Final Project: Term Paper

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LIS 584A, Knowledge Management

June 5, 2016

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Introduction

Businesses that seek to benefit from effective Knowledge Management (KM) practices require knowledge to be transferred from person to person, directly and with the aid of technology. Employees must communicate with management, so that management can track and enforce realistic metrics. Tacit knowledge must be converted to explicit knowledge, so that everyone can benefit from the expertise of top performers. Management must communicate with their executive leadership team, so that high-level decisions can be made, which affect everyone.

When people must communicate ideas to each other, there are challenges that can prevent them from sharing information the way that they should. Sometimes an individual does not know that the knowledge even exists, where it might be found, or who to ask to find answers. Knowledge managers work to build information connections that increase the efficiency of information-gathering efforts, while not damaging the credibility or quality of information. It is worth the effort, since information-sharing is vital to the success of an organization: "An organization's ability to transfer knowledge among its employees, functional areas, and geographic locations is a key determinant of the success of its knowledge management initiatives… The sharing and transferring of knowledge is vital to knowledge management." (Desouza, 2011) Better practices and procedures can sometimes help address concerns about gathering knowledge, and technology is making significant strides into areas that could change how businesses, and people in general, gather and interact with information to meet greater goals.

Better Knowledge Transfer Between People: Company Culture

Transferring knowledge from one person to another is not as simple a proposition as it sounds, and when we consider transferring knowledge to groups of people, the equation becomes even more complex. Workplace culture can have a great deal of influence on how information is exchanged, and often the efforts of individuals who are making an effort to share information, are seen to clash with organizational culture. (Bedford, 2013; Chang and Lin, 2015)

There are many ways to encourage employees to share information, but the best way seems to be to provide them with a supporting environment that enables them to work closely with their teammates, and share best practices. Employees who feel supported and happy in their job are most likely to have free channels of communication.

In many ways, progress is driven by the team leaders and management team: people who have helped to form standard operating procedures by developing tacit knowledge and codifying it to make it explicit. Best practices exchanged directly, from leader to employee, help to form company culture, which can be defined as "A shared set of assumptions invented, discovered, or developed by a group as it learns to cope with its problems of external adaptation and internal integration. It has worked well enough to be considered valid, and is taught to new members of the group as the correct way to perceive, think, and feel in relation to those problems." (Desouza, 2011) How leaders approach problems, and how they approach change, can directly influence the practices of teams that they supervise. In an interesting article about the role of organizational culture in KM, writers explain that "some organizational culture dimensions (results-oriented, tightly controlled and job-oriented) indeed have a significant effect on the KM process (creation, storage, transfer and application) intention of the individual. In sum, the results-oriented, loosely controlled and job-oriented cultures will improve the effectiveness of the KM process and while increasing employees' satisfaction and willingness to stay in the organization." (Chang and Lin, 2015)

Observations by Chang and Lin also point to a reason why knowledge transfer may be most difficult for new employees, and for those who have not yet advanced to leadership positions. Regular staff would be most closely monitored, and most likely to be held accountable for meeting trackable metrics, so that their management could account for team production to executive leadership. Managers, however, would have more freedom of action.

This would point to a tendency for open channels of communication to make the most sense at the leadership level of companies, from leader to leader, or leader to direct-report. New staff members, or those who have not taken on leadership duties (you don't have to be a manager to be a leader) would not have the same freedom to influence others. There may not be clear answers yet, to knowledge management questions about company culture, but it seems important that we continue to ask probing questions: "Moreover, the failure of many knowledge transfer systems is often a result of cultural factors rather than technological oversights." (Ajmal and Koskinen, 2008; Pirkkalainen and Pawlowski, 2013)

Incentives to Knowledge Transfer

Different people require different incentives to motivate them to share knowledge, so it is impossible to create a method that applies to everyone. Encouraging the employees that have the knowledge most valuable to a company's success, though, may be a bit easier goal to reach. Management tracks metrics that show which employees are meeting or exceeding goals, and if an employee is consistently an outlier, then it is possible that they may have information that could help others to succeed. Employees who are successful are often good candidates for leadership positions, and should be encouraged to begin to develop leadership qualities, and coaching skills that will be valuable throughout their career.

Employees who are not interested in leadership might also benefit from opportunities to coach others, possibly because they like being the center of attention, like making new friends, feel flattered in being asked, or just feel bored with doing the same thing every day. Being recognized as someone who is successful, and being shown appreciation might be just the type of validation that they need to feel happier in their job. Whatever the reason, encouraging employees to take on coaching challenges, and to exchange tacit information, is always a great idea for driving knowledge sharing between people by building relationships.

Employees who have had successful experience coaching others, and who would like to move into a management position, might take on opportunities to teach larger groups of people to meet and exceed goals. If the training team is present at group meetings, then they might take advantage of the opportunity to create explicit records of best practices, and make them into standard operating procedures. Everyone wins in this scenario: the employee gains exposure, and increases their chances of promotion, while the company is able to record and share information that would not have been available otherwise.

IOT and Filling in the Gaps in Knowledge Transfer

Sometimes people are not willing to share knowledge directly, or are not able to do so because they are too busy, are in different locations, work from home, or even if they do not speak the same language. In cases like that, technology should be able to help to fill in the gaps, and allow for knowledge transfer to happen. Specifically, there have been exciting innovations in how Internet-connected devices can be used to track people, and how they interact with the world

around them. Such smart devices, with connected sensors are called the "Internet of Things" (IoT). According to the President's National Security Telecommunications Advisory Committee, "The IoT is the latest development in the decades-old revolution in communications, networking, processing power, miniaturization, and application innovation and has radically altered communications, networks, and sensors. The IoT is a decentralized network of objects, applications, and services that can sense, log, interpret, communicate, process, and act on a variety of information or control devices in the physical world. However, the IoT differs from previous technological advances because it has surpassed the confines of computer networks and is connecting directly to the physical world. Just as modern communications have fundamentally altered national security and emergency preparedness (NS/EP), the IoT has had a similar transformative impact." ("IoT Final Draft Report 11-2014.pdf," n.d.)

While we are still exploring what the advancements into the IoT will mean to business reporting and metrics, there seems to be cause for excitement. People can be inconsistent, or can alter data for personal reasons, but direct tracking over the internet should be consistent and trustworthy. An IoT tool might be useful in establishing a baseline, or creating secondary confirmation for metrics that have always been tracked another way. Because it is connected to the physical world in ways that technology never has been before, it is possible that IoT devices could gather tacit knowledge, and convert it into explicit knowledge, by counting keystrokes, or tracking where a person is looking then creating a written record. Of course, tracking without action has no value, so people will always be an important part of the equation, but there is room for optimism in considering how IoT technologies might impact business analytics. The Pew Research Center writes that the growth of the IoT "will have widespread and beneficial effects by 2025. They say the opportunities and challenges resulting from amplified connectivity will influence nearly everything, nearly everyone, nearly everywhere." (Anderson & Rainie, 2014)

Reality of the IoT

There are 4236 devices tracked by the *Wolfram Connected Devices Project* (http://devices.wolfram.com/), but so far, they do not seem to quite be living up to the predictions of the National Security Report. Wolfram was one of several new businesses that I was able to find that are taking advantage of data science opportunities, offering services that take information gathered from devices and generate reports and data visualizations, but devices

that they use do not support enough data sharing between people. MuSigma ("Decision Sciences - Internet of Things – | Mu Sigma Thought Leadership," n.d.) and WSO2 ("WSO2 Blogs | WSO2 Inc," n.d.) offer interesting IoT services, and data reports as well, but WSO2's Blog Aggregator was the closest thing to a technological product that could claim to directly encourage or support knowledge transfer within an organization.

My goals, to show how IoT might help to transfer knowledge within an organization, to support the goals of KM, were supported by the literature more than by the actual devices, most of which seem more suited to tracking assets with IoT technology to serve customers better, than tracking feedback from employees or creating KM systems.

One article about using new technology to drive more effective data searches offered a way that IoT might allow the patterns of use of one person to guide the results of another. Internet devices with sensors have a unique ability to analyze patterns, from the large amounts of data that are generated over every interaction. If most of the people in your department access a certain site regularly, then the company intranet might be able to recommend that site as a preferred search solution based on certain keywords.

It is not as efficient as a mentor giving a protégé the answer directly, but it is certainly helpful if the search engine can give you the right information the first time you search for it, even if you are unsure that it exists: "Having a powerful and intelligent search solution built around the user can be an indispensable part of your information access strategy. Knowledge acquired by deep insight and intelligence gleaned from your information can speed the pace of business, connect the dots, strengthen your ability to compete, and solve some of your toughest information challenges." (Lucini, 2014)

Experts point out that even with the great technological advances that we have seen, "The best form of knowledge transfer is still through conversation." (Gago, 2012) In an article, she explains the use of enterprise social networking: it is like an extended conversation online, that can be taken apart and analyzed for KM content, context and all. The strength of analyzing the data in online chat, or emails within a company is that leaders can use reports on such shared information to help to isolate challenges and opportunities so that they can be handled appropriately, by the right people, the first time. If systems like the one at Wolfram can be used to convert trends into readable graphs or charts, then not only is knowledge being transferred between employees, it is being reported to decision makers at a scale never seen before.

Having data is great, but it has to be acted on, and for that, businesses have to have plans in place, to act upon at a moment's notice. If employees are suddenly emailing each other about customer complaints, or searches for the word "lawsuit" suddenly quadruple, then leaders must be ready to take appropriate action, whether it is to send an email to the whole team, with a standard answer to address customer concerns, or an email cautioning staff that a competitor's legal challenges are not an appropriate thing to talk about with customers. An IoT device can gather information, and flag it for attention, but "…simply triggering processes is not enough. Optimized data collection on the smart device must also be supported by optimized business processes orchestrated by BPM and case management applications. (Whibley, 2015)

Collaboration is Key

Technology opens doors, and can be a valuable tool to aid in communication and better tracking of transitory data. Surveys gathered through different means can be used as a tool to harvest tacit data, but computer connections cannot replace information gathered directly, as people connect with each other. "Knowledge transfer strategies… attempt to connect professionals across functions, platforms, and geographic distances. These connections assist in the formation of knowledge networks that help people establish relationships for knowledge sharing." (Desouza, 2011) Connecting computers is great, but KM is more concerned with connections that form, which allow knowledge transfer between people.

KM professionals seek to control processes, but there is a balance between control and the creative freedom needed for people to work together to solve new problems. The certainty that computers, and data can provide is soothing in its simplicity, but it is incomplete. "Sponsors of knowledge transfer tend to demand not only speed but also simplicity. That is evidenced by the constant pressure to encapsulate knowledge into bite-sized, memorable "nuggets."" (Murray & Prueitt, 2015) How do you create consistent policies and procedures without discouraging creativity? The filter of context may be the answer.
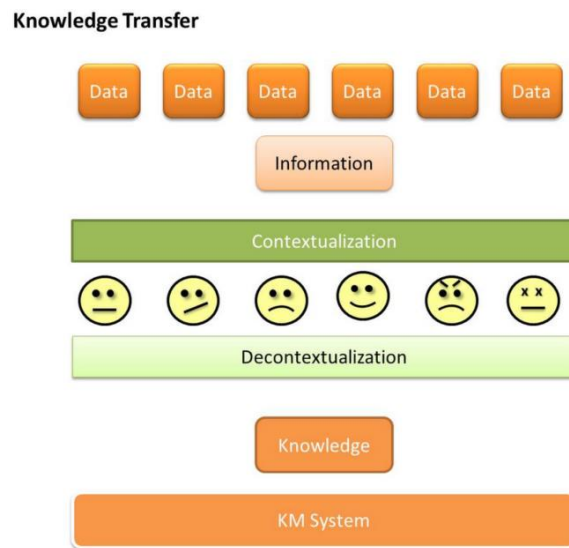
Before information can become knowledge, it must be contextualized by users. To understand what they are being taught, employees will apply different levels of experience to their problem-solving efforts, and their learning efforts, and they may agree or disagree on different points. If it is possible for leaders to discuss the reasons behind the decision to enact policies or procedures, then they can facilitate change, enable buy-in and perhaps even catch mistakes, and make changes based on the input of knowledgeable staff.

There is a parallel in how knowledge-based systems transmit data through Internet of Things processes. Discussing the route, in a knowledge lifecycle, authors point out that "Knowledge-based systems transmit data to an aggregation hub or analytic hub (e.g., a dashboard or a business analyst). But often data reach their destination and cannot be understood. For example,

a deck of PowerPoint slides might arrive without context, and the assumptions may feel like a black box to the receiver." (Pugh & Poole, 2016) Whether you are talking to people directly, or transmitting information via computers, there is a danger that something will be lost as the knowledge is rerouted and re-contextualized.

Knowledge transfer, at its best, involves breaking the "shallow learning barrier" in human sense making. "Breaking the shallow learning barrier means transferring not only the rules but also the underlying processes generating the rules. That can only occur through repetitive cycles of observation, self-directed inquiry and self-discovery." (Murray & Prueitt, 2015) If a leader, or mentor immediately gives a protégé the answer to a question, they are satisfying the need for speed, in our busy world, but not teaching them to think the problem through themselves. They are also missing out on a potential opportunity to hear a unique solution to an old problem. True communication and understanding is the key to turning information into knowledge, and that means that it could be worth it in the long run to take the time, whenever you can, to help staff to filter and contextualize information.

Conclusion

It may be true, that "Like knowledge platforms, IoT platforms have the potential to activate insight from data to improve processes, use resources more efficiently and improve revenue." (Pugh & Poole, 2016) Data for data's sake is not the answer, though, and my readings and study of IoT and its relationship with KM leave me with real concerns. The chart below, taken from Pugh and Pool's article on KM and the Internet of Things does a good job summing things up, for me.
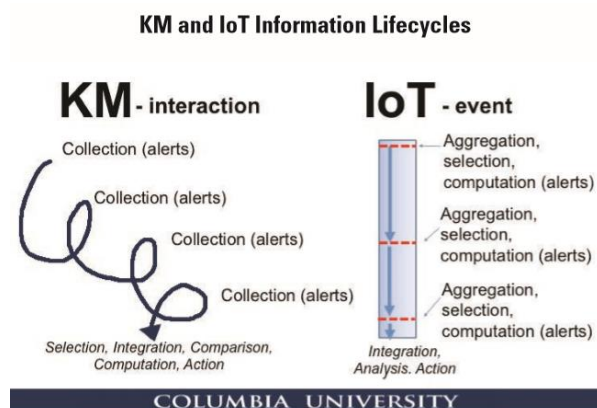
(Pugh & Poole, 2016)

If communication is key to effective knowledge transfer, then person-to-person is the best means of communication. Knowledge transfer from a person to a computer to a person has its advantages, mainly in the fact that computers can handle such high volumes of data and seem to be everywhere, but speed does not make such exchanges more valuable.

In a KM Interaction, "selection" involves thought, and it involves a decision, right at the beginning of an information lifecycle. I considered suggesting another step, anticipation of need, but it is an implied part of an information selection process, as described in the graphic above. In the case of an IoT "event," selection means something completely different. To me, in order for information to be selected, it must first be matched to a device that can judge need and meet it with suitable accuracy. The device must then be told what to select, in advance. It is great to be proactive, and the sheer volume of information that can be collected is impressive, but an IoT device cannot make decisions, so cannot deal favorably with unforeseen challenges or opportunities, and options are limited by the level of technology available.

In their article, speaking about enhanced knowledge transfer, Art Murray and Paul Prueitt offer the best explanation that I have seen: "When an expert knows something but can't explain it, that's a sign that he or she is operating at the engram level. An engram is the most fundamental element of memory. Each engram taken alone makes no sense. But according to neuropsychology, the "capacity" to deal with novelty comes from the expert's ability to observe external phenomena, break the observation down into engrams, store them in some way (e.g., as memory), reassemble them into a proper situational assessment and formulate alternative courses of action." (Murray & Prueitt, 2015) Barbara Gago, writing about context, might agree that individuals are the key to sorting out information challenges, and making them make sense: "The future of knowledge management is about letting employees curate their own information consumption, empowering them to be in charge of their own learning and professional development." (Gago, 2012)

No matter how difficult it can be to present information to people who have their own way of looking at things, cannot understand, or choose not to understand, we have to continue to try, if we want to transfer knowledge. IoT is a tool, or a collection of tools, but tools must be used and guided by people in order to be most effective, and the intuitive input from KM experts is needed at every step of the process, to make sure that opportunities are not missed.

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