Evolution of a Corporate Knowledge Management and Knowledge Building Effort: A Case Study of Just-In-Time Training and Support of Laboratory Robotic Workstations Driven Through Online Community Portals

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ABSTRACT

This is a case study of the evolution of a successful knowledge management initiative achieved in a corporate learning organization. The initiative was centered on providing training tools and documentation of automated laboratory workstations that are utilized by scientists in a drug discovery environment. The case study will address the software tools, processes for content building, and the organizational dynamics that either assisted or blocked the progression of the initiative. Over a four-year period three distinct efforts were implemented, each differed in the particular software tools and focus of the initiatives. This presentation will compare and contrast the elements that provided barriers to success in the first two initiatives and the mechanisms and focus used in the third initiative that proved successful, scalable, and sustainable.

Keywords: Communities of Practice, Corporate Training, Documentation, Tacit Knowledge, Knowledge Management, and Portals.

1. INTRODUCTION

Knowledge Management (KM) has many connotations and can elicit an equal number of reactions and interpretations. This is somewhat in contrast to its predecessor, documentation. Just utter the word documentation in the presence of engineers or software developers and you will feel the energy shift and hear the groans of displeasure. Documentation is a key component in sharing information and in distributing the information across groups of individuals, who may be distributed geographically. Knowledge Management generates a broader spectrum of interpretations, in corporate environments.

Fundamentally, how would an organization collect or build the content that is to be managed? Therein lies the true emphasis of a knowledge management initiative. Discovering, Collecting, Organizing, and Sharing the content or knowledge are all essential elements of a functional knowledge management initiative in a learning organization. Neglecting one of these key elements will translate into a KM effort that either falls short of its intended goal or is completely abandoned. If these four elements are to be examined in detail, then it is worth stating that the first three elements are integrally sustained and advanced by the fourth, which is the Sharing element. Sharing will be the foundation of this presentation and the basis for achieving optimal collaboration in a learning organization.

Background of Our Organization & Industry

Our department is an automation and technologies research group within a biotechnology research and development drug discovery organization. Our task is to develop enabling laboratory automation technology, and provide automated laboratory systems for biologists and chemists in support of their drug discovery efforts. Automation has evolved to be a critical tool for scientists to conduct their research at the pace required to be competitive in the drug discovery industry. Unfortunately, laboratory automation skills are not part of the commensurate curricula for drug discovery scientists and support staff. Additionally, the laboratory automation industry as a whole has been aggressively evolving from infancy to adulthood over the last ten years. As a result of these two conditions, laboratory automation systems and devices have been heavily customized to each organization's specifications. Our organization is no exception to this trend. When a scientist joins the research division, they have to accelerate up a steep learning curve to begin to utilize the customized automated workstations. Therefore, training, documentation, mentoring, and technical support related to these tools becomes vital for a new scientist to become productive and acclimated to the culture of our research organization.

Beyond transitions due to differences in customized workstations between companies in the industry, the pace of automation technology evolution itself is rapid with very short cycle times. This places a stronger burden on groups like ours to ensure that all scientists, not just the new entrants, are supported on an ongoing basis to utilize the novel instrumentation designed to facilitate revolutionary experimental formats. As a result of these factors, the truly competitive research organizations are continuous learning organizations where training and experiential knowledge must be readily accessible to all discovery scientists and accessible in formats that make each learning transaction efficient and effective. It is this fact of just-in-time and just-in-context that is the crux of a successful implementation of a knowledge management initiative in a rapid short cycle time learning environment. The importance of the just-in-context element of the successful initiative cannot be overstated. This focus should be revisited often in order to realize the desired goal.

The Need for Just-in-Time Support

Consider a typical widespread software application, like a word processing application. Each time you use the application you expect that it will perform consistently and predictably. When an exception occurs or you cannot intuitively get the program to perform a desired task, you seek assistance or support. It usually isn't possible to consult directly with the software developer when you encounter an error with your word processing program. Instead you would likely read the accompanying manual. If this proved insufficient, you would call a technical support specialist. The documentation manual serves as an immediate support option as well as the potential for the user to solve their question. The technical specialist takes more effort for the operator of the program to access. However, for more ambiguous or complex issues the technical support specialist is able to dialogue with the program operator and place the difficulty or error into context with the documentation and previous interactions of support requests from other program operators with similar inquiries. In this simple example of knowledge exchange, the documentation manual and the technical support specialist represent "the content", or the information that is managed and refined by the organization that first supplied the word processing program and then supported by operators that use the software program.

In the case of our organization, we lacked the resources of a word processor software development team. Additionally, we lacked the luxury of long lead times for development and testing of the software. This is confounded by the fact that we experience cycle times of sometimes less than three months. Our robotic control software applications can be highly dynamic and are continuously enhanced to allow the integration of new instruments, or to facilitate new sophisticated experimental techniques. This coupled with the relative lack of formal training for the scientist in the area of laboratory automation necessitates that groups like ours bridge this gap (which continues to grow as technological innovations continue to enter the field). In practice, the goal is to enable scientists with just-in-time training and information that is current and just-in-context to the scientist's task at hand. All encompassing multi-day training sessions are highly ineffective if the material will not be immediately utilized by the scientist to enable an experiment. Even if the scientist intends to use the robotic workstation within a few months, the exercise of training may be futile because either new instruments may be more appropriate or the control software may have been enhanced to the degree that the prior training is obsolete.

2. FRAMEWORK OF A SUCCESSFUL KM INITIATIVE

Progressively Encourage Knowledge Building

A common oversight in knowledge management efforts is the process and resources required to support knowledge building. This typically is called the content. It can easily become intangible because the time and energy needed to collect and organize the content is grossly underestimated. This occurs because all the stakeholders in the organization do not define "content" synonymously. In the case of our group, initial attempts at knowledge management initiatives were blurred by the "content" definition spectrum. As our case study will support, it is important to allow the community members time to find comfortable and effective mechanisms to share their tacit knowledge and to help build the content for the initiative. This is in essence the knowledge building effort, and should be explicitly planned and supported as the majority effort of the overall knowledge management initiative.

One element that is critical to mention is the time factor. Just like Senge has previously described [13] you cannot command a seed to bear fruit, it is nearly impossible to simply select a database structure, a software portal package, and disseminate it to the organization and expect the "content" to appear, or worse yet expect that the "content" *that does appear* will be of real effective value in a rapidly changing learning environment. People are as much a part of the initiative as the tools and the design of how the tools will be used to navigate the "content". Just as a seed needs to be nurtured and cultivated to sprout into a seedling and to mature into a flowering plant which can then be pollinated in order to eventually bear fruit, so also must a knowledge management effort be organically guided to evolve into a culture that encourages the knowledge building and sharing of all the organization's tacit knowledge. Furthermore, this tacit knowledge must be in a format that allows all community members the ability to easily contribute and participate in the process in a time efficient and effective manner. Put simply this means that community members need to progress through the "have to do it" and "need to do it" phases in order to reach the "want to do it" phase of collaboration. This is not news to experts in the knowledge management business [13,6,15,16], and many business units within companies desire the extraction of the tacit knowledge contained in their employees, but fail to realize that a piece of software or a corporate memorandum can advance them toward this goal. In this sense, they are commanding the seed to bloom into the flower without following its natural and requisite lifecycle**.**

Phases of Collaboration to Support Knowledge Building Efforts

Phase 1 - "Have to do it…": This comes from an organizational mandate or policy requirement. In other words, staff members are instructed that they must comply. This can be encouraged by both positive incentives and on occasion by threats or fear. While this may not be the preferred long-term support strategy, it can effectively initiate a knowledge building effort if it is quickly transitioned into the subsequent phases of collaboration. Techniques to accomplish this are shared later in the "Create the Environment to Share and Build Knowledge" section.

Phase 2 - "Need to do it…": Support Staff discover that they want to participate in knowledge building efforts because they have become overwhelmed with supporting the tasks or projects that they manage. In this sense, staff need to participate and to cope, but they have not yet reached the phase of willingly sharing their tacit knowledge except under extreme circumstances of being overwhelmed.

Phase 3 – "Want to do it…": The optimal phase of collaboration is achieved when the sharing of tacit knowledge is done proactively by the community members. The barriers to knowledge building have been successfully overcome and the process is self-sustaining because the environment and culture of the organization's values encourage frequent, genuine sharing of ideas, questions, experiences, and knowledge. Collectively these four elements equate to the tacit knowledge

of the organization and its members. When the "want to do it" phase of collaboration is the norm, this is a signal that the element of trust is embedded in the organization. This also helps its members to feel that they are collectively moving toward a shared and valued goal, which in our case, would be to provide tools to accelerate the discovery of therapeutics for grievous illnesses.

Barriers to Knowledge Building Efforts

Each individual may have all the answers to questions arising from a project or subject matter area, however, they may discover that they are either overwhelmed with addressing all the requests for information or further work, or discover that they are not always involved in the discussions that would benefit from their information or experiences. In the past, most employees would see being a gatekeeper as a means of job security, but this is actually quite contrary to reality, particularly when the organization is growing rapidly and in a very geographically distributed manner. When employees discover that their experiences are not sought or utilized, they become increasing more frustrated and potentially paranoid that their job security is in question. Thus, in the end they predictably arrive at their original notion of fearing to share their content knowledge. The most likely reason for this outcome is that they individually cannot sustain the gatekeeper or one-man-show model for long periods of time. The slope toward becoming an ineffective or disruptive team member isn't far when one is being overwhelmed by additional tasks and responsibilities, particularly in the area of giving away ideas, information and areas of expertise. In general, people resist sharing information openly in areas of subject matter expertise because they fear losing their valued position of expert. In teams though, individuals who openly share are usually valued even more. Staff members do not have time to become experts in all areas, so the paranoia theory doesn't hold in the workplace. Sharing, and sharing regularly, simply establishes a person as a resource and a valuable one because the sharing and collaboration takes place in an open and genuine way. Once you share, your colleagues will come back for more insights on future ideas or for the continued collaboration.

Trend Toward Importance of an Organization's Tacit Knowledge

Our team members don't have time to duplicate efforts in our areas of expertise other than their own, and likely could not even if they tried. In today's knowledge age, more effort is being placed on the collaborative learning of the whole team or organization. What makes each team member a valued contributor is their unique perspective born out of their collective practical and experiential education. This comes not only from formal learning programs, but also in how we have shared and applied this knowledge throughout our various career experiences. These combined experiences constitute an employee's collective curriculum and education. This is sometimes looked at as on-the-job-training or life experience, but increasingly this is the normal route that many of us will take to achieve our subject matter expertise in the multidisciplinary careers that are emerging in the knowledge age. Such training is quite different from that required during the industrial age when job tasks and roles were more clearly defined. Likewise, coursework in formal educational schools was more likely to keep pace with what industry and society required. Today, this is no longer the case, particularly with computers and technology. This has long been the case for my initial area of expertise, biomedical engineering, which is a multidisciplinary field that could span anything from creating MRI machines and prosthetic limbs, to computer simulations modeling drug distribution and pharmacokinetics in the body's organ systems. This is a merging of biology, chemistry, material science, physics, mathematics, computer science, electronics, and many more. In order to truly be an expert biomedical engineer, I would need to complete several master degrees in various fields. Even with that knowledge, I would still need team members that were knowledgeable in the areas where I was less proficient in order to achieve a functional and efficient team.

Create the environment to share and build knowledge

The most difficult part of a knowledge management system is not the technology or the structure of the information. These are simple tools not the actual content. Another common misconception is that knowledge management efforts need to be heavily designed or structured in order to realize the goal of being efficient warehouses of corporate/organizational knowledge and expertise. Beck's account of extreme programming would likely agree that over designing the infrastructure of a program is shortsighted. He would likely support a less heavyweight approach in the initial iterations of a knowledge management process. The distinction here is that the main goal is not the collection of data and information, rather its focus is the capture of the organization's tacit knowledge in such a way that its members can continuously build upon it and collaborate as an efficient learning organization. The same principles of extreme programming still apply for our purposes and in fact, many were unconsciously utilized in our third and arguably most successful effort toward meaningful collaboration.

The true work is in creating an atmosphere where all team members and staff members are comfortable with an environment of sharing. This sounds quite basic, but it is actually the most difficult part of the knowledge management process. It is usually referred to as simply "gathering the content". Some organizations are closer to achieving this than others because they draft documents on how content should enter the system. They also invest in software and tools that will ensure that collaborative documents are not duplicated or overwritten. This still doesn't really address the main barrier to share information or contribute content. The first step is to establish an environment where employees feel comfortable sharing their skills and expertise. The next is to encourage them to want to share their ideas and information, without being prodded or coerced. This sounds like the kindergarten sandbox or making sure that all of your friends get a chance to swing at the piñata at your birthday party. Well, that isn't far from the case in the area of knowledge building and gathering the elusive "content" for a knowledge management system. In short, it needs to become ingrained in the culture of the organization and it needs to be self-perpetuating to a large extent. Coercion and incremental extrinsic motivators will not encourage an enduring environment of information sharing across an organization and they are rarely successful in transforming an organization into a culture that supports the intrinsic motivators for sharing information to persist. This is like commanding a seed to sprout petals. The desired outcome is not achieved.

3. CASE STUDY

Determine the Goal – Our Motivation

The speed of technology development demands that tacit knowledge flow equally unbounded in order to achieve efficiency and effective collaboration. Unfortunately, managing knowledge without content is futile. How can the challenge of draining the content from the content trolls be met? In five years of battling this at my workplace we have literally tried many approaches including scare tactics like threatening bonuses and performance ratings. This only produced products that were a far cry from useful and nearly outdated before they were completed, not to mention the drain and pain of producing an inferior product. In our case, we were trying to capture knowledge of custom robotics systems. This posed numerous challenges due to the evolution cycle that these systems have. When this conscious effort began four years ago, we realized that the ring binder documentation books were far too static to meet our needs. Our group was also expanding the number of development engineers, robotic workstations, client groups, and robotic workstation operators. It was unreasonable to sacrifice time to replicate documentation manuals when new workstations or new operators were added. We also were aware modifications to a workstation design frequently occurred with each new replicate workstation. Documentation manuals also fell short with the addition of each new system operator because areas of ambiguity and misinterpretation were uncovered with each new operator. The designer who wrote these manuals and found that this led to many lapses in capturing their tacit knowledge about system operation because these details were invisible to the developer. In essence their expertise of the system rendered them unable to capture the detail that a novice operator might require or desire. As a department, we set our goal to develop a dynamic documentation system that would be readily accessible to developers, support engineers, current operators, and future robotic workstation operators. This was the "Goal". We were all clear on what was needed at the onset. We had management support in both financing and staffing.

Iteration One - Vision is Lost in the Design

A team was assembled to plan and design how the goal would be met. Everyone felt strongly that project should be embodied as a website or as a collection of web pages that could easily be shared and accessed from the company's intranet. Management approved the approach and the team began planning. From the formation of the team until we had the first design mock-ups of the website spanned three months. The team found that all sixteen department members had opinions on the design and organization of the web pages. Beyond this, there was heavy debate on the actual graphical interface appearance, navigation trees and paths, and general purpose of the website. (Ironically, the last issue was one that the team believed to have been agreed upon at the start). As more department staff voiced their opinions, elements of the website purpose began to reopen issues of what the scope of the content should encompass; just documentation of the systems as they were built; inclusive of standard operating procedures (SOPs); inclusive of error recovery and special condition responses; inclusive of technical support; and whether all systems' web pages should follow a consistent format. Another element of the vision that became unwieldy was the scope and depth of what "the content" should include. The idea of drilling down to further and further detail was quite appealing, but it made the content collection tasks all the more daunting because we were increasing the level of detail that an author would need to contribute. After nearly six months, we had many members within the department still not in agreement with the selected direction of the knowledge management initiative. We called these online manuals "short courses". If someone were to mention the short courses, palpable tension was evident from the course authors. The department did complete the initiative, but it was begrudgingly and with great resistance. The overall complaint was that the short courses were going to be outdated just as quickly as if we had printed out the same information in word documents.

So how was the vision lost? Why after nearly nine months were we about to launch a website of twenty short courses that would be nearly obsolete within another month? In retrospect, we got the goal partially right, but missed the mark on the real challenge, "the content". We spent 75% of the effort on the graphical design and the slick navigation schemes. And we did this without realizing that we were not addressing the dynamic nature of the information that we wanted to capture, share, and maintain. While the website was dynamic from the point of view of the user, it was far from convenient for a contributing author to update information or make changes to the original content of a short course. Feedback gained from using the short course to train system operators could not be easily posted or included in the short course for future training sessions.

Iteration Two - Vision is Over and Under Shot

Recognition that the short courses were not going to be sustainable immediately became evident. In the process we had placed a drain on all the contributing authors and team members involved in creating the WebPages. To confound matters, our department was still lacking mechanisms to share our knowledge and files easily. This coincided with our company's purchase of the Plumtree Portal software. Web Portals promised instant access to all information. We observed one knowledge management effort after another within other areas of our company. Our management acknowledged that designers and developers greatly resist ANY documentation. Because we are all so creatively driven, we detest writing about it in any manner. At the same time, we were approaching critical mass in our group. We had more than quadrupled our systems in a two-year period of time, while also increasing our system operators at a more accelerated pace. It was no longer possible to track of all the robotic workstations by hallway conversations and weekly meetings.

So this time, we were finally in a real crisis. We had created so much information that each one of us "knew" that we had done something like "that" before, only we could not easily find the PowerPoint presentation or short summary or drafting design or piece of code. Likewise our clients "knew" that we had done something similar and would request the previous data / information / report. Over the prior six years, we had experienced several sever and operating system upgrades. As a result of these instant mass migrations or purges, our "content" was relocated into new and non-intuitive locations. I might spend hours searching for a document and sometimes in vain because I had to know the unique Dewey decimal system of each scientist.

The frustration of file searching, coupled with the promised claims of portal technology, spawned a grand and encompassing vision of instant, nimble access to any piece of knowledge

created by the organization. The portal software contained a search engine feature that “crawled” designated paths in a file structure and returned all files matching key words of interest. Excitement of realizing the liberation from manually sifting through file tree overshadowed the initial move to implement the portal community webpage within our department. Again we drifted from the desired goal of collecting and sharing the tacit knowledge in our department. This excitement was so great that we proceeded aggressively to realize the vision of a nimble file crawler. As a result, we proceeded on parallel tracks with one exploring the potential and utility of the portal software’s crawler and the other organizing and standardizing our department file structure paths. The later also addressed a general lack of openly sharing files in a semi-public server location, which was a requirement in order to allow others to search and uncover files of interest. What good would it do to be able to search for a report and then not be able to access it simply due to its location?

To eliminate a long, drawn out debate over the standardized file structure, only three of the 20 staff members were tasked with creating the file structure. Once management approved, the plan was shared and the file organization began. A staff member wrote a simple Visual Basic folder creation wizard. The wizard ensured that future folder structures for our robotic system projects conformed to the agreed standard. Syntax and naming consistency were managed by the wizard. Over a six-month period of time, staff members were educated on the merits of sharing information and on compliance with the new standardized file organization scheme. At the end of the six months, it was clear that motivational stakes had to be heightened. A deadline for tossing all uncategorized files was announced, re-announced and executed. We really went through with it as scheduled, but note that we gave everyone ample time to comply. No threats of negative performance reviews were given, just loss of access to data. In the organization of our file structure, we had public and private mirror directories. Previously, 95% of the department’s files resided on the private server location. Under the new scheme we wanted to encourage, wherever possible, the placement of files on our public server that could be accessed by all of our internal clients and system operators. We allowed staff members to keep private the documents that they felt the entire company shouldn't access, but the private directories were not accessible by the clients of our department. The shift toward sharing was a drastic change for some who had only operated off of their own local hard drives. Periodically, the rouge folder would be announced and tossed if not claimed. This happened nearly every other month until recently.

The great effort placed on organizing the files into a common standard set of rules allow staff members an interim “manual” crawl function. When a document or piece of information was needed, any staff member could look through the organized set of files. This proved to demonstrate that when files were being viewed, the files were not being altered. The fear that a file might become corrupted or lost waned over several months. We became less skeptical of file recovery from data backups and we were delayed in realizing the full benefits of the portal software. Through practice and utility staff members began to really embrace collaboration and knowledge sharing. The entire department preferred to only use the public directory structure. Staff members finally "believed" that no one was out to sabotage their work and they enjoyed the benefits of easy access to their own files from any company computer at any company facility.

It should be mentioned that nearly two years elapsed during Iteration 2 of our KM effort. As mentioned previously, in parallel with the file structure standardization effort the utility of the company’s enterprise KM portal software solution was tested. The original vision likely overshot both our needs and the capability of the portal software. As staff members envisioned that all our activity was be based in the portal environment; it would be possible to openly edit and collaborate on documents within this context; efficiency would be maximized by the robust power of the portal’s crawler search engine. Many months of testing later, we discovered that we were bringing the search engine to its knees with our millions of data files, computer programs, and documents. It took over 24 hours to complete a crawl of our file paths. This was not very practical for our leader’s vision. In the process of being the project leader of Iteration 2, I learned about many other uses of the portal software package and its canned gadgets. The gadgets were all “mostlies”...meaning that they did something mostly cool, but not totally cool. They tended to fall short of the intended full advanced user demanded features. After nearly two years, it was clear that we would never realize our super engine crawler vision of the future. It was also equally clear that we were successful in Iteration 2 because we made great progress toward an optimal environment for collaboration and knowledge sharing.

Iteration Three - Revitalization Through Technology and Necessity

Rapid growth of the department and the number of systems that we support continued. As the natural close to the Iteration 2 effort occurred, the department moved its location and likewise so did one of our largest clients. This translated into a great deal of interruptive work. Systems were brought offline, moved, reassembled, and put into production. All the while, new systems were in development. When a system generated a fault, it became challenging to know the absolute state of the robotic system. Multiple engineers were "helping" by correcting the errors, but the designated support engineer for that particular system could easily have been unaware of these actions. Our efforts were colliding and clients were impatient as the same fault would recur. So we SHARED and SHARED HUGE!!! The lack luster of the initial attempt to implement a portal community in our department paved the way for what has proved to be an ideal usage of this software tool. The time spent testing the gadgets of the portal paid off. Instead of focusing the utility of the community on searching for files, we took a step in a different direction and harnessed the community building elements that some of its features support. The revitalized effort concentrated on the “To Do List” type gadget. It was our running punch list of the work that we needed to do on the systems and of the new requests that were submitted to enhance the systems. I showed my direct team members how to use it and warned of its numerous shortcomings, but I encouraged them that it would help the four us act more efficiently. At the time I was heavily discouraged from this new implementation of the portal. Its shortcomings were well known in the arena of a search engine and its instability was of great concern by our management. Rather than attempt to convince management otherwise, we just started using the portal community page for this new purpose and kept it very local initially. Within two weeks, we really got things cooking.

We no longer wondered about the status of a task or operational worthiness of a system. Before a meeting, I could scan the site in two minutes and have all the information I needed. If a detailed question was asked during the meeting, I could quickly click down and get the history I needed. In one instance I was on the hot seat for information for senior management and all I needed to do was access the community page for that remote computer in the conference room. In under a minute we had the information and the detail that was required. Experiences like this generated much curiosity about the portal community WebPages. Prior skeptics were impressed and wanted access, training and more targeted communities developed. In under a month, we had gone from a system of disjointed information to a path leading to total SHARING between the team, our colleagues in the department and our clients. The two months that followed were exciting because we began to work in concert instead of in collision. Anytime a duplicate request for an enhancement occurred, it was recorded and immediately apparent. If more that one client had a question about system operation, a quick tip sheet or announcement message was created and posted in the portal community webpage. Today we have five client targeted communities and one general community for our department.

Allowing this crisis of necessity to redirect the intent of the portal community webpage, we achieved more than we thought possible from the onset. The beauty of a portal community is that the barrier to add or modify content is extremely low! In fact it is as easily as emailing.

Retrospective of Previous Iterations

Finding the Goal Again: We initially tried to live the envisioned future immediately during Iteration 1. We were trying to harvest the fruit before the seedling had sprouted. By focusing too much on the design and the infrastructure of the website and the short course format, we lost the real focus of capturing the tacit knowledge of our robotic workstations from the system developers and operators. We also did not effectively address the barriers that allow our staff to navigate through the phases of collaboration in order to effectively share their knowledge. In the end the most important element for us was to keep the goal constantly in mind without getting distracted in vision or the tools of knowledge management. To keep pace with the rate that our group generated and refined tacit knowledge about our robotic systems, we focused on encouraging frequent short bursts of contribution by all community members. We removed the gatekeepers of the community WebPages and created a sense of trust that all members were vested in contributing accurate information for the benefit of all. This was supported by embracing the tools readily available to our organization without being overly critical of the shortcomings of such tools.

Support Small Victories and Encourage Community Sharing: While we may have overshot the vision with the performance specification that we demanded in Iteration 2 (our first implementation of the automation community portal Webpage), we did build in parallel some file structure guidelines that allowed our group to begin to achieve elements of the greater vision. Organization of files into a structure that allowed access to the files by all department members and our internal clients was the greatest progression toward optimal collaboration. Engineers and Managers in our department began to appreciate the benefit of shifting the majority of our documents and files into more public space. This was very beneficial as we began supporting robotic systems in other geographical locations. If an engineer was visiting a remote site, accessing a file, document, or piece of code was nimbly done just as though the engineer was at his/her desktop PC. It may seem odd that the file structure that we created and mandated in Iteration 2 was largely the driver for our departmental culture shift to sharing information more readily and in a much more open access collaborative manner.

The file structure also facilitated the quick implementation and adoption time frame that we observed with Iteration 3. In essence Iteration 2 may have failed in achieving the original vision in the near-term, but the time invested allowed us to learn the limits of the tool while in parallel finally addressing the barriers of knowledge sharing and knowledge building that we were previously unable to overcome in Iteration 1. These lessons learned also facilitated a redirection of the intent of the department community portal Webpage.

Give it Time: It takes time to realize benefits from an ambitious knowledge management initiative. When you force it, it really doesn't work even if your vision is inspired and cool. Sometimes the structure of the organization or the tools won't allow a course correction in order to realize a worthwhile end product. Given time and focus on the true goal, a functional solution can be achieved if knowledge building and collaboration are supported and encouraged by example.

Iteration Four – Technology will Emerge to Meet the Content

Today we have the file structure that makes finding information within our department easier. The portal communities have allowed us to highlight pertinent information / documents to support the targeted communities. As for real usage of the communities within the department, we have about a 60 percent usage by our staff on a regular daily basis. This ramped up over ten months from four percent usage in the initial month after the launch of the community portal. In our largest client group, we have about 30 percent usage on a daily basis, which reflects about half of the system operators in that department. After realizing these successes, we intend to more deliberately pursue the evolution of our portal community support WebPages. Further effort will be placed on collecting content from files that are difficult to locate. In addition, effort will be focused on maintaining our environment for collaboration and knowledge sharing. This will be done by continuing to support open sharing of draft documents for operating the systems and recovering from operational faults. You may say that this is back to ground zero and a repeat of the training manuals, but it is distinct because there is NO format required to share the information. Thus, the barrier to create the content is very low. It can be a checklist; an FAQ added to the collection; or a report. In the future, it would be nice to use a live screen capture software of actual live robot error recovery on the control computers. This will enable a more meaningful source of instant and exact tools to assist system operators in responding to their own system error recovery. This all continues to lower the barriers to sharing knowledge and building the “content” that these KM software packages are intended to manage.

4. CONCLUSION

The main key to a successful knowledge management effort is centered on iteratively examining the focus of the effectiveness of the tools and structure selected to encourage the knowledge building process. If the community members that possess the tacit knowledge of the community are unable, or unwilling, to share their experiences and to do so in manner to be meaningful for others to learn, then the knowledge management system or effort will not realize its full potential and likely it will fall short of the vision of the initiative champion. These champions need to realize early on that time is their main tool to achieve their vision. They need to exercise patience in a strategic way to allow all the community members the chance to learn to want to share their sage experiences. The initiative champion should periodically check to see if the focus of the effort has strayed down the paths of either glitz or structure tunnels. If the design and graphics take the focus of the overall initiative, it is highly unlikely that an effective and useful system will be achieved. Instead, the champion should remove the IT roadblocks that tend to isolate control of information contribution to a select group of highly computer technically advanced staff members. Knowledge management starts with the organization's general culture of how it encourages the sharing of information and general collaboration among its members. As corporate colleagues, we do require some conditioning in the area of collaboration. Effort should be placed in modeling the behavior that sharing information in the organization and capturing all individuals' experiences and ideas are valued and required for success of the individual and the group. This is done by spending a significant portion of time encouraging the knowledge building process and consistently using the tools and processes to communicate with the group on the actual knowledge management effort and all other projects. In other words, make usage of the system equally as easy to use as it is to contribute. If all your own information is being routed through the knowledge management software/ framework and you take the time to direct community members to your contributions, then they are converted or even encouraged to make their own contributions because of the experience and ease of contributing.

In summary, keep the real utility of the knowledge management effort in focus. Give the effort sufficient time to evolve. Impatience can actually lead to a wonderfully designed knowledge portal that is not dynamic to changing information that is rampant in fast paced learning organizations. Such inflexible systems are typically not scalable because they require gatekeepers to modify the web pages or the "content". Function should take the focus, but only after a culture of "content" building and sharing is widely embraced by the community members. If the community members are not vested in sharing their tacit knowledge and context specific experiences, then "content" that is collected and stored in the knowledge management effort is likely not the depth and detail of information that was originally envisioned. Finally, once the culture of collaboration is achieved, the design of the portal interface or the organization of the information can be optimized. It was this last realization that our organization had to empirically derive. Like many others, we attempted to overplan the initial efforts so that our knowledge management system would be scalable and sustainable. In the end, the irony was that to achieve a scalable and sustainable system, we approached the effort from the opposite end of the spectrum.

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The concept of just in time training is actually borrowed from Toyotaâ€™s famous lean manufacturing manifesto. It refers to only using effort when itâ€™s needed, instead of ahead of time. This means gaining new knowledge or skills only when you need them, rather than in case youâ€™ll need them. Think of just in time training as â€œon-demand trainingâ€. It requires a flexible approach to learning. One that recognizes that people in different roles donâ€™t need to learn the same skills, or access the exact same information, at the same time. Think of just in time training as â€œon-demand trainingâ€. Click To Tweet. JIT training requires a mindset-shift among corporate trainers, but itâ€™s by no means a novel idea. Just-In-Time (JIT), the dignified process of waste reduction and has been a very popular operational strategy because of its success in the manufacturing and production industry over many years. Various benefits like, improved operational efficiency, waste reduction, and faster response have been widely observed by previous researchers.Â Over time, the philosophy of just-in-time became apparent in healthcare. Strengthening and Expanding Child Services in Low Resource Communities: The Role of Taskâ€Shifting and Justâ€inâ€Time Training. Article. Mar 2019.Â This paper aims to consolidate knowledge regarding the important techniques and methods utilized within the current market scenario to increase productivity throughout a firm. Robotic Process Automation Use Case 1: Consumer loan-processing time can be reduced from 30 minutes to just ten minutes by eliminating the copying-and-pasting of customer information from one banking system to the next. Robotic Process Automation Use Case 2: It is now possible to boost the accuracy of new-bank-account-opening requests, replete with reduced downstream errors, and improved system data quality. All of this can be achieved by eliminating data-transcription errors from inbound new-bank-account-opening-request emails into the core banking system.Â 5. Seven Case Studies of Robotic Process Automation in Banking. According to P&S Market Research, the global robotic process automation market is projected to reach $8.6 billion by 2023. In Western business schools 30-40% of study time is paid to analysis of case studies. On an average, 35-40% of study time is dedicated to an analysis of typical situations.Â In the system of vocational training practice plays an important role. It is an integral part of the educational process in educational institutions and equips students with an initial professional experience. Case method, proposed for use in the preparation of students for professional careers, teaches students to navigate the typical encountered situations, expands vision of problems, develops the ability to take decisions, forms and expands the range of future professional competences. In order to determine the educational opportunities of case-method, it is necessary to identify its differences from other methods.