). DoS, Denial of Service Attacks are attacks against specific websites denying use by legitimate users. Digital forensics are used to detect and prevent IS security lapses such as these.

### **Purpose of Study**

Digital forensics is the science of obtaining, preserving, and documenting evidence from digital electronic devices, such as computers, pagers, PDAs, digital cameras, cell phones, and various memory storage devices. Forensic data collection must be done in a manner designed to preserve the probative value of the evidence and to assure its admissibility in a legal proceeding ([www.isfs.org](http://www.isfs.org)). Digital forensics the collection, preservation, analysis and court presentation of computer-related evidence- has developed as a specialized field in order to harness the power of vast amounts of

digital information for use in litigation. Increasingly, such computerized does not exist in hard copy, paper form ([www.isfs.org](http://www.isfs.org))

### **Methodology**

Standard security auditing of an IS may determine the need for digital forensics. An important concept with digital forensics is that it must be done in real time. Security analysts must determine the length of time data should be kept in history. Most people are currently reporting 72 hours with a maximum of 96 hours occurring. After the data has been deleted from the history real time is lost and digital forensics can not be performed (NID, 2001). Shell history files in UNIX forensics such as bash, csh, tcsh, and ksh can keep a history file not real time files but can help in an intruder alert.

Best practice is to prepare a forensics toolkit with trusted software on a bootable CD-Rom, for example to track log files (Garfinkel, 2003). It is a standard practice to use trusted software to monitor the system automatically such as “SWATCH”. In legal cases the chain of custody is very important to certifiable raw data (NID, 2001). “SNORT” is a network based intrusion detection solutions freeware commonly used ([www.snort.org](http://www.snort.org)). Among other best practices is UTMP files that are not world writable and installing a simple “cron” task to save copies of “last log file to track log ins (Garfinkel, 2003).

Digital forensics is not a pure science. It borrows from disparate research areas, including causality, criminal profiling, linguistics, and psycholinguistics, image analysis and image understanding pattern recognition (e.g., machine learning, statistical learning) probability and statistics and social network modeling and analysis (Digital Investigation, 2004). One of the flaws in the current digital forensics process is that investigators use logical copies of data in memory used in applications from the same vendor. If the

problem is the application has security holes than this is no good (Digital Investigation, 2004).

If the data to be investigated is in the cache or temporary files or the recycle bin the deleted items become difficult if not impossible to retrieve. Information from digital forensic evidence collected on an IS can be used to create a vulnerability assessment and prevent future losses to the private and public domains. SQL databases are often attacked and thus are subjects of digital forensic studies (NID, 2001). Digital forensics is relatively expensive. Methods for interpreting memory data dumps are difficult (Digital Investigation, 2004). In the future, a merger technologies that are currently varied and world wide standard such as IEEE would be helpful (Digital Investigation, 2004). Data mining and data correlation take human behavior into account and thus the social science parameters come into affect. Testing and validation are very important in processing digital information thus quantitative standards are formidable (Digital Investigation, 2004). Information policy during the Clinton Whitehouse did not address the need for digital forensics extensively (Samuelson & Varian, 2001).

Cyber crime as such a law enforcement issue the Computer Fraud and Abuse Act was crafted. This CFAA will provide a valuable tool to those involved in digital forensics. The CFAA was crafted to allow victims of cyber related crimes to seek redress in civil rather than criminal court. Often times not much more than a parking ticket is issued to the offenders (Howell, 2004).

### **Purpose of Study**

Digital forensics is an important part of the research for my dissertation is on intellectual property infringement. I am not sure if it will be on the entertainment industry

specifically or intellectual property in general to address or the concerns of the automotive industry with counterfeit parts and or the pharmaceutical industry with counterfeit drugs likes insulin. So if I stay in my specified research area, then yes the topic of digital forensics is very important. Let me tell you why.

Peer-to-Peer, P2P, networking issues are of major concern to Justice Departments around the world. In Great Britain, P2P networking from the point of law enforcement was a problem of the entertainment industry it was not seen as an avenue for other types of Internet related crimes (Fellows, 2004). Napster had centralized file sharing servers. The US Department of Justice shut Napster down with the help of the US Supreme Court. Very elementary digital forensic tools traced a few IP addresses to the Napster server. Copyright piracy at the permission of Napster became a recognized illegal activity. Now there are decentralized peer-to-peer systems such as KaZaA and Grokster. The US Supreme court in MGM v. Grokster made these types of P2Ps illegal. Once again digital forensics will help law enforcement agencies trace the perpetrators or bootleggers, copyright pirates to their home or business addresses. They will receive subpoenas, “cease and desist” orders and possibly arrest warrants thanks to digital forensics. IPsec firewalls will be installed, under court order, on offending computer systems to prevent further pirating of copyrighted materials.

(Adapted from an unpublished FBI document)

### **IOCE International Principles**

The international principles developed by IOCE for the standardized recovery of computer-based evidence are governed by the following attributes:

Consistency with all legal systems, Allowance for the use of a common language;

Durability, Ability to cross international boundaries;

Ability to instill confidence in the integrity of evidence, Applicability to all forensic evidence; and  
 Applicability at every level, including that of individual, agency, and country.

### **Examples of Crimes Requiring the use of Digital Forensics**

Their scope is comprised of but not limited to:

- ✓ Terrorism
- ✓ Child Pornography
- ✓ Crimes of Violence
- ✓ The theft and or destruction of intellectual property
- ✓ Internet Crimes
- ✓ Fraud

### **Tools available to the Digital Forensic Analysts**

Convention on Cyber Crime (2001), is the most important law enforcement tool in the arsenal against cyber crime. It was drafted much like the Geneva Convention. It was signed by the Council of Europe, the US, Canada, Japan, and South Africa. This convention places the responsibility of compliance to jurisdictional laws in cyber space upon the Internet Service Providers, ISP. Law enforcement is to make sure the ISPs are doing their job. Canada has been cited as being slow with enforcement (Huey & Rosenberg, 2004). Some provisions are:

- ✓ Article 21- Calls for legal measures to force ISPs to intercept and store electronic data streams. As is the case to catch P2P file sharers.

Fingerprint Utilities determine the OS of a remote computer. These utilities are the backbone of the hard science that can not be replaced by a digital forensic expert. Network administrators can use these utilities to determine the intrusion vulnerabilities of a network (Kerenyi, 2004). Finally from police to policing; many people and or organizations are using surveillance to collect digital forensic evidence. It can be perceived as harmless as the “cookies” as we are used to being stored on our computers

to “Carnivore” the FBI’s method of online surveillance. Australia, the Netherlands and Germany have established databases to have enforcement and national security agencies to obtain forensic information without court order (Huey & Rosenberg, 2004). What digital forensics cannot be used for is the snooping on a person’s computer system for personal reasons such as the “Jealous Lover Software”

([http://news.yahoo.com/s/ap/20050828/ap\\_on\\_hi\\_te/spy\\_software\\_indictmen](http://news.yahoo.com/s/ap/20050828/ap_on_hi_te/spy_software_indictmen)). The

inventors of this software are under federal indictment. It is like eavesdropping without a warrant or tapping with the US mail.

### Case Study

**P2P File Sharing a Commercial Digital Forensic Concern** (Adapted from The Hollywood Reporter.com Aug 27, 2005)

LA Man Pleads guilty to piracy site- Jed Kobles 34, pleaded guilty to one felony count of conspiracy to commit grand theft. It is the first recorded felony charge in online piracy. The perpetrator operated a website called “Smoking House” which was part of a larger network called “Untouchable Network” The MPAA, Motion Picture Arts Association filed the complaint to prosecuted. The Southern California High Tech Task Force had the search warrant leading to arrest issued to February 25, 2005.

File Sharing Programs-Peer to Peer Networks Provide Ready Access to Child Pornography (GAO, 2003). Classification of Images Downloaded through Peer to Peer File Sharing Program

- ✓ .13% Child erotica
- ✓ 14% Non-pornographic
- ✓ 29% Adult pornography
- ✓ 44% Child pornography

The Department of Defense- has outlawed the use of P2Ps in the interest of National Security (See Appendix A). It is believed that the P2P networks host a variety of computer viruses and malware. So by compromising the intellectual property of the artist military personnel also run the risk of compromising networks for satellite deployment in case of national emergency.

### Conclusions

Consumers often times do not use self discipline and stop themselves from accessing what is not legally theirs we have entered the true age of “Big Brother is watching rather it be innocence lost as in the case of child pornography or online illegal gambling.” There is a Keanu Reeves film called “A Scanner Darkly” to be released next year it is about digital forensics of the brain. More seriously, cyberspace is a multi billion dollar business realm. Millions perhaps billions are currently being spent on securing the digital world.

It was nice when cyberspace was the unknown frontier; we just used our best judgment and did what we wanted. A few people abused the privilege and now the monitoring of activities is part of what goes on everyday We must remember one’s computer is one’s intellectual properties, safe guard it properly. To have it monitored without consent is not right under any circumstances. This same digital forensics technology that helps to catch the bad guys’ monitors must protect the innocent.

### **Topics for Further Study**

The new “Freenet” technology that seeks to circumvent the current laws on file sharing will be discussed to some extent. The success rate of current domestic and international policy would be a good study. The use of digital forensics to catch counterfeiters, such as clothing, pharmaceuticals, automotives, and currency would make for an interesting study. The preventative affect of digital forensics on the GNP, Gross National Product would impact public policy to some degree. They are offering training classes at the new Western Regional Forensics Laboratory. The Internet does not say rather or not the courses are open to the public. This would be instrumental towards the

completion of the dissertation. Finally the comparison of forensic techniques say to catch gasoline pump thieves compared to digital thieves would be interesting.

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# Contact Optimization: Social Systems Segmentation and Analysis

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## Abstract

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In the study of a social system an immense quantity of observational data can be amassed. In the case of an airline attempting to understand a changing relationship with its travel agency channel, an enormous amount of flight records which contain pieces of the relationship puzzle must be cleansed, processed, and mathematically transformed. Utilizing data mining technologies on this ever increasing volume of data affords the airlines the possibility to leverage an agency relationship management opportunity in previously undetected groups.

Various forms of quantitative data mining analysis are typically deployed to articulate these groupings. One such method is the *k-means* procedure. In this paper, a new clustering analysis procedure is proposed and is compared to the *k-means* method. The new proposed method utilizes pattern classification techniques based on the transformation of flight records characterized by continuous data formats into binned categorical data.

This paper also presents a proposed method of “unsupervised” binning to accomplish the complex data transformations. The problem of developing an “optimal” histogram has been identified in the statistical literature since 1926. The proposed

method has the potential to optimally assign data to statistically relevant bins where many columns of continuous variables must be analyzed and mined.

### **Introduction**

The segmentation of a whole population of individuals into distinct clusters with multiple attributes has many applications in learning about the behavior of organizational entities. The goal of such partitioning is to gain insight into particular structures inherent in the population or in the case within a business environment, to develop a customized or optimal strategy (Michaud, 1997).

Extending the task of partitioning to include the concept characteristics described in Von Bertalanffy's social systems theory (Strauss, 2002), provides the opportunity for the marketing manager to know about the present state of the social system, and more importantly, to understand the trajectory of the population as a self-organizing entity. The objectives of this paper are to describe a social system within a business context, to decompose the characteristics of the population into data attributes, and to utilize social systems theory to quantitatively predict the population's trajectory in order to apply optimal marketing treatments.

Optimal marketing treatments define the process of how the firm's assets are allocated to market opportunities. Sharpe & Alexander (1990) referring to the performance of financial assets articulates how the choice to allocate a set of investments between different types of assets (that is, between "asset classes") is the most important decision the investor can make. This concept equally applies when it comes to determining whether or not over time the firm will earn the maximum rate of return on invested marketing capital.

Consider an asset class therefore as a sub-population of invest able entities that have more in common with the characteristics of population members within their group than they do with population members outside of their group. Another way this could be articulated is to say that across their respective attribute space, the best asset class segmentation will have a minimum of differences within a group, and a maximum of difference between the groups.

In the context of social systems theory, the definition of a statistically good cluster has also just been defined. The population under investigation will be travel agencies engaged in a kinematic business relationship with a major international airline. It is the airline's desire to understand the agency population in order to know how changes in the commission structure and other marketing variables will alter the relationship landscape. The segmentation of a whole population of individuals into distinct clusters with multiple attributes has many applications in learning about the behavior of organizational entities. The goal of such partitioning is to gain insight into particular structures inherent in the population or in the case within a business environment, to develop a customized or optimal strategy (Michaud, 1997).

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### **Travel Agencies and the Airline: Changing Landscape**

Since 1995 the commercial airlines and their long time partners in servicing passengers, the travel agencies, have been locked in contention over the cost of personal and business travel (Bond, 2002). At the time, just prior to the heavy use of web based purchasing, travel agents through the American Society of Travel Agents files a class action law suit against seven U.S. commercial carriers. The suit alleged that the airlines collaborated to cap agent's fees for providing travel assistance.

Airlines have long felt that the fees agents charge the carriers for booking assistance are one of their few controllable costs. In actuality, airlines have been whittling away at the agency fees for years reducing the percentage payouts and capping total dollar payouts. Delta and Continental led the way, which happened to be among the most financially stressed carriers at the time (Jonas & Chapman, 2002). Both carriers began to institute a "pay for performance" structure which forced agencies to prefer one carrier over the other, building volume, and therefore commissions, with a few suppliers.

The airlines, because of their strategies, have created a multi-tier set of customers – passengers as customers in the traditional sense, and agents as a new population of customers. The airlines subsequently also face a classic set of decisions regarding the treatment of these customer groups. Agencies now view themselves as consumers of transportation services and have a preference based on the relationship potential of certain carriers (Coulter, 2004). The agencies are partners, adversaries, and customers. A very complex set of relationships that require a carrier to thoroughly understand the trajectory of the relationship with this important channel as a social system.

### **Bookings Data → Information Formation**

Even for a medium sized carrier the number of records generated that must be inspected could easily number in the tens of millions on an annual basis. Mining this raw record would give us some central tendencies about routes, carriers, and class of service, but not really the tendencies about agencies. This record format is developed from the point of view of the carriers and not the agencies. To gain insight into the agency relationship the record needs to be mathematically transformed into an agent record. This concept is illustrated in Figure 1.

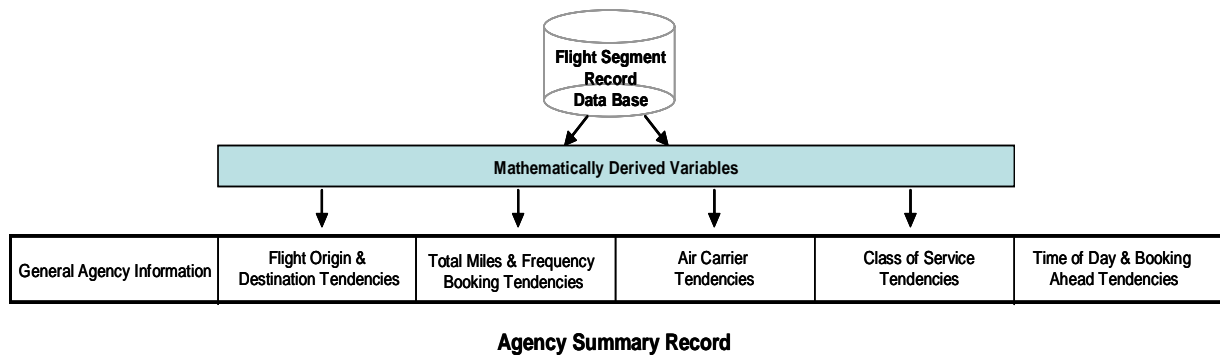


Figure 1. Deriving the agency record from the flight segment record.

Mathematical data transformations represent a necessary step to move from a flight record point of view to an agency relationship management point of view. Over 112 different data elements have been synthesized using numerical methods to build the Information Formation agency record. Ten of these variables will be used in the clustering process and the remaining 102 elements will be utilized by management as the query base to understand core business questions on agency performance and tendencies.

### **Information Formation → Arithmetic Binning**

Binning data is an important task in the process to transform the data from continuous variables into categorical variables (Giudici, 2003). The goal of this task is to

ultimately build a 10 dimensional array of variables for each agent describing propensities that can be mined, compared, and grouped based on their similarity in the clustering process. Sturges (1926) identified early that a core statistical question revolves around the number of bins required to describe the data accurately when representing a series in the form of a histogram.

This problem can be thought of as belonging to a class of partitioning problems (Birge & Rozenholc, 2002). Histograms have been used throughout statistics to represent data even though there are more sophisticated methods (wavelets as an example). Optimizing the number of bins to represent a data series usually entails the analyst building a histogram through trial and error. The challenge emerges when there are many columns of continuous data and each column must be optimized by hand, one at a time. Considering all the possible partitions involves a much more difficult optimization problem.

The human interaction with the selection of the number of bins is just one of the complexities in optimal bin representation. There is also the matter of where to place the partitions (left and right side boundaries) and the optimal density of each of the bins. Figure 2 illustrates the three simultaneous decisions that must be made. These decisions are also framed in an environment where the wrong decisions miss important data. Bias by the analyst is present in these decisions, which dramatically increases the risk in discretizing the data poorly.

Balancing this aspect of risk and bias is at the heart of the proposed bin solution in this paper. There are many rules of thumb for instance for assigning the density of the bins. Sturges (1926) rule was  $1 + \log_2 n$  bins, others would include having at least  $k$

observations in each bin ( $k$  being an arbitrary number selected by the user). With regard to density, Zang & Cheng (2003) correctly cite the power of Pearson's Chi-square test

represented by: 
$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}.$$

Where:

$O_{ij}$  = the observed frequencies  $I, j$ ,

$E_{ij}$  = the expected frequencies  $I, j$ , and

$r$  and  $c$  represent the row vector  $r$ , and column vector  $c$ .

The chi-square test is a nonparametric test and does not require normal distributions.

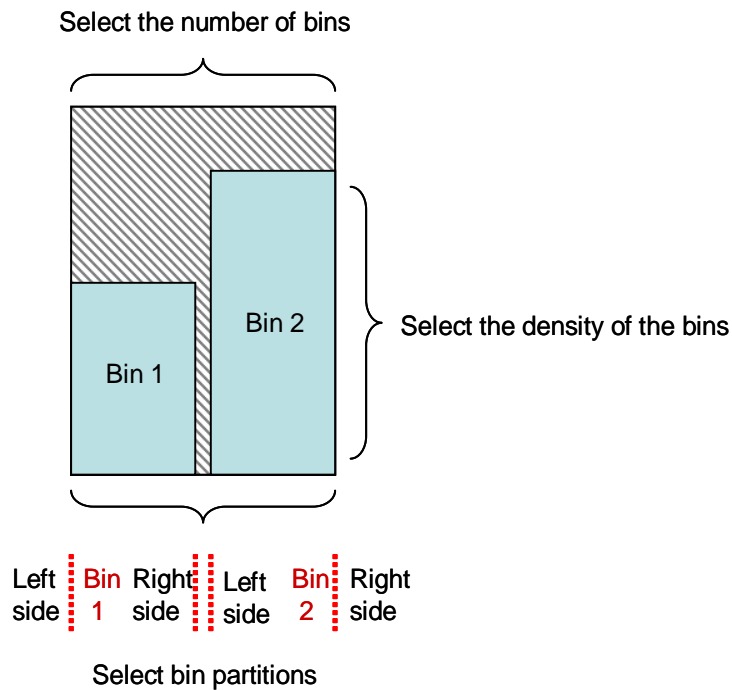


Figure 2. Bin decisions: Number, density, and partition placement.

Bins of equal density under this formulation would achieve a higher chi-square value than irregular bins. Pearson's Chi-square value therefore would depend heavily on the number of bins. Most references to bin numbers have included an approximation to the third root of the number of records being binned (Scott & Schmitz, 1988).

The problem when investigated deeper is usually traced to the small size of the data samples being used (anywhere from 100 to 1,000 records on average). This rule of thumb would make the number of bins exceptionally large when large data sets are used. The airline problem is currently using 3,600,000+ flight records. Even the small sample size of 12,517 records used to develop the concepts would generate over 2000+ bins. Much more than any business person would take seriously and is therefore rejected.

Relative to the bin partitions, Scott & Schmitz (1988) correctly identifies the use of a histogram as a unique semi-parametric tool with the ability to smooth out the "noisiness" in the data. This smoothing parameter is in fact the bin width. They also comment that analysts typically perturb these partitions to achieve an optimal value, but an automated, or data driven solution would be extremely useful. Thus the bin width serves as a kind of control on the amount of detail used in the discretization process.

To precisely articulate the problem to be solved in mathematical terms let  $X_1, X_2, X_3, \dots, X_n$  represent a column attribute from an  $n$ -sample data set of agent records from some unknown distribution with density  $f$  with respect to a line segment  $(a_i \rightarrow b_i)$ . This line segment would constitute a closed interval corresponding to a finite portion of an infinite line (continuous data). The histogram estimator  $f$  is based on a set of partitions with  $M$  hyperplane segments (Birge & Rozenholc, 2002). The density of each histogram could be represented by:  $f^{opt} = f_M(X_1, X_2, X_3, \dots, X_n)$ .

Where:

$f^{opt}$  = the optimal histogram density estimator,

$M$  = the set of hyperplane segments, and

$X_i$  = the attribute from a multi-dimensional attribute set.

The number of bins  $b$  may be represented as a new proposed rule of thumb where the statistical standard deviation of the attribute value is taken to the third root. This can be represented as:  $b^{opt} = \sigma(X_1, X_2, X_3, \dots, X_n)^{-1/3}$ .

Where:

$b^{opt}$  = the optimal number of bins,

$\sigma$  = the statistical standard deviation operator, and

$X_i$  = the attribute from a multi-dimensional attribute set.

The optimal partition separator creates the bin hyperplanes consisting of  $M$  optimal hyperplane positions placed at unequal line segment length with  $2 * b^{opt}$  intervals  $I_{left}$  &  $I_{right}$  (left and right sides). The placement of these intervals is based on minimizing the sum of the Euclidean distance values inside the bin (Borowski &

Borwein, 1989):  $d(x, \mu) = \sqrt{\sum_{i=1}^n (x_i - \mu)^2}$ .

Where:

$d$  = distance between two points in univariate space,

$x$  = observation,

$I$  = the  $i$ th observation,

$\mu$  = mean of the binned series, and

$n$  = the number of observations.

This may be written as:  $M_{left}^{opt}, M_{right}^{opt} = \sum_{i=1}^n \min I_{left, right}(X_1, X_2, X_3, \dots, X_n)$ .

Where:

$M_{left, right}^{opt}$  = the location of the optimal partitioned hyperplanes,

$I_{left, right}$  = the left and right side partition intervals minimized by the

sum of the Euclidean distances within the bin, and

$X_i$  = the attribute value from a multi-dimensional attribute set.

### 63651211331 → Absolute Proximity Distances

One may consider the task of clustering as binning the bins. Similar to the binning exercise, a population of agents is described by a set of attribute values. These values are now transformed into a long integer string. The objective of the clustering is to create separable partitions such that the agents are grouped together on their similarities, minimizing the differences of these attribute sets. The measure of goodness will be a minimization of the intra-cluster distances between all agents in a particular cluster, and a maximization of the inter-cluster distances between clusters.

The clustering exercise creates the “geometry” of the separable hyperplanes and is followed by the classification process. This process maps an observation  $v$  to a cluster target  $w$ . These partitions are non-overlapping, disjoint, and exhaustive subsets of the population. Each agent  $v_i$  in the problem domain will eventually be mapped into a unique cluster  $w_i$ .

Each clustering method whether supervised (has a discrete target or dependent variable) or unsupervised (no dependent variable used) produces these types of mappings. The difference being proposed is in the development of the similarity, and dissimilarity measures with the hope that the new method may add a modicum of partitioning accuracy.

Michaud (1997) states that “similarity” is generally difficult to describe. The more complicated the pattern to be matched, the more difficult the attempts to describe similarity become. Arrow (1951) gave clarity to the issue of similarity with his thoughts about “paired unanimity”. This idea of paired unanimity relative to the clustering problem states that identical pairs, which will be called “twins”, shall always be placed into the same cluster. A simple enough idea, but very powerful as a constraint and starting point for the articulation of the proposed clustering task.

The original data values contained in the bins are on average increasing in value from left to right with the minimum value being contained in the left most bin and the maximum value being a member of the right most bin. The distance between these two numbers constitutes the basis for a proximity measure.

### **Modified Hamming Distance → Separable Clusters**

Cluster analysis is the process of grouping a set of observations. Given a symmetrical data matrix of Modified Hamming distances composed of  $m$  rows representing agents and  $n$  columns representing attribute distances. The objective is to group the observations in such a way that they represent an internally homogeneous intra-cluster, and externally heterogeneous inter-cluster.

The observation matrix would be in the form (Giudici, 2003):

$$\mathfrak{R} = \begin{matrix} & 0 & \cdots & m_{1i} & \cdots & m_{1n} \\ & \vdots & \ddots & \vdots & & \vdots \\ m_{i1} & \cdots & 0 & \cdots & m_{in} \\ & \vdots & & \vdots & \ddots & \vdots \\ m_{n1} & \cdots & m_{ni} & \cdots & 0 \end{matrix}$$

Where:

$m$  = the row vector, one row per agency,

$n$  = the column vector of distance measures,

$\mathfrak{R}$  = the Modified Euclidean distance matrix.

The proposed method deployed is a two stage procedure. The data is randomly sampled from the total agent population using a ten percent sample to create the clusters. There are 4,164 agents in the sample, from a population count of 41,640 total agencies. In stage one, an initial agent is selected at random to begin the process. The logic groups all identical “twins” first. An identical twin represents two agents with the exact same binary number across all dimensions. This follows Arrow’s (1951) paired unanimity constraint and insures that all twins are in their respective clusters.

The next step in stage one is to fill the cluster with similar agents minimizing the sum of the Modified Hamming distances to insure a balance between class membership and intra-cluster inertia. Ten dimensional space is somewhat challenging to work in and certainly a challenge to visualize. A paradigm could be helpful in visioning the dynamics of selecting the next cluster to work on.

Think of the next cluster to be selected in this ten dimensional space having the objective of maximizing the distance between the previous cluster and the cluster just chosen. The second cluster that should be considered then would have a centroid the furthest away from the centroid of the first cluster selected. To find this centroid, the

agent is selected whose distance is the furthest away from the centroid of the first cluster. But, this logic has a slight problem.

The challenge is that there is a high probability that the furthest agent is up against a “wall”, or boundary in this ten dimensional space. Optimally drawing other agencies within close proximity into the cluster may be hampered by the center agent being up against this wall. To compensate for this probability, the agent that is selected is not the furthest agent from the centroid of the first cluster, but an agent whose distance has been compensated with the Golden Ratio (1.61803399). This will be referred to as adding a “flutter” and moves the centroid off the wall. This procedure is illustrated in Figure 3.

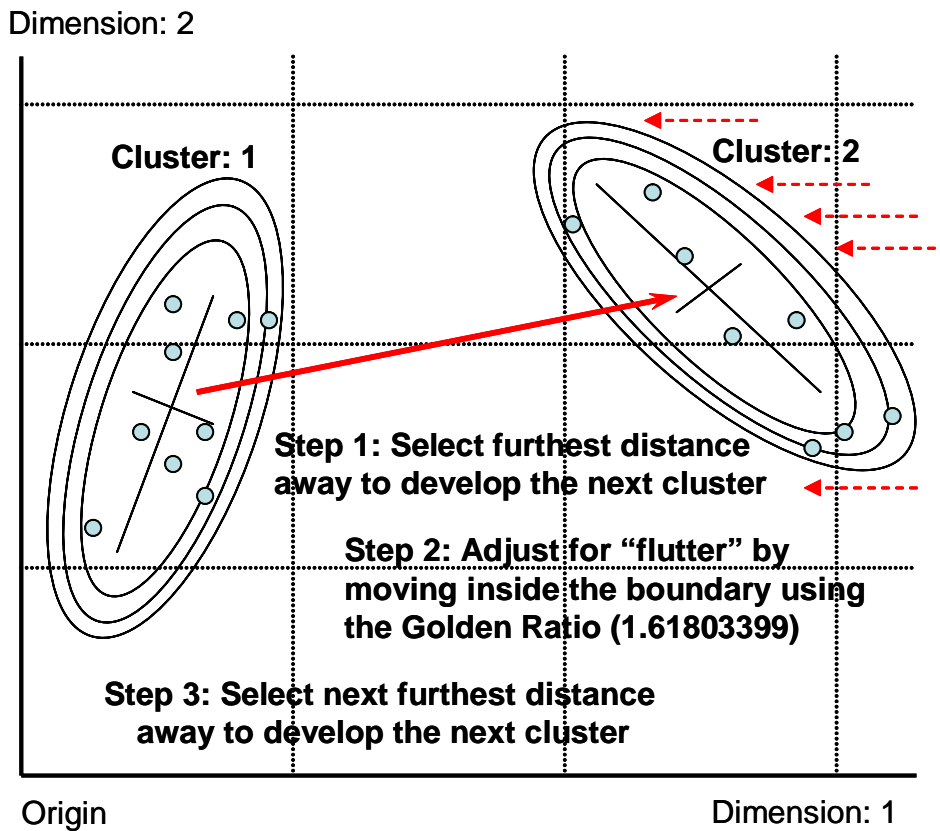


Figure 3. Cluster selection process with “flutter” for optimal selection.

Each cluster follows this process in an iterative procedure until all agencies have been assigned a cluster identification, mapping agent  $v$  to cluster identity  $w$ . The number of clusters is set at some upper bound (13 in the test runs). Once the cluster “geometry” has been established, the second stage procedures help improve the optimal partition sets and are described next.

### Clustering → Classification

A few comments on the acquisition of data for development of the clusters will precede the discussion of classification. In order to develop the best probability of a good statistical clustering the data sets were separated into three disjointed partitions for testing purposes (Miller, 2005). Figure 4 illustrates the three-way partitioning frame used in developing and testing the models.

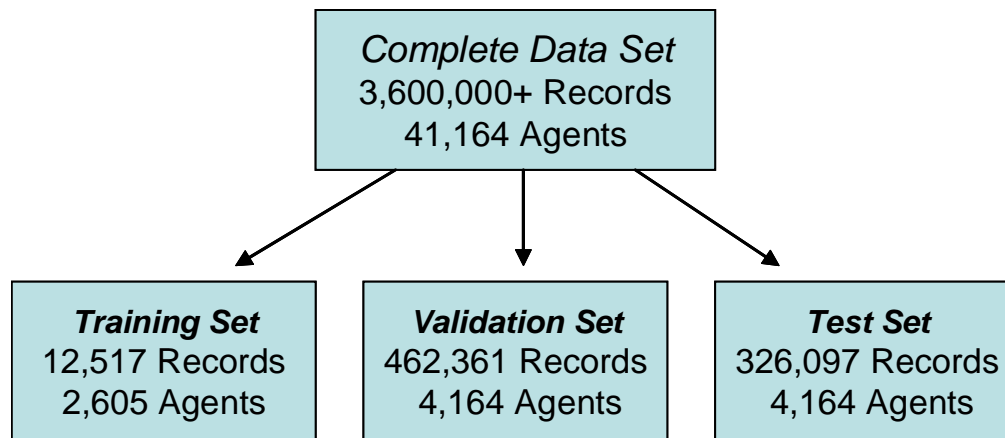


Figure 4. Three-way partitioning for training, validation, and model testing.

Returning to the assignment stage, the method for mapping agencies to clusters is the nearest neighbor method. This procedure takes the sum of the Modified Hamming distance and compares it to the sum of the cluster corner values, and assigns the agency

to the cluster corner closest to it in terms of proximity. This can be expressed as:

$$\min \sum_i^n v_i - \sum_j^k w_j$$

Where:

$v$  = the Modified Hamming distance of agency  $I$ ,

$n$  = the number of agencies,

$w$  = the cluster corner of cluster class  $j$ ,

$k$  = the number of clusters.

The process of mapping agency observation  $v$  to cluster  $w$  continues until each agency is assigned a cluster label and is then output to a comma separated value file for further analysis. The procedure moves to the analysis of the inter-cluster and intra-cluster measures of goodness of fit are computed.

### **Contrasting Procedures: A Technical Perspective**

Michaud (1997) correctly states that the comparison of methods is difficult at best. A lot rests with the analyst as to the care used in preparation of the data, the number of clusters ultimately selected, and the exact technique deployed to develop the clusters. The most utilized clustering method is the  $k$ -means procedure (Giudici, 2003), consequently comparisons of the proposed method will be contrasted with  $k$ -means. A good comparison of clustering should include both a technical argument and a business discussion.

Both SAS<sup>TM</sup> and SPSS<sup>TM</sup>, two widely used commercial packages, can execute the  $k$ -means procedure. Identical data sets and equal number of clusters selected were used for the comparison. In all cases the number of clusters, which is a required input, is set to

13. The *k*-means procedure operates by instituting a search for near optimal partitions and continues its iterations with minor improvements to the centroids at each iteration. Assignments to clusters are then made until all agents have been mapped to a cluster.

Some indication of the quality of the clustering may be seen by examining the measures of proximity between pairs of clusters. The sum of the interclass distances for the SPSS™ procedure is equal to: 2,802.64. The sum of the inter-cluster distances in the SAS™ procedure is equal to: 2,821.97. The distance value for the proposed method is 5,287.9. The proposed method would therefore provide a superior measure of 1.87 times the SAS™ procedure and 1.89 times the SPSS™ procedure. SAS™ Fastclus would slightly outperform the SPSS™ procedure by less than .01 times and may be deemed equivalent.

Comparing the intra-cluster support measures the SPSS™ procedure produced a value of 279.70. The SAS™ procedure produced a value of 190.45 and the proposed method produced a value of 171.96. On this measure of homogeneity, the proposed method outperformed the SPSS™ method by a margin of 62 percent and outperformed the SAS™ method by 11 percent. The SAS™ procedure outperformed the SPSS™ procedure by 47 percent.

A comparison of the number of agents falling into each cluster grouping may be another indicator of quality. This measure would make a statement about the homogeneity of the membership within each cluster. But, upon examination of Table 1, the output of the three procedures each produced very different density results.

Cluster	First	Cluster	Second	Cluster	Proposed
---------	-------	---------	--------	---------	----------

Summary	Density	Summary	Density	Summary	Density
1	375	1	81	1	1985
2	161	2	350	2	78
3	26	3	266	3	17
4	327	4	734	4	284
5	384	5	77	5	33
6	77	6	22	6	261
7	265	7	1149	7	33
8	755	8	188	8	110
9	671	9	28	9	176
10	472	10	423	10	380
11	538	11	302	11	377
12	92	12	267	12	223
13	21	13	277	13	207
Totals	4164		4164		4164

Table 1. Agent cluster densities produced by the various procedures.

Measuring the results of these data mining procedures is an area where further research is warranted. Ultimately declaring that one procedure is better than another may indeed rest with the functional area domain expert and should be based on the results and usefulness of the information derived from the clusters.

### Summary

The ability to cluster large amounts of data exists in support of developing a clarity and an understanding of changing social systems. In order to use the powerful data mining methods described, the format of the records must be mathematically transformed into a synthetic data design which allows for the utilization of pattern classification techniques. In the case of developing an agent relationship management understanding, continuous data provided was transformed through a new unsupervised binning procedure. The bins produced a long binary string which could be compared for both similarity and proximity differences. The benefit is that statistically optimal histograms are developed and smooth the data while serving as the mining base.

A new clustering procedure was developed which was based on a unique, more precise distance measure. This new technique takes into effect the proximity of change which must take place to morph one binary string into another. This new proposed distance procedure has been referred to as the Modified Hamming distance. The proposed method also exploits a two stage procedure which produces superior corner cluster attribute values. In trials with massive amounts of flight records, these new procedures provide novel clustering potential. These capabilities were compared on a technical basis to commercially available *k-means* alternatives.

This effort has identified several areas where future research is warranted:

1. Further development of binning constraints based on domain expert inputs,
2. Further explorations on methods where the number of clusters need not be known apriori, and
3. Further methods of comparing and contrasting data mining alternatives from both a technical and business perspective.

The business analysis of clustering results can not just rely on the technical conclusions of goodness of fit of any individual or group of clusters. The business interpretation is the ultimate payoff for developing enterprise clusters and has many uses. The business analyst must be able to see clearly separable groups with distinguishing strategies emerge from the exercise. In this sense, the business interpretation lies at the intersection of technical skills and domain knowledge. The technical analyst and the business analyst must strive to work together to insure the highest quality business result.

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## **Conference Speaker: Dr. Cesar Morales**

Dr. Cesar Morales is President Emeritus of the Mexico City Metropolitan Zone of Monterrey Tech. He holds three degrees from New Mexico State University (NMSU) at Las Cruces, NM: B.S. in Civil Engineering, 1964, M.S. in Civil Engineering, 1965, and Sc.D. (Environmental Engineering), 1968. Dr. Morales started his professional career at Monterrey Tech as a full time faculty member in the Department of Civil Engineering on September 1<sup>st</sup>, 1968. During his stay at Monterrey Tech, he held different positions that includes, Faculty member of the Department of Civil Engineering, 1968-1976, Campus Director for the State of Mexico Branch Campus, 1976-1979, Vicepresident for Branch Campuses, 1979-1985, and President for the Mexico City Metropolitan Zone, 1985-2002 (June 15<sup>th</sup>). The Mexico City Metropolitan Zone to June 15<sup>th</sup>, 2002 was composed of the following campuses includes Central de Veracruz, Ciudad de México, Chiapas, Cuernavaca, Estado de México, Hidalgo, Morelia, Toluca, and Santa Fe. The Mexico City Metropolitan Zone under the direction of Dr. Morales grew from 0 to 29,500 students and 6,000 jobs were created. Of the 6,000 employees, 3,000 were faculty members, 90% of them have a master degree and more than 550 hold the doctoral degree.

His contributions to Monterrey Tech, include the creation of the following campuses including Central de Veracruz, Chiapas, Ciudad de México, Cuernavaca, Estado de México, Hidalgo, and Santa Fe. He also promoted the satellite communication among campuses, which in time became the Virtual University. He initiated the concept of the Virtual Library and Specialized Computer Labs. One of his main contributions is the founding of the CAMP concept (daycare centers for children of female faculty members). More than 22,000 academic degrees hold the signature of Dr. Morales. Under the direction of Dr. Morales, the Mexico City Metropolitan Zone became the largest zone of Monterrey Tech, with more students and a larger budget than any other zone. Dr. Morales has dictated numerous conferences, both in Mexico and abroad. He has been on occasions consultant in water reuse for a number of Mexican companies. In January 2003, upon his retirement from Monterrey Tech, he joined the Universidad del Valle de Mexico, where he held the position of Chief Academic Officer. In April 2005, Dr. Morales is appointed to the position of Institutional Rector of the Universidad del Valle de Mexico. Since Dr. Morales joined the University, the UVM has been ranked as one of the 10 best Universities in Mexico, both in 2004 and in 2005. Also, under Dr. Morales' guidance, the University has become the second private University in Mexico in the number of accredited programs. The University has also received from the Ministry of Education, recognition of excellence in quality. This recognition has been given to only six private Universities in Mexico.

The Universidad del Valle de Mexico has 21 Campuses throughout Mexico and has an enrollment of 66,000 students. Dr. Morales has received three recognitions from his Alma Mater – New Mexico State University that includes One of 100 Outstanding Living Alumni at the NMSU Centennial Celebration, 1988, Distinguished International Alumnus Award, 1993, and Centennial Distinguished Alumnus from the College of Engineering, 1996. He is a member of the following Honor Societies including Sigma Pi Sigma – Physics, Phi Kappa Phi – Academics, Blue Key – Leadership, and Sigma Xi – Research.

## **Conference Speaker: Dr. Javier Fadul**

Dr. Javier Fadul is a business management professional with broad knowledge and expertise in the areas of strategic planning, business development, finance, product management, marketing, and field operations. In his more than 24 years of experience, Dr. Fadul has worked in several countries in Latin America, mostly in the oil and gas industry. In the past 9 years, he has worked in several management positions for a Fortune 500 corporation in the energy industry based in Houston. He holds a B.Sc. degree in Electrical Engineering from Universidad Javeriana-Bogota, a MBA from Le Tourneau University, and a Ph.D. in Applied Management and Decision Sciences from Walden University.

Dr. Fadul's research agenda is focused on corporate social responsibility and corporate valuation. His dissertation, based on these topics, was recently honored with the Frank Dilley Award for meeting the highest university standards of academic excellence. He has published scholarly articles on knowledge management and service quality for APQC (2004) and the Latin America Quality Council (2003). He also published an article on corporate social responsibility and firm value in the oil and gas industry in the 2004 Annual Symposium of the Society of Petroleum Engineers. Dr. Fadul is part-time professor of management at Walden University. He is also professor of business management, finance, and marketing in other institutions of higher education in the United States.