WisDOT Skills Readiness and Knowledge Management Project

Romila Singh, PhD
Associate Professor, Lubar School of Business

Xiao Qin, PhD
Professor of Civil Engineering and
Director, UWM-IPIT

Mark Gottlieb, PE
Associate Director, UWM-IPIT

Institute for Physical Infrastructure and Transportation
University of Wisconsin-Milwaukee

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16. Abstract

The purpose of this project was to understand and analyze the nature of gaps in skills needed for job performance and the current status of knowledge management (KM) practices across WisDOT and offer recommendations on how best to address some of the gaps using insights derived from a review of best practices and analysis of survey data. The project team created and administered an agency-wide electronic survey that assessed the importance of key skills to job performance across three time periods (past, present, and future) and select components of KM practices. A total of 1,153 survey responses were received, representing 30% of WisDOT employees. The results of data analysis revealed that across all divisions and job families, WisDOT employees have a set of durable and transferable skills that have positioned them well for job performance. Analysis of the data on KM practices likewise reveals a strong foundation for information and knowledge capture systems and solid processes, and procedures in place to share information. The results provide a strong foundation for the agency to build upon and position it for future success. Four broad recommendations were offered: (1) Establish a team of cross-functional professionals to engage in annual workforce planning activities that are coordinated with the strategic planning process and engage multiple layers of leadership. (2) Create a comprehensive and integrated succession planning and knowledge management strategy that is aligned with strategic workforce planning and development plans. (3) Re-envision talent management practices that are aligned with the strategic workforce management plan and are skills-based and data-driven. Prioritize mission-critical roles and positions. (4) In order to maximize the benefits of these recommendations, invest in skills-based technology that addresses skills and knowledge gaps.

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University of Wisconsin Milwaukee

Institute for Physical Infrastructure & Transportation (IPIT)

Final Report

Workforce Skills and Knowledge Management Project, 2022-2023

UWM-IPIT Team

Romila Singh, PhD
Associate Professor Lubar School of Business

Xiao Qin, PhD
Professor of Civil Engineering and
Director of UWM-IPIT

Mark Gottlieb, PE
Associate Director of UWM-IPIT

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Disclaimer

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ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AI	Artificial Intelligence
ATS	Applicant Tracking Systems
CoPs	Communities of Practice
DEI	Diversity, Equity, and Inclusion
DOL	Department of Labor
ERP	Enterprise Resource Planning
FHWA	Federal Highway Administration
HCM	Human Capital Management
HRIS	Human Resource Information Systems
IM	Information Management
KM	Knowledge Management
KSAOs	Knowledge, Skills, and Abilities, and Other Characteristics
KSAs	Knowledge, Skills, and Abilities
L&D	Learning and Development
LMS	Learning Management Systems
LXP	Learning Experience Platform
NCHRP	National Cooperative Highway Research Program
NNTW	National Network for the Transportation Workforce
OPM	Office of Personnel Management
SaaS	Software-as-a-Service
SHRM	Society for Human Resource Management
SWMP	Strategic Workforce Management Plan
TMS	Talent Management Systems
TRB	Transportation Research Board
US DOT	United States Department of Transportation
WisDOT	Wisconsin Department of Transportation

Divisions within Wisconsin Department of Transportation

DBM	Division of Business Management
DBSI	Division of Budget and Strategic Initiatives
DMV	Division of Motor Vehicles
DSP	Division of State Patrol
DTIM	Division of Transportation Investment Management
DTSD	Division of Transportation Systems Development
EO	Executive Offices

EXECUTIVE SUMMARY

The purpose of this project was to understand and analyze the nature of gaps in skills needed for job performance and the current status of Knowledge Management (KM) practices across WisDOT and offer recommendations on how best to address some of the gaps using insights derived from a review of best practices and data analysis.

The project utilized the literature and research from NCHRP, TRB, OPM, US DOT, FHWA, Deloitte, SHRM, and other sources to identify some of the major trends and best practices in skills assessments and KM practices that undergirded the project. In keeping with some of the trends and best practices identified in the literature, the project team created and conducted an agency-wide survey that assessed the importance of key skills to job performance across three time periods (past, present, and future) and main components of KM practices. A two-week response time yielded a total of 1,153 surveys or 30% of current staff; missing responses were calculated for each question. Data was analyzed using a variety of techniques.

The cumulative results of all the data analysis identified that across all divisions and job families, WisDOT employees have a set of core, durable, and transferable skills that have positioned them well for their job performance. These core skills include: different types of communication, analytical, problem-solving, critical thinking, and collaboration with colleagues and stakeholders. Analysis of the data on KM practices across different divisions likewise reveals a strong foundation for information and knowledge capture systems, solid processes and procedures in place to share information, and employees willing to capture, codify, and share their hard-won lessons, best practices, and guidance with others. The results also reveal areas of improvement and chart a strong path forward.

These results provide a strong foundation for the agency to build upon and position it for future success. The recommendations are based on the assessment of key best practices, results of gap analysis, and analysis of WisDOT structure. The recommendations include:

- Establishing a team of cross-functional professionals to engage in annual workforce planning activities that are coordinated with the strategic planning process and engage multiple layers of leadership. The team will be responsible for carrying out some of the essential activities associated with this function, including skills assessment and knowledge management.
- Create a comprehensive and integrated succession planning and knowledge management strategy that is aligned with strategic workforce planning and development plans.
- Re-envision talent management practices that are aligned with the strategic workforce management plan. Recruitment and (people and knowledge) retention plans need to be skills-based and data-driven, prioritizing mission-critical roles and positions. Greater investment needs to be in strategic workforce planning, management and development efforts.
- In order to maximize the benefits of these recommendations, technology needs to be a key enabler of any activities aimed at addressing skills and knowledge gaps.

CHAPTER 1: INTRODUCTION

Before proceeding with the discussion on the literature on skills readiness and knowledge management, it is important to first highlight the major trends and disruptors that are impacting state transportation agencies in various degrees. Understanding the larger context is important as transportation agency leaders consider options to address the twin challenges of skill gaps and knowledge losses.

EVOLVING TRANSPORTATION LANDSCAPE: MAJOR TRENDS AND DISRUPTORS

The transportation landscape is witnessing unprecedented disruption to its ecosystem brought on by changing economics of mass transit, innovations in mobility, changing commuting habits and demographic and economic shifts, to name a few. The pandemic amplified the impact of these changes, including greater financial pressures on the transportation ecosystem. Transportation agencies are being forced to move their focus beyond traditional infrastructure projects to incorporate different transportation modes and spheres of influence. Nicol, Salemme, and Featherby (2020) researched the changing transportation landscape and summarized the status of transportation agencies as they confront a pivotal moment:

> "*Transportation in America is at a crossroads… Our existing infrastructure is crumbling, with an estimated US $836 billion backlog of highway and bridge projects, and another US $90 billion needed to bring our transit systems back to "a state of good repair". Many transportation agencies' processes and procedures are rooted in the mid-20th century and could be ill-suited to today's rapidly evolving landscape. Transportation agencies aren't built for rapid innovation. Their typical decades-long planning cycles and procurement processes and workforce systems tend to be incompatible with the many new approaches – and could hinder their ability to thrive in the future of mobility*." (p.2; ACSE, 2017).

If these challenges are not daunting enough, Nicol, Salemme, and Featherby (2020) project that a confluence of major disruptive forces are bearing down on transportation agencies which will fundamentally alter agency priorities, business operations, and relationships with key stakeholders. Different agencies will feel the impact of these changes in different degrees of severity and at different points in time, but no agency will be immune from facing these disruptive forces. The five categories of trends shaping the future of transportation agencies are: societal, technological, economic, environmental and governmental.

Societal trends include a range of factors that encompass changing demographics and user preferences, expectations and attitudes that impact agencies' traditional ways of planning and operating. For example, according to the US DOT "Beyond Traffic 2045" report (2017), with the rise of the ride-hailing services and e-scooters, millennials were driving about 20% fewer miles by the end of the 2000s than they were at the start of the decade. Furthermore, the general rise in connectivity and customer-centric digital services has shaped consumers' expectations of their transportation options. Many of these changes in societal preferences and expectations are also being driven by transportation network companies that nudge the agencies

to reassess their priorities. In short, there is an increased demand on transportation agencies to become more responsive and receptive to society's shifting preferences for a frictionless, inclusive travel experience.

Technological trends are perhaps one of the most discussed and yet least predictable set of forces that are impacting transportation agencies' mission execution and fundamental operations. IoT networks, connected and autonomous vehicles, cloud computing, AI, advanced analytics and mapping tools are some of the technological innovations that are forcing transportation agencies in different degrees to quickly upgrade their legacy systems and be more receptive to harnessing the power of data and technology to execute the agencies' mission. An example that illustrates the scope of the technological tools that are enhancing the consumers' mobility experiences can be seen in the sweeping changes recently undertaken in the San Diego region by the San Diego Association of Governments (SANDAG) that "completely reimagines how people and goods could move throughout the region in the 21st century. This vision is fundamentally shaped by five key strategies for mobility, collectively known as the 5 Big Moves—Complete Corridors, Transit Leap, Mobility Hubs, Flexible Fleets, and the Next OS."(https://www.sdforward.com/mobility-planning/5-big-moves). Also refer to: https://www.sandag.org/projects-and-programs?param=none

Economic trends, with rising costs and shrinking sources of traditional revenues, add a challenging dimension to transportation agencies' operations. For example, many states that rely on fuel tax revenues were faced with a steep decline in revenues as a result of drastic reduction in travel during Covid-19 lockdowns. Adding to the complexity are regulatory changes such as those related to environmental impacts, which require agencies to add new programs or processes thereby adding to their ongoing economic pressures. Many agencies are responding to these forces by initiating public-private partnerships, exploring alternative revenue streams and adding technology to streamline their processes.

Environmental trends pose an additional layer of disruption to the transportation agencies' day-to-day operations and long-term planning. Transportation agencies are tasked with mitigating vehicular emissions, reducing the prevalence of single occupancy vehicles, and addressing threats and damage to the infrastructure caused by climate change. Further, regulatory changes such as the introduction of the "California Environmental Quality Act" has pressured the California DOT and other transportation organizations to change its processes to comply with the new regulation.

Governmental trends are perhaps one of the most direct and immediate sets of forces that shape every aspect of an agency's functioning, from its priorities, budgets, to workforce needs and capabilities. Transportation agencies need to engage in proactive stakeholder engagement and management in order to anticipate impending shifts and align their missions accordingly.

In response to these disruptors, the US DOT "Beyond Traffic 2045" report (2015) highlighted the "designated 18 "Beyond Traffic" Innovation Centers" housed in higher education institutions across the country that would provide the research, curriculum, outreach, and thought leadership to transportation organizations across the entire mobility ecosystem.

Transportation agencies have to proactively address these enormous forces while already facing an unenviable task in maintaining critical infrastructure and expanding services in a safe, sustainable and efficient manner. Nicol and his colleagues (2020) recommend a fundamental shift in mindset, "from a perspective focused on individual missions to one focused on the entire mobility ecosystem." (p.2). Such a shift needs to use data to drive decision-making about what, where, and which kinds of internal changes need to be made to the workforce and agencies' engagement with external stakeholders. Building a resilient and responsive workforce within the agency requires a fundamental reassessment of which tasks can be contracted out, what type of work can be done remotely and what types of tasks are no longer going to be necessary given the different disruptive forces discussed earlier. These disruptors are forcing transportation agencies to reckon and decide what the nature of work, workplace, and workforce means to their agency and which technologies and skills will yield the maximum payoff with the least pain.

Transportation agencies also need to invest in expanding their leadership in the entire mobility ecosystem by forging close partnerships with academia, non-profits, economic development corporations, public health advocates and other entities that can help transportation agencies attract skilled workers, provide regulatory structure and drive the adoption of technologically innovative solutions (using, for example, AI and digital twins) in response to changing societal needs. Ohio DOT stands out for creating a broad coalition of public-private agencies that are positioning them for creating, pilot-testing, and implementing a range of solutions to the challenges facing their agencies. Florida and Texas DOTs are leading the way in terms of accelerating the adoption of novel technologies to anticipate and proactively respond to the complex demands facing their agencies. At the regional level, the SANDAG exemplifies the effectiveness of multi-agency partnerships that were developed to creatively address the societal, technological, economic, environmental and governmental challenges confronting their transportation landscape thus transforming their entire mobility ecosystem. There are numerous examples of innovative public-private partnerships at the city level which enable their transportation leaders to rapidly respond to the challenges they face.

In sum, given the complex nature of the forces bearing down on transportation agencies, they must re-envision their role in the mobility ecosystem and use data to drive their decisions about adopting new technologies to transform their operations, their workforce and workplace management, and their partnerships with external stakeholders in order for them to survive and thrive in the future.

IMPORTANCE OF SKILLS TO ORGANIZATIONAL PERFORMANCE AND INNOVATION

Talent shortage continues to be the biggest challenge for all types of organizations and is viewed as the most significant threat to the organization's short-term and long-term operations and success (Nicol, Salemme, & Featherby, 2020; Human Capital Reviews Report, 2019). Changes in technology, market disruptions, changing workforce demographics, and shifts in workers' expectations from their employers all compound the talent shortage, specifically a "shortage of workers with the right skills" (LaPrade, Mertens, Moore, and Wright, 2019). Further exacerbating this ongoing problem is that as jobs change, new skill requirements emerge,

which are often accompanied by a revaluation of education, experiences and other credentials necessary for job performance. Research has shown that traditional efforts in addressing a shortage of skilled workers has largely concentrated on hiring and training employees which has resulted in many organizations effectively running in place and not gaining any traction in winning the 'talent wars'. Hiring and training as two stand-alone tools for addressing skilled workers has never been a sustainable or effective approach, but now their continued use will only exacerbate the organizations' ongoing problems in finding and retaining skilled workers. The following paragraphs provide a brief overview of the literature on the importance of skills to organizational performance and innovation, understanding the different types of skills that are most essential for organizational success, and conclude with a brief overview of organizationally driven strategies for proactively addressing the talent crisis.

TYPES OF SKILLS ESSENTIAL FOR ORGANIZATIONAL SUCCESS

According to LaPrade, et al. (2019), "Without skilled workers, organizations struggle to innovate, deliver value to citizens and shareholders, grow their businesses, and create new jobs." (p.2). According to a study on executive leaders conducted by LaPrade, et al.(2018), the top three critical forces impacting all organizational decisions in terms of strategic direction are: technology, 'market' forces, and workers' skills. Organizations that heavily invest in employee learning and development and continual upskilling and reskilling corroborate the centrality of skills in strategic growth by citing direct returns on their investment that is evident in increase in innovation, profitability, revenues and overall customer experience. A significant sign that the importance of skills to overall organizational survival and success has moved beyond HR domain is that top leaders have ranked investments in employees and their skills development as the number one way to accelerate their organizations' performance.

Various workforce planning experts and thought leaders contend that all employees require a blend of different types of skills to be successful in accomplishing their tasks and contributing to overall organizational success. Leaders across all organizational levels are worried about skill obsolescence since the half-life of many skills is less than two years (Bersin, 2021).

Skills can be broadly classified into two categories: soft skills and technical skills. Soft skills, also called "behavioral skills" (Deloitte, 2021; LaPrade et al., 2019), or "power skills" (Bersin, 2022), encompass a range of skills including problem-solving, communication, critical thinking, adaptability, empathy, and creativity. Technical skills, also called operational skills (Bersin, 2021) include skills in math, science, medicine, computing, operation of digital tools, machinery, equipment, software, etc. Technical skills are considered "essential skills" and must be validated for them to be effectively used to fulfill job responsibilities. Regardless of the organization and its work, all jobs require a combination of both soft and technical skills. Over the past decade rapid changes in technology, data science and automation have led to an increase in attention and investment being focused on addressing the gaps in employees' technical skills.

As organizations continue to heavily invest in upskilling and reskilling their employees in technical areas, recent research has highlighted an important shift in the types of skills that are

deemed as critical for ensuring organizational success, and indeed, its survival. Sources as diverse as Department of Labor (DOL), to industry thought leaders (e.g., Bersin), professional organizations (e.g., Society for Human Resource Management) and research based consulting firms (e.g., Deloitte) have highlighted how soft skills, or behavioral/power skills, have taken center stage in terms of their role in enabling employees to effectively work in teams, communicate with a variety of constituents and stakeholders, apply problem-solving, critical-thinking, and creativity to address problems head-on thereby enabling organizations to innovate and be more responsive to external and internal forces that compel changes.

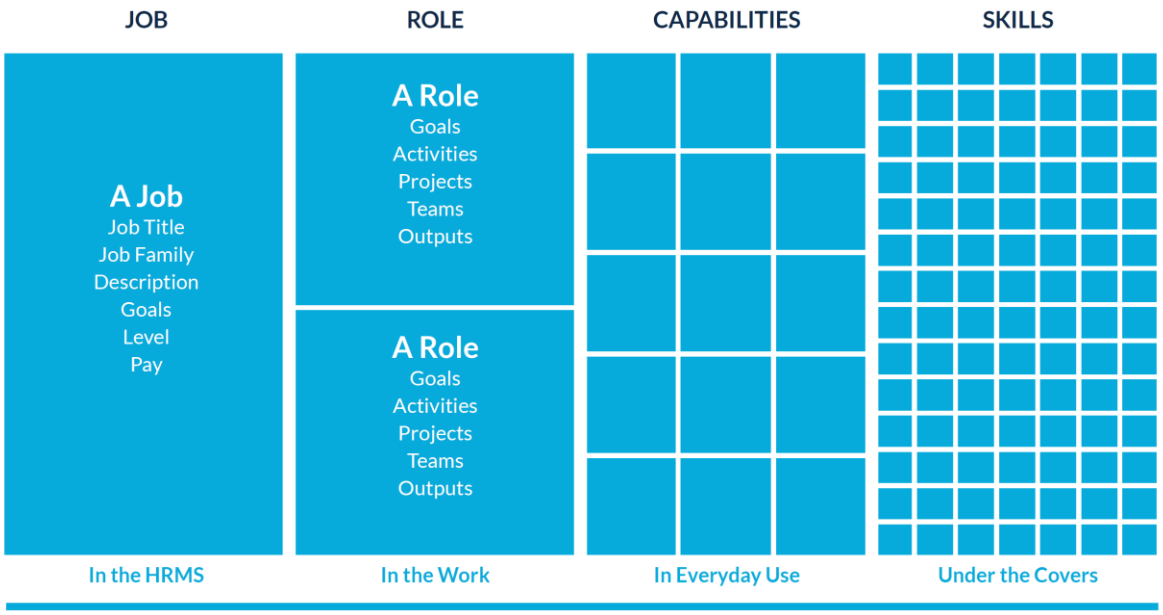
Organizations have long since recognized the importance of soft/behavioral skills, however, there has been a resurgence of interest in these skills because of the rapidity and complexity of technological, demographic and attitudinal changes sweeping many industries. The ongoing investments in reskilling and upskilling employees in technical skills has not been commensurate with the investment in such upskilling/reskilling efforts of soft skills. The result is that many organizations have reached a critical stage in what thought leaders describe as a gap in their organizational adaptability and agility. Specifically, under-investment and relative inattention given to soft skills are slowing down organizational responses to the internal and external challenges they encounter and is hurting their long-term ability to be innovative and successful. Before turning to a discussion of some strategies in addressing the talent crisis, it is important to understand the distinctions between skills, capabilities, and competencies since these distinctions have important implications for the organizational talent management strategy.

DISTINCTIONS BETWEEN SKILLS, CAPABILITIES, AND COMPETENCIES

It is important to understand the distinction between skills, capabilities, and competencies in order to identify appropriate solutions to address workforce planning challenges associated with recruitment, retention – including succession planning and career development – and knowledge management. Jobs are most commonly described in terms of tasks, duties, and responsibilities to fulfill, necessary skills and abilities, required educational degrees and/or certifications, and desired experience. Job descriptions typically don't reflect the day-to-day work that is performed nor the many relationships, projects, tasks, and teams in which job incumbents are involved. Further, job descriptions are typically not future-focused. They also don't reflect which tasks, duties, and responsibilities have either become obsolete or have been added on by incumbents eager to expand their skillset and learning.

Skills and capabilities are related to one another but capabilities are not "granular skills" (Bersin, 2021). According to Bersin, capabilities can be conceived as skills combined with experience that are aimed at solving work problems. Capabilities then subsume multiple skills, and by extension, experience with *using* a particular skill to solve problems. Conceived in this manner, Bersin illustrated this relationship between jobs, roles, capabilities, and skills in Figure 1-1 below.

Figure 1-1: Jobs, Roles, Capabilities and Skills



Source: Bersin (2022) Rise of the Talent Intelligence Platform: A Primer

Successful organizations are using AI enabled Human Capital Management (HCM) systems to create "skills taxonomies" by scanning capabilities, experiences and skills of all their employees and building a roadmap for their growth and development within the organization. These systems find, categorize and measure skills as well as 'tag' skills that are becoming obsolete. It is important to remember that while understanding, identifying, categorizing and evaluating the multitude of skills that make up a given job or work role is critical, they are still the starting point. The more challenging task for organization leaders is to identify an efficient and effective way to match employees to roles by focusing on the capabilities they need to succeed. This entails creating and providing opportunities for enhancing capabilities through training, job rotation, mentorship, coaching and developmental assignments. The chapter on the technology roadmap describes some of the HCM tools and platforms that seek to address this business challenge.

Competency models evolved in the early 1970s that reflected a combination of knowledge, skills, abilities and other characteristics (KSAOs) and were based on evaluating the job in terms of what successful job incumbents did in their particular role. Department of Labor (DOL) for Transportation defined a competency as "a cluster of related knowledge, skills, and abilities that affects a major part of one's job (a role or responsibility), that correlates with performance on the job, that can be measured against well-accepted standards, and that can be improved via training and development." (p.3 www.doleta.gov). Each competency typically had several levels of proficiency associated with it. DOL created a nine-tier "building block" competency model that can be customized to reflect specific competencies by different occupations, industries and sub-industries. DOL classified the nine-tiers in the competency model into three categories: foundational, industry-related and occupation-related. The building block model is not meant to convey a hierarchical importance of competencies but instead

reflects the “increasing specialization and specificity in the application of skills as you move up the tiers.”.

Foundational competencies encompass tiers 1-3. The bottom tier represents personal effectiveness competencies referred by DOL as “soft skills” and include interpersonal skills, professionalism, willingness to learn, adaptability, etc. Tier 2 competencies reflect academic competencies which include communication, critical and analytical thinking, computer, math and science skills. Tier 3, workplace competencies, follow next and represent motives, traits and interpersonal management styles including teamwork, planning, organizing, problem-solving and decision-making and are applicable to many occupations and industries. Rising next in the level of specificity and specialization is the category of industry-wide technical competencies (tiers 4 and 5) that allows personnel managers and decision-makers to identify cross-cutting technical competencies to create career lattices and manage internal mobility and succession planning processes. Finally, occupation-related category includes tiers 6 through 9 which represent occupation-specific competencies that capture the specialized KSAs that occur within specific occupations within an industry. It is interesting to note that data from private industries were used to create the competencies in the DOL model.

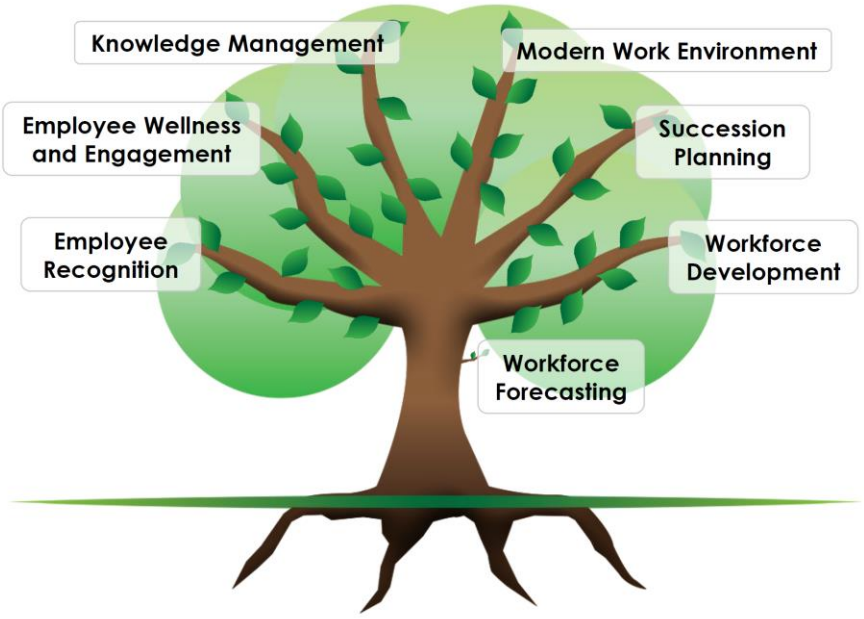
DOL competency models have been used by transportation professionals at the Federal Highway Administration (FHWA), Transportation Research Board (TRB), National Network for the Transportation Workforce (NNTW) and state DOTs for specific positions. As an example, the NCHRP Report (2021) documented a two-year, muti-agency effort to create a DOL competency model-based “talent profile” for transportation planning professionals. Similarly, the National Network for the Transportation Workforce (NNTW) Report (2019) documented a two-year, multi-agency effort to use the DOL models to update competencies and educational/training credentials for five types of transportation professional positions: transportation planning, transportation environment, transportation operations, transportation engineering, and transportation safety. These updated competencies reflected cross-agency career pathways to build, train and retain talent.

Reports based on efforts by these various agencies reflect the time- and skill-intensive process involved in creating position-level descriptions that are comprehensive and responsive to the changing trends in workforce, occupation/industry, technology, and organization. Because of the time, effort, and skill-intensive nature of creating or updating a competency model for any given position, their usefulness and prevalence has been limited - especially in the public sector. Similar trends were reported in private sector industries as well (Bersin, 2021). Across both private and public sectors, competency models, once created, have not kept up to reflect the massive disruptions in how jobs are done and who does what work. For example, changes in tools, technologies and skills have changed the nature of work performed in each job. In addition, as each job has become more project-based, more team-oriented, and less hierarchically and rigidly linked in terms of its connection to other jobs within the family, the limited relevance and usefulness of competency models has become more pronounced.

STRATEGIES FOR ADDRESSING SKILLS BASED TALENT CRISIS: IMPORTANCE OF STRATEGIC WORKFORCE MANAGEMENT PLAN (SWMP)

In a presentation to AASHTO and PacTrans in April 2021, the Scan Team for NCHRP 68-20D project on leading practices in strategic workforce management by transportation agencies advocated for the development of a comprehensive Strategic Workforce Management Plan (SWMP). Such a plan would encompass various activities including workforce forecasting to predict labor supply trends and compare them with internal demographic projections, workforce development, succession planning, modern work environment (which includes telecommuting, flexible work policies, team rooms, etc.), knowledge management, employee recognition and employee wellness and engagement. They presented the following graphic to capture their suggested vision for a SWMP:

Figure 1-2: Strategic Workforce Management



Source: NCHRP 68-20D" Leading practices in strategic workforce management by transportation agencies

The overarching message from the presentation emphasized that having a comprehensive SWMP allows the DOT's leadership to address workforce challenges precipitated by outsourcing, downsizing, decentralizing, retirements, turnover, mismatch of skills, budgetary constraints, hiring freezes, etc. in a holistic rather than a piecemeal manner. One of the seminal workforce planning guides used by DOTs until the emergence of the recent efforts, was a publication called "US Department of Transportation Human Capital Management: A Guide to Workforce Planning (2008). In that report, the links between strategic workforce planning, knowledge management, and succession planning as interlinked activities to address talent management challenges was clearly identified in the US DOT's 2006-2011 Strategic Plan as the following objective: "Conduct workforce planning to identify both mission and workforce trends, assess mission-critical core competencies, and implement plans to close gaps through

vigorous learning and knowledge management approaches, targeted recruitment, and succession planning." (p. 19).

Steps in Creating a Strategic Workforce Management Plan (SWMP)

A follow-up webinar presentation by Washington State DOT in October 2021 for the Transportation Research Board (TRB) that outlined their efforts in creating and implementing such a SWMP, which was also linked to their agency's strategic plan. NCHRP recently released its report based on the "scan team's" two-year research efforts that highlighted successful strategic workforce management practices by twelve DOTs (NCHRP, 2021). Among the twelve DOTs, only five– Alaska, California, Georgia, Maryland and Texas – were following all the elements of the SWMP identified in the "tree" illustration on the previous page. Further, three other participating DOT's – Arkansas, Colorado, and Minnesota – were following select elements of the SWMP. Based on the scan team's research, they recommended the following steps and actions to follow to develop and implement a SWMP:

1. **SWMP must be aligned with the strategic direction of the agency**. Some actions to achieve this include:
    a. Performing a SWOT analysis
    b. Conducting a risk assessment
    c. Developing communication and collaboration strategies
2. **Organizational design review needs to be conducted**. Some actions to achieve this include:
    a. Identifying mission critical roles
    b. Identifying areas of success and where greater efficiencies can be realized
    c. Defining current organizational structure and inventorying polices and directives
3. **Current state of work, workforce, and workplace needs to be conducted**. Some actions to achieve this include:
    a. Analyzing recruitment, turnover, and retention, and skills and education data
    b. Conducting employee engagement surveys
    c. Analyzing organizational culture
4. **Future state of work, workforce, and workplace needs to be defined**. Some actions to achieve this include:
    a. Identifying top industry disruptors affecting the agency's future
    b. Analyzing the impact of external factors on the agency's operations
    c. Analyzing internal data related to turnover, retirements, skills development, career progression etc.
5. **Gap analysis between current and future states needs to be performed**. Some actions to achieve this include:
    a. Prioritizing the agency's business and workforce needs
    b. Identifying areas of maximum gaps between current and desired state
    c. Identifying the best places to deploys resources to close the gaps

6. **Strategies to address identified gaps need to be developed**. Some actions to achieve this include:
    a. Developing recruitment and retention programs, knowledge management plan, succession planning activities, and robust learning and development programs to close gaps identified in Step 5
    b. Engaging employees across all levels
    c. Developing communication and collaboration strategies to ensure gaps are being closed
7. S**WMP needs to be created, documented, and implemented**. Some actions to achieve this include:
    a. Developing implementation timeline and identifying areas with the greatest impact
    b. Identifying champions to lead the implementation efforts across the organization
    c. Establishing mid-level allies to amplify the efforts of change agents
8. **SWMP needs to be regularly monitored, evaluated, results reported, and activities refined**. Some actions to achieve this include:
    a. Monitoring, tracking, and recording outcomes from implementing various SWMP elements
    b. Reporting results against established performance metrics and timeline
    c. Establishing governance structures to ensure SWMP is meeting agency's priorities and is continually refined using internal and external data.

Essential Factors for Ensuring Success of a Strategic Workforce Management Plan (SWMP)

As noted above, strategies for knowledge management and skills development are a vital facet of a strategic workforce management plan, especially in addressing the gaps between the current and desired future state. DEI considerations undergird many of the key activities within the strategic workforce planning process. In addition, the scan team noted the importance of the following factors in the success of creating and implementing a SWMP:

1. **Leadership vision for the SWMP and support** for resources required to create and implement it.
2. **Technology** is vital for the successful creation, implementation, and continual revision of a SWMP. It is critically important for data collection.
3. **Understanding change management** process is essential for effective implementation.
4. **Employees need to be involved** at all levels.
5. **Performance metrics and timeline** need to be identified.
6. **Collaboration with peer DOTs** and learning from their lessons helps avoid costly pitfalls.
7. **Each DOT will have their own blueprint** for successful creation and implementation of SWMP since each agency has its own priorities to address.

The research and recommendations by the scan team exemplifies and points out the direction for DOTs to take in order to comprehensively address myriad workforce challenges. Research by Singh, Qin, Gottlieb, and Fouad (2022) on workforce development and readiness project conducted for WisDOT contained results of SWOT analysis, focus group discussions, and risk analysis for one of the divisions to enable them to engage in strategic workforce management and planning and could serve as an example for the agency leadership and other divisions in their efforts for creating a SWMP. Before turning to a discussion of the tools and techniques for addressing these workforce concerns, it is important to first understand the specific challenges associated with Knowledge Management (KM) given that it is a key focus area of this study and report.

KNOWLEDGE MANAGEMENT: WHAT IT IS AND WHY IT IS IMPORTANT

In 1950, the first seeds of Knowledge Management (KM) were planted. It was not until 1998 that this term and discipline was recognized by AASHTO and made its way to being used by the Departments of Transportation in varying degrees nationwide through the FHWA's "Knowledge Sharing Initiative." Since then, there has been steady growth in understanding the importance of creating and implementing systematic KM plans, tools, and techniques across various DOTs. The last few years have seen a rapid growth in interest by AASHTO, NCHRP, and FHWA to research the links between KM and other organizational practices and share lessons learned from these efforts in the hopes of accelerating the knowledge capture, codification, and dissemination within and across DOTs. For a historical evolution of KM practices within the transportation industry and a preview of their upcoming research efforts, refer to: (AASHTO KM Timeline).

According to NCHRP Report 813, "A Guide to Agency-Wide Knowledge Management for State Department of Transportation" (2015), Knowledge Management (KM) can be thought of as an:

> *"…umbrella term for a variety of techniques for preserving and enhancing the knowledge of an organization's employees and effectively employing that knowledge as a productive asset. The goal of KM is to enhance organizational effectiveness and efficiency by facilitating mobilization and productive employment of this knowledge."*

Explained in this manner, understanding and effectively utilizing KM practices is a vital task to undertake for any DOT leadership in order to successfully fulfill the agency's mission and objectives.

Given that knowledge resides with people and information resides in many files, databases, and manuals scattered throughout the agency, an effective KM plan "helps ensure that people have the knowledge they need to do their work and make good decisions, that they have the knowledge when they need it, and that they understand why and how this knowledge can be useful." Knowledge is built over time and through continuous formal and informal learning, work experiences and interactions with people – internal and external to the agency. It is important to emphasize that most of the critical knowledge resides only in the employees, especially with the most experienced employees. In any emergency situation, it is these

experienced employees' "brain trust" that makes the difference between a successful outcome or an embarrassing or disastrous one. Given DOT's public facing and stewardship role, any poor decisions or inefficiencies caused by inexperienced or under-resourced staff can lead to unwanted and increased public scrutiny of DOT's internal operations.

The NCHRP (2015) report noted that while KM tools were widely used across public and private sector organizations, they had a limited adoption by state DOTs which only underscores the timeliness and importance of the current study. The DOTs that do have a KM plan in place are doing it in a (a) piecemeal fashion in that only certain KM practices are being utilized, and (b) fragmented manner – in that only certain departments or divisions are engaged in some KM practices while others are not doing anything.

There is a need to create a robust KM plan – one that can withstand the internal workforce changes brought on by retirements, turnover, restructuring, hiring freezes, or "doing more with less," and be responsive to technological changes that impact knowledge *and* information capture, storage, access, retrieval, and dissemination. According to the NCHRP (2015) report, investing in creating and implementing agency-wide and robust KM plan has a tremendous payoff because it helps to:

- ***improve organizational efficiency and effectiveness*** when faced with shrinking budgets, fluctuating revenue streams, changing missions, workforce demographics, and project and service delivery methods,
- ***strengthen organizational resilience*** by identifying and building a bench strength of critical employees, a strategy for replacing critical those employees without losing their expertise, and activities for getting new staff up to speed and growing their expertise and experience in requisite areas,
- ***strengthen workforce capabilities*** by reskilling, upskilling, recruiting, and retaining employees, and redesigning work – all of which are aligned with the agency's mission and helps it to meet emerging needs and in critical skill areas,
- ***reduce vulnerability to employee transitions*** caused by the departure of experienced employees with mission-critical knowledge and proactively anticipate and manage workforce transitions,
- ***leverage external expertise*** from contractors, consultants, and other partners by creating opportunities for knowledge and information capture, storage, and dissemination,
- ***foster learning and innovation*** that is vital to successfully adapting to changing requirements. KM payoffs are realized by creating processes that encourage information sharing within one's agency and across peer agencies, collaboration across teams and departments, reduce duplication of efforts, streamline intra-team and inter-departmental communication, and support internal transfer of knowledge through Communities of Practice (CoPs).

BEST PRACTICES FOR KM PLAN CREATION AND IMPLEMENTATION

Effective KM plans need to be agency-wide, well-organized, driven from the top and the bottom, closely integrated with organizational strategy and goals, and deeply embedded into the organizational culture and its systems. KM plans include *building*, *leveraging*, and *sustaining* a range of activities and techniques that many organizations may be already performing. Some relatively low-cost KM techniques also reflect elements of Information Management (IM) and include:

- ***workforce planning*** focused on identifying and closing gaps between needed skills and existing capabilities,
- **communities of practice** that capture the essential insights and hard-won lessons from experienced employees and are critical for knowledge capture, information codification, and knowledge/information dissemination,
- ***expertise directories*** that contain a department's or a team's list of go-to subject or functional matter experts for answering questions, trouble-shooting, and/or providing guidance, and
- ***information repositories*** such as databases, files, manuals, intranet, etc. that ensure quick and accessible information capture, retrieval, and dissemination.

KEY FEATURES OF AN AGENCY-WIDE KM APPROACH

The NCHRP (2015) report identified a four-step agency-wide KM approach for DOTs to follow for them to successfully reap the benefits of creating/strengthening, and implementing a KM program:

- ***Leadership and direction from the top*** is the first and the most critical step in this process. Lack of top leadership support, or worse, mere lip-service can undermine or derail even the best laid KM plans. Active, clear, and tangible support is essential that takes the form of creating an agency-wide KM team with a KM lead(s), identifying KM goals and desired outcomes that reflect agency strategic objectives, investing resources to accomplish these goals, and requesting regular updates.
- ***Fostering a culture of collaboration and knowledge-sharing communities*** that encourage a variety of modalities for mentoring, problem solving, and knowledge sharing. These could include online and in-person opportunities, informational forums such as 'lunch and learn' sessions, ask-an-expert discussions, etc. Such a culture is helpful in breaking down informational and functional silos by providing a community that encourages and supports cross-departmental/divisional collaboration, knowledge-sharing, and problem-solving.
- ***Knowledge codification and dissemination processes*** are another critical element of an effective agency-wide KM plan. A variety of procedures and techniques are used to identify and capture mission critical, unique and at-risk knowledge and that need to be codified and disseminated using a variety of techniques, including online and in-person.

- **Succession and talent management** needs to be tightly integrated into any comprehensive agency-wide KM plan and reflect emerging workforce knowledge gaps and risks. A synergistic approach to addressing these gaps and risk will need to incorporate skills assessment and touch every facet of the talent management process: recruiting, onboarding, training, developing, performance feedback, and rewarding and recognizing employees.

BEST PRACTICES FOR DEVELOPING AND IMPLEMENTING KM STRATEGY

The NCHRP report (2015) synthesized the best practices and recommended the following step-by-step approach in developing and implementing an agency-wide KM strategy:

1. **Assessment of agency risks and opportunities** especially with regard to the knowledge bench strength and gaps. Such an assessment is critical before developing a KM strategy. Risk and opportunity assessment can take several forms such as:
    a. Vulnerability and knowledge risk assessment that identifies employees with impending retirements who have valuable, difficult to replace expertise and knowledge. Such an assessment can be done at the position or job family level.
    b. Capability and bench strength assessment in key skill areas that identify gaps between the current and desired needs. This assessment should also factor in the agency's strategic goals and the skills and experiences needed to fulfill them.
    c. Assessment of current systems for knowledge capture and dissemination and gaps in these systems.
    d. *Senior leadership perspective and input* need to be captured using a focus group discussion. The purpose would be to identify and agree on the critical and "at-risk" knowledge areas with regard to the agency's mission.
    e. A formal and *in-depth knowledge assessment survey* to all employees is required to understand how and where information and knowledge is being accessed, capture knowledge sharing behaviors, and identify gaps in information or knowledge that impact job performance.
2. ***Developing a KM strategic plan*** based on results of various types of knowledge risk and opportunity assessments is essential for the successful implementation of a KM strategic plan. The KM strategic plan needs to be:
    a. *integrated into the agency's strategic plan and stated goals* and provide a roadmap or a blueprint for goal accomplishment. It can be developed as either a follow-on activity from the agency's strategic planning process or as a stand-alone activity keeping in mind the agency's strategic plan.
    b. *endorsed and supported by top agency leadership* and have resources identified and committed to support KM strategy implementation for at least 6-12 months.

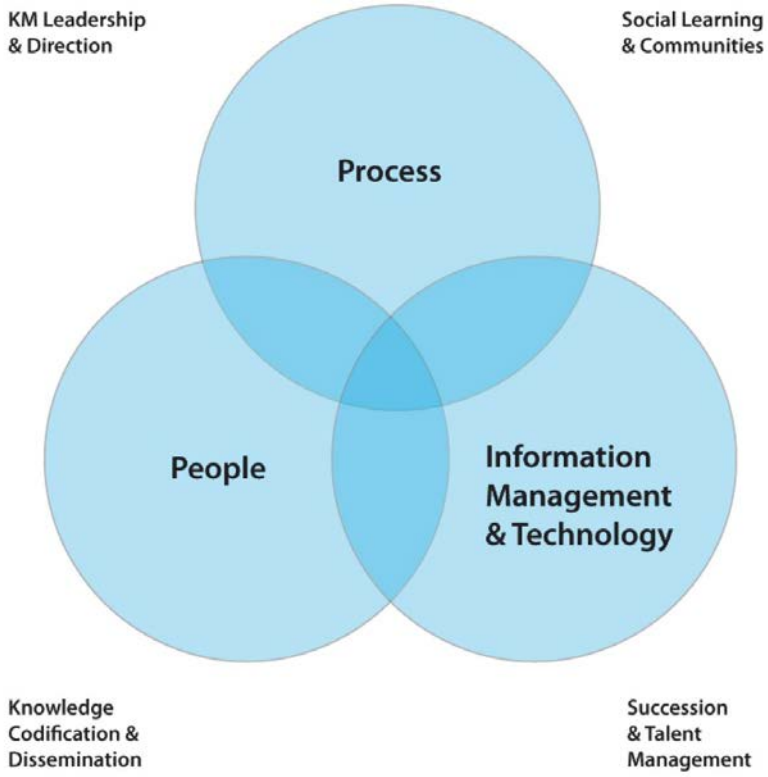
c. *specific in terms of KM goals* that will address gaps and risk identify through various knowledge assessments in the preceding steps. It also needs to be specific in terms of priority areas to focus on (e, g., departments, divisions, positions, job families, etc.)

3. ***Identifying a set of KM strategies*** that will address the KM goals and priority risks identified in the KM strategic plan. There are four broad categories of KM strategies that can be used to address a variety of challenges faced by DOTs. These four categories include:
    a. ***KM Leadership and Direction*** strategies are most appropriate for those who are pursuing an agency-wide rather than a divisional wide effort to improve KM. These strategies underpin all efforts and include activities such as data collection with regard to skills and knowledge gaps, supporting the establishment of KM leadership team and empowering them with resources, defining roles, responsibilities, and milestones for task delivery, and investing in agency-wide education and training on KM initiatives. Because of the extensive efforts involved, these strategies have the maximum payoff for the agency.
    b. ***Social Learning and Communities*** strategies include different techniques that facilitate knowledge-sharing, group problem-solving, and innovations. Common techniques include Communities of Practice (CoP), after action reviews, electronic expertise locator directories, etc. Engaging in these techniques enables the agency to speed-up onboarding of new employees, reduce occurrence of 'rookie mistakes,' improve organizational resilience, and reduce reliance on single expert employees.
    c. ***Knowledge Codification and Dissemination*** strategies focus on process and procedure documentation and capture of information and knowledge so that all employees have access to "*who, what, how, when, and why*" behind key business practices and established procedures. Not all knowledge lends itself to be captured and codified in this manner, typically, procedural knowledge and key lessons learned are best captured and codified to prevent both 'rookie mistakes' (or 'blind spot errors') as well as the tendency to "reinvent the wheel." Some common knowledge codification and dissemination strategies include content management systems and knowledge repositories lessons learned documentation, continuity and knowledge books, business process documentation, workflow management tools, etc.
    d. ***Succession Planning and Talent Management*** strategies are ideally suited to minimize the impact of knowledge loss and gap created by employee departures, especially, stemming from the departure of the most experienced employees with unique knowledge in mission critical positions. Strategies for succession planning and talent management include job shadowing, job rotation, mentoring, leadership training, retirees and alumni callbacks, desk-side reviews, etc. All these strategies

aim to systematically track available KSAs and identify ways to address/reduce the gap between the current and future needs and also to streamline employee mobility experience in and out of different work roles by preparing them to hit the ground running.

4. The above four strategies need to incorporate a balanced mix of three components that "*combine to provide the motivation, the means, and the opportunity for knowledge sharing in the organization*." (NCHRP, 2015, p. 24). Figure 1-3 displays the relationship between the four strategies and the three components.

Figure 1-3: Knowledge Management Strategies



Source: NCHRP (2015) A guide to Agency-wide Knowledge Management for State Departments of Transportation

The three components are:

a. ***People*** components that focus on fostering skill building and knowledge sharing behaviors,
b. ***Process*** components that focus on using insights and lessons learned for improving current and future work processes,
c. ***Information Management/Technology*** systems that focus on knowledge sharing and practices for information/data/content to be captured, stored, and documented for easy retrieval

5. ***Identifying a KM lead or leadership team*** who has the broad support and respect of the agency and divisional leadership to carry out the KM strategic plan. The KM lead or leadership team could be either centrally located or housed in other units, except for IT to avoid making it solely a technology driven initiative.
6. ***Developing a suite of KM techniques*** to implement different KM strategies that address the priority goals.
7. ***Developing a detailed KM implementation plan*** is essential for identifying the sequences of specific activities to be carried out, the appropriate people to manage the implementation, and the necessary resources that need to be committed to ensure maximum effectiveness. The implementation plan needs to include the following:
    a. Specific KM activities that will help address priority areas and goals
    b. Detailed plan for the first set of initiatives that will be carried out
    c. Budget and list of supporting resources (e.g., internal/external personnel, IT) for carrying out the activities
    d. Specific outcomes and milestones attached to each activity
    e. Schedule of milestones to be met
    f. Metrics and evaluation methods for tracking progress
    g. Regular review meetings to evaluate progress and make modifications
    h. Communication plan for building awareness and sustaining engagement with the activities.

POOR PRACTICES/PITFALLS TO AVOID IN KM CREATION AND IMPLEMENTATION

Just as important as it is to discuss best practices, it is likewise equally important to highlight poor practices or pitfalls in the creation or implementation of KM. The NCHRP (2015) report identified several such poor practices or mistakes to serve as a cautionary note for DOTs to avoid making in their effort to create a KM plan, implement the KM plan and strategies, or strengthen existing KM practices. Common KM pitfalls to avoid include:

- viewing KM primarily in terms of staff development or succession planning
- viewing KM primarily in terms of Business Intelligence (BI) or an extension of either the IT function or the library's reference desk role
- viewing KM solely in terms of one function or process instead of taking a multi-pronged approach
- utilizing only one KM tool out of a vast selection of tools and techniques, and
- the biggest mistake of them all – not taking a strategic view of KM and relegating it to a single entity, tool, or department.

An essential takeaway from the above discussion points out that for any KM plan to succeed at DOT, it needs to be completely aligned with the agency's strategic objectives and integrated with all aspects of the agency's talent management pipeline – from hiring, to onboarding, managing employees' performance, training them, developing their careers, creating or strengthening reward structures that incentivize learning, knowledge capture, codification,

transfer, and dissemination. Such an integrated approach needs to be data driven and responsive to real-time changes. Practiced in this manner, KM tools and techniques can be used as a catalyst for culture change by breaking down silos, promoting collaboration and teamwork, reducing information hoarding, lowering resistance to change how "we've always done things around here," and discouraging tendency to "reinvent the wheel" – all in a transparent and equitable manner.

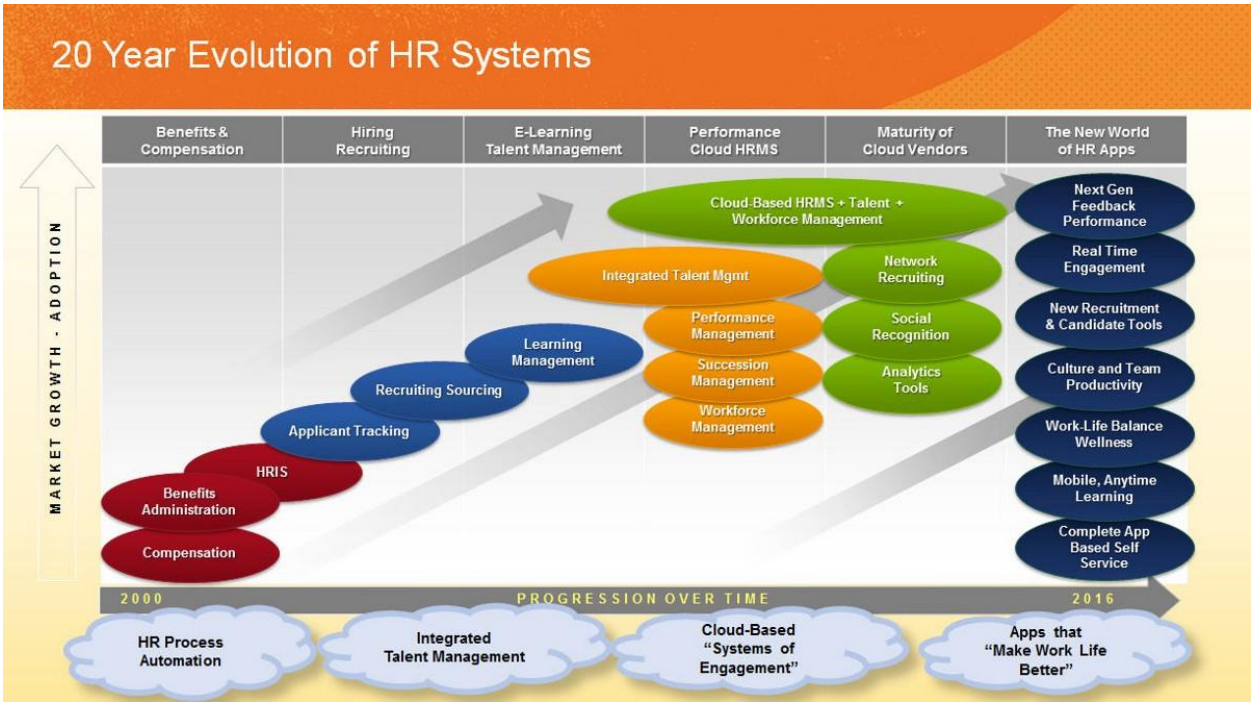
Successful organizations in public and private sector are increasingly relying on technologies that provided such an integrated approach to addressing workforce management challenges that bolster the reach and effectiveness of KM tools and techniques. The next section will briefly describe the evolution and current status of such integrated technology platforms that attempt to address these skill and KM related challenges. Chapter 4 on a technology roadmap will discuss various options for WisDOT to consider as they move forward to the implementation phase of this project.

INTEGRATED SYSTEMS/PLATFORMS TO ADDRESS TALENT AND KNOWLEDGE MANAGEMENT CHALLENGES: BRIEF HISTORICAL OVERVIEW, CURRENT STATUS, AND EMERGING TRENDS

Historical Overview: Given that the effectiveness of KM plans and strategies lie in its integration with all aspects of talent management systems, it is important to first understand the essential elements that make up such a system. As most leaders and managers understand, it is impossible to manage people and the knowledge that resides in them, without technology tools. The challenge is how to manage all these components using different, sometimes, disparate technological tools in the most effective, efficient, and streamlined manner. Inherent in this challenge is the notion that many technology tools require employees to not only spend time to learn how to use them but also to convince skeptical employees that it's worth learning the tools. Reluctance to learn and skepticism about the value of technology tools are directly rooted in the organization's learning culture where there is little support, incentives (both intrinsic and extrinsic), or recognition for engaging in the activities that apply these tools. Technologies that enhance employee experience and integrate seamlessly with every aspect of their work are likely to see greater use than any stand-alone talent or knowledge management systems.

Recent advances in the availability and use of various technologies have blurred the lines between traditional human resource functions like recruiting, onboarding, payroll, training, career development, and performance management and offered a more streamlined set of tools that built off one another in a modularized fashion. Over the last two decades, changes in these technologies have triggered a concomitant shift in organizational approaches to better understanding and managing their employees' work productivity and experiences. See Figure 1-4 created by Bersin (2016) for a graphical representation of this evolution.

Figure 1-4: Evolution of HR Systems



Source: Bersin (2016) https://medium.com/@josh_bersin/the-hr-software-market-reinvents-itself-83d93a2f19c8

The pandemic accelerated this shift toward more intelligent talent management that allow professionals to gather "insights about workers – their skills, capabilities, experiences, career aspirations, performance, demographics, learning needs, development opportunities – and uses this information to help people find the right opportunities for them" within the organization (Bersin, 2022; pg. 3). In essence, reframing the challenge not as matching people to jobs or open positions but using talent intelligence platforms to match people to opportunities. It would also entail reframing opportunities to be more comprehensive and include developmental and/or stretch assignments, mentoring, promotions, project roles, etc.

Matching people to opportunities cannot be undertaken by looking at competency models. As discussed earlier in the report, such competency models are inadequate for this purpose since they are too time intensive and laborious to regularly use and update and do not capture the complexity of work performed by employees. Moreover, jobs may be often ill-defined with tasks, duties, and responsibilities that quickly become out of date and do not reflect the changing projects, teams, and goals that make up an employee's job at any given time.

As many organizations moved away from competencies, they approached this task by mapping each job to its skills and created a "global skills taxonomy." Certain jobs in manufacturing, construction, engineering, operations, etc. required validated technical skills. For technical skills data to be valid and useful, it needs to be accurately measured which means there needs to be an agreement on how to define these skills, the level of granularity required to capture it, the process for updating these skills, and deciding which jobs require such an intensive skill taxonomy building and maintaining effort. Further, most skill taxonomies reflect

the jobs as they are at any given point in time and don't take into consideration the changing skills, tools, and technologies needed to get the same job done in the near future. The result is that organizations may end up managing their human resources into obsolescence by recruiting and retaining employees that freeze the organization in time.

Skills data is essential not only for recruiting, but also for continuous learning (vital for KM), internal mobility, leadership development, succession planning, and pay. According to Bersin (2022), intelligent talent management platforms are more than using skills data and combining them with people analytics. Intelligent talent management platforms work and build off existing Human Resource Information Systems (HRIS) and then scan the organization's workforce, jobs, Application Tracking Systems (ATS) data, learning systems, performance and turnover data, and external labor market data to infer skills and experiences and provide a range of opportunities. Talent intelligence platforms are most effective when led by a multidisciplinary/multifunctional employee team with experience in data analysis, workforce planning, sourcing intelligence, and learning and development, and aim to address problems of strategic importance to the organization.

Types of Strategic Organizational Problems Addressed by Talent Intelligence Platforms

Bersin (2022) categorized three typical strategic problems confronting many organizations which prompt them to switch to the use of a talent intelligence platform. Each of these problems requires a varying time investment to resolve them. The three categories of problems are:

i. ***an underperforming operation*** in which a department or a function is not meeting its targets, there's difficulty hiring people because it is not seen as an "employer of choice,"
ii. ***current or future talent gap*** that manifests in steep hiring curves, need for employees to have greater career growth and internal mobility, or a desire to expand and diversify one's talent pool, and,
iii. ***concerns about long-term organizational transformations*** that are precipitated by new technologies, shrinking budgets, changing missions etc.

Types of Talent Intelligence Strategies for Addressing Strategic Organizational Problems

Bersin (2022) recommended following a "Four Rs" of talent intelligence strategy for addressing any of the above three categories of problems confronting an organization. The "Four R's" refer to: Recruit, Retain, Reskill, and Redesign. Each one of these varies in terms of the immediacy of its impact and the time involved in its implementation. Figure 1-5 provides a visual representation of their approach. A brief explanation of each of these "Four Rs" follows:

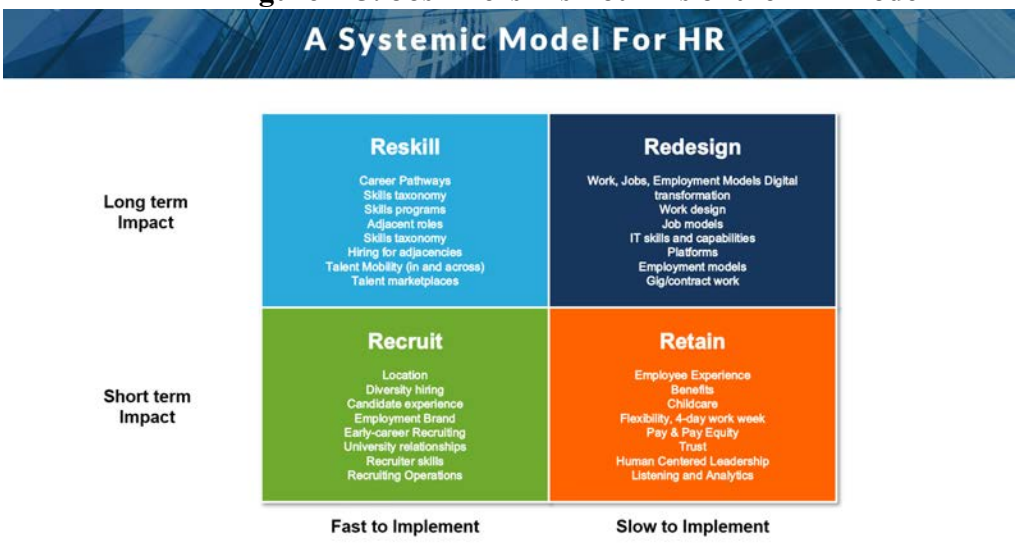
Recruit: These strategies involve addressing the fundamental questions related to sourcing candidates (how, where, which ones, and when), recruiting, hiring, and onboarding them. Issues related to diversity, location, organizational reputation/image, recruiter skills, including their tech savviness, etc. play a role in realizing the desired impact in addressing the specific strategic problem identified upfront.

Retain: These strategies involve addressing the fundamental issues around compensation, benefits, workplace flexibility (location/time), and human-centered leadership support that conveys that employees are valued and their contributions matter. These strategies are relatively more time-consuming to implement but can deliver relatively quick results in terms of retention metrics.

Reskill: These strategies involve addressing a substantial portion of employees' experiences centered around their access to learning, training, professional development, career growth, and mobility. These are also relatively quick to implement but take a longer time to reflect the full payoff from any implementation.

Redesign: These strategies involve addressing the fundamental question about reorganizing and redesigning work itself, and by extension, reorganize and redesign the structure and manner in which work is performed in response to internal and external changes. It is the most challenging of the four Rs in terms of its ambiguity and lack of clear-cut solutions/answers to addressing the strategic problem. It also requires a longer time to implement and see the results of any changes, and one that creates a potentially lasting impact – positive or negative.

Figure 1-5: Josh Bersin's Four Rs of the HR Model



All these four options for addressing an organization's strategic problems have certain common themes that tie them all together into one comprehensive framework.

- They are all '***capability' and data-based approaches***' which reflects a totality of employees' skills and experiences and are most productive when based off accurate and timely, comprehensive data, appropriate analysis, and embedded in an organization's Strategic Workforce Management Plan (SWMP). Because they are all capability and data-based approaches and anchored to the strategic workforce management plan, they are inexorably tied to the organization's knowledge management strategy and techniques. Any attempt to separate them in an effort to scale down the implementation time and cost is likely to result in a "penny wise, pound foolish" set of outcomes.
- Even if one of the "Rs" is the focus for any initiative to address a specific organizational strategic problem, it still ***cannot be undertaken in a stand-alone manner*** because of the interconnectedness among the remaining elements of the framework. Even if the other elements are not tweaked, the talent intelligence team leading this effort needs to be cognizant of the ripple effects on other parts of the system.
- All of the four "Rs" either implicitly or explicitly acknowledge the ***importance of factoring in DEI*** considerations in addressing any strategic problem. Ignoring or downplaying these considerations can, at best dampen the desired impact and at worst, nullify or backfire on the organization.
- The implementation time and impact for all of them is dependent on a combination of "***human and tech intelligence***." The greater the investment in this combination of intelligences, the greater the payoff and certainty of achieving the desired set of outcomes in addressing the strategic organizational problems. The full impact of investing in tech tools for managing employees cannot be realized without a central team that serves as the hub for utilizing and deploying these tools and evaluating their results on a continuous basis. Likewise, the full impact of investing in creating a cross-functional team cannot be realized unless this team is equipped and empowered to use current technologies that amplify their efforts.

***Best Practices in Operationalizing Talent Intelligence: Step by Step Approach*:**

According to Bersin (2022), in order to address a specific strategic organizational problem identified by the leadership *and* based on data and evidence, it is best to adopt a step-by-step approach to creating and implementing a set of actions that utilize the four Rs among other measures. All these steps outlined here are very similar and consistent to the ones identified the research scan team (NCHRP, 2021) and discussed earlier in the chapter.

1. Building a ***cross-functional Center of Excellence (CoE)*** is essential and foundational step in starting the process of addressing any strategic problem.
2. Identifying the ***critical talent challenge*** to focus on that underpins any strategic problem.

3. ***Gathering and analyzing the data*** related to internal and external organizational trends as they relate to the talent challenge and identifying the roles and skills most likely to be impacted.
4. Determining a ***suite of solutions*** for addressing talent issues using the four Rs.
5. ***Working across the organization to get buy-in and support*** to plan, design, develop, and implement the solutions.
6. ***Measuring success by first defining what it looks like***, and then using results to make modifications and continuously improve the next stage.

EMERGING TRENDS IN TALENT INTELLIGENCE: OVERVIEW OF TECHNOLOGICAL TOOLS

According to Bersin (2022) the next generation of HR technology for 2022 and beyond builds off the advances and insights of the previous generations of tools and applications (see Figure 1-6 for a visual representation). Each generation of tools and technologies also reflected the organizational cultural, demographic, and economic changes. Following is a brief description of the different layers that comprise Figure 1-6.

In the 1970s and 1980s, the creation and introduction of Enterprise Resource Planning (ERP) systems revolutionized workplace operations by integrating manufacturing, supply-chain, with many 'back-office' functions like finance, payroll, into one streamlined end-to-end process. Excited by the possibilities that such streamlining and integration offered, software vendors extended it to HR. Peoplesoft modified ERP applications to HR and took it a step further by creating automated systems of record for payroll, job architecture, and employee record keeping. These *transactional talent and Human Capital Management (HCM) applications* form the operational backbone of any organization's HR system and remain the base/foundational layer over which other platforms, tools, and applications were designed. New tools and technologies continue to emerge that streamline the connections between "systems of record," but it is currently not possible to have one single system of record given that data is in multiple places and HR tasks are complex.

However, ERPs were not designed or built around people who acquired new skills, experiences, and growth. This opened up a new front for innovation in HR tech starting in the 1990s and 2000s and came to be known as the *talent management systems*. These systems of talent management include Applicant Tracking Systems (ATS), Learning Management Systems (LMS), skills inference, and other types of assessment systems that were built as stand-alone modules for managing different tasks related to recruitment, performance management, and learning/training. Innovations in technologies in this talent management space continue, and include examples that feature an addition of a separate analytics feature and social media.

Both the HCM and talent management systems were built around the idea of industrial model for work and worker. According to Bersin (2022), "the HCM system, since it tends to treat employees and jobs as objects, is built on job families (i.e., Finance, IT, sales), hierarchical job levels, and tens of thousands of job titles, job descriptions, and job competency models. The concept of a "project team," a "part-time worker," or even a "contingent job" did not quite fit."

The rigidity of HCM applications made it impossible to accurately keep track of skills progression, career mobility, cross-division teams or projects that comprise one's work, among other things.

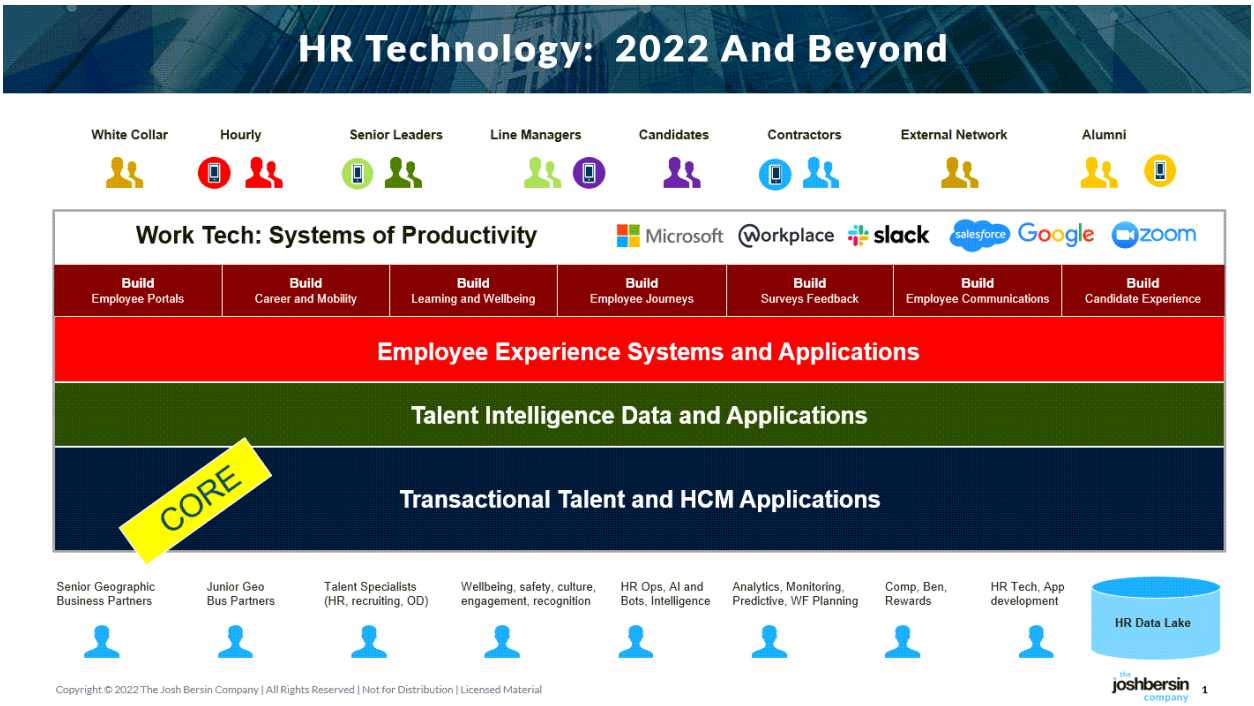
These limitations led to a growth in systems of engagement and systems of work productivity starting in 2010s and their growth continues today. These are represented in Figure 1-6 as the two top layers of HR tech and are known as skills and capability-based systems which have built-in analytics and AI to enhance employee experiences and engagement at work by matching employees with relevant opportunities. These systems are also cloud-based platforms that integrate with existing HCM systems and are more user-friendly than any other HR technology that preceded it. The latest generation of technological tools focus on not only enhancing experience and engagement but also the nature and productivity of work – and there's been explosive growth in this arena. Many new offerings seem like a "new and improved" version of an existing system, e.g., some applicant tracking systems are called candidate experience platforms. In addition, many of the previous stand-alone tools for pay, rewards, well-being, recognition, etc. are now being integrated and added on to existing systems like Teams, Slack, Zoom, Workplace, Google Workspace, etc.

Key Takeaways

There are several key takeaways from the above discussion.

- None of these different systems can act as a substitute for another. They each continue to play an important role in helping organizations achieve their objectives.
- Professionals need to be more educated than ever before when they evaluate vendors of various apps and technologies.
- The pandemic induced challenges of working from home or hybrid work arrangements have left many employees less excited about learning new tools or technologies unless they are easy to use and they see a direct benefit of using them to improve their work experience.
- One of the most critical takeaways is that organizations are most likely to reap the benefits of any investment in any of these technologies *only if they put their employees first*. In other words, it is vital to first define and understand employee and management needs, what talent goals or organizational culture shift they want to achieve, data they want to capture, and then select the tools that best meet their needs whether they start from bottom-up (by focusing on HCM first) or approach it top-down (by focusing on employee experiences and productivity first).
- Bersin aptly noted that based on research, the most successful organizations use HR technology as an enabler to help organizations address their strategic problems, or talent goals, or new operating models. In essence, the selection and deployment pf HR tech is best viewed as part of a holistic business transformation rather than a side IT project.

Figure 1-6: Future HR Technology



Source: https://joshbersin.com/2022/03/hr-technology-market-disrupted-employee-experience-is-now-the-core/

LEARNING OPPORTUNITIES AND CULTURE: THE NOT SO 'MAGIC BULLET' THAT TRANSFORMS ORGANIZATIONAL EFFORTS TO CLOSE SKILLS AND KM GAPS

In order for organizations to realize the benefits of deploying any talent intelligence platforms to address their twin challenges of closing skills and KM gaps, it is important to take a step back and understand the foundational elements that need to be created for ensuring the success of any initiatives. The research and best practices reviewed thus far have articulated, in both direct and indirect ways, the importance of creating a learning culture filled with appropriate and purpose-driven learning opportunities. Nowhere is this task more important than in public sector organizations, which are far less competitive than their private sector counterparts that are using some of the latest holistic approaches to attracting and retaining highly skilled employees, like high compensation, holistic and expansive benefits, rapid promotions, etc. What should provide optimism to public sector leadership is that polling data from a variety of sources all emphasize that opportunities to learn and utilize new skills are some of the most important reasons for employees either joining or leaving any organization.

For example, recent polling data from Gallup (2022) revealed that 48% of American workers would switch jobs if offered skills training opportunities. Likewise, polling data from Deloitte's (2022) survey on Global Millennial and Gen Z showed that 30% of workers chose their current jobs because of access to Learning and Development (L&D) opportunities, and

LinkedIn survey data (2022) confirmed these trends in its survey when it found that opportunities to learn and grow were the most defining feature of an exceptional work environment.

Use of Design Thinking in Revamping Organizational Learning Culture

Transforming L&D activities and by extension the underlying learning culture needs to be undertaken in a thoughtful and well-organized manner. Eggers, Titus, and Dattar (2022) recommended that public sector organizations need to follow five design thinking principles to optimize the impact from revamping their existing L&D programs and initiating new workplace learning and skills development opportunities. These five design thinking principles applied to improve L&D need to be: outcome-based, skills-focused, balanced with the right use of modalities, adaptive, and optimized.

Outcome based learning simply emphasizes that it is imperative for the organization to connect any learning to its tangible mission outcomes. It would mean that leaders need to break down the skills required, at a granular level, to accomplish the agency's goals. Reskilling and upskilling are examples of such outcome-based learning and for these strategies to be effective, they need to be integrated to mission critical positions with mission critical goals that need to be accomplished. If organizations are struggling to build their internal capacity, they could address their skills and KM gaps by using other options such as 'buying' or 'borrowing' those specific sets of skills. Examples of 'buying' include hiring new employees or contractors with specific mission critical skills. 'Borrowing' strategy allows organizations to "access skills that are hard to find, difficult to train, or too expensive to hire permanently." (Eggers, Titus, Datar, 2022). The Federal Office of Personnel Management (OPM) created an opportunity matching clearinghouse which lists open positions with specific skills that allows employees from different federal agencies to work in those open positions without leaving their current roles. Finally, not only do outcome-based learning opportunities need to be connected to the organizational mission and goals, but they also need to be incentivized by being integrated to growth opportunities within the organization.

Skills focused learning emphasizes self-directed, personalized, user-friendly approaches to empower learners to learn and apply those skills that help them improve their work performance and fulfill organizational goals. For this to be effective, it is important to first identify the different types of foundational skills that are important across mission critical positions in the organization and target the learning opportunities accordingly. According to a widely known statistic that the half-life of a skill is five years (Thomas & Brown, 2011), one can also argue that not all skills lose their relevance at the same speed. In fact, some skills sharpen over time and experience. It is important for organizations to identify and distinguish between the durable skills and perishable skills and how the two sets map onto to different positions. As has been noted earlier in this chapter and confirmed by Eggers, Titus, and Datar (2022), all research points out that soft skills like critical thinking, problem-solving, communication, leadership, etc., are the durable skills and some technical skills tend to be perishable skills.

Balanced learning emphasizes the importance of using the right mix of modalities for providing opportunities for skills acquisition and mastery. Macrolearning, microlearning,

university learning, VR, simulations, experiential learning and apprenticeships are some examples of mixed modalities for learning and mastering content and skills that are job-related and tied to organizational missions.

Adaptive learning strategy has its core in the notion of continuous learning and improvement. It involves planning ahead and anticipating skills needed in the next three, five-, and 10-years' time and accordingly retooling the opportunities for reskilling and upskilling. Of course, as options for buying and borrowing mission critical specific skills remain viable, it is also important to invest in internal capability and skills assessment systems (like the ones discussed earlier in this chapter and in Chapter 4) that enable the organizational leadership to quickly pivot and realign its existing workforce to better meet the anticipated business and employee needs. The long-range planning and workforce retooling efforts undertaken by Virginia DOT are an example of this adaptive and anticipatory learning strategy.

Optimizing learning strategies focuses on enhancing learning experience, specifically by creating personalized learning that utilize a mix of learning modalities, which are embedded within learners' 'flow of work,' and undertaken within the entire framework of the talent management process. Talent management systems discussed earlier provide an efficient and effective way to implement these strategies.

CONCLUSION

In sum, public sector employers can effectively compete with their private sector counterparts in terms of attracting and retaining highly skilled employees by elevating their L&D programming and re-investing in creating and sustaining a learning culture. The use of appropriate technological tools which enhance skills assessment, career planning, knowledge management, and succession planning are essential for enhancing human ingenuity and bold vision that characterizes many public sector leadership teams as they successfully confront the challenges facing their organizations.

CHAPTER 2: SURVEY DESIGN, METHODS, IMPLEMENTATION

The project was conducted by the UWM-IPIT team in close partnership with the WisDOT team that was charged with the task of providing inputs to fulfill the stated objectives.

SURVEY DESIGN

Throughout the duration of the project, the UWM-IPIT research team met regularly with the WisDOT team to discuss suggestions, review the progress of what had been accomplished, and recalibrate strategies based on the availability of information. The teams decided to utilize a survey methodology in order to understand the current state of skill readiness and assess various aspects of knowledge management. The survey was created by the UWM-IPIT team. The KM questions were based off the seminal "knowledge readiness and assessment" survey conceptualized by Liebowitz (2008) which was also extensively used by other DOTs embarking on KM efforts as captured in the NCHRP (2015) report. Survey questions were divided into seven broad categories:

- Demographic and background questions that focused on capturing the respondents' profile with regard to their tenure, education, division affiliation, type of employment, job classification, race, and gender.
- Skills usage over time which tapped into relative usefulness of an array of skills that respondents applied when they first started their job, an assessment of their current usefulness and future projections in 2-3 years' time.
- Knowledge resources which comprised of questions on how frequently various types of primary and secondary resources were used by respondents in performing their work. The goal was to capture how and where respondents sought information and knowledge – both from people and codified sources. These questions reflected information and knowledge sources related to materials like databases, manuals, documentation, as well as people such as supervisors, colleagues, or other experts.
- Knowledge use reflected questions on the relative frequency with which information or data was used in performing one's job.
- Knowledge sharing included questions related to the frequency with which different type of media is used for sharing information with colleagues or other organizational members.
- Transfer of information questions which captured the adequacy of documentation left by the experienced employees for the incoming employees.
- Learning and sharing culture included questions that assessed the extent to which culture at the department and division level was receptive to new ideas and learning.

SURVEY IMPLEMENTATION AND TARGET AUDIENCE

The survey was created on Qualtrics and after receiving approval from the Secretary's Office, a link to the electronic survey was sent via email by the WisDOT team to all permanent, classified employees in all the divisions on Sept 29, 2022. The survey was closed on Oct. 15, 2022. A total of 1,153 survey responses were received which represents 30% of the total number

of employees that received the survey. The survey responses varied by division with DTSD representing the largest number of respondents and EO the lowest.

DATA ANALYSIS

The survey data was analyzed using descriptive statistics. In addition, machine learning was also used to identify patterns of change in skills over time across different types of job families. Data was analyzed for each division, for the entire organization. Data on skills usage over time was also analyzed by specific job families that were identified by the WisDOT team as being most vulnerable to knowledge and skills loss.

The survey questions are presented alongside the results in the next chapter.

CHAPTER 3: SURVEY RESULTS AND DISCUSSION OF OVERALL TRENDS

This chapter is broken up into two main sections: first, detailed presentation of results with a brief explanation, and second, an overall interpretation and discussion of the overall trends gleaned from the results within the context of the literature reviewed in Chapter 1.

RESULTS AND ANALYSIS

Respondents' Background and Demographic Profile

Across the agency, the average length of time that the survey respondents reported working at WisDOT was between 7-10 years. Average organizational tenure for DTSD and DSP respondents was the same as the agency average. Respondents in other divisions had lower than average tenure while those in the EO had higher than average tenure (10+ years).

On average, respondents indicated that they have been working in their current jobs for 2-5 years at the time of the survey. Except for two divisions – DSP and DBSI[1] – all others were consistent with this average tenure in their current jobs. DSP respondents had the longest tenure in their current jobs (5-7 years) while those in DBSI had the lowest tenure in their current job (1-2 years). Almost all respondents reported working in full-time roles – this was the same across divisions.

Analysis of the gender and racial background indicates that over 80% of the respondents were white and 56% were male. DMV had the highest proportion of females and DTIM the lowest. On average, respondents had earned a Bachelor's degree.

[1] DBSI was created in 2019, which may contribute to the shortened tenure in respondents' current roles.

Table 3-1: Survey Respondents by Division: Overall Percent of Total

Agency-wide/ Division	Percent of All Respondents	Respondents as a Percent of Total Number of a Division's Employees	Type of Employment		Average Tenure at WisDOT	Average Job Tenure	Average Educational Level
			Permanent/ LTE				
Agency-wide			98.4%	1.4%	7 years – >10 years	2 years – >5 years	Bachelor's
DTSD	49%	35%	99%	1%	7 years – >10 years	2 years – >5 years	Bachelor's
DMV	19%	27%	100%	0%	5 years – >7 years	2 years – >5 years	Bachelor's
DSP	11%	17%	97%	3%	7 years – >10 years	5 years – >7 years	Bachelor's
DBM	10%	40%	98%	2%	5 years – >7 years	2 years – >5 years	Bachelor's
DTIM	7%	46%	92%	8%	5 years – >7 years	2 years – >5 years	Bachelor's
DBSI	2%	73%	100%	0%	5 years – >7 years	1 year – >2 years	Bachelor's
EO	1%	42%	100%	0%	10+ years	2 years – >5 years	Bachelor's

Table 3-2: Survey Respondents: Percentage Breakdown by Gender and Race

Agency-wide/ Division	Gender			Race/Ethnic Background	
	Male	Female	Non-binary/ Non-conforming	Whites	Non-Whites
Agency-wide	56.3%	42.3%	1.4%	86.2%	14.8%
DTSD	64%	35%	1%	90%	10%
DMV	27%	72%	1%	73%	27%
DSP	70%	30%	0%	88%	12%
DBM	59%	39%	2%	82%	18%
DTIM	70%	24%	6%	94%	6%
DBSI	52%	48%	0%	90%	10%
EO	54%	38%	8%	92%	8%

Table 3-3: Additional Credentials by Division

Most Frequently Cited Additional Credential	DBM (N=51)	DBSI (N=4)	DMV (N=45)	DSP (N=52)	DTIM (N=33)	DTSD (N=3408)	EO (N=12)
Occupational or professional licenses	21.57%	25.00%	33.33%	26.92%	42.42 %	65.69%	50.00%
Memberships in professional organizations	35.29%	0.00%	20.00%	38.46%	30.30 %	16.42%	41.67%
Apprenticeship	0.00%	0.00%	2.22%	0.00%	0.00%	1.96%	0.00%
Trade certificates	11.76%	25.00%	6.67%	11.54%	0.00%	5.88%	8.33%
Software certificate	21.57%	0.00%	6.67%	3.85%	6.06%	2.45%	0.00%
Other (please specify which ones)	9.80%	50.00%	31.11%	19.23%	21.21 %	7.60%	0.00%

***Takeaway**: Most prevalent 'other' credentials: Occupational/professional licenses, followed by memberships in professional organizations.*

Table 3-4: Perceptions of Usefulness of Education to Performing Job

(Response format: 1=Not at all useful; 2 = A little useful; 3 = Useful, 4 = Moderately useful; 5= Extremely useful)

Agency-wide/ Division	Average Usefulness	Division	Average Usefulness
Agency-wide	3.5	**DSP** (N = 93)	3.3
DBM (N* = 86)	3.4	**DTIM** (N = 60)	3.9
DBSI (N = 21)	3.7	**DTSD** (N = 454)	3.9
DMV (N = 160)	2.7	**EO** (N = 13)	4.3

* Note: Sample size of respondents denoted by N

***Takeaway**: Agency and division-wide respondents reported average to slightly above average level of usefulness and relevance of educational background and credentials to performing one's job. Three divisions – EO, DTIM, and DTSD reported above average levels of relevance of education to job performance and one division – DMV – stood out as seeing the lowest usefulness or relevance of educational background and credentials.*

Table 3-5: Perceptions of Adequacy of Training to Performing Job

(Response format: Yes, it was useful, No, it was not useful, No opinion)

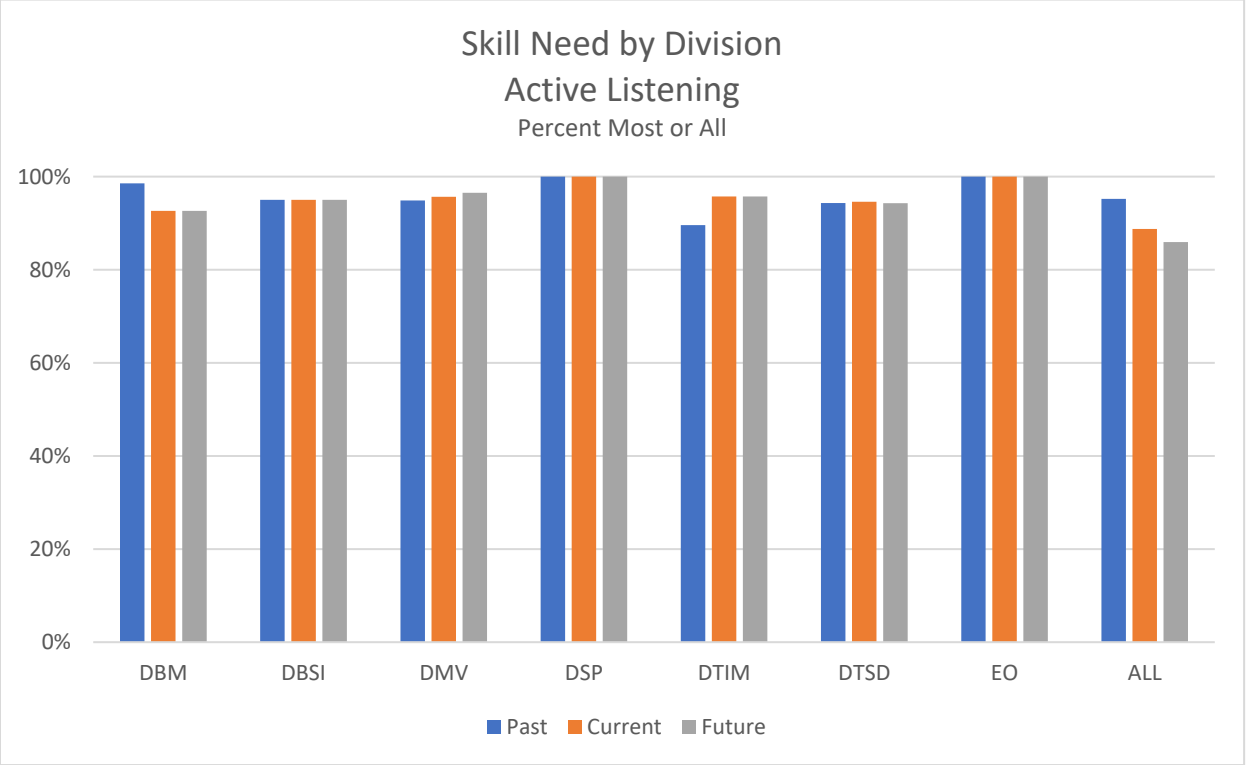
Agency-wide/ Division	Yes	No	No opinion	Division	Yes	No	No opinion
Agency-wide	58.6%	27.4%	14%	**DSP**	60%	21%	19%
DBM	67.5%	27%	11.5%	**DTIM**	61%	22%	17%
DBSI	65%	25%	10%	**DTSD**	58%	30%	12%
DMV	60%	24%	16%	**EO**	44%	44%	11%

Takeaway*: Overall, more respondents agreed rather than disagreed that the training they received at work was useful to them in performing their jobs. Except for respondents in EO, respondents in all other divisions predominantly agreed (by a two to one ratio) that their training was useful in performing their job. Respondents in DBM and DBSI expressed the greater agreement with the statement asking about usefulness of work training to their job performance*.

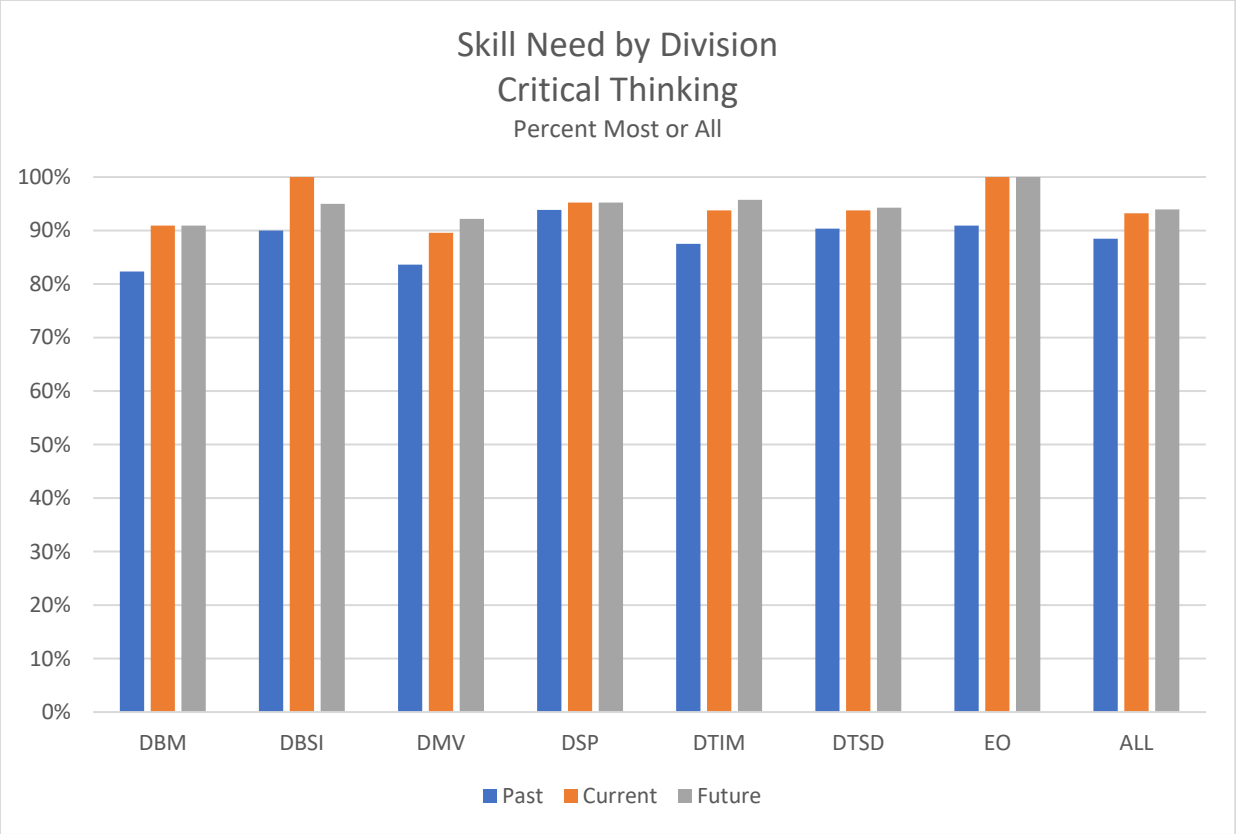
KSAs Needed for Job Performance Over Time[2]

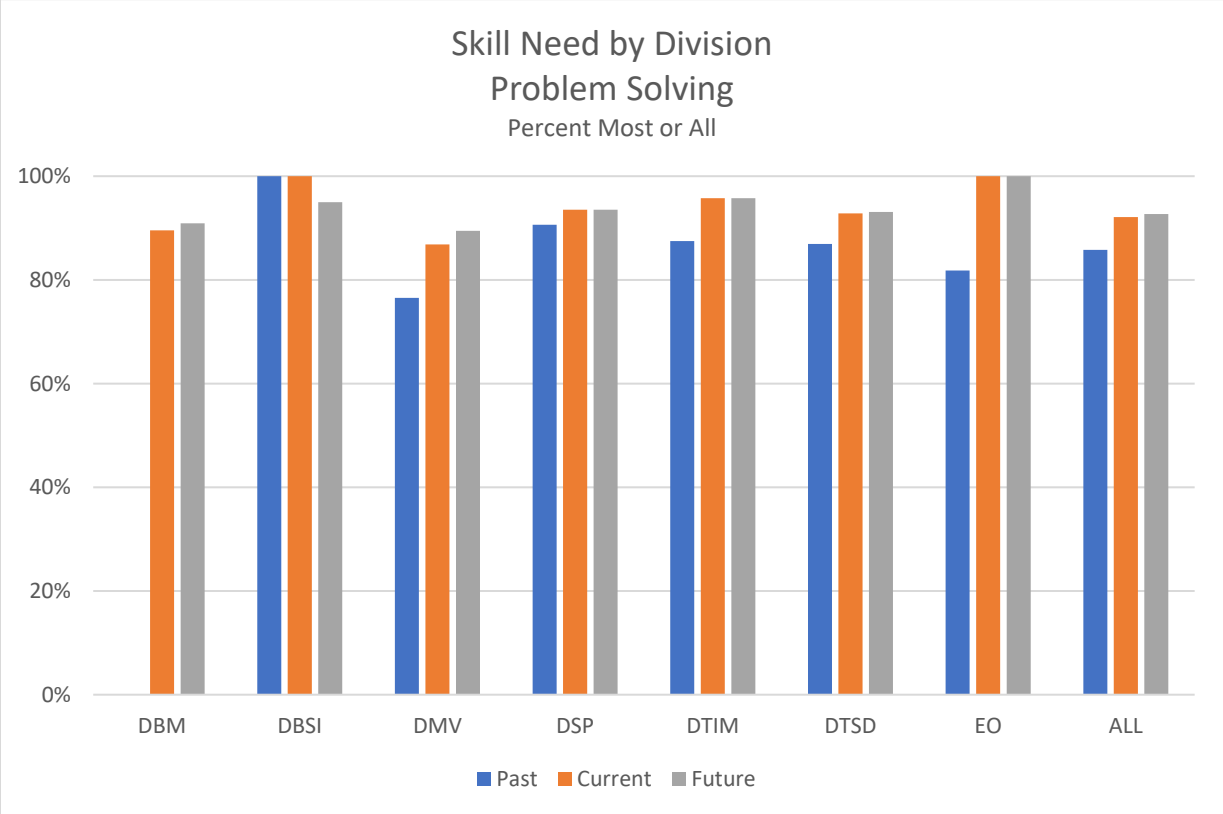
Prompt: Rate KSAs needed for job performance when first started role (past), those currently needed (present), and those that will be needed in 2-3 years' time (future).

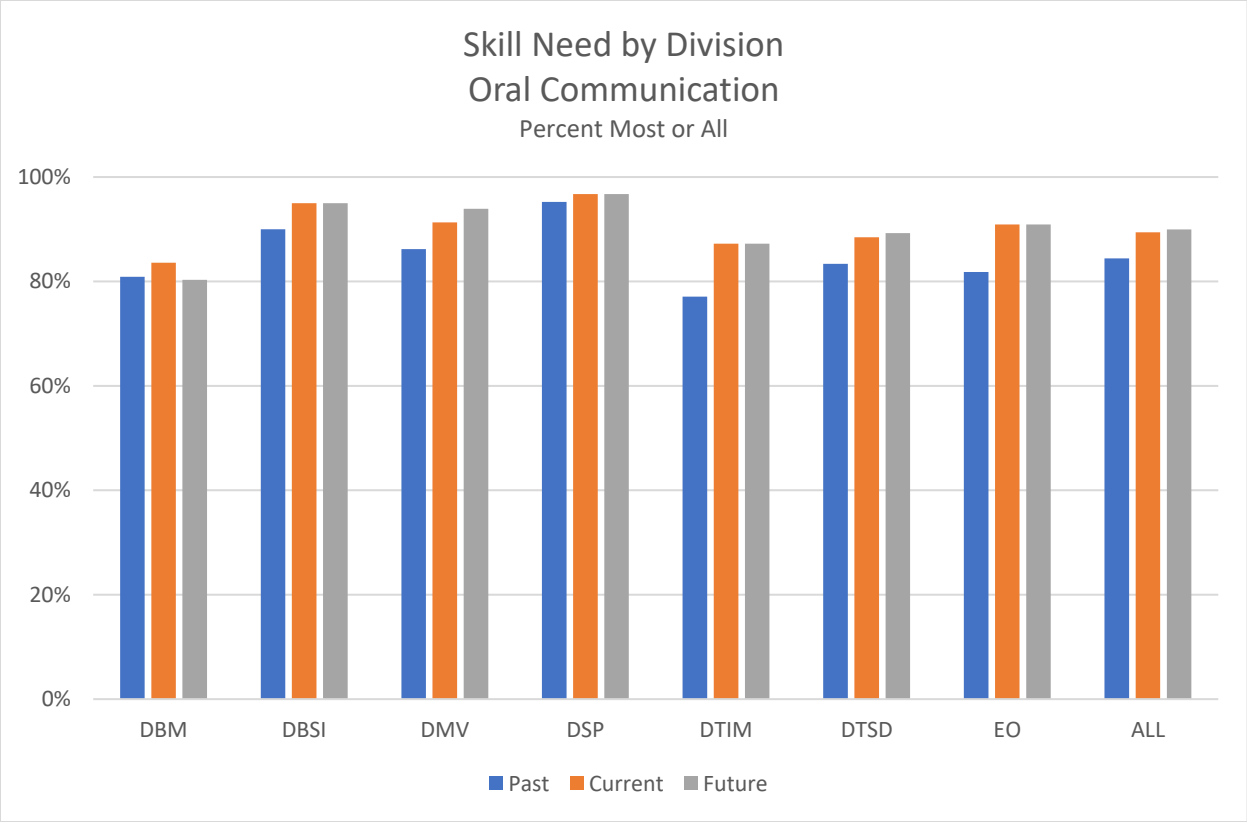
Graph 3-1: Top Five KSAs Needed for Job Performance Over Three Time Periods: Divisional View*

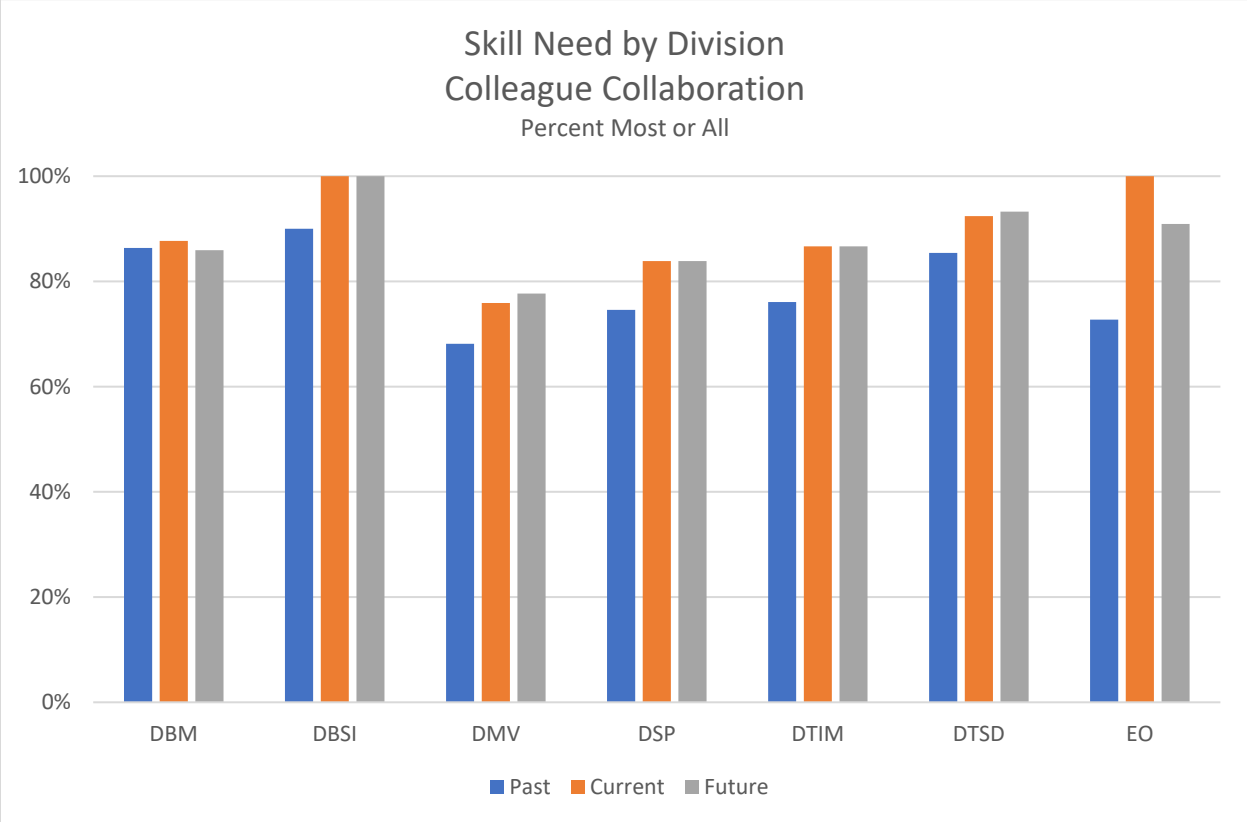


[2] A detailed view of KSAs needed across job families at three time periods appears in Appendix 1

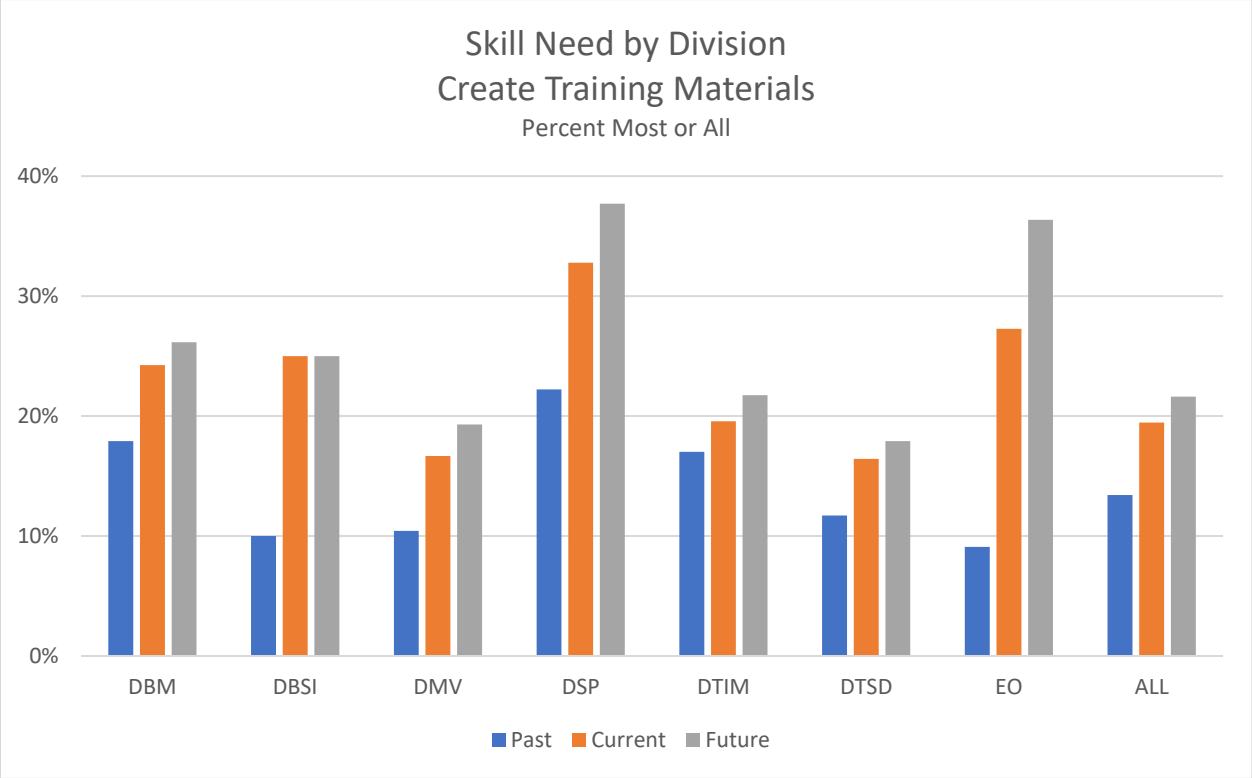

Skill Need by Division
Critical Thinking
Percent Most or All
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
DBM
DBSI
DMV
DSP
DTIM
DTSD
EO
ALL
Past
Current
Future

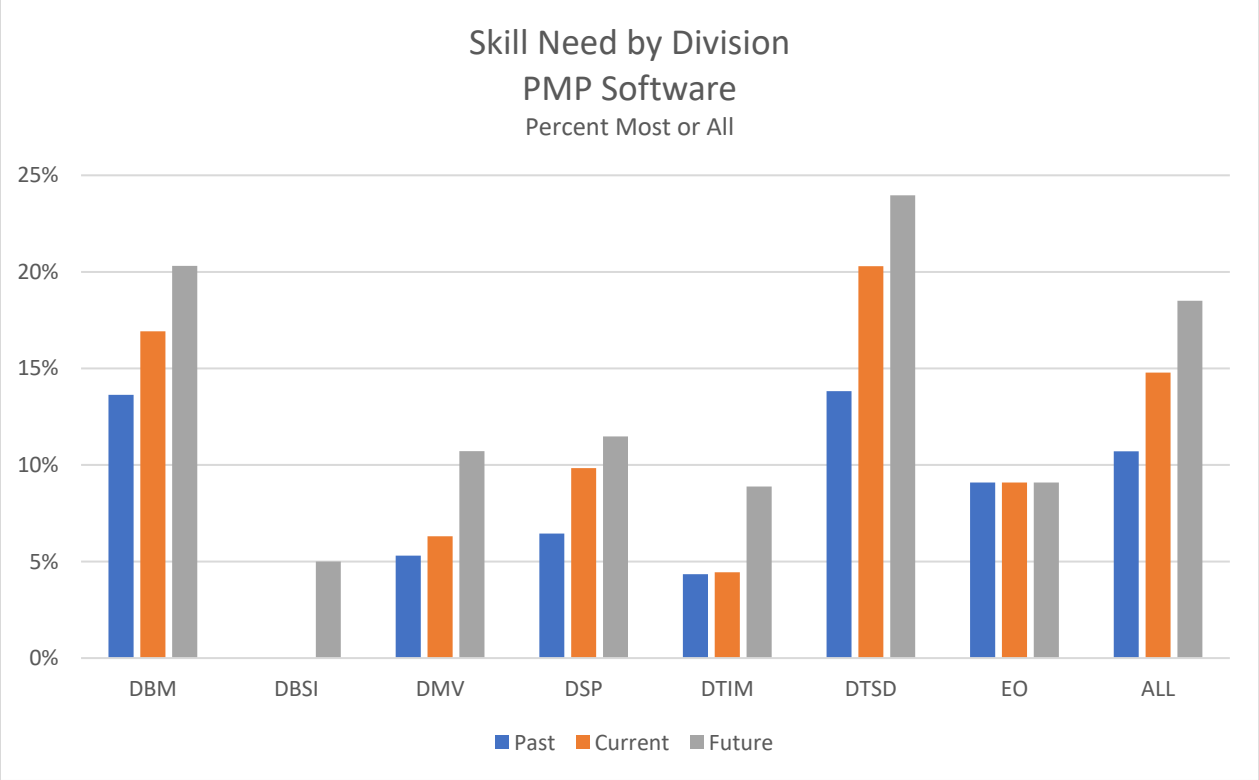

Skill Need by Division
Problem Solving
Percent Most or All
100%
80%
60%
40%
20%
0%
DBM
DBSI
DMV
DSP
DTIM
DTSD
EO
ALL
Past
Current
Future

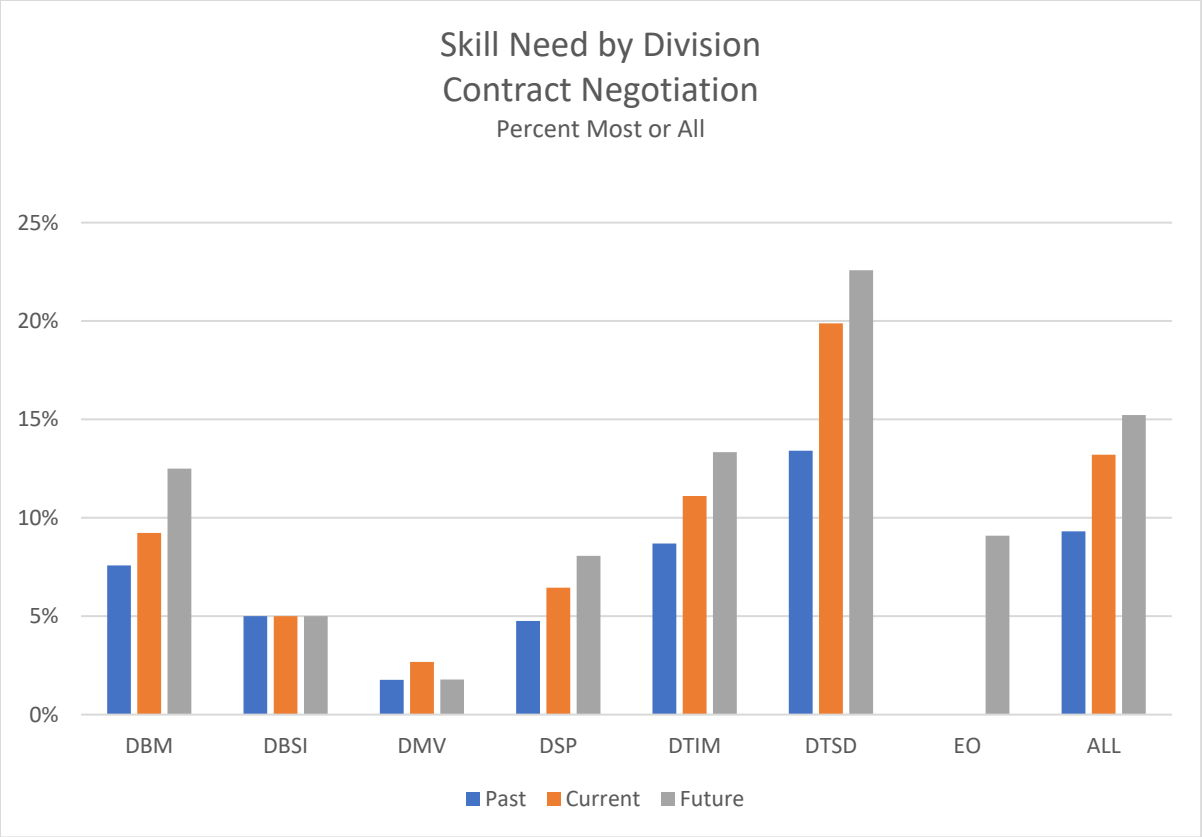

Skill Need by Division
Oral Communication
Percent Most or All
100%
80%
60%
40%
20%
0%
DBM
DBSI
DMV
DSP
DTIM
DTSD
EO
ALL
Past
Current
Future

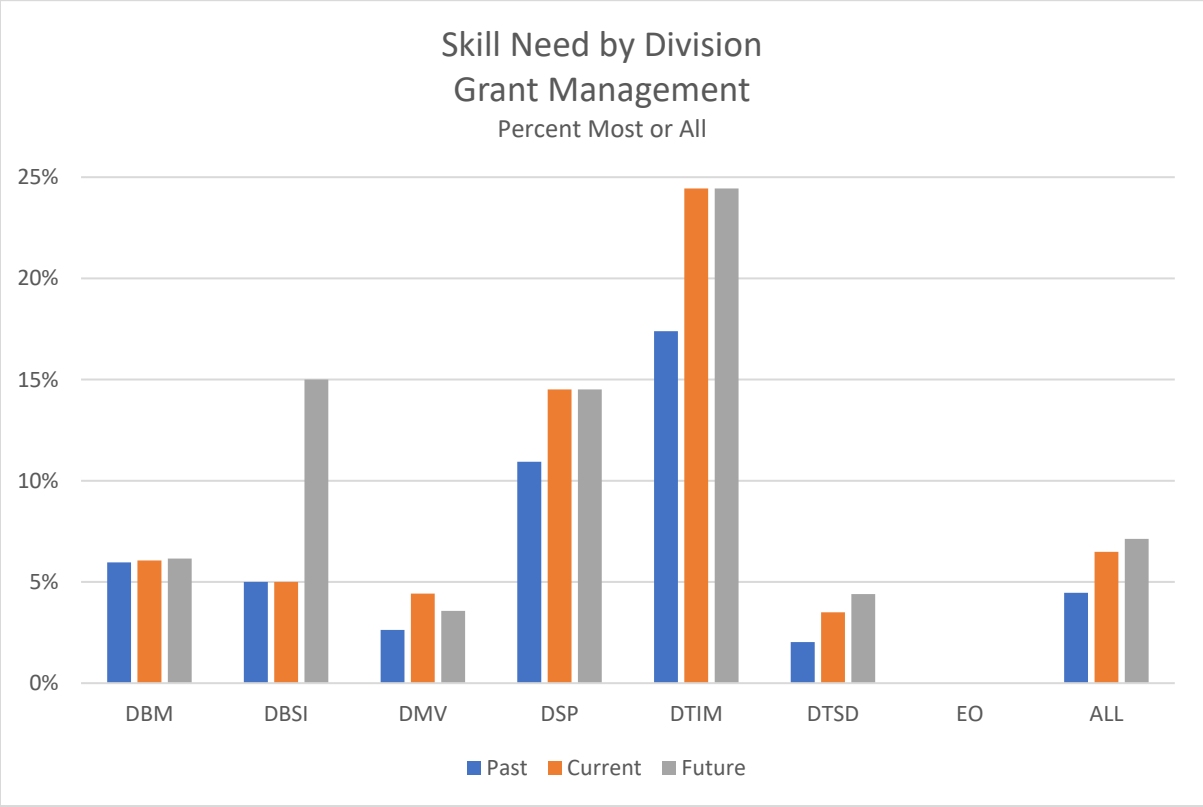

Skill Need by Division
Colleague Collaboration
Percent Most or All
100%
80%
60%
40%
20%
0%
DBM
DBSI
DMV
DSP
DTIM
DTSD
EO
Past
Current
Future

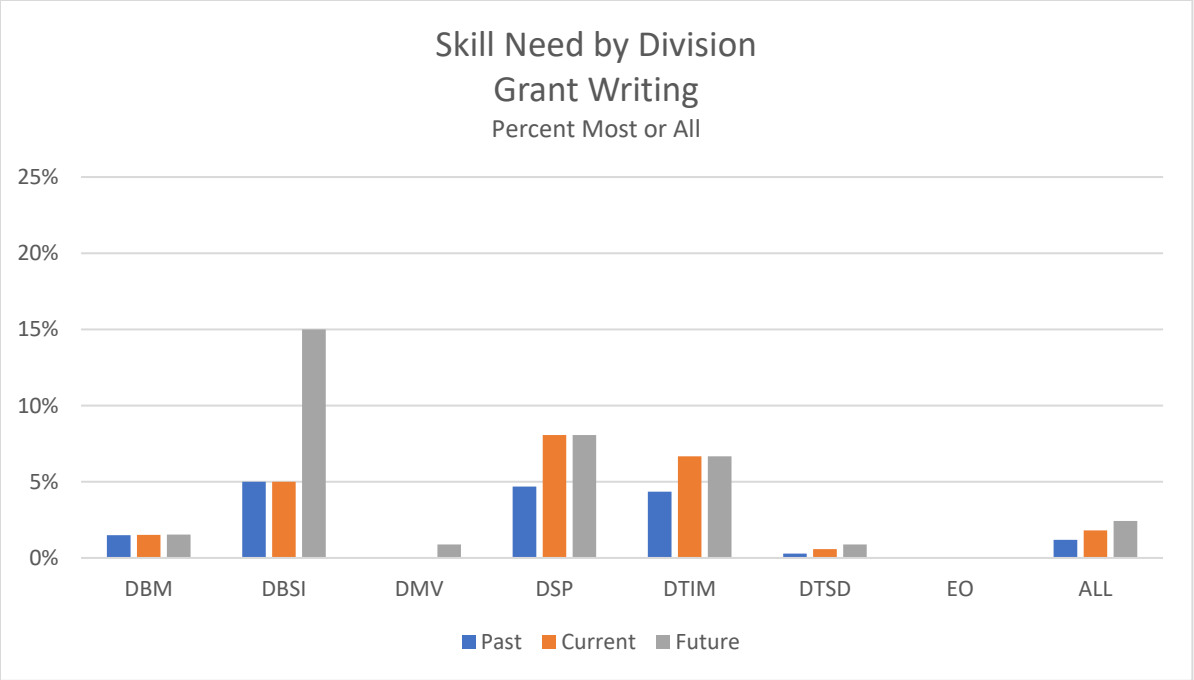
Graph 3-2: Bottom Five KSAs Needed for Job Performance Over Three Time Periods: Divisional View






Skill Need by Division
Contract Negotiation
Percent Most or All
25%
20%
15%
10%
5%
0%
DBM
DBSI
DMV
DSP
DTIM
DTSD
EO
ALL
Past
Current
Future


Skill Need by Division
Grant Management
Percent Most or All
25%
20%
15%
10%
5%
0%
DBM
DBSI
DMV
DSP
DTIM
DTSD
EO
ALL
Past
Current
Future



***Takeaways**: Across different job families and divisions, respondents noted the following top KSAs that they needed for performing their job across three time periods: communications skills (listening, written, oral), critical thinking, problem-solving, analytical and collaboration with colleagues.*

Responses were further analyzed for the 17 job families and 35 skills. Table 3-6 shows the most needed skills now and in the future for each job family with at least five survey responses.

Table 3-6: Most Needed Skills by Job Family

Job Family	Most Needed Skills (Current)	Most Needed Skills (Future)
Administrative Support	Critical Thinking Active Listening Problem Solving	Critical Thinking Active Listening Problem Solving
Business Management	Stakeholder/Customer Collaboration Colleague Collaboration ERP Systems	Stakeholder/Customer Collaboration Colleague Collaboration ERP Systems
Engineering	Active Listening Critical Thinking Problem Solving	Active Listening Critical Thinking Problem Solving
Financial	Active Listening Written Communication Critical Thinking	Active Listening Written Communication Critical Thinking
IT	Problem Solving Analytical Skills Digital Tools	Problem Solving Analytical Skills Digital Tools
Law Enforcement	Active Listening Oral Communication Critical Thinking	Active Listening Oral Communication Critical Thinking
Legal	Active Listening Critical Thinking Problem Solving	Active Listening Critical Thinking Problem Solving
Motor Vehicle Operations	Active Listening Oral Communication Customer Service	Active Listening Oral Communication Critical Thinking
Program and Policy	Critical Thinking Written Communication Active Listening	Critical Thinking Written Communication Active Listening
Property Management	Active Listening Oral Communication Critical Thinking	Active Listening Oral Communication Critical Thinking
Public Relations	Active Listening Critical Thinking Problem Solving	Active Listening Critical Thinking Problem Solving
Science	Active Listening Colleague Collaboration Critical Thinking	Active Listening Colleague Collaboration Critical Thinking
Specialized Management	Active Listening Problem Solving Oral Communication	Active Listening Oral Communication Problem Solving

Takeaway: *Respondents placed the greatest emphasis on "soft skills" involving communication, problem solving and critical thinking. This was true even in highly technical job families like engineering, IT and science. Also, the most important skills in the future tended to be the same as those needed currently.*

As shown in Tables 3-7 and 3-8, significant changes in perceived need for specific skills now versus in the future were mostly confined to a few smaller job families. There were no significant changes between current and future need for specific skills in the major job families.

Table 3-7: Ten Largest Increases in Future vs. Current Skills Need

Job Family	Skill	Current Need	Future Need
Legal	Public Presentation	17%	50%
Business Management	Research	50%	80%
Public Relations	Project Management	43%	71%
Public Relations	Program Management	0%	29%
Science	Managing Consultants	15%	38%
Legal	Technical Writing	40%	60%
Legal	Stakeholder/Customer Collaboration	67%	83%
Legal	Digital Tools	67%	83%
Legal	Create Training Materials	33%	50%
Legal	Process Financial Documents or Transactions	17%	33%

Table 3-8: Ten Largest Decreases in Future vs. Current Skills Need

Job Family	Skill	Current Need	Future Need
Legal	Program Management	17%	0%
Legal	Create/Manage Projects	17%	0%
Legal	Customer Service	67%	50%
Legal	Colleague Collaboration	100%	83%
Legal	Analytical Skills	100%	83%
Public Relations	Public Presentation	71%	57%
Business Management	Digital Tools	50%	40%
Business Management	Provide Administrative Support	50%	40%
Science	Technical Writing	92%	85%
Property Management	Auditing Practices	38%	31%

Table 3-9 shows the most used skills on an agency-wide basis, measured by the number of respondents stating that they currently use these skills on a regular basis. This table is useful insofar as it is weighted toward the job families with the largest number of respondents and gives an agency-wide picture of the most needed skills.

Table 3-9: Most Used Skills-All Respondents

Skill	Number of Respondents Frequently Using
Active Listening	497
Critical Thinking	454
Problem Solving	437
Oral Communication	427
Colleague Collaboration	407
Written Communication	385
Analytical Skills	341
Digital Tools	339
Customer Service	336
Stakeholder/Customer Collaboration	280

Relative Change in KSAs Over Time: In-depth Analysis Across 133 Job Classifications

Analysis Method – Part 1

Respondents were asked to rate the extent of use of each of the thirty-five (35) KSAs by choosing one answer from four different options: “need it all of the time”, “need it most of the time”, “need it sometime”, or “never need it”. Further, they were asked to rate the need of each KSA with regard to the time when the employee “FIRST started current job”, whether they “CURRENTLY need this skill when doing job”, and if “believe this skill will be necessary to perform current job in the next 2-3+ years.”

Respondents to this question represented 133 job classifications. Given the large number of classifications, it was neither efficient nor effective to cross-tabulate 35 KSAs by 133 job classifications. As a result, the objectives were then to screen all the responses for top KSAs by job classification, measure the skill perception over time, and explore the patterns and trends. Therefore, we first defined the top KSAs that were rated as being frequently used by employees. Then, we defined what was considered as a change in perception for skill usage.

Due to the variations of responses within and across job classifications, a top KSA was defined as one that was rated as “need it all of the time” or “need it most of the time” by 75% or more respondents within a job classification and also rated as “need it all of the time” or “need it most of the time” by 75% or more across job classifications. This positive rating had to be consistent in all three time periods: past, present, and future.

Results – Part 1

In sum, a total of:

- 13,965 data points were screened
- 13,965 data points were generated from 133 job classifications, 35 KSAs, and across 3 time periods

Based on the above, we identified the following top seven KSAs.

1. Active learning
2. Critical thinking
3. Problem solving
4. Analytical
5. Oral communication
6. Written communication
7. Effectively collaborating with colleagues within the department

Analysis Method – Part 2

We were also interested in knowing if there was any change in perceptions of these KSAs over time. In other words, which job classifications reflected more changed views regarding KSAs than the other classifications; and which KSAs received the most changed views? Again, there could be different variations within a job classification. We defined the change in perception of a KSA to be different if 50% or greater percentage of respondents within a job classification changed their rating; and there were five or more responses from each job classification. We measured two changes: past to present and present to future; and calculated the changes for each of the 35 KSAs.

Results – Part 2

In sum, a total of:

- 9,240 data points were screened and generated from 132 job classifications and 35 KSAs measured at two time periods,
- The job classifications with the most changed views regarding the KSAs were:
  - SURVEYOR-ADV where 18 KSAs out of 35 were viewed differently and most changes were from past to present
  - CIVIL ENGINEER-TRANSPR in which respondents changed their perception on 16 KSAs out of 35 and most changes were from present to future
  - DMV CUSTOMER SERVICE REP LEAD in which 11 KSAs out of 35 were rated as having changed. Mostly the changes were from past to present

KSAs with the most changed views were the relatively unique and special KSAs such as:

- Personnel management, which may include reviewing the work of others, assigning work, guiding and training staff, or resolving conflict, that were rated by nine job classifications
- Creating and managing projects that were rated by seven job classifications
- Creating training materials that were rated by five job classifications
- Program management skills that were rated by five job classifications

All changes in perception were from past to present as it was easier for respondents' to compare their current status with what they had experienced in the past rather than guessing which KSAs may be more useful to them in their work role in the future.

Question: Additional Top Three Software Programs That Respondents needed to Know Before Starting Their Jobs:

DBM

When first started job	Currently used on the job	Needed in 2-3 years time
Microsoft Office productivity suite	Microsoft Office productivity suite	Microsoft Office productivity suite
Peoplesoft, Cherwell service portal	Peoplesoft, Cherwell	Peoplesoft
Adobe creative cloud products	Adobe creative cloud products	Adobe creative cloud products

DBSI

When first started job	Currently used on the job	Needed in 2-3 years time
Microsoft Office productivity suite	Microsoft Office productivity suite	Microsoft Office productivity suite
Adobe creative cloud products	Adobe creative cloud product	Peoplesoft
Peoplesoft, FIIPS	Peoplesoft, FIMS	Adobe creative cloud products

DMV

When first started job	Currently used on the job	Needed in 2-3 years time
Microsoft Office productivity suite	Microsoft Office productivity suite	Microsoft Office productivity suite

OnBase, DMV suite, Knowledge Owl	OnBase	OnBase
RATS	RATS, CARES	RATS, CARES

DSP

When first started job	Currently used on the job	Needed in 2-3 years time
Microsoft Office productivity suite, Access database	Microsoft Office productivity suite	Microsoft Office productivity suite
MACH, TRACS	MACH, TRACS	MACH, TRACS
Peoplesoft	Peoplesoft	Peoplesoft

DTIM

When first started job	Currently used on the job	Needed in 2-3 years time
Microsoft Office productivity suite	Microsoft Office productivity suite	Microsoft Office productivity suite
Peoplesoft	Peoplesoft	ArcGIS, Adobe creative cloud products
ArcGIS, Adobe creative cloud products	ArcGIS, Adobe creative cloud products	Peoplesoft

DTSD

When first started job	Currently used on the job	Needed in 2-3 years time
Adobe creative cloud products; Bluebeam	Microsoft Office productivity suite	Microsoft Office productivity suite
Autodesk Civil 3D; Masterworks ArcGIS	Peoplesoft, Bluebeam	Bluebeam; Peoplesoft
AASHTOWARE	Autodesk Civil 3D; ArcGIS, AASHTOWARE	AASHTOWARE; Autodesk Civil 3D; ArcGIS

EO

When first started job	Currently used on the job	Needed in 2-3 years time
Microsoft Office productivity suite	Microsoft Office productivity suite	Microsoft Office productivity suite
Adobe creative cloud products	Adobe creative cloud products	Adobe creative cloud products
Peoplesoft	Peoplesoft	

Question: Additional Top Three Profession-Specific KSAs Required Over Three Time Periods

DBM

When first started job	Currently used on the job	Needed in 2-3 years time
Communication skills	Communication skills	Project management
Customer service; problem-solving	Project management	Communication skills
Leadership, management (project, contracts, people) skills	Knowledge of legislative, finance, accounting, grants, emergency processes	Organizational, financial, programming, and audit management skills

DBSI

When first started job	Currently used on the job	Needed in 2-3 years time
Policy, legislative, research analysis	Budgeting	Policy, legislative analysis
Program, project, information management	Data, policy analysis	Data analysis
Communication skills	Microsoft productivity tools	Accounting, budgeting, contracting skills

DMV

When first started job	Currently used on the job	Needed in 2-3 years time
Communication skills, including listening and empathy	Management (time, data, people, organizational) skills	Communication skills, including listening
Customer service; problem-solving	Communication skills, including listening	Customer service; problem-solving
Management (time, data, people, organizational) skills	Customer service; problem-solving,	Management (data, budgets, people, including teamwork) skills,

DSP

When first started job	Currently used on the job	Needed in 2-3 years time
Law enforcement strategies including firearms proficiency, defensive and arrest tactics, investigations, etc.	Communication skills, interpersonal skills	Defensive skills

Communication skills, interpersonal skills	Management (people, accounting, budgeting) and data analysis skills	Communication skills, interpersonal skills
Problem-solving, critical thinking, analytical skills	Defensive skills	Software skills

DTIM

When first started job	Currently used on the job	Needed in 2-3 years time
Data analysis skills	Data analysis skills	Communication skills
Project management	Project, time, personnel management	Project, time, personnel management; engineering, programming knowledge
Programming skills; communication skills	Knowledge of federal/state regulations; communication skills	Knowledge of federal/state regulations; communication skills

DTSD

When first started job	Currently used on the job	Needed in 2-3 years time
All facets of construction planning, design, implementation	Communication skills, problem-solving, critical thinking	Knowledge of specific construction and engineering design tools
Communication skills, problem-solving, critical thinking	Management skills: program, project, budget, resource, contracts, records, software, time, personnel, teamwork, consultants	Communication skills, problem-solving, critical thinking
Management skills: program, project, budget, resource, contracts, records, software, time, personnel, consultants	Knowledge of specific construction and engineering design tools	Management skills (project, contracts, budget, personnel, consultants)

EO

When first started job	Currently used on the job	Needed in 2-3 years time
Legal analysis, budgeting process and tools	Legal analysis, budgeting process and tools	Legal analysis, budgeting process and tools
Project management	Microsoft productivity tools	Microsoft productivity tools
Microsoft productivity tools	Research skills	Presentation and editing skills

Question: Additional Top Three Profession Specific KSAs Required Over Three Time Periods

DBM

When first started job	Currently used on the job	Needed in 2-3 years time
Communication skills	Communication skills	Communication skills
Problem-solving	Advance computing skills	Advanced technical skills
Programming skills	Management skills	Organizational, management skills

DBSI

When first started job	Currently used on the job	Needed in 2-3 years time
Policy, legislative, analysis	Communication skills	None responded
Supervision	Knowledge of WisDOT and other DOTs	
Communication skills	Microsoft productivity suite	

DMV

When first started job	Currently used on the job	Needed in 2-3 years time
Communication skills, including listening and empathy	Management (time, data, people, organizational) skills	Communication skills,
Customer service; problem-solving	Communication skills, including listening, policy and procedure knowledge	Customer service; problem-solving
Management (time, data, organizational) skills	Customer service; problem-solving,	Management skills

DSP

When first started job	Currently used on the job	Needed in 2-3 years time
Communication skills, interpersonal skills	Communication skills, interpersonal skills	Communication skills
Problem-solving, critical thinking, analytical skills	Management skills	Problem-solving skills
Police procedures	Problem-solving skills	Management skills

DTIM

When first started job	Currently used on the job	Needed in 2-3 years time
Programming skills; communication skills	Computational and computer skills	None responded
Stakeholder management	Management, supervisory, leadership skills	
Management skills	Knowledge of electrical and wireless devices set-up	

DTSD

When first started job	Currently used on the job	Needed in 2-3 years time
Computational and software skills	Communication skills, problem-solving, critical thinking	Communication skills, problem-solving, critical thinking

Communication skills, problem-solving, critical thinking	**Management skills: program, project, contracts, records, software, time, personnel, teamwork, stakeholder**	**Collaboration skills**
Management skills: team members, stakeholders	Knowledge of specific construction and engineering design tools	Knowledge of specific computer programs and software

EO

When first started job	Currently used on the job	Needed in 2-3 years time
Statutory analysis	Microsoft productivity tools	None responded
Communications	Legal research	

SKILLS USAGE: DISCUSSION OF TRENDS AND IMPLICATIONS OF SURVEY RESULTS IN THE CONTEXT OF LITERATURE

Detailed analysis of results on skills usage over past, present, and future time periods reveal two consistent trends: there is very little variation in the top skills that are used across divisions, job families, and time period, and the top skills all belong to the category of soft skills, also termed “power” or “behavioral” skills by various thought leaders. It is not surprising or unexpected that power skills dominate the results of the top skill categories regardless of job family or division. These results are consistent with literature reviewed in Chapter 1 from DOL competency models, research by IBV, and Bersin’s insights, that highlight the foundational and

essential nature of these skills for enabling employees to accomplish their work goals. The near uniform universality of these skills and how closely aligned they are with trends in the literature imply that WisDOT leadership has a strong foundation in place as it considers next steps for bolstering its efforts for workforce readiness and addressing knowledge gaps and losses. As Chapter 1, the foundational nature of these soft skills sometimes lends them to be relegated to the background in recruitment, retention, reskilling, and work redesign efforts. The results point out that regardless of the intensity and level of technical work that require validated, operational skills, respondents in each division view these soft skills as one near constant feature of their work that enables to accomplish their tasks. By no means do these results suggest that technical or operational skills are not important or not used in work performance. To the contrary, the results indicate that many technical skills remain solidly behind the soft skills in terms of their importance and use. It is possible that respondents accept that learning new technical skills or updating existing ones is expected from them in order to successfully perform their job and hence they underreport the extent of changes they experienced or will experience relative to other skills. In other words, it is possibly indicative of the "change is constant" mindset with regard to their evaluation of technical skills.

The literature reviewed in Chapter 1 on skills highlights that all the skills work in tandem with one another. The enduring nature of soft skills and technical skills in these survey results are consistent with the literature and reinforce the key idea that the full impact of technical skills is realized when it is combined with soft skills. For example, many employees may be skilled in creating pivot tables in Excel, but the employees who know how to critically analyze and solve a work problem by manipulating pivot tables, and effectively communicating these results using various modalities, are likely to be most successful performers. They are also likely to add the most value to any team, project, and organization.

With this pattern of results, WisDOT leadership is well-primed to capitalize on a set of strong foundational soft skills and technical skills to address its challenges stemming from recruiting and retaining talent. Each of Bersin's (2022) four "Rs" discussed in Chapter 1 – recruit, retain, reskill, and redesign – is built off the notion of skills identification, categorization, and timely applicability to a wide swath of jobs, cutting across job families, divisions, departments, projects, and other silos to enable employees and the organization to succeed. The use of appropriate technology can streamline and optimize these efforts but is not a substitute for the core team of cross-functional professionals working in tandem with top leadership to chart the course. This is an important and relevant takeaway for WisDOT to consider.

Results for Questions on KM Practices

Resources Used in Doing One's Job: Agency-Wide and Across Different Divisions

Question: In the course of doing one's job, which resource does the respondent most often uses when looking for information? (Respondents selected only one)

Table 3-10: Resources Most Frequently and Primarily Used in the Course of Doing One's Job

(N=580)

Primary and Most Frequently Cited Type of Resource	Agency-wide (N=580)	DBM (N=56)	DBSI (N=19)	DMV (N=90)	DSP (N=49)	DTIM (N=41)	DTSD (N=313)	EO (N=8)
Consult with a colleague within WisDOT	40%	35.71%	42.11%	27.78%	44.90%	56.10%	41.85%	12.50%
Consult with a colleague outside of WisDOT	1.9%	5.36%	5.26%	0.00%	2.04%	2.44%	1.28%	12.50%
Ask your manager/supervisor for guidance based on their experience	7.76%	10.71%	15.79%	7.78%	4.08%	2.44%	7.35%	25.00%
Do an internet search (for example, Google, Bing, Safari)	11.38%	21.43%	26.32%	4.44%	16.33%	12.20%	9.58%	12.50%
Go to a known (professional) web site (e.g., TRB, ASCE)	2.59%	3.57%	0.00%	1.11%	6.12%	7.32%	1.92%	0.00%
Search on-line WisDOT resources (for example, MyDOT)	22.59%	14.29%	10.53%	35.56%	10.20%	4.88%	25.88%	12.50%
Search through documents/publications in your office	8.1%	5.36%	0.00%	11.11%	10.20%	12.20%	7.67%	0.00%
Post a message on a listserv/on-line community to which you belong	0.17%	0.00%	0.00%	1.11%	0.00%	0.00%	0.00%	0.00%
Consult with a mentor	1.21%	1.79%	0.00%	2.22%	0.00%	0.00%	1.28%	0.00%
Other (please specify)	4.31%	1.79%	0.00%	8.89%	6.12%	2.44%	3.19%	25.00%

Takeaway*: Overall agency-wide and across all divisions: Consulting with a WisDOT colleague was the most frequently used source when performing one's job followed by searching WisDOT online (e.g., MyDOT), and internet. There was variation by division in the top three resources that were cited as being most useful.*

Question: Which secondary resource would respondents most often use when looking for information? (Respondents selected only one)

Table 3-11: Secondary Resources Most Often Used

Second Most Frequently Cited Resource Used	Agency-wide (N=575)	DBM (N=56)	DBSI (N=19)	DMV (N=90)	DSP (N=48)	DTIM (N=41)	DTSD (N=309)	EO (N=8)
Consult with a colleague within WisDOT	34.09%	30.36%	42.11%	41.11%	29.17%	19.51%	34.95%	37.50%
Consult with a colleague outside of WisDOT	4.35%	3.57%	0.00%	0.00%	6.25%	12.20%	4.53%	0.00%
Ask your manager/supervisor for guidance based on their experience	18.26%	23.21%	21.05%	20.00%	25.00%	24.39%	15.21%	0.00%
Do an Internet search (for example, Google, Bing, Safari)	13.74%	19.64%	15.79%	4.44%	16.67%	24.39%	13.59%	12.50%
Go to a known (professional) web site (e.g., TRB, ASCE)	3.65%	8.93%	15.79%	3.33%	2.08%	2.44%	2.27%	12.50%
Search on-line WisDOT resources (for example, Intranet)	16.52%	10.71%	0.00%	21.11%	12.50%	7.32%	19.74%	0.00%
Search through documents/publications in your office	5.22%	0.00%	5.26%	2.22%	8.33%	4.88%	6.47%	12.50%
Post a message on a listserv/on-line community to which you belong	0.70%	1.79%	0.00%	1.11%	0.00%	2.44%	0.32%	0.00%
Consult with a mentor	0.87%	0.00%	0.00%	3.33%	0.00%	0.00%	0.32%	0.00%
Other (please specify)	2.61%	1.79%	0.00%	3.33%	0.00%	2.44%	2.59%	25.00%

***Takeaway**: Overall agency-wide and across all divisions; consulting with a WisDOT colleague was the most frequently secondary source used when performing one's job followed by asking one's supervisor, searching WisDOT online (e.g., Intranet), and internet searches.*

Question: On average, how often did the respondents use each of the following in their job:

Table 3-12: Use of Information Resources (Agency-wide)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Large, shared database (e.g., shared calendar, FIIPS, PeopleSoft, Excel, etc.)	74.09%	19.83%	2.96%	1.74%	1.39%	575
WisDOT-operated web site (e.g., intranet, Knowledge Owl)	57.54%	26.69%	8.32%	3.47%	3.99%	577
My own database or contact list file	41.54%	27.75%	8.90%	5.24%	16.58%	573
Department policy/ procedures manual or guidelines	25.00%	31.08%	24.13%	16.32%	3.47%	576
Division-specific procedures manual or guidelines	21.74%	30.43%	23.48%	17.74%	6.61%	575
State and/or Federal databases or regulations	17.57%	25.04%	23.83%	21.74%	11.83%	575
Vendor-provided procedures manual or guidelines	5.11%	10.92%	20.77%	25.35%	37.85%	568
My own notes or procedures	56.27%	27.53%	9.76%	3.66%	2.79%	574
Other (please specify)	55.56%	11.11%	0.00%	0.00%	33.33%	27

Overall takeaway*: the top three most frequently used resources on a daily basis were: large shared databases (e.g., FIIPS, Excel, PeopleSoft), WisDOT operated website (e.g., Intranet, Knowledge Owl), and respondents' own notes or procedures. On a weekly basis, the top three resources used were: division specific procedures manual or guidelines, department policy/procedures manual or guidelines, and respondents' own database or contact list file. On a monthly basis, the top three sources used were similar to those used on a weekly basis: i.e., department policy/procedures manual or guidelines, division specific procedures manual or guidelines, and state and/or federal databases or regulations. On a quarterly basis, the top three sources used include vendor provided procedures manual or guidelines, followed by respondents' own database or contact list file, and finally, state and/or federal databases or regulations. The top three resources that were cited as never being used were those related to vendor provided procedures manual or guidelines, followed by respondents' own database or contact list file, and finally, state and/or federal databases or regulations. However, the proportion of respondents who never used these resources was less than 40%. For the results on the breakdown of information resource use by division, refer to Appendix 2.*

Question: What type of resources would better assist respondents in completing their job duties? Respondents indicated their usefulness to them in performing their job.

(Response format: 1=Least useful; 2= Somewhat useful, 3= Useful; 4 = Moderately useful; 5 = Very useful.)

Table 3-13: Resource Usefulness by Division

Usefulness of Resource for Job Performance	Agency-wide (N=559)	DBM (N=53)	DBSI (N=18)	DMV (N=85)	DSP (N=47)	DTIM (N=40)	DTSD (N=308)	EO (N=8)
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Division-wide database	2.69	2.36	2.33	2.94	2.77	2.48	2.71	2.63
External website	2.6	2.62	2.56	2.43	3.15	2.5	2.55	3.25
WisDOT website	3.01	2.76	2.61	3.19	2.77	2.87	3.11	2.25
Department operated database	2.86	2.58	2.5	3.14	2.83	2.85	2.87	2.5
Cross-training resources within work unit	2.94	3.02	2.83	3.05	2.87	2.85	2.93	2.63
External organization policy/procedures manual or guidelines	2.2	2.13	2.37	2.13	2.34	2.15	2.21	2
Department or division-specific procedures manual or guidelines	2.94	2.54	2.61	2.95	2.89	2.85	3.04	3.13
Additional technical training materials	2.08	2.13	1.89	2.14	2.28	2.08	2.04	2.5
Vendor provided procedures manual or guidelines	2.76	2.64	2.67	2.7	2.87	2.42	2.83	3.13
Other (please specify)	3.19	4	0	3	3	4	3.04	4

Takeaway*: On average, all respondents across the board – agency-wide and all divisions – reported that all the resources listed in the survey were either somewhat useful or useful in helping them complete their work duties. On average, WisDOT website was reported being among the most useful, followed by cross-training resources within the work unit, and department or division specific procedures manual or guidelines. There was minor variation across different divisions in terms of the most and least useful of the resources listed*.

Question: On average, how often were each of the following staff sought for help with understanding or clarifying how to perform one's job, solving a problem, getting an answer to a question from a customer, or learning how to accomplish a new task?

Table 3-14: Colleague Resources (Agency-Wide)

Colleagues as Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Your immediate supervisor	8.66%	44.52%	29.86%	10.25%	6.71%	566
Your office director or division administrator	1.24%	9.04%	14.01%	21.99%	53.72%	564
Technical or functional subject matter expert within WisDOT in an area such as policy, practice, research, accounting, legal, contracts, administration, technology, or HR	7.73%	31.28%	31.28%	21.09%	8.61%	569
Technical or functional subject matter expert outside of WisDOT in an area such as policy, practice research,, accounting, legal, contracts, administration, or technology	1.75%	9.47%	19.12%	22.98%	46.67%	570
A peer or colleague within your work unit or division	37.08%	46.05%	12.48%	2.28%	2.11%	569
A peer or colleague outside your work unit or division but within WisDOT	6.33%	26.54%	32.34%	17.05%	17.75%	569
A peer or colleague outside of WisDOT	3.33%	8.41%	16.99%	26.62%	44.66%	571
Other (please specify)	20.00%	24.00%	20.00%	4.00%	32.00%	25

Takeaway*: Overall, agency-wide and across all the divisions, there is remarkable consistency in peers and colleagues within one's work unit or division being most frequently sought out for help on a weekly and monthly basis while performing one's job. Supervisors are most frequently sought for help, on a weekly and monthly basis followed by technical or functional subject matter expert within WisDOT. Peers and colleagues outside one's division but within WisDOT are also sought for help in the course of performing one's work. For the results on the breakdown of colleagues as resource within each division, refer to Appendix 3.*

Information Sharing Practices at Work

Question: Respondents specified the frequency with which they usually used each of the following in doing their job.

Table 3-15: Frequency of Resource Use (Agency-Wide)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Data or information from a known source (e.g., database, files) used to answer a specific question	58.89%	28.89%	6.67%	3.89%	1.67%	540
Data or information that you have to gather from multiple sources and analyze and/or synthesize to answer a specific question	33.21%	35.06%	19.48%	7.42%	4.82%	539
Step-by-step instructions you provide that is not a document, to a customer, vendor, or staff person	13.94%	26.21%	26.95%	17.47%	15.43%	538
Direction you provide to a customer, vendor, or staff person such as advice, counsel or guidance, not step-by-step	24.39%	32.96%	21.23%	12.85%	8.57%	537
Judgments or recommendations you are asked to make based on data or information that is given to you	33.89%	36.13%	16.95%	7.45%	5.59%	537
Judgments or recommendations you are asked to make based on data or information that you must find yourself	32.28%	36.01%	17.35%	8.21%	6.16%	536
Routine procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (always done the same way)	37.20%	31.59%	16.64%	8.41%	6.17%	535

Variable procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (requires some analysis and judgment to select the proper procedure or process to follow)	23.77%	33.58%	22.83%	12.26%	7.55%	530
Reports, memoranda, letters, or informational materials for customers, vendors, or staff that you must compile and/or write. Educational or promotional materials that you must compile and/or write	15.17%	28.46%	21.35%	18.54%	16.48%	534
Proposals you develop to recommend new programs, projects, procedures, or processes	4.67%	12.52%	19.44%	35.70%	27.66%	535

Takeaway*: Overall, across the agency and all divisions, the most frequently used information sharing practices on a daily and weekly basis were data or information from a known source to answer a specific question, followed by judgements or recommendations that one has to make based on information that is either given to them or they must find themselves and routine procedure or process for handling information, paperwork, requests etc. In addition to these sources, other sources used on a weekly and monthly basis included both routine and variable procedure or process for handling information, paperwork, requests, etc., providing step-by-step instructions and direction to customers, vendors, or staff as well as direction that is not step-by step, and reports, memoranda, letters, or informational materials for customers, vendors, or staff. For the results on the breakdown of resource use within each division, refer to Appendix 4.*

Question: How frequently does one use the following to share information with one's colleagues? The information could be a news item, updated guidance, etc.

(Response format: 1= Never use; 2 = Use sporadically; 3 = Use somewhat frequently; 4 = Use very frequently; 5 = Use it almost all the time)

Table 3-16: Information Sharing with Colleagues

Information Sharing Practices with Colleagues	Agency-wide (N=550)	DBM (N=53)	DBSI (N=19)	DMV (N=81)	DSP (N=45)	DTIM (N=39)	DTSD (N=301)	EO (N=7)
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Email	4.7	4.79	4.58	4.46	4.71	4.54	4.78	4.43
Teams	4.28	4.42	4.42	4.31	3.24	4.26	4.4	4.14
Phone call	3.78	3.6	3.63	3.48	3.96	3.44	3.92	3.86
Instant Message	3.21	3.42	3.58	2.89	3.22	2.97	3.28	3.86
Newsletter	1.61	1.58	1.72	1.83	1.51	1.34	1.59	2.29
Update organization policy/procedures manual or guidelines	2.14	1.87	1.78	2.25	2.22	2.18	2.15	2.71
Update department or division specific procedures manual or guidelines	2.08	1.9	1.82	2.18	2.16	2.1	2.07	3
Create additional technical training materials	2.04	2.19	2.17	1.94	2.04	2	1.99	2.57
Other (please specify)	2.95	4	1	0	2.5	0	2.93	3.5

Takeaway*: Overall across the agency and all divisions, email, Teams, and phone calls were the three most frequently used information sharing practices that respondents used.*

Question: Respondents' indicated their level of agreement/disagreement with the following statements regarding constraints to the accessibility or sharing of knowledge in the workplace.

(Response format: 1=Strongly disagree; 2 = Disagree; 3 = Neutral; 4= Agree; 5= Strongly agree)

Table 3-17: Constraints to Knowledge Sharing

Accessibility of Knowledge Sharing Practices	Agency-wide (N=548)	DBM (N=53)	DBSI (N=19)	DMV (N=82)	DSP (N=46)	DTIM (N=38)	DTSD (N=299)	EO (N=7)
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Department leadership does a good job in sharing information in a timely manner	3.51	3.53	3.63	3.3	3.39	3.58	3.54	4.17
WisDOT has a culture for storing or sharing knowledge with others	3.48	3.42	3.58	3.47	3.3	3.34	3.52	3.83
WisDOT encourages innovation	3.47	3.42	4.11	3.4	3.15	3.42	3.51	3.29
My division leadership sees value and prioritizes our capturing and sharing information with one another	3.66	3.72	3.89	3.49	3.59	3.87	3.66	4
My supervisor and/or team lead is open	4.27	4.51	4.53	4	4.17	4.45	4.28	3.83

to hearing my ideas								
My work area is open to new ideas	4.02	4.19	4.37	3.69	3.85	4.16	4.06	3.86
I feel supported to learn new skills to do my job successfully	4	4.19	4.47	3.7	3.91	4.18	4.02	3.71
I take time to capture and share information with my colleagues	4.12	4.34	4.37	3.91	4.13	4.13	4.11	4.43
I have access to an adequate amount of information to do my job successfully	3.89	3.96	4.16	3.8	3.87	3.82	3.89	4.14
I have the resources to share or store information	4.04	4.32	4.21	3.8	3.85	3.89	4.09	3.86
Knowledge sharing is an important part of my job	4.36	4.47	4.58	4.24	4.35	4.45	4.35	4.57

Takeaway*: Overall across the agency and all divisions, respondents expressed agreement with a culture of knowledge capturing and sharing practices. There was some variation by division.*

Documentation Practices at Work

Question: When respondents first started their current job, was there any documentation for their position that helped them get started on their work?

(Response Format: Yes/No)

Table 3-18: Documentation Practices

Agency-wide/ Division	Yes	No	Division	Yes	No
Agency-wide (N= 543)	63%	37%	**DSP** (N= 45)	67%	33%
DBM (N= 54)	74%	26%	**DTIM** (N= 39)	67%	33%
DBSI (N= 19)	68%	32%	**DTSD** (N= 295)	60%	40%
DMV (N= 81)	62%	38%	**EO** (N= 7)	29%	71%

Takeaway*: Overall across the agency and all divisions except for EO, the majority of respondents reported having documentation left for them when they started their current role. There was some variation by division with EO being the only division in which the majority of the respondents reported not having documentation left for them when they started their role.*

Question: How well were the work processes documented before respondents started their current work role?

(Response format: 1=There was no documentation at all; 2= There was minimal documentation; 3= There was some documentation; 4 = There was moderate amount of documentation; 5 = It was extremely well-documented)

Table 3-19: Quality of Documentation

Agency-wide/ Division	Average Level of Documentation	Division	Average Level of Documentation
Agency-wide (N= 544)	2.87	**DSP** (N= 45)	3.04
DBM (N= 54)	3.09	**DTIM** (N= 39)	3.05
DBSI (N= 19)	2.58	**DTSD** (N= 296)	2.77
DMV (N= 81)	3.02	**EO** (N= 7)	1.86

Takeaway*: Overall, across the agency and all divisions except for EO, the majority of respondents reported having at least some documentation left for them when they started their current role. There was some variation by division with EO being the only division in which the majority of the respondents reported having minimal to no documentation left for them when they started their role.*

Question: How well was the relevant job-related information transferred to respondents when they started their current work role? (Note: TOI: Transfer of Information)

(Response format: 1 = There was no transfer of information at all; 2 = There was minimal transfer of information; 3 = There was some transfer of information; 4 = There was moderate amount of transfer of information; 5 = There was excellent transfer of information.)

Table 3-20: Information Transfer

Agency-wide/ Division	Average TOI	Division	Average TOI
Agency-wide (N= 538)	3.14	**DSP (N=45)**	3.24
DBM (N= 54)	3.28	**DTIM (N= 38)**	3.08
DBSI (N= 19)	2.63	**DTSD (N= 291)**	3.11
DMV (N= 81)	3.26	**EO (N= 7)**	2.71

Takeaway*: Overall, across the agency and all divisions, the majority of respondents reported having some transfer of information (TOI) when they started their current role. There was some variation by division with respondents in DBSI and EO reporting minimal to some TOI and those two divisions were the two relatively lowest levels of TOI among all other divisions.*

Question: The top five resources that were most useful to respondents when they first started their new work role. The top five resources cited were common across divisions.

- Peers (within and outside department)
- Supervisors (and Chiefs), and mentors
- Internet/Intranet, documentation left (e.g., by supervisors, previous job incumbents, one's own notes)
- Manuals of different kinds (e.g., policy, training, vendor, procurement, program management, policy development, etc.)
- Training and software (e.g., Excel, Peoplesoft, etc.)

Question: What would have been most helpful to respondents in capturing the knowledge and insights of experienced employees before they left WisDOT? Respondents indicated their helpfulness to them in performing their job.

(Response format: 1=Not at all helpful; 2=Minimally helpful; 3= Somewhat helpful; 4=Helpful, 5= Most helpful)

Table 3-21: Usefulness of Knowledge Capture Processes

Usefulness of Knowledge Capturing Process	Agency-wide (N=524)	DBM (N=51)	DBSI (N=19)	DMV (N=76)	DSP (N=45)	DTIM (N=38)	DTSD (N=287)	EO (N=7)
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
On-the-job coaching	4.17	4.16	3.74	4.08	4.36	4.05	4.23	3.57
Previous incumbent was available to ask questions or provided job shadowing	4.06	4.16	3.63	3.91	3.62	4.22	4.18	2.5
Previous incumbent provided written process documentation of their work	3.82	4.14	3.89	3.81	3.71	4.06	3.77	2.67
Previous incumbent provided videotaped documentation before they left	2.55	2.51	2.42	2.59	2.33	2.69	2.58	1.33
Cross-training with the incumbent before they left	4.06	4.22	3.68	3.99	3.64	4.24	4.14	2.17
Sharing lessons learned with the previous	3.91	3.96	3.68	3.87	3.51	4.11	3.99	2.5

incumbent before they left								
Mentor with a colleague in a similar position	4.04	4.12	3.89	4.14	4.09	3.68	4.07	3.29
Other (please specify)	3.79	2.33	5	3.8	3	5	3.86	5

Takeaway*: Overall, across the agency and all divisions, the top sources that were reported as being most helpful to respondents for capturing the knowledge of experienced employees before those employees' departure from WisDOT were: on-the-job coaching, asking questions of the previous incumbent as well job-shadowing and cross-training with them, and mentoring from a colleague in a similar position. There was some variation by division.*

KNOWLEDGE MANAGEMENT: DISCUSSION OF TRENDS AND IMPLICATIONS OF RESULTS IN THE CONTEXT OF LITERATURE

The overall results of knowledge usage and sharing practices reveal that as an agency, WisDOT, has a very strong foundation in terms of the three main components of any successful KM strategy: people, process, and information technology management systems. Moreover, the agency demonstrated a number of positive elements that comprise a strong foundation of creating and sustaining a learning culture that is essential to implementing an effective KM strategy. Each of these components will be briefly discussed in the context of the literature reviewed in Chapter 1. The results present several opportunities for building on these positive trends and these will be discussed in Chapters 4 and 5.

As discussed in Chapter 1, people or employees are at the heart of any successful KM strategy and across various divisions and agency-wide, the survey respondents indicated that they most frequently and primarily turn to consulting with WisDOT colleagues, including their supervisors, getting help from them for addressing problems, and seeking their guidance on a regular basis, before turning to resources such as MyDOT, professional association websites, databases, manuals, files, or colleagues outside of the agency. The results indicate another positive facet of the "people" component of KM: there's a strong community of people, with varying levels of functional and subject matter expertise, who act as the brain trust and are willing to share their accumulated knowledge to help others in performing their job. This translates into a strong learning culture wherein new ideas and innovations are encouraged within divisions and across the agency, which the results highlight. Some divisions reported having a stronger underlying learning and sharing culture than others and the results show which divisions need to examine their cultures and identify areas for improvement. Leadership support (referenced in various best practices reviewed in the literature in Chapter 1) is a critical element

for understanding how best to proceed with this culture audit before identifying best ways to strengthen their culture and engaging in changing the learning cultures.

As noted earlier in the report, such a collaborative learning and knowledge sharing community is the backbone for the creation and use of processes for documenting best practices to inform current and future decisions and the results highlight that feature. Likewise, a collaborative community for capturing, codifying, and sharing knowledge and expertise is essential for creating, using, updating, and managing the information technology systems that facilitate these processes. The survey results point out that there is not only a solid infrastructure for information capture, storage, and dissemination seen in terms of the wide variety of options presented to the respondents like different types of databases, manuals, electronic documentation, etc., but it also indicates that respondents were aware of these resources and regularly used them to perform their jobs. The results also highlight the ubiquity and widespread use of everyday communication channels such as emails, phones, and Teams as tools for capturing, accessing, and sharing timely information within the unit. These results are consistent with the trends mentioned in Michigan DOT's efforts to revamp their KM strategies and practices (for details, refer to Phase 1 report). Likewise, they are echoed in the Chapter 1 review of best practices on talent intelligence technologies that build off and integrate with these pre-existing, easy-to-use information channels. The usage pattern of these information system resources within each division provides a good starting point for the divisional leadership to identify areas to strengthen, improve, or discontinue investments. The results also indicate that while there can be an overall agency-wide strategy to improve and strengthen certain information capturing and sharing systems, each division will need to use these results to develop and guide their own decision-making with regard to investing in these systems, especially in the short-term as it relates to vital transfer of information and documentation for new incumbents. Results on the adequacy of documentation and transfer of useful information for new incumbents suggest there is room for significant improvements in this area, most of which require only proactive planning and minimal start-up costs in implementing (e.g., on-the job shadowing of departing employees, cross-training etc.).

The people component of KM, as in colleagues within and across the Divisions, as the sources of knowledge, learning, and sharing, provides a strong starting point for WisDOT to create a comprehensive Strategic Workforce Management Plan (SWMP) (discussed in greater detail in Phase 1 report) that integrates KM strategy with workforce development and succession planning. This is an essential step to address the challenges related to knowledge loss from factors such as retirements, turnover, internal mobility, etc. Not investing time and resources in creating and implementing an integrated SWMP is likely to have negative consequences at the divisional and agency level, although, these consequences may vary in severity within a given division and department but no entity will be immune from them. Some of these negative consequences were highlighted in Chapter 1. Investing in identifying and developing knowledge experts and thought leaders is an important element for ensuring continual improvement of work processes and practices and using appropriate technologies to aid in those efforts.

The preceding discussion of the patterns of skills usage over time and different facets of KM all reinforce a key idea that was succinctly stated by Liebowitz (2008): "*KM* is an integral part of succession planning and workforce development efforts" (p. 3). Any efforts to address gaps in skills readiness or challenges stemming from knowledge loss or gaps, needs to include broader strategies for workforce management that is linked to the agency's goals and objectives for hiring, developing, and retaining people. KM challenges are inherently linked to every aspect of the talent management process but most notably reflect inadequate investments in succession planning, career development, training and onboarding efforts, and inflexible job architecture. Likewise, challenges in skills readiness can be traced to not only inadequate assessment and categorization of skills but to every other aspect of the talent management process mentioned above. Given the many commonalities that give rise to the twin challenges of inadequate skill readiness and KM practices, agency leaders considering potential solutions need to explicitly factor in the interconnected nature of these challenges as they make their decisions. Potential solutions are discussed in the next chapter.

LIMITATIONS

The results of this study need to be interpreted considering limitations that are inherent in any survey design and methodology.

First, it was not possible to include all aspects of a workforce readiness and knowledge management framework into the survey because of concerns surrounding survey fatigue and because some of these aspects don't lend themselves to be captured through a survey method. For example, skills assessment is an enormous and complex subject area, and it was not possible to "comprehensively" capture all the different skills employees used in their work across different types of job families and divisions. Skill categories deemed as most essential and widely applicable were included. Likewise, it was not possible to include all facets of the knowledge management process into the current survey. It is important to supplement the survey results with other methods for gathering additional data through focus groups, workshops, interviews, etc. in order to create and implement an SWMP as described in Chapter 1.

Second, it is possible that the length of the survey in a relatively short period of time, deterred many employees from filling it out and therefore the results reflect the responses of those who did take the time and put in the effort to fill out the survey. As mentioned in the previous point, additional methods of tapping into the perspectives of those who did not respond are essential.

Third, given the anonymous nature of the survey it is not possible to identify who the thought leaders are within a workgroup, division or agency-wide. Identifying these thought and knowledge leaders to solicit their perspectives on current gaps in knowledge capture and use and identify areas of improvement for KM plans and strategies is important. Focus groups and/or interviews are two possible options to use for obtaining this additional source of data and insights. Data from the internal thought and knowledge leaders can also be immensely useful in generating creative options for stemming the knowledge loss from the departure of experienced employees.

Finally, given the self-reporting nature of the survey, the results need to be interpreted as being indicative of respondents' perceptions which may, accurately (or not), reflect the 'ground realities.' The results can be used to highlight any areas of disconnect between the perceptions and the realities and identify the reasons for this disconnect before devising strategies for addressing them.

SUMMARY AND CONCLUSIONS

The results indicate that WisDOT and all the divisions have a strong foundation for creating and implementing a SWMP which includes KM, workforce development and management and succession planning. The results also highlight that given the strong foundation, the agency is in a good position to move forward in the desired direction given the strong leadership support for this study. Moreover, there is momentum for creating a lasting and positive change and the leadership is interested and invested in capitalizing on the opportunities for improvement that are captured in the results.

CHAPTER 4: PROPOSED INDUSTRY TECHNOLOGY ROADMAP: INTEGRATED HUMAN CAPITAL MANAGEMENT (HCM) SYSTEM FOR SKILLS AND KM NEEDS

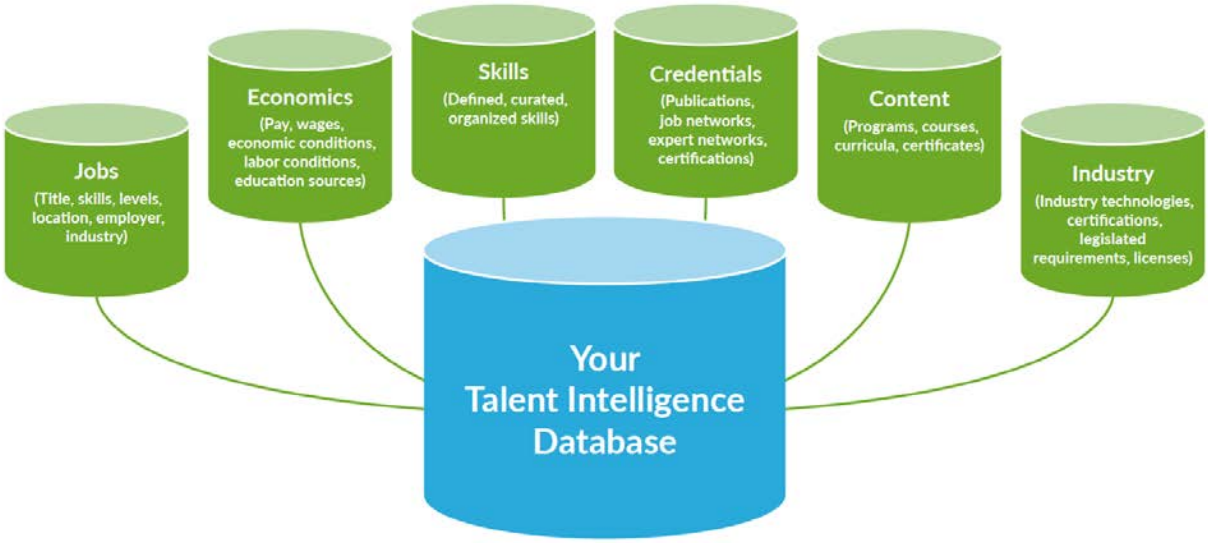
Emerging forces are impacting workforce planning and development in transportation. These forces include rapidly changing transportation technologies and services (e.g., autonomous, connected, electrified, and shared mobility) and increasing demand for data driven decision-making with the advent of big data and data analytics. To effectively prepare for this evolution, a transportation agency needs access to a wide range of Knowledge, Skills and Abilities (KSAs). Given the limited resources, identifying the desirable KSAs has become a pressing problem. Determining what types of skills an agency has, what skills it needs, and how to acquire and develop these skills is the most crucial Human Capital Management (HCM) challenge. One of the emerging technologies, SkillsTech, is specifically created for defining, categorizing and analyzing skills. Applications such as skill engines can be used by agencies to find an existing solution or develop new solutions. Vendors like Eightfold AI, Workday, Gloat, Beamery, Phenom, and others have built cloud-based, data-rich and AI-enabled tools. Figure 4-1 shows a small number of the new vendors that have entered the market in the last five years.

Figure 4-1: SkillsTech Market

Source: https://joshbersin.com/wp-content/uploads/2021/04/HR_TechMarket_2021_v7.pdf

With the boom of the SkillsTech market, the problem of accessing and analyzing massive amounts of data to extract useful information is becoming more pronounced, surpassing the demand for developing new algorithms. Vendors have been aggressively harvesting data from everywhere, both internal HR systems and external market data sources, as shown in Figure 4-2. The volume and variety of data being collected and utilized has far exceeded what is traditionally managed by HR. For example, Eightfold, LinkedIn, Beamery and Seekout have been collecting and analyzing *billions* of employee records for years. Supported by emerging technology and AI, the diverse and rich datasets substantially increase the reliability, accountability and agility of decision-making.

Figure 4-2: Data Needs in the New Era of HCM



Source: *https://joshbersin.com/wp-content/uploads/2021/04/HR_TechMarket_2021_v7.pdf*

Another overarching challenge is that new employee's expectations on job structure, work environment, supervision, and interactions are leaning towards more flexible working schedule and environment, unique work experiences, transparent communications, and clear career plans. Job structure includes flexibility in work areas, functions, levels, and positions in an organization. Job assignments are becoming more dynamic with varying goals, responsibilities, and demands for technical proficiencies. Any given employee may be involved in different teams, and their skills may be broadly defined by industry/knowledge area or function/capabilities. These characteristics will prompt organizations to shift from "manager led" to "market led" where employees' job assignments, goal setting, performance reviews, career planning, internal mobility, and leadership development are all driven by the market needs.

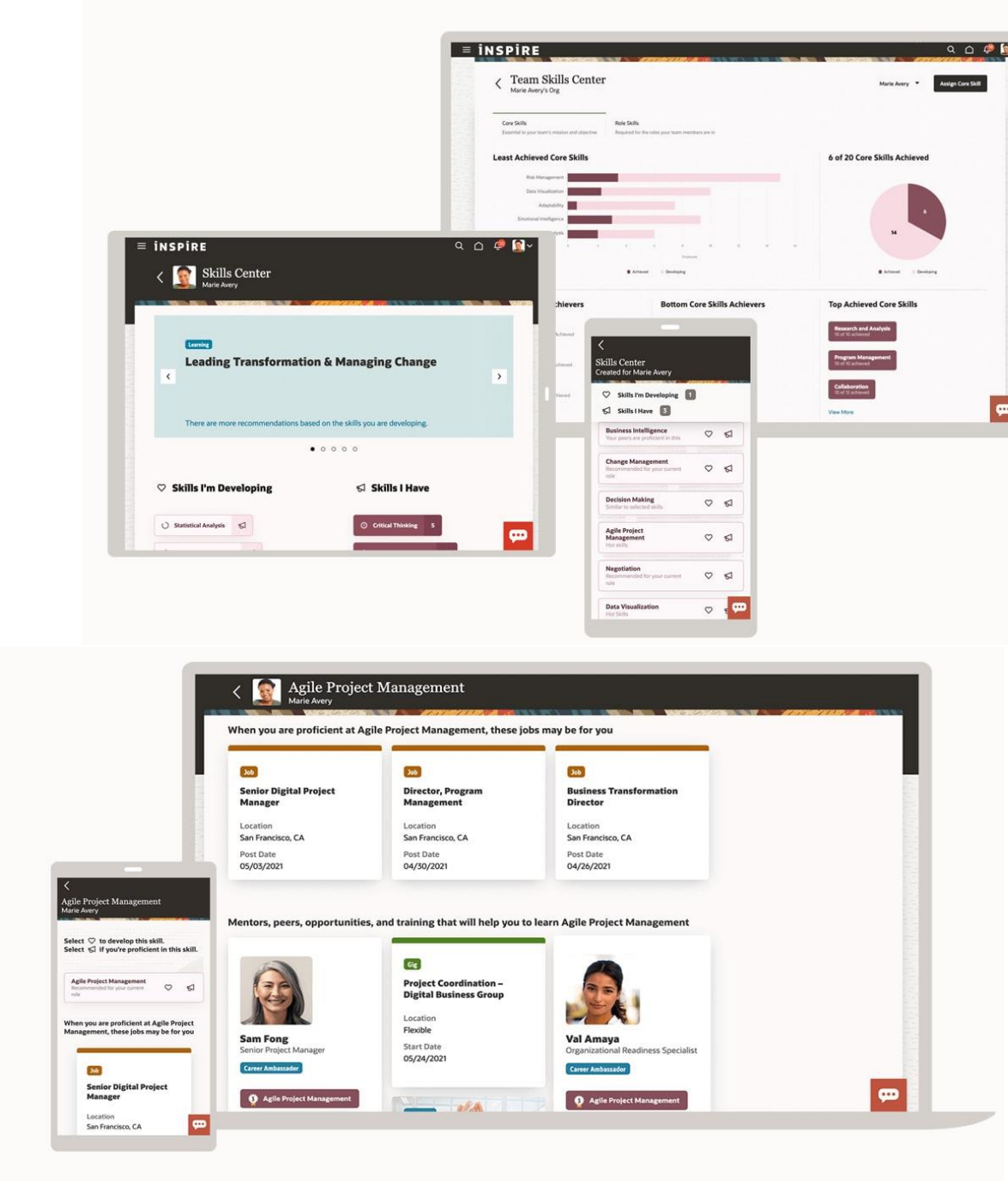
In light of these changes, an agency-wide Knowledge Management (KM) must be strategic, accountable and agile. KM activities should be focused on the organization's greatest risks and opportunities, clearly defined and tracked performances, and application of the most appropriate and effective tools and techniques to achieve the desired outcomes. Thus, it requires regular and rigorous reviews of emerging workforce knowledge and skill gaps and risks, active approaches to addressing gaps and risks, a combination of strategies to recruit, reskill, retain and redesign or reprioritize traditional focus areas.

Traditional succession planning and talent management strategies can no longer keep up with the growing need for greater analytical capabilities and predictive insights to improve workforce planning and KM and decision-making. A Talent Management (TM) suite with an integrated set of modules is necessary to support an organization's need to plan, attract, develop, reward, engage, and retain talent. These functional modules align perfectly with the key Human Capital Management (HCM) processes.

The Oracle Peoplesoft Human Capital Management (HCM) can expedite the modernization of talent management. According to the product introduction, "Dynamic Skills"

uses deep learning techniques to “source, detect, manage, and grow the skills that fuel your talent supply chain”. Dynamic Skills can help leverage the skills within the organization by focusing on three key areas: “understanding your employees’ skills, connecting people with relevant skills, and supporting career development and personal growth”(Oracle Dynamic Skills). Figure 4-3 shows the screenshots of Dynamic Skills function.

Figure 4-3: Dynamic Skills by Oracle Peoplesoft



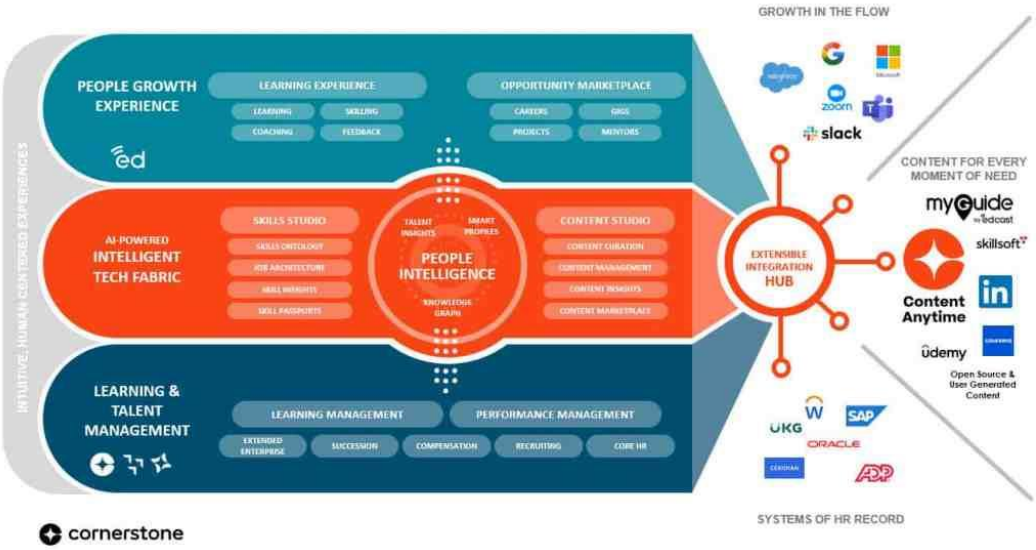
Source: https://www.oracle.com/human-capital-management/skills/tour/

Dynamic Skills has several modules such as Skill Nexus, Skill Advisor, Skills Analysis, Skills Center, and Team Skills Center. Skill Nexus is an AI-driven tool that continuously keeps the skills in an organization up to date and supports the skill training and planning decisions. Skill Advisor connects candidates and employees with personalized skills recommendations. Skills Analysis identifies skill gaps and suggests critical reskilling and upskilling activities to support organizations' strategic goals. Skills Center is a personalized data portal for employees and managers to manage skills and recommend actions to drive personal and organizational growth. At the team level, Team Skills Center provides managers with a centralized place to review, assign, and manage skill development of the entire team.

The Cornerstone product targets five major areas, each of which is built on existing products and new technology integration (Bershin, 2022). As shown in Figure 4-4, the base level is the Cornerstone core Learning Management System (LMS) and Talent Management Systems (TMS). The lower level is a common data and skills system called the People Intelligence core. The system is a massive skills and people database that combines data from the core talent systems and Cornerstone's massive content libraries. The next level is the user/employee experience layer. The fourth level offers a massive content library and toolset called Content Studio, and the fifth level contains a set of APIs and connectors to third party systems. Moreover, Cornerstone has a world-class Learning Experience Platform (LXP) and interfaces to other applications such as Microsoft Teams, Slack, Google, or Salesforce. A new feature is the Cornerstone Opportunity Marketplace which includes many of the features of its rival products such as Gloat, Fuel50, Eightfold, and Workday.

Workday is a Software-as-a-Service (SaaS) that offers cloud-based solutions to its customers through subscriptions to its various services instead of selling the software (Bershin, 2020). Workday offers a combined HCM, financial management, payroll, and other services. As a service product, Workday provides continuous support to its users by automatically releasing the updates and solutions to its customers twice a year. As a comparison, the customers who use PeopleSoft HCM have to depend on their IT departments to manage and apply patches. In the Fall of 2018 Workday introduced the Skills Cloud that is designed to help agencies create a "skills ontology" and discover the skills and skill gaps in the workforce.

Figure 4-4: Cornerstone 4-level systems of HR record



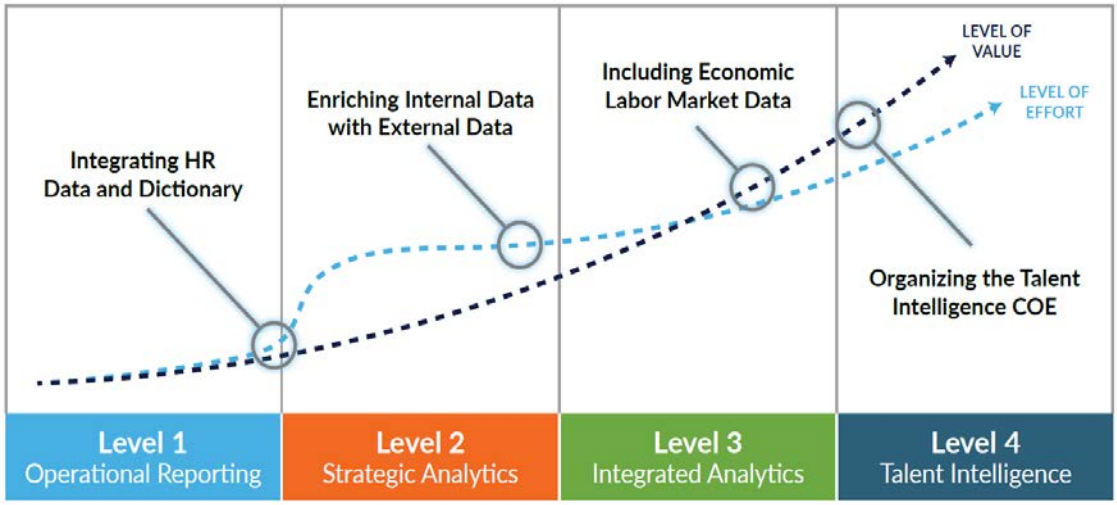
Source: Https://Joshbersin.Com/2022/10/Cornerstone-Makes-A-Play-To-Dominate-The-Skills-Platform-Market/

Talent Intelligence: A Comprehensive Framework for Integrating Internal and External Workforce Data

As the above review of different HCM platforms indicates, HR tech vendors continue to innovate and offer one-stop talent intelligence solutions by focusing on integrating as many facets of an employee's experience as possible. According to Bersin (2022), "Because the talent intelligence platform is built as an integrated platform, it ingests data from a wide variety of sources – from employee profiles and HRMS data, jobs, ATS data, learning systems, performance data – to match across different areas and for many different use cases. And that's why it has so many different uses cases – from recruiting to talent mobility, succession management, gig work and career management" (Bersin 2022, p. 5).

An integrated talent intelligence platform is displayed in Figure 4-5 and provides a rough roadmap for starting the organization's task of revisioning its entire talent management process. As seen in Figure 4-5, what all these HR tech products have in common is a process that begins with the need to build an internal dataset, one which includes a skill taxonomy, describes roles and job levels, contains information on recruiting, retention, and other functions, and is reflected in a operational reporting level. Next, these sources of internal data are enhanced by labor market data and information on skills and credentials from public and private sectors or industries, and are reflected in the level of strategic analytics. Level 3, or integrated analytics, seeks to incorporate data from market growth and economic development. Finally, everything is integrated into a comprehensive database merging internal people analytics with extensively sourced external labor market information in the talent intelligence level, which is reflected in Level 4. The evolution and growth trajectory of these four levels of talent intelligence is presented in Figure 4-5.

Figure 4-5: Four levels of talent intelligence evolution



Source: Understanding Talent Intelligence: A Primer, Josh Bersin

Technology is, and has always been, one of the major driving forces that advanced HCM. The conventional approach to talent management assumed that HR managers know every job, every role, and the required skills in their organizations. When organizational leaders wanted to understand changes in skills sets or jobs, they designed and sent out surveys and asked their employees to respond. Often the responses were slow, skewed to reflect socially desirable features and provided sparse actionable insights. With the explosive growth of HR technology and the changing landscape of the transportation industry, organizational leaders can no longer expect the traditional practices of relying on periodic skills assessment surveys to take them to where they want to be. Data analytics and AI technology can harness and integrate critical information from large volumes of internal and external workforce data and feed the leadership team answers in real time. Moving toward talent intelligence ultimately integrates people analytics, sourcing intelligence, and strategic workforce planning, which by extension also includes succession planning and planning on addressing knowledge gaps and losses. While the technologies and data are becoming more robust and powerful, agencies must decide which problems they want to solve (e.g., fix an underperforming operation, address a current or future talent gap, or long-term organizational transformation) and the strategic moves they need to make towards a successful adaptation and transformation of their organizations.

Talent intelligence technologies are only effective when they are anchored to the organization's Strategic Workforce Management Plan (SWMP) and utilized in service of fulfilling the organizational mission. As organizations seek to transform their workforce, improve their hiring practices, address their skills and knowledge gaps and increase employee engagement and retention, integrated talent intelligence technologies can serve as vital tools to aid the organizational team in charge of workforce planning, management, and development but they cannot be substitute for human ingenuity and perceptiveness required to anticipate, articulate, and solve the organization's problems.

CHAPTER 5: RECOMMENDATIONS AND NEXT STEPS

According to NCHRP Report (2021), a strategic approach to workforce planning, development, and management is necessary to deal with volatility, uncertainty, and heavy competition for talent that faces many organizations. The transportation landscape is evolving rapidly amidst an array of economic, demographic, technological, and legislative forces that exert an enormous pressure on the leadership of state DOTs across the country. The agency leaders are using different approaches to respond to these pressures. The report noted that public sector agencies have been slow to respond to the change. But now, many have realized that they need to "reshape how they approach knowledge retention, workforce skills, and talent management," (p. 42) and are taking a comprehensive approach to address all these interconnected talent management challenges. A survey analysis of 45 state DOTs reported in the NCHRP report (2019) noted the indisputable fact that workforce planning and development is an important strategic and essential activity for managing the staffing challenges faced by state DOTs. The current UWM-IPIT-WisDOT study is a step in the right direction and a timely effort for WisDOT to address its talent management challenges.

The results of the study provide a strong foundation for envisioning the next steps and recommendations. These recommendations are also drawn from the review of literature on some of the best practices in addressing talent challenges related to workforce skills and knowledge management/retention. WisDOT has a solid core of dedicated and highly-skilled professionals who are working hard to sustain a good learning culture, have good information technology systems and sound processes that enable them to capture and share knowledge. WisDOT also has a strong foundation of soft and technical skills across divisions, job families, and levels that can be further leveraged to address its talent management concerns. Considering the insights gleaned from the study results and the best practices discussed in the report, the following recommendations to consider are:

1. **Establish a formal central office/team of cross-functional staff trained to engage in strategic workforce planning and development activities**: The rationale for this recommendation stems from various sources of information presented in this report including a review of literature on best practices and results from survey analysis. All sources point to a significant need for WisDOT to strategically engage in workforce planning and development activities that are integrated with their business planning, forecasting and budget formulation efforts. These planning efforts should be undertaken on an annual or biennial basis, to align WisDOT's workforce needs in response to WisDOT's priorities and challenges. It is imperative that these efforts are linked to the strategic management planning process and the central team reports directly and works closely with the Secretary's Office (SO) and Administrator's Office (AO) leadership teams. It is also important for the central team to coordinate with DOA so as to complement and supplement rather than duplicate their efforts. As part of these efforts and in coordination with SO and AO, the cross-functional team needs to consider the following recommendations to address its concerns:
    a. **Create a Strategic Workforce Management Plan (SWMP)** that is linked to the agency's strategic management plan and goals and is integrated with the agency's

entire talent management process (which should include KM and succession planning efforts). Chapter 1 provided an overview of the step-by-step approach to the strategic workforce planning process recommended by the NCHRP (2021) scan team for DOTs to consider in creating and/or refining their plans. Strategic workforce planning undertaken by this proposed, newly created office should also involve participation by directors and lower-level managers within the regions and bureaus. All of these activities need to be undertaken by the division staff trained in workforce planning and development in conjunction with the leadership input and guidance from the Administrators' Offices as well as from the regions and bureaus. A graphical illustration of the proposed structure is presented in Figure 5-1 as an example for the leadership to consider before it starts the strategic workforce management planning process. Once created, the SWMP plan needs to be reviewed on an annual basis using data from various sources and workforce analytics tools and technologies. Some of those technology tools that provide the necessary analytics were presented in Chapters 1 and 4. There are many technology tools to consider based on WisDOT's strategic priorities and needs.

b. **Identify compelling problems and priorities to address**. In creating the SWMP, the cross-functional team will need to use data and analytics tools to identify and specify problems and priorities to address at the agency level and specific ones that also reflect the needs of different departments and divisions. Some of the data driven strategies to identify compelling challenges to address include:
    i. **Workforce planning metrics** need to be collected and analyzed on a regular basis for adequate workforce planning and forecasting activities that will shape the creation and implementation of SWMP and provide benchmarks to monitor progress toward goal achievement. In addition to turnover analysis (described next), the following metrics need to be collected and factored into the planning: such as time-to-fill a vacancy, skill-gap rate that provides a 5-year "look-ahead" for skills gap and a 5-year "look-ahead" for requirements, supervisory ratio, bench-strength ratio that provides a ratio of trained or in-training employees to step into a vacant leadership role, and FTE to consultant ratios. There are technology tools that can vastly improve these metrics collection and data synthesis efforts and need to be used by the central team to yield desired results.
    ii. **Turnover analysis** should be regularly conducted to understand who is leaving (broken down by demographics, departments, and divisions), why they are leaving, and the costs associated with their departure, including costs of hiring, on-boarding, and training replacements. Society for Human Resource Management (SHRM) has several turnover cost calculators specific to different job classifications and geographical locations that are available for the members to use. Many professionals engaged in workforce planning efforts have membership with the organization and use their tools and templates so as to remain consistent

with best practices as well as not reinvent the wheel. The WisDOT team coordinating this study did a great job in creating a comprehensive 'vulnerability index' that captured and synthesized information related to a variety of job families that provided a cross-cutting view of areas that are at most risk of suffering from knowledge losses and gaps created by attrition. It is highly recommended for this team and the central team to dig deeper into this data and conduct a root cause analysis of the problems that lead to attrition and high level of vulnerability. To what extent do these problems stem from people, process, or information or technology systems factors?

iii. **Skills assessment** using analytics tools is essential for creating and implementing any meaningful SWMP. By extension and at the very least, results from skills assessment should inform and feed into KM and succession planning efforts. At best, regular skills assessments should underpin each and every facet of the talent management process. Skills assessments and skills gap analysis (between current and desired skills) are best conducted using technology which was described in Chapters 1 and 4. It is also recommended that such assessments should be performed on an annual basis, which can only be accomplished when there is a dedicated central team/office to lead these efforts and integrate it with other parts of the talent management system. It is important to remember that if this effort has not been undertaken in the past, a comprehensive skills assessment and gap analysis can take up to a year to complete for the entire organization (SHRM, Winter 2022). Because of the time and effort involved, many professionals are intimidated by the thought of performing skills assessment and gap analysis. They are also "*afraid that skills assessment will reveal weakness as opposed to [seeing it] as building strengths and fixing weaknesses*" (p. 18, SHRM, Winter 2022). Recognizing some of these barriers to conducting skills assessment is necessary before undertaking this activity.

iv. **Employee engagement/satisfaction surveys** should be factored into strategic workforce planning and development efforts. This is critical to understanding which features of the workplace culture and environment are driving (dis)engagement/(dis)satisfaction. In a 'hy-flex' work environment, the surveys should explicitly examine how these arrangements are impacting people, processes, and systems.

2. **SWMP implementation strategies aligned with the four R framework**: **R**ecruit, **R**etain, **R**eskill, and **R**edesign. This framework proposed by Bersin (2022) and discussed in Chapter 1 provides a good way to design and structure implementation activities and allows the team to monitor how an activity in one arena is affecting other parts of the system, especially since different facets of the same data pool are feeding each part of the system. For example, skills assessments provide good insights into retooling not only the

hiring process but also the onboarding program, and performance management, not to mention KM and succession planning.

3. **Create an overall agency-wide KM strategic plan** for addressing agency and division-specific KM gaps and needs. The agency-wide KM strategy needs to be linked to the SWMP and by extension, the agency's overall strategic plan. A KM strategy team needs to be created that works closely with the SWMP team. Steps in developing and implementing an agency-wide KM plan were discussed in Chapter 1.
4. **Identify the most appropriate technologies that will help address problems and priorities identified in the SWMP and KM strategic plan**. Technology is an enabler rather than a substitute for leaders' critical analysis and problem-solving abilities. As aptly noted in NCHRP report (2015), "*one common pitfall is to have Technology be the centerpiece of KM strategy. It should not be. Look first at People, and Process elements, and then identify a limited number of technology strategies needed to support these other elements. Technology should not be the driver of KM*." (p. 24). The NCHRP report (2015) profiled a matrix table containing WisDOT's KM techniques, the approximate effort and resources required to use them, and what purpose they served. At the time of the publication in 2015, WisDOT's team had also created a KM guide that emphasized the use of simple, low-cost techniques. The table is in Appendix 1. It would behoove the WisDOT team leading the KM and SWMP planning to revisit those guides and undertake a technology systems assessment in light of the current needs and priorities to address and understand which technologies need to be added and for what purpose. In addition, it is recommended to evaluate the relevance and impact of existing KM techniques and the efforts needed to update them to reflect current priorities. This background assessment work would be a precursor to establishing the KM budget, implementation timeline, expected outcomes, and measures to track progress toward those outcomes. It is important to remember that an agency-wide KM plan need not require significant new investments since most agencies, including WisDOT, are already doing many of the key elements of knowledge management. The idea is to assess the current status of the KM plans and techniques in terms of meeting the stated needs and then build on and/or expand on the existing infrastructure with the regard to the three components that reflect KM strategies: people, process, and information and knowledge management technology.
5. **Engage in risk analysis** to understand the costs of not taking any actions for addressing problems associated with knowledge losses and skills gaps. Risk analysis is essential before making any decisions with regard to team creation, resource investments, technology purchase/adoption. Risk analysis sheds light on the various types of costs that could be incurred if status quo is the chosen strategy and the costs of implementing any given strategy.
6. **Change management expertise is imperative**. Because all these recommendations touch on changing people, processes, and/or technologies, it is imperative to understand principles of change management, especially best practices and pitfalls. Project leaders and change champions need to be identified for implementing the identified strategies. This is especially critical if WisDOT decides to adopt new HR technology platforms that enable it to address its twin challenges of employee skills and knowledge gaps. Joe

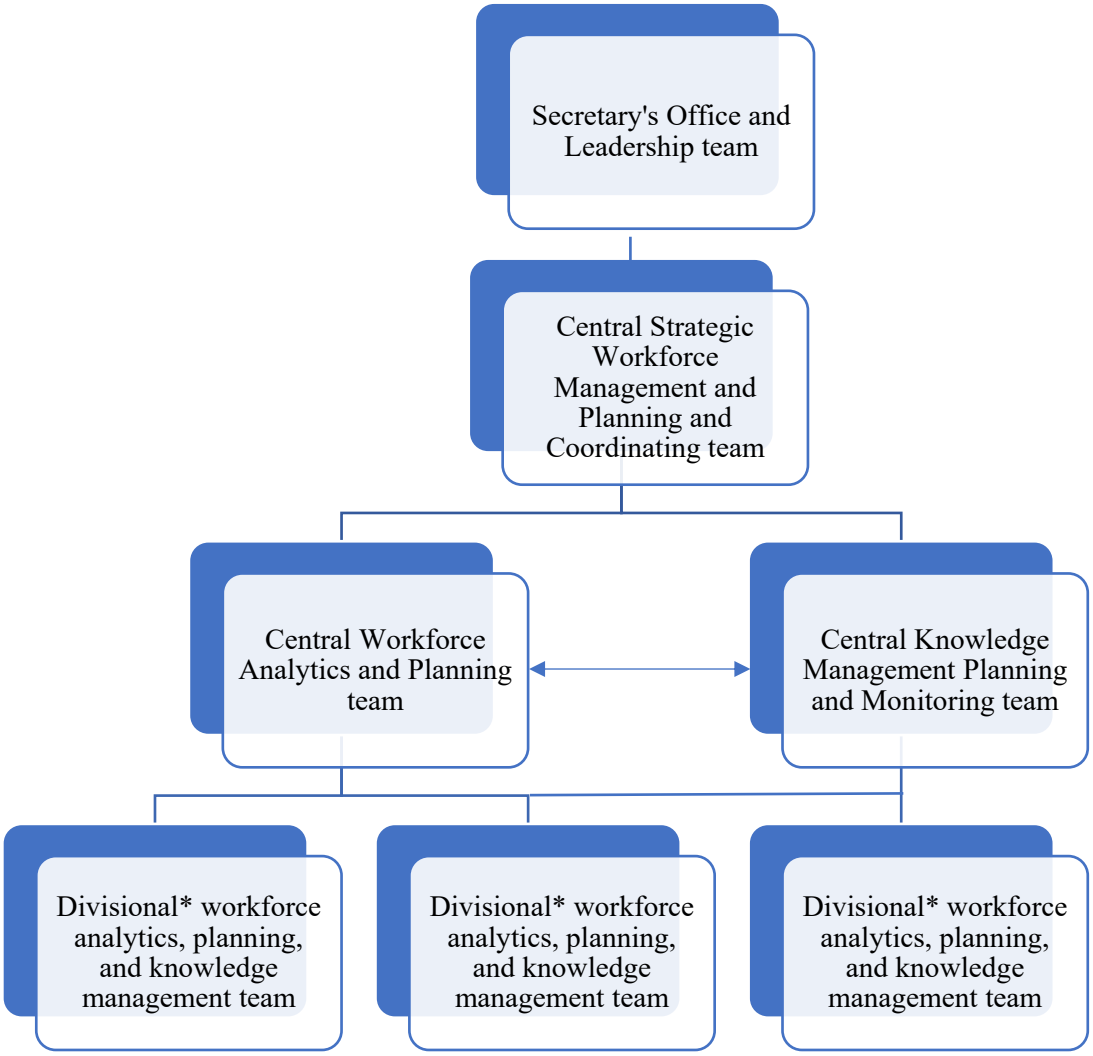
Atkinson, Vice-Chair and Chief Product and Technology Officer for PwC stated that, "*too many companies assume [HR technology] adoption is going to just happen. But any successful implementation requires thinking carefully about change management communication and preparation of the organization to accept and adopt a new technology. While that may be a well-understood problem, it's not a problem that's typically well-executed upon*." (p. 25, SHRM, Winter 2022). Simpler and creative strategies such as gamification techniques have helped boost adoption of new technology. Other strategies include offering incentives such as learning badges, extra time off for professional development opportunities, and peer recognition programs.

7. **Top leadership commitment and support is critical**, so also leadership at the division level, for any of the above recommendations to be successfully implemented and sustained over time. The NCHRP (2015) recommended establishing a broad buy-in across all levels of organizational hierarchy and creating "knowledge stewards" in each business units who have the respect of their peers to infuse KM efforts in their respective units and coordinate with other "knowledge stewards" to lead the agency to accomplish its stated goals.

CONCLUSION

It may be trite to state, but it's worth repeating and reminding, that for any organization, their employees are their most precious, non-imitable, and not easily substitutable resource. Loss of these resources, through departures, underutilization, overutilization, or under-investment, hurt the organizations' capacity to be effective and efficient. The literature reviewed and the study results provide a solid foundation for WisDOT to evaluate their options and make decisions for addressing knowledge gaps and losses and strengthen their talent and knowledge management systems. ***The selection of appropriate technologies is contingent on accurately understanding the people and processes that drive WisDOT's continued success and using technology to optimize their talents, skills and ingenuity to drive WisDOT on the road to greater success.***

Figure 5-1 Example Proposed Structure of Central Office for Strategic Workforce Management Planning



*Each division could have its own workforce analytics, planning, and knowledge management team, or a couple of smaller divisions could share one team.

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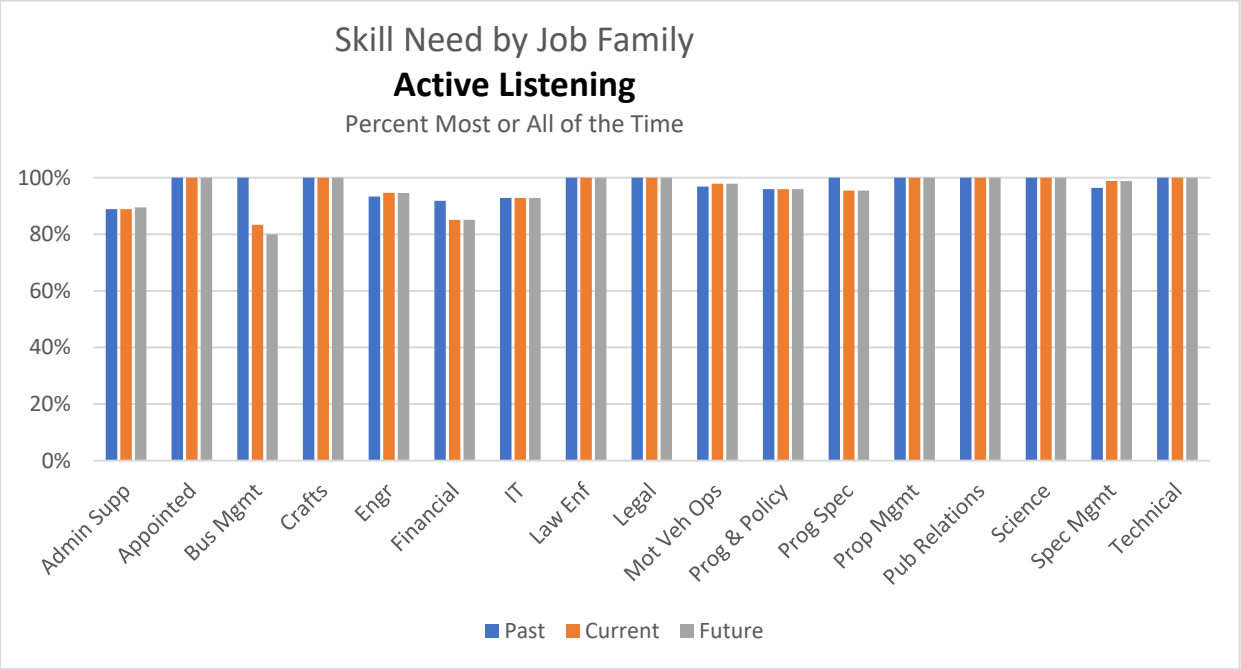
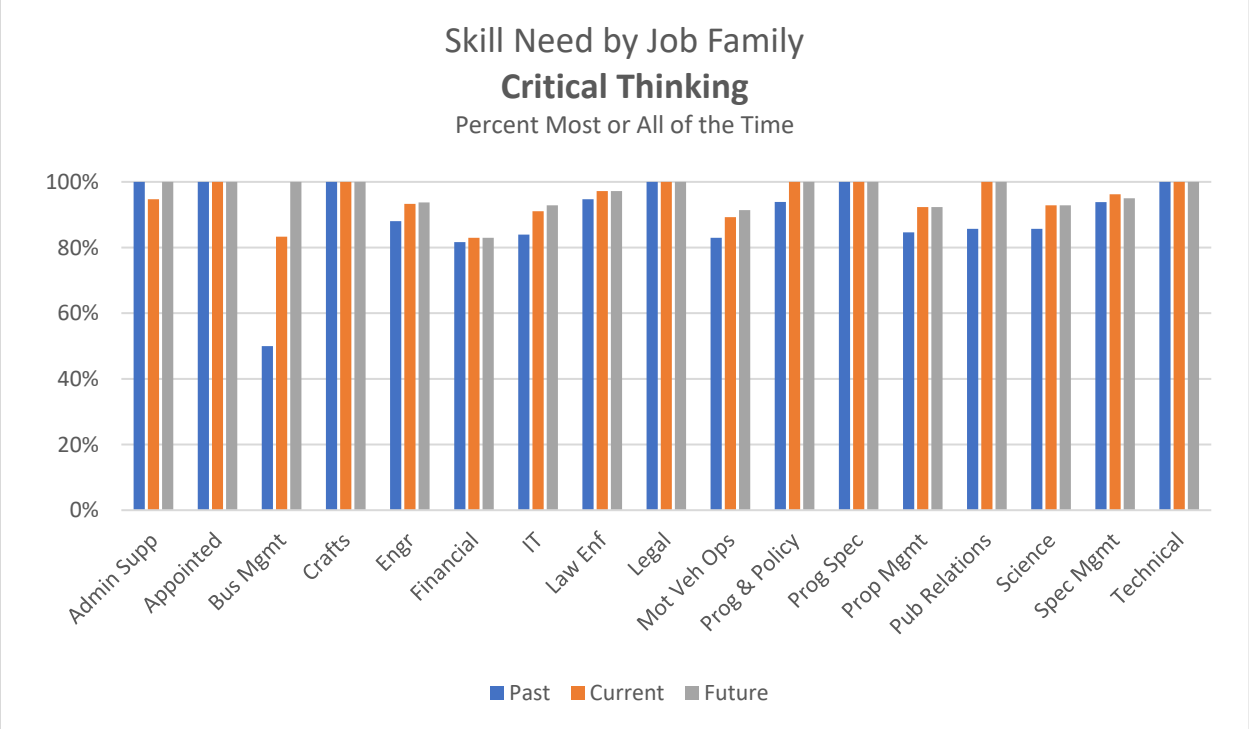
APPENDIX 1: Survey Results of KSAs Needed Across Job Families at Three Time Periods

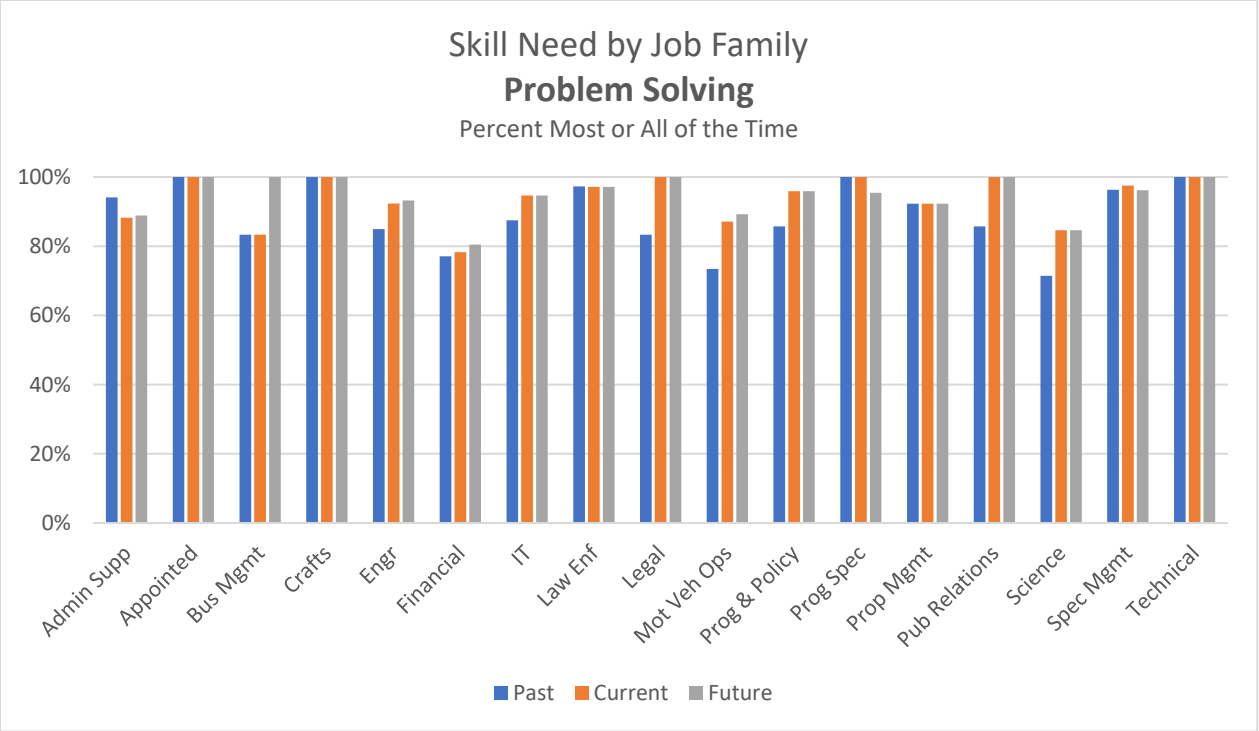
(Descending Order of Importance)

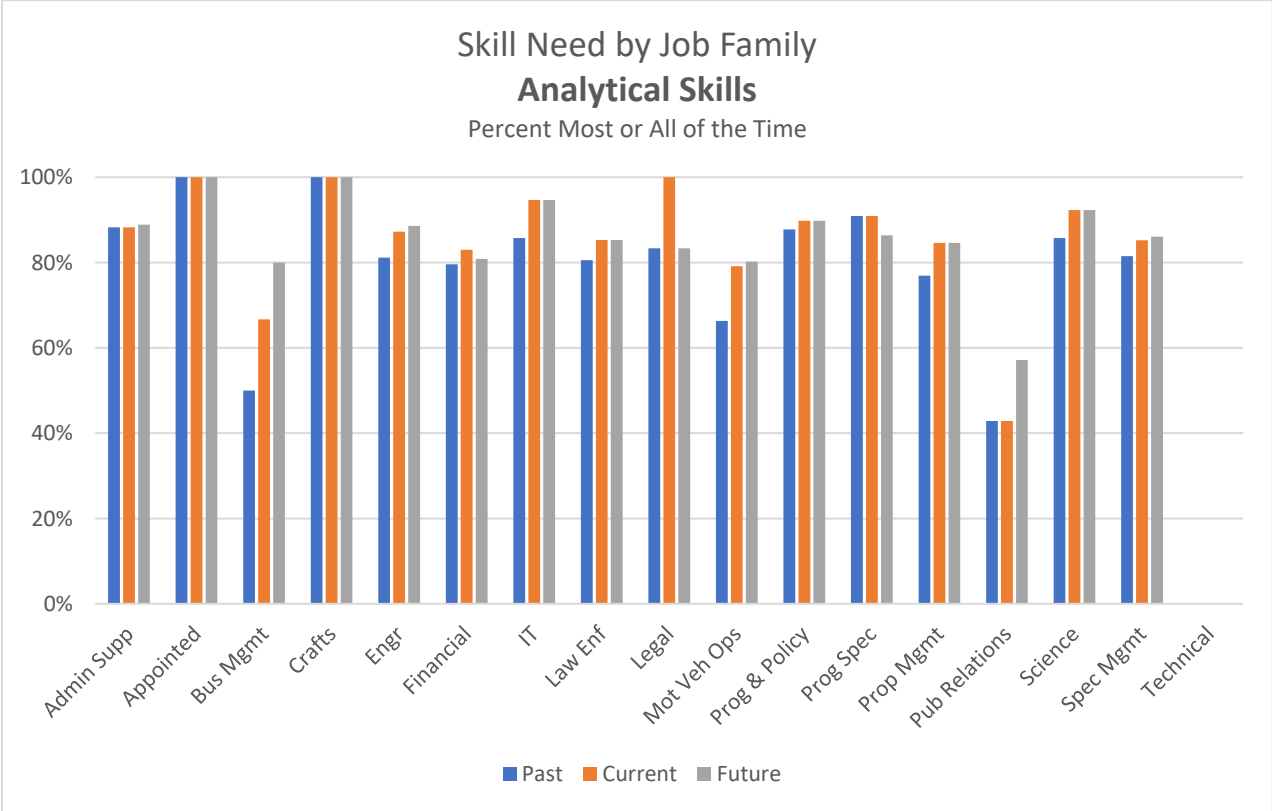
Figure A1-1

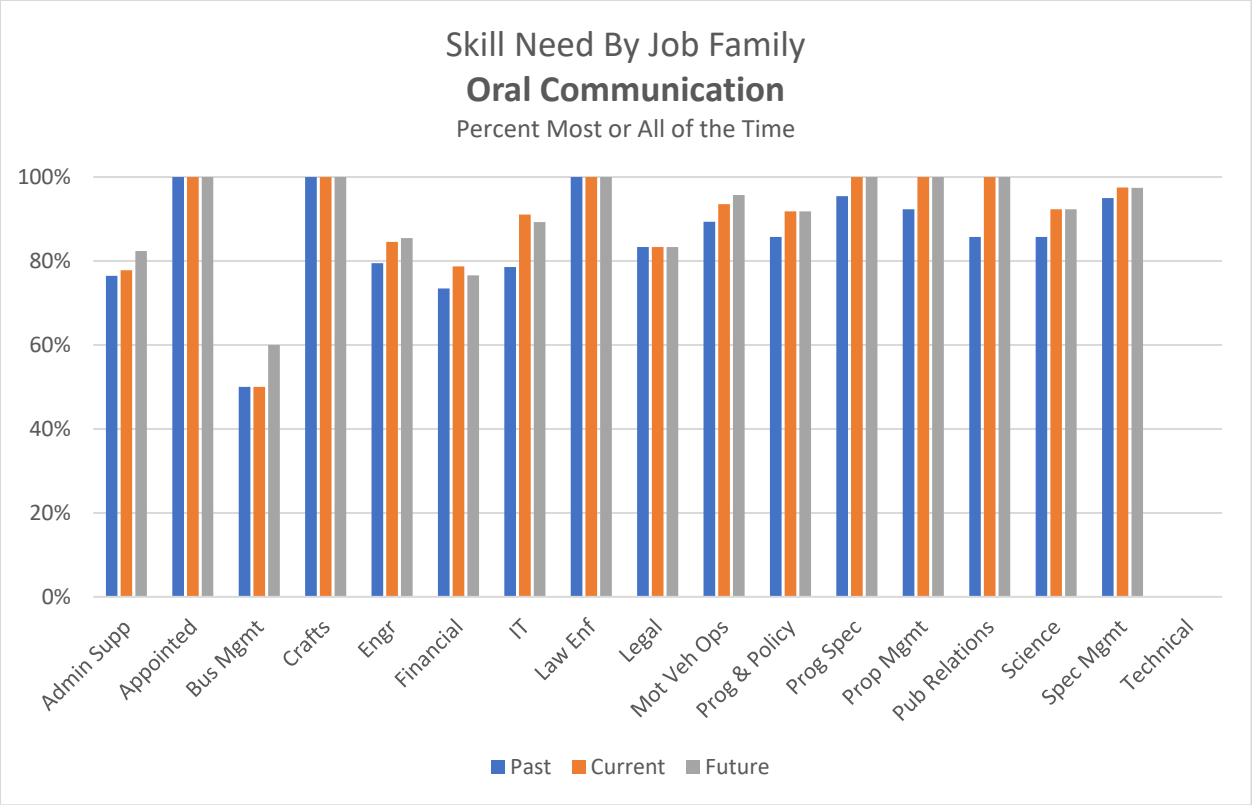
Question: Rate KSAs needed for job performance when first started role (past), those currently needed (present), and those that will be needed in 2-3 years' time (future).






Skill Need by Job Family
Problem Solving
Percent Most or All of the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Analytical Skills
Percent Most or All of the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need By Job Family
Oral Communication
Percent Most or All of the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
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Prog Spec
Prop Mgmt
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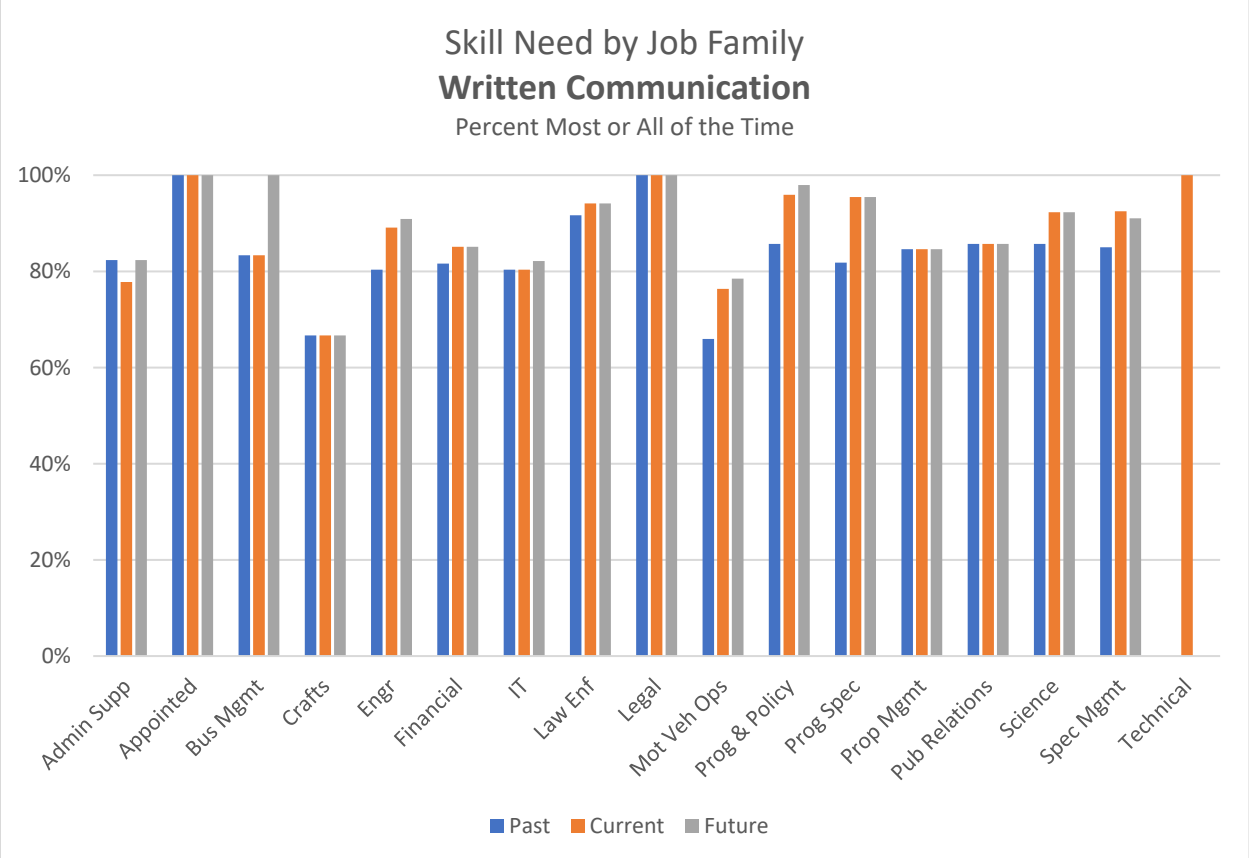
Technical
Past
Current
Future


Skill Need by Job Family
Written Communication
Percent Most or All of the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
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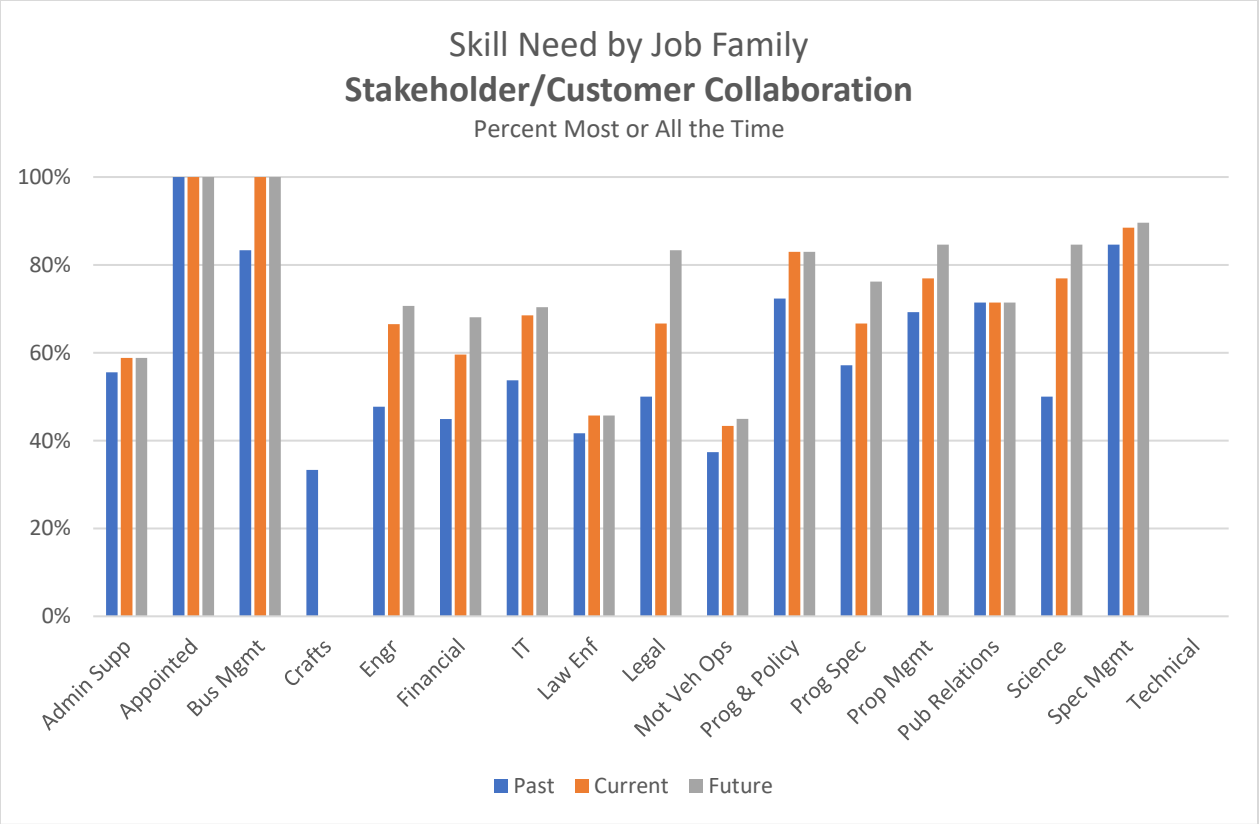
Skill Need by Job Family
Stakeholder/Customer Collaboration
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
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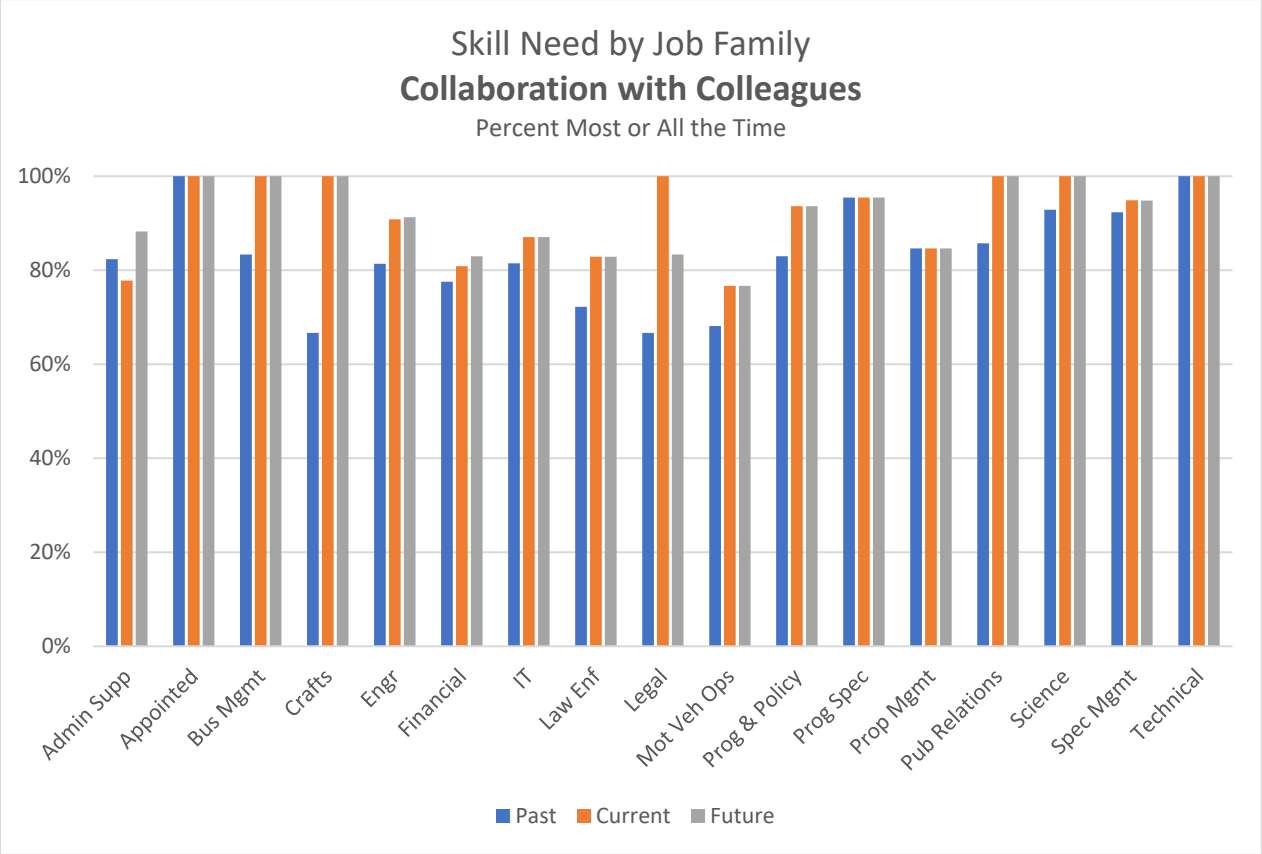
Skill Need by Job Family
Collaboration with Colleagues
Percent Most or All the Time
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80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
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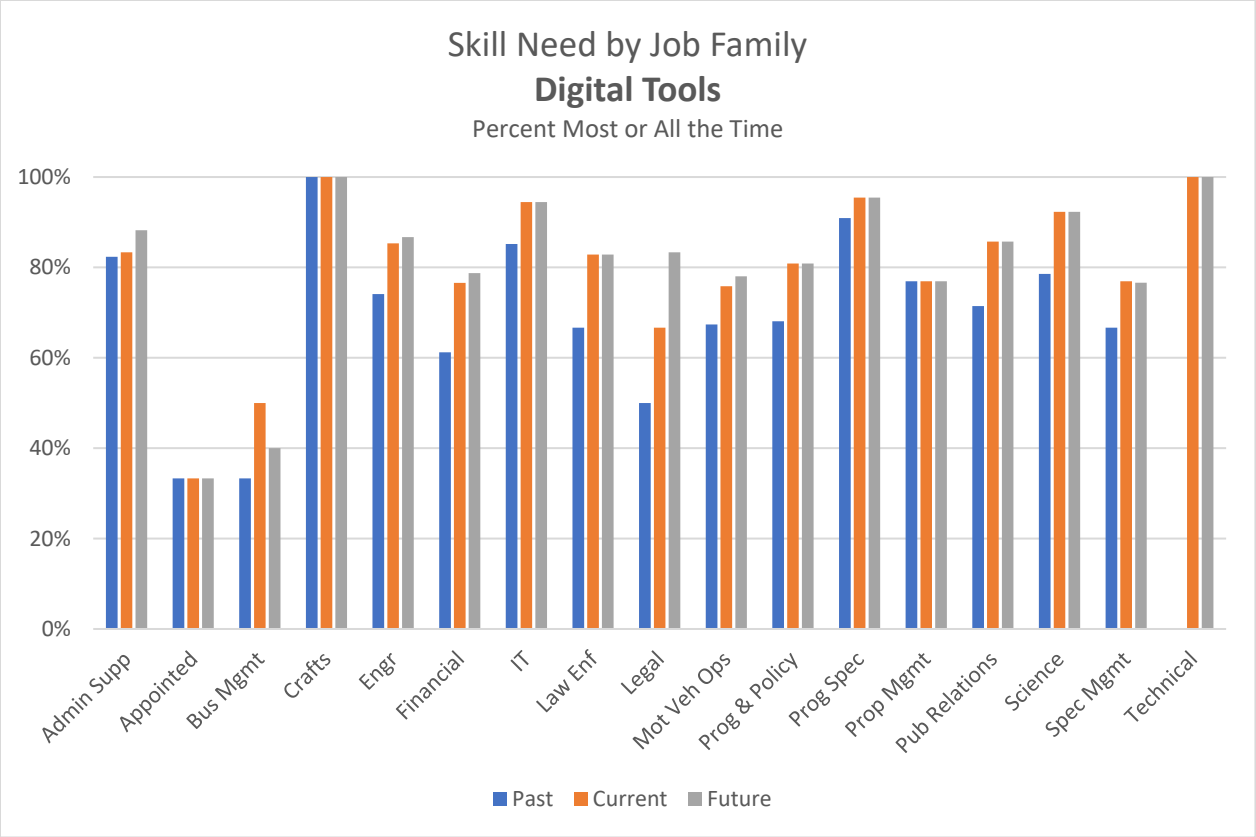
Skill Need by Job Family
Digital Tools
Percent Most or All the Time
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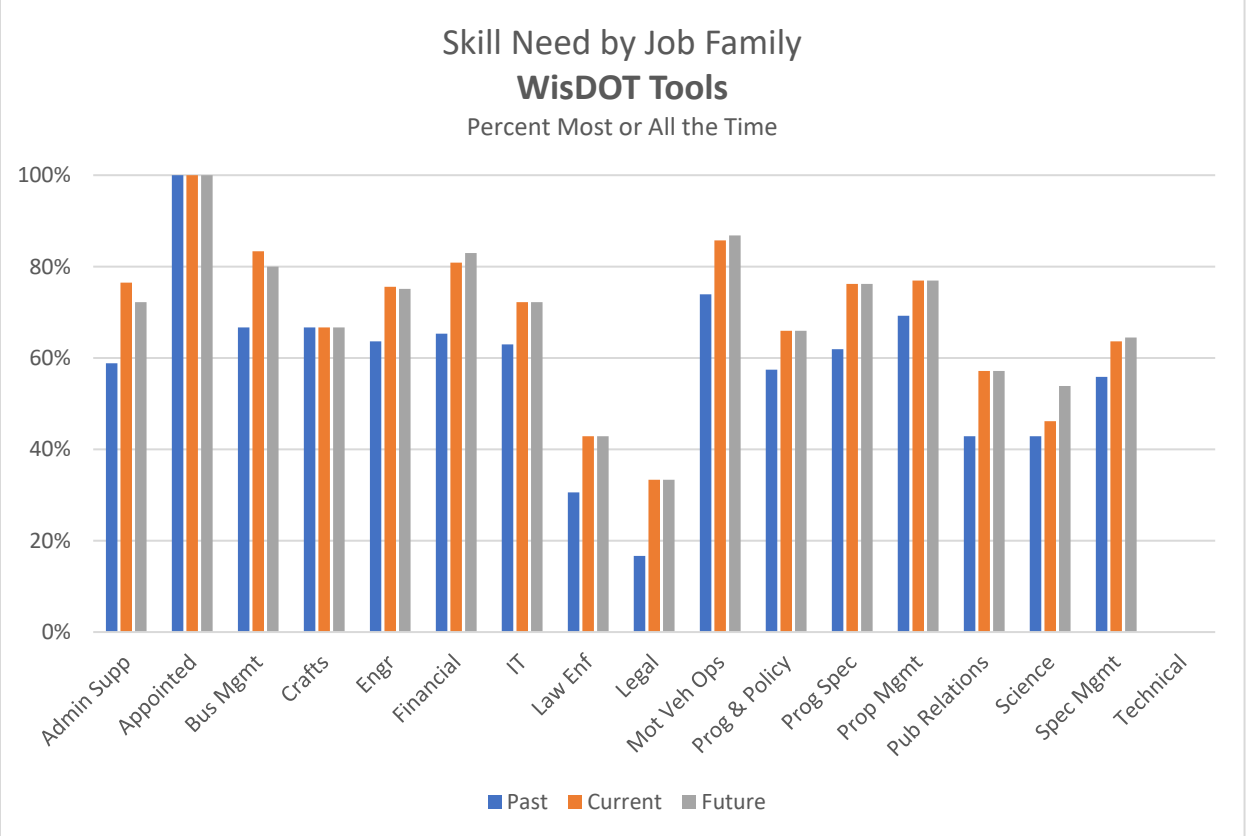
Skill Need by Job Family
WisDOT Tools
Percent Most or All the Time
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80%
60%
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Crafts
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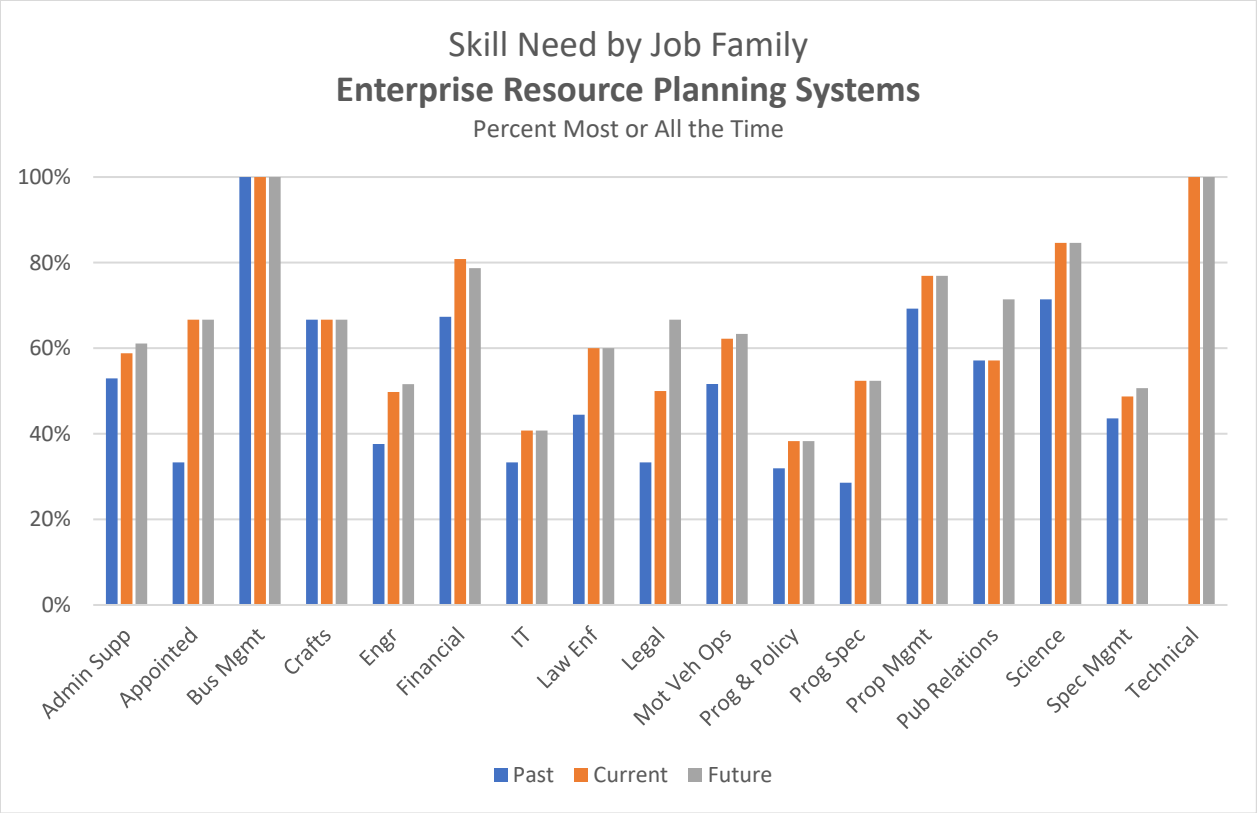
Skill Need by Job Family
Enterprise Resource Planning Systems
Percent Most or All the Time
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60%
40%
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Admin Supp
Appointed
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Crafts
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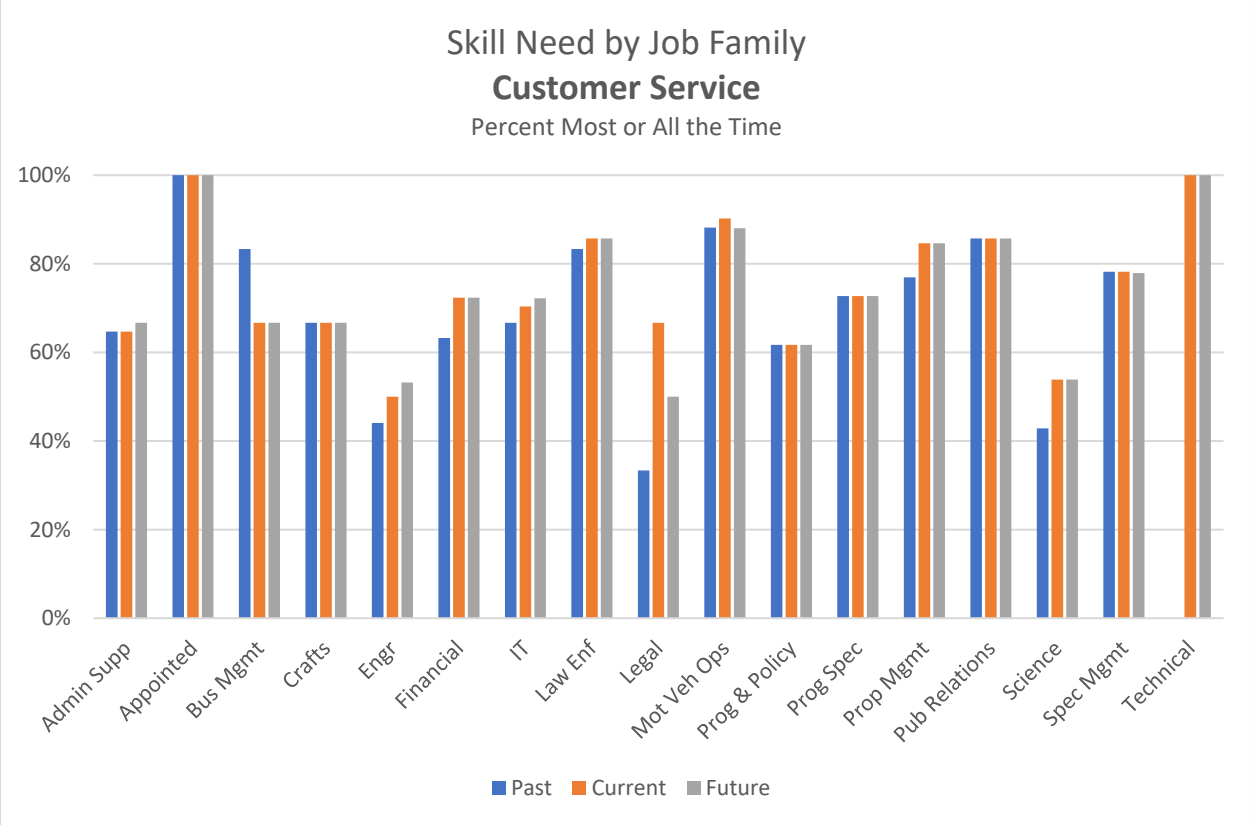
Skill Need by Job Family
Customer Service
Percent Most or All the Time
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20%
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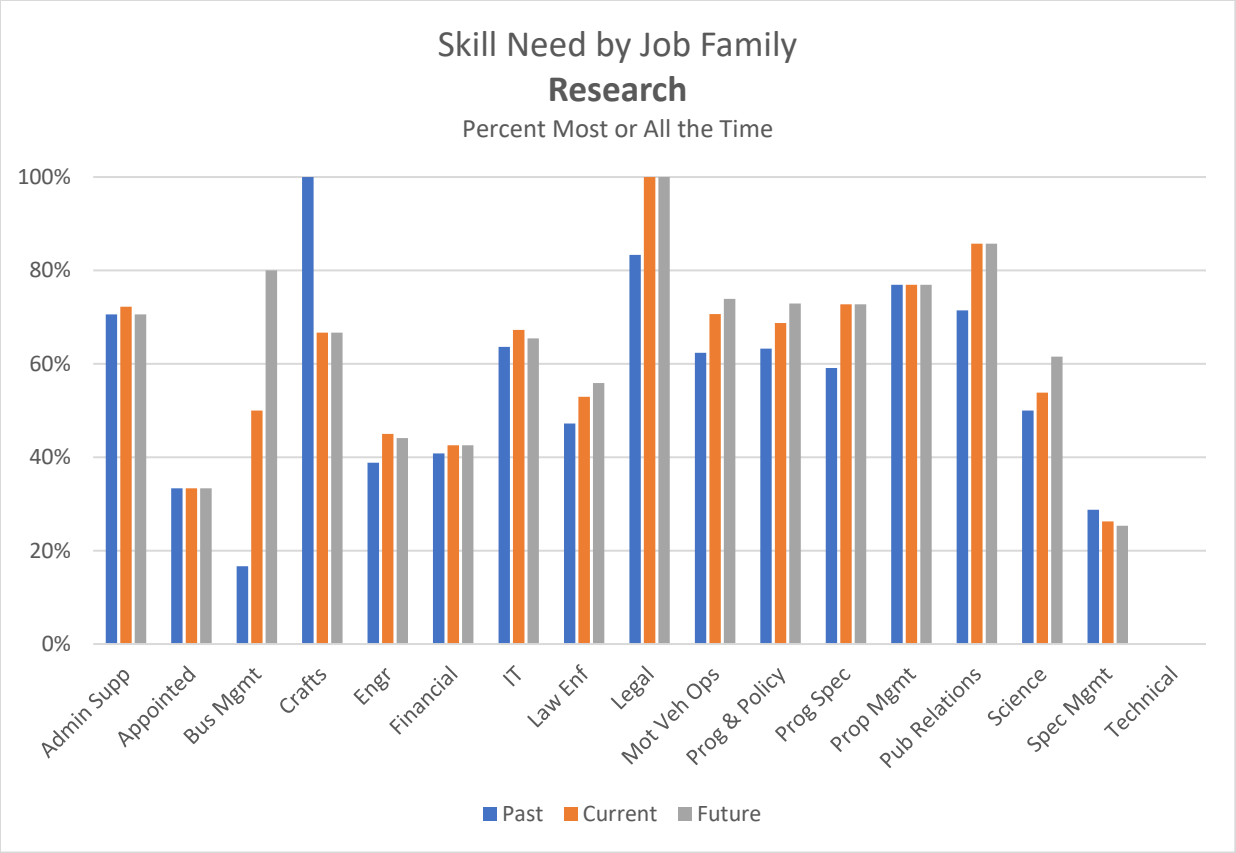
Skill Need by Job Family
Research
Percent Most or All the Time
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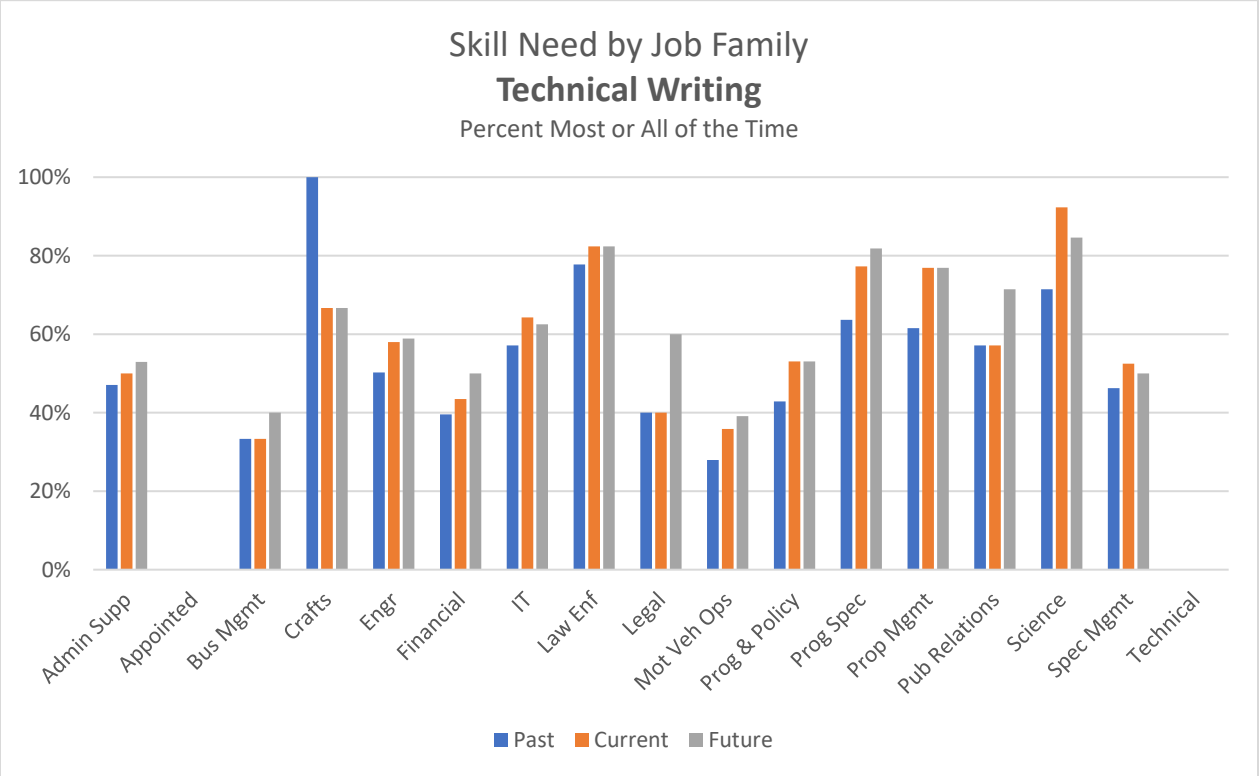
Skill Need by Job Family
Technical Writing
Percent Most or All of the Time
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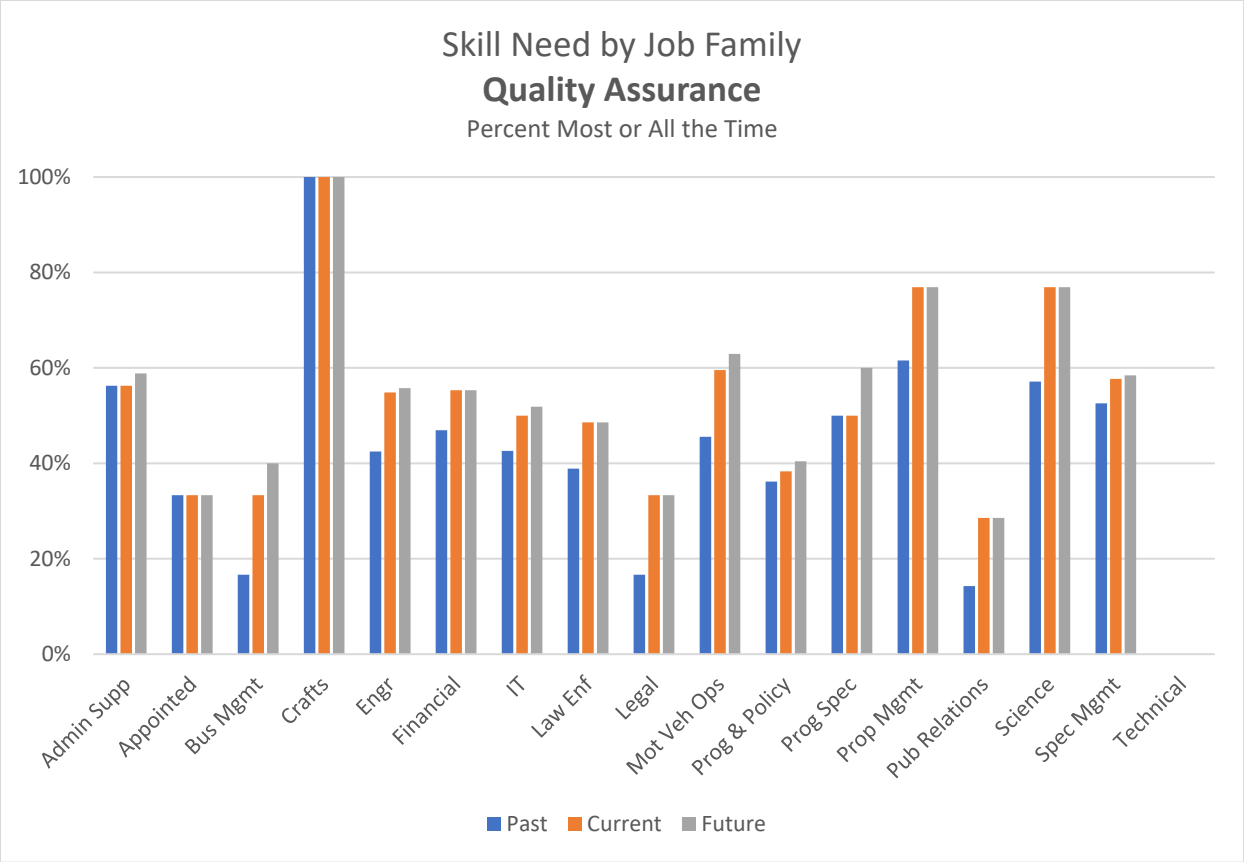
Skill Need by Job Family
Quality Assurance
Percent Most or All the Time
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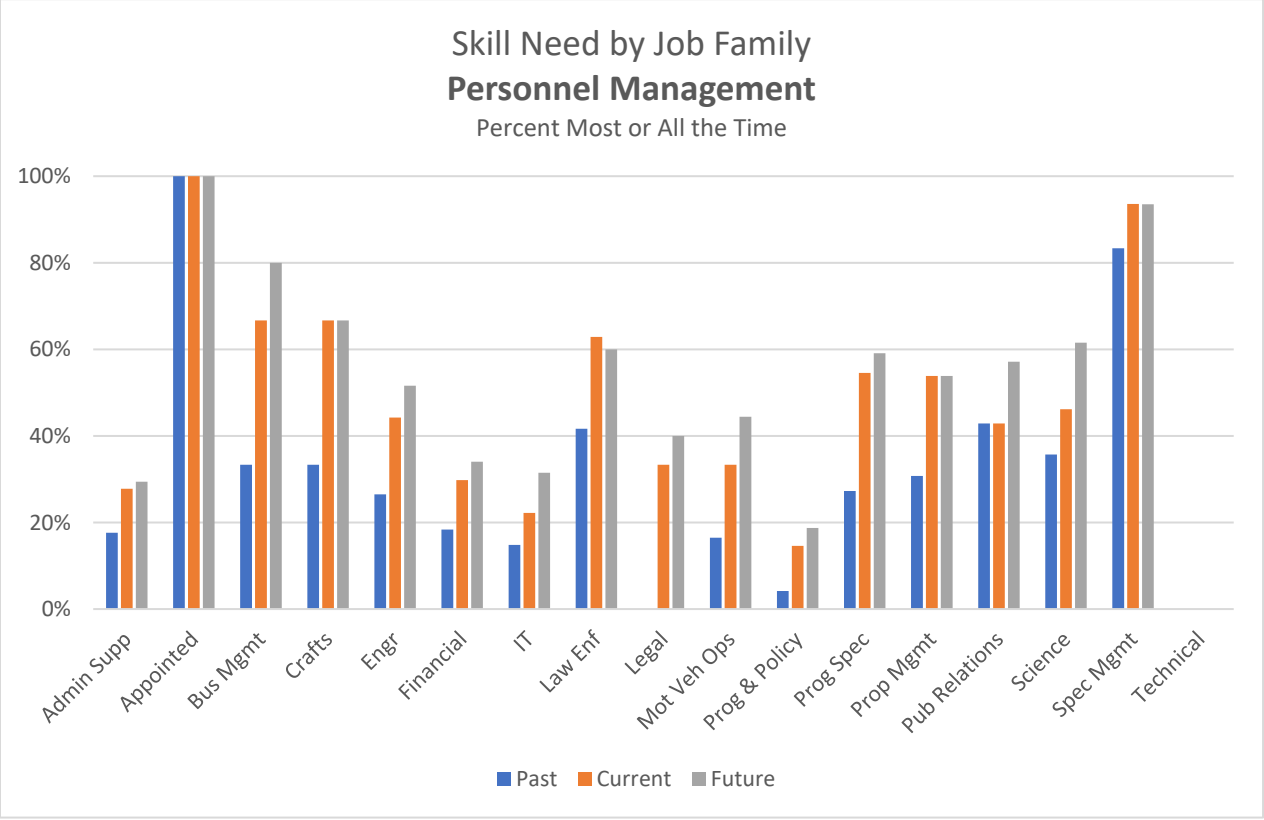
Skill Need by Job Family
Personnel Management
Percent Most or All the Time
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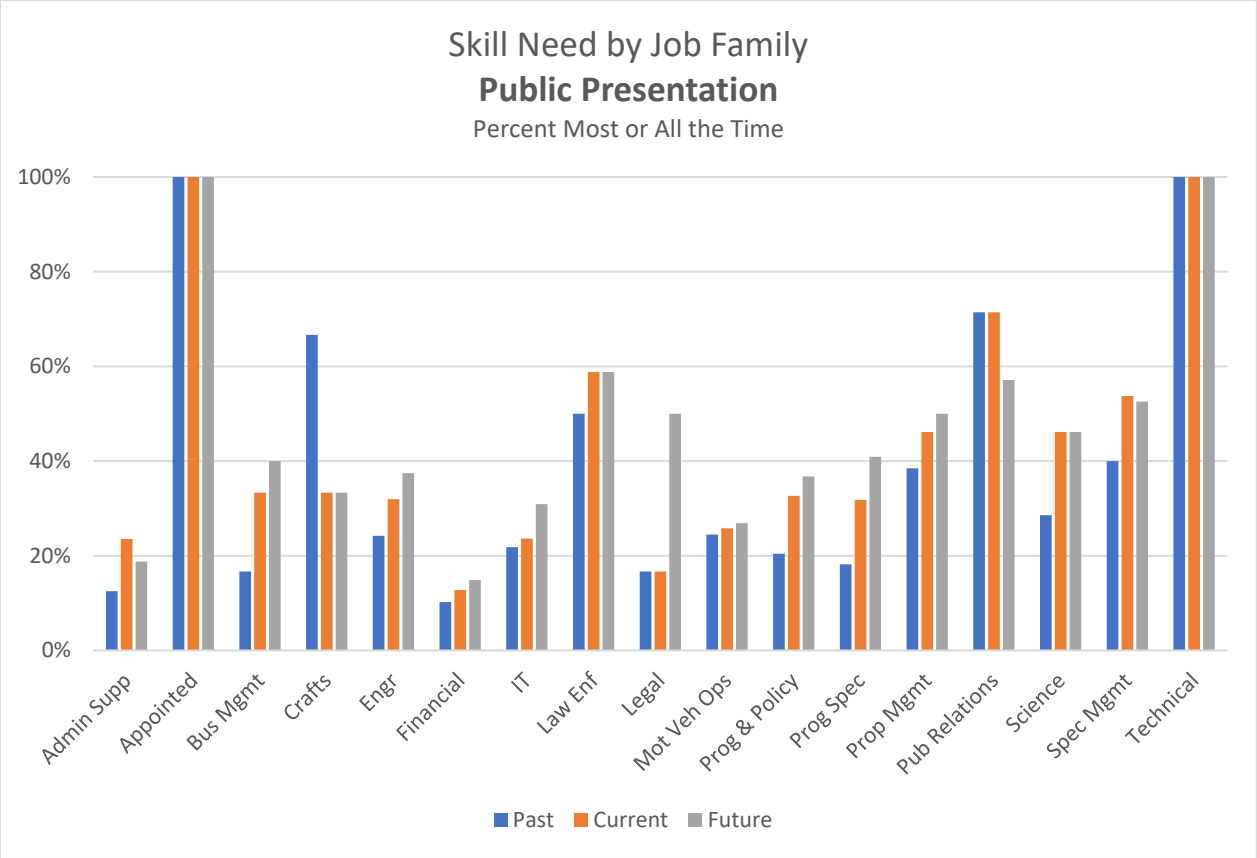
Skill Need by Job Family
Public Presentation
Percent Most or All the Time
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80%
60%
40%
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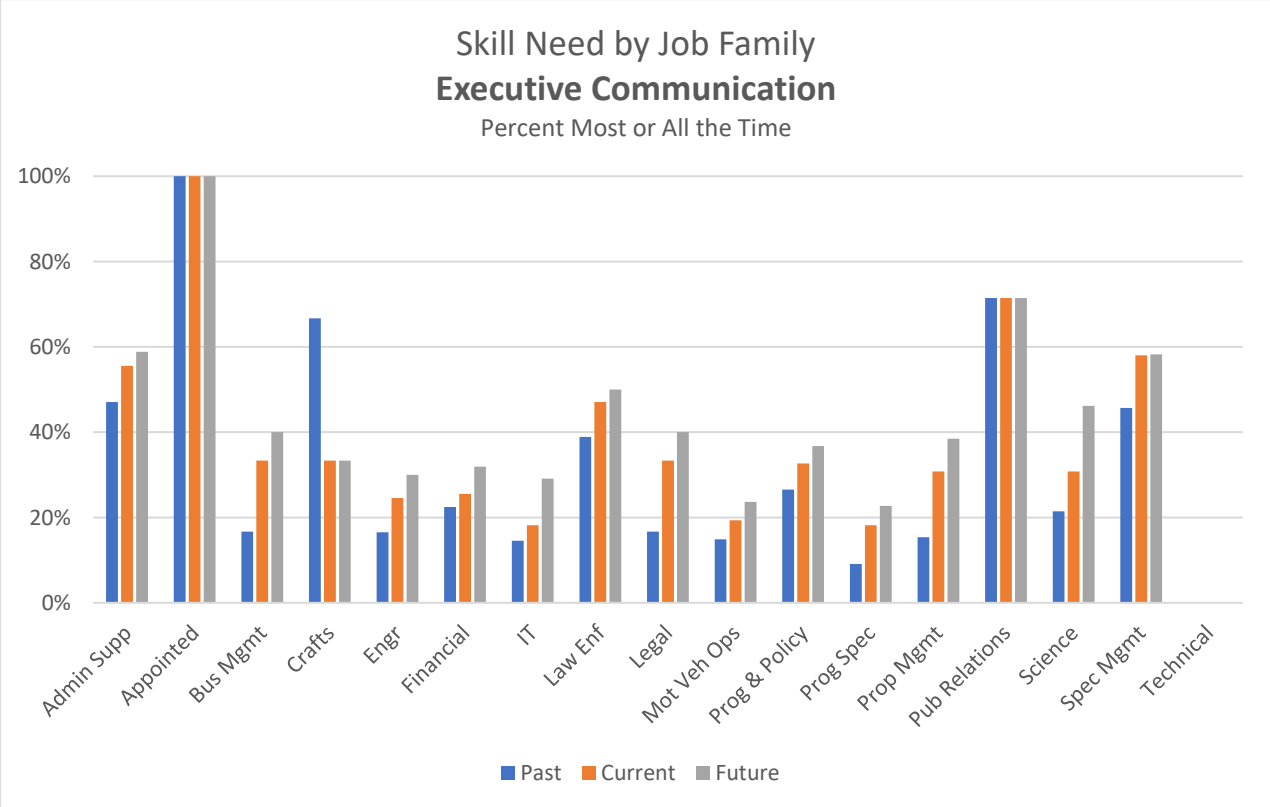
Skill Need by Job Family
Executive Communication
Percent Most or All the Time
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80%
60%
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Admin Supp
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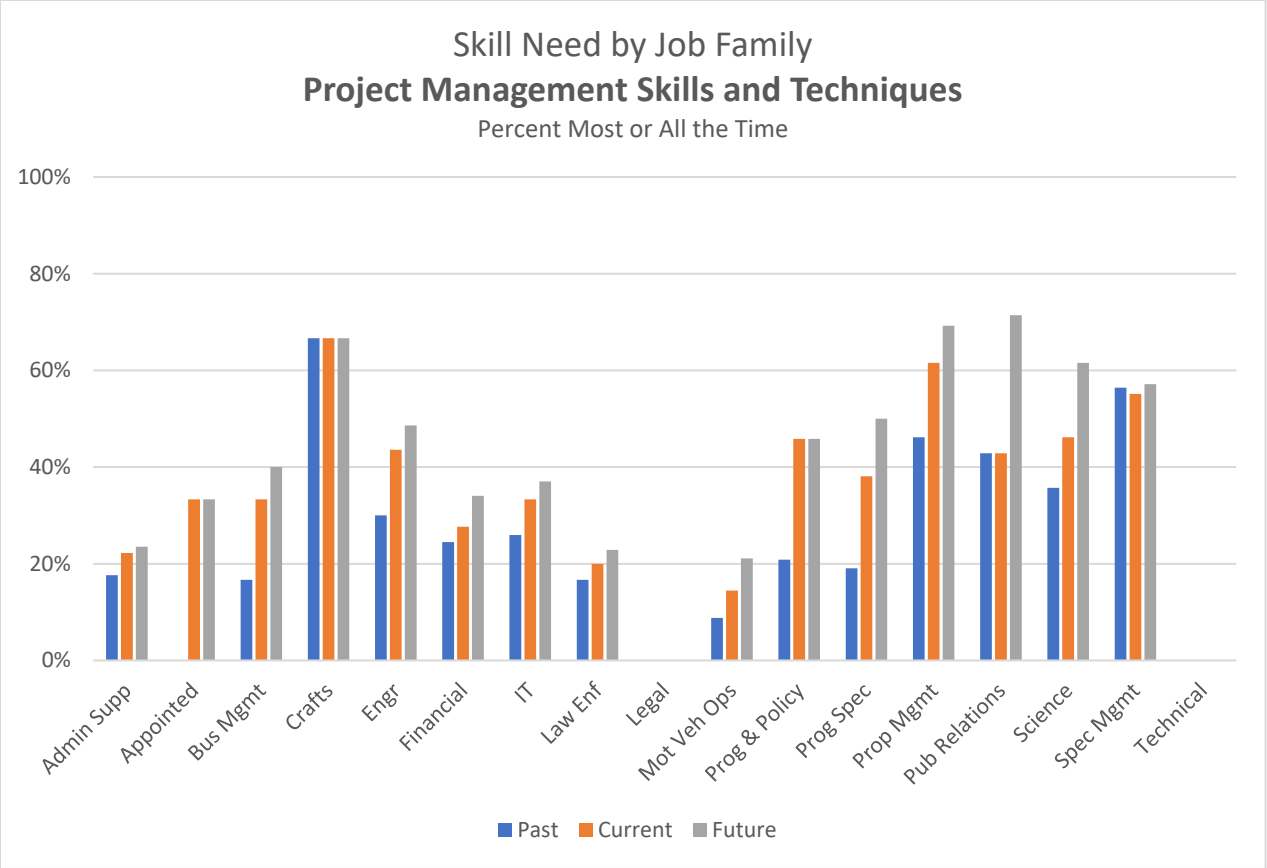
Skill Need by Job Family
Project Management Skills and Techniques
Percent Most or All the Time
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80%
60%
40%
20%
0%
Admin Supp
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Bus Mgmt
Crafts
Engr
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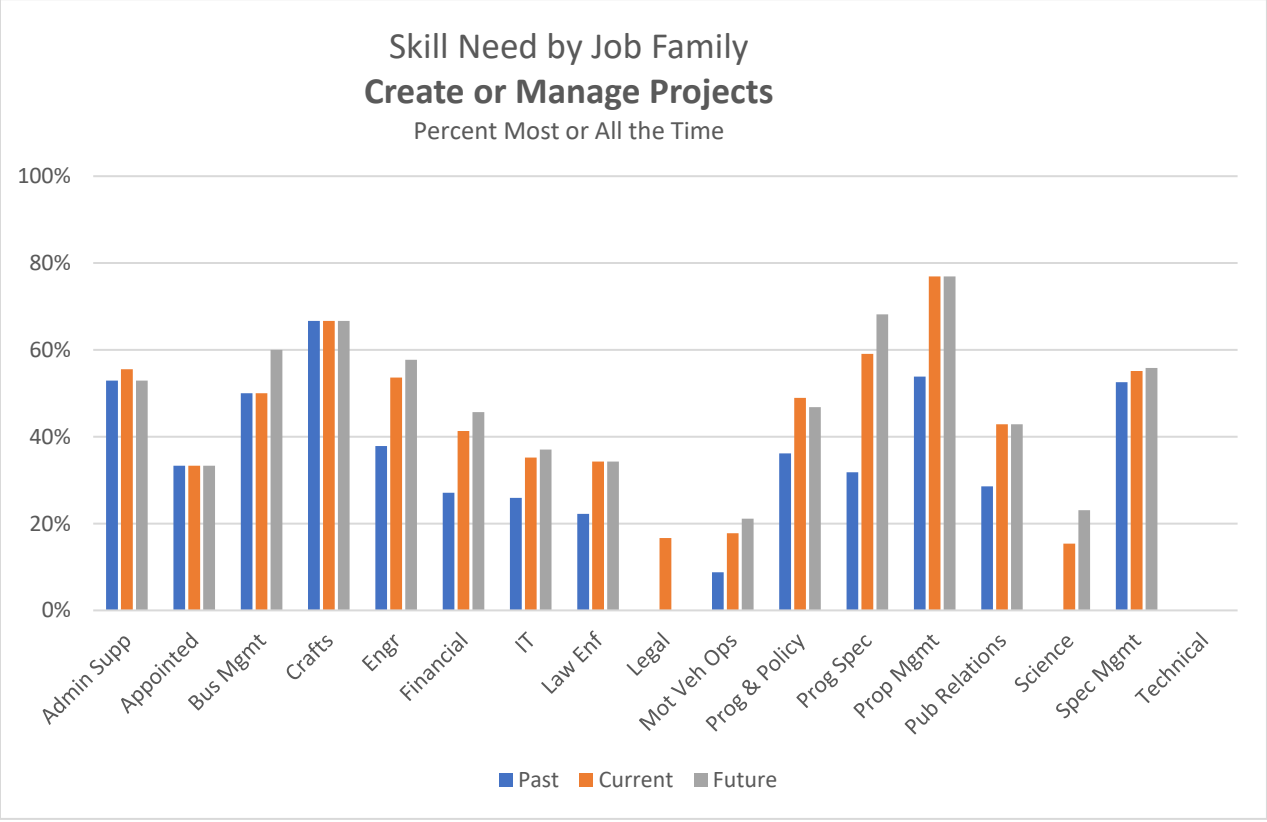
Skill Need by Job Family
Create or Manage Projects
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
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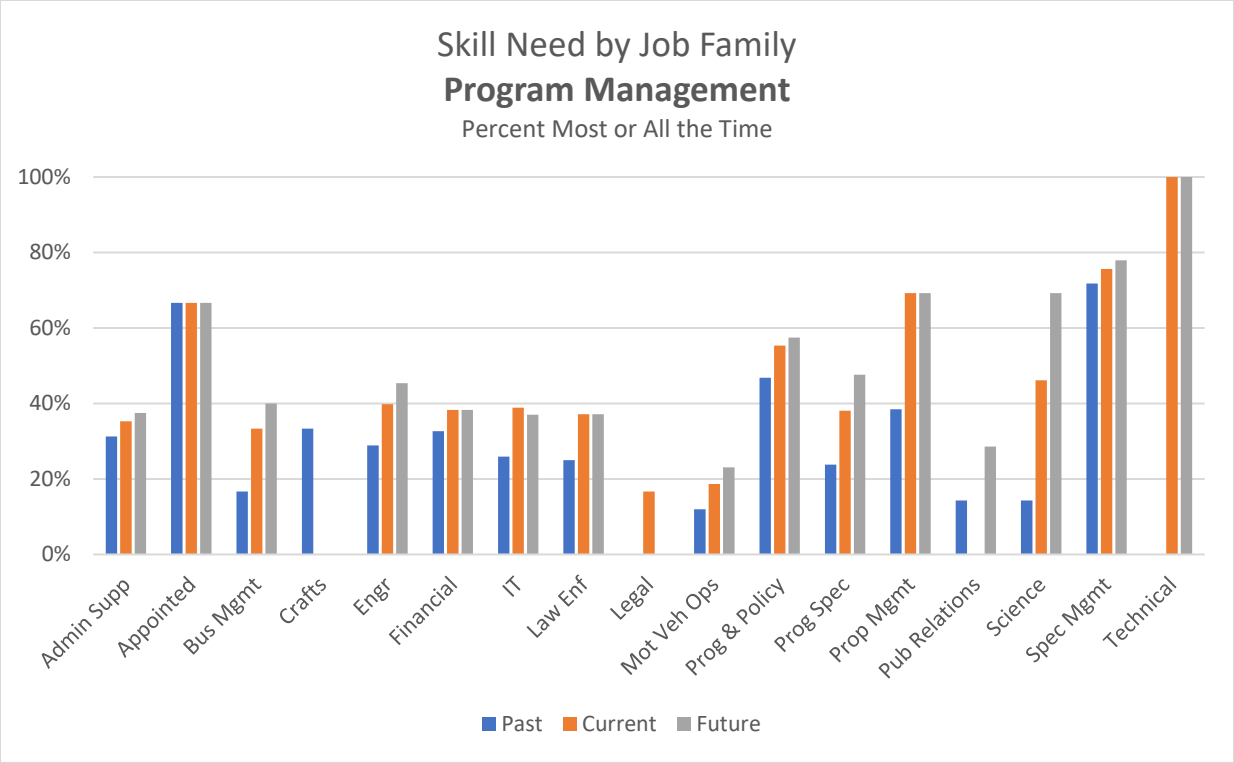
Skill Need by Job Family
Program Management
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
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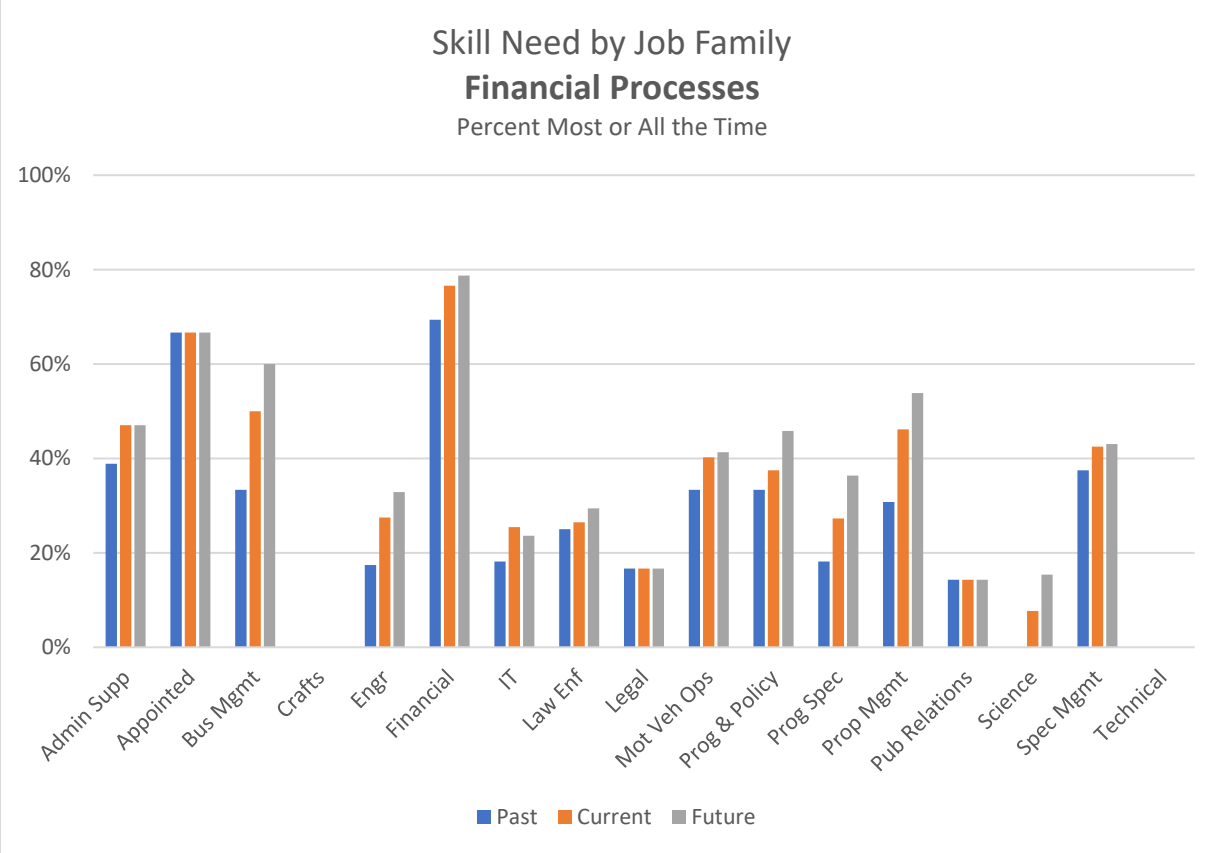
Skill Need by Job Family
Financial Processes
Percent Most or All the Time
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60%
40%
20%
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Crafts
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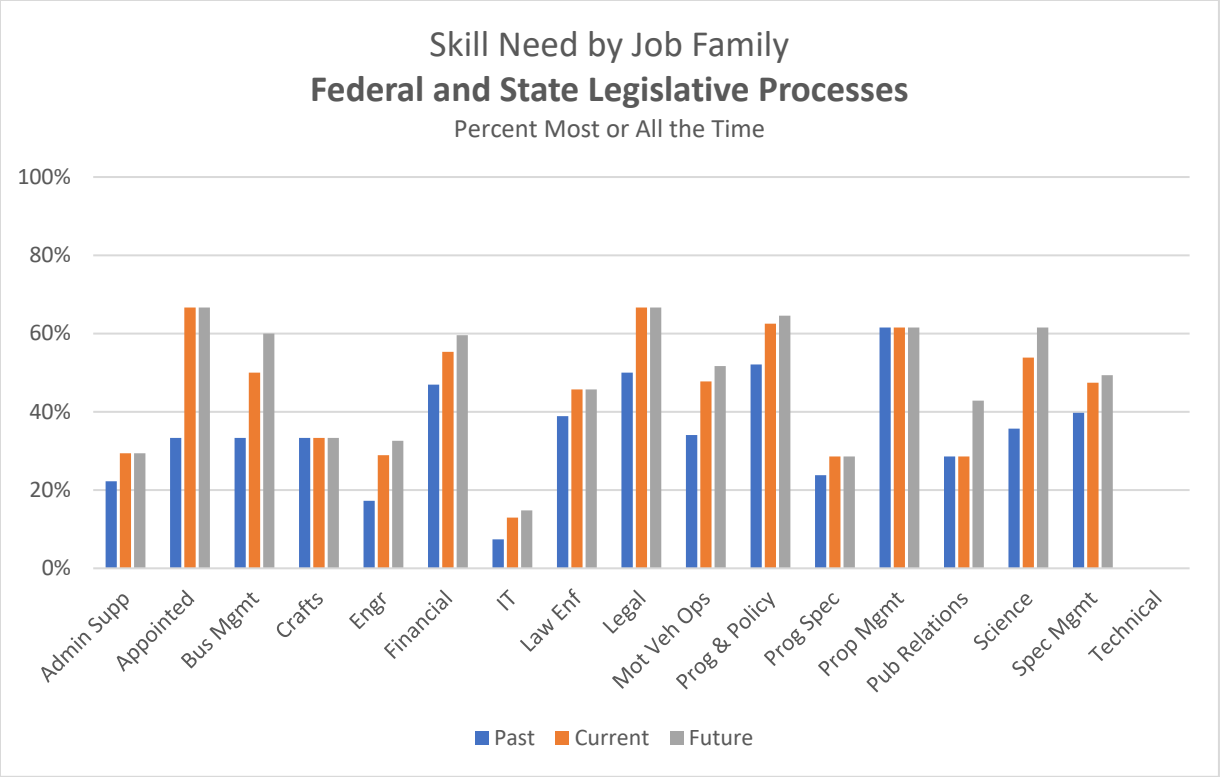
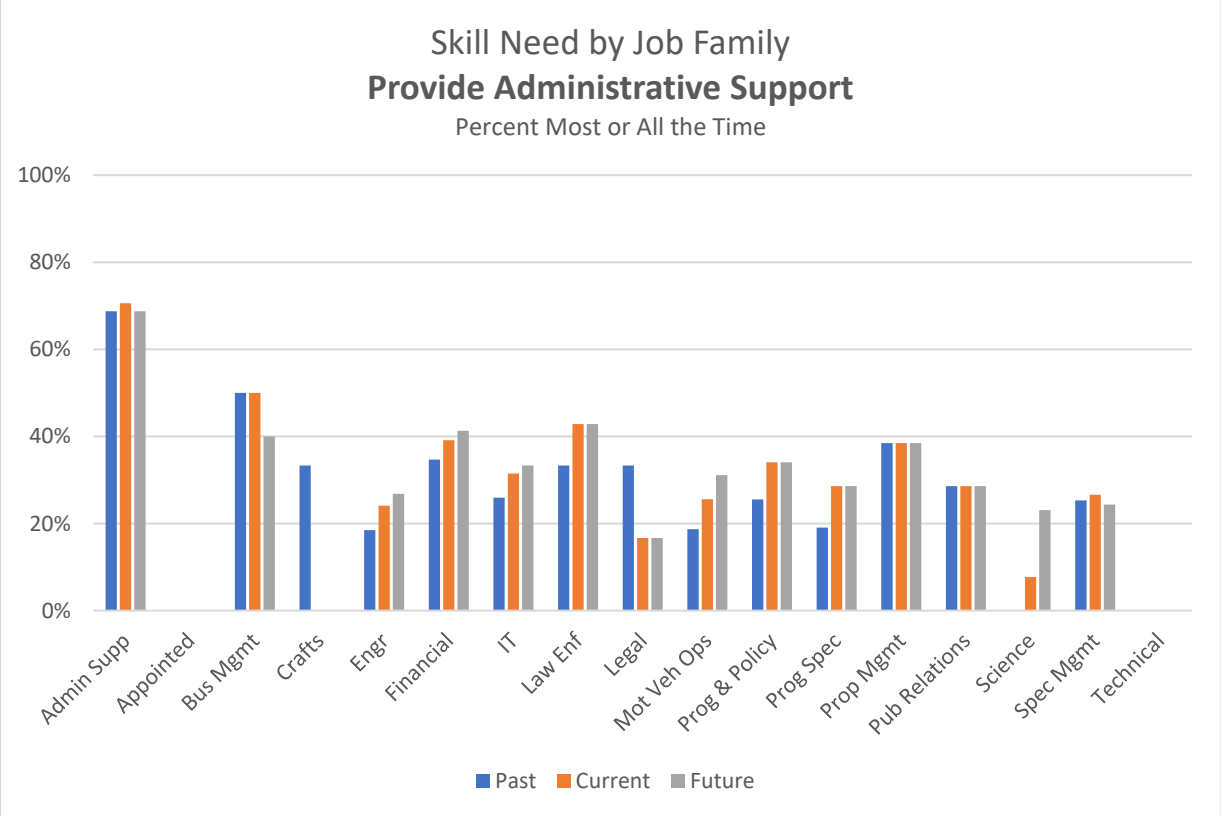
Current
Future


Skill Need by Job Family
Federal and State Legislative Processes
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Provide Administrative Support
Percent Most or All the Time
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80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
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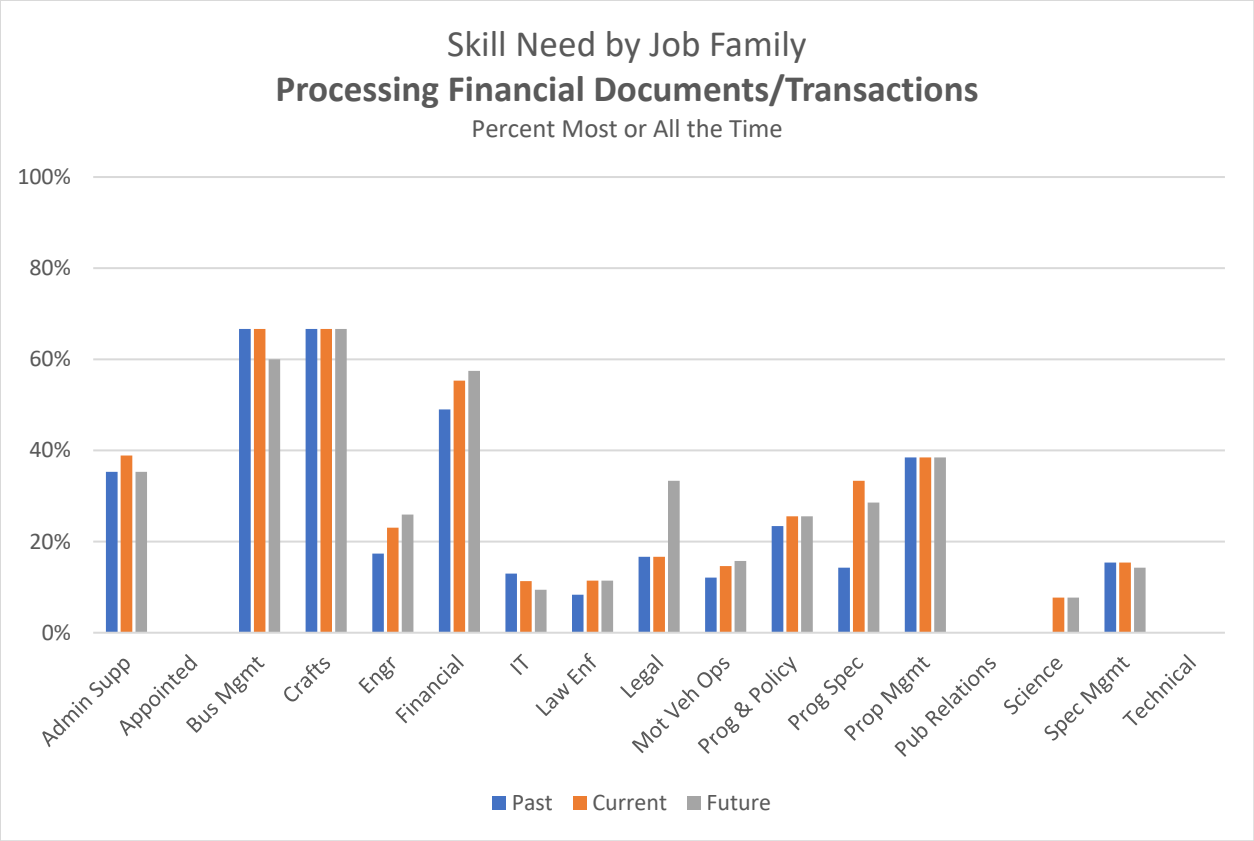
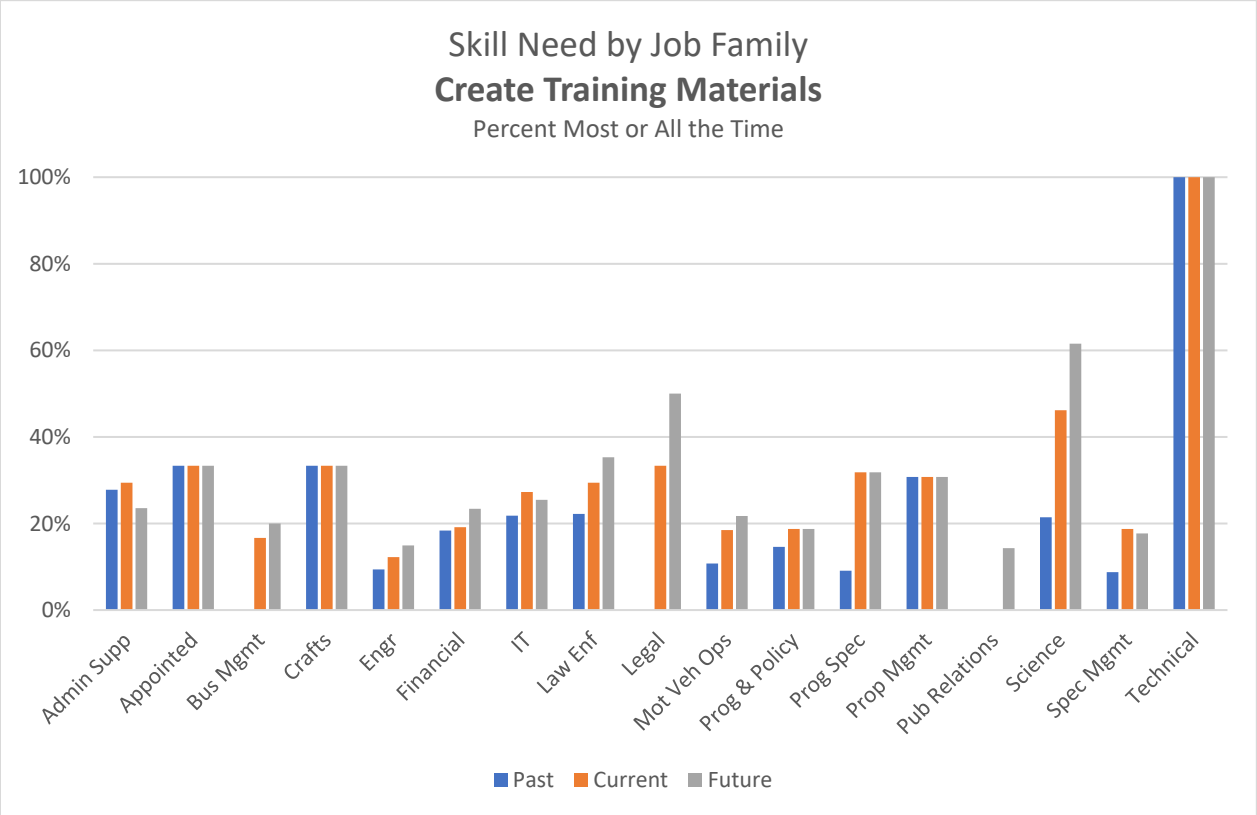
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Processing Financial Documents/Transactions
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Create Training Materials
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
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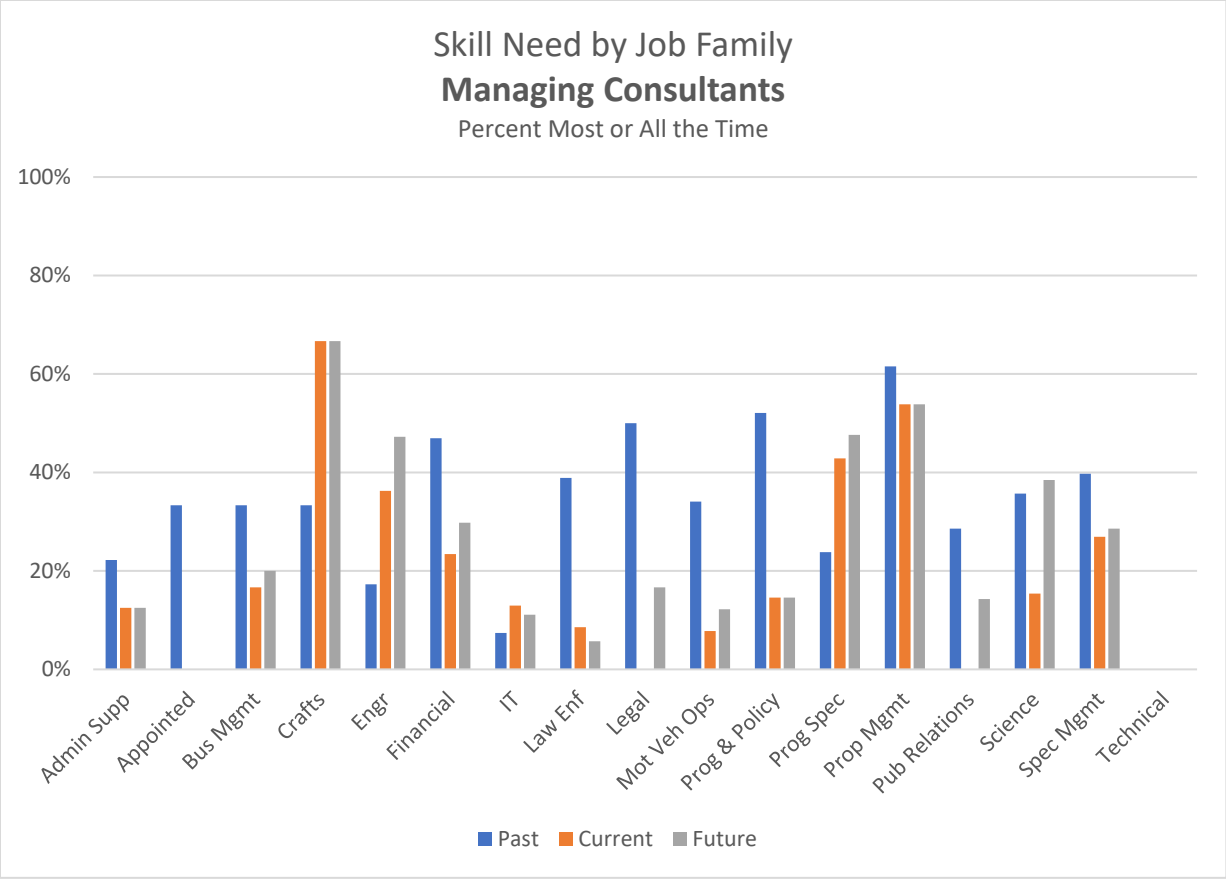
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Managing Consultants
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
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Prog & Policy
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Pub Relations
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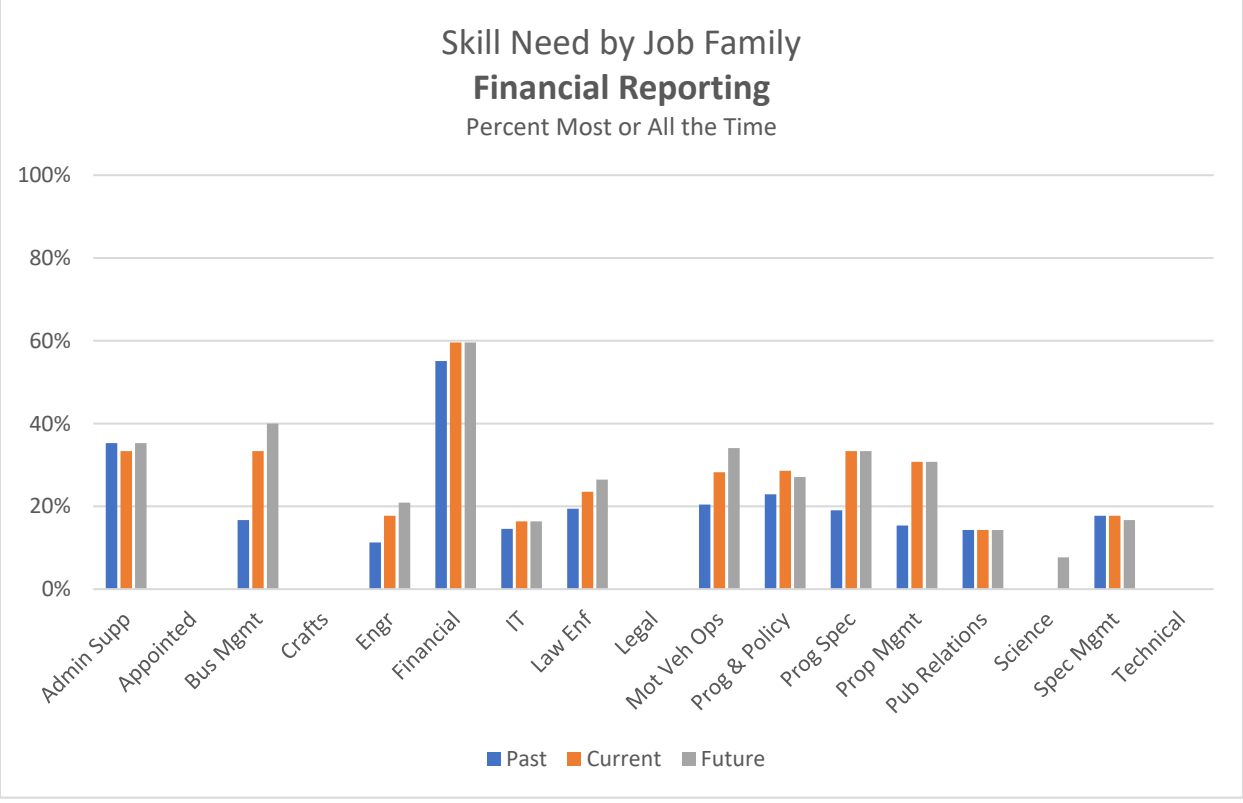
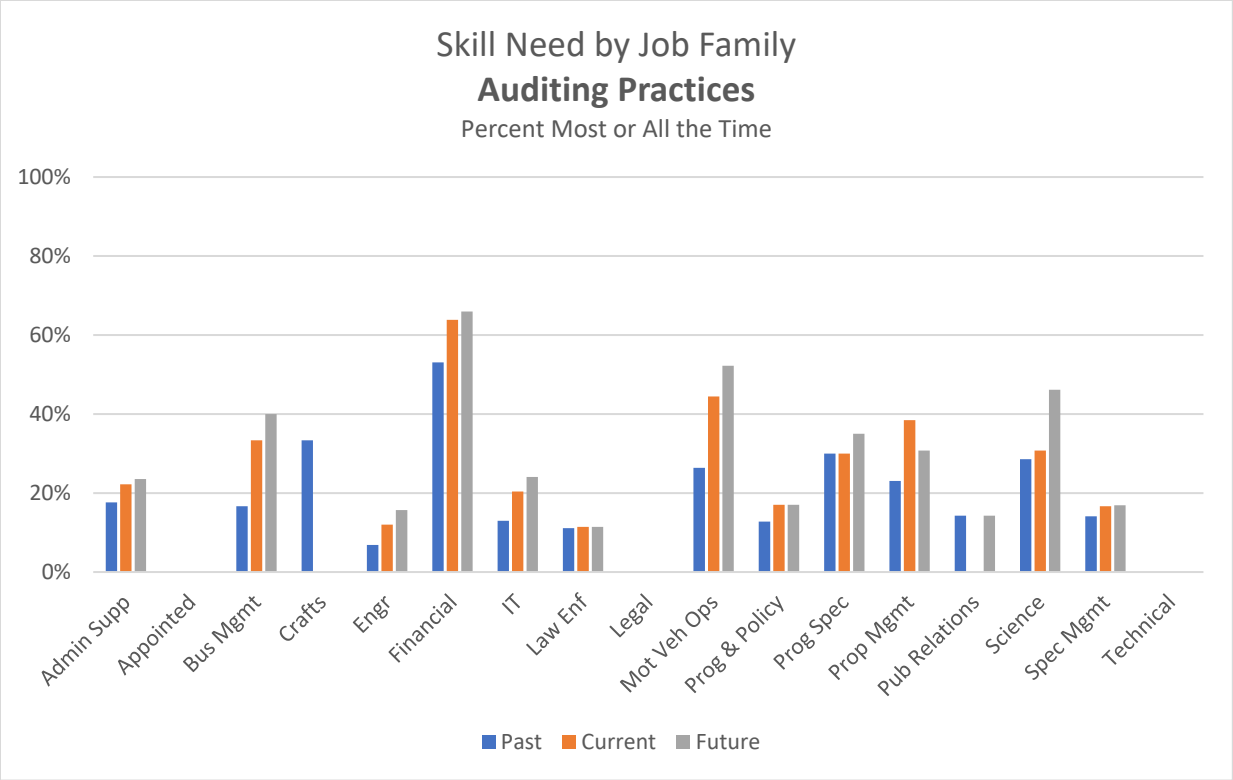
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Financial Reporting
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Auditing Practices
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
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Law Enf
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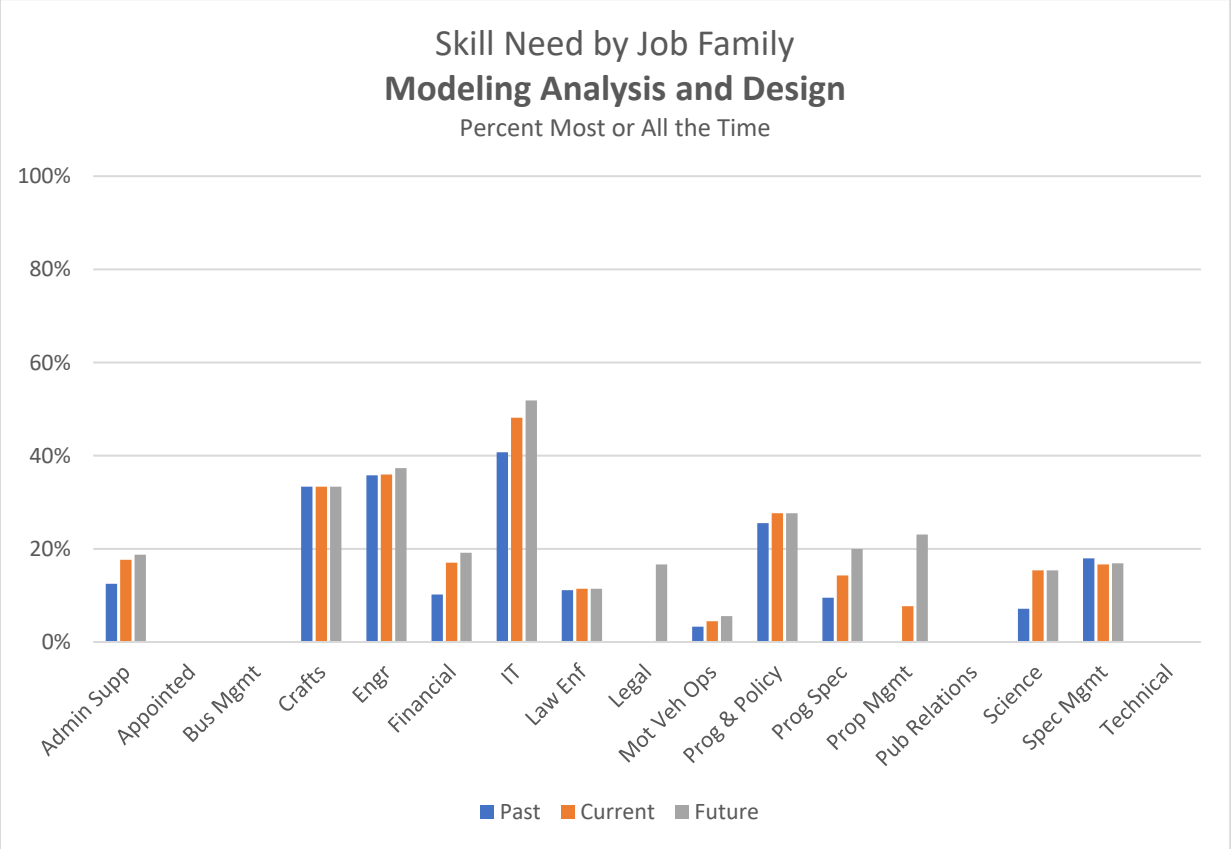
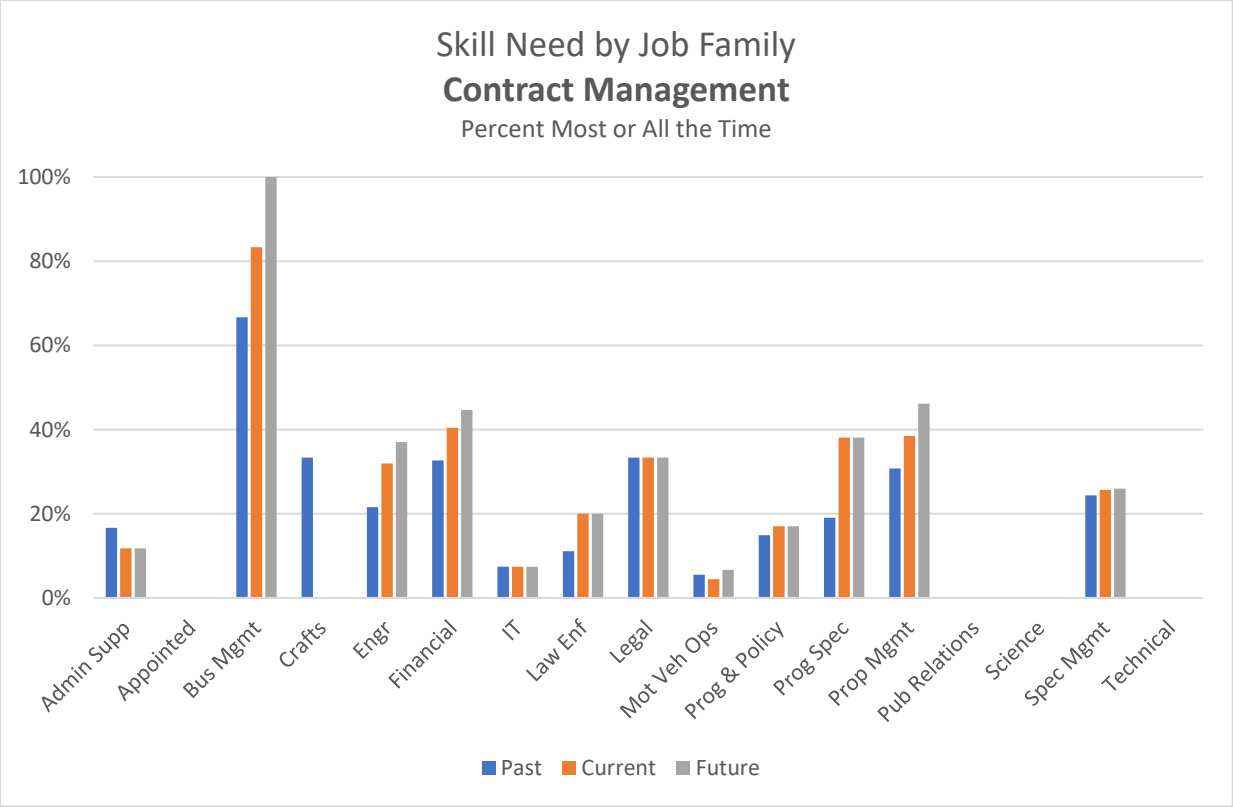
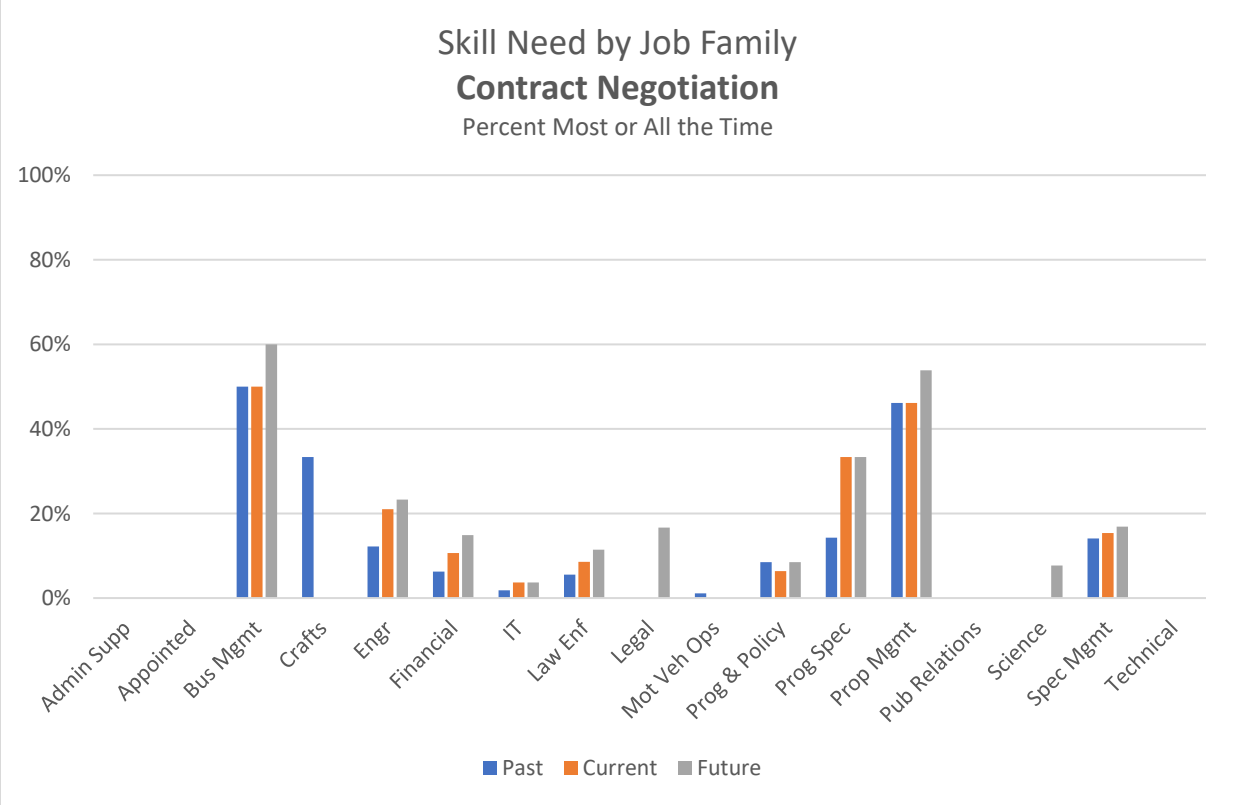
Technical
Past
Current
Future


Skill Need by Job Family
Modeling Analysis and Design
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Contract Management
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
Science
Spec Mgmt
Technical
Past
Current
Future


Skill Need by Job Family
Contract Negotiation
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
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Current
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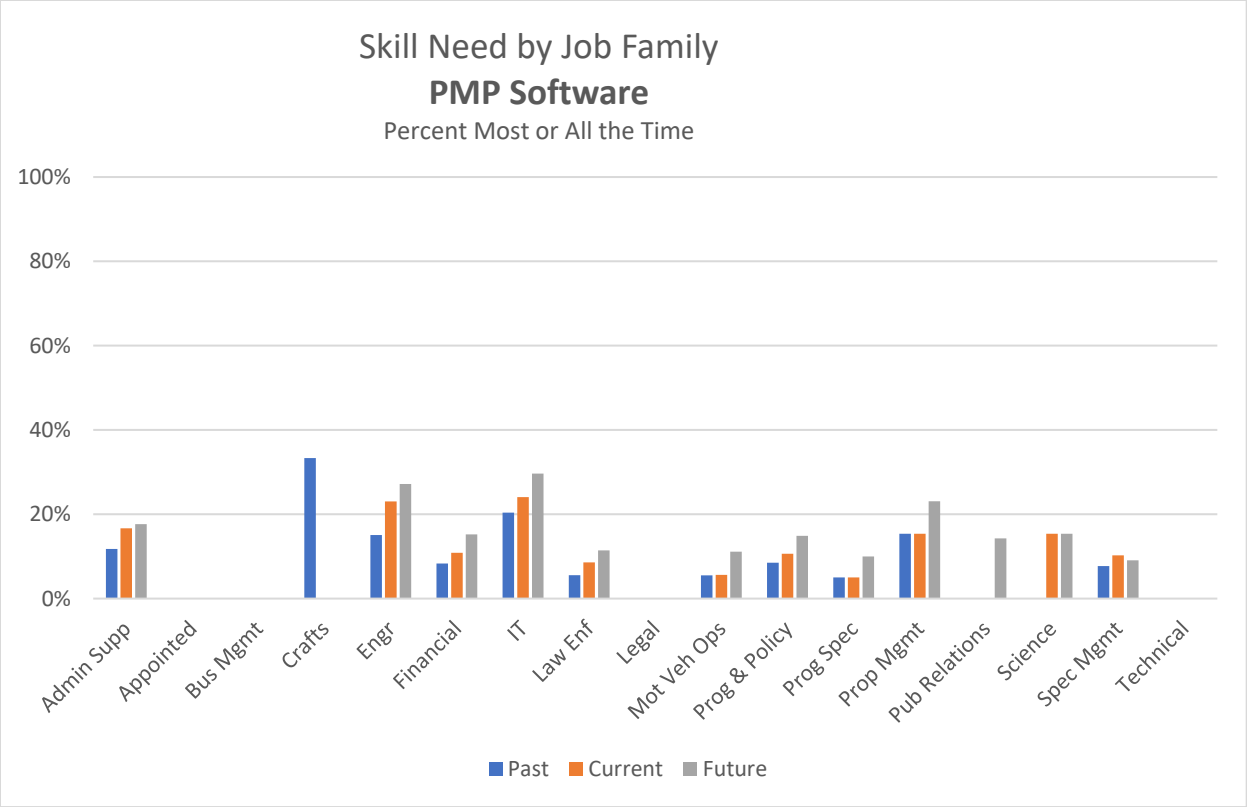
Skill Need by Job Family
PMP Software
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
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Past
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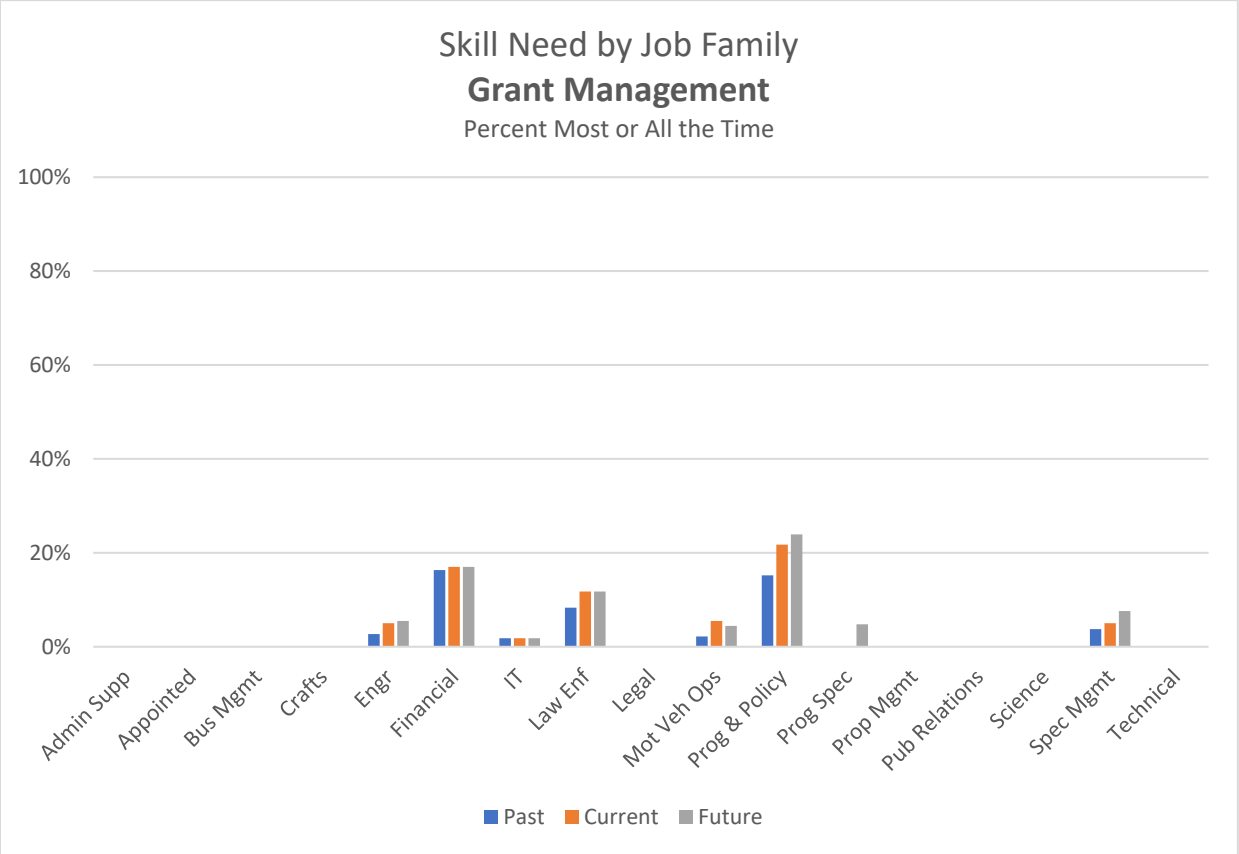
Skill Need by Job Family
Grant Management
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
Engr
Financial
IT
Law Enf
Legal
Mot Veh Ops
Prog & Policy
Prog Spec
Prop Mgmt
Pub Relations
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Spec Mgmt
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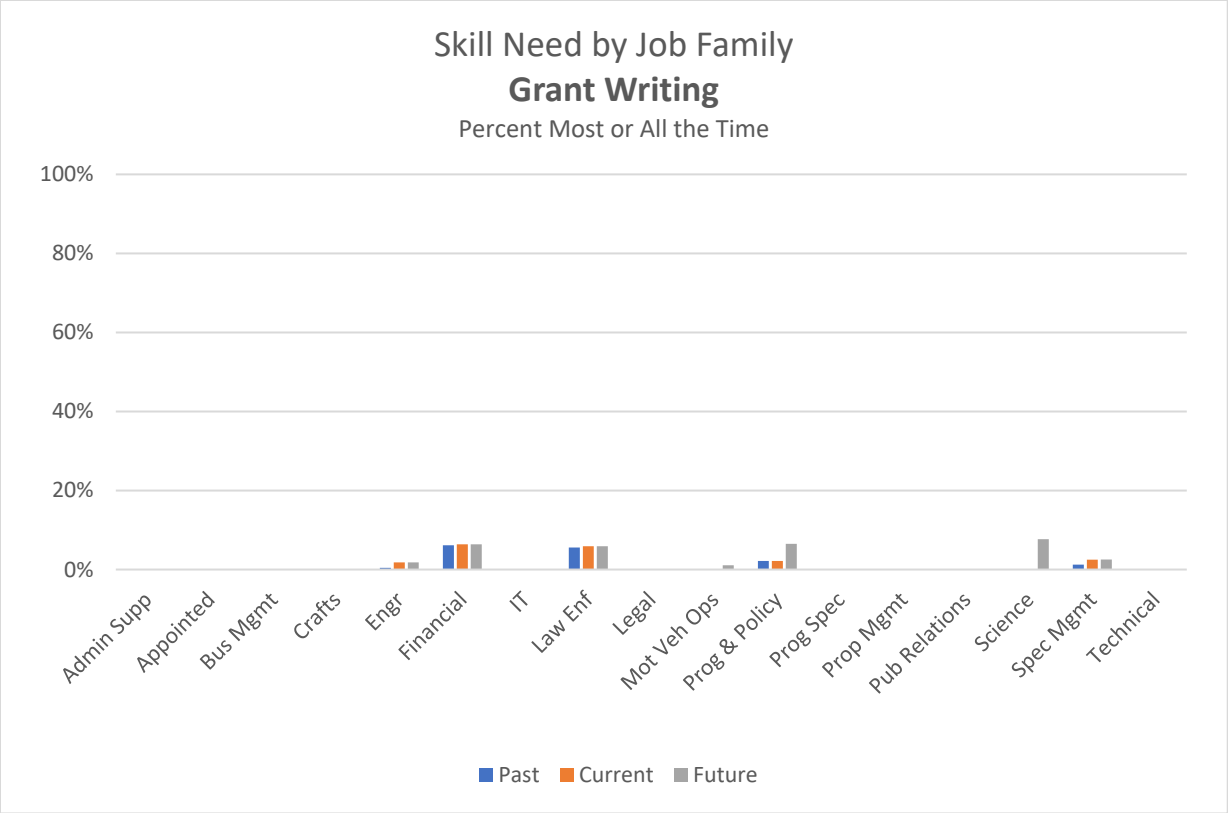
Skill Need by Job Family
Grant Writing
Percent Most or All the Time
100%
80%
60%
40%
20%
0%
Admin Supp
Appointed
Bus Mgmt
Crafts
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APPENDIX 2: Survey Results on Use of Information Resources Within Each Division

Question: On average, how often did the respondents use each of the following in their job:

Table A2-1: Use of Information Resources (DBM)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Large, shared database (e.g., shared calendar, FIIPS, PeopleSoft, Excel, etc.)	85.71%	12.50%	1.79%	0%	0%	56
WisDOT-operated web site (e.g., intranet, Knowledge Owl)	50.00%	32.14%	8.93%	1.79%	7.14%	56
My own database or contact list file	40.74%	22.22%	9.26%	5.56%	22.22%	54
Department policy/ procedures manual or guidelines	7.14%	23.21%	33.93%	26.79%	8.93%	56
Division-specific procedures manual or guidelines	7.14%	21.43%	32.14%	28.57%	10.71%	56
State and/or Federal databases or regulations	10.71%	14.29%	16.07%	30.36%	28.57%	56
Vendor-provided procedures manual or guidelines	7.14%	16.07%	21.43%	17.86%	37.50%	56
My own notes or procedures	46.43%	37.50%	16.07%	0.00%	0.00%	56
Other (please specify)	0.00%	0.00%	0.00%	0.00%	100.00%	1

Takeaway*: Overall across DBM, the most frequently used resources, on a daily basis, were large, shared databases, followed by WisDOT operated websites, respondent's own notes or procedures. Other resources were not used as frequently.*

Table A2-2: Use of Information Resources (DBSI)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Large, shared database (e.g., shared calendar, FIIPS, PeopleSoft, Excel, etc.)	52.63%	31.58%	5.26%	10.53%	0%	19
WisDOT-operated web site (e.g., intranet, Knowledge Owl)	42.11%	42.11%	15.79%	0.00%	0.00%	19
My own database or contact list file	52.63%	26.32%	15.79%	0.00%	5.26%	19
Department policy/ procedures manual or guidelines	5.26%	10.53%	42.11%	26.32%	15.79%	19
Division-specific procedures manual or guidelines	10.53%	0.00%	42.11%	31.58%	15.79%	19
State and/or Federal databases or regulations	15.79%	36.84%	15.79%	15.79%	15.79%	19
Vendor-provided procedures manual or guidelines	0.00%	0.00%	10.53%	15.79%	73.68%	19
My own notes or procedures	73.68%	10.53%	10.53%	5.26%	0.00%	19
Other (please specify)	0.00%	0.00%	0.00%	0.00%	0.00%	0

Takeaway*: Overall across DBSI, the most frequently used resources, on a daily basis, were respondent's own notes or procedures, followed by respondent's own database or contact lists, use of large, shared databases, and WisDOT operated websites. Other resources were not used as frequently.*

Table A2-3: Use of Information Resources (DMV)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Large, shared database (e.g., shared calendar, FIIPS, PeopleSoft, Excel, etc.)	81.61%	14.94%	1.15%	1.15%	1.15%	87
WisDOT-operated web site (e.g., intranet, Knowledge Owl)	91.01%	7.87%	1.12%	0.00%	0.00%	89
My own database or contact list file	38.64%	20.45%	5.68%	5.68%	29.55%	88
Department policy/ procedures manual or guidelines	41.57%	23.60%	17.98%	13.48%	3.37%	89
Division-specific procedures manual or guidelines	42.05%	15.91%	18.18%	14.77%	9.09%	88
State and/or Federal databases or regulations	27.27%	17.05%	23.86%	15.91%	15.91%	88
Vendor-provided procedures manual or guidelines	12.64%	9.20%	16.09%	18.39%	43.68%	87
My own notes or procedures	61.36%	15.91%	10.23%	3.41%	9.09%	88
Other (please specify)	50.00%	0.00%	0.00%	0.00%	50.00%	4

Takeaway*: Overall across DMV, the most frequently used resources on a daily basis were WisDOT operated websites followed by large, shared databases and respondent's own notes or procedures. Other resources were not used as frequently.*

Table A2-4: Use of Information Resources (DSP)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Large, shared database (e.g., shared calendar, FIIPS, PeopleSoft, Excel, etc.)	73.47%	18.37%	2.04%	2.04%	4.08%	49
WisDOT-operated web site (e.g., intranet, Knowledge Owl)	36.73%	18.37%	16.33%	14.29%	14.29%	49
My own database or contact list file	50.00%	27.08%	4.17%	0.00%	18.75%	48
Department policy/ procedures manual or guidelines	18.37%	26.53%	30.61%	22.45%	2.04%	49
Division-specific procedures manual or guidelines	24.49%	26.53%	24.49%	24.49%	0.00%	49
State and/or Federal databases or regulations	32.65%	26.53%	20.41%	18.37%	2.04%	49
Vendor-provided procedures manual or guidelines	14.29%	10.20%	20.41%	20.41%	34.69%	49
My own notes or procedures	61.22%	26.53%	8.16%	2.04%	2.04%	49
Other (please specify)	66.67%	0.00%	0.00%	0.00%	33.33%	3

Takeaway*: Overall across DSP, the most frequently used resources on a daily basis were large, shared databases followed by respondent's own notes or procedures, and their own database or contact list files. Other resources were not used as frequently.*

Table A2-5: Use of Information Resources (DTIM)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Large, shared database (e.g., shared calendar, FIIPS, PeopleSoft, Excel, etc.)	67.50%	22.50%	5.00%	5.00%	0.00%	40
WisDOT-operated web site (e.g., intranet, Knowledge Owl)	47.50%	27.50%	17.50%	5.00%	2.50%	40
My own database or contact list file	35.00%	37.50%	10.00%	2.50%	15.00%	40
Department policy/ procedures manual or guidelines	10.00%	20.00%	37.50%	20.00%	12.50%	40
Division-specific procedures manual or guidelines	7.50%	7.50%	30.00%	32.50%	22.50%	40
State and/or Federal databases or regulations	20.00%	17.50%	22.50%	30.00%	10.00%	40
Vendor-provided procedures manual or guidelines	2.50%	20.00%	10.00%	27.50%	40.00%	40
My own notes or procedures	60.00%	27.50%	7.50%	2.50%	2.50%	40
Other (please specify)	0.00%	0.00%	0.00%	0.00%	0.00%	0

Takeaway*: Overall across DTIM, the most frequently used resources on a daily basis were large, shared databases followed by respondent's own notes or procedures, and WisDOT operated website. Other resources were not used as frequently.*

Table A2-6: Use of Information Resources (DTSD)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Large, shared database (e.g., shared calendar, FIIPS, PeopleSoft, Excel, etc.)	72.76%	21.47%	3.53%	0.96%	1.28%	312
WisDOT-operated web site (e.g., intranet, Knowledge Owl)	55.77%	30.45%	7.37%	3.21%	3.21%	312
My own database or contact list file	40.71%	29.81%	9.94%	6.73%	12.82%	312
Department policy/ procedures manual or guidelines	27.97%	38.26%	19.94%	13.18%	0.64%	311
Division-specific procedures manual or guidelines	20.90%	40.84%	21.54%	13.18%	3.54%	311
State and/or Federal databases or regulations	12.86%	29.58%	26.37%	22.19%	9.00%	311
Vendor-provided procedures manual or guidelines	1.97%	10.16%	24.26%	30.16%	33.44%	305
My own notes or procedures	53.87%	30.32%	9.03%	4.84%	1.94%	310
Other (please specify)	46.67%	20.00%	0.00%	0.00%	33.33%	15

Takeaway*: Overall across DTSD, the most frequently used resources on a daily basis were large, shared databases followed by WisDOT operated website, and respondent's own notes or procedures. Other resources were not used as frequently.*

Table A2-7: Use of Information Resources (Executive Offices)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Large, shared database (e.g., shared calendar, FIIPS, PeopleSoft, Excel, etc.)	62.50%	12.50%	0.00%	12.50%	12.50%	8
WisDOT-operated web site (e.g., intranet, Knowledge Owl)	25.00%	50.00%	12.50%	0.00%	12.50%	8
My own database or contact list file	62.50%	25.00%	0.00%	0.00%	12.50%	8
Department policy/ procedures manual or guidelines	0.00%	25.00%	37.50%	25.00%	12.50%	8
Division-specific procedures manual or guidelines	12.50%	37.50%	25.00%	12.50%	12.50%	8
State and/or Federal databases or regulations	37.50%	12.50%	12.50%	12.50%	25.00%	8
Vendor-provided procedures manual or guidelines	0.00%	0.00%	12.50%	25.00%	62.50%	8
My own notes or procedures	75.00%	12.50%	12.50%	0.00%	0.00%	8
Other (please specify)	100.00%	0.00%	0.00%	0.00%	0.00%	2

Takeaway*: Overall across EO, the most frequently used resources on a daily basis were respondent's own notes or procedures followed by, large, shared databases and their own database or contact list files. Other resources were not used as frequently.*

APPENDIX 3: Survey Results on Colleagues as Resources Within Each Division

Question: On average, how often were each of the following staff sought for help with understanding or clarifying how to perform one's job, solving a problem, getting an answer to a question from a customer, or learning how to accomplish a new task?

Table A3-1: Colleague Resources (DBM)

Colleagues as Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Your immediate supervisor	7.14%	53.57%%	30.36%	5.36%	3.57%	56
Your office director or division administrator	0.00%	7.14%	12.50%	21.43%	58.93%	56
Technical or functional subject matter expert within WisDOT in an area such as policy, practice, research, accounting, legal, contracts, administration, technology, or HR	8.93%	28.57%	33.93%	25.00%	3.57%	56
Technical or functional subject matter expert outside of WisDOT in an area such as policy, practice research,, accounting, legal, contracts, administration, or technology	3.57%	8.93%	25.00%	26.79%	35.71%	56
A peer or colleague within your work unit or division	28.57%	51.79%	16.07%	1.79%	1.79%	56
A peer or colleague outside your work unit or division but within WisDOT	7.14%	16.07%	33.93%	21.43%	21.43%	56
A peer or colleague outside of WisDOT	1.75%	5.26%	17.54%	28.07%	47.37%	57
Other (please specify)	0.00%	50.00%	50.00%	0.00%	0.00%	2

Takeaway*: Overall across DBM, peers and colleagues within the work unit or division are most frequently sought for help on a daily basis in the course of performing one's job. Supervisors are most frequently sought for help on a weekly and monthly basis, followed by technical or functional subject matter experts both within and outside of WisDOT.*

Table A3-2: Colleague Resources (DBSI)

Colleagues as Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Your immediate supervisor	21.05%	36.84%	36.84%	5.26%	0.00%	19
Your office director or division administrator	5.26%	26.32%	36.84%	10.53%	21.05%	19
Technical or functional subject matter expert within WisDOT in an area such as policy, practice, research, accounting, legal, contracts, administration, technology, or HR	10.53%	36.84%	26.32%	21.05%	5.26%	19
Technical or functional subject matter expert outside of WisDOT in an area such as policy, practice research,, accounting, legal, contracts, administration, or technology	0.00%	16.67%	22.22%	22.22%	38.89%	18
A peer or colleague within your work unit or division	36.84%	47.37%	10.53%	0.00%	5.26%	19
A peer or colleague outside your work unit or division but within WisDOT	11.11%	27.78%	33.33%	16.67%	11.11%	18
A peer or colleague outside of WisDOT	11.11%	0.00%	22.22%	27.78%	38.89%	18
Other (please specify)	0.00%	0.00%	0.00%	0.00%	0.00%	0

Takeaway*: Overall across DBSI, peers and colleagues within the work unit or division are most frequently sought for help on a daily and weekly basis while performing one's job. Supervisors are most frequently sought for help on a weekly and monthly basis, followed by technical or functional subject matter experts both within and outside of WisDOT.*

Table A3-3: Colleague Resources (DMV)

Colleagues as Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Your immediate supervisor	15.12%	41.86%	29.07%	5.81%	8.14%	86
Your office director or division administrator	2.44%	9.76%	9.76%	23.17%	54.88%	82
Technical or functional subject matter expert within WisDOT in an area such as policy, practice, research, accounting, legal, contracts, administration, technology, or HR	9.30%	27.91%	23.26%	19.77%	19.77%	86
Technical or functional subject matter expert outside of WisDOT in an area such as policy, practice research,, accounting, legal, contracts, administration, or technology	1.15%	6.90%	9.20%	18.39%	64.37%	87
A peer or colleague within your work unit or division	50.00%	39.53%	8.14%	1.16%	1.16%	86
A peer or colleague outside your work unit or division but within WisDOT	2.30%	17.24%	20.69%	17.24%	42.53%	87
A peer or colleague outside of WisDOT	0.00%	2.30%	4.60%	8.05%	85.06%	87
Other (please specify)	0.00%	0.00%	0.00%	0.00%	100.00%	2

Takeaway*: Overall across DMV, peers and colleagues within the work unit or division are most frequently sought for help on a daily and weekly basis while performing one's job. Supervisors are most frequently sought for help on a weekly and monthly basis, followed by technical or functional subject matter expert within WisDOT.*

Table A3-4: Colleague Resources (DSP)

Colleagues as Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Your immediate supervisor	4.26%	40.43%	27.66%	14.89%	12.77%	47
Your office director or division administrator	2.13%	14.89%	12.77%	21.28%	48.94%	47
Technical or functional subject matter expert within WisDOT in an area such as policy, practice, research, accounting, legal, contracts, administration, technology, or HR	2.17%	10.87%	34.78%	32.61%	19.57%	46
Technical or functional subject matter expert outside of WisDOT in an area such as policy, practice research,, accounting, legal, contracts, administration, or technology	0.00%	6.52%	28.26%	19.57%	45.65%	46
A peer or colleague within your work unit or division	23.91%	54.35%	19.57%	0.00%	2.17%	46
A peer or colleague outside your work unit or division but within WisDOT	6.52%	17.39%	34.78%	19.57%	21.74%	46
A peer or colleague outside of WisDOT	8.70%	15.22%	13.04%	28.26%	34.78%	46
Other (please specify)	33.33%	0.00%	0.00%	33.33%	33.33%	3

Takeaway*: Overall across DSP, peers and colleagues within the work unit or division are most frequently sought for help on a daily and weekly basis while performing one's job. Supervisors are most frequently sought for help on a weekly and monthly basis, followed by technical or functional subject matter expert within WisDOT.*

Table A3-5: Colleague Resources (DTIM)

Colleagues as Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Your immediate supervisor	10.00%	47.50%	35.00%	5.00%	2.50%	40
Your office director or division administrator	2.50%	12.50%	15.00%	22.50%	47.50%	40
Technical or functional subject matter expert within WisDOT in an area such as policy, practice, research, accounting, legal, contracts, administration, technology, or HR	15.38%	30.77%	30.77%	15.38%	7.69%	39
Technical or functional subject matter expert outside of WisDOT in an area such as policy, practice research,, accounting, legal, contracts, administration, or technology	2.50%	17.50%	22.50%	12.50%	45.00%	40
A peer or colleague within your work unit or division	32.50%	45.00%	17.50%	5.00%	0.00%	40
A peer or colleague outside your work unit or division but within WisDOT	5.00%	25.00%	37.50%	12.50%	20.00%	40
A peer or colleague outside of WisDOT	2.50%	10.00%	22.50%	30.00%	35.00%	40
Other (please specify)	0.00%	0.00%	100.00%	0.00%	0.00%	2

Takeaway*: Overall across DTIM, peers and colleagues within the work unit or division are most frequently sought for help on a daily and weekly basis while performing one's job. Supervisors are most frequently sought for help on a weekly and monthly basis, followed by technical or functional subject matter expert within WisDOT.*

Table A3-6: Colleague Resources (DTSD)

Colleagues as Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Your immediate supervisor	5.54%	44.95%	29.97%	12.38%	7.17%	307
Your office director or division administrator	0.65%	5.83%	13.59%	22.98%	56.96%	309
Technical or functional subject matter expert within WisDOT in an area such as policy, practice, research, accounting, legal, contracts, administration, technology, or HR	7.07%	34.73%	32.80%	19.94%	5.47%	311
Technical or functional subject matter expert outside of WisDOT in an area such as policy, practice research,, accounting, legal, contracts, administration, or technology	1.93%	9.00%	18.01%	26.37%	44.69%	311
A peer or colleague within your work unit or division	37.10%	46.45%	11.29%	2.90%	2.26%	310
A peer or colleague outside your work unit or division but within WisDOT	7.10%	32.26%	33.87%	16.45%	10.32%	310
A peer or colleague outside of WisDOT	3.54%	9.32%	19.61%	31.51%	36.01%	311
Other (please specify)	23.08%	30.77%	7.69%	0.00%	38.46%	13

Takeaway*: Overall across DTSD, peers and colleagues within the work unit or division are most frequently sought for help on a daily and weekly basis in the course of performing one's job. Supervisors are most frequently sought for help on a weekly and monthly basis, followed by technical or functional subject matter expert within WisDOT and a peer or a colleague outside one's work unit or division but within WisDOT.*

Table A3-7: Colleague Resources (Executive Offices)

Colleagues as Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Your immediate supervisor	42.86%	28.57%	14.29%	14.29%	0.00%	7
Your office director or division administrator	0.00%	42.86%	28.57%	0.00%	28.57%	7
Technical or functional subject matter expert within WisDOT in an area such as policy, practice, research, accounting, legal, contracts, administration, technology, or HR	0.00%	50.00%	37.50%	12.50%	0.00%	8
Technical or functional subject matter expert outside of WisDOT in an area such as policy, practice research,, accounting, legal, contracts, administration, or technology	0.00%	0.00%	62.50%	0.00%	37.50%	8
A peer or colleague within your work unit or division	37.50%	37.50%	12.50%	0.00%	12.50%	8
A peer or colleague outside your work unit or division but within WisDOT	0.00%	37.50%	37.50%	25.00%	0.00%	8
A peer or colleague outside of WisDOT	0.00%	25.00%	37.50%	12.50%	25.00%	8
Other (please specify)	50.00%	0.00%	50.00%	0.00%	0.00%	2

Takeaway*: Overall across EO, supervisors are most frequently sought for help on a daily and weekly basis in the course of performing one's job. Peers and colleagues within the work unit or division are most frequently sought for help on a weekly and monthly basis, followed by office director or division administrator, and technical or functional subject matter expert within WisDOT.*

APPENDIX 4: Survey Results on Information Sharing Practices Within Each Division

Question: Respondents specified the frequency with which they usually used each of the following in doing their job.

Table A4-1: Frequency of Resource Use (DBM)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Data or information from a known source (e.g., database, files) used to answer a specific question	54.90%	33.33%	9.80%	0.00%	1.96%	51
Data or information that you have to gather from multiple sources and analyze and/or synthesize to answer a specific question	19.61%	45.10%	25.49%	7.84%	1.96%	51
Step-by-step instructions you provide that is not a document, to a customer, vendor, or staff person	13.73%	31.37%	33.33%	11.76%	9.80%	51
Direction you provide to a customer, vendor, or staff person such as advice, counsel or guidance, not step-by-step	24.00%	36.00%	26.00%	10.00%	4.00%	50
Judgments or recommendations you are asked to make based on data or information that is given to you	31.37%	41.18%	13.73%	7.84%	5.88%	51
Judgments or recommendations you are asked to make based on data or information that you must find yourself	27.45%	45.10%	11.76%	7.84%	7.84%	51
Routine procedure or process for handling information, paperwork, requests, payments, invoices, and so forth	36.00%	32.00%	12.00%	14.00%	6.00%	50

(always done the same way)						
Variable procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (requires some analysis and judgment to select the proper procedure or process to follow)	24.00%	30.00%	20.00%	14.00%	12.00%	50
Reports, memoranda, letters, or informational materials for customers, vendors, or staff that you must compile and/or write. Educational or promotional materials that you must compile and/or write	14.00%	26.00%	24.00%	20.00%	16.00%	50
Proposals you develop to recommend new programs, projects, procedures, or processes	2.00%	18.00%	14.00%	38.00%	28.00%	50

Takeaway*: Overall across DBM, the most frequently used information sharing practices on a daily and weekly basis were data or information from a known source to answer a specific question followed by routine procedure or process for handling information, paperwork, requests etc. Data or information that one must gather, judgements or recommendations that one has to make based on information that is either given to them or they must find themselves, and directions, advice, and guidance provided to a customer, vendor or staff are also some of the other information sharing practices used on a weekly and monthly basis.*

Table A4-2: Frequency of Resource Use (DBSI)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Data or information from a known source (e.g., database, files) used to answer a specific question	57.89%	15.79%	15.79%	0.00%	10.53%	19
Data or information that you have to gather from multiple sources and analyze and/or synthesize to answer a specific question	47.37%	26.32%	15.79%	5.26%	5.26%	19
Step-by-step instructions you provide that is not a document, to a customer, vendor, or staff person	10.53%	21.05%	21.05%	21.05%	26.32%	19
Direction you provide to a customer, vendor, or staff person such as advice, counsel or guidance, not step-by-step	10.53%	42.11%	21.05%	5.26%	21.05%	19
Judgments or recommendations you are asked to make based on data or information that is given to you	26.32%	26.32%	42.11%	0.00%	5.26%	19
Judgments or recommendations you are asked to make based on data or information that you must find yourself	31.58%	31.58%	26.32%	0.00%	10.53%	19
Routine procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (always done the same way)	21.05%	26.32%	15.79%	21.05%	15.79%	19
Variable procedure or process for handling information, paperwork, requests, payments, invoices, and so forth	15.79%	26.32%	31.58%	15.79%	10.53%	19

(requires some analysis and judgment to select the proper procedure or process to follow)						
Reports, memoranda, letters, or informational materials for customers, vendors, or staff that you must compile and/or write. Educational or promotional materials that you must compile and/or write	21.05%	42.11%	21.05%	15.79%	0.00%	19
Proposals you develop to recommend new programs, projects, procedures, or processes	10.53%	36.84%	15.79%	31.58%	5.26%	19

Takeaway*: Overall across DBSI, the most frequently used information sharing practices on a daily and weekly basis were data or information from a known source to answer questions followed by data or information that one must gather from multiple sources to answer questions. Directions, advice, and guidance provided to a customer, reports, memoranda, or informational letters for customers, vendors, or staff, judgements or recommendations that one has to make based on information that they must find themselves, are also some of the other information sharing practices used on a weekly and monthly basis.*

Table A4-3: Frequency of Resource Use (DMV)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Data or information from a known source (e.g., database, files) used to answer a specific question	75.00%	20.00%	2.50%	0.00%	2.50%	80
Data or information that you have to gather from multiple sources and analyze and/or synthesize to answer a specific question	46.25%	23.75%	15.00%	5.00%	10.00%	80
Step-by-step instructions you provide that is not a document, to a customer, vendor, or staff person	36.25%	26.25%	16.25%	6.25%	15.00%	80
Direction you provide to a customer, vendor, or staff person such as advice, counsel or guidance, not step-by-step	44.87%	28.21%	11.54%	5.13%	10.26%	78
Judgments or recommendations you are asked to make based on data or information that is given to you	43.59%	30.77%	12.82%	2.56%	10.26%	78
Judgments or recommendations you are asked to make based on data or information that you must find yourself	35.06%	32.47%	14.29%	6.49%	11.69%	77
Routine procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (always done the same way)	56.41%	20.51%	12.82%	6.41%	3.85%	78
Variable procedure or process for handling information, paperwork, requests, payments, invoices, and so forth	41.56%	27.27%	16.88%	5.19%	9.09%	77

(requires some analysis and judgment to select the proper procedure or process to follow)						
Reports, memoranda, letters, or informational materials for customers, vendors, or staff that you must compile and/or write. Educational or promotional materials that you must compile and/or write	21.79%	21.79%	10.26%	14.10%	32.05%	78
Proposals you develop to recommend new programs, projects, procedures, or processes	7.59%	6.33%	15.19%	27.85%	43.04%	79

Takeaway*: Overall across DMV, the most frequently used information sharing practices on a daily and weekly basis were data or information from a known source to answer a specific question followed by routine procedure or process for handling information, paperwork, requests etc. Data or information that one must gather, judgements or recommendations that one has to make based on information that is either given to them or they must find themselves, and directions, advice, and guidance provided to a customer, vendor or staff are also some of the other information sharing practices used on a weekly and monthly basis*

Table A4-4: Frequency of Resource Use (DSP)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Data or information from a known source (e.g., database, files) used to answer a specific question	44.44%	44.44%	4.44%	6.67%	0.00%	45
Data or information that you have to gather from multiple sources and analyze and/or synthesize to answer a specific question	33.33%	33.33%	20.00%	6.67%	6.67%	45
Step-by-step instructions you provide that is not a document, to a customer, vendor, or staff person	17.78%	13.33%	28.89%	22.22%	17.78%	45
Direction you provide to a customer, vendor, or staff person such as advice, counsel or guidance, not step-by-step	20.00%	35.56%	15.56%	20.00%	8.89%	45
Judgments or recommendations you are asked to make based on data or information that is given to you	28.89%	31.11%	15.56%	13.33%	11.11%	45
Judgments or recommendations you are asked to make based on data or information that you must find yourself	26.67%	26.67%	11.11%	26.67%	8.89%	45
Routine procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (always done the same way)	40.00%	31.11%	13.33%	11.11%	4.44%	45
Variable procedure or process for handling information, paperwork, requests, payments, invoices, and so forth	24.44%	24.44%	26.67%	15.56%	8.89%	45

(requires some analysis and judgment to select the proper procedure or process to follow)						
Reports, memoranda, letters, or informational materials for customers, vendors, or staff that you must compile and/or write. Educational or promotional materials that you must compile and/or write	13.33%	35.56%	15.56%	22.22%	13.33%	45
Proposals you develop to recommend new programs, projects, procedures, or processes	0.00%	11.36%	20.45%	34.09%	34.09%	44

Takeaway*: Overall across DSP, the most frequently used information sharing practices on a daily and weekly basis were data or information from a known source to answer specific question followed by routine procedure or process for handling information, paperwork, requests etc. Data or information that one must gather, directions, advice, and guidance provided to a customer, vendor or staff that is not step-by-step, judgements or recommendations that one has to make based on information that is either given to them or they must find themselves, are also some of the other information sharing practices used on a weekly and monthly basis.*

Table A4-5: Frequency of Resource Use (DTIM)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Data or information from a known source (e.g., database, files) used to answer a specific question	73.68%	15.79%	2.63%	5.26%	2.63%	38
Data or information that you have to gather from multiple sources and analyze and/or synthesize to answer a specific question	54.05%	21.62%	18.92%	5.41%	0.00%	37
Step-by-step instructions you provide that is not a document, to a customer, vendor, or staff person	5.26%	18.42%	39.47%	21.05%	15.79%	38
Direction you provide to a customer, vendor, or staff person such as advice, counsel or guidance, not step-by-step	18.42%	10.53%	42.11%	18.42%	10.53%	38
Judgments or recommendations you are asked to make based on data or information that is given to you	31.58%	31.58%	21.05%	13.16%	2.63%	38
Judgments or recommendations you are asked to make based on data or information that you must find yourself	31.58%	34.21%	23.68%	7.89%	2.63%	38
Routine procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (always done the same way)	36.84%	15.79%	18.42%	18.42%	10.53%	38
Variable procedure or process for handling information, paperwork, requests, payments, invoices, and so forth	28.95%	13.16%	31.58%	21.05%	5.26%	38

(requires some analysis and judgment to select the proper procedure or process to follow)						
Reports, memoranda, letters, or informational materials for customers, vendors, or staff that you must compile and/or write. Educational or promotional materials that you must compile and/or write	5.26%	26.32%	34.21%	21.05%	13.16%	38
Proposals you develop to recommend new programs, projects, procedures, or processes	10.53%	10.53%	18.42%	34.21%	26.32%	38

Takeaway*: Overall across DTIM, the most frequently used information sharing practices on a daily and weekly basis were data or information from a known source and data or information that one must gather to answer a specific question. Routine procedure or process for handling information, paperwork, requests etc., judgements or recommendations that one has to make based on information that is either given to them or they must find themselves, and reports, memoranda, letters or informational materials customers, vendors or staff are also some of the other information sharing practices used on a weekly and monthly basis.*

Table A4-6: Frequency of Resource Use (DTSD)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Data or information from a known source (e.g., database, files) used to answer a specific question	56.08%	30.74%	7.43%	4.73%	1.01%	296
Data or information that you have to gather from multiple sources and analyze and/or synthesize to answer a specific question	28.72%	39.19%	19.59%	8.45%	4.05%	296
Step-by-step instructions you provide that is not a document, to a customer, vendor, or staff person	8.16%	28.57%	27.55%	20.75%	14.97%	294
Direction you provide to a customer, vendor, or staff person such as advice, counsel or guidance, not step-by-step	20.95%	35.14%	21.96%	14.19%	7.77%	296
Judgments or recommendations you are asked to make based on data or information that is given to you	33.22%	38.98%	16.95%	7.46%	3.39%	295
Judgments or recommendations you are asked to make based on data or information that you must find yourself	33.56%	37.29%	19.32%	6.10%	3.73%	295
Routine procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (always done the same way)	32.31%	37.76%	19.39%	5.44%	5.10%	294
Variable procedure or process for handling information, paperwork, requests, payments, invoices, and so forth	18.28%	41.03%	23.45%	11.72%	5.52%	290

(requires some analysis and judgment to select the proper procedure or process to follow)						
Reports, memoranda, letters, or informational materials for customers, vendors, or staff that you must compile and/or write. Educational or promotional materials that you must compile and/or write	14.68%	29.01%	23.55%	19.11%	13.65%	293
Proposals you develop to recommend new programs, projects, procedures, or processes	3.40%	11.56%	21.77%	38.78%	24.49%	294

Takeaway*: Overall across DTSD, the most frequently used information sharing practices on a daily and weekly basis were data or information from a known source to answer a specific question, followed by judgements or recommendations that one must make based on information that is either given to them or they must find themselves and routine procedure or process for handling information, paperwork, requests etc. In addition to these sources, other sources used on a weekly and monthly basis included both routine and variable procedure or process for handling information, paperwork, requests, etc., providing both step-by-step instructions and direction to customers, vendors, or staff as well such direction that is not step-by step.*

Table A4-7: Frequency of Resource Use (Executive Offices)

Type and Frequency of Resources	Daily	Weekly	Monthly	Quarterly	Never	Total
Data or information from a known source (e.g., database, files) used to answer a specific question	42.86%	28.57%	0.00%	28.57%	0.00%	7
Data or information that you have to gather from multiple sources and analyze and/or synthesize to answer a specific question	28.57%	28.57%	14.29%	14.29%	14.29%	7
Step-by-step instructions you provide that is not a document, to a customer, vendor, or staff person	28.57%	14.29%	28.57%	0.00%	28.57%	7
Direction you provide to a customer, vendor, or staff person such as advice, counsel or guidance, not step-by-step	42.86%	28.57%	0.00%	14.29%	14.29%	7
Judgments or recommendations you are asked to make based on data or information that is given to you	28.57%	42.86%	0.00%	14.29%	14.29%	7
Judgments or recommendations you are asked to make based on data or information that you must find yourself	28.57%	42.86%	0.00%	14.29%	14.29%	7
Routine procedure or process for handling information, paperwork, requests, payments, invoices, and so forth (always done the same way)	71.43%	14.29%	0.00%	0.00%	14.29%	7
Variable procedure or process for handling information, paperwork, requests, payments, invoices, and so forth	42.86%	28.57%	0.00%	14.29%	14.29%	7

(requires some analysis and judgment to select the proper procedure or process to follow)						
Reports, memoranda, letters, or informational materials for customers, vendors, or staff that you must compile and/or write. Educational or promotional materials that you must compile and/or write	28.57%	42.86%	0.00%	14.29%	14.29%	7
Proposals you develop to recommend new programs, projects, procedures, or processes	14.29%	42.86%	14.29%	14.29%	14.29%	7

Takeaway*: Overall across EO, the most frequently used information sharing practices on a daily and weekly basis included both routine and variable procedure or process for handling information, paperwork, requests, etc. followed by using data or information from a known source to answer a specific question. Some of the other practices used on a weekly and monthly basis included judgements or recommendations that one has to make based on information that is either given to them or they must find themselves, proposals that one develops to recommend new programs, projects, or procedures, and reports, memoranda, letters, or informational materials for customers, vendors, or staff.*

APPENDIX 5: WisDOT KM Matrix (2015)

Wisconsin DOT KM Tools Matrix

TOPIC AND TASKS	BRIEF DESCRIPTION	MIGHT BE GOOD FOR…	RESOURCES
Documenting processes			
Writing down processes	Incumbent writes down steps in key tasks.	Stable, routine tasks; quick reference	Low
Videotaping processes	Incumbent is videotaped performing key tasks.	Quick capture; including context	Low
Formalizing process			
Formalizing process	Manually require steps be completed in certain way.	More complex tasks	Low
Automating process	Automation requires steps be completed in certain way.	Highly complex tasks with many players	Med
Expert decision system	Incorporates expert judgment. Provides decision.	Complex decisions that can be modeled	High
Experiencing together			
Double filling key positions	New employee and retiring employee work together.	Critical positions with sole complex knowledge	Low
Cross training	Train employees to do a range of overlapping work.	Positions with sole knowledge	Med
Communities of practice	Employees with similar work regularly communicate.	Positions scattered throughout agency	Med
Sharing experience			
Exit interviews	HR or supervisor asks questions of departing employee.	All departing employees	Med
Expert interviews	Interviewer asks questions of knowledgeable employee.	Employees with extensive specific knowledge.	Med
Last lectures	Departing employee gives open-ended talk.	Departing employees with extensive tacit knowledge.	Med
Storytelling	Current employees share stories of challenges faced.	Current employees with extensive tacit knowledge.	High
Developing leaders			
Rotation program	Selected employees work in one or more new areas.	Employees showing leadership promise.	High
Leadership program	Selected employees receive agency exposure.	Employees showing leadership promise.	High

Source: Wisconsin DOT