KMPro Journal

KMPro
KNOWLEDGE MANAGEMENT PROFESSIONAL SOCIETY

# Inside KMPro Journal

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***Contributions***

For more information about contributing to the Journal, please see page 26.

## FROM THE EDITOR'S DESK

Welcome to the second edition of our Journal for 2006. Indeed, it has been an exciting year for the Journal and I am delighted to offer our Society a second edition full of exciting, engaging, and educational articles from a variety of authors. 2006 marks the first year that we have been able to deliver two high quality editions. I hope that the demand will continue to increase.

In this edition we carry on our tradition of highlighting the works of up and coming scholars. In the past, we have published *works-in-progress* penned by PhD candidates. Few journals provide such an opportunity and we are proud to fill this unfortunate void. This edition is particularly special, as it includes a 'concluding' article from a recent PhD graduate whose early ideas graced our pages . . . congratulations Dr. Jerry Westfall!

We continue this quest and we have expanded our horizons by introducing two outstanding graduate students, both of whom are worthy of your attention. Please take the time to read their review of a classic book in our domain – Richard Wurman's seminal work entitled *Information Anxiety*. William (Zach) Pilkerton and Sandra Lambert's review of *Information Anxiety* is excellent and may even convince you to add this classic book to your reading list.

Equally exciting is the expanding interest in our Journal, which is evident by the number of international authors submitting articles. We are very fortunate to have two first-class papers that demonstrate that KM is of global interest. The first of these is by Haris Papoutsakis, whom I met at a KM conference in Chile. I was very impressed with Haris' interest in the real-world application of KM. The second international paper is from Dr. S. Balasubramanian, a prior KMPro Journal author, and S. Manivannan, both of whom are KM practitioners from India. Once again, Dr Balasubramanian has provided a paper that will be of great interest to many.

Based on the encouraging feedback I received on the last edition, we have included two articles that discuss the practical application of organizational storytelling as a knowledge transfer technique. Melinda Bickerstaff, the *raconteur extraordinaire*, has graciously agreed to continue our discussion of knowledge management in general, but with a special emphasis on organizational storytelling. Although much has been written on the subject, there are precious few real-world experts – Melinda is one of the few corporate executives that have actually proven storytelling *truly* works in the real world.

Building on the storytelling theme, your humble servant has put pen to paper in an effort to chronicle a success, albeit small, in the domain. This story is shared with the hope that others will be able to replicate the tiny triumph.

Sadly, 2006 ends on a sour note with the tragic loss of Melissie Rumizen. She was the personification of a KMer. She understood what eludes so many of us: *knowledge sharing is powerful* and *simple is good*.

Please remember that the aim of our Journal is to provide the Knowledge Management (KM) community a forum in which we may share ideas about the domain. In order to achieve this aim we invite original submissions in a variety of formats, including peer-reviewed articles, points of view, book reviews, success stories, and works in progress to name a few. Please feel free to send your comments and submissions to:

John P. Girard, PhD
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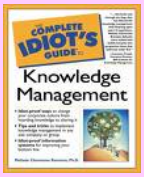
Editor KMPro Journal

## IN MEMORIAM: MELISSIE RUMIZEN

### Spirit, Life and Light

The world of Knowledge Management lost a shining star with the passing of Melissie Rumizen, Ph.D., on December 5, 2006 at the young age of 51. All who knew her were inspired by her intensity and spirit, as well as her sheer joy of life. She embarked upon her calling to knowledge management in 1995 after attending a conference and becoming convinced of the absolute imperative of KM. Her approach to knowledge strategy was beautiful in her "simple is good" philosophy and belief that KM was all about learning and the importance of connecting people.

She was quick to remind us that while strategy was important, that there was no such thing as the perfect strategy and any underlying discussion should always include asking WIIFM (what's in it for me). While Melissie is gone from us now, her spirit and passion for knowledge management lives on everywhere her light shined and within everyone she touched.



# ABOUT KMPRO

The Knowledge Management Professional Society (KMPro) is an international professional society headquartered in the Washington, D.C. area and is the world's largest KM society with more than 120,000 members in 88 countries world-wide. It is a non-profit, member-driven community committed to promoting knowledge management (KM) worldwide, with membership available for those interested in KM.

We are a society created by KM Professionals and for KM Professionals actively engaged in KM implementation, Change or Information Management, Innovation, Human/Intellectual Capital Strategy, Intangible Asset Valuation. KMPro welcomes both those new to KM and experienced practitioners.

We serve the professional needs of the broad KM community through a variety of training, collaboration, networking, mentoring, partnerships, publishing, advertising opportunities. We also offer our CKM certification graduates with the opportunity to collaborate and network.

We are 100% member-driven, locally and globally, working together to invigorate the KM community. KMPro is an INCLUSIVE organization, and one of our goals is to form strategic alliances and partnerships with those organizations who share our vision, ethics, values and beliefs. We openly seek and promote collaboration with other organizations when such a partnership would provide benefit to our members and would support our vision.

In support of our goals to advance KM and professionalism in the field of KM, KMPro offers opportunities for KM certification, career assistance and networking.

KMPro is the leading certifying body and largest international association dedicated to knowledge management and its Knowledge Management Certification Board (KMCB) was formed in 1999. In support of our goals to advance KM and professionalism in the field of KM, KMPro offers opportunities for KM certification including the Certified Knowledge Manager (CKM) certification, as well as the Certified Knowledge Management Professional (CKMP) and Master Certified Knowledge Management Professional (MKMP) certifications. KMPro has also begun to offer KM certification at the organizational level with the new "Certified KM Organization" (CKMO), and its international KM organizational award program will begin in 2007.

Members also have access to our KMPro Career Center where members can post resumes, and organizations seeking to hire those with KM expertise can post KM job listings which are made available via our KM-Jobs listserv. We're in the process of conducting the world's first global KM Salary and Benefits survey, and will publish those results once the survey is complete.

Networking and collaboration opportunities are available through member only chapter meetings (80+ chapters worldwide), events, online activities, KMPro's LinkedIn Group, and exclusive Certified Knowledge Manager (CKM) Network.

For questions concerning membership, contact the VP of Member Services at membership@kmpro.org. For questions regarding our training services, please contact your Certification Coordinator at 866-31-KMPRO (866-315-6776) Outside U.S. 757-460-6500, or training@kmpro.org

Our purpose is to encourage the practice of knowledge management, reflect the diversity of thought found in this growing field, and disseminate the best ideas and tools from the many disciplines that facilitate organizational learning and improvement.

KMPro is incorporated within the State of Maryland, and is governed by its laws. Our Governance webpage contains our By-Laws. Ultimately we will provide available to members copies of board and meeting minutes when a secure member area is available.

# STORIES OF KNOWLEDGE IN ACTION: UNKNOWN UNKNOWNS – GIBBERISH OR WISDOM?

By John P. Girard, PhD © 2006

For several years, I have had the great pleasure of speaking to groups of organizational leaders about knowledge management. Specifically, I speak about how leaders may reap the benefits of creating and sharing organizational knowledge. This journey has taken me to destinations across the United States and Canada as well as Europe, Asia, and South America.

Over the years, my talks have changed. Initially, I spoke about rather complex cognitive theories with the hope that folks in the audience would take my *words of wisdom* and single handedly transform their organizations. After many sessions of watching yet another audience grin politely as I delivered my sermon, I realized that I was contributing to one of the common themes of my talks – *information overload*.

As it turns out much of what I was talking about was simply *lost in the translation.* At first, I wondered if it was the audiences . . . because it certainly could not be me! After each presentation, I would spend hours answering emails from individuals with questions such as "I really enjoyed your talk; however, I am not really sure how to implement the ideas you were discussing. Do you have any examples of these ideas in action?" After many nights of responding to similar questions, I realized (finally) that I was making the whole thing seem very complicated.

I began to respond to questions with short stories that illustrated the point I was trying to make. Most of these stories were based on real organizations – although I would often change the names to protect the innocent, like Joe Friday from Dragnet. One day I had an epiphany – why wait until after the presentation to share these stories. I decided to transform my talks to a series of stories that explained the (unnecessarily) complicated theories I was describing. The rest, as they say, is history.

This was the genesis of a presentation entitled *Simple Ideas that work in Complex Environments*. The premise was rather simple (pun intended) . . . to describe some ideas, many of which were grounded in complicated cognitive theories, which seemed to work in complex environments. What, you may ask, is a complex environment? I opted to use Merriam-Webster's definition for complex: "a group of obviously related units of which the degree and nature of the relationship is imperfectly known." This terse definition describes so many of the organizations in which I have worked, studied, or consulted. The final clause seemed to be key, "the degree and nature of the relationship is imperfectly known."

The text that follows is one story from the collection of the stories that I use in my talks. The set includes original stories, classic stories, stories based on television commercials, stories that have helped guide great organizations, and stories from great leaders (such as the one below). Although the origin of each story is very different, I believe that they all share the common theme of simplifying complex environments. Of course, you are the real judge; let me know what you think.

Many of the stories have transcended the boundaries of my talks – I now use them in a

variety of venues including graduate and undergraduate management classes, corporate training events and consulting. A short reflection and points to ponder section follows the story. I hope that these segments will help you understand and implement the ideas – again feel free to let me know.

Some people have suggested that the stories are very short and that each story could or even should be expanded each into a 10-page chapter. I have deliberately keep the stories as short as possible because I believe that knowledge transfer is best achieved in bite size pieces, sans fluff.

## Unknown Unknowns – Gibberish or Wisdom?

The Plain English Campaign is a United Kingdom-based organization that describes itself as "an independent pressure group fighting for public information to be written in plain English." Annually the Plain English Campaign presents a variety of awards focusing on the use of English.

One of their awards in entitled the *Foot in Mouth*, which is presented to a public figure for a baffling quote. In 2003, the recipient of the *Foot in Mouth* award was former US Defense Secretary Donald Rumsfeld for saying the following during a Pentagon press conference on February 12th, 2002:

> *. . . as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns -- the ones we don't know we don't know. And if one looks throughout the history of our country and other free countries, it is the latter category that tend to be the difficult ones.*

Say what? What do you mean there are know knowns, known unknowns, and unknown unknowns? This sounds like gibberish at best or perhaps just pure nonsense. Many journalist poked fun at Donald Rumsfeld and a series of Internet sites emerged to document the *poetry* of Rumsfeld. Surely, the Secretary misspoke or was misquoted. In fact, nothing could be further from the truth as Donald Rumsfeld very concisely described a major complex management challenge.

The challenge is best illustrated using a 2 x 2 matrix:

| | |
|---|---|
| **Unknown Knowns** | **Unknown Unknowns** |
| **Known Knowns** | **Known Unknowns** |

Figure 1 - Rumsfeld Unknown Unknowns

## Reflection

The point that Secretary Rumsfeld so eloquently articulated in just 20 seconds has since been the subject of a variety of articles and book chapters. Take for example Alex & David Bennet's chapter entitled *Exploring the Unknown* in their book *Organizational Survival in the New World: The Intelligent Complex Adaptive System*. This chapter

focuses on "how do we identify things that we don't know we don't know." (p. 348)

This is exactly what Rumsfeld was suggesting. If we know that we do not know something then we can develop a plan to find out more. Likewise, if we do not know that we know something then again we can develop a plan to find the missing link. Both of these issues are dealt with during external and internal scanning, competitive intelligence, and the like.

The 2 X 2 matrix is a useful way to categorize the challenges confronting many originations. Unfortunately, most leaders focus on the easy bits: **things they know** and **things that they know that they do not know**. Many organizations ignore the upper right-hand quadrant – the unknown unknowns – because it is just too difficult.

To some degree the avoidance of the upper right-hand quadrant is a symptom of the ***not on my watch*** **syndrome**. Many leaders do not wish to dig too deep into the unknown unknowns because it is uncharted territory. Equally concerning is the fear that discovering unknown unknowns will expose a corporate Achilles heel . . . Then what would we do?

### *Points to Ponder*

1. Use the matrix above to describe the challenges confronting your organization. Try to list three in each quadrant.
2. What percentage of time do your leaders spend focusing on known knowns? What about Unknown Unknowns? What do you think is the correct balance?
3. How can you use Rumsfeld's ideas to create competitive advantage?
4. How transparent should the discovery process be? Is this guarded knowledge that must be keep within the inner circles of an organization or should it be shared throughout the entire organization?
5. Rumsfeld's Unknowns Matrix is sometimes compared to the Johari Window developed by Joseph Luft and Harry Ingham in 1955. Research the Johari Window – a good starting point is Wikipedia (http://en.wikipedia.org/wiki/Johari_window) – and describe the differences between the models.

### *References / Recommended Reading:*

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Plain English Campaign website: www.plainenglish.co.uk

### About the Author

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# INTEGRATING STRATEGIC IT ADOPTIONS WITH KNOWLEDGE MANAGEMENT PROJECTS: LESSONS FROM A CASE STUDY

By Haris Papoutsakis © 2006

This paper aims at demonstrating the importance of Knowledge Management projects that run in parallel with strategic Information Technology adoptions. It highlights important lessons learned from a case study at INTRACOM, the largest Telecommunication and Information Systems manufacturer in Greece, with a strong international presence. Early in 2001, INTRACOM decided to replace ESTIA (its old, in-house-built, Oracle based Warehouse Management System) with a customized version of SAP that could incorporate all the essential features of ESTIA. The project was successfully implemented in various phases, the most important of which were completed in January 2002 and in May 2003.

The paper discusses the various implementation phases, implications, strategic benefits and drawbacks in integrating SAP from INTRACOM's perspective. Special emphasis is given on the parallel Knowledge Management project, designed and implemented by both SAP specialists and INTRACOM's staff (the so called Key-Users) in order to manage the new knowledge acquired and train a total number of 700 INTRACOM's employees (the End-Users). It also highlights future development opportunities, as additional modules (subsystems) are being integrated into the system, as well as the company's own deliberations regarding warehouse management. Finally, the paper concludes with a summary of the important lessons learned and some indications of the future challenges that INTRACOM is bound to face.

**Keywords**: Information Technology, Store's Automation, Strategic Management, Intellectual Capital, Knowledge Management.

## Introduction

In the relevant literature, it is very often that we encounter papers –and even entire books– built upon case studies investigating major Information Technology (IT) adoptions. In various parts of the globe, major companies such as Siemens, Toyota, Matshusita, Honda, Canon and Xerox, just to mention a few, have become the subject of such studies (Davenport and Probst, 2002; Dyer and Nobeoka, 2000; Nonaka, 1991; Seely Brown 1991). Despite the widely recognized importance of the strategic IT adoptions only leading corporations, like the ones aforementioned, do reshape their organizations in order to increase the potential in knowledge management and sharing. In the new global competition era, continuous rise of business opportunities demands practical and parallel running of Knowledge Management (KM) projects in order to support enhanced IT capabilities.

INTRACOM, although smaller in size – compared to the multinationals mentioned above- is the Greek equivalent to the above cases. The company was established during a period that was marked by the end of the strong presence of three multinational enterprises in the Greek telecommunications market. These were namely: ITT, PHILIPS and SIEMENS, who for almost three decades (from the early 1950s to the late 1970s) had dominated the market. Today only SIEMENS has maintained a strong presence and a plant in Greece, whereas for

certain telecommunication projects ALCATEL and NOKIA are still vital competitors. Regarding military projects, where INTRACOM has been very active in the last two decades, THALES is a major competitor. As only one of the above four competitors has a plant in Greece, it is obvious that INTRACOM has a strategic competitive advantage against the other three.

At the time of our study, INTRACOM employed 3,100 highly qualified and specialized professionals, while the Group had a total workforce of about 6,800. INTRACOM's facilities cover a total area of over 70,000 sq. m. and the group provides products as well as integrated services for the design, manufacturing, turnkey project implementation and support in the fields of Telecommunications, Information Technology and Operation Support Systems and Defence Systems.

INTRACOM is active in both the Greek market (main telecommunications hardware and software supplier of OTE, the Hellenic Telecommunications Organization) and internationally. Initial focus was on countries of Central and Eastern Europe (Hungary, Romania, Moldavia, Armenia, and Bulgaria) and later, by establishing joint ventures, subsidiaries and representation offices, INTRACOM has expanded in a way that, today, its products are sold in more than 40 countries in Europe, the Middle East, the CIS countries, Asia, Africa and the Americas.

The company's strategic planning focuses on:

- Sustaining future growth mainly through the development of new advanced technology products and services.
- Maintaining and enhancing its leading position in the Balkan market, as well as increasing exports especially to developing markets.
- Capitalizing on joint efforts with industry leaders to secure a strong presence in the European market.

This case study is organized in five sections. The following section defines the problem by analyzing the business process under consideration and the entire Store Management process, during the pre-SAP automation era. The third section describes the five phases of the implementation process of the customized SAP application. The fourth section compares the cost to the benefits of INTRACOM's SAP application and further explores the strategic benefits related to the application, using two of the existing conceptual models: Venkatraman's 5 Levels of Business Transformation and McFarlan's Strategic Grid Model. The final section concludes the paper with an analysis of the important lessons learned from the INTRACOM experience and highlights important challenges in store for the company.

## Problem Definition

At the end of 2000 INTRACOM had seven warehouses that were interconnected with Production sites as well as with Quality Assurance for in-coming inspection.

- Goods would arrive at In-coming Store, where Counting also took place, and then would pass to Quality Assurance.
- Then, through the central warehouse, which was used for both in-coming and out-going goods, they were distributed to the appropriate warehouse.

- From the central warehouse again, ready-made products would pass on to Packaging and from there they were delivered to customers.

- Transportation was either Internal (to and from the warehouses), done by clarks, or Transfer, done by trucks.

Here it has to be noted, that although all the above company facilities are in the same geographical location, in Paiania, they are not all within next-door proximity.

The pre-SAP automation was initiated in 1997, when the first Enterprise Resource Planning system (ERP), a carousel based system, was installed in the In-coming stores. During the same period (November 1997), another built-in-house program, PACKAGING, was installed and later in (November 1998) INTRACOM's Informatics Division developed ESTIA, an Oracle based Warehouse Management System. ESTIA's first version was developed by 4 people after an 8 month task and was designed to control only raw materials and ready-made products, using R/F (Radio Frequency) controlled computer-equipped pistols and bar-coded system. R/F antennas and small printers, located at appropriate points, were used, because pickers were not all equipped with a portable one. During this second step, top management got involved and the assistance of INTRASOFT (a sister company, now fully integrated with INTRACOM) was requested to enhance ESTIA, which, since then, has been considered a very vital part of the company's intellectual capital.

## The SAP Implementation Process

In the second half of 2000, a Warehouse, Transportation and Assets Management Division was created and the decision was taken for the company to go ahead and select a new Management Information System that could, at a preliminary stage, co-operate and later on replace the three currently running programs: ESTIA, PACKAGING and the Accounting Program. Two suppliers, Oracle and SAP had been considered. As Oracle's proposal involved considerably more programming in order to cooperate with the existing applications, SAP was soon short listed as the most suitable to cooperate with ESTIA and PACKAGING to further build upon the company's intellectual capital. Early enough in the negotiation process, SAP highlighted the need for users' training and made it clear that the task should be viewed as a joint project of IT adoption and Knowledge Management. The abbreviation SAP-KM was adopted and the project was finally implemented in five phases, while further phases were already under design upon completion of our study in the autumn of 2004. In the following sections we shall describe each one of the five phases.

## Design of the System Secifications

A team consisting of SAP and INTRACOM's specialists accomplished the task. Every INTRACOM Division designated a Key-User (the person who had the best knowledge of the Division's requirements) who was fully authorized by the Division Manager. The latter, also participated in certain group meetings, as the real Business Process Owner. The Information Management System, proposed by SAP, was a Materials Requirement Planning (MRP) system, with the following subsystems:

- PP: Production Planning, handling all production activities (MRP algorithms, production orders, and follow-up of employee's productivity).

- MM: Materials Management, dealing with material's basic data, and logistics.

- SD: Sales and Distribution, handling all customer related activities (sales orders, and delivery orders).

- FI: Financial, administrating accounting, cash flow, invoicing and assets.

- CO: Costing, dealing with material and product costing, cost centers, expenses, contracts.

- QM: Quality Management, handling quality control of both incoming raw materials and finished products.

- WM: Warehouse Management for the main SAP application.

- PS: Project Systems, assisting Project managers to better plan their projects (based on Work Breakdown Structures) according to the desired method of control. Provides the option of direct labor charging by the employees, to the project.

- HR: Human Resources. The subsystem has not been fully utilized yet, despite the fact that it offers possibilities of on line control of all employee related data (i.e., addresses, telephones and career/salary paths).

Apart from the Key-Users, Division Managers were also involved in the most critical decisions, and they had to sign and approve every decision agreed upon by the Key-Users. An exemplary list of INTRACOM's Divisions could include, but not be limited to: Warehouse Transportations and Assets, Accounting, Offers & Contracts, Telecommunications Products, Military Products, New Product Development, System Networking Products, Domestic Marketing & Sales, Export Marketing & Sales, etc. The Key-Users team, assisted by experienced End-Users, worked very hard in order to carefully design business blueprints for more than 200 business processes (approximately 30 for each one of the 8 initially developed subsystems PP, MM, SD, FI, CO, QM, WM and PS). The subsystems were installed at various steps as we shall see further down.

## SAP Customization

Upon completion of the most important issues of phase one, which is still going on as new Business Processes are continuously added into the system, phase two officially started in October 2001. As the SAP Version 4.6, which was offered by the German company, did not meet all INTRACOM's requirements, customization was a mandatory phase, for the success of the entire project. This was a very complicated and delicate phase, capitalizing to a great extent on the company's intellectual assets. The scenario method was adopted by the SAP-KM project team as a powerful management tool and an opportunity to accelerate both the SAP customization and the inter-organizational learning envisaged by the KM project. The scenario process collects and analyses tacit and explicit knowledge from the knowledge sharing network and at the same time implies the collective participation of a variety of people connected with the learning network: End- and Key-Users, SAP specialists, and top management.

A big number of scenarios were written for the INTRACOM SAP-KM project. The basic ones were the 19 Cross Module ones, but as in most cases a scenario for every blueprint was required, a total number of

more than 200 scenarios were designed, including the Cross Module ones. Out of this very large number of scenarios, the 15 more important ones and a number of branches connected with them were very carefully considered during the long lasting meetings of the SAP-KM project team. As a result, a significant number of modifications and enhancements were pointed out, which actually gave birth to the SAP Customized Version that could finally meet INTRACOM's needs. The amount and complexity of problems related to each one of these scenarios (i.e., shortage of code numbers, materials or data in the original Version 4.6) was one of the parameters that complicated the team's work.

Early enough the need of a parallel Knowledge Management project became obvious, with a first target to effectively manage both the existing and newly acquired explicit knowledge, mainly through blueprints and scenarios. Looking into the issue from a theoretical perspective, we consider that INTRACOM developed its Knowledge Sharing Networks (KSN) following the design guidelines of Zack (1999) and the application guidelines highlighted by Dyer and Nobeoka (2000) in their Toyota case study. Zack (1999) proposes a framework that he calls Knowledge Management Architecture, in order to manage mainly explicit knowledge, based on two KSN elements:

- Repositories of explicit knowledge, and
- Refineries for accumulating, refining, managing, and distributing explicit knowledge.

He also recognizes the new organization roles needed in order to execute and manage the refining process, and the importance of Information Technology (IT) in supporting the repositories and processes. Dyer and Nobeoka (2000) consider that a KSN serves as a locus for facilitating knowledge sharing and effective knowledge work, since it makes knowledge permanent, accessible and portable to those who need it, both inside and outside organizations. We shall briefly explain here and in the following section these two KSN elements.

Knowledge repositories were used in phase two of the SAP-KM project in order to capture explicit, codified information wrapped in varying levels of context. They were used to store and make accessible 'what the organization knows'. They included data warehouses, which were useful in knowledge management when the mining and interpretation of their content allowed employees to become better informed. More sophisticated repository approaches attempted to enfold more context around information as it was captured. The basic structural element of a repository was the Knowledge Unit, a formally defined, atomic package of knowledge content (labeled, indexed, stored, and retrieved). The repository structure also included schemes for linking and cross-referencing the different knowledge units. The knowledge units that derived from the blueprints (in phase one) and the scenarios (in the current phase) were all stored into Knowledge Repositories, based on their structure and content. Repository structure, in addition, included schemes for linking and cross-referencing with the repositories created during phase three, below.

## End-Users' Training

Following SAP recommendations the parallel Knowledge Management Project was assigned a second, equally important, target: the End-Users' training and inter-organizational knowledge embedment. As End-Users INTRACOM defined all

employees who, one way or another, were going to use SAP in their daily work. During the design phase, they were represented by the Key-Users, who passed their views and problems to the design team. In this phase, they had to be trained by both SAP specialists and Key-Users. The content of this KM training project was based on the SAP user manuals but mainly on the explicit knowledge created during the development of the numerous blueprints and scenarios, which, during phase two, had been stored into parallel repositories. Prior to being used, in this phase, a refinement (cleansing, labeling, indexing, etc) was necessary.

This was done in Knowledge Refineries, which, according to Zack (1999), represent the process for creating and distributing the knowledge contained in a repository. In the INTRACOM case this process included five stages:

- Acquisition of the knowledge acquired from SAP or created in phase two.
- Refinement, a value-adding process that included cleansing, labeling, indexing, sorting, abstracting, standardizing, integrating, and re-categorizing the knowledge acquired or created in phase two.
- Storage and Retrieval that bridged upstream repository creation and downstream knowledge distribution.
- Distribution, the groupware mechanisms that made the repository content accessible to the End-Users.
- Presentation, as the context in which knowledge was used influenced its value, in a certain way.

According to the SAP-KM project team acquisition, refinement and storage created and updated the knowledge platform, whereas retrieval, distribution, and presentation developed various views of that knowledge. Standardization and integration of this knowledge resulted in the creation of more than one hundred special Training Manuals covering every Business Process or certain large or small End-Users groups. During a month and a half (November – December 2001) in 16 classrooms at INTRACOM's facilities, 700 End-Users attended daily, full-time courses.

As part of the KM training project, a sub-project was created to identify the skills needed for, and the human resources made unnecessary by the SAP adoption. Early in 2002, the first estimates for the staffing level reductions were decided. To neutralize the concerns raised by the employees regarding who could possibly lose their job, which mounted the antagonism towards the new system, Division and top management used the trained End-Users as starting point, and, during the two following years, gave birth to a number of innovative activities:

- Identified and used as internal consultants the new SAP Experts, i.e. End-Users with expertise on certain SAP subsystems (PP, MM, SD, WM, etc). This was the starting point for the creation of a number of similar Expert-clubs on VLSI design, Web applications, environmental issues, etc.
- INTRACOM's Human Resource Management division initiated the so-called Talent Management plan, aiming at identifying and making best use of talented employees (an approximate 10% in every division) for the benefit of the organization.

- The initial Key-Users group was reinforced with new members offering their services in consulting as well as in the on-going End-Users' training.

In the new era, some new knowledge-related organizational roles were also created: Knowledge analysts, classifiers, integrators and finally a librarian (or knowledge curator). At the time of our study, these roles were unofficially assumed by certain Key-Users. As its KSN is expanding both in size and importance, INTRACOM is not too far from creating a Knowledge Management Division, headed by a Chief Knowledge Manager (CKO) and incorporating all the above new organizational positions. The SAP-KM project team though, emphasized that implementation and proper user training was so important that a concurrent attempt to re-structure the organization should be avoided or postponed until the final commissioning of the project.

## SAP at Work

January 16th, 2002 was selected as the starting date for SAP, after an extremely short period of only one-year's preparation. SAP itself is recommending a two-year preparation period, but, as urged by the Manager of the Warehouse, Transportations and Assets Division, INTRACOM decided to take the risk of an early implementation.

Exceptionally for the year 2001, INTRACOM's annual census was completed by mid December, and an entire month was assigned for INTRACOM and SAP teams to have the new system up and running. A huge amount of modifications and tests had to be made, so that SAP could successfully replace ESTIA, PACKAGING and the Accounting program, as of January 16th. In addition, the Interfaces that had been designed to support communications between SAP and ESTIA; ESTIA and PACKAGING; PACKAGING and SAP, as well as the up-grades of both ESTIA and PACKAGING (in order to successfully co-operate with SAP) had to be extensively tested. These Interfaces were necessary, as ESTIA was scheduled to remain in use until mid 2003, when Warehouse Management – the last one of the SAP modules– was planned to replace this old software product, designed by INTRACOM.

## Warehouse Management

In the course of the year 2002, one after the other the SAP subsystems (PP, MM, SD, FI, CO, QM and PS) were tested and successfully installed. On-the-job troubleshooting was very essential during this period. Warehouse Management (WM) was the last one pending, as it required major rearrangements in the entire INTRACOM warehouse set-up. According to the schedule, out of the seven warehouses in use during the pre-SAP period, only three remained operational at the beginning of 2003. The last central one that opened in January 2002, a smaller one in the production area and the third, an outdoor warehouse that had remained in use at that time, but was scheduled to close soon. It was only in May 2003, with the installation of WM, the SAP module that eventually replaced ESTIA, when INTRACOM benefited of SAP in its full potential.

So finally, after a year of preparations and designing (2001), a very short trial period (December 15th, 2001 – January 15th, 2002) and sixteen months of progressive installation of subsystems (January 2002 – May 2003) the customized SAP version was eventually up and running and pretty soon won the acceptance of all users, a fact that was perceived with great relief by the entire SAP-KM project team.

### Cost versus Strategic Benefits

As exact cost figures were not made available from INTRACOM, a close estimate of the total cost for both the SAP implementation and the parallel KM project, for the three years, is given here below.

***Direct cost:***

- to SAP - €8,800,000

***Indirect costs:***

- 35 Key-Users X 100% X 1 year X 56,000 Euro/year[1] €1,960,000
- 55 Key-Users X 35% X 2 years X 56,000 Euro/year[1] €2,160,000
- 700 End-Users: 4000 man days X 185 Euro/day[2] €740,000
- 10 man/years[3] X 3 years X 49,280 Euro/year[4] €1,480,000
- 8 man/years[5] X 3 years X 56,000 Euro/year[1] €1,340,000

Total SAP application 3 years cost €16.480,000

Some cost explanations:

[1] : Staff average annual cost.

[2] : Average cost per day for the End-Users mix (70% employees - 30% staff). Employee average annual cost 33,600 Euro/year

[3] : The INTRACOM Informatics Division full-time support team

[4] : Average annual cost for the above team's mix (70% staff - 30% employees)

[5] : Expert Key-Users who shall replace the SAP team, on a full-time basis

But the main benefit of SAP implementation is the fact that as of January 2002 all transactions that are done via SAP are fully automated and integrated (i.e. accompanied by the relevant Invoice or Delivery Document). Besides this, a number of other benefits can be listed:

- Less paperwork and administrative work, mainly from the above mentioned benefit. Paperwork is completed with no further follow-up and double-checking.
- This has obviously created some very significant staffing level and cost reductions that have not been calculated, mainly due to the fact that the SAP implementation came at the same time with INTRASOFT´s merging.
- More reliability and data accuracy, as all data are only written once, and no critical data are any longer handwritten.
- Eventually, remaining stores have been better organized and space has been saved for inventory.
- This has improved customer service, mainly regarding delivery time.

If we examine the case under the scope of Venkatraman's (1994) five Levels of Business Transformation shown in Figure 1, we can observe that:

- The Localized Exploitation level was successfully completed during the years 1997-8 with the deployment of two "tailor-made" systems (ESTIA and PACKAGING), which has had a

minimal effect on the company's business process.

- The Internal Integration level was at the first half of 2002 in its final phase, as advanced and fully customized SAP modules were integrated in a way that leverages IT capabilities throughout the entire business process, including warehouses, manufacturing, quality assurance, accounting, and to a certain extent suppliers and customers.

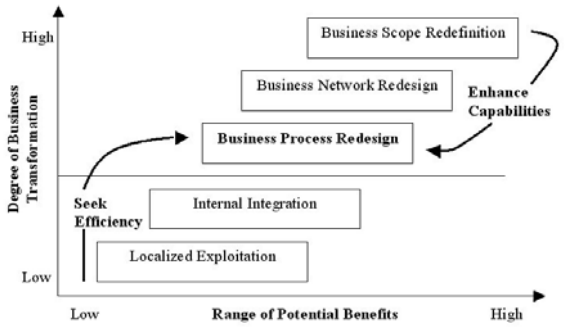


**Figure 1. Venkatraman's 5 Levels of Business Transformation**
Source: Venkatraman, N. (1994, p. 85)

So, early in 2002 INTRACOM faced a very critical question: Was it going to remain at this level of automation of the existing processes or should it pass onto the first Venkatraman's "revolutionary" level? At that point in time, it was clear to INTRACOM's senior and top management that the SAP adoption benefits could not be fully realized, as they were simply superimposed on the existing business process. But the forthcoming complete integration of the three systems (SAP – ESTIA – PACKAGING) could and should be used as lever for designing the new company organization and the associated business processes. This level of Business Process Redesign would definitely require fundamental changes in the company's organizational routines.

Top management, taking into consideration INTRACOM's high level of automation together with INTRASOFT's full integration, considered Venkatraman's avenue of "Enhanced Capabilities", leading to business process redesign, as the more appropriate one. Of course it required more senior management involvement for detailed definition of the business processes that needed to be redesigned. INTRACOM's international business strategic goals were also taken into consideration when analyzing the company's future position into the new, highly globalized business world.

We can also examine INTRACOM's IT adoption using McFarlan's (1999) Strategic Grid Model, as shown in Figure 2.

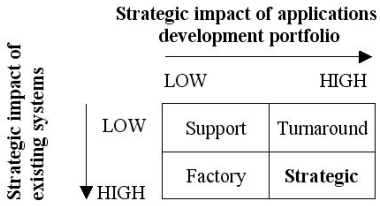


**Figure 2. McFarlan's Strategic Grid Model**
Source: Applegate, L.M., McFarlan, F.W. and McKenney, J.L. (1999, p. 21)

Taking into consideration:

- the high strategic impact of the on-going SAP implementation, and
- the increased strategic impact of the application, especially after the implementation of the Warehouse Management module,

INTRACOM can definitely be placed into McFarlan's bottom-right block of strategic applications. INTRACOM's activities critically depend on IT, top management is actively involved and IT related development plans exist in both medium and long-term horizons.

## Lessons Learned and Future Challenges

INTRACOM, being the leader in the telecommunications and informatics industry in Greece and confronted with a very exceptional situation, the geographic spread of its manufacturing and stores facilities in the location of Paiania, was forced to decide on this strategic IT adoption in order to better face future challenges. The customized SAP implementation can be compared to any large IT adoption project, but it has the peculiarity of the KM project that ran in parallel. While the experiences of a particular company do not always provide a valid basis for generalizing conclusions, we believe that this particular INTRACOM experience can provide valuable lessons for other companies attempting to embark on strategic IT adoptions. We are concluding the paper by portraying the seven most important lessons learned from this case study.

1. Neither SAP nor the KM project would have ever succeeded without the firm top management commitment. Top management saw the entire SAP-KM project as a vehicle for organizational change and the SAP implementation as integrating more than simply warehouse related information. Though top management remained committed to the project over the three years, at times there was a sense of disappointment in relation to the materialization of certain strategic benefits.

2. It has proved very crucial to have a strong mix of business and technical skills from the different divisions in the project team for a project of the size and significance of the SAP-KM. Initially the team was more technically oriented but soon the IT experts realized that they needed business support in order to objectively evaluate the strengths and benefits of SAP in the different divisions or business areas.

3. Both SAP and KM projects require high quality project management, capable of avoiding delays, budget over-runs and, at the same time, able to bridge the different needs or languages spoken among the divisions. Precise pre-implementation risk evaluation and strict control of the schedule were two additional challenging areas for the SAP-KM project management.

4. The scenario method has proved to be a strong management tool in supporting the SAP customization and inter-organizational collaborative learning. It encouraged the dialogue among the participating divisions along with facilitating periodical revision of corporate strategies, under the light of the current business environment. Based on the interaction among participants (both via face-to-face meetings and through appropriate groupware tools) it finally helped INTRACOM to develop a roadmap for its possible future technological realities and plan the changes required for them to be adopted.

5. A closer look into the developed KSN has highlighted the following key-factors for its success and management:

   - The appropriate socio-cultural environment that permitted values like motivation, commitment, trust and reciprocity to flourish among the users, despite the different languages spoken among the participating divisions.

   - The knowledge sharing process and the appropriate groupware technologies used for this purpose.

Although it is true that groupware technologies alone cannot promote knowledge sharing, they can best enhance group collaboration and the KSN when designed to fit the company culture and are supported by top management.

- Top management involvement in KSNs is fundamental, as it is only they who can motivate End-Users to share their knowledge with their colleagues. By promoting knowledge sharing they trigger knowledge creation and further build and utilize the company's intellectual assets.

6. Projects, like the SAP-KM, which take up several years between conception and fulfillment, run the risk of loosing touch with End-Users and management. Solid expectations have to be generated and periodically renewed in the various divisions. Initially, the strategic dimension of SAP was oversold to top management and this created high expectations. Certain End-Users were also impressed by its benefits, while others (including some Key-Users) were confused by its aims and the impact it had on the staffing of their divisions. Many End-Users were disappointed when –during the initial implementation of SAP– they were confronted with many technological bugs.

7. Strategic IT adoption projects with cross-organizational boundaries create the foundation for new organizational structures and processes by affecting what End-Users do and how they do it. The required changes in processes and job practices should be agreed upon and addressed early in the project. Top management support is essential for their realization.

Four years after its commencement day, SAP has overcome many teething problems and the parallel KM project has revealed its fruits. Today the focus of the joint SAP-KM management team has shifted from development to operations management and the consideration of future challenges in both the technological and organizational areas.

On the technological front the possibilities for expanding and improving SAP seem limitless:

- There is always the challenge of upgrading the computer configuration and incorporating features of the latest SAP versions.

- As INTRACOM opens its horizons to the private sector, adding electronic data interchange (EDI) links between its internal and customer computers systems has been under strong consideration.

- The use of expert systems and other artificial intelligence applications for every-day commercial operations no longer seem too distant for INTRACOM.

It is obvious that this type of changes will require redesigning and expansion of the KM project, but they will further strengthen INTRACOM's position into the "Strategic Applications" block of McFarlan's (1999) Strategic Grid Model.

The major challenge though has been identified in the area of organizational change. Top management, in the course of the SAP-KM project has recognized the need to not only electronically link the organization and further automate the warehouse management and order processing procedures, but also to suitably

change the entire structure of the organization and redesign the business processes following the avenue of "Enhanced Capabilities" proposed by Venkatraman (1994).

After having invested more than 16 MEuro and more than 125 man years of effort in customizing SAP, INTRACOM realizes that the true benefits can only be capitalized by actively exploiting SAP strategic potential and by multiplying it with adequate KM projects, running in parallel. The SAP-KM implementation team is very well prepared to respond to this challenge and continuously improve this very important strategic IT adoption.

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## About the Author


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# THE RACONTEUR EXTRAORDINAIRE: REAL-WORLD STORYTELLING

By John P. Girard, PhD © 2006

## Introduction

Organizational storytelling, or narrative as some prefer to call it, is growing in popularity, not as a novelty sport but rather as a proven business tool of the modern executive. Witness this fine journal, which provides an opportunity for us to view storytelling through an academic lens. Gone are the days where organizational storytellers must argue the legitimacy of their craft. Today storytelling is recognized as an essential part of organizational life.

As with many business practices, this domain owes its success to a few pioneers who ventured into uncharted territory. By taking a chance, these brave innovators developed the tools and techniques that are commonplace today. This is a story of one such pioneer. Melinda J. Bickerstaff has been using futurist stories to guide organizations for more than two decades.

Melinda kindly agreed to share her story. The text that follows is an interview with Melinda in which she discusses her style of story, the factors that influenced her style, and a many of the secrets to her success.

## The Interview

***John P. Girard [JPG]:*** As you know I'm a real believer in storytelling to achieve organizational objectives and I have used it to some success myself. There's no doubt you are the *Raconteur Extraordinaire* in Corporate America today. You should be proud of that and proud of the successes that you've had. Perhaps you could tell me how you got started in storytelling?

***Melinda J. Bickerstaff [MJB]:*** Early in my career, I was actively involved in the work of the American Society for Training and Development (ASTD). I was part of the Society's Strategy Team trying to create a global five-year vision. At the time, the organization of about 45,000 members was primarily US-focused. The task before us was just "how do you communicate this global vision to the membership?" We thought that the best approach was to paint this future picture by writing a story. The story, in a Newsletter format, simply described what that the future organization would look like. For example, the story included holding the annual Conference outside US borders; it included knowledge exchanges between countries; it included setting up local chapters in Europe, etc. This story really worked to communicate this future vision. That was my first experience with the power of story as a way to shape a vision. Many more would follow.

***MJB:*** In other parts of my career, for example, when I was the head of organizational development, or when I was brought in to reshape the human resources function, I've used story to paint the picture of the future. Not necessarily writing a story but painting the picture of where we were headed. I saw and experienced how powerful stories could be. Probably a combination of this experience with the American Society for Development, which was the early 80's, and my own proclivity to using story a to paint a picture of the future led me to thinking about using it as a way to

communicate the value and impact of Knowledge Management (KM) at Bristol-Myers Squibb (BMS). When I saw the opportunity to use it at BMS, I said, I'm going to try this in this situation. We did this with a lot of trepidation from my boss and people who were not quite as familiar with it and not quite as trusting as I was.

***JPG:*** You talked about using stories to create a vision and lead people into the future. As you know, Steve Denning often talks about that as the most difficult type of story and, yet somehow you have seemed to have mastered it. I think that Steve is now talking about it more because of your successes. So what is the recipe to your success? How have you managed to create the enthusiasm about these stories in creating these visions of the future?

***MJB:*** I was just doing this naturally in 2001 – 2002 in our KM work at BMS and then I discovered Steve. Steve had just left the World Bank when I read his book, *The Springboard: How Storytelling Ignites Action in Knowledge-Era Organizations.* I called him and I said you're doing some really great stuff. I gave him the infamous *Financial Times* article which we'll talk about soon and other articles that showed how we were using narrative. He reviewed this stuff on a flight to Europe. When he came back, I got an email from him that said "this stuff is fantastic….and some of the best I've ever seen!" He said that we should meet and he wanted to know more about how I did this!"

***MJB:*** So we spoke and he said, "You know, writing a story in the future is one of the hardest things to do." I said I'm really glad I didn't meet you until now because if I had known that, I probably would have been afraid to write our stories! He laughed. I said I didn't know it was supposed to be so difficult or hard, so for me, it wasn't! So that's a professional joke that we have between us. I think the key is and I believe that Steve will say this, too, don't go too far out into the future so that you would lose or confuse your reader. In other words, our stories were only two years out into the future. We grounded them in reality. You can do that by using real names, not fictitious names. If you think about our *Financial Times* story (see Figure 1), we used a picture of the current President, the names of the people who actually worked in our labs with slight misspellings and made references to real places, hence grounding the story in the present.

World Business Newspaper

FINANCIAL TIMES

Saturday May 10 2003

**Bristol-Myers Squibb Named Top-Ranked Global Pharmaceutical Company**

**Managing Intellectual Assets Attracts Top BMS Alliances—Blockbuster Drugs Follow**

By Lesley Hiller in Princeton, NJ and Otis D. Mahle in Wallingford, CT.

"In 2001 BMS set a goal to become the industry's "alliance partner of choice". A commitment to managing knowledge as a major competitive advantage has allowed us to achieve that objective," said Peter Ringrose, Ph.D., Chief Scientific Officer and President, Pharmaceutical Research Institute at Bristol-Myers Squibb (BMS) in an exclusive interview to the Financial Times.

Earlier today Mr. Ringrose announced the launch of BMS' third blockbuster drug this year.

"Two years ago, we realized that 40%-50% of our work would have to be accomplished through partnerships and alliances. We had pipeline material, but to bring new drugs to market we needed to partner with niche specialists."

Streamlining processes and making the company's intellectual assets work for the entire enterprise was key to attracting these new partners, Mr. Ringrose said.

BMS' growth has drawn much analyst attention. Two years ago, *FORTUNE* named Bristol-Myers Squibb "America's Most Admired Pharmaceutical Company." Today, Peter Lynch said on CNBC that the announcement of this new blockbuster drug represents a major milestone for



Peter Ringrose Ph.D., Chief Scientific Officer and President, Pharmaceutical Research Institute

BMS, and puts the company first as the most productive and innovative global pharmaceutical company." Mr. Lynch went on to say that "with its new #1 ranking in prescription sales, BMS is delivering impressive top- and bottom-line growth."

When asked how BMS managed to propel itself from a company with only four blockbuster drugs in its first 100 year history to a company that has turned out three world class drugs in a year, Mr. Ringrose attributed BMS' growth to four critical factors: partnerships, R&D's alignment with corporate strategic initiatives, increased speed and quality of decision making and the successful leveraging of intellectual capital.

According to sources inside BMS, key innovations in knowledgement management at the company fueled the new processes.

Two years ago, BMS launched a new role, the Knowledge Integrator (KI), to leverage the use of information and increase the speed and accuracy of decision-making by scientists, business managers and assesses the team's information needs. The KI then acts proactively to filter and analyze scientific, clinical and competitive intelligence as it is published, and alerts team members to the latest advancements in medicine and biotechnology. This ensures against the team's overlooking of key actionable items. Mr. Ringrose opened the doors of the PRI and other areas of BMS to the Financial Times for individual interviews (see below) to learn how this new role is working in the company.



R&D: The Future of Medicine

**Knowledge Desktops become Portals for Genomics R&D**

Genomic technologies are rapidly changing the paradigm of pharmaceutical R&D, according to Mark H. Crocket, Ph.D., Executive Director, Functional Genomics. "We needed an equally innovative technology to keep pace—to centralize PRI progress-to-date in a way that we could also have access to the latest information in the field."

Now Crocket and his high-tech program teams rely on team portals called *Knowledge Desktops* developed by the staff of Knowledge Integration Resources (KIR). This new knowledge technology provides one- stop shopping for key project information. According to Mr. Crockett, the Knowledge Desktop is used as a central access point for project-related

For reprints of this article in print or electronic format, please contact **Knowledge Integration Resources:** *Leveraging Knowledge for Competitive Advantage*

Figure 1 - *Financial Times*- A Compelling Story for Senior Executives

***MJB:*** The other trick is to pay attention to how the future reader of the story learns or receives information. A good example was when we had this opportunity to communicate the vision for the transformation of the corporate library to the President. This is really the story of how the *Financial Times* came about. Instead of giving him our complete fifty-page Strategic Plan to read we wrote this future story. I

asked, what does the President read? Well, he's British, so we knew he read the real *Financial Times*. So we put the story in a mock-up (color and all) as a re-print in the *Financial Times*. The idea was to give him the story in a format that was familiar to him. In this particular story, of course, the President's picture appears, the names in the story are real and just slightly off (we used Mark Dockett for Mark Crockett because he personally knew Mark Crockett), the real labs are described, as well as locations of other sites. What's new in this story are the concepts, the value of knowledge management to him, the new services and roles and their impact on his business. When he read this, he said, "I finally understand what knowledge management is and more importantly, its value to my business. I'm going to send this article to all of my Executive Committee members (along with a hand written note from me), asking them to meet with you." So with this story, we got more than we ever expected. The trick is to know who your reader is, what they're comfortable with and aim your story towards them. If you are going to try to move them out of their comfort zone, start first with where they are most comfortable. Have the names or something be very familiar to them, and then add concepts or ideas that will make them stretch just a bit, but not too far. I describe this as having one foot in the present and one foot in the future and balancing that in the content and ideas of the story.

***JPG:*** There is always the danger of the naysayer, the people who read the story and say the future is not as rosy as you are painting it. How do you deal with that? Have you had to deal with those sorts of folks? Have you run into occurrences where people have read the story and said I don't think it's going to be like that, the problem is x, y, and z? Or have most people been quite supportive of the ideas you've been putting into this vision?

***MJB:*** I would say generally most people are supportive because if you do your homework, it's about helping people change and accept new ideas. Maybe this is a tenet of the success of a future story: You stretch people in a way you think they're ready to be stretched. Don't stretch them where you know they don't want to go. Don't push them too far in the story.

***JPG:*** Good advice. Many people will say that a story is all about the delivery and to some degree, I think you are capturing that in your written stories because you carefully craft your stories for a specific reader. People sometimes suggest it is about the storyteller connecting with the audience. When you speak to many professional storytellers, they will say that the only true stories are those oral stories where you can connect face-to-face and you can see the expressions in your audience. You have done a great job on these written stories. I wonder what your feeling is on this idea of telling oral stories versus the idea of a written narrative.

***MJB:*** I think that they both work and I think they both work in different circumstances. I think that the pure field, I mean nothing is actually pure in the world any more, but you will have pure storytellers who believe in narratives and they will tell you that it is only in the delivery that you can be successful. But many of these folks don't work in a business setting. I think what Steve brings is this bridge between the purist and those of us who are working in a business setting. You know now there are storytelling weekends, there are workshops on how to deliver stories, and sometimes you get to bring that into a business setting, but rarely. What Steve Denning brings is a way to take the concepts of narrative and

shows how these can be applied in the business setting in order to change an organization or lead an organization into the future. I think we're learning more and more about these techniques and I think this is really an emerging area. I think what I tapped into, in a very left-brained, scientific organization is a way to nudge people out of pure left-brained thinking, into something that is more futuristic and whole-brained.

***JPG:*** You mentioned Steve Denning again. Of course, Steve is one of the great storytellers and master of narrative today. One of his colleagues, Dave Snowden, often disagrees with Steve on the types of stories we should tell. Steve often promotes a positive story where Dave tends to say we can learn more from a negative story. What is your take on this?

***MJB:*** I think they're both right. I think what Steve is talking about are stories to change places or to spark action. I think what Dave talks about, and I'm certainly familiar with his work, are stories to share knowledge. If you're sharing knowledge and that's the domain you are playing in, you really do want to learn about the mistakes. Like the Lessons Learned Consulting Service that we developed is about sharing knowledge. This means sharing what worked, what didn't work and what we should be done differently in the future. Remember that's one of the seven different kinds of stories that Steve talks about – stories to share knowledge. That's really where Dave focuses and so his idea that we learn more from our mistakes is absolutely right. On the other hand, Dave doesn't talk about writing a story to tame the grapevine. He doesn't talk about writing a story to envision the future. He doesn't talk about writing a story to "spring" an organization into action. Steve does! For the space they're both working in, they're both right!

***JPG:*** I think it is important that we have differing views in this whole domain because there's not just one way to do a story. There are many ways and I think we can learn from each of these ideas. As a master of this craft, if you were speaking to a "newbie" somebody just starting out, what would you recommend they do to learn the art of storytelling to apply in business and organizations?

***MJB:*** I would begin by sending them to one of Steve's basic workshops around the value of narrative so that they could learn more about what narrative can and cannot do. Then once they understood the techniques of narrative, I would ask them to ask themselves, what are the greatest problems facing your company? Is it that your scientists aren't talking to the marketing people, or are there are problems in manufacturing? Or is it that you just invested $400 million dollars in an IT solution and no one is using it? Figure out what the critical problems are and then see if the medium of story can help solve it. I used the later example of the IT solution because we actually did that at BMS with our process chemists around the world. We really needed to move to a culture of using electronic lab (e-Lab) notebooks. You know, you really can't read people's handwriting anymore. And in this litigious society where everything is discoverable including unreadable notebooks, this could present a huge risk to the organization. . We can't actually teach people to write differently, so we introduced a reasonable technology solution, e-Lab notebooks. There was, of course, great resistance to this new technology.

***MJB*:** So how do you overcome this initial resistance? We painted a picture of the end state where the e-Lab notebooks were fully adopted and wrote about how work was getting done to the benefit of the scientists

and described a situation in which risk was mitigated. We crafted this future story using somewhat real and well-known names just one year into the future, not too far out. Then I asked, "So, where should we put this story?" The IT Project Manager looked at me and said what do you mean? I asked what do these process chemists usually read? Well, he said they read this, and this and this and he said most of them read the *Journal of Chemical Engineering.* So we got the logo for this journal off the web and created this future story in the *Journal of Chemical Engineering* and distributed it to process chemists around the world. Using this story has actually sped up the adoption rate because people saw a picture of what it could be like at the end and how it would be easier for them as a result of using of this enabling technology. We could have used something else. Because our IT partner saw the power and influence of the *Financial Times* story, he wanted to use a story to communicate his vision of the end state. It's a two and a half page story, three columns; it looks just like one that would be published in the *Journal of Chemical Engineering* (see Figure 2 - The *Journal of Chemical Engineering* article was developed to increase the "adoption" rate of e-Lab notebooks for process chemists globally). The story was distributed to all of our process chemists only those inside the company. I also sent a copy onto the SVP of our Pharmaceutical Development Center of Excellence as an FYI. I immediately got a phone call from him. He said, "With great concern in his voice he asked, "Melinda, this article wasn't *actually* published in the *Journal of Chemical Engineering*, was it?" I assured him that it wasn't. But to him, the story looked so real that he actually thought it had been. We still laugh about this today.

NEWS OF THE WEEK

**Bristol-Myers Squibb Process R&D Embraces the New World of *Electronic* Scientific Knowledge Management**

It's 7:46 on a Monday morning when Dr. Daniel, staring at the computer screen in his office, mutters something unprintable. The screen is displaying "Highest" in red next to not one but **three** emails that his boss, Kirsten, has sent over the weekend.

"She needs to get a life!" Daniel thinks as he clicks opens the first email.

"Top priority!" Kirsten's message begins. "Come see me ASAP."

The other two emails are variations on the same theme: *Drop everything.*

When they meet later that morning, Kirsten spells out Daniel's assignment: Develop a new process for BMS-7700011-02, for potential use in Alzheimer's disease. Kirsten's just learned that the core piece of the Alzheimer's compound which Process R&D has been pursuing for some months is being replaced by an analogue with a different side chain.

"We can't afford to let this change crimp the critical path timelines of this key project," Kirsten says. "It's crisis time, Daniel."

With a major challenge staring him in the face, Daniel goes straight from the meeting with Kirsten to the same computer screen at which he'd directed a few choice expletives earlier that morning. A couple of mouse clicks bring him to IntelliChem Synthesis and the Vault database. He inputs some search criteria and, in a couple of minutes, he locates another compound with the analogous side chain as well as the names of the scientists who synthesized it.

That afternoon, he's able to present Kirsten with a design approach for a highly promising development process based on chemistry known to be scaleable. Kirsten, not known for lavishing praise, grins and says, "You're the man, Daniel!"

**Turn Back the Clock**

The date of that particular Monday is, well, "the future." So let's turn back the clock to, say, a Monday in early 2004. This time, the scenario is less inspiring. Now, as Daniel leaves Kirsten's office, he's more than a little worried. He still heads back to his computer, but this time he sends out an all-points bulletin to his colleagues in PR&D, asking if anyone has any leads for him.

A couple of days later, word filters back to Daniel that "someone did some work on some analogues that might be interesting." But no one is able to name the relevant researchers or the analogues. Daniel's only recourse is to start searching through old status reports and lab notebooks. The problem is, where are the relevant experiments if they're not indexed?

After long, joyless hours, Daniel is able to hunt down a few possibly relevant notebooks and begins paging through them, only to be confronted by handwriting so "original" that the chemist who made the notes must have left IBMS to go to med school and pursue a career writing illegible charts and illegible scripts. (At least Daniel's developed a sense of humor on the job—part of what he calls "the survival kit.")

When he finally cracks the handwriting "code" (yeah, those "y's" are actually "g's"), Daniel realizes—more expletives deleted—that the notes display what might charitably be called "a lack of clarity and rigor." Daniel has wasted days trying to get the information he needed. In the end, he repeats a lot of experimental work that, in a more perfect "future world," he would have been able to avoid.

**The Future Is Arriving (Already)**

The good news is that the future is just arriving in process chemistry at Bristol-Myers Squibb, and it is called "IntelliChem." Moreover, as Dr. Daniel would tell you, "The future is good." The IntelliChem Solutions—especially the electronic LabJournal and Compose parts of IC Synthesis—are positioned to make life a good deal easier and more efficient in Process R&D as well as in the neighboring functions of Discovery Chemistry and Analytical R&D.

Let's take a before-and-after look at how Daniel has been functioning and how he will be functioning in the IC Synthesis environment that BMS is

Figure 2 - *Journal of Chemical Engineering* Fantasy Article

***JPG:*** Now you mentioned the measurement of stories or measuring the success of the story in the *Journal of Chemical Engineering.* How do you measure the success of stories?

***MJB:*** Well, in the *Chemical Engineering* story it was really around the adoption rate of a new technology. You could do some surveys with people and hear, oh yeah, I really began to use it and I could see the impact it made in getting my work done, particularly in actually being able to read someone else's notes. I'm glad you asked this question. Because of our relationship with the Babson College Working Knowledge Research Group and Steve Denning, we brought Steve in to help us solve a complex communication problem. At the time, he was looking for a complicated business problem to solve using story and the measure the impact. We, like most companies, are heavily involved in developing enterprise- wide compliance and risk management programs. We initiated a program and a process about a year and a half ago called Business Risk Management (BRM). Over time, the Program will be

implemented in every area in the company to teach managers about risk and how to develop an appropriate risk plan. This process has often been described as like "someone calling you up and saying the IRS is coming to see you" and you should really be happy about that. Now, you have all these templates to complete, you have to fill out and you have to comply, and of course, it won't be adding any work to your already huge workload. So far, BRM has been piloted in about six or seven areas around the company.



***MJB*:** The BRM Team came to us and said, we have to go around the company for the next three or four years and talk about the value of what we are doing but people keep looking at us like we are from the IRS. I said let's bring Steve in and he teach your team along with partners from HR and Organizational Development via a "Narrative Workshop" the value of using narrative or story as a way of communicating the value of BRM to them and the organization. We're now creating three real stories that highlight the impact and value of risk management. They were crafted out of the actual experiences of the BRM Team as they've been rolling out this process. We're using Steve's format: a protagonist, a key player with whom everyone can identify: the bad news if they don't implement a risk management process; the good news when they do; and what the future outcome might look like if all areas in the company did this as well. We're using these stories as a way to communicate what business risk management is. In fact, just the other day we were developing our metrics for this work. So the metrics are not going to be, did you like the story? The metrics are going to be, do you understand risk management? Do you understand your role in it and do you understand what the risk management team can do for you? Do you understand what value it brought to other areas of the company? At the end, we'll ask a question like by the way, did you notice the story? Was the story a good way to introduce this complex concept to you? That will be the last question.

***JPG:*** Once again, you have brought it back to solving the business problem. You have a business problem to solve, and I think that is why you have been so successful. I remember so many times when I was in Defence in Canada; people would come to me and say we want to do some of this

knowledge management thing. I would say, why do you want to do it, what are you trying to solve, what is the problem? Well, I don't really have a problem, but I hear it's a good thing. I think those are the implementations that are doomed for failure. If you do not have a problem to solve, I do not think you have much chance for success.

***MJB:*** Yeah. I called it, for awhile there, the *executive syndrome*. CEOs meet other CEOs at conferences and meetings and they talk to each other about what they are doing. Someone says, I just hired someone in knowledge management. Their colleagues ask: What's that? And just what will that person do for you? Well, that's a really good thing to have. So when these CEO's come back home, they say, I want one of those. So we should hire a Chief Knowledge Officer or a Chief Learning Officer often not really knowing what this position can do for them.

***JPG:*** I thought maybe we could close with you describing what might be a poster story for BMS, one of the most successful stories that you have had or a story that you are particularly proud of and what made it special?

***MJB:*** I think the story that would be the poster story is about the Approval Process Study work that was framed and led by the KM Group in collaboration with many others. Our CEO asked us in 2002, why we weren't getting our drugs approved? What is going on in terms of our low success rates? We had just come from the experience of two failed attempts that cost the company millions of dollars. And for success rates, we were in the lower third ranking of the pharmaceutical pack. One aspect that makes this such a great story is that we convened professionals from HR, Learning & Development, OD, the Corporate Library, and KM together to help the business solve this particular problem. We developed a root-cause analysis process to look at six products or drugs that either got approved or failed in the US and Europe over the past 2 years. We reconvened the teams and asked them: What worked? What didn't work? And what would they now do differently? We then packaged our combined learning for each product into six stories or Case Studies (in *Business Week/Fortune Magazine* tone and format) about each Product---the Story of Product A, the Story of Product B, etc. We sent these six stories onto the CEO and members of his Executive Committee to read as pre-reading for a six-hour structured conversation about what they learned and what we needed to do as a company in order to improve our success rates. The thing that is remarkable about this is that BMS was willing to look inside itself to see what was working and what wasn't working. That's a huge cultural change. Then, not only to do that but when the mirror was put up in front of the CEO and members of the Executive Committee, they said, you know, it's this, it's this, it's this and they could sit there and they could say, we've known about these issues for years. We simply said if that's the case, it's time we did something about it. They agreed. The stories were the way to package this complex information into a format that allowed the executives to move to very targeted actions.

***MJB*:** The other aspect of this is when there is a problem most executives think or hope there's gotta be a "silver bullet" solution. However, we saw that there was no silver bullet to improve our success rates. The CEO perhaps thought if he only had broader and deeper regulatory capability, then we could improve our success rates. It *was* that, but it also was our decision making process; it was about our relationships with our development partners and regulatory agencies; it was about some aspects of our culture, it was a number of things. We said,

you know, if you tinker with one of them, it's going to take quite awhile to have an impact on our success rates. If you tinker with a number of them simultaneously, you could have a huge impact. So we went into action on many fronts. The success of this introspective process is that, 33 months later, four drugs have been successfully approved by regulatory bodies around the word, a pace unprecedented in our industry. Two of these were with votes of 15 to zero and 18 to zero at the Advisory Committee phase. That, too, is unprecedented. And about four weeks ago, we had two more drugs approved at the Advisory Committee phase with plans for one of these to enter into the market early in 2006. So you can see, the success trend continues. The stories provided a "springboard" for this turnaround. The story here is about BMS' willingness to look at its own successes and failures, learn from both, and then move quickly into actions. I think that is a really remarkable story, and I feel privileged to have played a part in it.

***JPG:*** Absolutely! Well Melinda, thanks so much for just a great conversation. It was really interesting and thought-provoking. Thanks also for your real contributions to KM in general and to storytelling in particular. I think you have done some fantastic things and I know there are a lot of people who are watching what you do and are trying to learn from your successes. I want to close by thanking you again for allowing me to talk with you today.

### About Melinda Bickerstaff

Melinda has recently accepted a position as Senior Vice President –Learning and Development for Discovery Communications, Inc, the world's leading real-world media company with headquarters in Silver Spring, Maryland. As the Chief Learning Officer (CLO), she continues to create and share organizational knowledge from the learning platform. She can be reached at:

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# THE IMPACT OF STRUCTURE ON EXPLICIT KNOWLEDGE RECALL - THE CONCLUSION

By Jerry Westfall, PhD © 2006


## Abstract

This study presented a case for business training with the use of presentation structure in knowledge transfer when knowledge was in the explicit form. This knowledge was believed to be best transferred using some style of structure as the basis for presentation to ensure better memory recall in employees. To examine this type of better recall ability this study utilized a quasi-experimental design to test the proposed hypotheses.

Three methods were used to measure recall and thus transferability of knowledge. The first was a non-structure style (X1) which relied on the ability of the recipient to recall information that was presented in paragraph form. The structure style (X2) relied on the ability of the recipient to recall information that was presented in a hierarchal form. The quasi-structure style (X3) relied on a mixture of non-structured and hierarchal structured forms.

The results indicate that a difference was found between the three styles themselves and that the participants perceived a difference in the three styles. Also recall scores for the non-structure (paragraph style) was found to be highest of the three and was concluded that some elements of story narrative effects might have contributed to this results. Also due to the nature of this experiment future research is indicated to apply other relevant style choices to duplicate the results found here.

These results indicated that differences did occur due to presentation style and that business training entities need to consider presentation style when developing their business training programs.


## Introduction

Today we live in a "knowledge society" characterized by "knowledge workers" (Heath, 2003) who use the knowledge they have of their organization to interact with each other and change organizational outcomes. Organizational outcomes might be profits, customer retention, customer service improvements or goodwill. Whatever the outcome there are employees in the organization that have the knowledge to make those outcomes successful. Since the employee knowledge concept has become increasingly understood it has caused organizations to realize that knowledge is critical to their continued success (Wild, Griggs, & Downing, 2002). The critical part became their need to retain business knowledge within their organizations for future use and integration. The trend became one of movement by organizations from exclusive physical asset management to dual physical and knowledge asset management.

Evidence of the change from exclusively physical asset management to knowledge asset management became clear in that organizations worldwide are spending upwards of $2.2 trillion dollars on employee training and education. The knowledge industry has become larger each year as organizations continue to leverage their

knowledge assets to produce some type of positive organizational outcome. Training and education became integral to an organization for it to remain competitive. There has been a move to expand competitiveness and outcomes by investing in human capital (knowledge) and technology. (Paye, 1996)

## Specific Research Question

Did the structuring of a business task (knowledge presentation) improve employee recall? Businesses have increased their funding for employee training with costs expected to be near $2.2 trillion dollars world-wide in 2006. The need for effective business training has always been vitally important. Therefore the impetus for this current research was to find out which presentation method improved employee recall.

## Explicit Knowledge

Considering the possible impact on organizations due to tacit knowledge, or that which we know internally, loss the problem became one of finding a way to help retain knowledge within the organization. What has been needed has been a way to understand how presentations of explicit knowledge was retained or recalled by the receiving employee.

This current study was designed to look at explicit knowledge and how it was best transferred to other employees to maximize its exploitation within an organization. Explicit knowledge has been expressed as that knowledge which might have once been internal or tacit, but in some form is made external or explicit (Connell, Klein, & Powell, 2003). Explicit knowledge is that which was transferable to others via some methodology such as text, video, or sound. Explicit knowledge has become a precondition for flexible use of knowledge (Herbig & Bussing, 2004). In its explicit form knowledge should be more easily transferred to others thereby creating an atmosphere of knowledge retention for the individual employee.

This current research had as a central idea an understanding of knowledge and what it meant to an organization seeking to utilize its knowledge assets (employees) to improve organizational performance and outcomes. If a best method of presentation was determined that elicited better recall of knowledge from individual to individual then an organization should be able to use that method to improve knowledge sharing performance. This study had the objective of providing a means for organizations to make maximum use of their employee knowledge.

## Lack of Research

Examining the literature in knowledge management (KM) research there was an overwhelming emphasis on knowledge capture and encoding via electronic means (Forrester, 2004). There were whole organizations striving to capture and store electronically any knowledge they could elicit from their employees. They wished to retain this knowledge in hopes that it would provide some benefit to the company in some future period. However they sometimes missed the importance of using that knowledge to train employees and to allow it then to generate new knowledge within the company.

Most definitions of knowledge management stated that KM was the generation, representation, storage, transfer, transformation, application, embedding, and protecting of organizational knowledge (Alavi & Leidner 2001) (Pentland 1995). This definition was appropriate but there

was another aspect of this type research that was often overlooked, that of employee recall once training had been completed. This present-day research sought to strengthen the KM body of knowledge by investigating recall in employees.

The current research outlined in this document was designed to show that successful employee recall was best accomplished by applying some type of structure to a task presentation. The three styles of structure used were chosen to represent several common types of explicit knowledge presentation. This was a pragmatic decision based on common methods of knowledge dissemination. Jeremy Aarons (2004) stated that knowledge management research should be more pragmatic in orientation and more in parallel with physical science research aims. This research was geared to the pragmatic thereby making a practical as well as statistical contribution to the KM domain. It was pragmatic in that it had real-world application for business training scenarios in that the three presentation styles could be used to improve recall in employee trainees.

## Statement of the Research Problem

The problem examined during this current research and supported by a thorough literature review was one of understanding how well employees were able to recall training material presented to them during a business training exercise, seminar, or class. While much research has been conducted on "What is Knowledge", and "How to Capture Knowledge", there was little research on the results of presenting this captured knowledge back to the employee. The employee must have recalled the knowledge for it to be useful and beneficial to the business.

Therefore it was determined that an examination of the recall ability of an employee after a training situation would expose whether a particular method of presentation improved recall or not. This would then lead to a better understanding of how knowledge should be structured and produced for business training scenarios. In this way knowledge could be useful far beyond its initial presentation to employees and benefit a business beyond its initial capture and storage.

The problem then was not only concern with how knowledge was captured, but also how it was structured for explicit presentation to employees. This research sought to define this problem and then produce measurable results indicating whether recall was improved in employees or not. Since this research was initially examined in a previous KMPro Journal article (Spring 2006) this concluding article therefore will proceed to the results of the research experiment with a brief re-introduction of the relevant Hypotheses, Models, and Methods.

## Hypotheses, Models, and Methods

### *Hypotheses*

The following hypotheses were tested:

*H0: There was no difference in recall of a training presentation between the three presentation styles.*

This was the null-hypothesis describing no change in recall of the participants during this research effort. The basis for this null-hypothesis was that none of the three presentation structure styles was responsible for improving recall.

*H1: An explicit training presentation that was structured (hierarchal style) improved recall.*

This hypothesis suggested that tacit specified knowledge that was translated into explicit knowledge and structured in the hierarchal style improved recall. The recall was expected to be better for each participating employee when the hierarchal structure was used.

*H2: Recalling the training presentation was greater when structure (hierarchal style) was used.*

This hypothesis was to illustrate there was better recall when the hierarchal structure was used. This was tested to show that recall scores for hieratically structured presentations improved recall more than the other two styles.

*H3: A non-structure (paragraph style) presentation did not improve recall.*

This hypothesis was created to illustrate that a non-structured presentation (paragraph style) did not improve recall.

## Methods

This research was centered on a quasi-experiment within-subjects design with the following design form which was setup to investigate whether structure improved recall of a business training task(s).

*Table 1 - Posttest Non-Equivalent Quasi-Experiment*

| | IV | Business Task | Post Test | Business Task | Post Test | Business Task | Post Test |
|---|---|---|---|---|---|---|---|
| Parti-cipants | O | X1 | O1 | X2 | O1 | X3 | O1 |

*Table 2 - Research Key*

| | | | |
|---|---|---|---|
| O | = | IV Variables (B1-B6) | Covariate Variables |
| O1 | = | Posttest | Recall Score Instruments |
| X1 | = | Non-Structure Presentation | Paragraph Style |
| X2 | = | Structure Presentation | Hierarchal Style |
| X3 | = | Quasi-Structure Presentation | Paragraph + Hierarchal Style |

The following table described the distribution of this current experiment as related to the expected outcomes developed from the hypotheses already examined in chapter two.

*Table 3 - DV Variable Testing Structure*

| | Non-Structure | Structure | Quasi-Structure |
|---|---|---|---|
| Participants | X1O1 | X2O1 | X3O1 |

## Conditions & Outcomes:

The results of this experiment indicated the level of recall for each task presented by scores on the post-test. Since three different tasks were used the chance for practice or learning effects were reduced (Hopkins, 2000). Also learning effects were reduced because the training tasks were only presented once for each participant.

Each participant/employee was given forty-five (45) minutes total time for the three task presentations. Each presentation was two (2) minutes and forty-five (45) seconds in length. Each presentation had the same visual theme, font color and size, and automatic timing applied. The only difference visually was the structure of the text presented based upon the three types used in this present experiment (X1-X3).

The total time needed for each group of participant/employees measured was thirty (30) minutes and was sufficient for all participants to complete the three task-test sequence. The three task-test sequence was conducted in one session for each group of participant/employees.

Presentations and Posttest (Using PowerPoint)

### *Non-structure Presentation (X1)*

This presentation was designated as the non-structure presentation and the information for the task was presented in paragraph style. Paragraph style was similar to how most reading material was written and therefore best suited for that style of presentation.

### *Structure Presentation (X2)*

This presentation was designed to present the task in a hierarchal style or outline form. This resulted in a highly ordered presentation to contrast with the non-structure (X1) and quasi-structure (X3) presentations.

### *Quasi-structure Presentation (X3)*

This presentation was designed to present the task in both non-structure (X1) and structure (X2) styles.

### *Posttest (01)*

The posttest was a ten (10) question multiple-choice test. The same style of test was used for all three presentations. Utilizing the same type of test ensured that the only difference in the current experiment was between the three task presentation styles.

## Measures and Indicators

The following table describes the variables that were measured.

*Table 4 - Independent Variables (IV)*

| Variable Name | Variable Label | Variable Type |
|---|---|---|
| Gender | B1 | Nominal |
| Age | B2 | Scale (Ratio) |
| Education | B3 | Nominal |
| Employment | B4 | Nominal |
| Income | B5 | Nominal |
| Research | B6 | Nominal |

**Nominal Variable: Gender (B1)**

The gender variable was used to determine the between-subjects factor in GLM testing to account for any differences between males and females in memory recall performance. It was a useful variable to examine as it helped strengthen the conclusions about whether gender differences were important for organizational training programs.

### *Scale (Ratio) Variable: Age (B2)*

This variable was examined in the statistical analysis phase to eliminate any interference in the study due to age differences in participants. The age variable was used to determine if there were any differences between employees of differing ages in their memory recall ability or performance. This helped in analyzing the data for any inconsistencies or changes in memory recall among different aged participants.

### *Nominal Variable: Education (B3)*

This variable was used to determine how education affected the recall ability of the participants.

### *Nominal Variable: Employment (B4)*

This variable was examined to determine if employment status influenced employee recall scores.

### *Nominal Variable: Income (B5)*

Income level was examined to determine if varying levels of income influenced recall ability.

### *Nominal Variable: Research (B6)*

This variable was used to determine if participant motivation had any influence on recall. The question was a simple Likert scale measurement with four answer possibilities. This was used to measure how much motivation participants had when they became involved with this current research effort.

Table 5 - Dependent Variable (DV)

| (DV) | Measure | Measure Label |
|---|---|---|
| Recall | Non-Structure Presentation Recall Score | X1O1 |
| | Structure Presentation Recall Score | X2O1 |
| | Quasi-Structure Presentation Recall Score | X3O1 |

### *Non-structure Presentation and Posttest (X1O1)*

The non-structure presentation was designed to elicit the normal pattern of learning and recall generated by participants when seeing a task presented in paragraph form. This indicated the normal everyday recall experience of the participants and indicated the level of recall associated with this type of learning method. The indications were that with normal cognitive processes people learned through conscious awareness and intent (Herbig & Bussing, 2004). The posttest score obtained on this test revealed this awareness and intent.

### *Structure Presentation and Posttest (X2O1)*

The structured-form presentation was designed to elicit similar responses as that of the non-structured presentation but the material was codified into a hierarchal structure. The hierarchal structure was used to facilitate learning as indicated by the experiments of Brown (1998) and Botvinick and Bylsma (2005). The indications were that the hierarchal structure outline form was conducive to improving memory recall. However some researchers disagreed with this theory (Jonassen, 1993) but there was more recent work by Botvinick and Bylsma (2005) that indicated that the hierarchal style did improve memory recall. Farther back in time there was evidence in the results of Kintsch and Yarborough's (1982) experiments that indicated that ordered or hierarchal in nature presentations improved recall better than non-ordered or non-hierarchal presentations. The posttest scores from this current research indicated whether the evidence previously examined was still true or not.

### *Quasi-structure Presentation and Posttest (X301)*

The quasi-structure presentation (X3) was a combination of the paragraph and hierarchal presentation styles outlined above. This method was used to combine non-structure and structure to form a hybrid presentation. This was a way to illicit recall scores in the three dimensions of presentation style.

### *Recall*

Recall was the dependant scale variable examined from the posttest instruments. Recall was the participant's ability to consciously intend to remember some knowledge (Herbig & Bussing, 2004). Because the material examined for retention was meaningful or at least considered meaningful, employees developed cognitive structures to retain the knowledge (Day et al, 2001). This involved internalization of the knowledge or building cognitive structures to facilitate recall later (Nonaka & Takeuchi, 1995) (Marwick, 2001).

The recall variable was crucial to this present experiment as it was the underlying process examined. The recall score was

determined by the percentage of answers correct on each recall posttest up to 100% correct answers.

### *Power of the Test (Sample Size Calculations)*

The sample population for this experiment was approximately 121 participants from a total population of 174 employees. The statistical power of this experiment was determined to be:

1. Confidence Level 95%
2. Confidence Interval ±5%

The confidence interval was the percentage of error that was tolerated for statistical analysis. This was important for this current experiment in trying to determine a change in recall based on the presentation styles. The total sample size was deemed adequate to provide a basis for statistical analysis and was typical of, or larger than the sample sizes used in similar studies (Walma van der Molen & Van der Voort, 1997) (Lorch, et al, 1999) (Gibson & Meade, 2004). Sampling both females and males also helped eliminate any gender bias from influencing this current research project.

### *Population Concerns*

The population sample was made up of participants located within a 30 square mile region in Southeast Ohio. This population was made up of males and females of varying ages. The population was homogenous geographically. Participants were similar to other geographic regions participant populations.

## Presentation and analysis of data

The purpose of this research was to determine the best method for presenting explicit material to improve memory recall. The results of this study have been presented in the following sequence.

1. Descriptive profile and statistical analyses of the data collected
2. Major findings of the study
3. Summary

### *Descriptive profile - Data collected*

All 121 participants indicated both their age and gender on the pre-test questionnaire. Of those 39.7% were female and 60.3% were male. The minimum age was 18 and the maximum age was 54. The mean age was 22.49 and the standard deviation was 6.152.

*Table 6 - Gender Descriptives*

| | Frequency | Percent |
|---|---|---|
| Female | 48 | 39.7 |
| Male | 73 | 60.3 |
| Total | 121 | 100.0 |

*Table 7 - Age Descriptives*

| | N | Min | Max | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Age | 121 | 18 | 54 | 22.49 | 6.152 |

The majority of participants were in the lower to mid-twenties which was consistent with the population in the geographic area where this experiment was conducted.

### *GLM (General Linear Model)*

The General Linear Model was utilized to examine the results of the recall scores on participant post-tests. These results for all variables are listed below in table 8.

Table 8- Within Subjects Effects

(All Covariates via GLM)

| Source | Sphericity Assumed | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Recall | Yes | 5752.230 | 2 | 2876.115 | 15.167 | .000 |
| Recall* Gender | Yes | 442.175 | 2 | 221.087 | 1.166 | .314 |
| Recall* Age | Yes | 2461.162 | 2 | 1230.581 | 6.489 | .002 |
| Recall* Education | Yes | 701.292 | 2 | 350.646 | 1.849 | .160 |
| Recall* Employment | Yes | 61.706 | 2 | 30.853 | .163 | .850 |
| Recall*Income | Yes | 3.470 | 2 | 1.735 | .009 | .991 |
| Recall* Research | Yes | 84.411 | 2 | 42.205 | .223 | .801 |
| Error | Yes | 42857.084 | 226 | 189.633 | | |

The results conveyed in Table 8 indicated that all factors, except Age, had little or no effect on recall. Results of previous research in this area indicated there was found a difference between recall scores when different presentation styles were used and results in this present study were consistent with previous findings (Casselman and Samson,2005)( Botvinick and Bylsma, 2005).

### *Hypotheses Results*

H0: There was no difference in recall of a training presentation between the three presentation styles.

1. Age Reject H0
2. Gender (Within-Subjects) Failed to reject H0
3. Education Failed to reject H0
4. Employment Failed to reject H0
5. Income Failed to reject H0
6. Research Failed to reject H0

H1: An explicit training presentation that was structured (hierarchal style) improved recall.

1. Age Failed to reject H0
2. Gender (Within-Subjects) Failed to reject H0
3. Education Failed to reject H0
4. Employment Failed to reject H0
5. Income Failed to reject H0
6. Research Failed to reject H0

H2: Recalling the training presentation was greater when structure (hierarchal style) was used.

1. Age Failed to reject H0
2. Gender (Within-Subjects) Failed to reject H0
3. Education Failed to reject H0
4. Employment Failed to reject H0
5. Income Failed to reject H0
6. Research Failed to reject H0

H3: A non-structure (paragraph style) presentation did not improve recall.

1. Age Failed to reject H0
2. Gender (Within-Subjects) Failed to reject H0
3. Education Failed to reject H0
4. Employment Failed to reject H0
5. Income Failed to reject H0
6. Research Failed to reject H0

### *Hypotheses, Models, and Methods Conclusion*

Overall the analysis of the recall scores here disproved the null-hypothesis assumptions that there was no difference in presentation styles. The present research study was successful because it showed that different styles of presentations affect recall. This current research has added additional data to the knowledge management domain and implicated the need for further study.

In conclusion the hypotheses were examined statistically and the results were evaluated. The findings of this completed study suggest that presentation styles affect recall. Although the hierarchal structure presentation was not determined to improve recall scores as was found in past experiments the presentation styles differences noted were useful in proving that there is a difference when a particular presentation style is used. Business's seeking to maximize training budgets might investigate the most effective method for training by considering the style of presentations when developing their training programs. This strategy might result in improved recall after employee training and lead to improved business outcomes once employees recall and utilize their newfound knowledge.

### *Limitation of the Population*

The population as examined in this completed research study was potentially a problem factor for the results analysis. However, the population was indicative of the type of people working in businesses in the geographic area from which the subject population was derived. Because the average age of the participants was 22 years it was recognized that the population may not have been representative for the general population in the United States where the average age is 35 years (Population Research Center). Further research is indicated to try to bring the representative average ages of the participants closer to the national average to provide for a more universally accepted conclusion. However, the population best represented the people living in the geographic area and represented the types of employees working in that geographic area of the nation, Southeast Ohio.

The mean age of the participants at 22 years was also a potential factor in the three presentation recall scores. The first task (non-structured) was in paragraph form and the topic was Business Communications. This topic consisted of various references to wireless devices, personal digital assistants and other current technologies. Therefore with the age of the participants barely into the post-teenage years this topic may have been more interesting to them. The other two presentations topics were "Buying a Business" and "E-Commerce" and are topics that might have been less relevant to the younger subjects. Frey and Birnbaum (2002) found that subjects typically perceive the use of PowerPoint as indicating organization and preparedness of the trainer. However they also discovered that for younger subjects the PowerPoint had to be motivational and used effectively to hold their attention for learning. Another interesting study concluded that even though young people believed that PowerPoint indicated organization and that their attitude was positive towards PowerPoint training there was no difference in their recall scores due to PowerPoint used during the training (Susskind, 2005). In Susskind's research even when the trainer used similar material, and lectured similarly subject achievement was not improved.

Another aspect to consider were the story based effects of the paragraph and

combination presentation styles. Both styles used paragraphs to explain the topic points which are the normal mode of reading and learning in normal (non-handicapped) people. Also narrative or story telling is "grounded in the premise that narrative is a fundamental structure of human meaning making" (Bruner, 2003). This might suggest that when people read paragraphs even on PowerPoint slides that there is an inherent story aspect involved and may alter the results of an experiment. The narrative then becomes a powerful motivator for learning, development and transformation (Rossiter, 2003).

In conclusion the age of the subject seems to have played a part in the results obtained for this current project. Although additional research will be needed to explain this age aspect in more detail the results still indicated that a difference in presentation styles was found.

## Conclusion of Research Findings

The conclusion for this research was that presentation structure did impact recall. The research procedures were deemed adequate and correct to provide for differences in recall between the task presentations methods if any were indicated and all of the test instruments and environment were identical during the experiment for all participants. The findings already discussed then confirmed that the style of presentation impacted recall scores and that other factors such as age and gender also had some influence on recall.

### *Discussion of Research Findings*

Because the majority of business training presentations today are conducted with PowerPoint (or similar software) this study was best served by utilizing this methodology. The presentations used in this completed study were not made to mirror true business training scenarios and this may have been a possible problem. The presentations used were designed to provide enough information to be recalled but not be complete business training on a particular topic. In this way no prior learning skills would be directly utilized to improve recall results. This was similar to tests given to foreign language training candidates who took a pre-test that was in a non-traditional language to gauge their ability to understand and learn a foreign language (Defense Language Aptitude Battery, DOD). This was done to remove any previous influence on the learner. All prior-experience can not be eliminated entirely and therefore some influence was possible.

The results of this completed study were expected to mirror those of previous studies and they did so. The implications were that presentation styles affects recall and that further research needs be conducted to compare the three modalities of presentation, video, text, and PowerPoint styles and this is examined in the next section.

### *Further Research*

For future research there are several aspects worth examining. One aspect is to ensure that there are participants whose ages on average are closer to the national average of thirty-five years. This will help in making the experiment more relevant to the larger population.

A second aspect worth examining is the nature of the presentations themselves. To conduct another experiment there must be a more thoughtful study to determine which topics to cover in the training presentations. Also care must be given to ensuring that the topics are similar without being the same topic. Using the same topic for each

presentation would be ideal, but would introduce learning or training effects into the experiment. Keeping the topics separate but similar may well be a difficult task. Once careful topic examination is complete then a decision must be made to use the topics given their relative similarities and differences.

A third aspect to consider is the order of presentation. In this completed study the tasks were presented in the following order:

1. Non-Structure Paragraph style
2. Structure Hierarchal style
3. Quasi-Structure Paragraph + Hierarchal styles combined

This topic order was deemed relevant for the current study but there are additional factors to consider for future research. One way to eliminate problems with topic selection and order is to conduct the experiment in all of the following ways:

| **Experiment 01** | | **Experiment 02** | | **Experiment 03** | |
|---|---|---|---|---|---|
| **Topic** | **Style** | **Topic** | **Style** | **Topic** | **Style** |
| Topic 1 | Paragraph | Topic 1 | Hierarchal | Topic 1 | Com-bination |
| Topic 2 | Hierarchal | Topic 2 | Combination | Topic 2 | Paragraph |
| Topic 3 | Combination | Topic 3 | Paragraph | Topic 3 | Hierarchal |

From the sample styles given above there would be three possible combinations of presentation style. This would help distinguish between the topics themselves and verify if the topic has an effect or the style of presentation has an effect. This would necessitate using a longer research cycle to gather data but it would eliminate possible topic issues.

Another consideration is the necessity for three presentation styles. Do the three styles capture the necessary data needed to show a difference in presentation styles versus recall scores? Does including the quasi-structure add any additional data validity to the experiment? These questions must be considered for future research. Since it has been examined that the paragraph style involves story narrative aspects then the combination style would also introduce these same story elements. This would suggest that there is possibly no need for the quasi-structure style.

Conducting the experiment with two presentation styles would also provide valid data to examine the differences found between them. Again the order must be reversed for each topic to eliminate previously mentioned order bias, but with only two styles to work with the experiment cycle would be shortened and less time spent developing unnecessary elements avoided. Therefore the following would probably be a good outline for future experiments.

| **Experiment 01** | | **Experiment 02** | |
|---|---|---|---|
| **Topic** | **Style** | **Topic** | **Style** |
| Topic 1 | Paragraph | Topic 1 | Hierarchal |
| Topic 2 | Hierarchal | Topic 2 | Paragraph |

There is an issue here of trying to eliminate topic relevancy problems within the experiment. If the style is considered the element that makes the difference in the experiment than changing topic style over the course of the experiment the topic relevancy problem may be solved.

Finally for topic issues there would need to be a topic order consideration made. The order that the topics are presented must be examined also. Changing the topic style for each topic may not be enough to ensure accuracy during the experiment. The following illustrates the order of presentation issue.

| Experiment 01 | |
|---|---|
| **Topic** | **Style** |
| Topic 1 | Paragraph |
| Topic 2 | Hierarchal |

| Experiment 02 | |
|---|---|
| **Topic** | **Style** |
| Topic 2 | Hierarchal |
| Topic 1 | Paragraph |

| Experiment 01b | |
|---|---|
| **Topic** | **Style** |
| Topic 1 | Hierarchal |
| Topic 2 | Paragraph |

| Experiment 02b | |
|---|---|
| **Topic** | **Style** |
| Topic 2 | Paragraph |
| Topic 1 | Hierarchal |

This expresses the choice to eliminate topic and order issues from the experiment. Restricting the experiment to only two presentation styles may help substantiate the procedures used.

A forth aspect for future research is examination of what constitutes the correct styles needed for the presentation topics. In this finished study the hierarchal and paragraph styles were chosen to represent structure and non-structure. However are these two styles actually representative of these terms? Is a hierarchal structure different from a simple outline? Also what benefit is expected from either style? These questions should be answered before future research is conducted.

Given the wide variety of possible styles that might be considered structure or non-structure a decision would need to be made to identify the style and then to confirm its use within the experiment design. The choice of style is relevant for future research, but the need for consistency is more important to make certain the results are validly obtained. The current research utilized three styles and three topics and decided that these would provide valid data. The data results confirmed that the presentation styles did influence recall and that they were perceived by the subjects as different one from the other. Therefore for future experiments this same perception would need to be realized even when changing the order, style and presentation of the topics used.

A final aspect to examine for future research is the time of day that the experiment is conducted. The current research did not specify a specific time of day to conduct the experiment. This may have influenced the results due to sleep and stress issues for the participants. To eliminate these problems a specific time of day might be used for all participant groups and thereby eliminating extraneous elements of sleep problems and stress circumstances.

### *Concluding Further Research*

Research in this area of knowledge management is somewhat limited. Only a few researchers have done research into recall ability of explicit knowledge. However as this completed study suggests there is definitely a need to look into this area more. If knowledge management is concerned with retrieving and storing employee business knowledge than it must also be concerned with how well employees recall this knowledge once disseminated. If the employee cannot effectively recall knowledge than they will be unable to apply it to their daily business routines as needed.

From this completed research project and from analysis of the results, further research is most definitely indicated and should be pursued whenever possible. This will give a more complete picture to the knowledge management field of retrieving, storing, and recalling explicit knowledge.

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# EMPIRICAL INVESTIGATION OF SUCCESS AND FAILURE FACTORS OF CMMI IMPLEMENTATION

S. Balasubramanian and S. Manivannan © 2006

## Abstract

Lightweight software development methodologies promise an easy way to deliver products of high quality without excessive cost and effort. This paper mainly discuss about the critical success factor for CMMI implementation, successful implementation case study and misconceptions about the CMM level and practice and finally discuss about the CMMI implementation approach

**Keywords:** Capability Maturity Model Integration (CMMI), Software Engineering Institute (SEI), Key Process Area (KPA), Critical Success Factors (CSF).

## Introduction

The CMMI is a model for improving and appraising the performance of development organizations. It stands for Capability Maturity Model Integration. The CMM was originally commissioned by the American department of Defense to help them qualify software vendors' capabilities. From there it quickly evolved into a powerful tool to guide process improvement initiatives, not only for Software Development but also for many related fields such as Systems Engineering, Product Acquisition, Team Management, Research and Development, etc. Today the CMMI is used around the world in military, commercial and government organizations. It has been shown to reduce the risks associated with development projects, increase efficiency and improve the overall quality of products and deliverables

The five maturity levels (Initial, Repeatable, Defined, Managed, and Optimizing) represent evolutionary plateaus on the road to a high level of software process capability. Each maturity level, except the first, defines several key process areas (KPA) -groups of related software practices must be satisfied in order for an organization to attain that level (Table 1).

Each KPA has two to four goals, all of which must be achieved in order to satisfy the objectives of KPA. In addition, each KPA describes a number of key practices that typically lead to achieving that KPA's goals. These practices are grouped into five "common features." The key practices of the common feature called Activities Performed define technical and managerial activities that typically lead to satisfying the KPA goals, thereby establishing a specific process capability in that key process area.

Table 1. Key Process Areas of the Capability Maturity Model.

| Maturity Level | Key Process Area |
|---|---|
| 1: Initial | None |
| 2: Repeatable | Requirements Management, Software Project Planning, Software Project Tracking and Oversight, Software Subcontract Management, Software Quality Assurance, Software Configuration Management |
| 3: Defined | Organization Process Focus, Organization Process Definition, Training Program, Integrated Software Management, Software Product |

| | |
|---|---|
| | Engineering, Intergroup Coordination, Peer Reviews |
| 4: Managed | Quantitative Process Management, Software Quality Management |
| 5: Optimizing | Defect Prevention, Technology Change Management, Process Change Management |

## Literature Review

In 1960's big software developers, such as IBM, encountered serious problems concerning software development process. Since then a lot of ideas, methods and tools have been proposed to make software development easier, more predictable, and more effective in the sense of customer satisfaction. Structured programming (Elgot 1976), modularity (Parnas 1972 and Wirth 1982), structured analysis (DeMarco 1978), object-oriented programming (Stroustrup 1985), object-oriented analysis (Booch 1991), CASE tools and many others have been proposed to produce software of better quality. Capability Maturity Model (CMM) developed a few years later at the Software Engineering Institute (Pittsburgh, USA), much better suited the needs of software developers (Paulk et al 1995).

## Success factors of CMMI Implementation

The CMMI helps organizations sharpen their competitive edge by providing better predictability and greater efficiency, ultimately leading to lower costs and more satisfied customers. Based on the study conducted by Software Engineering Institute (SEI) during the CMMI process improvement initiatives at companies such as Siemens, JP Morgan, Chase, and Lockheed Martin indicated a major process improvement percentages is as follows:

- 20 percent cost reduction
- 37 percent more likely to be on schedule
- 67 percent productivity increase
- 50 percent fewer defects
- 14 percent higher customer satisfaction

Of course, a CMMI implementation entails additional engineering and process-related costs. Many research Studies have shown that companies that invest 5% to 10% of their operating costs into process improvement typically experience a return on investment of 100% in the first year and upwards of 400% after 3 to 5 years. These returns on investments are based on reductions in the number of defects, faster time to market, improvements in estimation capabilities and better project control.

Tata Consultancy Services is an India based software organization has achieved significant improvements in productivity, reduced delivery time, increased return on investment and reduced post-production defects through internalizing of the CMM model and its processes.

The Table 2 illustrates the benefits accrued to one of TCS telecom clients.

**Table 2: Benefits achieved through CMMI Deployment**

| Metrics | 4th Quarter 2000 | 4th Quarter 2001 |
|---|---|---|
| Project management effort as a % of total project effort | 6.5% | 4.0% |
| ROI (Number of Orders processed) | 35030 | 36531 |
| Productivity (Time taken/transaction) | 0.73 | 0.50 |

### *List of Critical Success Factors for CMMI Implementation*

These critical success factors are derived based on the CMMI implementation experience.

- Top Management Support and commitment
- Capability of the organization to map their process area into the CMM Process area
- Ownership
- Managing Change
- Training
- Implementation team experience
- Employee commitment and learning capabilities
- Adoption Methodology
- Organizational culture
- Managing Process
- Quality policy and Quality standards
- Communication and sponsorship

## Major Misconceptions of the CMM

As organizations attempt to apply the CMM framework to their software process improvement activities, it's easy to get confused by incomplete or erroneous interpretations of the CMM. Let's clarify some of the misconceptions indicated in the process improvement model **(**Karl E. Wiegers, 1996).

- Level 2 is mostly about software engineering activities, such as requirements analysis, design, coding, and testing
- You have to perform all of the activities and practices defined at some maturity level in order to achieve that level.
- Software measurement is not required until you are approaching Level 4
- The SEI certifies an organization at a specific maturity level
- The CMM requires use of some specific software development practices, tools, and methodologies
- The CMM mandates a waterfall life cycle model
- The Software Quality Assurance KPAs are mostly about testing
- The CMM requires that you perform software inspections to achieve Level 3
- Having a "tailorable" process really means that you can do whatever you want
- Requirements management is the same thing as requirements engineering
- The CMM mandates bureaucracy and wasteful paperwork
- The CMM is a quick fix for short-term problems

The framework for process improvement provided by the CMM can go a long way toward improving the ability of a software organization to be successful on project after project

## CMMI Implementation Approach

The graphical representation of the CMMI implementation approach is shown in figure 2. This approach is based on the concept of pilot implementation in some specific process. If the pilot has succeeded, go for implementing in the entire process. Many small and medium based organizations are trying to use this kind of approach.

## Conclusions

Unless you believe that common sense does not apply to your context, then the CMMI is a powerful tool to guide your process improvements efforts. Whether yours is a

mega-corporation with thousands of employees or a small outfit with just a handful of developers, the CMMI can help you deliver better products faster.

CMMI KPAs have to be followed and implemented meticulously, because If the company wants to deliver a product on time, with the desired quality (with a fewer defects and regressions) and achieve high productivity to meet up the desired CSI (Customer Satisfaction Index).

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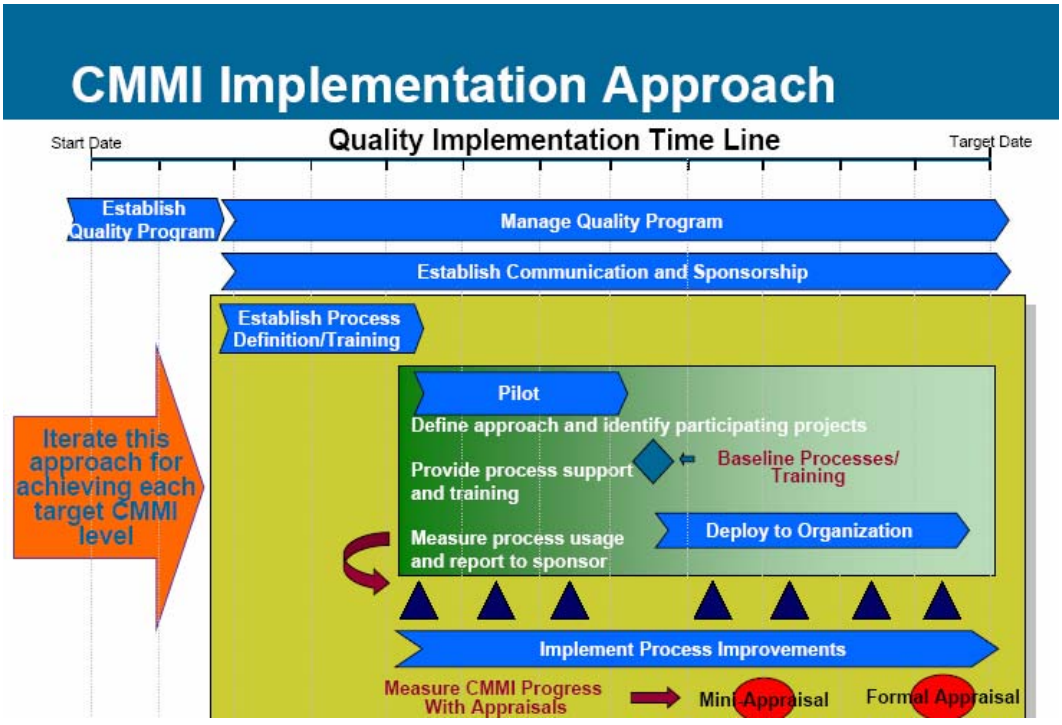


Figure 1. CMMI Implementation Approach

# AND THE WHIPPOORWILL . . .

By William Pilkerton and Sandra Lambert © 2006

*And the Whippoorwill… Does the title leave you confused or puzzled? The author of Information Anxiety, Richard Saul Wurman describes the onslaught of data and information, as leaving us in a perplexed state. (Wurman, 1989)*

The following review of Information Anxiety by Richard Saul Wurman suggests that we are trying to play catch up in a sea of data. A person would have more success surfing in quicksand than trying to keep up with the amount of data that is being processed. Wurman lends his perceptions to understanding excess data and solutions, through the depiction of information which he claims we are inadvertently exposed.

## Understanding Richard Saul Wurman "Ricky"

Richard Saul Wurman, had an early desire to learn and obtain knowledge. This drive has guided Wurman through many endeavors. Although his first interest was painting, Wurman achieved many of his interests through Architecture and writing. (Kushner, 1997) Wurman's life is as complex as his best seller *Information Anxiety*. Richard Saul Wurman embarked on a career as a writer at a young age of 26. Since then he pursued a passion for simplifying the emergent and massive amount of information. Information Anxiety his 45th book; written as a summation of his motivating principles. (pp 355-356)

According to John Naisbitt,

> *"Richard Saul Wurman, FAIA, is an architect, graphic designer, cartographer, and recipient of Guggenheim, Graham, Chandler, and NEA fellowships. A graduate of the University of Pennsylvania School of Architecture, he has held professorial positions in architecture, urban design, and graphic design at Cambridge University, Princeton University, University of Southern California, UCLA, and others"* (Naisbitt, 1989)

Continuing his endeavors and striving for new ways to add an understanding to the insurmountable state of information led to the creation of TED, which stands for Technology, Entertainment, and Design. TED is an annual conference, which is attended by invitation only and the cost of attending is four thousand dollars. (Ted Conference, 2004).

More recently he has created a new business endeavor called TOP; Publishing Company based on the principle TOP-It's this simple...Richard Saul Wurman. An objective of TOP is the design of understanding, which has a similarly to the book Information Anxiety also a creation of Wurman. TOP follows the theory "Understanding comes from asking questions, not just listening to answers." (Understanding comes from asking the right questions)

## Unknowledgeable Presence

Wurman employed several common themes within Information Anxiety as a premise, to lead his reader. A prime example is proclaiming ignorance, which he emphasizes is a foremost opportunity to

learn. The aspiration to know everything is unnecessary; knowing where to find obtainable information is imperative (pp 52-55). We as a nation have a tremendous fear of admitting “ignorance” and our lack of “understanding” toward information. Wurman ascertains an escape from this succession, as he claims ignorance is his greatest asset is ignorance. Divulging of ignorance is very liberating and eradicates expectations of “knowing” what someone is talking about and “freeing” an individual to learn through awareness alone. (pp 53-55)

Children are overflowing with wonder and ask a myriad of “who, what, when, and where” questions. Unfortunately, as teenagers and adults, we feel the pressure to have a broad-spectrum of general knowledge. Some people perceive this as an annoying trait; however others are unaware of this annoyance. Often one will share newly acquired knowledge and others simply state “Yeah, I know.” Aggravation occurs in conjunction with a subtle perception that their answer was given on pretense.

## Sensory Overload

Wurman declared that the amount of data being processed was doubling about every five years when Information Anxiety was published in 1989 (Wurman, 1989). Although, humans are capable of learning an infinite amount of information, sensory overload may occur quickly, because we process a finite amount at a time. Infants are a perfect example, as infants receive an excessive amount of attention they become restless and start to fuss or cry, which eventually stops their bewilderment.

The goal of his book seems designed to enlighten its audience to the sheer terror of information overload, in turn leading or developing into information anxiety. During a situation of overload, a person can possess a poor sense of judgment and can contribute to the addition of more anxiety. “Information Anxiety” continues to stress ways of understanding the ambush of information and the many ways to prevent the effects of excess information. The author of Information Anxiety used explicit details based on his perceptions to prepare his readers for a defense toward the information anxiety overload. Wurman referenced Chapter 15 by stating “This chapter outlines my own prescriptions for reducing anxiety, for making less painful and more sensible decisions about the information in your live, for developing practical defenses against the increasing onslaught of raw data.” (Wurman 1989, pp 318)

## Applying Principles

*“The term "information architecture" was first coined by Richard Saul Wurman in 1975. Wurman was trained as an architect, but became interested in the way information is gathered, organised and presented to convey meaning. Wurman's initial definition of information architecture was "organising the patterns in data, making the complex clear”* (Barker, 2005).

Wurman also offers a solution to information anxiety, which he calls understanding, which is a simplified solution to an enormous problem. Unfortunately, to achieve a state of understanding, one must prepare themselves by slowing their pace. Therefore, any attempt to mentally nibble or feast newly acquired information will allow a thorough process of digestion. The following comparison is a perfect case in point. Heartburn is caused by quickly swallowing a meal; Information Anxiety is

caused by receiving a mass amount of information. The processing of information is more effective if digestion is achieved one bite at a time. Another case in point is a snake, which will suffocate by biting a larger amount than it can literally chew or ingest; humans will also be adversely effected when an overwhelming amount of data and information are obtained.

Wurman provides principles to follow providing avoidance of information anxiety pressures. Those pressures relate to the magnitude of information, chaotic presentation of data and information, and diminutive amount of time available to absorb the information. One pressure that can be avoided is the need to know it all, which could be caused by the feeling that the world will pass you by (pp 318-330). This is a case in which humans can learn from observing a Whippoorwill; it may be several days before they approach a feeder (Basic Survival Needs, 1998-2002).

Observing exhibits of the Smithsonian in Washington, D.C. or the Louvre in Paris, France in a day, week, or month would be unrealistic. Patience provides time to realize that some of the expectations we employ are unrealistic. The understanding of a remarkable amount of information and the pursuit of selecting the most meaningful choice comes along with the experience.

A trip taken to Louvre Museum, by one of the AND THE WHIPPOORWILL… authors and their co-travelers caused the recognition of the inability to see it all. They were given four hours to explore the Louvre and started racing through an extremely crowded museum to see every exhibit.

All the while, this once in a lifetime opportunity, was wasting away for over an hour, before the author realized that the ability to see everything in the allotted time was unrealistic. He thought about the exhibits, this time based his personal priorities as well as his interest in art. The recognition led him to the belief that the Mona Lisa was of the most importance along with his interests in Egyptian history and artwork. The final two-and-a-half hours were spent enjoying a wonderful Egyptian exhibit and battling the never-ending crowd for a glimpse at the most famous painting in the world. The realization freed the author to enjoy the remainder of the trip based on personal interests and importance.

The following principles were specified by Wurman in order to reduce such information anxiety.

→ Recollection of unknown knowledge
→ Recognition of insurmountable information
→ Acceptance of ignorance (Pg 318)
→ Relationship of newly acquired knowledge to past knowledge
→ Observation of other possibilities by changing directions
→ Concentrating on the opposites (Pg 47)
→ Confidence in understanding
→ Pursue interests (Pg 148)

## Diverse Narrative Suppositions

- **Recollection of unknown knowledge**
  - A set of circumstances in which you were reminded of a preceding situation, such as being a new employee or new to a city. Validation of the right to be unknowledgeable in the specific situation will lesson anxiety.

- **Recognition of insurmountable information**
  - The possibility of reading everything in the Library of Congress is unrealistic. This revelation frees one of anxiety because the task is more daunting than climbing Mount Everest.

James Billington stated

> *"The Library of Congress is the nation's oldest federal cultural institution and serves as the research arm of Congress. It is also the largest library in the world, with more than 130 million items on approximately 530 miles of bookshelves. The collections include more than 29 million books and other printed materials, 2.7 million recordings, 12 million photographs, 4.8 million maps, and 58 million manuscripts."* (Billington, 2005)

- **Acceptance of ignorance**
  - Accepting ignorance removes unrealistic expectations and self awareness and bequeaths a starting point for learning.
- **Determination to pursue interests**
  - A passion and determination exudes when pursuing ones own interests, as well as greater receptiveness to the field of study.

## Information Anxiety Evaluation

The first impression of Information Anxiety is a mixed of confusion and information overload. The wordy dust jacket was written by J. Naisbitt. The inside covers are filled with reviews from other authors, presidents, CEO's, Directors, Publishers, Graphic Designers, as well as a U. S. Senator. Previous to the Table of Contents, Wurman assures us that Information Anxiety will be unlike other books, which he states are another cause of anxiousness. Further on the page the author stated that the book can be read out of sequence. (p. 5)

Wurman is correct, a person can start reading basically anywhere in the book and still understand the readers message. Comparison can be made to Chicken Soup for the Soul, because both books consist of narratives experiences. Although Wurman used his experiences to enlighten his readers to the minuscule details of any and all type of possible information, with the intention of liberating the reader of Information Anxiety. Sections of the book indeed liberate from Anxiety and other sections cause Information Anxiety, which is an interesting combination.

The table of contents has summations of each chapter and again is very wordy, although this is a book. The difference between this and other informative books is the numerous illustrations, such as a door knob, a spoon, a one way sign pointing in two directions, and comparisons of two pictures. These illustrations continue throughout the table of contents and the chapters with some occurring multiple times (Wurman, 1989). It is possible that the author was trying to prove a point by comparing the overload of information to excessive illustrations. He may have intended the illustrations to be one of paradox or purposeful confusion.

Along with the illustrations in the book quotes are written in the margins, such as "It is the spectrum, not the color, that makes color worth having, and it is the

cycle, not the instant, that makes the day worth living. Source Unknown" (pp 170). The quotes written in the margins may have been added as a novelty or with a sense of purpose. According to the statement below the purpose was to incorporate ideas and a contradictory way of thinking. Wurman referred to the composition of the book Information Anxiety in the following statement.

Wurman stated

> *"The traditional book form has been broken to allow me to insert marginalia, stories, and diagrams inspired directly and indirectly by the text; the book is modeled after the quirkiness of conversations and the association of ideas-the opposite of the sequential, linear way books are supposed to work"* (Wurman 1989, p 47).

Wurman exceeds the expectations of the reader due to the magnitude of data and information one can comprehended within a short period of time. It would be difficult to think of any information that was omitted, considering the date of the book. The Internet was covered in the sequel, Information Anxiety 2nd Edition. Various topics comprised of five rings, classifications, art of listening, communication, instructions, learning, memory, exaggeration, and a selective perception. Information Anxiety followed a methodical process within the chapters of the book, by clarifying each aspect of Information.

Nevertheless the presentation of the Information Anxiety with the random illustrations and margins filled with quotes, radiated chaos and a rather rebellious persona. At the onset of reading the book the chaos is noticed and questions form. Similarities between *AND THE WHIPPOORWILL…*and *Information Anxiety* has been portrayed through the use of narratives, chaos, and quirkiness. Akin to one of Wurman's illustrations, you wonder about the intentions of the author. "Why did the writer insert a key on the previous page? Why was the text right justified? Why did the text end vertically opposed to horizontally? What was the purpose for the numerous narratives?" Ultimately you are inclined to overlook the numerous narratives, the chaotic state of the book and continue reading, since there is a lot to learn within his book.

## AND THE WHIPPOORWILL… Finale

Wurman assures us that Information Anxiety is dissimilar to other books, which holds true (pp 5). A component which adds to the enjoyment of reading Information Anxiety is the unsystematic form, allowing the reader to start essentially anywhere within the book, including the table of contents. Choosing the area which piques your interest is also a reading experience. Although the book is a departure from the status quo, trying to take on a significant amount of material will require the reader to stretch the reading time-span and undergo a thorough examination into the essence of the matter. Information Anxiety is not a light or casual reading, as there is much to ruminate. This first edition is thought provoking and a reader should allow an abundance of time regardless of an agreement or disagreement with Wurman's suppositions.

The authors of And the Whippoorwill… feel that Wurman's Information Anxiety 1st Edition is an interesting, informative, out of the ordinary, and courageous book. The framework as attention-grabbing as the subject matter, which together

provides a remarkable approach to writing. Although at times Wurman does seem to have some exasperating points, however this may be in his attempt to ensure his message is being received. The tackling of a myriad of issues people face while trying to swim in a sea of data in a complex manner is what makes the composition of this book a courageous feat. All the while pointing out that "raw data can be, but isn't necessarily, information," and continues to say "unless it can be made to inform, it has no inherent value" (pp 38). Seemingly simple, yet thought provoking, as many of his ideas are throughout this book.

Information Anxiety is how information affects us and the approach Wurman uses is a narrative style, which allows the reader to jump into any section and read what piques his or her interest, without requiring the previous chapters to be read, consider it 15 chapters of a series of short stories or novellas compiled into one published work. It is also these approaches that make the book informative, out of the ordinary and courageous as well. The tables of contents consume 21 pages of the text and are very narrative as well. Information Anxiety does create some anxiety of its own – intentional or not – by using a wordy dust cover, facts and quotes in the margins, splashes of illustrations throughout, which at first are distracting and can detract, but as interest increased the "noise" was not as noticeable.

Wurman, at times, seems to be playing or toying with us. The out of the ordinary layout of the book is evidence enough. However, it raises the question, "Is there some method to his madness in creating such an out of the ordinary work?" The authors think so. Amongst Information Anxiety, Wurman delivers a well conceived and written book, which is a worthy read because it creates thought provoking information and offers simple, yet often overlooked solutions to the problem of information glut.

Information Anxiety provides examples that prove limiting or filtering the amount of information we attempt to understand at one time, slows or eliminates the inundation process of excess information. Therefore leaving us with a more satisfying and less painful experience. A light bulb would have been a more appropriate illustration than the door knob in the table of contents of Information Anxiety. (pp 7) The light bulb would represent the insight a reader will receive from reading Information Anxiety. The door knob, senseless maybe or maybe not. The doorknob could represent all the doors to be opened and the many different directions to take or the all of the insurmountable information just waiting on the other side. Consequently, Information Anxiety is more than just about information anxiety, it is about communicating effectively. The book offers practical advice all the while pointing out that much communication, by trying to cover all its bases with accuracy, has actually made communication meaningless. The core problem is not asking what is the point, or information, what are we trying to communicate. One of the examples Wurman uses is New York City grocers with signs stating "We sell kosher and nonkosher food." Wurman questions "Why do they bother? What else is there." Just informing the public kosher food is sold there would be enough (pp 114-116). Yet, on another note, Wurman also wrote questionable information within his book. A reader may ask the same question. Why did he bother adding information about the guides and maps? At times it seems that Wurman is

taking an opportunity to promote his ACCESS® product lines. Wurman's first guides were map to cities, called Access Travel Guides (pp 143-145). Wurman also uses his work experiences on a number of other projects as examples to illustrate his points.

What authority and expertise does the author possess to write about Information Anxiety? Wurman stated "I am an expert on none of these subjects, which makes me the appropriate author" (Wurman 1989 pp 45). An author of more than 75 books and holder of many prestigious positions, Wurman accepted the challenge to question the obvious. Wurman has no fear of embarrassment or questioning the obvious. Wurman has attained the ability to set aside his crown of ego releasing him from the fear of "not knowing" by embracing his ignorance of a subject: real or feigned. This approach has been very successful in his business endeavors (pp 45). Therefore a man of great conquests and Information Anxiety is just one iota.

There is no doubt after reading the book Information Anxiety the importance of understanding information. A different perception can lead one to a more knowledgeable existence. The reality portrayed within Wurman's forty-fifth book is that a world exists with explanations of the insurmountable information. The choice is ours whether we take on the challenge or continue to live in an existence with our head swarming in the sea of data. The scope of Information Anxiety written in 1989 exceeds the expectations of the readers, through the amount of information and knowledge of the author, Richard Saul Wurman, also known as Ricky has acquired.

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