Implementation of National and Statewide Transportation Knowledge Management Initiatives: The Role of KM Professionals

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Introduction

The National Transportation Knowledge Network (NTKN) is a voluntary alliance of transportation organizations. NTKN supports a network of transportation information professionals, who collaborate to expand, improve access to, and preserve the domain of transportation knowledge. The purpose of NTKN is to coordinate with transportation research centers, libraries, information providers, and technical assistance centers to develop a comprehensive transportation information and knowledge network that supports the activities of its members and their users. NTKN creates value for member institutions and their individual communities, which include State Departments of Transportation, national technical assistance organizations, transportation research organizations, and other transportation knowledge and thought leaders. This article discusses three different projects from geographic locations throughout the United States that utilized knowledge Management (KM) constructs to provide solutions for future generations of transportation professionals. KM is defined as the process an organization uses to collect and manage organizational knowledge and information (National Academy of Sciences, 2017). National Rural Transit Assistance Program (National RTAP), headquartered in Woburn, Massachusetts, developed and continuously updates a comprehensive Transit Manager’s Toolkit to provide an ongoing tool for succession of knowledge for new rural transit managers entering the workforce. Oklahoma Department of Transportation (ODOT) developed a comprehensive knowledge management initiative. The Idaho Transportation Department (ITD) is starting from the beginning, by building an Information Management (IM) program to set the foundation for Knowledge Management. All three of these projects have utilized the expertise of librarians as driving forces in accelerating knowledge sharing and KM best practices. Outcomes of this article will assist organizations considering or planning KM initiatives to identify key objectives, methodologies and roles necessary for success.

Planning for Knowledge Management

Organizations implement knowledge management programs to institutionalize and promote knowledge-sharing practices (O’Dell and Hubert, 2011). Information does not become knowledge until it is used by someone and designing a system for KM to be shared requires the best combination of people, information, processes, and technology (McNabb, 2007). Before embarking on a KM initiative, having a clear methodology for identifying, capturing, managing, organizing, and sharing information to establish corporate knowledge is crucial. Building a comprehensive knowledge management plan also requires coordinated effort and support from organizational leadership and staff at all levels.

When transit agencies lose employees due to turnover, there is a significant subsequent impact of knowledge loss on the operations of the agency. The Vermont Agency of
Transportation (VTrans) surveyed their constituents in 2018 and found that over 50% of them agreed or strongly agreed that they would benefit from determining relevant knowledge, job aids, templates, and access to documents (VTrans, 2019). The Virginia Department of Transportation instituted a new Knowledge Management Division to mitigate lost experience and valuable institutional knowledge and address critical knowledge identification, collection, organization, and dissemination (McNabb, 2007). When the Federal Transit Administration (FTA) created a central repository with a single location for all elements of their daily procedures, they found that the impact that the absence of one team member could be mitigated (Camarena, 2014). These types of efforts show the transportation industry’s growing commitment to knowledge management. KM strategies can even attract new talent to transportation agencies through a culture of knowledge sharing and when potential employees can see career pathways (NAS, 2017).

The National RTAP Transit Manager’s Toolkit was developed to provide new rural transit managers with the information they need on day one to ensure their transit organizations operate smoothly and are in compliance with federal regulations.

National RTAP began planning the first toolkit in 2010 and launched it in 2014. It was developed by a work group formed by current or former National RTAP Review Board members. The work group included transit agency managers and State DOT transit program managers from various geographic locations. The KFH Group, Inc., a consulting firm with expertise in transportation planning, management, policy analysis, service evaluation and design, and operational support, was contracted to update the Procurement section of the toolkit in 2016. Minor updates by National RTAP staff to other sections had been ongoing. By 2018, many sections of the toolkit needed updating, and a continuous process for knowledge capture and transfer was needed. The Resource Center Manager began a process for documenting transit management-related questions received that the toolkit had been unable to answer, so that the information could be included in the subsequent update of the resource. The Resource Center instituted a Customer Relationship Management (CRM) platform that served as a searchable knowledge repository to store this information. Knowledge repositories can make it possible to reuse the knowledge and experience gained by others when knowledge is collected and organized in relevant, shared categories (McNabb, 2007).

The project was fully supported by organizational leadership and stakeholders at all levels, and the Resource Center Manager was selected as the lead to develop a Request for Proposals (RFP) for one or more Subject Matter Experts (SMEs) and work with a project lead from the successful proposer. Since the toolkit encompasses many different facets of rural transit, such as human resources, safety, Americans with Disabilities Act (ADA), and others, we needed to tap a combined knowledge base that spanned beyond individual job responsibilities. After a committee reviewed all the proposals submitted for breadth of transit management knowledge and project management approach, we selected The KFH Group, Inc. for this project.
The 2019 update was the first comprehensive, systematic update to the toolkit and the first to incorporate potential new sections based on gaps in knowledge identified by SMEs, knowledge management professionals, and long-standing transit practitioners.

Each National RTAP Review Board SME was assigned a page consistent with their subject expertise. The Review Board’s experience in the field helps guide and inform the development of National RTAP’s products and services, and they were able to provide in-depth expertise and local perspective. McNabb (2007) explains that KM is not about building a smarter computer network; it is about knowledge and experience - the world of “people at work.” Additional review was executed as necessary by SMEs identified by the Review Board. It is a good practice to spread the responsibility among multiple people, so that the KM project would not create too great a load on any single individual (NAS, 2017). It is also important to develop a team for information projects that includes professionals with unique areas of accountabilities and skills to maximize value (Gunter, 2018). The National RTAP Resource Center Manager added an additional layer of review for each page to provide a literature review that included assets in the public domain and the grey literature, and connections to proprietary forums to crowdsourcing original research and co-create the process of information gathering. For example, the Rural Transit Manager’s Forum was utilized to quickly gather model transit agency mission and vision statements across geographies and types of agencies. By engaging expert practitioners to share their knowledge directly from the field with tacit knowledge gained through direct experience, the toolkit became a living document of best practices and tools for transit management. KM can be a strategic enabler of business success (NAS, 2017), and this project demonstrates how knowledge transfer can improve staff skills and workforce capabilities.

The following KM initiative at ODOT also arose from the issues of succession and turnover. With older workers set to retire, ODOT continues to face issues of retention and knowledge capture. Some workers have been with the organization for decades, and as these experienced employees leave, institutional knowledge is lost. The issue is not a new one for public agencies. Across the country, public organizations are facing similar crises of brain drain, siloed information, and lack of knowledge transfer infrastructure. Some have been slow to adapt or are unable to devote enough resources to handle the problem efficiently. The private sector has been much more effective than the public in combating this knowledge drain, and in implementing KM practices altogether. Despite a lack of a general national effort towards integrating KM strategies, the Office of Research and Implementation (ORI) at ODOT has seized on the issue and devoted plentiful resources to tackling the problem head-on.

First, ORI personnel reached out to ODOT personnel in human resources and in one of its engineering field divisions. These individuals formed a knowledge management task force that would attend conferences pertaining to KM and begin to assemble a plan to tackle ODOT’s KM issues. The Oklahoma Transportation Library, ODOT’s research library, played an important role in developing the KM strategy as well. After two meetings, the KM task force requested the
library to conduct a literature search on best practices in KM, and to recruit a KM expert they
could work with to survey ODOT and find out ways to assist the organization. Specifically, the
group wished to find best KM practices for organizations similar to a DOT, alleviate the brain
drain caused by retiring personnel, and improve the flow of information and productivity across
the agency. After an initial literature review, the librarian levied contacts from the University of
Oklahoma School of Library and Information Studies to find candidates to interview for the role
of ODOT KM advisor. After various meetings and a round of interviewing, the team selected a
KM expert who had graduated from the University of Oklahoma’s Master’s program in
Knowledge Management. After selection of a candidate, ODOT created an official task order to
fund the project.

Like ODOT, IDT recognized the importance of knowledge management and began its
own program for tackling the complicated subject.

The Information Management program began at the Idaho Transportation Department
(ITD) in July of 2017. Although ITD had a developed Records program, no formal discipline
towards holistic information management existed, and the information landscape was jumbled
and bloated. For example, upon reviewing the department’s 2010 SharePoint implementation for
migration, approximately 85% of the system was redundant, obsolete, or trivial (known as ROT).
It would not be a far stretch to estimate the rest of the information systems suffered the same
fate. In addition to an overload of hoarded information, the majority of systems existed in silos.
There were few systems that worked together to share information, and most systems or
locations were restricted by permissions and access. Essentially, ITD had too much information
and had no guaranteed access to vital materials. Materials were locked away in several content
management systems and file shares, with no holistic indexing or cataloging of information
sources. Systems were not widely used, as users struggled to sift through mountains of irrelevant
information, complaining that finding anything was time consuming and difficult. To complicate
things, previous leadership in technology expanded the organization’s email storage capabilities
and encouraged users to leverage email as personal file storage systems.

**KM Project Management**

Every KM project is different, but their success is based on strong leadership, stakeholder
engagement, focused objectives, and a strategic and well-defined methodology.

A large KM project like updating and maintaining an encyclopedic collection of regulatory
and practice knowledge requires a systematic approach. O’Dell and Hubert (2011) recommend
mapping knowledge by identifying sources and recipients of critical knowledge and identifying
important knowledge assets needed for each step of the process. National RTAP utilized this
type of approach in terms of project management. The original National RTAP Transit
Manager’s Toolkit was divided into sections on Administration and Compliance, Operations, and Tribal Transit. Each section was broken down into chapters and provided bibliographic resources. Throughout the toolkit were federal requirements, best practices recommendations, and case studies. An important part of the toolkit update was defining knowledge gaps and deciding how the resources could best be reorganized and enhanced. Gaps were identified in a number of ways:

- Initial review by The KFH Group and SMEs working on individual pages
- Biannual surveys conducted by National RTAP of transit managers and State RTAP managers asking for their priorities and hot topics
- Informal survey of National RTAP Review Board before the start of the project
- Conference call with the project team halfway through the project to review progress to date
- Review Board formal page review process
- Reference and technical assistance questions asked of the National RTAP Resource Center on transit management topics during the past four years, where the toolkit did not answer the topic

While there is no “one-size-fits-all” transit training, the combination of this research, analysis and review process assured that the final product would transfer knowledge from across a broad spectrum to address the basic needs of all rural transit agencies. National RTAP regularly surveys its stakeholders on their training needs and outputs, as well as their two top priorities for the coming year.

The added value that a librarian could bring to the table were an extensive knowledge of organizational information products and the ability to supply on-the-spot solutions for situations where no ready-made resources existed. A librarian also has key access to individual and institutional knowledge. When information was lacking, research could be undertaken to create a new product, such as the What Transit Agencies Need to Inform the Public About Before Making Changes checklist that was created to fulfill a request by a State RTAP Manager.

The toolkit project lead worked with the National RTAP Resource Center Manager to ascertain whether any of the National RTAP resources have been launched or updated since toolkit’s first publication. This assured that the most up-to-date resources were being utilized. National RTAP individual resource updates often prompted changes to the toolkit content itself.

National RTAP was able to complete the 2019 update in a six-month timeframe using simple, readily-available project management tools. The consultant project lead and the National RTAP Resource Center Manager held weekly phone meetings to discuss progress and action items. The Resource Center Manager served as the central communicator between all the various stakeholders and made sure that all the gears were synchronized (Gunter, 2018). After the Review Board SME signed off on the content of each page, edits were conducted between the
consultant project lead and the National RTAP Resource Center Manager until both felt that the page was complete. Other agencies have also found that working one on one allowed for sharing of nuanced knowledge (VTrans, 2019). While more robust document management technologies could have been employed, a simple solution suited all the parties involved.

The current toolkit contains three sections as well, but has been largely reorganized: Administration, Operations and Planning, and Compliance. All toolkit pages now have “Updated on” footers, as information on various components becomes available in different cycles. The plan for ongoing maintenance is to update individual sections of the toolkit on an as-needed basis, with full updates when legislation prompts (such as reauthorization or a new circular).

Many sections were brand new or comprehensively changed. New sections included:

- Mission and Leadership, with a matrix of model mission and vision statements from a variety of rural transit agencies. The National RTAP Transit Manager’s Forum was utilized to quickly gather statements for consideration.
- Driver Recruitment, Training, and Retention - this was one of the gaps identified in the planning stage.
- The “Procurement – Day One” and “Day Two” sections were renamed as “Procurement 101” and “Beyond 101”, to better organize basic and advanced procurement information for new transit managers, and to provide logical naming conventions for the sections that more accurately defined the content.

The National RTAP KM project leveraged individual and institutional knowledge throughout and beyond the organization to create a sustainable repository.

Similar to National RTAP’s toolkit, the ODOT team began its project by identifying key knowledge gaps, and focused on how best to organize its own information resources. To further this goal, the ODOT KM project organized a KM team which included a representative from ORI, human resources, an ODOT engineering division, the ODOT library, and a KM expert. The first phase of the project would run from the beginning of February 2019 until the end of September 2019 and had three main objectives: Compile a literature review on KM best practices, create a framework for KM implementation at ODOT, and conduct a survey of ODOT employees that will inform the creation of said framework. The group prepared monthly reports that documented their activities, and would also publish a final report upon the project’s completion.
Figure 1. Selected Tasks Performed by the ODOT KM Team

The librarian kept a running literature search throughout the project, and updated members with newfound items as he received them. The literature search’s findings will be added to the final report at the end of the project. ODOT provided generous funding for the KM expert to attend conferences relating to the project. The KM expert had the opportunity to interview key figures in the KM field and compare with other public organizations on their own KM efforts.

After establishing a baseline of where ODOT stood in relation to other organizations in adopting KM, the expert began creation of a framework that would best address ODOT’s needs. The team emphasized that they did not wish to reinvent the wheel and looked for applicable KM initiatives that they could borrow from. The team discovered that very few DOTs invested heavily in KM, and fewer still had any KM initiatives at all.

The ODOT team met regularly throughout the project, most times monthly. As the project neared its final stages, the group began meeting every other week. The librarian met with the KM expert weekly throughout and provided insight and collaborated with the expert on what direction the project needed to head.

By the 5th month of the project, the KM expert had developed a draft implementation framework and created a draft survey to give ODOT employees relating to KM implementation. Originally, the team intended to conduct a trial run of the framework, testing it on one department within ODOT. Data from this trial run would be used to convince ODOT of continuing support of the project. The team planned on presenting their findings to the Oklahoma Secretary of Transportation at a meeting at ODOT by late August. The team also conducted interviews of key ODOT personnel, including department heads, to determine their willingness to engage in the project. Many key figures at the organization were excited, and even volunteered information explaining their knowledge management woes.

By September, the KM team had the following deliverables: a literature review of KM practices in transportation agencies, a draft implementation framework, a survey for employees
to discuss their ideas regarding KM, monthly reports for each month of the project, and a final report discussing the project and KM expert recommendations. The group then met with ODOT leadership, including the Oklahoma Secretary of Transportation, to discuss their findings. ODOT leadership approved of the work and recommended a second phase of the project be initiated for the next fiscal year.

The next phase ran from December 2019 to September 2020. The team focused on developing and redlining a scalable KM framework, expanding critical knowledge documentation, refining the literature review, developing a survey tool, mapping critical knowledge, and architecting a Microsoft Teams wiki page to store and access KM information and resources. A third phase began in November 2020 and will run until September 2021. This time, the team will focus on the following areas: applying their scalable framework to several small project, survey employees about to retire as well as new hires to identify gaps in knowledge and document in Microsoft Teams, survey employees in selected divisions to document their critical knowledge, and create a project completion summary for ODOT projects. Below is an example of a page created for the KM project in Microsoft Teams to document the project's findings.

Figure 2. ODOT KM Microsoft Teams Page Screenshot
ITD maintains its own team of Information Management experts to carry out its projects as well.

The core team of ITD’s Information Management includes a Records Analyst, a Data Coordinator, and a librarian leading the group as an Information Manager. This three-pronged approach is designed to address three crucial areas of Information Management – records, data, and general information science. The first step for Information Management was the creation of a strategic vision for ITD, establishing a framework for how information ought to be governed with objectives to meet stated goals.

To set the foundation for beginning an Information Management program, the most crucial thing was to explain the “why” to employees and leadership of ITD. As a result, the Information Management team focuses a majority of their time on education and outreach activities. The team acquired licenses for poster and video making software, and set a benchmark of creating learning objects to explain the core concepts of records, data, and information management. Staff cannot engage and support information management goals without understanding what governance entails, and why governance makes work life easier without program leaders explaining taking the time to ensure understanding of core concepts. For example, using the CRAAP Criteria established by Sarah Blakeslee (2004), being Currency, Relevancy, Authority, Accuracy, and Purpose, the Information Manager created a poster asking staff, “Is It CRAAP?” of all information used by the department. The posters were widely received and generated strong, positive feedback from ITD staff across the state. Several other posters on records management topics and data governance issues were produced and distributed around the state, as well as basic 101 videos, which were included in the state’s training and development system.

In addition to the education initiatives, outreach efforts began to build communities of practice around Information Management. The Information Management group leads the Information Management Governance Board, which contains members from nearly all work areas of the transportation department, fulfilling a comprehensive, cross functional team of stakeholders that collaborate together for effective information governance (Gunter, 2018). The Governance Board’s charge is to advise Information Management on the creation and implementation of standards, lead a grass-roots effort towards information governance in their work units, and provide feedback towards real-life information management issues occurring in their daily work lives. Other communities of practice are the Records Coordinators and Data Stewards, consisting of work groups that directly oversee ITD records and data management. The groups meet several times a year via video conferencing, where best practices are shared with each other and educational opportunities are provided. Currently, the groups consist of just under 100 individuals out of a state department workforce of 1600 people. This network of people is crucial to the ongoing management of ITD’s records, data, and information, and helps to build a support network of the people whose daily lives directly interact with the management
of information assets. The Records Coordinators and Data Stewards leverage the Information Management team for expertise and guidance, while providing first points of contact with peer staff in their business units. This alleviates confusion about information governance and enables the success of staff regarding the transition, coordination, disposition, and storage of information, among other information governance duties (Bryant, 2017).

Furthermore, the group is working on department-level policies and standards to help establish the framework for information management. All documents are shared with the Governance Board, which weighs in on the applicability and value of the standard, and to ensure that standards are relevant and useful. The Governance Board has a communication plan, and communication mechanisms like internal newsletters and posters disseminate the standards outward. Examples of standards include Information Lifecycle, Systems of Record, and Classification of Data. Other standards exist within the Project Management Office in order to ensure that all projects consider Information Management when implementing new software and systems, and in Purchasing, such as the acquisition of third-party data for ITD use.

After two years of work and education and outreach, the Information Management team used the Communities of Practice to disseminate a survey on the experiences of working with information, records, and data throughout the department. The Information Management department wanted to understand ITD staff’s views on records, data, and information in order to establish where additional education and outreach initiatives were needed, and to share the results to build credibility towards governance initiatives at ITD with leadership. The findings were telling; the need for Information Management is high. In 2012, the McKinsey Global Institute shared a report stating that 19% of the average worker’s time at work was spent searching for information (McKinsey, 2012). This is the case for ITD, as 48% of survey respondents reported spending 7+ hours per week searching for information in ITD’s systems. 74% of respondents trust their own data, but do not trust the data of others at ITD. 43% of respondents think data is insufficiently documented. Overall, the survey demonstrates that staff spend too much time searching for information, struggling to verify the validity and usefulness of the information they do find, and to know that the information is compliant with business values, and State and Federal requirements. One can ask, “How do we perform effective Knowledge Management when we cannot find or trust our knowledge sources?”

Results and Discussion

Research by the American Productivity & Quality Center (APQC) has shown that organizations that measure KM can show a 200 percent return on investment. Measures can take into account KM involvement, process efficiency, and business performance (O’Dell and Hubert, 2011). These three projects also demonstrate that librarians, knowledge managers, and
information professionals serve in leadership roles to make information more discoverable, thus significantly increasing value for their organizations. Since the completion of the 2019 update, the National RTAP Transit Manager’s Toolkit has been used to answer 17% of the questions that rural transit managers asked, a significant increase over 2% during the previous year.

After National RTAP updated and launched the Transit Manager’s Toolkit, utilization effectively doubled, from about 490 monthly web sessions to over 800 sessions.

![Transit Manager’s Toolkit Pageviews](image)

*Figure 3. ODOT KM Microsoft Teams Page Screenshot*

Right away, twenty-seven manager-related questions that Resource Center users have asked since the update were fully answerable by the revised tool. Between June and December of 2019, the average turnaround time using the Transit Manager’s Toolkit to answer questions was 1.3 days, and sixteen questions were answered during the same day. In comparison, data from 2014 through the first half of 2019 showed that the Transit Manager’s Toolkit was used to answer Resource Center questions twenty-three times over that entire period. Areas where the revised toolkit contained the exact knowledge needed by rural transit stakeholders included records retention, grant matching, random drug and alcohol testing, and driver background checks.

The National RTAP Transit Manager’s Toolkit is a simple, comprehensive, user-friendly web-based platform containing shared knowledge from dozens of transit leaders and experts throughout the country. Cross-agency knowledge sharing has made the toolkit more robust and applicable to transit managers from many types of agencies. Greater efficiencies can be built based on personnel leveraging others’ expertise and approaches and leveraging existing knowledge rather than “reinventing the wheel” if information was already available. (NAS, 2017). A vital part of this toolkit update was the knowledge capture and transfer from the SME researchers and authors, as well as the National RTAP Review Board members, many of whom have been transit leaders for over thirty years. While stringent research (including first-person
research with the Federal Transit Administration as needed) was conducted to make sure that everything written was supported by current legislation, the individual contributions of each SME with extensive knowledge of the field made this an original and unique document for rural transit managers. Having case studies, templates, and expert recommendations such as “Minimum Suggestions for Bus Operator Training” add the type of practical value to make this toolkit one-stop-shopping for turning rural transit newbies into expert rural transit managers.

After the initial phase of ODOT’s KM project, awareness in the agency about KM practices is increasing. Individuals in key departments have expressed willingness to go along with the project and provide valuable information that will help development of the pilot project in phase two. The team also established a shared information platform on ODOT’s intranet to host all documents related to the KM project, which will ideally be migrated to another technology platform during the second phase.

The librarian is continuing to refine his literature search, exploring technological applications for KM as well as KM success stories in the public and private sector. The team continues to meet monthly and is preparing to roll out the pilot project in Human Resources within the coming months. Additionally, ODOT leadership appointed one of their own members to act as a high-level liaison to work with the KM team, keeping apprised of the latest updates and passing that information on to the leadership committee.

The ITD team also continues to make strides in its reorganization of information and solidifying connections with internal departments.

The work ITD Information Management put into education, outreach, and standards gained many successes, including massive deletions off file shares. At the beginning of 2019, the information technology department announced a need to migrate many of the department’s file shares, giving Information Management an opportunity to work with business units to review materials. Using tools that review content for usage and permissions, the team was able to provide reports to business units identifying stale data, which was used to delete approximately 5 terabytes of data before migration. Additionally, the team works with business units with new file shares to establish folder structures revolving around retention periods, helping steer units away from obscure file paths and data silos. The long-term plan is to create records locations in selected systems of record, however, resources are too thin to enable this work, so file shares are still used. Nevertheless, organizing materials into these folders will enable quicker migration in the future, which may be automated by machine learning algorithms.

Additional deletions of aged data are ongoing. As the Information Management team has socialized the concept of deleting unnecessary information in order to streamline governance and retrieval for use, business units are willing to reassess retention schedules to modify retention periods longer than ten years. Many retention schedules included materials with long retention periods, some permanent, that were purely for business value or for transfer to the State
Archives. The Information Management team worked with the State Archives to review all retention schedules that mention transfer to the Archives, providing samples of these documents to verify if the Archives are, in fact, willing to receive and house these materials. As a result, many record series were eliminated as candidates for transfer to the Archives, and business units were happy to modify the retention of those items to shorter, business value schedules.

Along with the records work, strides towards effective governance of data occur, as well. As business units bring in software and systems, a methodology for building data dictionaries and cataloging information are being developed. Vendors are expected to provide data dictionaries with new software and system acquisitions that host and manage data, and the eventual plan is to use these data dictionaries to produce a basic schema for ITD data and information. Additionally, there is a project growing out of one of our districts that is pushing ITD to adopt a state-wide schema for data collection around road assets. These efforts demonstrate the positive impact the Information Management team has towards achieving governance standards.

Finally, the survey results produced a list of education topics for future work. Using poster making software and video creation software, the Information Management team will undertake producing materials for answering questions and addressing governance issues. Future meetings with the Communities of Practice will include governance standards and topics to help further explain why effective governance will provide value and ease frustration for those needing information and data for decision-making. All of this work will provide the foundation to begin Knowledge Management. Establishing the foundation and discipline of managing our information translates to the ability to search and find correct information for knowledge transfer. Creating efficient searching and finding will enable staff to devote time towards collaborating and solving the “one deep” problem of siloed expertise. Furthermore, the survey results are used as leverage by the Information Management team to encourage ITD leadership to prioritize information governance, and treating information as a valuable asset.

**Lessons Learned**

While all three of these projects have demonstrated initial successes, there have been numerous challenges and lessons learned from each one. Key to the success of any KM effort involves reaching out to the individuals who will be impacted most, and convincing them of the importance of KM. Resistance could develop from employees who are not convinced that KM can benefit them or those around them, and a goal should be to communicate in a way that demonstrates KM’s value to their own priorities and objectives.

Long tenured workers may hold knowledge without realizing that it is important for them to share (NAS, 2017). Those who have knowledge may not realize that others may find it useful,
and those who could benefit from knowledge may have no idea someone else in the organization already has it (O’Dell and Hubert, 2011). Many employees could view the adoption of a new policy or being forced to comply with a new routine in support of KM to be problematic. In the first round of interviews, the ODOT team found this to not be the case. Many department heads were supportive of the notion of KM and offered to name individuals that would act as a KM-embedded team member to support the overall project. One of the key strategies of winning people over ironically involved avoiding the use of the term “knowledge management.” The term itself may appear unfamiliar for many, and overwhelming and unnecessary to others. For that reason, the ODOT KM expert avoided overuse of the term “knowledge management,” and emphasized that many of the practices employees used could already be tied into a more streamlined KM system. Additionally, the expert stressed how implementing KM best practices would reduce the time an employee spent looking for information and increase their time spent in getting the job done. The approach proved successful and helped reduce barriers to understanding the objective of the KM project.

Generational divides also played a role in developing a KM strategy. Different generations share information differently. For example, older workers could be more comfortable with phone calls and email, while younger workers may favor instant messaging and other apps to stay in touch. A KM strategy would necessarily involve the use of technology for storage and retrieval of information. Younger workers would potentially be more comfortable adopting newer technology, while older workers could be hesitant or outright resistant. The ODOT KM expert placed importance on using technology that most employees were already familiar with. The more the team could integrate KM strategies into existing platforms, the more successful, and less costly, the project would be.

The National RTAP Transit Manager’s Toolkit project helped to foster an active, rather than passive, approach to training needs, as gaps would trigger the same types of library literature reviews as before, but now new information could be added to a searchable tool for the next individual to find independently. McNabb (2007) developed a model of how KM subsystems interact to produce learning and generative change, which would result in a living, dynamic system where new elements are being added often. With this process in place, the Resource Center Manager will be able to quickly and seamlessly incorporate new information as it becomes available in the future.

In the course of the National RTAP KM project, it took a great deal of attention to detail to track versioning through the multiple party review cycles, and other organizations planning to undertake similar projects should thoroughly research what types of project and document management approaches may best suit the needs of all parties involved.

Another challenge identified involved succession planning for the SMEs involved in the project. In any organization, it is not unusual to have to find new individuals to complete projects
when the original assignees no longer can. National RTAP ran into this toward the end of the update process, and was fortunate to be able to find a new SME from within the Review Board promptly, so the project was able to be completed on time. Knowing the strengths of the knowledge experts involved in the project, and possibly having a fallback group of other experts that can be called upon when needed can ensure that a project does not languish due to the exit of one member.

Maintaining support at the highest levels of ODOT, as well as from every department, proved critical. While some departments already supported the project, such as ORI and human resources, others needed convincing. The project would mean a complete cultural change in how ODOT operated, stored, and shared information. Convincing and keeping that high-level support will make or break any KM project. In the project’s literature search, the team discovered that many organizations may start out supportive, but as administrations change, support can wane over time. Significant initial investments can be for not if high-level staff no longer support KM.

Another key element is to make sure the project aligns with the organization’s goals. If it is a public organization, beginning with their mission statement, and finding out what direction the agency head wishes to take the organization is vital. Similarly, the team made sure the project aligned with the governor’s objectives. In a recent speech, the Governor of Oklahoma expressed a desire to modernize outdated processes, improve broken workflows, and create savings for taxpayers. KM fit with this message perfectly and tying in elements of the project to these goals proved invaluable in promoting it aligned the organization with state government priorities.

Ensuring top-level support boosts the success rate of any KM project exponentially. If continually supported, KM efforts will leave a powerful legacy of institutional change that will reshape over time the entire organizational culture.

This hard work towards Information Management has lasting implications, as once ITD has the discipline to manage its information effectively, they can begin to use that information to develop a corporate identity and use it to create knowledge through knowledge management strategies (Gunter, 2018). The biggest assumption immediately countered was the best guess that ITD employees were familiar with information governance and records retention schedule. After a few short weeks of preliminary work, it became clear that the team needed to build the Communities of Practice and help ITD refine its systems and information overload before moving forwards.

A huge win for the Information Management group was the massive undertaking to inventory applications in the IT network of systems in order to identify redundancy. Using data from the Windows 10 migration project, lists were made of all discoverable applications. The team learned quickly that there were untold duplicates that could be selected for deletion. For example, the data showed 21 different applications for reading PDF files. This list is enabling
ITD’s IT department to decide what systems serve the best business value and enable IT resources to specialize in specific software for support and assistance.

Additionally, the Data Coordinator for the Information Management team began to explore how to use machine learning for the application of metadata for migration or transfer. Legacy systems containing business value information or materials held for compliance reasons may be searchable from the front-end web form, but back-end access proves difficult. In order to decrease the systems and support structure for redundant applications, migration of the information needs to occur. Without bulk migration abilities, this proves difficult with over 100 million separate documents stored over many years. Machine learning algorithms are written to “roll up” individual pages into one document, assign administrative metadata and other data the algorithms can read, and import those items with those attribute fields into selected systems of record are proving useful. This alleviates the need for people to look at each item and migrate individually. Although initial successes worked, there is still work to do to refine the process and deal with unstructured data stored without Optical Character Recognition or any other useful metadata. The team continues to work on the problem and conceptualize strategies for migration.

Along with the migration work, it’s become clear that ITD needs a clear methodology for creating digital objects. Using ISO standard 13028:2010, the Information Management team created a scope for digitization that helps business units prioritize what materials need to be preserved, and what priority that material needs. Criteria like ongoing and regular use, format type and required hardware, and retention period helps people decide what makes the most sense for digitization. The group is also creating a standard operating procedure to follow that will help ITD staff and contractors digitize to the ISO standard without the work of reading and interpreting the standard document.

ITD is using the foundations of Information Management to set the state for Knowledge Management. By establishing the discipline towards keeping only what matters for decision-making, adhering to findability structures in systems of record, and following retention schedules, users are learning to prioritize the information for data driven decision making. Ensuring that ITD keeps only what it needs for compliance and learning, effective strategies towards using and relying on the information are placed in motion. More work needs to be done, but huge strides towards developing an Information Management discipline helps ITD staff ensure they will be prepared for a full Knowledge Management program.

**Conclusion**

As McNabb (2007) demonstrated, the most successful KM projects include a combination of people, information, processes, and technology. Transportation librarians, information, and knowledge management professionals are known for their exceptional skill sets to identify, obtain, share, organize, and manage information and knowledge.
For a KM resource like the National RTAP Transit Manager’s Toolkit, it is important to keep in mind that regulations, practices and technologies will surely change in the future. However, the project participants feel that the process we have identified for this update will translate well to future revisions. The straightforward approach to KM and involvement of library staff to help guide the process and retrieve “hidden” knowledge that can also translate to other knowledge projects and endeavors. Information and knowledge management professionals must operate in the present, but also look to the future, continually scanning the environment to be aware of the need to change the information to respond to evolving laws, regulations, and business processes (Bryant, 2018).

Key to this strategy involves partnering with forward-looking institutions and other organizations that can offer a wide variety of support.

One of the reasons for ODOT’s project success involved their relationship with the state’s flagship university, The University of Oklahoma. Leveraging university contacts and building on institutional partnerships provides a built-in and enthusiastic network of support that can ensure any project has a wealth of expertise to support it. Additionally, as previously mentioned, support from upper management is key for the success of any KM initiative. Support from the ODOT State Engineer and the entire Office of Research and Implementation proved key in driving the project forward. Without support from both within the organization and with forward-looking partner institutions, the project would not have been as successful.

Like ODOT, ITD leverages partnerships, but is building those partnerships from within. ITD’s Information Management unit is leveraging the Records Coordinators and Data Stewards to build a robust Community of Practice for sharing tips, strategies, and pain points regarding the management of records, data, information, and knowledge. The meetings are every other month, and aside from a training tip and basic networking, real-life problem solving occurs as individuals bring forth their unresolved issues. It is the intention to continue to grow this community in order to build strategies for knowledge management and knowledge distribution.

Additionally, explaining the "why" is extremely effective. Many people grasp the concept of knowledge management, but may not see the details on why practicing effective information management and knowledge management benefits them and their work practice. ITD uses outreach and education activities, like the posters and Community of Practice meetings to explain a key concept and how it directly helps make work life better for ITD employees. When staff understand the “why” behind the work, they are more likely to adopt standards and guidance set forth by the Information Management team.

Finally, ITD is working towards developing the discipline across the agency to delete extraneous materials. At the time of migrating from the on-premise SharePoint server to SharePoint Online, about 85% of the SharePoint content was stale (untouched material that did not relate to a retention schedule or provide relevant, current value). If this is a common theme,
much of the information within ITD’s systems is ROT, or redundant, obsolete, or trivial, and can be deleted without review. Eliminating useless information refines systems so that employees find, learn, and make decisions about information that is accurate and timely. The Information Management unit at ITD is using its methodology of posters and education and outreach to put up posters like, “Keep Calm and Delete On” around the building, and using the CRAAP criteria to help individuals evaluate their information for deletion. Small scale victories are occurring, and the work towards developing the implementation of an Information Lifecycle standard will continue.

In conclusion, successful KM initiatives can span many variations that are agency specific for the people, process, technology, and information relevant for learning and decision-making. These case studies describe three successful KM projects that can be used as models for others interested in implementing similar ventures. The National Transportation Knowledge Network and the member libraries can be a valuable source for all transportation KM efforts.

Endnotes


