FURTHER IMPLEMENTATION OF ODOT KNOWLEDGE MANAGEMENT FRAMEWORK

FINAL REPORT
TASK ORDER NUMBER 2160-20-07

Submitted to:
Office of Research and Implementation
Oklahoma Department of Transportation

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
	NOTE: volumes greater than 1000 L shall be shown in m^3			
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003)

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1.0 Introduction

Awareness about Knowledge Management (KM) continues to take hold in the transportation industry (See 23-year history in Appendix A). Highlighted by the formation of the National Transportation Knowledge Network (NTKN) in 2007 (National Transportation Library, 2021), the creation of the Transportation Research Board (TRB) task force on KM in 2011 (The Academies of Sciences, Engineering, and Medicine, 2021), and the first meeting of the American Association of State Highway and Transportation Officials (AASHTO) (n.d.) Committee on KM in 2018, there is growing support for state departments of transportation (DOTs) to learn more about KM practices. Initiatives are being introduced to capture, manage, share, find, access, and retain organizational knowledge for reuse and continuous improvement among employees, contractors, and other partners. Unintended consequences of the COVID-19 pandemic and necessary remote work have intensified the interest in/understanding of KM concepts and catapulted the adoption of various KM practices and tools (e.g., Microsoft (MS) SharePoint and Teams cloud services, intelligent search, lessons learned). Networking among transportation-centered KM Communities of Practice (CoPs) is gaining momentum, and the Oklahoma Department of Transportation (ODOT) has established a noticeable presence among these groups over the past three years.

DOTs are especially attracted to KM strategies for retaining knowledge of an aging workforce, increasing workflow efficiency, and reducing search time for critical information. Accordingly, leadership teams are embracing KM solutions as part of their vision, mission, innovation, and evolution. The Oklahoma Transportation Cabinet Agencies (hereafter OTCA) is no exception.

This year-end report details KM efforts at ODOT during a third year of funding (Federal Fiscal Year [FFY] 2020-2021), which coincided with the organization focusing its efforts on a modernization initiative. Together with Oklahoma Turnpike Authority (OTA) and Oklahoma Aeronautics Commission (OAC), the consolidated OCTA organization is in the midst of implementing recommendations from Guidehouse Consulting Services and the Oklahoma Transportation Modernization Committee (TMC), which follows an intense year of gathering employee feedback and analyzing work processes. Previous year-end reports by the KM working group (hereafter KM Team) have evidenced that ODOT has been on the leading edge of state DOTs that are introducing a KM culture into their respective organizations. ODOTs senior leadership has acknowledged KM as a practice for mitigating knowledge loss, improving workflow, and sparking innovation. Meeting these goals is paramount for achieving OTCA's mission to "*provide a safe, economical and effective transportation network for the people, commerce and communities of Oklahoma.*" With purposeful knowledge capture and sharing, Oklahoma can affirm its status as a top-10 state in transportation.

The balance of this report is organized, as follows. Section 2 details six tasks on KM task order 2160-20-07 and reports each task's activities. Section 3.0 summarizes the KM Team's recommendations for moving the overall KM implementation framework forward, starting with tasks approved for KM task orders 2160-22-05 and 2160-22-06 for FFY 2021-2022. Suggestions take into consideration recommendations introduced by Guidehouse and the TMC. Projected work focuses on activities that would benefit from continuing work with Department of Innovation to execute recommendations described in the modernization initiative executive summary and final report draft.

2.0 KM Task Order 2160-20-07

The objectives for task order 2160-20-07 (FFY 2020-2021) can be broken down into the following:

1. Develop a method for transferring critical knowledge by conducting interviews with ODOT employees to identify gaps in knowledge; document in KM MS Teams website.

2. Identify critical knowledge repositories in various divisions at ODOT by conducting interviews with employees; document KM MS Teams website.

3. Establish a KM liaison network among divisions/departments to advance KM initiatives and communicate changes.

4. Foster a culture of KM by expanding use of MS Teams among engineers in training (EITs).

5. Create a draft of a project completion summary (i.e., lessons learned) for use as ODOT projects are closed.

6. Work with advisory and consultation agency Guidehouse to help identify and advance KM objectives.

This third KM task order, namely Further Implementation of ODOT Knowledge Management Framework, was designed to add scalable KM best practices to the scaffolded framework the KM Team continues to build (See definition of KM at ODOT in Appendix B and an overview of KM task orders at ODOT in Appendix C). The KM Team for task order 2160-20-07 was composed of Michael Molina (OU), Michelle Farabough (OU), Ron Curb (ODOT Office of Research and Implementation), Trenton January (ODOT Field District 5), Elizabeth Blais (ODOT Human Resources), Scott Lange

(ODOT Human Resources), and April Meadows (ODOT Human Resources). The KM Team met monthly via MS Teams and scheduled additional meetings as needed. Molina and Farabough met weekly. In mid-year, Joni Seymour (OTCA Chief Innovation Officer [CINO]) joined the KM Team and has since become the team's liaison with OTCA senior leadership. Seymour recruited Shannon Hagar (OTA Process Integration/IT) and Eric Dawley (OTA Maintenance) to fill an identified need for information technology expertise on the KM Team and to expand collaborative efforts with OTA workers.

Having Blais and Seymour also serve on the TMC aided the KM Team by keeping members aware of modernization activities and timelines. Blais coordinated a meeting with Guidehouse on February 9, 2021, to ensure no duplication of effort. Ongoing modernization surveys and communication throughout 2021 were unforeseen and took precedence. The KM Team was diligent not to overwhelm ODOT employees with perceived changes, while also ensuring future endeavors would align with strategic plans for modernization. Farabough acknowledged that Guidehouse Consulting Services activities closely mirrored traditional processes and procedures undertaken when introducing KM into the culture of an organization and that recommendations for the expanding modernization initiatives would encompass KM practices.

Throughout 2021, the KM Team remained actively involved in KM events hosted by national organizations. Members regularly attended virtual conferences and webinars hosted by TRB, NTKN, AASHTO, and the American Productivity & Quality Center (APQC). Meadows continued to collaborate with HR employees working on similar KM projects in other state DOT HR departments. Molina and Farabough were invited to join

a panel presentation at the TRB 100th Meeting with transportation KM subject experts Leni Oman (Washington State DOT), Shelly Ray (LA County Metropolitan Transportation Authority), and Kim Glover (TechnipFMC). (See Appendix D).

Molina also served on a panel discussion about KM at the Special Libraries Association (SLA) Annual Meeting. Panelists included noted KM experts Dr. Suliman Hawamdeh (University of North Texas), Dr. Denise Bedford (Georgetown University), Dr. Jay Liebowitz (Seton Hall University), and Dr. Deborah Swain (North Carolina Central University). (See Appendix E.) At the same meeting, Molina and Cara Marcus (National Rural Transit Assistance Program) delivered a presentation highlighting information from a paper authored with Farabough and Jezmynne Arroway (Marcus, Molina, Arroway, & Farabough, 2021)—"Implementation of national and statewide transportation knowledge management initiatives: The role of KM professionals."

Following is a summary of the intended purpose, associated activities, deliverables, continuing work, and recommendations for tasks undertaken during FFY 2020-2021. Each task aimed to pilot test KM practices that could be scaled across the OTCA. Recommendations for related future work are listed in Section 3.0 and that they are considered for inclusion as part of short-term and long-term strategic plans for OTCA.

Transfer Critical Knowledge

Choosing a transfer approach for critical knowledge at OTCA requires determining the ratio of tacit to explicit knowledge, the stability of knowledge, the desired speed of transfer, and the audience for the knowledge.

Purpose. The purpose of introducing a systematic knowledge transfer approach into a KM framework is to:

- protect at-risk knowledge,

- prevent knowledge loss,

- replicate knowledge across divisions,

- make knowledge explicit, thus more easily accessible, and

- support employee learning and development.

Activity. With these objectives in mind, the KM Team interviewed 15 ODOT employees, primarily engineers in training (hereafter EITs), to discover current knowledge transfer practices and identify knowledge gaps (i.e., needed information resources that are either difficult to access or not available). We asked, *"when you have a question or need information to complete a task or project, what is your current process for finding what you need?"* This question was followed by asking *"how would you prefer to find information you use most often?"*

Deliverables. Respondents validated that the primary practice at ODOT for finding answers to their questions (i.e., transferring knowledge) is grounded in the organization's strong tradition of experienced employees (or subject experts, as commonly termed) sharing their tacit knowledge orally when asked about a specific task. Interview results regarding how workers initiate their search for information were divided between getting guidance from someone or looking through various information resources on their own (See Figure 2.1). One EIT indicated they prefer talking with someone, although they admitted work could be done "more efficiently if there was a

centralized resource with a robust search function." Another EIT said that they prefer to "search and find information on their own, but unfortunately, this is not possible now."

Figure 2.1

Question: *Would you prefer to talk with a person or search/find information from an enterprise-wise documentation catalog/repository?*
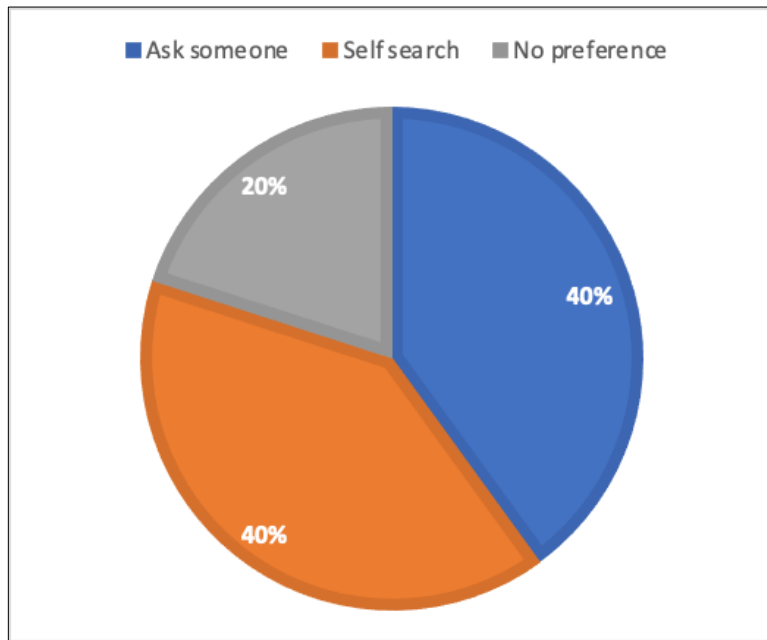
Interview responses to questions about knowledge transfer validated our three-year internal environmental scan, which has previously included interviews with ODOT KM Team members, HR staff throughout the state, and division heads: most critical organizational knowledge at ODOT is tacit. The chief impediment to accessing explicit organizational knowledge is having access to one centralized, well organized, searchable database/search engine that archives various forms and documents currently dispersed in siloed, division-specific shared drives and diverse statewide systems. Another impediment is standardizing methods for making tacit knowledge explicit (e.g., cheat sheets, how-tos, spreadsheets, processes, communications).

ODOT employees expressed a desire for using a single sign-on to access an information system that will return metadata records with hyperlinks to needed information and resources. Interviewees mentioned that information at ODOT is currently stored in hierarchical folder structures without a standardized naming convention. Locating information is difficult due to the lack of an agreed-upon taxonomy or controlled vocabulary, which makes it necessary for an employee to execute several searches with different search terms in many different information resources to locate a specific form or document. For example,

"Folders on shared drives are messy. People have their own; departments have their own. Divisions 1-8 each have their own sources of information. In a perfect world, it would be nice to have a unified division resource, such as design references and all answers with references. I am concerned if I am using the latest versions. Engineer's specific formulas used on projects are currently not saved."

"Right now, if I try to find specs/policy to inform my question, I start with the Internet, then intranet, books, shared drives, Oracle BI system, U drive, then start down the path to ODOT's website to consult various department pages and try to find a contact name and info. I'd prefer having every project tagged with a project number or 'j' number, depending on when/where completed. The more centralized, the better… with better searchability. Knowledge sharing about 'how to' is decentralized. There is so much duplication of effort!"

"I prefer to work from examples done before. I use other DOT's standards online because they are searchable. I would prefer if ODOT design standards and specs were searchable with links to full-text through Norman's Oklahoma Transportation Library."

"The 'business' tab on the intranet is where standards and specs are. This is hugely confusing. An 'engineer' tab would've made more sense. It's like searching through a spider web."

"I wish there was a 'walk-through' of forms, like inspections and quality testing, with instructions about how to fill those out. Different divisions do it differently. Training should be standardized, and then save all this in a training repository. Right now the labels are vague. For example, density without units specified. Details are only via word of mouth. Training should address this."

"I don't always know what I need. I want a search function that is easy to query and that doesn't require drilling down through a folder structure."

"I start with shared drives, but folders are a maze. I also use ProjectWise, which is not bad because you don't have to drill through folders. Everything is in different places, all requiring a unique login/access/password. I'd like everything together in either an app or a website where everyone has access and information is easily searchable, not buried in folders."

"Specs, provisions, and plans typically imply paper or ProjectWise. ProjectWise is supposed to have everything, but projects are often incomplete. If you don't have a cheat sheet list that someone made, you will be lost. Site managers often have books with examples and notes. It is a 20-step process to accomplish one task."

"There is just not a clear roadmap on the intranet. I had to learn my way around it on my own. Searching doesn't work. Form names are not consistent. I prefer to call someone who can explain the roadmap or tell me who I need to call."

Continuing work for this task will benefit from interviewing a wider scope of employees from among ODOT's list of top 100 workers with the highest years of service (See Appendix F). The KM Team should solicit a similar list from OTA and OAC for interviewing so that workers at all OTCAs are represented.

Continuing Work. As the modernization initiative continues, the KM Team is poised to commence interviews to further implement a strategy for knowledge transfer. By talking with a random sample from OTCA's most tenured workers, as well as key individuals who were recently hired/transferred to a position to replace recent retirees and those leaving key positions (See Appendix G), the organization will benefit from identifying gaps in current knowledge transfer. Obtaining insights from workers who are new to their positions is highly valuable, as these individuals have a heightened awareness of information needs and work processes that were not transferred.

Recommendations. Senior OTCA leadership should consider the various methods for capturing/ transferring knowledge and include activities to do so in their strategic planning. The KM team advises that waiting to capture critical knowledge

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during exit interviews toward the end of employees' work at the organization is risky for

a number of reasons. Foremost is that a tenured employee's concept of what is

important is biased (i.e., their perception of "critical" to the organization is tainted by

their own strengths and personal approach to task completion). Employees often do not

know what they know, thus intuitive processes/important relationships are taken for

granted.

The KM team recommends adopting an organized approach for inserting

knowledge transfer processes into the everyday workflow at OTCA. Common

approaches are provided in an APQC diagram in Section 3.0 and range from more

typical solutions for retiree transfer interviews and lessons learned to CoPs and expert

locator software. Additional techniques include training courses, webinars, workshops,

and collaborative brainstorming sessions. A more systematic approach includes an

intranet portal for information/content searching, a lessons learned database, and

active, methodical use of collaborative software, like MS Teams.

Identify Critical Knowledge

Implementing a framework for KM at OTCA calls for a knowledge asset

inventory.

Purpose. The purpose for this task is identifying information resources where

knowledge content, documents, and forms are archived. This year, the KM Team

expanded the knowledge asset survey developed in the 2160-18-08 task order by

adding a list of frequently used knowledge repositories to prompt respondents'

recollection. These included MS Teams, ProjectWise, GIS, ODOT Intranet, DocuShare,

MS SharePoint, department shared drives, division shared drives, external Internet search, OPEN DATA portal, other DOT websites, and an open invitation to list others.

The goal for data collection was determining the most frequently used knowledge assets/repositories and characterizing the ease of and/or frustration associated with their use.

Activity. As the Engineer Development Council (EDC) began work to improve the Engineer Development Program (EDP)—formerly EITs, the KM Team added interview questions to assist in this regard. Fifteen engineers were interviewed.

Deliverable. Questions with responses are listed below with their associated responses in graphic format. Data for Figure 2.3 was based on a single response from each of the 15 respondents, thus percentages are justifiably reported. Data depicted in Figures 2.4 through Figure 2.7 show weighted responses from open ended questions related to knowledge repositories, thus figures represent trends rather than percent of total respondents.

Figure 2.3

Question: *When you have a question or need some information to complete a task/project, what is your current process for finding what you need?*
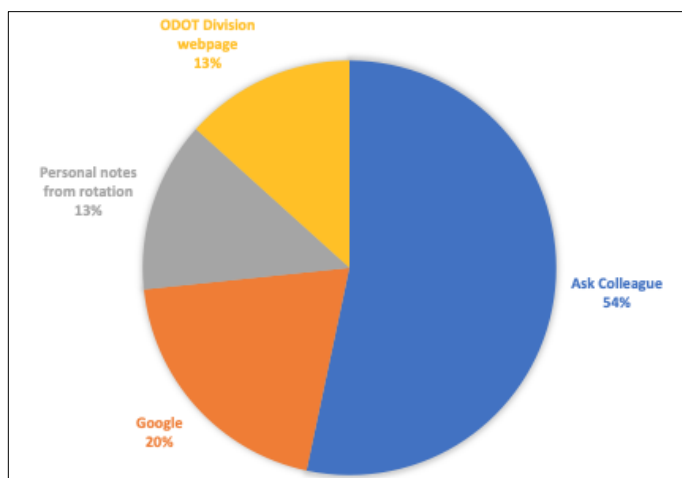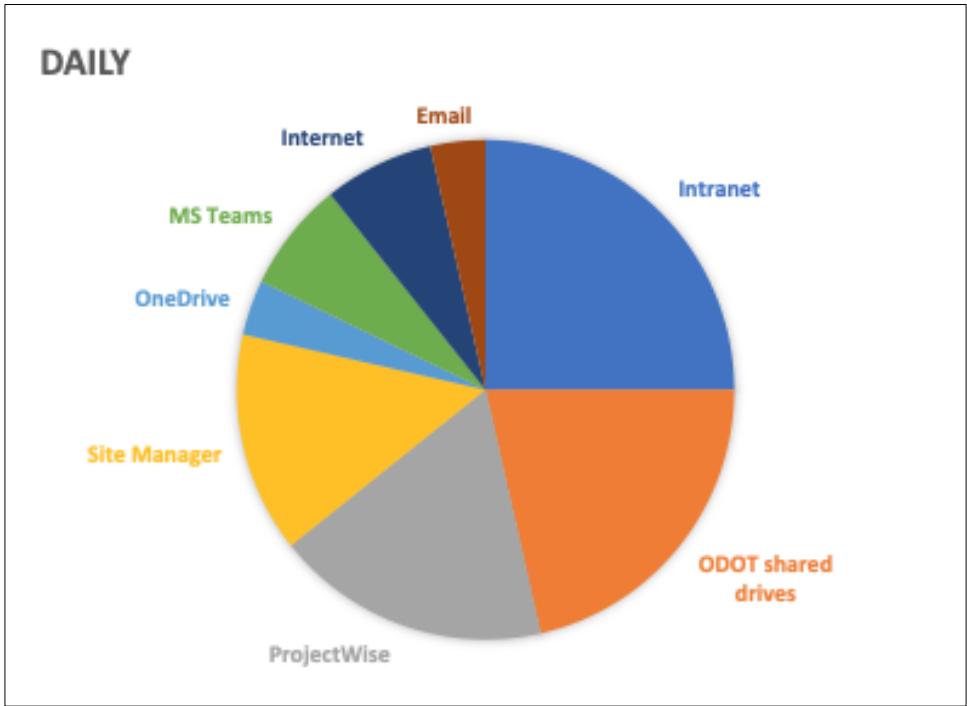
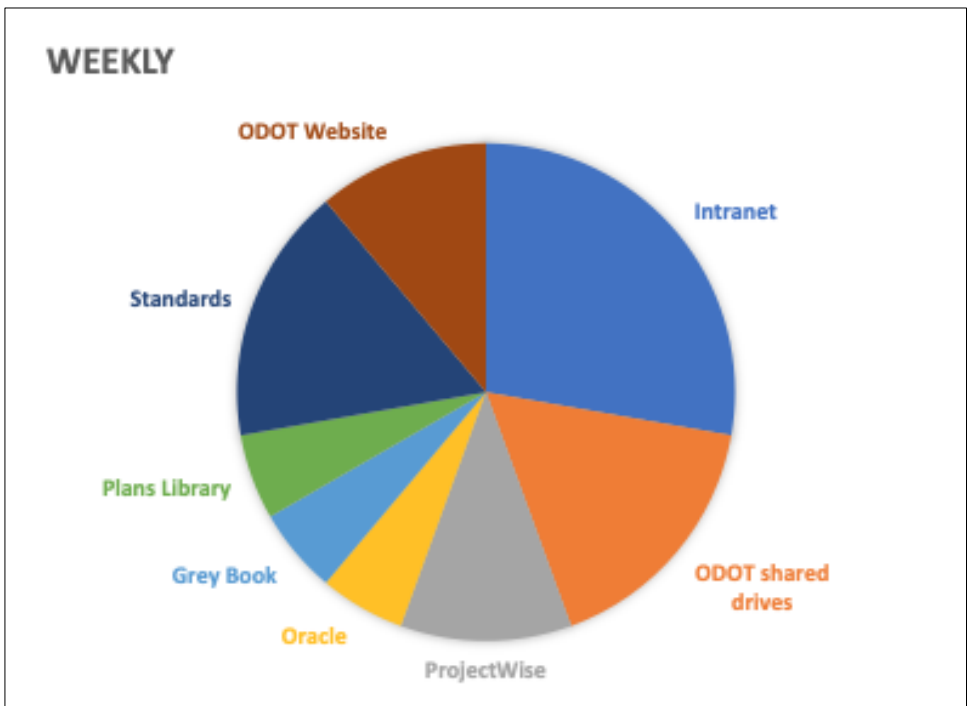Figure 2.4a,b,c

Question: *What are the top three ODOT knowledge repositories you use most often?*

a.

DAILY

b.

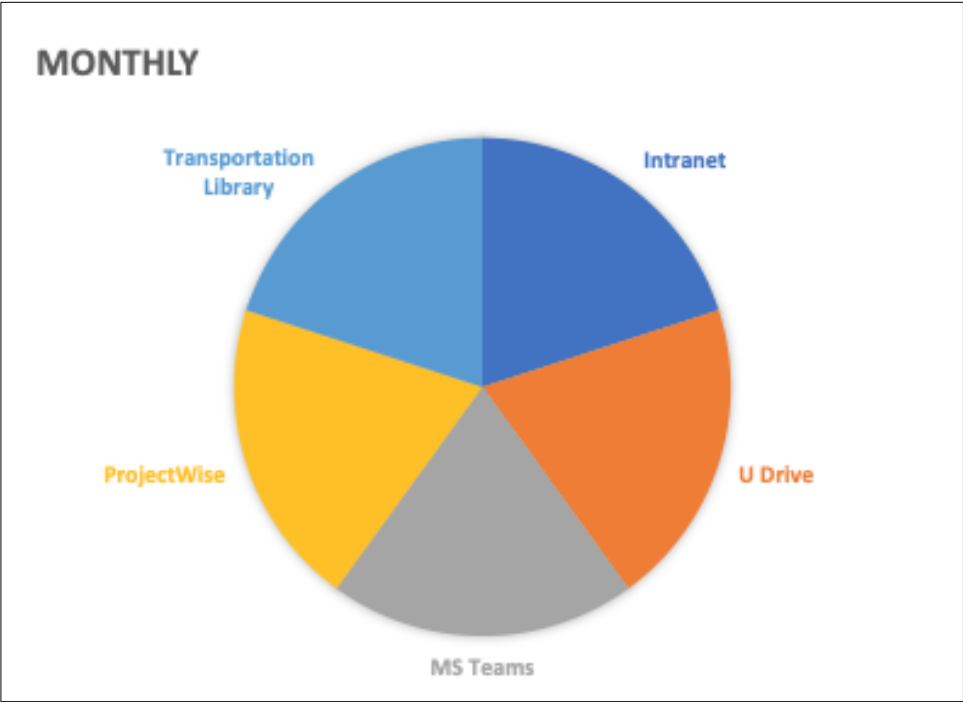WEEKLY

c.

MONTHLY

Figure 2.5

Question: *When you create content, what are your top three ODOT knowledge repositories?*
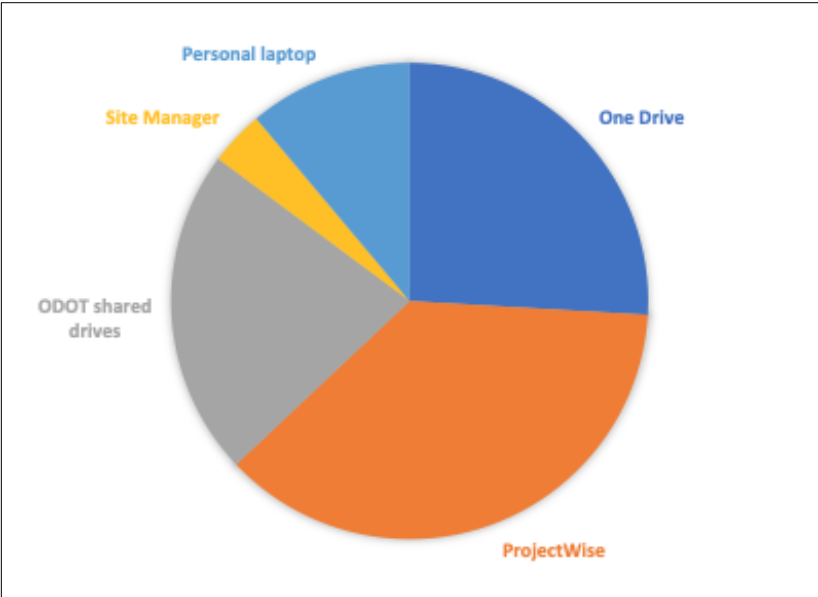
Figure 2.6

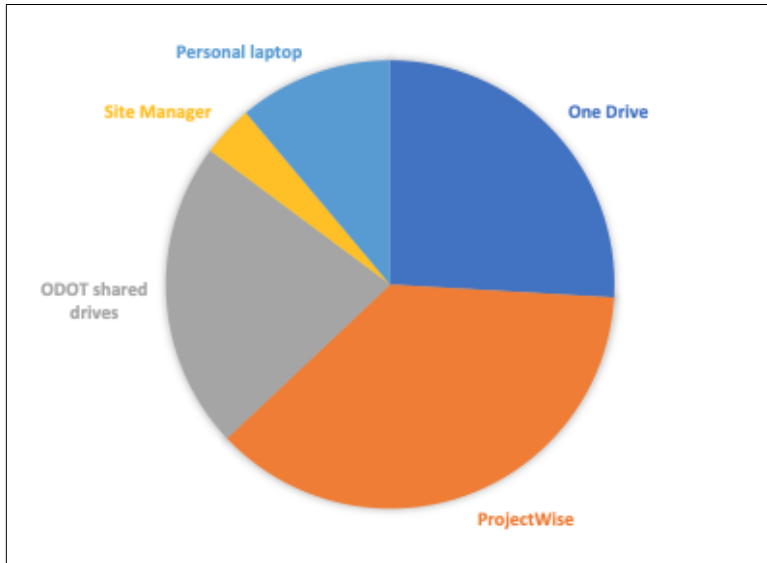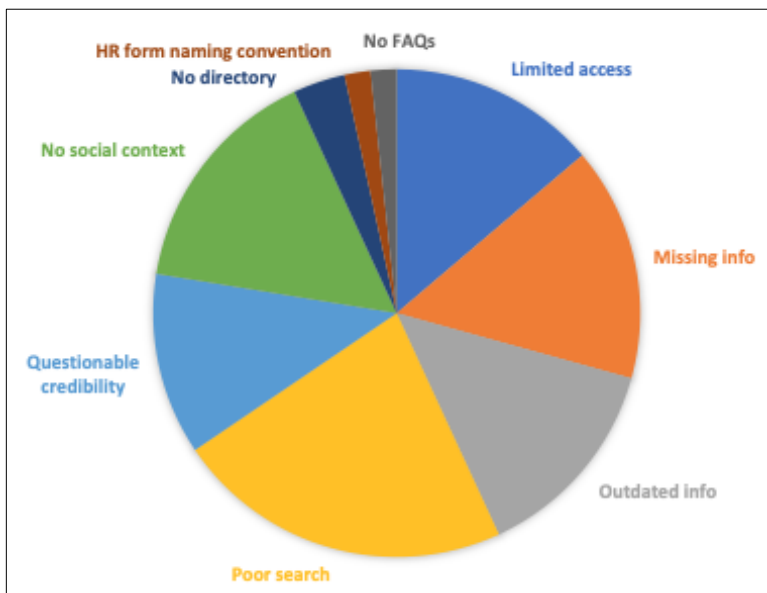Question: *What intranet information resources do you access for completing a task?*

Figure 2.7

Question: *What frustrations have you experienced when seeking information to complete a task?*

Continuing Work. As OTCA continues to improve the EDP experience, the KM

Team is poised to follow-up with respondents and document newly developed project

management tools (e.g., interactive spreadsheets) onto the EDP MS Teams "General"

channel.

Hagar is currently working with Farabough to identify various technologies and

systems used by OTCA employees to aid employee understanding of how daily use of

technology supports organizational KM. Critical knowledge will be identified as a)

community and collaboration, b) content creation and management, and c) data and

information management (See Figure 2.8).

Figure 2.8

Visual Depiction of Information Systems and Communication Technologies
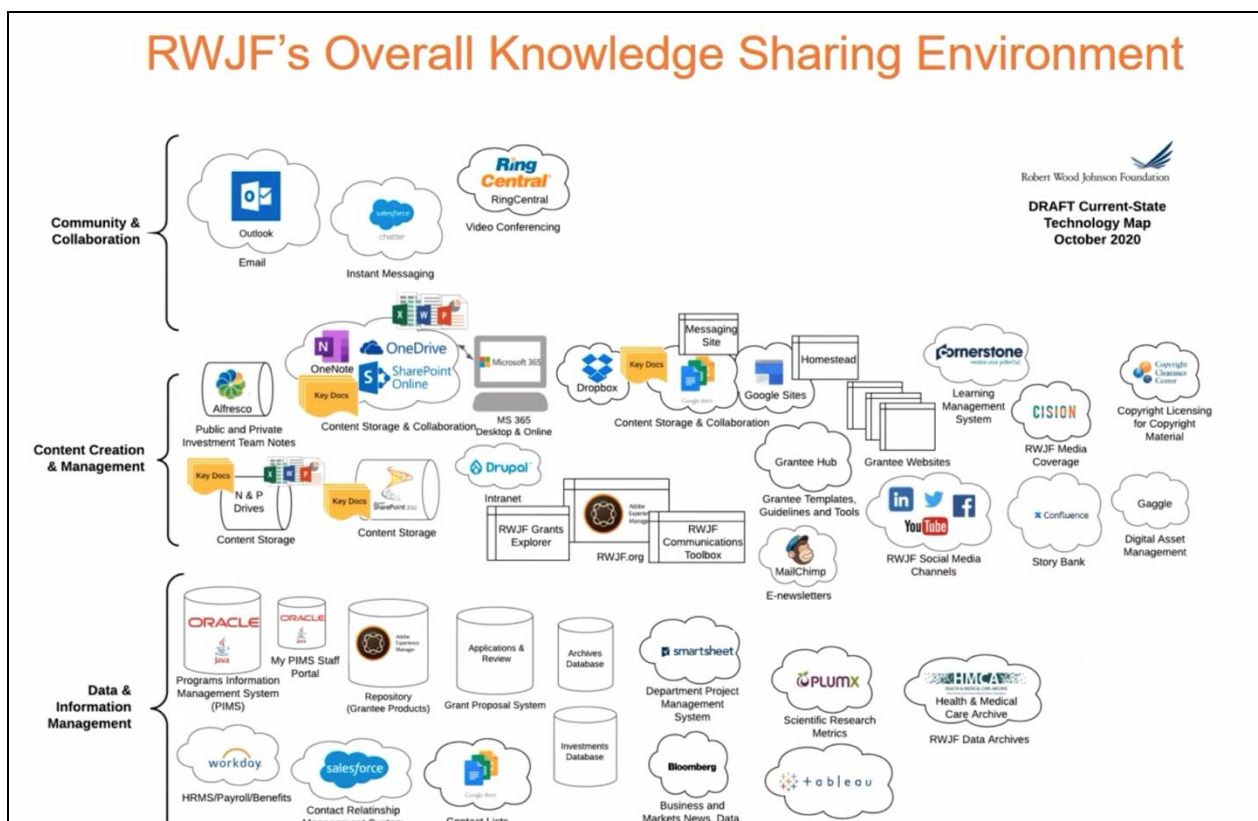
The Robert Wood Johnson Foundation developed a visual map of their overall knowledge sharing environment by placing each information resource or information communication technology into a tiered system.

Recommendations. Redesign the EDP MS Team site "General" channel and promote its use. Add additional channels, as needed. Create a SharePoint Online landing page for EITs. Consider additional comments from EITs that might benefit the OTCA IT department and its employees who are designing enterprise-wide content management and information systems. For example:

> "A lot of us want to work smarter, not harder, but we are working harder. It's a wild goose chase looking for information for a simple project."

> "Information is too decentralized. We need a landing page that links to resources. Right now there are too many places to look."

> "I'm not certain that HR items that are available on the intranet are the most up-to-date version. Sometimes forms are emailed, and an older version might be archived on the intranet."

> "I would like more 'help' guides and pointers to resources. Everyone has cheat sheets, but these are not discoverable. A key component of rotations is learning about the cheat sheets and having a colleague share those with you."

> "There is so much information we need to learn at first. It's frustrating to eventually come across a document that explains where a procedure came from and why we follow the procedures."

> "SiteManager is very confusing. I did not learn about step-by-step resources until much later than when I first started using the software."

Establish KM Liaison Network

A social network is composed of a group of individuals connected by social interactions and personal relationships. Network members typically leverage a dedicated website or information communication technology (ICT) to communication with each other by posting messages, comments, or images and creating content. It is important to note that adding social context to these information sources elevates them to organizational knowledge.

Purpose. The purpose for establishing a KM liaison network at ODOT is to model a KM culture that leverages the implementation of Communities of Practice (CoPs) as part of a KM framework for introducing KM into everyday work processes for knowledge transfer. The KM Team is eager to establish a high-level network of relationships with OTCA division heads or their designates to:

- introduce a foundational knowledge of KM—its purpose and practices,
- accelerate access to (i.e., communication with) divisions for work on future task orders,
- build relationships across not otherwise connected silos, and
- grow KM champions.

Activity. In April 2021, prior to the release of Guidehouse and TMC recommendations, the KM Team drafted an invitation list composed of key positions from targeted divisions and representatives that we had identified as pivotal to our pilot projects and KM implementation efforts (See Appendix H).

The practice of CoPs at ODOT was first piloted among HR workers during task order 2160-19-07. Creating an HR Liaisons CoP facilitated by the HR MS Teams "HR Liaisons" channel opened direct lines of communication between HR workers from across the state tasked with onboarding new employees. Advantages of this deliberate effort to connect workers with similar job tasks was to improve communication and standardize work procedures and standardize processes (e.g., correspondence with new employees).

Prior to this pilot CoP, interviews with members of ODOT senior leadership team in 2019 confirmed interest in an organization-wide liaison network and indicated their

willingness to serve on the network or to elect a designate on their behalf. By establishing an expectation to be the first line point of contact for their division about KM communication and initiatives, the KM Team intends to leverage the power of social networks.

Deliverable. The KM Team developed an informational script to recruit prospective KM network liaisons to join the network or appoint a designate (See Appendix I). In accordance with the modernization timeline, formal contact was delayed in anticipation of modernization announcements.

The KM Team defined the role of an OTCA KM network liaison as an established and familiar partner of the KM Team who serves as a first point of contact when the KM Team wants to share information about a KM initiative or to engage/recruit OTCA workers to participate in a KM-focused task, a pilot project, or user testing. KM Network Liaisons should have strong organizational ties and communication skills. In this way, they are naturally inclined to build connections among their working/social networks; facilitate communication about KM to their divisions/departments; and help coordinate efforts of the KM Team.

Meadows began working with ODOT graphic design in July 2021 to elevate the script into a flyer format and is awaiting a final proof. Text will be considered for task order 2160-22-05—Knowledge Management Awareness, Information Storage/Retrieval, and Workshops/Short Courses—in FFY 2021-2022.

In October 2021, the KM Team determined that targeted contacts for establishing the liaison network should expand to include OTCA division heads and district engineers (See Appendix J).

Continuing work. A targeted KM Network Liaison group is crucial for completing tasks in the current FFY task order 2160-22-04—ODOT Social Network Analysis Toward Critical Process and Procedure Identification and Improvement. This group will first receive the informational flyer and a personal invitation to become part of the KM liaison network. A personal phone call from a KM Team member will follow to answer questions. Network liaisons will be kept apprised of the monthly KM Team meetings and may request access to the MS Teams KM site.

With the proliferation of e-mail and collaborative technologies (e.g., MS Teams), many workers rely on impersonal media for communicating news and ideas. Our KM Team recognizes that nothing can substitute for one-to-one relationships and trust that develops among persons who share a common concern, a set of problems, or an interest in a topic and who come together to fulfill both individual and group goals (Wenger-Trayner & Wenger-Trayner, 2015). Hence, we consider members of the liaison network as first level KM champions.

Recommendations. Actively promote membership in the KM Liaison Network by rewarding members and making them feel valued (e.g., gamification points/badges, KM "swag," and an invitation to an annual event). Schedule regular (e.g., monthly or quarterly, as mutually agreed upon) personal contact between a KM Team member and a network liaison to build community cohesiveness, personal relationships, and buy-in for KM.

Grow MS Teams Engagement Among Early Career Engineers

The shift to telework accelerated the adoption of KM platforms, like MS Teams, by workers in many organizations. ODOT employees were no exception. The KM team

took advantage of this opportunity during the previous year's task order to research the ways ODOT HR and Maintenance Divisions were using MS Teams for communication, collaboration, and content creation/management.

Purpose. The purpose for growing the use of MS Teams among EITs is to further strengthen relationships and knowledge sharing among the newest ODOT engineers. The long-term goals is gaining new knowledge and work practices (e.g., automated spreadsheets) from newly graduated professionals; advancing new engineers at OTCA; retaining engineers as employees; promoting the development of an EIT CoP as a social benefit of working; and conferring status on actively involved EITs.

Activity. Blais added Farabough and Molina to the EDP MS Teams site to monitor activity in the EDC and General channels. Meadows introduced the General channel to EITs in February 2021. Files archived on the site include new employee forms, intern information, a resource guide, and travel arrangement/hotel reservation procedures. In July 2021, Farabough met with Trapper Parks to brainstorm ways to further engage EITs. They devised questions for EIT interviews. Farabough and Crawford interviewed during August and September 2021. Blais and Meadows, EDC members, and EITs reported that EITs rarely used their designated "General" channel. The posting/announcement feature was rarely used for communication. Initial questions posed by EITs to the group on the posts page were unanswered, which further discouraged use.

Farabough recognized that EDC members primarily used the EDP MS Teams site to post meeting agendas and minutes. This practice is commended as a first step for archiving project information. The wiki feature was not used by EDC or EITs.

One unintended consequence of EIT interviews was giving voice to EITs and the positive feeling this created. One EIT was anxious to report that the KM Team interview was the first time they'd been able to talk to an individual: "This survey asked questions that are pertinent to the EIT situation, and it was helpful that the interviewer took time to clarify and check for understanding. I feel comfortable sharing feedback in this kind of setting." Another EIT echoed, "I loved the ability to talk to someone and be transparent about my thoughts."

Overwhelmingly, EITs were willing and appreciative of the opportunity to share their opinions and ideas for improving the EDP. Detailed recommendations are provided in Section 3.0 of this report.

Deliverable. To better understand the hesitation and barriers to using MS Teams, the KM Team asked a series of related questions during interviews with EITs. Interview questions are listed below, with responses following each.

1. *Do you use teams?*

   Over 90% of EITs reported that they use teams, although use is generally limited to the chat (instant messaging) and video meeting features. The "General" channel is not used for archiving files, explicitly answering questions, or as a regular part of everyday workflow. MS Teams was used heavily during telework as a communication tool.

2. *How many teams are you a member of, and which ones are they?*

   Most EITs are members of several MS Teams—five on average—and their membership depends on rotation. For example, Squad, EDP, EIT Recruiting Materials, Roadway, Bridge Training, Residency, Division Staff, HR, 0365 Training,

and Geotech. Some mentioned that don't regularly pay attention to announcements in MS Teams.

3. *What percentage of people you work with use MS Teams?*

EITs estimated that 75% of their co-workers use MS Teams. There was consensus that usage is directly correlated to the age of the employee. In response to a follow-up question asking if they would like that percentage to increase, over half said yes; 13% said no. Three offered no opinion.

Comments about MS Teams included the following.

"MS Teams has potential that is not being used, like the team coordination planner feature."

It is a good tool—much better than Skype because it interfaces with other MS products and much better than email."

"MS Teams makes it easier to connect with people, especially for meetings while we're in the field."

"Leaders use MS Teams to quickly distribute materials."

"I like that you can access information on MS Teams anywhere and anytime. It is not locked down in the U drive."

4. *How can MS Teams help you complete a task/project more efficiently?*

Twenty-five percent of respondents offered no opinion. The balance of EITS offered Insightful responses that could inform future MS Team sites architecture and graphical user interface (GUI) design. For example,

"Use MS Teams as intended—a place for meetings, a platform for accessing and distributing information."

"Communication can become more efficient when using MS Teams fo instand messaging."

"We need a landing page for each MS Team site that says 'here's what this group is about'."

"I want to continue our meetings on MS Teams. I also like the contextual updates. This is a simple tool to use and a good place to get together."

"It would be helpful if people used it more. Sharing files would be helpful. I like how you can provide links to the files in chats."

"I use it for meetings, not for information. Our group met for 10 minutes every day at 4 p.m."

"I like asking questions using the IM chat."

"I've had multiple people use it for sharing a document, but not very often."

"I like using it to get the names of people to contact for help with a specific task."

"It's super helpful for sharing you screen to show someone how to do something instead of describing what you're doing in words."

"It is great for collaboration."

"I'd like it to be more searchable."

5. *How do you find information you are looking for on MS Teams?*

Thirty-five percent of those interviewed do not use MS Teams to find information; 25% use it to find people. Two respondents reported they use the HR MS Teams site extensively. In particular, EITs reported that

"I use MS Teams to find training, rotation training exercises, videos and some documents."

"The search function is better than most other resources at ODOT. I find files using keywords."

"The Squad MS Teams site uses the wiki feature where they share documents and store videos."

"Sometimes when a supervisor posts a word document or spreadsheet, there is confusion about where to go to access it (ODOT intranet or Division shared drive).

6. *What additional content would you like to access on MS Teams?*

Over half of the respondents had no opinion about this. Those that did shared the following comments:

"We need a landing page to direct us to information."

"The EIT group does not utilize their MS Teams page for information dissemination. It would be nice if they did. It would've been helpful to know expectations, tips, resources, necessary software, and other information for our rotations."

"I want more information sharing and meetings hosted on MS Teams."

"I wish more people used it!"

"I would like pointers shared on MS Teams about where to find resources I need from the ODOT intranet."

Continuing work. Interviews with the EITs formed the backbone of the KM Team's efforts to engage EITs and encourage the use of MS Teams. Following input from EITs and direction from Hagar, the EDP MS Teams' "General" channel will be rearchitected and promoted among EITs. Per interview responses, Farabough will upload additional content to the "General" channel files and architect a wiki with innovative knowledge previously created by EITs, including interactive spreadsheets, helpful tips for rotations, EIT photos and profiles, and an FAQ webpage.

Similar survey questions and the interview format can be used as part of MS Teams user testing among other divisions, departments, and CoPs. Answers will inform about ways to improve site design, manage content, and communicate purpose for use. It is important to note that one-on-one communication builds positive feelings about modernization efforts at OTCA.

Recommendations. The "General" channel for EITs should be renamed and redesigned to increase appeal and ownership by EITs. Continuous user testing should

be performed, and feedback should be solicited for making regular updates. OTCA is invited to utilize Farabough's Forum Innovation Agility Model (Farabough, 2021) to further develop and promote use of MS Teams as a KM tool/technique (See Appendix K).

The KM Team suggests systematically implementing similar surveys/interviews to other divisions/departments to grow MS Teams use at OTCA. Answers will inform about ways to improve site design, manage content, and communicate purpose for use. After surveying/interviewing, divisions, departments, and CoPs should receive training about on best practices for MS Teams sites, including standardization of use (e.g., communications, like instant messaging, video meetings, and announcement; and site architecture, like channel structure, uploading files, organizing wikis for archiving content, designing landing pages, and linking to statewide OMES systems). While templates could be provided for simplification, user testing should be performed for each division, department, and CoP to accommodate unique information needs.

Project Summaries to Capture Lessons Learned

A project summary is a project management tool that summarizes a project's history at a moment in time. The document serves as a project brief and an executive summary for not only project managers, but also for team members, contractors, service providers, and other partners. More importantly, a project summary serves as explicit documentation of organizational knowledge. These documents are concise, comprehensive, and provide an overview of all the key details/processes/contacts of a critical project. They communicate project milestones, metrics, and project timeline

updates to demonstrate how project teams got organized, kept on track, and worked together efficiently.

Regarding KM, project summaries are invaluable for helping work teams and new employees get a quick impression of a project's nature, status, and overall context, including social contacts. Project summaries often act as frameworks and proposals for upcoming projects with a goal of making project planning and execution much easier.

Purpose. The purpose for developing a project completion summary (or lessons learned) template was to initiate a practice of inserting KM into the everyday workflow at ODOT. This practice should be adopted by all OTCA. Documenting lessons learned is a method for gathering critical information to retain knowledge that is gained through various projects (i.e., learning through *experience* in the form of observation or participation). The document should capture/show ways (i.e., *patterns*) for doing things (i.e., the process) in certain circumstances. This is especially true for processes that have been identified as critical for generating value to the organization. The goal is preventing institutional knowledge loss and *improving* the way things get done.

Activity. Work for this task commenced in January 2021 with a literature review and environmental scan of state DOTs that utilize lessons learned in their organization. Team members synthesized what they learned into a proposed project summary template. The team considered issues related to indexing documents in a knowledge repository, including the use of controlled vocabularies and/or taxonomies to standard terms and make project summary completion and subsequent document searching simple and more efficient.

Interviews with ODOT employees confirmed an interest in Project Summary documents. One ODOT employee reported in their interview that "it is best to work from examples completed before… at least a packet with job leadership position information and an idea of how to carry out specific functions."

The KM Team joined efforts with the Strategic Asset and Performance Management (SAPM) Division to develop a final document prototype that can be used universally across OTCA. In October 2021, KM Team members Meadows and Molina met with John Leonard (ODOT Construction Division Engineer), Daniel Ngueyn (ODOT Division Manager for Project Management Division), and Shawn Davis (ODOT Director of Operations) with an intent to prevent duplication of work and jointly devise a single form that could be used organization wide. The goal is for the project completion form to be utilized, stored, and widely accessible via a single search in an enterprise-wide search engine.

Deliverable. Samples and forms from CA, MN, MT, TN, TX, VA, and WA are archived in the MS Teams KM site. Examples are shown below in Figures 2.8 through 2.10.

The KM Team developed the Project Summary Form shown in Figure 2.11 for consistent and widespread use by all OTCA divisions and departments. Careful consideration should be given to where the forms are stored and how workers can successfully access them. See Appendix L for an example of a completed Project Summary form.

Figure 2.8

Spreadsheet used by WSDOT in their Lessons Learned Database

	A	B	C	D	E	F	G	H	I	J
1	Quality Office Lessons Learned Database for PS&E									
2	Use the Table below to find issues that occurred and Lesson Learned									
3	Region	Date	Project Title	Project Type	Project Size	Category	Issue	What we did right	What we did Wrong	Actions for Improvement
4	Northwest	1/25/2019	SR 000 EXAMPLE Project	Intersection	>$5,000,000 and <$10,000,000	Traffic Control	Vehicular Traffic turning into Pedestrian Path from RAB	Installed Bollards	During construction we did not clearly identify path	During consturction evaluate the signage to ensure drivers understand
5										

WA lessons learned are captured in an excel spreadsheet that populates a database. Column headers include region, date, project title, project type, category, issue, what we did right, what we did wrong, and actions for improvement. Contact information is not provided. Consistent with the intent of lessons learned, the goal is process improvement.

Figure 2.9

CalTrans Captures Lessons Learned using Photographs

Full CalTrans presentation is available at https://www.flowstobay.org/wp-content/uploads/legacy_media/2.%20Burlingame%20C.6%20Lessons%20learned.pdf

Figure 2.10

VDOT Lesson Learned Form

VA project results documents have a title and location. Headings include purpose, cost, results, and conclusions. Contact information is not provided.

Figure 2.11

Proposed Project Summary/Lessons Learned Template

Project Summary Document

Prepared for:
Prepared by:
Date Prepared:

How to Use this Document: This document is used to record lessons learned from a project. Under the Project Information heading you will include basic elements describing your project including key words related to your project. This will assist in users being able to search and access project summaries. Under the Lessons Learned heading you can be more descriptive and provide insight into specific challenges you faced and any important takeaways you learned. Recording this information will contribute to a database that will assist employees in carrying out future similar projects.

Project Information
Project Title:
Project Begin/End Date:
Project Description (Brief):
Key Words:
Project Team (Name, Title, Division, Email):
Project Goal:
Location/Site:
Lessons Learned Information
Challenges:
Key Takeaways:

Continuing Work. The KM Team will continue to work with SAPM to finalize a proposed project completion form, determine critical projects, perform user testing, and train on using the form.

Recommendations. Of utmost importance is optimizing searchability/findability by assigning meaningful keywords. Individuals working on a final form should consider the advantages and disadvantages of using controlled vocabulary, industry taxonomy, and/or OT-specific taxonomy, as well as how the form will interface with a technology system's artificial intelligence (AI). Based on currently technologies, the KM Team recommends considering the TRB Transportation Research Thesaurus (TRT), which is a tool to provide a common and consistent language for transportation information. Terms are arranged in hierarchies under 21 top concepts and can be accessed at the following url: https://trt.trb.org/

Challenges for lessons learned initiatives include a) methods for collection, b) process of documentation, and c) communication of the lessons learned. One caution when implementing a practice and process for lessons learned is that once information is captured/documented, many documents become lost in a shared drive or an infrequently used database. Research has shown that organizations often fail to assimilate the lessons that were identified; thus, people don't change the way they work, and the organizational culture fails to evolve from experience.

The KM Team advises to adhere to the following best practices for capturing lessons learned in a project completion summary document:

1. *Collection.* Either on the fly as part of workflow embedded MS Teams' conversations or schedule a moderated postmortem meeting. Consider this a project milestone or "gate." A key facet is asking individuals to play the devil's advocate, identifying problems encountered during the project. Admitting failures is a good thing.

2. *Prioritization.* Quantity does not mean quality. Key project stakeholders should assimilate lessons collected from a wide array of project participants from all "matrix" (i.e., hierarchical) levels. A scoring system can be helpful. Our proposed form as just three parts.

3. *Documentation.* Lessons should be documented in a consistent, standardized format to facilitate future retrieval. Use actionable "terms" (i.e., "you will need," "we will strive"), identifying practical changes in the processes.

4. *Communication.* Link lessons to project deliverables (e.g., timelines, budgets, risk management) so that before another project begins, the lessons are easily accessed. In fact, they should be built into the process. It is helpful to assign keywords, key people with contact information onto a physical document that is easily searchable. The ODOT KM task force team has a goal to make the practice of gathering and using lessons learned part of leveraging KM in the everyday workflow at ODOT. We are recommending the capture of brief lessons learned documents and archiving them in an organization-wide SharePoint site that can be accessed by all employees (i.e., without information siloed off by division or department). Information should not contain proprietary or private information. Alternative forms of communication could include videos, podcasts, checklists, storytelling.

5. *Assimilation.* Create a checklist for project deliverables (e.g., timelines, budget, risk-response) and regularly update those with lessons learned from each project. Make reviewing the brief lessons learned sheet from a previous project a part of the kick-off meeting/"gate" for a new, similar project. Checklists should be reviewed and updated with each project's lessons learned document.

When commencing a lessons learned initiative, it is important for each division/department to clearly define what knowledge generates value and center the lessons learned meetings/documents accordingly. The best way to assimilate lessons learned is to incorporate lessons learned into process assets. This final step should be done after each project.

A balance between Information confidentiality, integrity and availability should be determined based on thoughtful decisions regarding document access and control (i.e., ability to enter and edit data). Accordingly, permissions should be granular. While every OTCA employee should be able to search for and find these brief project snapshots, changes and suggestions might take the form of added comments so that the agreed upon process is preserved until it is formally edited by the process owner. The overall goal is to minimize work duplication and promote continuous improvement is possible. It is extremely important to provide the social context (i.e., people to contact) for each project and process/procedure.

User experience, followed by user testing (e.g., database architecture and graphical user interface), should be evaluated before introducing the forms organization-wide

Collaborate with Modernization Initiative

KM, thus the KM Team's goals, purpose, and efforts, are closely aligned with the Modernization Initiative at OTCA.

Purpose. The purpose for working in concert with groups leading the modernization effort at OTCA was (and is) to ensure no duplication of effort and to be recognized as an extension of positive changes at ODOT, rather than a separate

initiative. It was important for our KM Team not to overwhelm ODOT workers with our own surveys and to limit the amount of perceived disruption within the organization. Guidehouse's operational effectiveness consulting services (e.g., process diagnostics and improvement, change management, and organization transformation) and the changes proposed by the TMC are in line with a strategic plan that includes implementing KM practices into an organizational culture. Hence, when task order 2160-20-07 was proposed in the early fall of 2020, the KM Team agreed that Guidehouse and modernization efforts took precedence.

Activity. A February 9, 2021, meeting with Guidehouse consultants offered the opportunity for KM Team members to ask questions about plans for process improvement, KM initiatives, and new technologies for OTCA. Guidehouse representatives reviewed task order 2160-20-07 and advised the KM Team to move forward with our tasks, indicating that our work and grassroots efforts would likely be beneficial for aiding OTCA when implementing modernization recommendations and initiatives.

Throughout the 2020-2021 task order, the KM Team regularly reviewed and archived (on the KM MS Teams site) guiding principle and modernization vision emails/flyers sent on behalf of Secretary Gatz and the TMC. Blais kept the KM Team apprised of the modernization initiative timeline; other team members reported the "pulse" of ODOT workers as the organization progressed through stages of the modernization initiative. Drafts of the executive summary and final report were reviewed, with associated KM activities noted. These included implementing an element of KM into performance reviews; leveraging cabinet-wide IT services for developing a

ubiquitous enterprise-wide database for content creation, search, and discovery; and embedding KM practices into HR services from hire to retire (e.g., training, professional development, leadership, knowledge sharing, lessons learned, exit interviews).

Deliverable. CINO Seymour joined our KM Team and became our liaison with OTCA senior leadership. Seymour recommended Hagar and Dawley as KM team members and asked for team member profiles and KM activities to assist with recruiting additional KM Team members, as well as KM liaisons for the extended network. This document is archived on the KM MS Teams site.

Hagar and Dawley became active members of the KM Team, with Hagar offering valuable insights about impending cabinet-wide IT services, as well as a unified SharePoint intranet platform as a solution for enterprise-wide information/content management and searching. Hagar is to be commended for her intuitive awareness of and desire for practicing KM at OTCA, "I really just want to see efficiencies created and help make people's jobs easier and more streamlined using the tools and technologies we have at our disposal."

Continuing work. Like modernization efforts, KM should be an ongoing part of modernization initiatives and innovative practices/procedures at OTCA. First steps toward this are described in task orders 2160-22-05 and 2160-22-06 in FFY 2021-2022.

Recommendations. The KM Team recommends that our members remain actively involved in modernization activities and that the group's tasks become part of strategic plans for innovation at OTCA.

3.0 Results and Recommendations

Presenters at the November 2021 KMWorld Connect Conference emphasized that the current state of KM is affected by four drivers: 1) search and findability; 2) expertise location (i.e., people are another type of content); 3) digitally enabled communities; and 4) innovative technologies (KMWorld, 2021). These same issues are at the forefront of needed KM decisions and technology solutions at OTCA when implementing KM framework.

Based on the KM work accomplished at ODOT in the past three years, the KM Team suggests the following four areas of action.

1. **Insert KM practices from the ODOT KM Implementation Framework into everyday processes and procedures (i.e., workflow) at OTCA**

   KM is most sustainable when it becomes part of everyday work. To do so, senior leadership must embed KM support into real business problems and targeted business groups. This can take many forms (e.g., KM liaison network; MS Team members have part-time KM duties; KM champions are recruited from divisions and embedded into the teams they support; KM champions gain social capitol and rewards for participation; KM champions are responsible for knowledge sharing among their CoP). KM should be promoted as a tool for helping and supporting people to do their jobs easier and more efficiently. KM should be tied to performance and career goals and should be integrated into the way everyday work gets done. Finally, KM practices and procedures should be designed to make it easy to contribute, access, and use knowledge. This can be accomplished by:

- Introducing KM-framework practices and procedures for knowledge capture and sharing across divisions and departments as part of modernization initiatives

- Utilizing MS Teams for capturing real time social context (i.e., subject expert names, knowledge, and roles) and related project information and files

- Leveraging the subject expert locator feature in Workday, populating it with employee profiles and u[dating profiles annually

- Including KM as an annual work performance measure

- Sharing organizational knowledge in learning management systems and during training and job enhancement/advancement programs

- Scheduling, documenting, and archiving project kickoff meetings so they are searchable and accessible by all OTCA employees

- Scheduling, documenting, and archiving project close-out meetings, utilizing standardized project summary/lessons learned form to achieve continuous improvement and innovation; include employee, contractor, and or partner names and contact information on project completion summary documents

2. **Implement a strategic plan for knowledge transfer**

Because tacit knowledge is high-risk and most knowledge at ODOT resides in the experiences and minds of ODOT employees, KM efforts should identify critical knowledge for each division, which is addressed in FFY 2021-2022 task order 2160-22-04—ODOT Social Network Analysis Toward Critical Process and Procedure Identification and Improvement. Data collection is aimed at identifying critical processes and key employees who affect the flow of information within each division, as well as highlight the roles key individuals play in their network of influence (e.g., gatekeeper, broker, isolate). Questions will:

- Identify critical knowledge for each division; capture role-specific knowledge

- Prioritize critical knowledge

- Identify critical knowledge gaps

- Document communication media and methods used for sharing information

Data analysis should:

- Determine techniques for knowledge capture (See Figure 3.1 for knowledge capture spectrum)

- Develop a knowledge transfer plan, based on the following techniques:

  - *Formal knowledge elicitation,* including retiree transfer interviews and lessons learned capture/transfer

  - *Expert-and peer-based approaches,* including CoPs, expert locator systems, mentoring, and enterprise social networking

  - *Learning sessions and events,* including training courses, webinars, conferences and workshops, collaborative problem-solving sessions.

  - *Documentation approaches,* including a content portal, best practice or lessons learned database, blogs, and wikis

- Build on ODOT's strong, long-standing tradition of sharing tacit knowledge orally by building an expert locator system within Workday

- Identify key individuals with tacit knowledge

- Identify employees with similar work roles and processes across OTCA and facilitate the formation of CoPs

The KM Team recommends following the same month-by-month schedule that was implemented when updating legal processes and procedures in 2019.

Figure 3.1

Knowledge Capture Techniques

SPECTRUM FROM SYSTEMATIC TO ORGANIC

Enterprise social networking	Expertise location	Lunch-and-learns	Formal mentoring	Knowledge mapping
	Informal mentoring / "Ask the expert" service	Webinars, seminars, presentations	Expert/retiree knowledge transfer	
	Communities of interest	Chartered, sponsors communities of purpose		Knowledge capture interviews
	Informal Communities of practice *Formal*			

← **Organic** — **Systematic** →

	Content portals, libraries, and repositories				Facilitated transfer of best practices
Spontaneous knowledge sharing & collaboration	Unmanaged repositories, spontaneous contribution	Wikis	Lessons learned databases	Managed repositories, targeted harvesting	After action reviews, lessons learned capture
	Peer-contributed videos / Blogs	Targeted, indexed videos			Training courses, e-learning
Informal Knowledge sharing events *Formal*					
Conversations with colleagues		Conferences and workshops			

9

APQC developed the "Spectrum from Systematic to Organic" guide for categorizing methods for capturing knowledge in an organization. Methods are shown from organic on the left to systematic on the right. Purple-colored methods are expert- and peer-based approaches. Chartreuse-colored methods are learning session and event driven techniques. Dark blue-colored methods require formal documentation. Light blue-colored methods are the more frequently recognized, traditional knowledge capture practices.

3. Architect a technology solution for accessing organizational knowledge

Design a portal-structure technology with target audiences in mind. Perform extensive user testing.

- Ensure robust search functionality

- Make knowledge accessible/open access to everyone, everywhere on mobile devices

- Establish an FAQs with searchable content; if search is unsuccessful, then provide a subject expert contact

- Allow users to customize the information that is pushed to them (i.e., notifications)

- Focus on data visualization (e.g., infographics, videos, images, knowledge maps to graphically display datasets using clouds, maps, charts, and graphs) for helping users by showing trends, patterns, and ideas expressed in the data

- Extend the use of MS Teams and SharePoint to ensure organizational information is captured within a social context, which elevates information to knowledge

- Create SharePoint Online landing pages customized for each Division with links and instructions for accessing most often used information resources

- Introduce and implement a practice of user testing to bridge the gap between IT solutions and employees who use the solution

- Leverage artificial intelligence for content accessibility. Intelligent search is useful for gaining a better understanding of behavioral patterns, analyzing sentiment, and actively learning and adapting search/find for information requests

Regarding the use of AI, keep in mind that "if you have 10 million documents, which a company of medium-to-large size is not unheard of, and they are in six or seven systems, knowledge repositories and different platforms, you have something on SharePoint, something on shared drives, AI is not going to do anything for you" (Piazza, as cited in Clark, 2020).

4. **Improve EDP engineer engagement by a) establishing an active CoP, b) adding content to EDP MS Teams, and promoting the use of MS Teams**

A remote workforce brought with it both positive and negative unintended consequences. Many EITs were negatively affected by distance learning, believing they did not build necessary relationships for learning or becoming an integral part of the organization. Others believed they were more productive employees when working from home. Leveraging KM tools and best practices (e.g., MS Teams; digital documentation;

instant messaging; subject experts; collaboration) increased the likelihood of more effective collaboration across remote teams and locations.

Supporting asynchronous, distributed work with access to needed information is becoming the status quo. Workers often share work-in-progress virtually, which makes implicit knowledge explicit. Without a doubt, a digital workplace helps move KM forward. Despite these advancements, the KM Team recommends a return to more traditional indoctrination, including face-to-face meetings for sharing basic organizational knowledge with EITs and building loyalty to the organization.

- Prepare a welcome packet for new EITs

- Host a "job fair"-like welcome week

- Develop a larger pool of EIT mentors; allow EITs to select their mentor

- Schedule EDC mentor check-in prior to checking in at a new rotation

- Create a CoP among EITs with individual class years connected by social network technology and communication channels

    o Schedule additional casual gatherings, like holiday parties and lunch mixers

    o Schedule annual training event in OKC

    o Schedule ongoing online training

    o Schedule monthly virtual 10-minute check-in meetings

- Continue to build perceived "family"-like connection among employees

- Create an MS Teams channel for each rotation, adding content like best restaurants, stores, entertainment, and other helpful hints for daily living

- Benchmark MS Teams usage by examining web analytics; continue to monitor usage

- Provide a learning model for tenured division/field work ODOT employees to address misogynistic attitudes and comments toward young female EITs

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The current state of KM as a discipline is fundamentally built on four drivers: 1.) search and findability; 2.) expertise location (i.e., people are another type of content); 3.) digitally enabled communities; and 4.) innovative technologies. A remote workforce has brought KM to the forefront. KM practices (e.g., MS Teams; digital documentation; instant messaging; subject experts; collaboration) have facilitated more effective collaboration across remote teams. Supporting asynchronous, distributed work with access to needed information has become the status quo. As of late, workers must share often work-in-progress virtually, which makes implicit knowledge explicit. The tools we use to work this way are in essence KM—people, process, content, and technology. The creation of a digital workplace helps move KM forward. FAQs with searchable content, and if search is unsuccessful, then provide a subject expert contact.

Necessary facets of KM. multifaceted knowledge-management-related work, including KM strategy, social network analysis, communities of practice, and design and implementation of portal structures. Data visualization is gaining popularity (e.g., infographics, videos, images, knowledge maps to graphically display datasets using clouds, maps, charts, and graphs). These will help users by leveraging a visual representation of trends, patterns, and ideas expressed in the data.

Conoco Phillips. At ConocoPhillips. nearly 20% of the employee base is eligible for retirement. "Knowledge Sharing." Network of the Year. Hall of heroes (3 or more years of network of the year).

Role of AI. AI can be used to understand behavioral patterns, analyze sentiment, and actively learned and adapt to individual requests. However, "if you have 10 million documents, which a company of medium-to-large size is not unheard of, and they are in six or seven systems, knowledge repositories and different platforms, you have something on SharePoint, something on shared drives, AI is not going to do anything for you" (Piazza, as cited in Clark, 2020).

PowerPoint by Leni Oman presented virtually November 4, 2021, to the Committee on

Knowledge Management at the AASHTO Agency Administration Conference.

Evolution of Knowledge Management

The first generation of KM as a practice focused on finding and capturing information just in case it might be needed in the future. It focused more on technology and information than with knowledge. Concepts for knowledge assessment, knowledge asset management and knowledge technologies emerge. Nonaka publishes *A Dynamic Theory of Organizational Knowledge Creation*.

Third generation of KM addresses the issues of a complex, trans-organizational context where knowledge flows in a semantic grid. Knowledge architecture, knowledge leadership and strategy emerge.

Supply Side KM

People & Semantic Agents

1990s — 2000s — 2010s

Demand Side KM

The second generation of KM focuses on the sources of knowledge – people, communities and organizations. Organizational learning, organizational culture and communications, collaboration and communities, intellectual capital and knowledge-embedded business operations.

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1998

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2004

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2005

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✓ FHWA - *Knowledge Management: Everyone Benefits By Sharing Information* published in Public Roads

2001

✓ National Transportation Library pilots Midwest Transportation Knowledge Network (TKN) established

2003

✓ VA DOT Knowledge Management Division established
✓ Scoping Study for a National Strategic Plan for Transportation Information Management

2006

✓ TX DOT Pavement-Related Corporate Knowledge
✓ MSHA investigates KM as a potential business process
✓ PennDOT publishes *Knowledge Management*
✓ TRB Special Report 284 *TKNs: A Management Strategy for the 21st Century*

Knowledge Management in Transportation 2007 - 2010

- ✓ FTA creates Chief Knowledge Officer role
- ✓ AASHTO RAC TKNs Task Force begins
- ✓ MSHA tests CoPs
- ✓ Western TKN established
- ✓ National TKN established
- ✓ Transportation Librarian's Toolkit
- ✓ NCHRP Report 365 *Preserving and Using Institutional Memory Through Knowledge Management Practices*

- ✓ NCHRP Report 643 *Implementing Transportation Knowledge Networks*
- ✓ KS DOT *Ontology Engineering for Management of Data in the Transportation Domain*
- ✓ *Developing a Transportation Knowledge Network*, TR News, Issue 261
- ✓ *Point of View: Making Transportation Libraries and Information Services a Priority*, TR News, Issue 261

2007

2009

2008

- ✓ Eastern TKN established
- ✓ VA DOT wins the Harvard award for Innovations in American Government: KM for their Knowledge Management Toolkit
- ✓ AK Knowledge Transfer in State of Alaska Agencies

2010

- ✓ Pitch made for AASHTO Special Committee on Knowledge Management
- ✓ AASHTO SCOH develops a resolution for Transportation Workforce Planning and Development
- ✓ WSDOT publishes *Organizational Network Analysis for Two Networks in the Washington State Department of Transportation*

Knowledge Management in Transportation 2011 - 2013

- ✓ TRB Task Force on Knowledge Management
- ✓ WI DOT *Best Practices in Guidance for Workforce Transition and Succession Planning* – including Guide to KM
- ✓ GA DOT publishes *Developing Strategic Systems Supporting Communities of Practice*
- ✓ ME DOT publishes *Institutional Memories of Road Design*
- ✓ AK DOT&PF publishes Serving Future Transportation Needs
- ✓ Public Roads Volume 74, Issue 6, includes *Masters of Information, and Using Information Investments Wisely*
- ✓ Knowledge management in theory and practice, 2011
- ✓ *A Knowledge Management Platform for Infrastructure Performance Modeling*
- ✓ *Low-Cost Knowledge Management Techniques for Use in a Changing Workforce*

- ✓ NCHRP Report 754 *Improving Management of Transportation Information*
- ✓ 2013 – NCHRP 20-68A (12-04) Domestic Scan on Knowledge Management
- ✓ *KTC Outsourcing and Its Impact on Knowledge Management*: Case Study of Kentucky Transportation Cabinet.
- ✓ Knowledge Management as Part of Strategic Workforce Development in Transportation Agencies presentation
- ✓ *Systems Thinking for Knowledge Transfer in Organic and Mechanistic Organizations*: State Government Transportation Research Organizations

2011

2013

2012

- ✓ MAP-21 includes a mention of Transportation Knowledge Networks
- ✓ AK DOT&PF publishes *Knowledge Transfer Needs and Methods* research report.

Knowledge Management in Transportation 2014 - 2018

- ✓ NCHRP 20-68A (12-04) *Advances in Transportation Agency Knowledge Management*
- ✓ GA DOT establishes KM Task Force and publishes *Implementing Communities of Practice in the Georgia Department of Transportation*

- ✓ TR News issue on *Applying Knowledge Management* published
- ✓ GA DOT *"JOB SEEKER"* (Job Shadowing for Employee Engagement through Knowledge and Experience Retention) published
- ✓ *Knowledge and Information – Critical DOT Assets* published
- ✓ A Model for Effective International Knowledge Exchange presented

- ✓ First meeting AASHTO Committee on Knowledge Management
- ✓ VT AoT publishes *Employee Retention and Knowledge Management Study*
- ✓ KTC publishes *Developing Knowledge Management Strategies*

2014   **2016**   **2018**

2015

- ✓ NCHRP Report 813 *A Guide to Agency-Wide Knowledge Management for State Departments of Transportation*
- ✓ UT DOT Tacit Knowledge Management
- ✓ WS DOT initiates Deploying Practical Solutions using Lean Techniques & KM

2017

- ✓ AASHTO Committee on Knowledge Management created
- ✓ Caltrans *Knowledge Transfer Guidebook* published
- ✓ NCHRP Report 846 *Improving Findability and Relevance of Transportation Information*
- ✓ Mn DOT begins developing knowledge books
- ✓ TCRP Report 194 *Knowledge Management Resource to Support Strategic Workforce Development for Transit Agencies*

Knowledge Management in Transportation 2019 - present

- ✓ Transportation Research and Connectivity project initiated
- ✓ GA DOT *Tacit Knowledge Model to Support Knowledge Capture and Transfer in GA DOT* published
- ✓ NCHRP 23-02 *Guidelines on Collaboration and Information Security for State DOTs* initiated
- ✓ NCHRP Report 947 *Implementing Information Findability Improvements in State Transportation Agencies*
- ✓ MN DOT publishes web-based *Bituminous Knowledge Book*

- ✓ 23-31 *Enabling Knowledge Management through Leadership Culture & Strategy*
- ✓ Assessing and Measuring the Business Value of Knowledge Management
- ✓ The Art of Decision Making
- ✓ Strategies to Strengthen Data Driven Decision-making

2020   **Anticipated**

2019

- ✓ 20-24 (95) *Ensuring Essential Capability for the Future Transportation Agency* completed
- ✓ *Agency Capability Building Portal* published
- ✓ TRB Standing Committee on Information and Knowledge Management created
- ✓ WSDOT completes *Deploying Practical Solutions using Lean Techniques & KM*

2021

- ✓ NCHRP 20-24 (131) *Mapping the Connections of AASHTO Committees* visualization tool released
- ✓ NCHRP 23-14 *Research Roadmap for Knowledge Management* initiated
- ✓ NCHRP 23-18 *Understanding Knowledge Management in Context with Other Organizational Practices* initiated
- ✓ ACRP 01-49 *The Evolution of Knowledge Management at Airports* initiated

AASHTO Committee on Knowledge Management (CKM)

2018

- ✓ 1st AASHTO CKM Annual Meeting
- ✓ Three task forces established
- ✓ Strategic Plan adopted
- ✓ Created a CKM website
- ✓ Surveyed members about CKM expectations
- ✓ Submitted one problem statement to NCHRP

2019

- ✓ 2nd AASHTO CKM Meeting
- ✓ Mid Year Meeting
- ✓ Initiated an annual CKM survey of practice
- ✓ Joint Task Force on Managing the Impacts of Digitalization on State DOT Workforces (JTF DIG) established
- ✓ Submitted 3 research problem statements
- ✓ Hosted 1 webinar
- ✓ Developed a case study template
- ✓ Prepared KM white paper

2020

- ✓ 3rd AASHTO CKM (Virtual) Annual Meeting
- ✓ Conducted annual CKM survey of practice
- ✓ Mid Year (Virtual) meeting
- ✓ Hosted 4 webinars
- ✓ Submitted 3 research problem statements
- ✓ Worked with the NTKN & TRB IKM on the KM Lib Guide

2021

- ✓ 4th AASHTO CKM (Virtual) Annual Meeting
- ✓ Mid Year (Virtual) meeting
- ✓ Conducted annual CKM survey of practice
- ✓ Initiated monthly knowledge cafes
- ✓ Participated in the out-brief of the JTF DIG
- ✓ Updated the CKM web design

2022

What's next?

Knowledge needs to be a verb.
W. Edwards Deming

What will we do next?

APPENDIX B: Knowledge Management at ODOT

During the first KM task order at ODOT, the KM Team agreed on the following concept for KM and developed a statement about KM specifically aimed at ODOT employees. This information will be included as part of the formal invitation to targeted employees for the expanded KM liaison network at the Oklahoma Transportation Cabinet Agencies.

What is KM?

KM is the deliberate and systematic coordination of an organization's people, technology, processes, and organizational structure for the purpose of adding value through knowledge reuse and innovation. This coordination is achieved through creating, sharing, and applying knowledge, as well as feeding the valuable lessons learned and best practices into corporate memory to foster continuous organizational learning.

How does ODOT define KM?

During KM task order year 1, the KM Team defined KM at ODOT as "a variety of techniques to help workers quickly find accurate subject matter information and expertise to more efficiently answer a question, solve a problem, or complete a task."

APPENDIX C: History of Knowledge Management at ODOT

Task Order 2160-18-06; Federal Fiscal Year (FFY) 2019.

Knowledge Management (KM) was formally introduced to the Oklahoma Department of Transportation (ODOT) organization under task order 2160-18-08 in 2019. To confront industry-wide challenges to knowledge loss, documenting processes, and intelligent search for information, Office of Research and Implementation engineer Ron Curb reached out in May 2019 to Scott Lange, April Meadows, and Elizabeth Blais in Human Resources (HR) and engineer Trapper Parks from Field District 8 to initiate a formal investigation of implementing KM at ODOT. Meadows and Parks were currently serving as ODOT representatives on AASHTO's Committee on KM. The task force began working with Oklahoma Transportation Library Director Michael Molina to develop the initial 2160-18-08 KM task order. The group coalesced into a team (hereafter KM Team) and met with KM advisor Michelle Farabough in October 2018. Farabough began working with the KM Team in January 2019 to develop a KM implementation framework at ODOT. In addition to executing tasks explicitly articulated in the initial task order (e.g., literature review on current state of KM, creating a KM strategy, developing a survey), additional activities included advancing the understanding of KM among the group, defining KM at ODOT (See Appendix B), gauging ODOT's readiness for KM implementation, and performing a comprehensive external environmental scan of KM activities in the transportation industry. This work continues today as KM Team members work in concert with modernization initiative efforts and network with their counterparts at state DOT who are also actively promoting

KM in their organizations. Several KM Team members attended AASHTO's Agency

Administration Conference in May 2019 and established collaborative relationships.

An internal environmental scan included informational visits with ODOT OMES and

technology workers, a review of ODOT's intranet platform, and interviews with division

heads. The KM Team recognized the need for a long-term, customized strategy for

introducing, promoting, and implementing a KM culture; hence, decided to implement a

department-specific, pilot program approach to introduce KM at ODOT. This strategy

included targeting specific business process projects, applying scalable KM techniques

for process improvement, modeling KM practices for information documentation and

sharing, and communicating one-to-one with ODOT workers about the purpose and

benefits of KM.

In November 2019, the KM Team presented an overview of first year efforts to

ODOT senior leadership. Individual KM Team members highlighted the importance and

potential impact of implementing KM to"

- identify critical knowledge,

- align KM with ODOT priorities,

- embed the KM Team,

- develop a KM strategic plan, and

- leverage technology and a growing KM culture

to mitigate knowledge loss and improve access to knowledge assets. The KM Team

asked for approval to continue their work and to be assigned a direct report from ODOT

senior leadership. Secretary of Transportation and ODOT Executive Director Tim Gatz

agreed with the team's assessment of ODOT readiness and affirmed leadership's

commitment to KM Team efforts. This signaled the development of a task order

proposal for a second year of funding.

Task order 2160-19-07; FFY 2020.

Work on the "Implementation of ODOT Knowledge Management Framework"

task order commenced in December 2019 and continued through September 2020.

Tasks included mapping critical knowledge assets and refining, then implementing a KM

framework for a pilot project that would introduce scalable KM practices that could be

adopted in other business-directed projects. To this end, the KM Team considered

several important projects before selecting HR digital onboarding as their focus.

Focusing on a project that addresses an identified organizational need was part of the

KM implementation framework developed in the first KM task order. An established

working relationship with employees from the HR department was attractive for KM

Team members, as effort could immediately be devoted to applying KM practices rather

than growing trust.

HR stated objectives for the digital onboarding project included:

- reducing work time associated with the onboarding process for ODOT
  workers
- alleviating new hire frustration over not having necessary information to
  complete their in-person onboarding process
- shortening time to new hire first-day-on-the-job
- decreasing time for obtaining new hire email address and technologies
- developing training videos to lead new hires through the onboarding process
- promoting information sharing among ODOT HR workers

- enhancing access to shared documents

- improving access to forms and documents by creating digital media from paper-based media

- documenting tactic knowledge

- archiving personal files from individual HR worker computers and office file cabinets in a shared digital workspace.

Further implementation of the KM framework introduced in the first KM task order included *developing a more comprehensive survey* for identifying critical knowledge assets used for the management/execution of hiring and onboarding processes by HR workers in ODOT's eight geographically dispersed field districts and the Oklahoma City office. A need to emphasize that workers are both creators and users of content became obvious. The developing KM framework also established a precedence for overcoming the noise of online surveys by *conducting personal, on-on-one interviews with key informants*. To accomplish this, the KM Team recognized that ODOT leaders situated in a targeted KM pilot project must serve as necessary, temporary partners with the KM Team, connecting team members with project stakeholders and generating buy-in for KM and the project. *Cultivating KM champions* is a KM best practice and was the impetus for establishing a KM liaison network at ODOT during the third KM task order.

Another important addition to the KM framework during 2020 was the consequential, yet value-added, *leveraging of an online, digital KM platform*, namely MS Teams, to simultaneously complete work and capture project knowledge. A forced exposure to such an online system would likely not have otherwise occurred. Dramatic changes to the work environment in the wake of the COVID-19 pandemic, afforded HR

workers a first-hand opportunity to better understand and enjoy benefits from KM tools designed to facilitate collaboration, communication, documentation, and retention. Individual interviews with HR workers uncovered changes in the HR hiring/onboarding processes/workflow necessitated by remote work. Workers could no longer walk down the hall to get a form, deliver or photocopy a document, or share a time-saving tip with a colleague in a face-to-face conversation. HR employees were quick to articulate their desire to decrease the inconvenience of a paper-based hiring/onboarding process; to increase the use of technology (e.g., digital signatures, accessing/sharing documents); to standardize documents (e.g., job offer letter, drug testing instructions); and to utilize instant messaging.

In this second KM task order, the KM Team prioritized *identifying organizational knowledge assets* specific to HR hiring/onboarding processes, as well as additional assets necessary for other HR processes, like tracking job transfers and promotions. ODOT HR workers explicitly articulated knowledge assets as:

- hard-to-find forms scattered on the ODOT intranet

- necessary links to various state-sponsored websites (e.g., employee self-service, OPERS, Sooner Save, Pathfinder, OMES group insurance division)

- customized spreadsheets saved on personal computers

- subject expert names and contact information stored in personal memory and/or written among personal notes

- field district-created job-offer letters, drug testing directions, and personal protection equipment information for new hires.

One HR worker described a folder she keeps current with examples of up to date, filled-out forms and a list of necessary URLs to guide new hires through the onboarding process. A KM implementation framework should include a process for *discovering such innovative knowledge assets, recognizing workers who make process improvements, and determining a method for sharing improved workflow processes with workers tasked with similar processes.*

Suggestions for process improvement to the HR onboarding process included:

- streamlining HR hiring/onboarding collateral materials and workflows,

- establishing the practice of user testing for processes and technology solutions, and

- establishing CoPs among HR workers in the eight field districts and the Oklahoma City office.

As a result, Meadows established the "HR Liaisons" MS Team channel as part of the "ODOT Human Resources" MS Teams site, where announcements are made, updates are communicated, files are shared, and live video meetings like New Employee Orientations are hosted (See Figure C1).

During 2020, KM Team member Blais leveraged her increasing knowledge about KM and advanced HR use of MS Teams throughout the ODOT organization with the ODOT Human Resources MS Team site. This knowledge asset is currently used to post announcements about meetings; answer FAQs; store files/forms; link to resource URLs; and share information about rules, state employee discounts, and job postings at ODOT, OTA, and OAC. Blais and ODOT HR is utilizing MS Teams as a one-click

resource for OT workers that incorporates KM best practices into its site architecture,

design, content, and use (See Figure C2).

Figure C1

Screenshot of Social Communication in ODOT MS Teams HR Liaison Channel
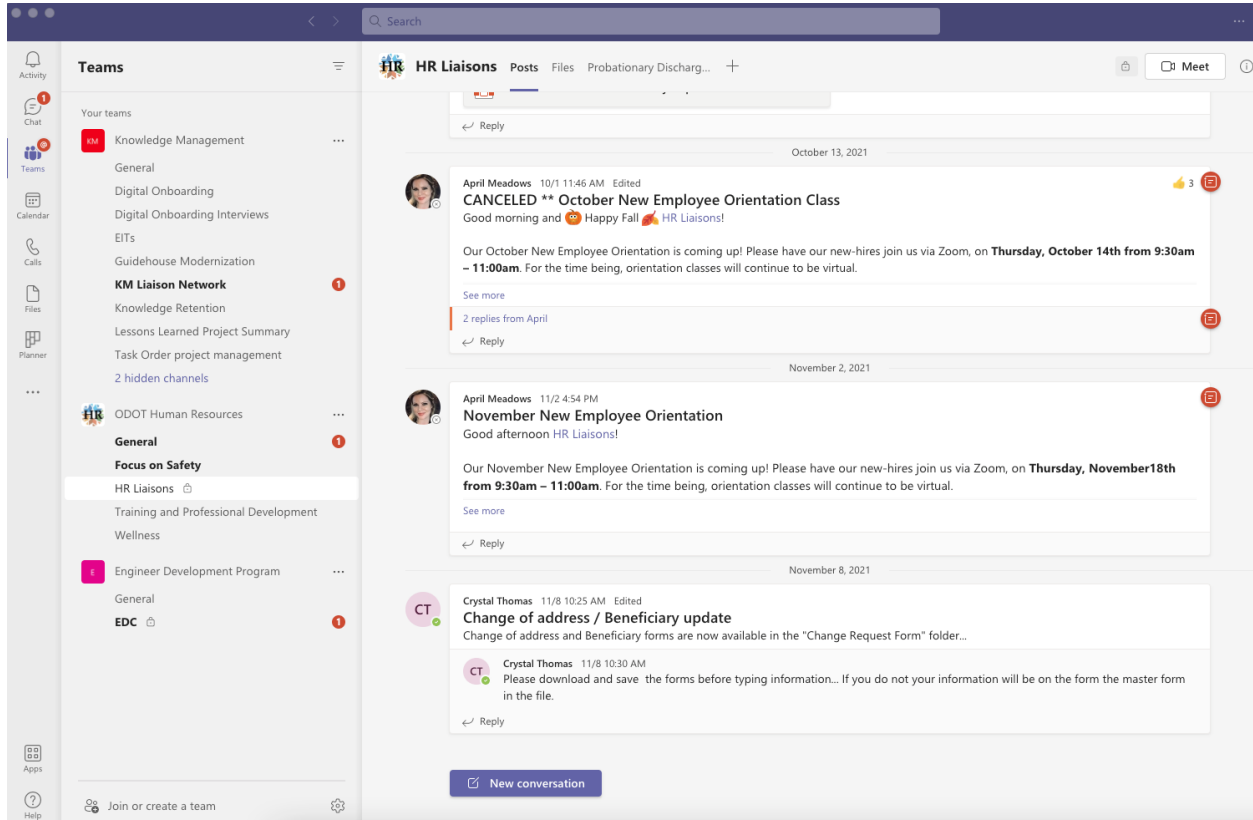
Figure C2

Screenshot of Files Archived in ODOT MS Teams HR Liaison Channel
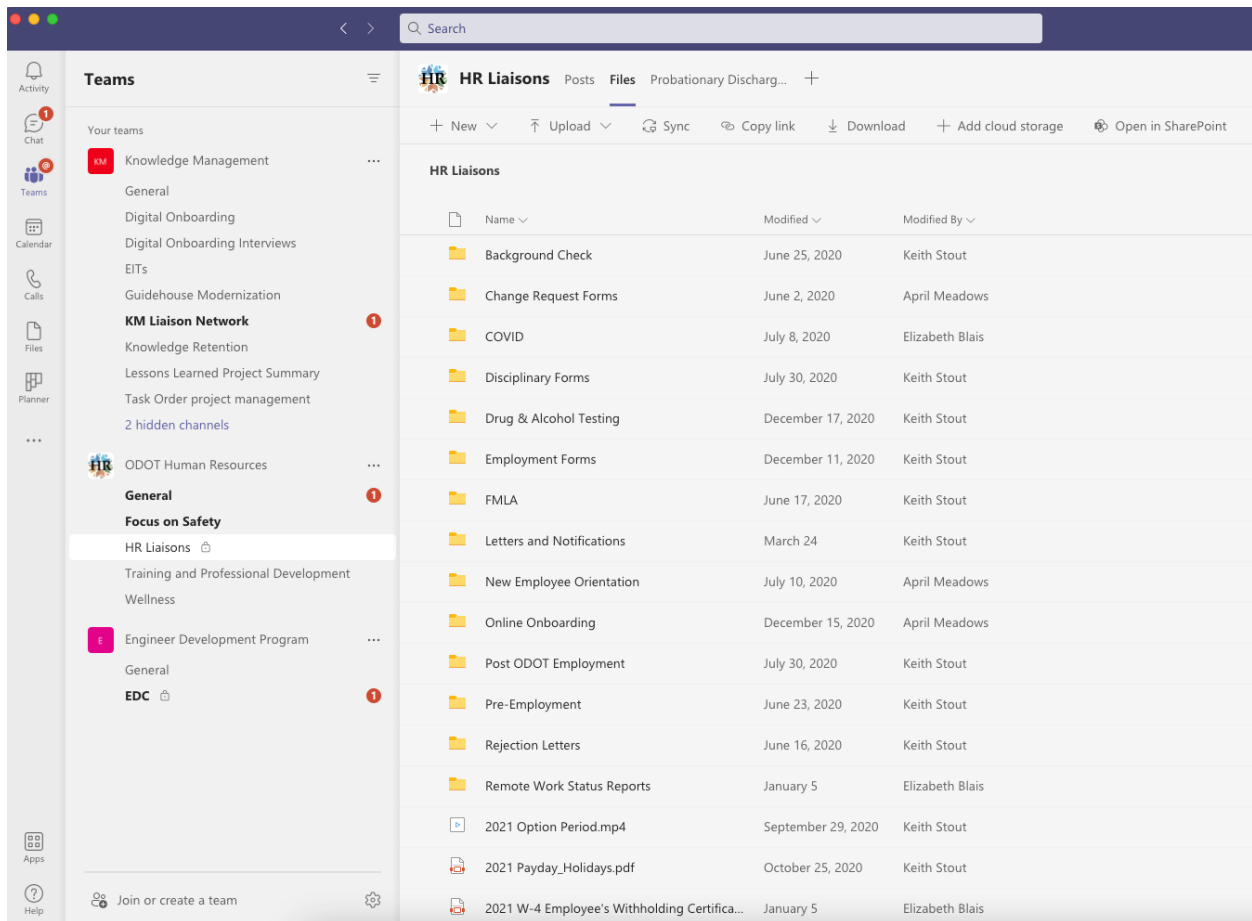
A request by Secretary Gatz to investigate best practices and vendors for developing training videos for field workers inserted an element of scope creep into the second KM task order. Molina and Farabough conducted a literature search, performed an environmental scan, and made recommendations based on their findings. Since KM involves all aspects of worker engagement with an organization, especially training, learning, and evaluation, the team welcomed the opportunity to provide input for the video training project. As HR director, KM Team member Lange was able to provide expert knowledge about alternative training resources and predict how ODOT employee

might use the videos. Meadows' working relationship with the ODOT video team was helpful for comparing ODOT production abilities with outside vendors.

By the end of the second task order, the KM Team successfully archived activities and deliverables from the first two KM task orders onto a "Knowledge Management" MS Teams site. Information was organized in channels and associated wikis according to task. The site and its content can be used as a model for KM practices, an example of real-time project management, and a socially contextual communication tool for knowledge capture.

Task Order 2160-20-07; FFY 2022

A third KM task order commenced in October 2020 and was scheduled to end September 2021. A two month, no-cost extension was granted to complete work by November 30, 2021. A detailed report is provided in the following section.

APPENDIX D: Transportation Research Board (TRB) Lectern Invited Presentation
(https://www.trbikm.org/meetings/)

KM Team members Molina and Farabough developed and presented an overview of KM activities at ODOT to lectern session attendees during the 100th Meeting of TRB.

Details: Thursday, January 28 1:00 PM- 2:30 PM ET – Lectern Session 1380
Library and Knowledge Management Practices That Help Employees Find What They Need, Wherever they Are

Moderator: Alexander Linthicum, OST-R/Volpe Center

Panel presentations:

- Transitioning together: Library and Knowledge Management Roles at WSDOT, P21-20102
  Leni Oman, Washington State Department of Transportation
  Kathy Szolomayer, Washington State Department of Transportation
  Slides: Oman-Szolomayer TRB 2021 Session 1380

- Knowledge Management in Action: Oklahoma DOT's KM Initiative with the Oklahoma Transportation Library, P21-20104
  Michael Molina, University of Oklahoma
  Michelle Farabough, Oklahoma Department of Transportation
  Slides: Molina-Farabough TRB 2021 Session 1380

- Developing KM though Librarian and Records Management Collaborations, P21-20105
  Shelly Ray, Los Angeles County Metropolitan Transportation Authority
  Slides: Ray TRB 2021 Session 1380

- Library and Knowledge Management at TechnipFMC, P21-20103
  Kim Glover, TechnipFMC
  Slides: Glover TRB 2021 Session 1380

Panel discussion

Paper presentation

APPENDIX F: ODOT List of Top 100 Workers with the Highest Years of Service
(Information provided by Keith Stout, HR staff.)

Division	Location	Name	Job Code
4-DIV4	4-04510	Taylor III,John M	T22E
2-DIV2	2-02000	Clubb,Joey D	T23B
BRIDGE	9-HA000	Peters,Walter L	S12C
4-DIV4	4-0413C	Christian,Roger D	T26B
FACMAN	9-EC000	Winfree,David R	T23C
HRD	9-CE010	Morris,Brenda L	C31D
MAINT	9-JC060	Johnson,Melody D	E12C
MAINT	9-JC007	Goeringer,Gayden	B21C
4-DIV4	4-04520	Bell,David L	T22C
ORE	9-BA020	Green,William D	T23B
6-DIV6	6-06520	Michael Jr.,Charles L	T23B
2-DIV2	2-0211J	Kerns,Ricky B	T26A
7-DIV7	7-07010	Hennessee,Rebecca K	E12C
7-DIV7	7-0711F	Potts,Monte D	E17B
HRD	9-CE020	Coyle,Pamela Holliday	C31D
3-DIV3	3-0315A	Canada,Marty R	F47C
1-DIV1	1-0111G	Vandiver,Mark A	T26B
5-DIV5	5-05010	Gholston,Yvonne A	C31B
4-DIV4	4-04010	Patak,Tony G	F21B
MATLS	9-JB010	Steinhouse,Kelly D	T22F
ROADWY	9-HB000	Monroe,Cecilia M	E17B
4-DIV4	4-04010	Kukuk,Teresa S	E17B
LOCGOV	9-HD000	McElroy,Tamara D	E12B
2-DIV2	2-02530	Cox,Johnny R	T23A
6-DIV6	6-0611D	Ferrell,Linda F	E17B
ROW	9-GA050	Barlow,Diana F	T23B

7-DIV7	7-07000	Hennessee,Joe D	T23B
5-DIV5	5-0513B	Stotts,John C	T26A
6-DIV6	6-06000	Roesner,Wayne A	T23B
BRIDGE	9-HA070	Cao,Nhang	S11B
COMPTR	9-FA036	Elkins,Larry D	D14D
OFFSVC	9-EA010	Whatley,Pamela Gean	E12C
3-DIV3	3-0312A	Garrison,Henry W	T26B
BRIDGE	9-HA070	Mayfield,Keven R	T10F
4-DIV4	4-0411L	Yeager,Robert L	T25C
2-DIV2	2-0211J	Morris,Joe L	F47C
1-DIV1	1-01510	Utley,Thomas E	T22F
COMPTR	9-FA034	Pearson,Katherine E	D14D
CONSTR	9-JD000	Leonard Jr.,John B	S12D
5-DIV5	5-05000	Cornell,William W	T23B
1-DIV1	1-01520	Orendorff,Barry D	T23B
5-DIV5	5-0514A	Reimer,George W	T25C
MAINT	9-JC007	Groff,David A	B21C
1-DIV1	1-01000	Bennett,Mickie T	T23B
6-DIV6	6-06510	Embree,Jerry L	T23A
6-DIV6	6-0611C	Purcell,Ava G	T25C
BRIDGE	9-HA020	Murray,George R	B25B
4-DIV4	4-04550	Arnold,Kevin C	T23B
SURVEY	9-HC000	King,Kyle K	S17C
BRIDGE	9-HA120	Snider,Kenneth D	T10E
HRD	9-CE010	Stout,Darwin Keith	8172
SURVEY	9-HC042	Pauley,Charles W	T22F
LOCGOV	9-HD010	Gutierrez,Raul G	E12D
OFFSVC	9-EA020	Lowe,Kevin D	E10A
7-DIV7	7-07000	Riggs,Robert L	T23B
8-DIV8	8-0811B	Girkin,Brian K	T25C

8-DIV8	8-0812A	Zumber,Gregg S	T26B
OFFENG	9-JA000	Thompson,Jamie LaDawn	E12C
GENCSL	9-BB001	Bohannon,Chris R	T23B
5-DIV5	5-05000	Bright,Richard L	J30A
SURVEY	9-HC020	Anderson,Derrick E	S17A
DCPIM	9-EZ010	Curb,Ronald F	S12B
6-DIV6	6-0611B	Bowers,Robert O	T26B
BRIDGE	9-HA110	Maupin,Michael L	T10F
3-DIV3	3-03520	Plain,Averell L	T22D
4-DIV4	4-0414A	Williams,Craig L	T26B
3-DIV3	3-03510	Wade,Anthony D	T23A
5-DIV5	5-05000	Almquist,Brent A	7657
DEPDIR	9-CZ000	Smith,Montie E	8172
8-DIV8	8-08000	White,Randle W	7657
1-DIV1	1-01510	Ivy,Steven W	T23A
5-DIV5	5-05000	Clanton,Michael K	T23B
MAINT	9-JC000	Jones,Mary L	E17B
MAINT	9-JC006	Bruce,Ronald G	T22E
MATLS	9-JB010	Thomas,James D	T22E
8-DIV8	8-08510	Westfall,Stanley D	T23A
2-DIV2	2-0211G	Turner,Larry J	T26B
4-DIV4	4-0411E	Yarbrough,Michael G	T22E
4-DIV4	4-0413B	Kelley,Patrick A	T25C
6-DIV6	6-06000	Mitchell,Kerry B	T23B
COMPTR	9-FA033	Dyer,Glenn D	D14D
6-DIV6	6-0611J	Morgan,Jerry L	T26B
7-DIV7	7-0711F	Elam,John W	T26B
HRD	9-CE030	Simon,Ann	C31D
PROJMT	9-DA010	Willis,Lary L	4758
4-DIV4	4-04000	Gilbreath,James E	T23B

4-DIV4	4-0415A	Bolay,Ted J	F47E
ROW	9-GA000	Blackwell,Robert D	T23D
4-DIV4	4-04510	Smith,Robert L	T22E
5-DIV5	5-0511K	Ragains,Kenneth J	T26B
8-DIV8	8-08510	Smith,William G	T22E
SURVEY	9-HC040	Scott,William B	T22E
6-DIV6	6-06000	Harmon,Bradley L	T22E
4-DIV4	4-04510	Cross,Tony E	T23A
8-DIV8	8-08530	Wilson,Mark W	T23A
3-DIV3	3-03530	Grant,Gary W	T23A
1-DIV1	1-0114A	Orr,Eric D	T26B
4-DIV4	4-0411E	Doss,John F	T22E
8-DIV8	8-0811C	Harris,Daniel E	T23B

APPENDIX G: ODOT Retirees from 10-2021
(Information provided by Keith Stout, HR staff.)

ID	Name	Eff Date	Action	Reason	Status	DeptID	Location	Job Code	Division
132212	Canada,Marty R	9/1/2021	Retirement	S02	R	3100001	3-0315A	F47C	3-DIV3
122955	Davis,Elmer A	9/1/2021	Retirement	S02	R	3100001	5-05010	F20B	5-DIV5
137799	McElroy,Tamara D	9/1/2021	Retirement	S02	R	3500001	9-HD000	E12B	LOCGOV
178556	Moore,Twyla Jo	9/1/2021	Retirement	S02	R	3100001	5-0511L	E17B	5-DIV5
131292	Potts,Monte D	9/1/2021	Retirement	S02	R	3100001	7-0711F	E17B	7-DIV7
132490	Johnson,Daryl G	10/1/2021	Retirement	S02	R	3100001	9-JB030	S12B	MATLS
127499	McNamar,Ricky L	10/1/2021	Retirement	S02	R	3100001	7-07530	T22D	7-DIV7
159746	Stepeny,Keith D	10/1/2021	Retirement	S02	R	3100001	4-04540	T22C	4-DIV4
131933	Wilkerson,Billy J	10/1/2021	Retirement	S02	R	3100001	2-0212C	T26A	2-DIV2
128620	Bell,David L	11/1/2021	Retirement	S02	R	3100001	4-04520	T22C	4-DIV4
159066	Taylor,Jack R	11/1/2021	Retirement	S02	R	3100001	2-0211C	T25C	2-DIV2
156706	Turner,Jackie Gene	11/1/2021	Retirement	S02	R	3100001	3-0314A	T25C	3-DIV3
245318	Kelly,Michael Kevin	12/1/2021	Retirement	S02	R	3100001	1-01000	S12B	1-DIV1

APPENDIX H: Pre-Modernization Proposed ODOT KM Liaison Network

Department	Supervisor	Liaison	Task
Div Engineer	X	X	Field worker/engineer stakeholders integration
Div Engineer (8)	Randle White	Trapper Parks	Field worker/engineer stakeholders integration
CIO	X	X	Information systems
Maintenance	Shawn Davis	Stephanie Richardson	Field worker stakeholders integration
Capital Programs	Rick Johnson		Strategic planning
Traffic	Tim Tegeler	Lauren Parrish	Field worker stakeholder integration
Director's Office	Tim Gatz	Tara Moore	Policies and Procedures development
OTA	X	Connie Blue	Modernization
OTA	X	Joni Seymour	KM integration with Innovation
OMES	X	Jamie Bleeker	IT integration
SAPM	Rick Johnson	Mathew Swift	IT integration
Internal Communications	X	X	Intranet, Email Blasts
Project Management	Rick Johnson	Daniel Nguyen	Project Summary/Lessons Learned

APPENDIX I: Script for KM Liaison Recruitment

2020-2021 Knowledge Management (KM) Task Force Team

April Meadows, CPM, *ODOT HR Program and Training Development, Talent and Recruitment Manager, AASHTO KM Committee Chair*
ODOT KM Task Force lead. KM advisor and advocate. Organizes monthly meetings and internal communication about KM/KM Task Order with ODOT Executive Staff and key employees.

Trenton January, PE, *ODOT Division 4 Engineer, AASHTO KM Committee Member*
ODOT KM Task Force advisor offering valuable perspective, ideas, and connections from both an engineering point of view and rural/field worker ODOT employee point of view.

Joni Seymour, *ODOT Chief Innovation Officer, AASHTO KM Committee Member*

Ron Curb, PE, CPM, *ODOT Senior Engineering Manager/Acting Research Department head*
ODOT KM Task Force advisor. Longtime advocate for KM with active involvement in KM activities in TRB. Lead on initial KM Task Order through ODOT research department.

Elizabeth Blais, IPMA-SCP, SHRM-SCP, PHR, *ODOT HR Program Manager, Training and Professional Development.* ODOT KM Task Force advisor focusing on implementing HR pilot projects, aligning performance reviews and training with KM principles.

Scott Lange, *ODOT HR Director*
ODOT KM Task Force advisor offering perspective and connections with ODOT department leaders. Oversees KM implementation into HR practices and procedures.

Shannon Hagar, *OTA Manager, Process Integration & Information Technology*
KM Task force advisor for all things technology related, offering first-hand knowledge about MS SharePoint and statewide information systems.

Michael Molina, PhD, MLIS, *ODOT/Transportation Librarian at the University of Oklahoma*
KM Task Force advisor and PI for ODOT KM task orders. Writes annual task order proposal from OU to fund KM Task Force. Works closely with Michelle Farabough and provides direction/supervision on the project. Also works closely with Ron Curb on task order development, transportation research, and literature needs through the Oklahoma Transportation Library. Member of/lead in several ancillary national transportation KM organizations and committees (e.g., NTKN, TRB, NTL, SLA). Maintains ODOT presence in national KM/KM-in-transportation organizations.

Michelle Farabough, MSKM, AHIP, PhD, *KM Advisor/Consultant*
Outside KM advocate/evangelist with master's degree in KM from the University of Oklahoma. Aligns ODOT KM Task Force objectives with evidence-based KM practices. Executes tasks on annual Task Order (now in year 3). Interviews ODOT employees to aid in pilot projects; documents KM activities in MS Team

wiki; performs environmental scans on KM activities and solutions; maintains
ODOT presence in national KM/KM-in-transportation organizations.

Julia Crawford, MS, AHIP, *PM Consultant*

Project manager with experience in manufacturing, clinical trial administration,
capital project knowledge management, and information organization. Applies
PM standards and framework to deliverables required by annual task
order; executes tasks on annual task orders including information gathering,
awareness campaign, identification of technology platform for knowledge
repositories per Guidehouse recommendation.

What is a KM Network Liaison?

The ODOT KM Task Force working group is eager to establish a network of
relationships with ODOT workers throughout the organization. KM Network Liaisons
will be our first point of contact when we want to share information about a KM task
or to engage/recruit ODOT workers in feedback about or participation in a KM-
focused task or pilot project. KM Network Liaisons have strong organizational and
communication skills. In this way, they build and maintain connections with their working
and social networks at ODOT; facilitate communication about KM to
their divisions, departments, and colleagues; and help coordinate efforts of the KM Task
Force working group. With the proliferation of e-mail, technology (e.g., MS Teams), and
social networking websites, many rely on these modes for communicating news and
ideas. Our KM Task Force working group recognizes that nothing can substitute for
personal information sharing and relationships among persons who work together.

KM Network Liaisons will be invited, but not required, to attend our monthly KM
Task Force working group planning meetings to offer their perspectives and ideas for
advancing KM throughout ODOT. They will also be invited to be a member of the KM
MS Teams site for reviewing archives about the Task Force working group
and participating in conversations about KM at ODOT.

APPENDIX J: Post-Modernization Prospective OTCA KM Liaison Network Representation

Division	Sr. Staff Member	Liaison or Select Designate
District 1	Shawn Davis	Chris Wallace
District 2	Shawn Davis	Anthony Echelle
District 3	Shawn Davis	Ron Brown
District 4	Shawn Davis	Trentony January
District 5	Shawn Davis	Brent Almquist
District 6	Shawn Davis	Ron McDaniel
District 7	Shawn Davis	Jay Earp
District 8	Shawn Davis	Randle White
BRIDGE	Tim Tegeler	Justin Hernandez
BUSSVC	Dawn Sullivan	Kevin Lowe
CHENGR	Brian Taylor	X
CIVRI	Dawn Sullivan	Jenny Allen
COMPTR	Chelley Hilmes	X
CONSTR	Shawn Davis	John Leonard
DCPIM	Rick Johnson	X
DENGR	Tim Tegeler	X
DEPDIR	Dawn Sullivan	X
DFINAD	Chelley Hilmes	X
DIR	Tim Gatz	X
DOPS	Shawn Davis	X
EIT	Brian Taylor	Scott Lange
EIT -OU Design Squad	Brian Taylor	X
EIT- OSU Design Squad	Brian Taylor	X
ENVIR	Rick Johnson	Joe Brutshe
FACMAN	Rick Johnson	Ken Phillips
GENCSL	Sarah Penn	X
HRD	Dawn Sullivan	Scott Lange
IA	Tim Gatz	Holly Lowe
INNOV	Tim Gatz	Joni Seymour
IT		Jamie Bleeker

LOCGOV	Rick Johnson	Shelly Williams
MAINT	Shawn Davis	Taylor Henderson
MATLS	Shawn Davis	Matt Romero
MULMOD	Rick Johnson	Jared Schwennesen
OFFENG	Shawn Davis	Anthony Delce
PROCUR	Dawn Sullivan	Jennifer Hankins
PROJMT	Rick Johnson	Daniel Nguyen
ROADWY	Tim Tegeler	Randy Woods
ROW	Tim Tegeler	Robert Blackwell
SAPM	Rick Johnson	Matt Swift
STRCOM	Dawn Sullivan	Jessica Brown
SURVEY	Tim Tegeler	Kyle King
TRAFIC	Tim Tegeler	Chad Pendley

APPENDIX K: Forum Innovation Agility Model

Farabough (2021) developed the Forum Innovation Agility Model to advise organizations when implementing new interactive technologies in their organization. Factors affecting the use of new technologies are organized in four layers on a continuum ranging from inside to outside the control of the organization. The model provides a list of factors that should be considered to ensure the focus remains on target. Circumstances affected by users should be iteratively monitored using a variation of actions based on Everett Rogers' four elements of diffusion of innovation. Findings might require agile adjustments to ensure technology adoption and sustainable use. Intended and unintended consequences of the adoption in action should be evaluated to determine if a new common purpose is warranted and changes to agile factors should be made.

"Inside" factors—stating a common purpose and project management—should be part of the organization's strategic plan. "Agile" factors (i.e., features that can pivot quickly) are created by project teams that plan in detail only functionality that won't change before execution. Contingency plans should be developed for adjusting to changes outside organizer's control. Factors in the "Agile" layer include user experience, sponsorship, technology, and championing. Measuring outside forces should be done iteratively (i.e., repeatedly) to signal when contingency plans should be enacted. This means that "Agile" and "Iterative" factors consistently influence one another. Factors in the "Iterative" layer are defined by Rogers' four main elements in the diffusion process: social system, promotion, the innovation itself (e.g., MS Team), and time. Organizers should eliminate distractions (i.e., factors) that are "Outside" their control and focus on results of their stated purpose. Organizers should evaluate how the innovation is adopted in action. Careful examination will indicate necessary changes in the "Agile" and "Iterative" processes to ensure successful adoption.

Forum Innovation Agility Model

Outside

Iterative

Agile

Inside

Adoption in Action

Social System
Time
Promotion
Forum

Championing
Technology
Sponsorship
User Experience

Project Management
Common Purpose
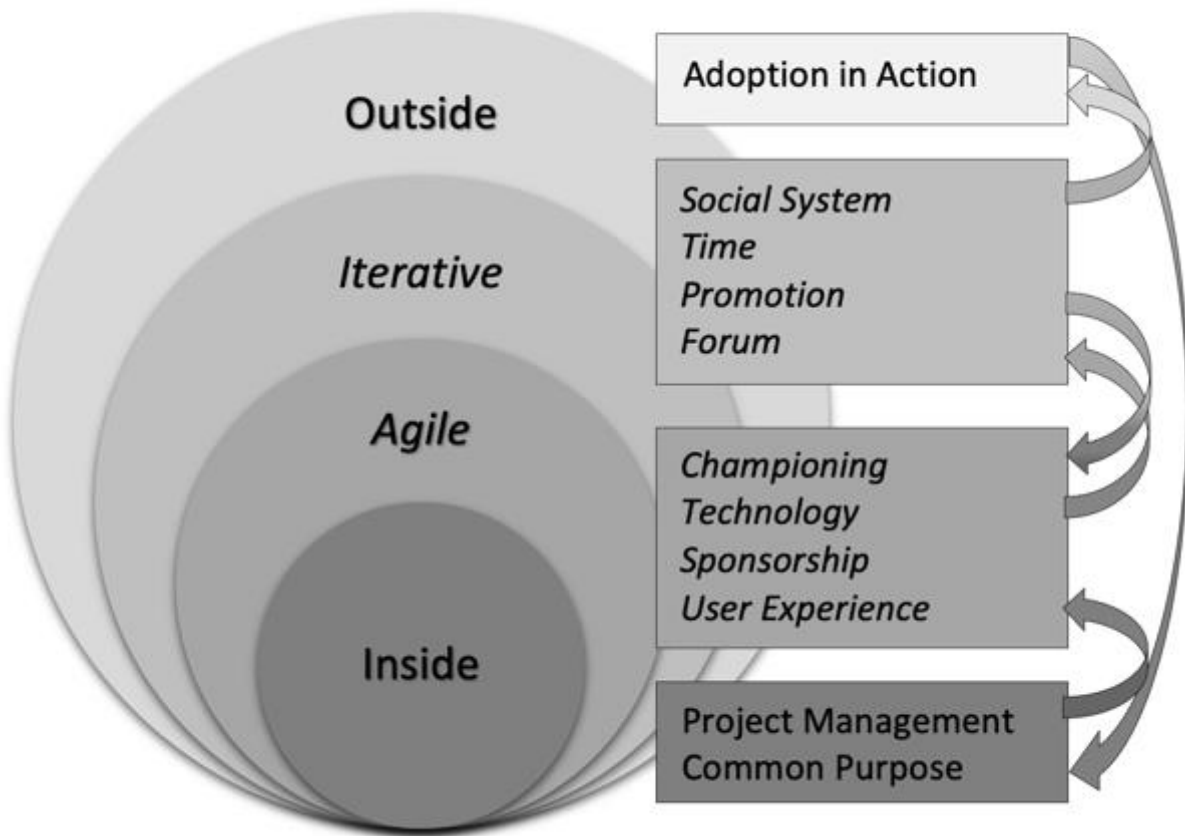
APPENDIX L: Example of Completed Project Summary Form

Project Summary Document

Prepared for: John Doe

Prepared by: Jane Doe

Date Prepared: April 1, 2021

How to Use this Document: This document is used to record lessons learned from a project. Under the Project Information heading you will include basic elements describing your project including key words related to your project. This will assist in users being able to search and access project summaries. Under the Lessons Learned heading you can be more descriptive and provide insight into specific challenges you faced and any important takeaways you learned. Recording this information will contribute to a database that will assist employees in carrying out future similar projects.

Project Information
Project Title: Asphalt patching on Highway 9
Project Begin/End Date: October 1, 2020 – September 30, 2021.
Project Description (Brief): Patch deep holes with an asphalt patching compound and apply a liquid seal coat over the entire surface.
Key Words: Asphalt pavements, patching, seal coats

Project Team (Name, Title, Division, Email):
Jane Doe, Engineer, Division 4, JDoe@notreal.org
Bob Doe, Engineer, Division 4, BDoe@notreal.org

Project Goal:
The goal of this project was to successfully patch holes on Highway 9 to ensure safe roadway operations.

Location/Site:
Cleveland County
Highway 9, between Jenkins Ave and Chautauqua Ave.

Lessons Learned Information

Challenges: Upset motorists attempting to use the roadway, unstable pavement, inclement weather.

Key Takeaways: Ensure traffic control and safety cones are in place to protect employees from angry motorists. Liquid seal coat reacted negatively with asphalt. Bring correct seal coat next time. Plan work more efficiently around weather conditions. Tornadoes blew equipment away and had to start over.