**Business Process Meets eLearning: Real-World Success with Knowledge Maps**

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**Abstract**

Utilizing business user-friendly technologies, and leveraging existing skills and materials, the Sacramento Municipal Utility District (SMUD) achieved a standardized platform for knowledge retention and training in which business process diagrams serve as ‘maps’ to process-specific knowledge assets and online training. Project success and rapid acceptance by end-users has positioned this organization to achieve the goal of deploying ‘learning everywhere’ in a business process context.

The eLearning solution deployed by SMUD was facilitated by GEMWorX Flowmodeler software, which contains the novel combination of a business process analysis toolset, a lightweight learning management system (LMS), and a web-publishing facility that is free of any web-development or coding requirements. By incorporating familiar Microsoft technologies (the Visio drawing tool, SharePoint and MS Office applications) GEMWorX creates new possibilities for eLearning implementation, mobile learning, online training, and performance support systems.

**Categories and Subject Descriptors** – aging workforce, business process improvement, knowledge management systems, learning management systems, on-demand training, operations support

**Index Terms** – eLearning, GEMWorX, knowledge loss, knowledge mapping, knowledge retention, Visio

I. INTRODUCTION

A picture may be worth a thousand words, but what is a picture of a thousand words worth?

The answer to this question might not be as simple as it seems. A picture of a thousand random words would probably be worth nothing at all, but what if the words had been hand-painted on a canvas and signed by a famous artist? What if the words described a secret formula, or contained a code that would lead to discovery of real-world treasure? What if they were arranged in a framework that comprehensively documented the inner workings of a global business?

Knowledge Mapping is not new, and numerous schemes for its classification have been put forth over the years. Some authors have focused on mapping concepts, such as Eppler’s model of Source, Asset, Structure, Application, and Development maps. [1] Others have emphasized the types of knowledge being mapped (data, documents, organizational memory), or the way the knowledge is depicted in the maps (two-dimensional tables, three-dimensional networks, freeform ‘mind-maps,’) or on the knowledge-seeker’s objectives (discovery, analysis, reference).

This paper does not attempt to revise or update the taxonomy of knowledge mapping—but it does introduce new material on the practice of creating and utilizing knowledge maps on a day-to-day basis in a business environment. We live in a ‘learning everywhere’ world. All kinds of knowledge can be obtained in an ever-expanding number of ways—so many, in fact, that there is a danger of information sources becoming ‘pictures of a thousand words’ that are brimming with information but lacking in utility. For knowledge mapping to prosper in a business environment, there must exist a practical, readily adoptable, and rapidly deployable means for organizing, communicating and utilizing information to meet specific business needs.

II. ‘KNOWLEDGE MAP’ SOFTWARE, ORIGINS AND USES

Of all the various types of, and uses for, knowledge maps, the one that seems to align best with real-world organizational activity is the procedural (or process) knowledge map. After all, the business process (aka ‘workflow’) map is a familiar form to business users, even in organizations that are not particularly process-oriented.

Microsoft Visio is a software toolset that facilitates the ‘drawing’ of all kinds of process maps—from electrical or hydraulic flows to business process diagrams. Gartner (a leading information technology analysis and advisory firm) estimates that Visio ‘owns’ 38% of the market share for business process documentation tools [2] and the general consensus is that about 70% of all business process diagrams are Visio diagrams.

Despite its popularity as a drawing tool, Visio’s shortcomings quickly become apparent when the drawing task requires integrating and synchronizing multiple processes. Visio users can quickly produce detailed...
drawings—but the tool provides no easy way to store process-related information, or to track, update, or extract the information that has been created within the individual digital files. Thus, as a Visio-based ‘process model’ becomes more complex and multi-layered, the amount of labor and time required to maintain and update the model accelerates rapidly.

Enabling non-technical users to create interactive knowledge maps from Visio diagrams did not originate as an eLearning solution, or even as a knowledge capture/knowledge management solution. Rather, the software that is now known as GEMWorX was created simply to enable its users—who are technology integration consultants working in the utility industry—to ‘use Visio better’ for documentation and change management activity in support of the planning and rollout of process improvements and new technologies.

A. From Process to Change Management to Training

It has been said that the best architects are the ones who started out as builders. This probably applies to software architects as well. GEM’s consultants did not set out to ‘design a product’. They only sought to increase the efficiency of their work, and to add value to the business process deliverables they were creating for their clients.

Making Visio the ‘drawing’ component in a fully-functional Business Process Analysis (BPA) software application, focusing on ‘what people do at work’ (instead of on technology), and later adding web-publishing and lightweight learning management systems had an unexpected result: every single GEM client who saw the tool in use asked if they could buy it. GEM’s internal productivity tool was soon to emerge as the GEMWorX software product.

The successful use of this novel technology has been the subject of a Gartner research study [3], a cover-story in Public Power magazine [4], and presentations at the 2008 National Conference of the American Public Power Association, the National Workforce Summit, and the 2008 Gartner Business Process Management Summit.

B. The importance of Knowledge Retention

Working in the electric utility industry brought GEM into early contact with the aging work force challenge. The retirement of the ‘baby boom’ generation is causing an unprecedented rate of workforce turnover: 30 to 40% of the entire utility industry workforce will retire within the next 5 to 10 years. [5] And because this is a global demographic phenomenon, challenges arising from rapid workforce turnover and related knowledge loss will impact virtually every industry over the next 10 to 15 years.

The potential dangers of knowledge loss are greatest in organizations that have had a long history of relatively stable employment. This is why utilities, energy companies, government agencies and educational institutions are all in the ‘high risk’ category. Unfortunately, the management response to ‘workforce shortage’ has leaned heavily on recruitment, with comparatively little awareness of the need for knowledge retention or potential adverse impact on organizational function. A 2008 study by the Institute for Corporate Productivity (i4cp) showed that 71 percent of midsize to large corporations surveyed had no current programs in place for incorporating retirement forecasts into knowledge transfer activities, and that 84 percent expected to rely on existing training methods for knowledge transfer. [6]

A study by Dr. David DeLong, “Diagnosing the Cost of Lost Knowledge,” [7] cites numerous examples of real-world business setbacks that were directly attributable to a failure to address the loss of key knowledge resources. In some of the examples, knowledge loss triggered major business dysfunctions with a remediation cost exceeding $1 billion. In case after case, a familiar pattern emerges: losing job-specific knowledge causes sporadic, focused problems, but losing control of undocumented business processes causes systemic, ongoing performance failures that can be very difficult to repair.

In many organizations—especially those with a large percentage of longtime employees—business processes operate as an implicit network of collaborative activity and shared responsibilities. Even individuals who do not have "critical job knowledge" may still be a key connection point. The people are the processes.

When the knowledge obtained from each individual is given a separate ‘address’ (whether in a digital file, a database location, a link in a wiki, or within the mind of a new worker through one-to-one mentoring) the other actors in a given business process do not have an opportunity to compare or agree upon the correctness or completeness of process interaction. Thus, if knowledge has been retained in discrete parts and pieces, the business processes themselves remain implicit.
Increasingly frequent departures can cripple process understanding as ‘holes’ appear in the network. Stress on remaining veterans causes delays, increases error rates and disrupts normal mentoring, leaving new workers feeling disconnected, dissatisfied and underutilized. In one utility, customer service veterans ‘left behind’ were so overwhelmed that they took early retirement—leaving just 20% of the departmen’s staff in place.

The terms “implicit knowledge” and “tribal knowledge” appear frequently in research and commentary on knowledge loss, but most knowledge retention efforts are not focused on the implicit knowledge that sustains business processes. Considering the proven potential for severe adverse effect when shared process understanding is allowed to disintegrate, there has never been a greater need for process-oriented knowledge mapping.

III. Research Site

A. Existing Learning Practices

Sacramento Municipal Utility District (SMUD) in California serves more than 575,000 customers in a 900-square-mile area. In addition to being the 6th-largest municipally owned utility company in the U.S., SMUD is also recognized as one of America’s most progressive and efficiently run utilities of any size or type.

When SMUD set out to solve problems related to employee training, aging work force-related knowledge retention was not the primary objective. Rather, the organization needed to improve the quality of training within its Service Delivery Information Technology (SDIT) department, where multiple business applications were supported by multiple types of training material, all of which had arrived at different times from different sources. As a result, none of the training material was standardized in content, method of presentation, or technology platform.

The difficulty of maintaining and updating the training materials had been the source of ongoing communication and performance issues at SMUD. The business applications—geographic information systems, service outage management systems, mobile data dispatch, and others—are essential to the work of the electricity distribution services team, so the chief information officer assigned high-priority status to the problem.

B. Perceived need vs. proposed solution

SMUD issued a request for proposals for “SDIT Software Training Program Design and Coordination” and selected Global Enterprise Managers and its GEMWorX software for its pilot project. GEM’s deep experience with electric utilities was important, but SMUD’s interest in GEM was primarily based on the proposal to integrate business processes and training.

SMUD’s original plan had been to re-work each of the five separate training modules, creating a standardized training and eLearning platform. But with GEM’s guidance, the focus shifted to key business processes. The processes were selected based on their relevance to the broad population at SMUD, and also on the extent to which the processes involved use of the five SDIT applications. A new goal emerged: the creation of “knowledge maps” consisting of business process diagrams in which each step in a process would be linked to specific knowledge and training about that specific step. The GEMWorX web-publishing and eLearning software modules would serve as the delivery system.

C. Results

Dawn Miller, SMUD’s supervisor of organization effectiveness, found that the team adapted quickly to the new approach. Familiarity with Microsoft Visio and the MS Office suite resulted in a rapid learning curve for the ‘process designers.’

“We are able to work with users for as little as 30 minutes and get them actively using the tool themselves” reports Dawn Miller. The team members jumped right in and began drawing maps while our consultant guided the discussion. Even better, they could spontaneously add ‘top of mind’ details that would be important for end users to know.”

SMUD’s business process diagrams turn informal processes into explicit ones. The diagrams are viewed in a Web browser as “knowledge maps” that link process steps to reference and training materials, supporting both individual tasks and group process interactions.
New information technology doesn’t always measure up to its promise—at least, not without requiring more time and money than originally estimated—but at SMUD, this technology performed beyond expectations. Much of the credit goes to SMUD’s own readiness to utilize a process-oriented approach, but the user-focused design of the software, and the natural congruency between business process maps and business knowledge assets certainly helped.

“We were able to meet in groups and develop the process maps and key content in the moment of conversation,” Miller said. “The toolset did not hamper the free-flow of discussion. All processes and related content and training were integrated into one place for simpler maintenance, and we were able to publish diagrams and training to the Web on-the-fly, with no programming at all required.”

Having reached a full understanding of what the new toolset could do, SMUD discovered a bigger-picture use for GEMWorX, as the database for enterprise knowledge retention and the delivery mechanism for knowledge transfer.

Creating learning material within the GEMWorX application is similar to the development of process diagrams. According to Miller, working within the eLearning module was a natural next step once the process maps were built. “It was simply a matter of thinking from the end user’s perspective: ‘what resource would they need to carry out this step?’ and then connecting the piece of training right there.”

SMUD’s approach was to make as much use of existing training and process-reference material as possible. Even before the process diagrams were fully formed, the design team went to work building links to reference materials distributed inside and outside the organization. Everything from procedure and specification documents in Word and Excel, to PowerPoint slide decks, Camtasia (screen-capture) animations, and intranet and internet reference locations were added to the database, making them linkable to individual process steps in the diagrams.

“Based on what we learned in that initial project, it became evident that this was the right answer for delivering training in support of any and all business processes. In fact, one of our biggest advocates today is our manager of Asset Management, who is sponsoring a District-wide implementation of a consistent Design Change Notification process, supported by a new technology application. He was adamant that our GEMWorX solution was the way he wanted his initiative rolled out and sustained. That’s amazing support,” said Miller.

Ultimately, the SMUD team built and updated four major processes, to which they attached 17 training courses and innumerable knowledge assets. After the pilot program was completed, GEMWorX was recognized as the platform for documenting processes throughout the organization, with the goal of creating a true enterprise process knowledge repository for the utility. Miller knew it had become clear to all that “…there is a huge business benefit in having the most current knowledge maps accessible anytime, from any desktop. The right resources are always immediately available.”

D. Implications & Uses

The original SDIT pilot ‘knowledge maps’ are used by line workers and field service personnel, in substations and meter shops, in network construction design, and elsewhere. 84% of the original users are male, with an average 15.1 years of service. GEMWorX has now been adopted in several other departments, and the concept of interactive knowledge mapping is being viewed in a whole new light at SMUD, as well as within several other current and prospective GEMWorX users. Some of the knowledge-mapped applications being considered include pre-hire orientation, post-hire employee onboarding, cross-training, on-demand emergency procedures review, and job-succession training.

Michael Blechar, the Gartner vice president and distinguished analyst who developed a research case study on the SMUD project, said “Leveraging business process modeling efforts in the creation of employee training materials not only increases productivity and provides standardization, but also ensures accuracy and relevance.”

Miller adds her own observation that knowledge retention is not a one-time event. “Business needs and objectives are always changing, so enterprise-wide knowledge capture and knowledge transfer has to be an ongoing process,” said Miller. “We have the tools and skills in place, and now we see that it can be done.”

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