Implementation of Robotic Process Automation in U. S. Federal Government

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Abstract

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Three areas of literature set the foundation for this exploratory research - innovation adoption process in organizations, technology adoption process, and the public sector innovation adoption process. Twelve expert interviews from individuals involved in RPA implementation in nine U. S. federal agencies plus a review of supporting government documents inform the answers to two research questions: What factors facilitate RPA implementation? What factors are barriers to RPA implementation?

Three preliminary insights were found. Resource availability was a facilitator and barrier, and organizations made choices about the type of resource to use during implementation based on the constraints that were in place at the time. Cyber security related barriers were the most common barrier and included both policy and process. Most public sector specific factors differed from those found in the literature. Further research should explore the relationship between the types of resources, constraints, and leadership decision-making, and explore the ways in which U. S. federal government sector specific factors, including regulations, impact

innovation adoption and implementation. In addition, further research is needed to refine and test an RPA technology program specific innovation decision process.

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General Audience Abstract

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DEDICATION

To my wife Mary Arledge and my parents Carroll and Margaret Arledge.

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Chapter 1: Introduction

Citizens, public officials and government employees expect government organizations to embrace and utilize emerging technology similar to the private sector. As a result, government organizations are exploring technologies that will aid in internal operations as well as aid in service delivery. The U.S. federal government is no exception. President G. W. Bush and President Obama both had technology agendas which included efforts to provide faster and better service to citizens as well as increase internal government efficiency (*Digital Government*; *Promoting Innovation and Competitiveness*). During the first Trump Administration, one area of the President's Management Agenda (PMA) focused on increasing the time employees spent on high-value work through the use of automation (*Cross-Agency Priority Goals Overview*). President Biden signed an executive order to advance the use of artificial intelligence in federal government (*Administration Actions on AI*).

These presidential efforts often target specific areas of emerging technology and are communicated to federal agencies through executive orders or management agendas. These documents put government into action. In 2018, the first Trump Administration's focus on moving employees from performing low-value work to performing high-value work as part of the PMA was outlined in an Office of Management and Budget (OMB) memorandum, M-18-23. In this memorandum, robotic process automation (RPA) was specifically mentioned as a potential solution ("Shifting from Low-Value to High-Value Work," 2018). In the years immediately following the OMB memorandum, the General Services Administration (GSA) focused on promoting RPA among federal agencies. GSA started a Federal RPA Community of Practice (CoP) and in January of 2020, the CoP published the RPA Program Playbook to assist agencies interested in starting and expanding an RPA program (*RPA Program Playbook*, 2020).

RPA use in U. S. federal government has increased since 2018. A 2021 GSA report shows that agencies had more than doubled their usage from 2020 to 2021 (*The State of Federal RPA*, 2021) and the report published in 2023 also indicated an increase in automation deployment and hours saved (*The State of Federal RPA*, 2023). The continuing increase in RPA usage is no surprise. RPA is a software application (often called a bot) that automates tedious tasks which then frees workers to perform higher level, more complex tasks (Axmann & Harmoko, 2020). The benefits of RPA include speed, accuracy, and cost-effectiveness – it is faster than humans, more accurate than humans, and is relatively inexpensive compared to other technology innovation such as artificial intelligence (Axmann & Harmoko, 2020; da Silva Costa et al., 2022; Penttinen et al., 2018). Given the benefits, it is surprising that federal agencies are not implementing RPA more aggressively. Different U. S. federal agencies are implementing RPA to different degrees as indicated by the number of automations reportedly in use (*The State of Federal RPA*, 2021; *The State of Federal RPA*, 2023)

The annual GSA surveys provide insight into federal RPA programs, but in general, little is known about the adoption and implementation process of RPA in the U. S. federal government and in particular the factors that enable or impede technology innovation implementation. Previous scholarly RPA work has focused primarily on benefits, risks, and technological features of RPA and less on scaling implementations (Sobczak, 2022). Recognizing that the context within which an organization implements technology innovation matters, this project looks specifically at the technological, organizational and environmental factors that impact implementation. My research questions are: “What factors facilitate RPA implementation?” and “What factors are barriers to RPA implementation?”.

The definition of innovation varies depending upon whether it is used in business, economics, and public administration or in general, everyday conversation (Damanpour & Aravind, 2012). This project uses Rogers (Rogers, 2003) definition of innovation which is "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 12). The innovation process generally consists of generation of the innovation, diffusion of the innovation, and adoption of the innovation. Generating innovation, sometimes called invention, involves the creation of a new idea, product, or service. Once something new is created, it is communicated to others that it exists and may be useful. As others learn about the new "thing" they make decisions about using the new "thing" and the actions needed (Damanpour, 2020).

The research questions focus on one type of innovation, RPA, and are explored using three areas of innovation adoption scholarship to include the innovation adoption process in organizations, the technology adoption process and the public sector innovation adoption process. The literature review introduces two key works on innovation adoption in organizations to situate the work within the innovation process continuum and then moves to two subsets of innovation adoption: technology adoption and innovation in a public sector setting referred to as public sector innovation (PSI). These three areas of work are used to set the stage for categorizing RPA adoption and implementation factors in U. S. federal government through the lens of the technology, organization, and environment (TOE) framework.

Twelve expert interviews of RPA program personnel from nine U. S. federal agencies are used to address the two research questions. The agencies ranged in size with six of nine agencies having less than 10,000 employees, two agencies had between 10,000 and 50,000 employees and one department with greater than 50,000 employees. The organizations that the interviewees represent have implemented RPA to varying degrees. These individuals have been a part of the

implementation process and provided insight into the agencies' RPA journey and the facilitators and barriers that impacted implementation. A document review was conducted to provide additional context.

There is both scholarly and practitioner significance to this work. Research on U. S. federal government technology innovation adoption is lacking as is a focus on the implementation phase of the adoption process, in general. There is little to no research on public sector RPA adoption and what does exist has occurred outside of the United States, primarily at the local level. For the practitioner, insight into the facilitators and barriers to RPA implementation may help with successful RPA implementation and may inform the adoption and implementation of other emerging technologies.

The remainder of this dissertation provides background on RPA use in U. S. federal government in Chapter 2 and an academic literature review in Chapter 3. Chapter 4 lays out the methodology used and describes the data. Chapter 5 identifies the findings from the interviews and supporting documents. Chapter 6 discusses the findings in light of previous scholarly work and addresses limitations and recommendations for future research.

Chapter 2: Robotic Process Automation in U. S. Federal Government

There has been a continuous theme in presidential administrations of pursuing efficiency and effectiveness usually through executive orders and management agendas. Utilizing emerging technologies has been one outlet of these pursuits and, at times, specific technologies were targeted. In the first Trump Administration, one of the technologies targeted was robotic process automation (RPA). In 2018, the Office of Management and Budget (OMB) published memorandum M-18-23 further expanding on the Administration's initiative to focus employee time on high-value work. The memorandum specifically mentioned RPA as a technology to consider for shifting resources to higher value activities and reduce administrative tasks ("Shifting from Low-Value to High-Value Work," 2018).

What is Robotic Process Automation

RPA is software that imitates human action in back off work and automates repetitive, rules-based tasks typically performed by humans such as reading emails, entering data, and producing reports (Axmann & Harmoko, 2020). RPA should not be confused with robots that physically move things or confused with learning capable technology sometimes referred to as cognitive automation such as machine learning and deep learning (Lacity & Willcocks, 2021). It is considered a lightweight technology that sits "on top" of the information technology infrastructure and may be less expensive to implement as compared to traditional back-end automation solutions (Enríquez et al., 2020; Penttinen et al., 2018). RPA is a low-code software that does not require high level coding skills and can be implemented faster than other automation solutions (Plattfaut et al., 2022). RPA has been widely promoted as being more accurate, faster, efficient, easy to implement, and as a means to free employees from low-value work (Beerbaum, 2022; Yarlagadda, 2018).

RPA has gained popularity in recent years in the commercial sector (Axmann & Harmoko, 2020; Hofmann et al., 2020) with Gartner, Inc. estimating RPA growth at 63 percent in 2020, 31 percent in 2021, and 22 percent 2022 (*Critical Capabilities for Robotic Process Automation Summary*, 2023). Gartner, Inc. also suggests that the technology has passed the initial excitement phase and is becoming more mature (*Critical Capabilities for Robotic Process Automation Summary*, 2023). The technology is beginning to gain traction in the public sector as well (Baran et al., 2020).

Market.us Scoop summarized RPA industry statistics in July of 2024 finding that the RPA market was $1.23 billion in 2020 and grew to $3.17 billion in 2022 with expected continued growth. Market size is estimated to be $12.22 billion in 2029. The market expects organizations will continue to adopt RPA given its benefits. However, as of January 2025 use across industries is varied. Manufacturing has the largest adoption rate at 35 percent. Public sector is substantially less at 5 percent. RPA use is expected to grow based on the benefits; however, there are recognized challenges. Market.us Scoop found organizations underestimate time and cost needed for implementation and many organizations must work with contractors for specialized expertise as the knowledge does not currently exist in their organizations (Pangarkar, 2025).

On the U. S. federal government side, the National Aeronautics and Space Administration was an early adopter of RPA and provides an example of what it means to automate low-value work. The Shared Services Office processed approximately 75 grants per week which were all paper intensive and required manual activities such as scanning documents. Automating this process freed employees from the tedious work of handling and scanning paper documents (low value) and allowed more time for analysis and other higher value activities (Miller, 2018).

The benefits of RPA have been widely promoted. At the same time, though, there are downsides to the technology. While RPA can be easier to implement than traditional technology solutions, it may not provide the level of performance of back-end automation solutions (Eulerich et al., 2024; Penttinen et al., 2018; Plattfaut et al., 2022). Integrating RPA into organizational information technology infrastructure drives complexity which requires information technology expertise to achieve success (Plattfaut et al., 2022). In addition to performance concerns and expertise demands, the true cost of RPA may not be accurately captured. RPA programs advertise cost savings of labor hours and reduced errors, but often do not include RPA operations costs in these calculations especially costs involved after development and during the monitoring and maintenance stages (Eulerich et al., 2024).

RPA in US Federal Government

In early 2019, the General Services Administration (GSA) sponsored the Federal RPA Community of Practice (CoP) with the goal of accelerating RPA adoption across the federal government (*Innovation Committee White Paper: Robotic Process Automation in Federal Agencies*). A community of practice is a group of people with a shared interest who come together to share knowledge (Wenger, 2011). Since this time, GSA has advocated for more RPA use in U. S. federal government and the Federal RPA CoP has written the RPA Program Playbook (*RPA Program Playbook*, 2020) and published three reports on the state of RPA in the federal government (*The State of Federal RPA*, 2020; *The State of Federal RPA*, 2021; *The State of Federal RPA*, 2023).

The RPA Program Playbook (*RPA Program Playbook*, 2020) is a guide for federal agencies to use to start and expand an RPA program and is part of a larger CoP effort to generate agency information sharing, lessons learned, and best practice sharing. The Playbook covers two

broad areas, RPA program technology and RPA program management. On the technology side, the Playbook highlights both the infrastructure needed for implementation as well as cyber security considerations such as credentialing and security and privacy policies. Choices regarding where the software resides such as on an individual computer, in a virtual environment or part of an enterprise platform drive infrastructure considerations and investment as well as security considerations. While infrastructure and security can be challenges, the Playbook offers points of consideration and recommendations to overcome these barriers.

Where the RPA program technology section focuses on unique technology aspects, the RPA program management section covers the elements needed to run a program and one of these elements is the program's governance structure. The Playbook suggests there are three types of models used in federal government - centralized, federated, and decentralized. In a centralized model, all RPA functions happen within one office inside the agency. This office is responsible for the full range of RPA activities from ideation to deployment. In a federated model, there is an office at the agency level who is responsible for setting program standards, policy and overall program management. In this model, there are individual RPA programs across the agency that work within the agency's RPA framework. The decentralized model has no overarching office for oversight. There are multiple RPA programs within the agency operating independently. There is no "right" operating model and agencies must choose the structure that works best for the organization.

Another important aspect of RPA program management is how the program will be staffed and the individuals' roles and responsibilities. Early-stage programs can start with a program manager, business expert, and a developer and as the program matures, additional staff

can be added. Agencies can source the RPA program with all federal employees, all contractors, or a mix of federal employees and contractors.

Identified roles in an RPA program are:

- program manager – overall focal point for the program including acquiring the technology, working with security experts, and collaborating with other program personnel;
- business subject matter expert – this role helps developers understand the business function and identifies bot requirements;
- developer – technical expert who codes the bot;
- process expert – this role helps the organization fine tune the process being automated to ensure optimal design;
- project coordinator – a facilitator of individual bot projects from opportunity identification through development and deployment;
- RPA custodian – this role launches automations and monitors execution if the program uses attended automations;
- factory manager – manages project coordinators to ensure the maximum operation of the developmental teams; and
- evangelist – this role spreads the word in the organization, looks to expand interest in RPA and keeps more RPA coming into the development and production pipeline.

The Playbook covers ways in which agencies can report the value of an RPA program such as through annualized capacity, total investment, average cost per automation, employee engagement, customer satisfaction, cost avoidance, error rate, and employee productivity to

name a few. Methods for selecting the best processes to automate are provided as well as considerations for engaging employees and reskilling or upskilling employees impacted by RPA implementation.

The Playbook introduces the RPA program maturity model that is used to evaluate where an agency is in utilizing RPA. Not to be confused with technology maturity levels which assesses the maturity of the technology itself, the RPA maturity model assesses the overall RPA program. These levels take into account, among other things, number of automations in production, hours of annualized capacity, program management, enterprise reach and number and types of personnel. The RPA program maturity model is used to evaluate agencies across the four RPA technology capability areas and six program management capability areas.

In addition to the Playbook, three State of Federal RPA reports were published in 2020, 2021, and 2023 based on survey and interview data collected by GSA. **Figure 1** depicts the growth in survey responses from 2020 to 2023. Surveys were sent to CoP members and participation was voluntary.

Figure 1: Community of Practice Reports Descriptive Data

Community of Practice Report Title	Year Published	Community of Practice Membership	Number of Federal Agencies Represented in the Community of Practice	Number of Programs Participated in Survey	Number of Programs from Survey with Automations in Use
State of Federal RPA	2020	1000+	65	23	18
State of Federal RPA	2021	1200+	100+	65	49
State of Federal RPA	2023	1,600+	100+	71	60

Data taken from (*The State of Federal RPA*, 2020; *The State of Federal RPA*, 2021; *The State of Federal RPA*, 2023)

The first report published by the Federal RPA CoP came out November 1, 2020 (*The State of Federal RPA*, 2020) and was part of the CoP's effort to "promote efficient and effective adoption of RPA governmentwide" (p. 2). At the time the first report was written, the CoP had over 1000 members from 65 federal agencies. The purpose of the report was to provide a standardized program maturity framework, establish a baseline to measure RPA program growth,

create a methodology to determine RPA impact, identify steps to mature RPA programs, and acknowledge barriers to RPA adoption. Surveys were distributed to all RPA programs and individual interviews were then conducted. Detailed assessments were done on 23 government RPA programs and found that 18 of the agencies reported automations in use while five of the agencies were in the pilot stage for a total of 460 automations deployed.

The 2021 report was written approximately three years after the federal government started using RPA (*The State of Federal RPA*, 2021). At this point, the federal RPA CoP had over 1,200 members across 100 federal agencies. In FY21, the federal RPA CoP expanded upon the maturity model from FY20. This report received comprehensive survey responses from 65 programs focusing on the 49 with bots in use. The report found RPA programs were automating 2.5 times more than in the previous year with approximately 1,000 automations in use. Twenty programs had five or less automations in production, 16 programs had between 5-20 automations in production, seven programs were at 20-50 automations in production, five programs were between 50-100 in production and one program had greater than 100 automations in production. This report references citizen developers. Citizen developers are not information technology professionals, nor do they work in information technology departments. These individuals have functional or business line expertise who can quickly with a few lines of code develop an application (Bernsteiner et al., 2022).

The State of Federal RPA report published in 2023 is more comprehensive than the previous two reports (*The State of Federal RPA*, 2023). The federal CoP grew to over 1,600 members across 100 agencies. The FY22 maturity survey had responses from 71 federal programs with 11 exploring RPA and 60 actively deploying bots. Of the 60 active programs, 55 had automations in production and five had pilots in progress. Reporting was presented

differently so direct comparisons to previous years is difficult. Information in this report provides some insight into the research question specifically in the areas of training, the levels of executive support and funding. This report also references citizen developers and found 31 percent of programs surveyed use citizen developers.

Overall, the federal government through GSA and the Federal RPA CoP has emphasized expanding this particular technology and has developed a wide range of resources to help federal agencies put RPA into use. Although survey participation is voluntary, the three CoP reports suggest U. S. federal government RPA use is increasing.

Other Supporting Documents

Documents other than those produced by GSA and the Federal RPA CoP describe U. S. federal government RPA use. The U.S CIO Council referred to as the CIO Council Innovation Committee wrote a whitepaper prior to the Federal RPA CoP handbook (*Robotics Process Automation (RPA) - Priorities, Benefits, and Considerations for CIOs*, 2020). The white paper was written to provide an overview of RPA to federal government CIOs and other leaders (*Innovation Committee White Paper: Robotic Process Automation in Federal Agencies*). The paper includes an understanding of what RPA is, how it contributes to presidential administration goals, use case categories, and consideration for agency leaders.

In 2020, the Treasury Inspector General for Tax Administration (TIGTA) completed an audit of "effectiveness and efficiencies achieved through the Internal Revenue Service's (IRS) implementation of Robotic Process Automation and Intelligent Automation technologies" (McKenney, 2020, p. 1). In communicating why the audit was accomplished, the document mentions the March 2018 President's Management Agenda (PMA) which "focused Federal agencies on shifting resources from low-value work to high-value work" (McKenney, 2020, p. 1)

The report provided four recommendations, all of which were accepted by the IRS and the corrective actions were implemented.

Two documents were produced by the American Council for Technology-Industry Advisory Council (ACT-IAC), a non-profit educational organization focused on effective and innovative government and includes industry and government leaders. In October 2019, the ACT-IAC released the Intelligent Automation Playbook, Volume 1: Robotic Process Automation (Burrow, 2019). The synopsis referenced the PMA, Cross Agency Priority (CAP) Goal 6 – Shifting from Low-Value to High-Value Work. The Playbook included guidance on starting an RPA program as well as operating and maturing a program and finished with lessons learned. The second ACT-IAC document titled RPA in Federal Agencies: How Federal Agencies Achieve More Through Robotic Process Automation was published in March 2021 (*RPA in Federal Agencies: How Federal Agencies Achieve More Through Robotic Process Automation*, 2021). This document uses examples of federal government programs to highlight the benefits of RPA and how to put a plan into action. The plan includes mission alignment, senior executive buy-in, Chief Information Officer roles, security and cultural risks, infrastructure and governance recommendations, funding considerations and communication options.

Overall, these documents provide best practices into program development and insights into the growth in RPA use. The CoP Playbook gives agencies a general outline to follow to start and develop an RPA program. The three CoP reports suggest U. S. federal government use is increasing. These reports also include program spotlights where RPA program managers can share how the agency is using RPA and share program successes. Supporting documents other than those from GSA and the Federal RPA CoP reinforce these messages.

Chapter Summary

This chapter provides an overview of what RPA is, the U. S. federal government's interest in RPA, and the actions the federal government has taken to promote RPA use. RPA is a low-code software that mimics human actions and automate repetitive, rules-based processes (Axmann & Harmoko, 2020). This automation has a number of advantages including accuracy, speed and efficiency (Beerbaum, 2022; da Silva Costa et al., 2022; Yarlagadda, 2018) but also has a number of disadvantages. It may result in lower performance than more intrusive solutions, integrating RPA into the information technology infrastructure can be complex, and often the true cost of RPA is unrecognized.

The U. S. federal government, during the first Trump Administration, recognized the potential value in RPA use. The OMB highlighted RPA as a potential solution and the GSA promoted RPA use through the Federal RPA CoP which has published a Playbook as well as several annual reports highlighting agencies' progress. With this foundation of RPA knowledge as well as an understanding of U. S. federal government efforts the next chapter looks more deeply into the academic research on innovation adoption and implementation.

Chapter 3: Innovation, Technology and Public Organizations

Agencies within the U. S. federal government are adopting and implementing RPA. The Federal RPA CoP annual report published in 2023 found 55 federal agencies were using the technology and five others were running a pilot (*The State of Federal RPA*, 2023). This chapter focuses on the academic literature to better understand adoption and implementation of technology innovation drawing on three areas of scholarship: the innovation adoption process in organizations, technology adoption process, and public sector innovation adoption process. The word "innovation" has been used differently in different contexts. This project defines innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12). The innovation process from idea to use includes the generation of the innovation, the diffusion of the innovation and the adoption of the innovation (Damanpour, 2020). A general depiction is seen in **Figure 2**. Authors acknowledge that the innovation process is not linear. The order of actions may be different, and some elements may not occur (Rogers, 2003; Tornatzky et al., 1990). Not all scholars use "innovation process" in the same way. Zaltman et al. (Zaltman et al., 1973) for instance, does not include generation of the innovation as part of his description.

Figure 2: The Innovation Process – Idea to Use

Processes of Technological Innovation Tornatzky and Fleischer 1990	The Innovation-Decision Process Rogers 2003	Process of Innovation Core Processes Damanpour 2020
	Needs/problems	Generation
Research	Basic and Applied Research	
Development	Development	
	Commercialization	
Deployment	Diffusion and Adoption	Diffusion
Adoption		Adoption
Implementation		
Routinization		
	Consequences	

Source: (Damanpour, 2020, p. 108; Rogers, 2003, p. 138; Tornatzky et al., 1990, p. 32)

The elements within the innovation process can be characterized as developer activities and user activities. Early stages of the process contain developer activities particularly the research and development aspects with a focus on creating something new. The latter stages of the innovation process having to do with adoption and implementation involve user activities. This project is focused on the user experience of adoption and implementation.

This chapter begins with the foundation of general adoption theories and in particular work by Rogers (Rogers, 2003) and Zaltman et al. (Zaltman et al., 1973) that describe the stages of the adoption process within organizations. The two sections following cover two subsets of innovation research: technology adoption and public sector innovation adoption. Technology adoption covers a wide range of topics, but for this effort will focus on the facilitators and barriers to RPA adoption. This section ends with an overview of the technology, organization and environment framework which will be used to categorize factors found in this research. This framework provides a lens through which to understand the contexts within which an organization adopts and implements technology.

Following the section on the technology adoption process is a focus on public sector innovation adoption. This effort focuses on implementation in a public sector setting providing insights into the U. S. federal government and on the public sector unique attributes that may appear. The public sector innovation adoption research provides an understanding of adoption within this unique environment. Research into public sector RPA adoption and implementation has primarily been conducted outside of the U. S. and mostly at the local level. This chapter finishes with a brief summary of key insights from each section that are applicable to my research question.

The Innovation Adoption Process in Organizations

Adoption of innovation either by an individual or an organization is well researched in a wide variety of settings. This project focuses on the innovation adoption process in organizations. Classic work by Everett Rogers (Rogers, 2003) has set the stage in many ways for the discussion of the innovation process. Rogers extensively explored the diffusion of innovation and the innovation decision process. Initially focused on individual innovation adoption, Rogers later applied these ideas to innovation in organizations outlining an innovation process with two phases, initiation and implementation that are separated by a decision to adopt (or not adopt). He further divided the phases of the innovation process into five stages with agenda-setting and matching in the initiation phase and redefining/restructuring, clarifying, and routinizing in the implementation phase. The decision occurred between the two phases (Rogers, 2003).

Zaltman et al. (Zaltman et al., 1973) also developed an innovation in organizations process. Similar to Rogers, the authors categorized the process of innovation into initiation and implementation. Their focus, however, was on the characteristics of the organization particularly the structures and processes that facilitate innovation adoption. Much of the diffusion of innovation writing at the time centered on the individual rather than the organization and these authors broadened the dialogue with their work. The initiation stage is characterized by three substages: knowledge-awareness, formation of attitudes toward the innovation, and decision. The implementation phase has two sub-stages: initial implementation and continued-sustained implementation. As with Rogers, Zaltman et al. move from initiation to implementation at the decision point however, Zaltman et al include decision in the initiation phase. **Figure 3** is a comparison of the two conceptualizations. This project's focus is Zaltman et al.'s implementation stage of RPA within an organization.

Figure 3: Organizational Innovation Process

Rogers	**Initiation**		**Decision**	**Implementation**		
	Agenda-setting	Matching	Decision	Redefining/restructuring	Clarifying	Routinizing
Zaltman et al.	**Initiation**			**Implementation**		
	Knowledge-awareness	Formation of attitudes	Decision	Initial	Continued-sustained	

Source: (Rogers, 2003; Zaltman et al., 1973)

Numerous others have developed organizational innovation adoption process models and these models generally consist of three phases 1) pre-decision, 2) decision, and 3) post-decision (Damanpour, 2020). Much of the academic scholarship is focused on actions before a decision is made or on the decision itself leaving implementation, or post-decision, understudied (Damanpour, 2020; Young, 2020). This effort looks to contribute to the understudied area of implementation.

Tornatzsky et al. (Tornatzky et al., 1990) pointed out that "there is little consensus about either the definition or measurement of the degree or level of implementation" (p. 200). They found two perspectives on degree of implementation in technology innovation. One, a generalist approach, suggests that the degree of implementation is conceptually the same regardless of the type of technology and the second perspective suggests that the degree of implementation is specific to the technology (or technology family). Both Rogers (Rogers, 2003) and Zaltman (Zaltman et al., 1973) fit into the generalist perspective which is typically defined by passage through either cycles or stages.

Sarilo-Kankaanranta and Frank (Sarilo-Kankaanranta & Frank, 2021) expanded upon Rogers' (Rogers, 2003) innovation decision progress in their work on the continued adoption of RPA in public service centers. They put forth that the later stage of RPA implementation, continued use (meaning the addition of more automations), is a continuous loop of the stages of the innovation decision process. They found six factors to be a challenge every time a new cycle of RPA decision-making occurred: the role of competing technologies and compliance with the

enterprise architecture, resourcing model, process selection, interaction between information technology and other teams, amount of knowledge and ideas and resistance to change and trust.

The technology specific perspective focuses on steps that need to be taken and completed rather than stages as depicted by the generalist perspective (Tornatzky et al., 1990). Herm et al (Herm et al., 2023) developed a framework for implementing RPA that falls into this perspective. Their framework shows the steps to take in implementing an RPA project which includes identifying the need for a bot, choosing software, piloting the bot and then putting the bot into use. Their focus is on implementing an individual bot. They see continued use as a function of support processes and centers of excellence that occur almost as a foundation upon which individual implementation occurs.

This study uses a generalist approach specifically Zaltman et al.'s (Zaltman et al., 1973) portrayal of implementation which is defined by two substages: initial and continued-sustained. RPA program implementation is defined as having an RPA pilot project (initial sub-stage) or RPA in production (continued-sustained substage).

Technology Adoption Process

Technology innovation adoption research spans a number of areas. Examples include factors that influence adoption decisions (Harrison et al., 1997; Vagnani et al., 2019), individual actions that are taken during the adoption process (Bankins et al., 2017; Meijer, 2014) and the type of innovation as a research lens (Buchheim et al., 2020). Specific to this project is another line of organizational technology adoption research that examines the facilitators and barriers to adoption and implementation of emerging technologies such as blockchain (Reddick et al., 2019), artificial intelligence (Hamm & Klesel, 2021; Marzouki et al., 2023; Neumann et al., 2024) and RPA (Frick, 2024; Plattfaut et al., 2022).

RPA Facilitators and Barriers

Academic examination of RPA implementation exists, but it is limited. In 2023, Fernandez et al. (Fernandez et al., 2023) published a bibliometric analysis on RPA finding 244 published manuscripts using the Web of Science database between 2016 and 2022. Of these, 109 were conceptual or empirical, 109 were conference papers, and 26 were systematic or critical reviews. Three of the reviews focused on RPA implementation and one focused on success factors. The researchers found that "challenges in RPA adoption" was an emerging theme and recommended future attention in this area.

Looking specifically at RPA adoption and implementation, **Figure 4** showcases RPA studies of relevance to this project. These works were selected given their focus on some aspect of adoption and implementation with several addressing facilitators and barriers of implementation. Only two of the studies were quantitative and both used surveys for data collection. The list includes both private sector and public sector focused work. Six categories of topics were found across the studies.

The systematic literature reviews ranged from general information on RPA adoption to specifically addressing facilitators, barriers, and prerequisites to adoption. Syed et al. (Syed et al., 2020) looked to understand what discussions were occurring in the RPA literature and to identify gaps. They found that the research covered five primary areas: 1) the benefits of RPA as well as the challenges of realizing those benefits, 2) organizational readiness to adopt RPA 3) organizational capabilities needed for adoption, 4) advice and guidelines on deployment methodologies, and 5) research into the technology aspects of RPA. "Enterprise-wide adoption of RPA technologies remains a challenge due to scalability problems. Innovative methods and techniques are needed to overcome existing barriers to larger-scale implementations (p.12). "

Figure 4: Select RPA Adoption and Implementation Studies

Author(s)	Year	Type	Focus	Type of Organization Studied	Topics Covered					
					Process Selection	Adoption Phases and Scaling	Benefits and Costs	Security Risks	Organizational Readiness and Capabilities	Adoption and Implementation Factors
Al-Slais & Ali	2023	Systematic literature review	RPA and intelligent automation security challenges	Not specified				X		
Bagheri & van de Wetering	2024	In-depth Interviews	Organizational RPA readiness	Not specified				X	X	
da Silva Costa et al.	2022	Systematic literature review	General information on RPA adoption	Not specified	X	X	X	X		X
Eulerich et al.	2024	Interviews	Risks and challenges of RPA	Private sector			X	X		
Fernandez & Aman	2021	In-depth case study	RPA implementation challenges in global business services	Private sector	X			X		X
Flechsig et al.	2022	Multiple case study	RPA potentials, barriers, and implementation in purchasing and supply management	Private sector and public sector	X	X	X		X	X
Frick	2024	Systematic literature review	Barriers, facilitators, and prerequisites for RPA adoption in public administrations	Public sector	X	X				X
Herm et al.	2023	Expert interviews	RPA implementation framework	Private sector	X	X				
Kraus et al	2024	Expert interviews	Typology of RPA implementation challenges	Not specified						X
Plattfault et al.	2022	Expert interviews	RPA critical success factors	Statutory healthcare payer and private sector		X				X
Plattfaut & Borghoff	2022	Systematic literature review	Research agenda	Not specified	X					X
Ranerup & Henriksen	2019	Case study	Value positions viewed through automated decision-making in social services	Public sector			X			
Sarilo-Kankaanranta & Frank	2021	Interpretive case study	Continued adoption of RPA in service centers	Public sector	X	X				X
Sharma et al.	2023	Surveys	RPA adoption in service sectors	Private sector and public sector			X			X
Sobczak	2022	Surveys	Deployment approaches and success factors	Private sector		X				
Syed et al.	2020	Systematic literature review	RPA themes and challenges	Not specified	X	X	X		X	
Zhang et al	2023	Case study	RPA implementation case study in accounting	Private sector				X		

Source: Author, 2025

Plattfaut and Borghoff (Plattfaut & Borghoff, 2022) focused on better understanding the definitions of RPA, feasibility, advantages, disadvantages, risk and best practices of RPA. The three top advantages they found were productivity increase, ease of use, and the technology's non-invasiveness. The disadvantages included the inferiority to back-end automation, complexity, process and data restrictions, and the need for investment in information technology staff and information technology skills. Best practice findings included process selection, role of process owners, technical implementation, change management, and knowledge management. Al-Slais and Ali (Al-Slais & Ali, 2023) were very specific to the question of security challenges in their literature review. Their work included RPA, artificial intelligence, and blockchain and they found six areas of concern relevant to RPA – logging and auditing, access control, security standards and compliance, network security, encryption, and lack of testing.

Several scholars have looked at the factors that impact adoption. Sobczak (Sobczak, 2022) explored the assimilation of RPA surveying over 250 private sector organizations and found a few main factors that impacted adoption and implementation: organizational structure such as a center of excellence that was responsible for RPA; principles for the selection of processes to automate; and RPA competencies within the workforce.

Plattfault et al. (Plattfaut et al., 2022) utilized expert interviews from three organizations in different industries (healthcare, insurance, and sports and entertainment) to identify critical success factors. They were able to group factors into 1) development structures 2) change management and 3) organizational structure. Development structures included activities supporting a standardized development approach. Change management included factors such as management support, stakeholder management, development of adequate skills, and

communication. Organizational structure included factors such as strategic approach, coordination across efforts and adequate structure including governance.

Flechsig, Anslinger and Lasch (Flechsig et al., 2022) used the TOE framework to explore barriers to RPA implementation through multiple case studies in procurement and supply chain management – both private and public sector. Technical barriers included information technology (IT) infrastructure and IT personnel. This categorization differs from the original intent of the technology category which focused on the technology itself. Organizational barriers included internal communication, financial resources, top management support, and organizational structure. Environmental barriers included suppliers and government regulations.

Eulerich et al. (Eulerich et al., 2024) explored the risks and challenges of RPA through 26 interviews with individuals in Fortune 500 companies. They found five challenges with RPA usage: 1) RPA is used as a quick fix rather than addressing core system issues; 2) RPA can have control and security issues; 3) the true cost of RPA is not well understood or is understated; 4) RPA governance is complicated and challenging; and 5) RPA use can result in process knowledge loss.

Frick (Frick, 2024) focused on public sector RPA adoption and identified 85 factors – 31 barriers, 28 facilitators, and 26 prerequisites. Frick's definitions were:

- Antecedent – factors that must be in place for RPA adoption to succeed (p. 9)
- Barrier – factors that might hinder or prevent RPA adoption (p. 6)
- Facilitator - factors that have the potential to foster RPA adoption (p. 8)

He reported on 22 of the most common factors as seen in **Figure 5** listed by pre-requisite, facilitator or barrier.

Figure 5: Frick's RPA Findings

Prerequisite	Facilitator	Barrier
Awareness of public sector values	Acquirement of external expertise	Budget restrictions
Compatibility with existing IS	Process standardization	Bureaucratic organization
Compliance with regulations	Project support by internal experts	Difficulties in finding the right processes
Experiences in public administration work practices	Promotion in policy documents	Insufficient management support
Fitting processes for automation		Lack of contextual process knowledge
Interoperability along multiple dimensions		Lack of personnel capacity
Involvement of operational staff		Lack of technical expertise
Organizational readiness		
RPA governance		
Technological readiness		
Trained personnel		

Source: (Frick, 2024)

Bagheri and van de Wetering (Bagheri & van de Wetering, 2024) focused specifically on organizational readiness for RPA adoption defining readiness as "an organization's assessment of its preparedness to effectively adopt and use this technology to take advantage of it" (p. 2). Utilizing 16 expert interviews and the TOE framework, they found 17 factors that play a role in organizational readiness including motivation and willingness to change, financial resources, human resources, upskilling, RPA awareness, compatible IT infrastructure, data security, privacy, and access control, exception handling, top management support, communication, innovative culture, collaborative work, organizational structure, RPA strategy, RPA governance, RPA process fit, and vendor selection.

Overall, the limited academic scholarship in RPA adoption and implementation contains a few similar messages. More RPA academic research is needed (Syed et al., 2020) especially in areas such as security challenges (Al-Slais & Ali, 2023), adoption phases and scaling (da Silva Costa et al., 2022) and the factors present in success implementation (Syed et al., 2020) as well as more public sector focused research which is still scarce (Frick, 2024). A few topics specific to this effort were identified across RPA studies to include adoption phasing and scaling, benefits

and costs, process selection, security risks, organizational readiness, and adoption and implementation factors.

Some authors feel RPA literature lacks theoretically based adoption and scaling frameworks (da Silva Costa et al., 2022; Plattfaut et al., 2022; Syed et al., 2020) however, some frameworks have been proposed most of which build upon previous innovation adoption processes. Flechsig et al. (Flechsig et al., 2022) proposed a three stage adoption process. Herm et al. (Herm et al., 2023) also proposed a three stage adoption process with a continuous cycle of support processes occurring as each bot is developed and implemented. Sarilo-Kankaanranta and Frank (Sarilo-Kankaanranta & Frank, 2021) built upon Rogers (Rogers, 2003) five stage innovation-decision process suggesting that the decision-making process starts again after each bot is implemented. None of these frameworks provide greater detail into degree of implementation.

The benefits of RPA are well known such as efficiency, accuracy, and the low cost of the technology compared to other technology solutions (da Silva Costa et al., 2022; Flechsig et al., 2022; Ranerup & Henriksen, 2019; Syed et al., 2020) but an organization's realization of these benefits is not guaranteed (Syed et al., 2020). The true cost of RPA use includes not only the software, IT infrastructure and developers but also includes the maintenance involved with these automations. These costs are not always captured leading to overestimation in savings. Additionally, to realize true savings, employee hours saved by the automation should be refocused elsewhere. This shift in duties is difficult in practice and may not occur (Eulerich et al., 2024). Sharma et al. (Sharma et al., 2023) found cost to have a negative impact on RPA implementation in an emerging country as the automation is seen as an additional cost: it does not replace employees but is a cost *in addition to* employees. Selecting the right process to

automate is a critical factor in successful bot implementation. RPA works best with highly repetitive, rules-based processes (da Silva Costa et al., 2022; Fernandez & Aman, 2021; Flechsig et al., 2022; Frick, 2024; Herm et al., 2023; Plattfaut & Borghoff, 2022; Sarilo-Kankaanranta & Frank, 2021; Syed et al., 2020). Selecting a process without these attributes results in difficulty and added time in development or possibly, failure to successful automate the process.

Several authors identified cyber security related challenges including safety and data privacy (Al-Slais & Ali, 2023; Bagheri & van de Wetering, 2024; da Silva Costa et al., 2022; Eulerich et al., 2024; Fernandez & Aman, 2021; Zhang et al., 2023). Bots have the same credentials as humans. This means that the bot has access whatever information systems the developer codes. Unlike humans who can recognize an error in the process, a bot simply executes the functions it is code to execute. If a developer makes a mistake in coding, network security may be compromised. One interviewee from work done by Zhang et al. (Zhang et al., 2023) described how a data breach resulted from a programmer's error during RPA bot development. Programming errors and programming that occurs outside of an organization's security protocols open the door to unknown security risks (Eulerich et al., 2024). Organizations must put controls in place to ensure the appropriate handling of sensitive and personal data (Fernandez & Aman, 2021). Al-Slais and Ali (Al-Slais & Ali, 2023) looked specifically at the security challenges of three automations, and found lack of logging and auditing capabilities, insufficient access controls on bots, inadequate compliance to security standards, inadequate network security, lack of data encryption, and lack of bot testing to be common security concerns.

Organizational readiness and capabilities were found to be necessary for successful adoption (Bagheri & van de Wetering, 2024; Flechsig et al., 2022; Syed et al., 2020). This

perspective suggests certain factors must be in place or at least considered prior to RPA adoption. Related to organizational readiness is the RPA adoption and implementation research however, the delineation between readiness factors and adoption and implementation factors was unclear. Bagheri and van de Wetering (Bagheri & van de Wetering, 2024) defined organizational readiness as an organization's preparedness to adopt and they looked at the factors that determine organizational readiness for RPA adoption. Many of the factors they identified were found by others who looked at adoption and implementation factors. They developed an organizational readiness framework with 17 factors, and they believe this framework will help organizations prepare for RPA adoption. Flechsig et al. (Flechsig et al., 2022) use readiness to denote the prerequisites needed for adoption – the ability for an organization to bring technology in and use it. They identified barriers to implementation through a lens of readiness. If the organization is not ready in an area, this is considered a barrier to adoption. While Syed et al. (Syed et al., 2020) do not define readiness, they appear to use the term to mean preparedness for implementation. They found readiness to be a theme across RPA literature particularly organizational readiness and process/task readiness. These three authors suggest certain things need to be in place prior to adoption for adoption to be successful.

Other authors examined adoption and implementation factors often using a variety of descriptors such as challenges (da Silva Costa et al., 2022; Fernandez & Aman, 2021; Kraus et al., 2024), critical success factors (Plattfaut et al., 2022) best practices (Plattfaut & Borghoff, 2022) and prerequisites, facilitators, and barriers (Frick, 2024). Challenges fell into several categories including security and data issues, process issues, IT infrastructure, costs, and human resources. Critical success factors and best practices included scalability, top management support, process selection, change management, communication, governance, and knowledge

management. Frick's (Frick, 2024) separation of factors into pre-requisites, facilitators, and barriers is found in **Figure 5** earlier in this document and includes many of the factors identified above however, his findings also include public specific factors such as public values and experience in public administration.

Technology, Organization, and Environment

When exploring the facilitators and barriers to technology adoption and implementation, scholars often bundle the various factors into categories such as structural/cultural (Meijer, 2015; Moser-Plautz, 2024), people/organization/process/information technology (Marzouki et al., 2023) inter/intra/extra-organizational factors (Mergel, 2021), environment/organization/citizen or individual/technology (Chen et al., 2024; Novianto, 2023) and innovation/task/individual/environment/organization/social or political context (Frick, 2024). How scholars determine categorization depends on the area of interest.

One framework often used to categorize adoption and implementation factors is the contextual perspective of the Technology, Organization, and Environment (TOE) framework (Tornatzky et al., 1990). Thomas and Yao (Thomas & Yao, 2023) found that TOE has been used in more than 80 empirical information systems adoption studies since the 1990s. The authors used previous studies to look more deeply into the categories and sub-categories used in the framework and found the TOE framework had broad applicability across all stages of organizational technology adoption including information gathering, decision, and use.

The TOE framework posits that there are three contexts relevant to the innovation process in organizations – the technology, the organization, and the external environment. The context of the technology includes the availability and the characteristics of the technology such as cost, speed and accuracy. The organizational context includes resources, structures, and processes such

as slack resources, size, communication processes and linking structures. The external environment is the context within which the organization does business including regulations, technology support infrastructure, and industry characteristics (Tornatzky et al., 1990). The adoption and implementation of technology occurs within constraints and understanding these constraints can enable better strategies during the implementation process.

The original TOE framework has been used with other theories such as institutional theory to expand from the original nine subcategories. A meta-analysis revealed new organizational sub-categories that were not included in the original framework as shown in **Figure 6** (Thomas & Yao, 2023). No new technology or external environment sub-categories were identified. The expanded sub-categories are all within the organization category.

Figure 6: Technology, Organization, and Environment Framework

	Technology	Organization	Environment
Original Sub-Categories	Availability	Formal and Informal Link Structures	Industry Characteristics and Market Structure
	Characteristics	Communication Processes	Technology Support Infrastructure
		Size	Government Regulation
		Slack	
Expanded Sub-Categories		User Capability	
		Top Management Support	
		Top Management Characteristics	
		Strategic Value	
		Security Concerns	
		Readiness	
		Complexity	
		Compatibility	

Source: (Thomas & Yao, 2023)

Flechsig, Anslinger and Lasch (Flechsig et al., 2022) and Bagheri (Bagheri & van de Wetering, 2024) both used the TOE framework in their RPA work. The TOE framework provides a solid foundation from which to explore factors that impact RPA implementation. This research project uses the TOE framework as the approach to categorizing factors.

Public Sector Innovation Adoption

Public sector innovation as a practice and a research area is gaining popularity having grown steadily over the last 20 plus years (Sapiyi et al., 2024). Public sector elected officials as well as employees want to be innovative and bring new ideas and practices into the organization (Demircioglu & Van der Wal, 2022). The phrase public sector innovation or PSI as it is abbreviated refers to the "adoption and implementation of innovative practices, policies, and services" (Criado et al., 2023, p. 1) in public entities.

PSI encompasses all types of innovation including the adoption and implementation of technology. Broadly, academic examination of the public sector innovation process cuts across three public administration subfields – public management, public policy, and e-government - and includes several types of innovation such as process innovation, product or service innovation, governance innovation and conceptual innovation. While some overlap occurs between the three sub-fields, each largely evolved independently and there is potential to bring lessons from one sub-field and apply them to another sub-field (de Vries et al., 2018).

PSI Antecedents

The meta-synthesis of the literature performed by de Vries et al. (de Vries et al., 2018) is a good overview of antecedents found in the public sector diffusion and adoption process. The paper does not define antecedent but suggests these are "essential for fostering an innovation's diffusion and adoption" (p. 166). **Figure 7** shows the three sub-fields' antecedents across environment, organization, and innovation. Adoption of technology falls within E-government.

Figure 7: Antecedents Found in PSI Research

Context	Theme	E-gov	Public Mgt	Public Policy
Environmental				
	Collaboration	X	X	X
	Coercion/regulatory aspects	X	X	X
	Learning		X	X
	Competition	X	X	X
	Socioeconomic charteristics	X	X	X
	Mimicry		X	X
	Proximity			X
	Dissemination	X	X	X
Organizational				
	Slack resources	X	X	X
	Supportive leadership	X	X	
	Risk culture	X	X	X
	Size	X	X	X
	Structure	X	X	
	Training	X		
	Intra-organizational networks	X	X	X
Innovation				
	Ease of use	X		
	Compatibility	X		X
	Relative advantage	X		X
	Security and privacy	X		
	Costs	X		
	Trialability	X		X
	Observability	X		X

Source: (de Vries et al., 2018)

Researchers have explored a wide variety of technology topics with PSI including e-government (Gil-Garcia & Flores-Zuniga, 2020; Savoldelli et al., 2014; Zhang et al., 2014), digital government/digital transformation/smart government (Bjerke-Busch & Aspelund, 2021; Mergel et al., 2019; Moser-Plautz, 2024; Schedler et al., 2019; Wilson & Mergel, 2022), big data (Coulthart & Riccucci, 2022; Gasco-Hernandez et al., 2022; Gil-Garcia & Flores-Zuniga, 2020; Pencheva et al., 2020; Van der Voort et al., 2019), smart cities (Akgün et al., 2024; Tang & Ho, 2019), open innovation (De Coninck et al., 2021; Mergel, 2021), and open data government (Young, 2020; Zhao & Fan, 2021). Specific types of technology innovation have also been studied such as robotic process automation (Baran et al., 2020; Bozeman & Youtie, 2020; Frick,

2024; Ranerup & Henriksen, 2019, 2020) and artificial intelligence (Agarwal, 2018; Bérubé et al., 2021; Chen et al., 2024; de Sousa et al., 2019; Giest & Klievink, 2024; Oswald & Babuta, 2019; Wirtz & Müller, 2019; Wirtz et al., 2020; Yigitcanlar et al., 2024). Overall, many of the factors found in the RPA literature on adoption and implementation discussed earlier are seen in PSI.

Public Sector RPA Research

A small amount of RPA public sector research has been conducted and has occurred outside of the U. S., primarily at the local level. Frick's (Frick, 2024) systematic literature review on RPA adoption found only 23 reports on public sector RPA use with 18 focused on RPA adoption. The articles were from seven countries: Sweden (8), Germany (4), Finland (2), Poland (1), Australia (1), Peru (1), and the Netherlands (1). Of the 85 factors identified, eleven were public sector specific and these were primarily in public governance and public value management. Factors such as bureaucratic organizations and compliance with regulations are infused with underlying public governance concepts such as transparency, accountability and integrity. Public value management reflects public administration's requirement to meet the needs of citizens and businesses.

Flechsig, Anslinger and Lasch's (Flechsig et al., 2022) work compared purchasing and supply management in private and public organizations. They found differences in process and IT landscape, RPA awareness, motives for adoption, the potential benefits, barriers, process selection, length of time to implement and type of center of excellence. The top three barriers for private sector were 1) financial resources 2) IT human resources and 3) organizational structure and in public organizations, it was 1) organizational structure, 2) government regulations, and 3) internal communications. Private sector organizations used either a centralized or federated

center of excellence while public organizations used a centralized center of excellence. The types of factors did not appear to be different between private and public sector organizations, however, the weight of importance of some factors differed between the two. Their work was included in Frick's (Frick, 2024) review. Lindgren et al. (Lindgren et al., 2022) examined RPA implementation in Swedish local government and found implementation challenges within four themes: 1) initiating RPA top-down without bottom up support, 2) lacking sufficient process and IT competence, 3) dependence on individual enthusiasts and external RPA consultants and 4) difficulties in finding suitable processes to automate.

Johansson et al. (Johansson et al., 2022) examined public value creation through the use of RPA focusing more on what policy areas and political contexts are most suitable for RPA as well as awareness of public administration legitimacy as it relates to transparency, integrity and professionalism. Ranerup and Henriksen (Ranerup & Henriksen, 2019) examined public value in RPA use in local level, social services. The authors categorize RPA as weak artificial intelligence and consider RPA to be automated decision-making. They looked at four value positions of professionalism, efficiency, service, and engagement and found the use of RPA reinforces accountability, increases efficiency, and decreases costs but there is a balance between values and automation effects such as between professional knowledge and automated decision-making. Public value found in RPA work focuses on the values of efficiency that RPA introduces to organizations, accountability and transparency that comes with auditability as well as defined rules for decision-making, and good governance that automation brings. All of the public sector RPA work referenced in this section was include in Frick's (Frick, 2024) systematic review.

Project Framing

This project is framed using the three areas of literature previously discussed. First, in order to position this work across the innovation adoption phases, I used Zaltman et al.'s (Zaltman et al., 1973) stages of the innovation process as seen in **Figure 8**. This depiction represents the user experience and does not include the generation of the innovation.

Figure 8: Zaltman et al. Stages of Innovation Process

Initiation			**Implementation**	
Knowledge-awareness	Formation of attitudes	Decision	Initial	Continued-sustained

Source: (Zaltman et al., 1973)

Research on technology adoption, specifically RPA adoption and public sector innovation adoption, and the scant work on RPA public sector adoption is used to understand prior findings regarding factors impacting adoption. Key factors are presented below using the TOE framework in **Figure 9** with a description of each that follows. E-government and public sector RPA research were used to capture the public sector perspective and private sector RPA research findings were included for additional perspective.

Technological Factors

There are three technological factors found across the three areas of interest – compatibility, security and privacy, and costs. Generally, compatibility refers to the innovation's ability to fit into the organization to include things like values and beliefs, current operations, and the needs of the organization (Rogers, 2003). Specific to RPA, compatibility represents RPA's ability to fit into the technological landscape of the organization to include compatibility with the IT infrastructure that is in place, data compatibility, the fragility of RPA when IT system and/or

Figure 9: Factors Across E-Government and Private and Public RPA Research

Context	Theme	E-gov	RPA Private	RPA Public
Technological				
	Compatibility	X	X	X
	Security and privacy	X	X	X
	Costs	X	X	
Organizational				
	Resources	X	X	X
	Supportive leadership	X	X	X
	Risk culture	X	X	
	Size	X		
	Structure	X	X	X
	Training	X		X
	Intra-organizational networks	X		
	Process fit		X	X
	Public value awareness			X
Environmental				
	External collaboration	X	X	X
	Coercion/Regulations	X	X	X

Source: Author, 2024

source data updates occur as well as error handling (da Silva Costa et al., 2022; Fernandez & Aman, 2021; Flechsig et al., 2022; Frick, 2024; Kraus et al., 2024; Sarilo-Kankaanranta & Frank, 2021; Sharma et al., 2023). Frick (Frick, 2024) considered these as prerequisites while Flechsig et al. (Flechsig et al., 2022) considered the absence of compatibility as a barrier.

Security and privacy concerns are factors found across all three areas. In an e-government literature review, Savodelli et al. (Savoldelli et al., 2014) found a lack of privacy and security in e-government as a barrier to e-government adoption. Concerns exist in RPA adoption regarding the vulnerabilities introduced by the automation. Threats related to RPA include vulnerabilities that may allow an attacker access to data, insider threat of programmers to allow data leakage through the bot, and disclosure of confidential information through poor programming (Kurylets & Goranin, 2023). The right security controls must be in place for auditing activities and ensuring compliance with laws and policies (Bagheri & van de Wetering, 2024). There are two sides to these barriers. On one side, is a concern that automation will introduce vulnerabilities

into the system that will impact the security of data. On the other side, security controls and policies make it difficult to introduce automation into an information technology ecosystem. Scholars differ on how security and privacy concerns are classified. Some scholars consider these as technological factors (de Vries et al., 2018; Flechsig et al., 2022). In the expanded TOE framework put forth by Thomas and Yao (Thomas & Yao, 2023), they considered security concerns as both a technological factor (related to the technology's characteristics) and as an organizational factor. In this project, security and privacy are considered technological factors.

Costs of innovation/technology were seen as themes in e-government and RPA private sector research but did not appear in RPA public sector research. Two of the reasons for adopting RPA are the lower cost of RPA compared to other IT solutions and the potential, long term cost savings both of which are considered benefits (da Silva Costa et al., 2022; Flechsig et al., 2022). RPA adoption is typically less expensive and faster than back-end information technology efforts. However, Eulerich et al. (Eulerich et al., 2024) found that the true cost of RPA is "often misunderstood and understated" (p.143).

Organizational Factors

The largest group of factors used in this project is organizational. Resources, supportive leadership, and structure were found across all three bodies of work with risk and process fit found in two areas. The others were included in only one area. Availability of resources is a consideration in innovation implementation. Resources encompass a number of different things such as money, people, expertise and infrastructure and different scholars have treated resources differently including how these are classified in the three TOE categories. As an example, budgets and available financial resources have been classified as an organizational factor (Flechsig et al., 2022) as well as an environmental factor (Frick, 2024). Expertise has been

considered as both an organizational factor (Wilson & Mergel, 2022) and a technological factor (Flechsig et al., 2022). It is generally recognized that resources are needed and are seen as either an antecedent (de Vries et al., 2018) or as a barrier if not available (Flechsig et al., 2022; Frick, 2024).

Supportive leadership has been found across all three areas of literature and is seen as positively impacting technology adoption (Gagnon, 2001). General RPA adoption scholarship shows top management support as a factor in successful implementation (Bagheri & van de Wetering, 2024; Sharma et al., 2023) and lack of support as a barrier (Frick, 2024). Among other things, top management can ensure appropriate resources are allocated to the effort (Plattfaut et al., 2022). Others classify areas such as digital roadmap and strategy as an element of supportive leadership and, if lacking, are barriers to implementation (Flechsig et al., 2022).

Organizational structure was referenced across all three areas. The discussion of centralized versus decentralized organizational structure is found in e-government research with decentralization assumed to be more advantageous to diffusion (de Vries et al., 2018). However, Zaltman et al. (Zaltman et al., 1973) pointed out that centralization may have different effects depending upon where an organization is in the innovation process and could be more beneficial in implementation. One aspect of structure found in RPA literature is the need for some type of governance structure including centers of excellence (Bagheri & van de Wetering, 2024; Flechsig et al., 2022; Herm et al., 2023; Plattfaut et al., 2022; Sharma et al., 2023). Frick (Frick, 2024) does not specifically call out organizational structure in his review of public sector RPA implementation research, but does identify two areas that potentially fall within structure: 1) a bureaucratic organization as a barrier which mostly addresses processes and procedures and 2) the prerequisite of RPA governance.

An organization's ability to tolerate experimentation and risk-taking impacts the innovation adoption process. E-government research considers whether an organization is risk adverse or risk taking (de Vries et al., 2018). Risk taking has been found to be positively associated with technology adoption. As examples, Feeney and Wang (Feeney & Wang, 2016) found risk taking to be positively associated with intranet adoption in local government and Demircioglu and Audretsch (Demircioglu & Audretsch, 2017) found experimentation to be a condition for innovation in public sector organizations. In RPA adoption, risk can be decreased by starting with a proof of concept and moving forward if successful. Several works reference proof of concept as part of the adoption process rather than an adoption factor (da Silva Costa et al., 2022; Flechsig et al., 2022; Herm et al., 2023) although proof of concept as part of a staged approach was included as a critical success factor by Plattfaut et al. (Plattfaut et al., 2022).

There is some evidence that training employees on the innovation positively impacts adoption. This was found in e-government and RPA public sector work. There is one distinction between e-government and RPA public sector literature regarding training employees. In general, e-government research focuses on training employees who are impacted by the technology whereas RPA research focuses on training personnel who are programming the technology as opposed to individuals who are impacted by the technology. de Vries et al. (de Vries et al., 2018) found that training for employees led to greater diffusion and adoption of public sector innovation and Greenhalgh et al. (Greenhalgh et al., 2004) found that high quality training materials and on-the-job training enhanced innovation implementation success. Frick (Frick, 2024) found that having trained personnel on RPA specific knowledge was a pre-requisite to adoption. There is a difference in the training emphasis between general technology and RPA.

Process fit was found in both RPA private sector and RPA public sector research, but not in e-government. This suggests this factor is RPA specific. Process fit, defined as selecting appropriate processes to automate, is an important part of successful RPA implementation. RPA is best used with rules-based, standardized, and highly repetitive processes (Flechsig et al., 2022). Selecting the wrong processes to automate can negatively impact bot implementation and is considered a challenge or a barrier (da Silva Costa et al., 2022). Flechsig et al (Flechsig et al., 2022) considered process selection as a barrier within technological factors rather than an organizational factor and Frick (Frick, 2024) considered process fit as a prerequisite and an organizational factor.

Size and intra-organizational networks were found as a factor in the e-government literature. de Vries et al. (de Vries et al., 2018) found that larger organizations had a positive influence on adoption across the public administration sub-fields. Larger organizations potentially have the staff capacity to handle the additional work associated with innovation adoption which ties back to the ability to free personnel for implementation. For example, in the public-school setting, Fernandez and Wise (Fernandez & Wise, 2010) examined the factors that influenced adoption of H-1B visas for foreign skilled workers and found organizational size in the number of employees had a positive effect. Although size has been investigated as an adoption factor, size as a variable is not useful. It is often a proxy for something else such as resources (Tornatzky et al., 1990).

Intra-organizational networks promote both communication and learning. Intra-organizational networks provide opportunities for employees to ask questions, share knowledge, and learn what works and what does not work as well. These networks provide support to peers during the adoption process. de Vries et al. (de Vries et al., 2018) found intra-organizational

networks to be a common factor across all three public administration sub-fields in the adoption of innovation (de Vries et al., 2018). Greenhalgh et al. (Greenhalgh et al., 2004) found that "strong, diverse, and organic intra-organizational networks" (p. 606) facilitate knowledge sharing within organizations which facilitates the adoption of technological innovations.

Public sector RPA research includes some of the previously discussed organizational factors, but also identifies another element specific to public organizations, namely awareness of public sector values. Public sector values originally focused on efficiency, then efficiency and effectiveness and now more broadly to include "values associated with democracy" (Bryson et al., 2014, p. 445). Bannister and Connolly (Bannister & Connolly, 2014), in work on public values and information and communication technology, pointed out that public value has two interpretations - the public value (worth) and a public value (held by people) and for clarity in their work, they defined public value as a "mode of behavior" (p. 120). Frick (Frick, 2024) did not define public values but suggested that public sector values are core to public administration and therefore, he classified public sector value awareness as a prerequisite to RPA adoption. RPA adoption can lead to increased accountability, greater efficiency and decreased costs (Ranerup & Henriksen, 2019).

Environmental Factors

The last category of factors in TOE is environmental. The environment within which an organization operates can influence decisions regarding the implementation of technology (Tornatzky et al., 1990). Two environmental factors, external collaboration and coercion/regulations, were found across the three sub-areas. External collaboration in e-government literature refers to collaboration outside the public agency such as with other public sector agencies, citizens and elected officials (de Vries et al., 2018). Cinar et al. (Cinar et al.,

2019) found that external interaction barriers in the public sector innovation process were most often found between public sector organizations followed by citizens and non-governmental organizations, businesses as contractors and politicians. Specific to RPA, collaboration with entities outside the organization was found to be a barrier by Flechsig et al. (Flechsig et al., 2022) which is not surprising given the collaborative nature of supply chains. Outside collaboration was not referenced by Frick (Frick, 2024).

Coercion/Regulations also influence an organization's innovation process. Flechsig et al. (Flechsig et al., 2022) found government regulation to be a more significant barrier for public organizations than private organizations particularly in relation to procurement law which places more stringent requirements on public organizations to ensure transparency and equality. Frick (Frick, 2024) considered compliance with regulations to be a prerequisite to RPA adoption rather than a barrier as compliance with regulations is fundamental to public administration and therefore is mandatory for adoption. The technological, organizational, and environmental factors found in e-government, private sector RPA, and public sector RPA research will be used to guide data analysis.

Summary

Agencies in the U.S. federal government are adopting RPA, yet little is known about implementation experiences. Scholarly research on the innovation process is well established from early works of Rogers (Rogers, 2003) and Zaltman et al. (Zaltman et al., 1973). Scholars have formulated theories, frameworks, and models to explore the realization of the technology innovation process in organizations and public sector researchers have taken these approaches and applied them to public administration technology adoption and implementation. Gaps exists in these works, though. The factors that impact the implementation stage of the process are

understudied. Work specifically looking at RPA use in the public sector is limited even though public sector use has grown. There appears to be no scholarly investigation of RPA adoption and implementation in U. S. federal government.

This project uses Zaltman et al.'s (Zaltman et al., 1973) portrayal of the adoption process specifically the implementation phase to situate this work within the innovation decision process. Implementation factors found in RPA and public sector innovation research inform the interview process and the technology, organization, and environment framework are used to categorize findings as seen previously in **Figure 9**.

Chapter 4: Methodology

The U.S. federal government is pursuing the use of emerging technology to provide better service to citizens as well as increase the efficiency of internal operations. One of the technologies being pursued is RPA, yet very little research exists that sheds light on the adoption process as well as the enablers and the challenges of RPA implementation or RPA implementation in U. S. federal government. Scholarly work in the adoption process in organizations, technology adoption, and general public sector innovation adoption are good foundations to build upon to further explore this topic. Using previous scholarly work to guide engagement with individuals who are directly involved in RPA implementation can shed light on this important topic. This project uses expert interviews and supporting documents to explore technology innovation implementation in U. S. federal government and to answer the research question "What factors facilitate RPA implementation?" and "What factors are barriers to implementation?".

This chapter describes the research approach and data collection tools and then discusses sampling decisions, the data collection process and the data analysis approach. Descriptive data is presented last. Twelve (12) expert interviews were conducted between January 2024 and May 2024 with individuals from nine agencies using an interview guide based on the literature review. The interviews were analyzed using thematic analysis. Additional supporting documents were collected and reviewed for additional context. Descriptive data is included in this chapter to provide more context.

Interview Research Approach

This project uses expert, semi-structured interviews in conjunction with Federal RPA Community of Practice (CoP) documents and other supporting documents as the mode of inquiry

to explore the facilitators and barriers to RPA implementation. The expert interview as a qualitative method has been discussed and further developed since the 1990s often within the areas of political and social science research (Döringer, 2021). In general, experts are "knowledgeable of a particular subject and are identified by virtue of their specific knowledge, their community position, or their status (Döringer, 2021, p. 265)". This project uses one of the three types of expert interviews classified by Meuser and Nagel (Meuser & Nagel, 2009) - the systematizing expert interview which targets specialized knowledge held by the expert. In this case, the expert is an individual involved in the creation and/or management of the agency's RPA program.

Semi-structured interviews capture details, stories, and nuances of the implementation experience while also ensuring the discussion is in line with the research objectives. Interviews are a good way to explore an area of interest, identify new variables or in this study, factors, while also providing clarity on previously identified variables or factors (Ahuja, 2011). Interviews provide the opportunity to hear stories that provide context of the implementation environments. The process of technological innovation is complex, and viewing this process through an understanding of context can help reduce this complexity (Tornatzky et al., 1990). Interview data was supplemented by several supporting documents.

The interview guide was developed using public sector innovation research supplemented by RPA adoption and implementation research and interviews focused on both sub-stages of implementation as depicted by Zaltman et al. (Zaltman et al., 1973). Adoption is defined as "a decision to make full use of an innovation as the best course of action available (Rogers, 2003, p. 21)." Implementation is defined as the "actual utilization of the innovation by organizational

members as they perform their tasks (Zaltman et al., 1973, pp. 66–67)" and more specifically to RPA in this project, is defined as having an automation in pilot or production.

The unit of analysis for this work is the bureau, a subunit within the agency, and the unit of measurement is the individual. The intent is not to compare one bureau to another but to identify patterns. The expert provides their account of what helped or hindered implementation. These patterns provide preliminary insights into implementation experiences.

Data Collection Approach

The type of data gathered in this project was designed to provide insight into the various factors that impact implementation while also recognizing the other factors that may be present. In the fall of 2023, Virginia Tech Institutional Review Board approval was obtained to gather data using expert interviews of U. S. federal government individuals who are or were directly involved in RPA implementation. Experts in RPA implementation are a specific group of individuals who possess a degree of knowledge about the process being studied. When participants are needed with particular experiences and the pool of potential participants is too small for random sampling, purposive sampling is an appropriate approach (Rich, 2018). The individuals contacted for study participation had in-depth knowledge of how the RPA adoption process worked in their organization and could provide rich details regarding the factors that impacted implementation.

While there is no known, complete list of all U. S. federal agency RPA managers and program participants, a partial list of individuals was obtained from a 2022 General Services Administration (GSA) Freedom of Information Act (FOIA) request. This request resulted in a list of 136 personnel who participated in two community of practice surveys – one in 2020 and one in 2021 – focused on federal agency RPA programs. The list of 136 was cleaned and four

incomplete names of entries and 14 duplicate entries were deleted. Of the remaining 118 participants, 79 listed email addresses. Those who listed their email address were from the 2021 survey. Four individuals were part of the federal organization in which I was employed and were taken out of the pool resulting in 75 individuals that could be contacted from the GSA FOIA request. Additional online searches added four more names and email addresses, and snowball sampling was used to obtain an additional 16 contacts. The snowball technique is a technique where the interviewer asks the interviewee for recommendations of others to interview. This technique has been shown to be successful in gaining access to other knowledgeable individuals (Fujii, 2017).

Figure 10 shows the breakdown of potential interviewee outreach. A total of 89 initial emails were sent between December 2023 and March of 2024. The recruitment email is found in the **Appendix D**. Of the emails that were sent, 70 email addresses were taken from the 2021 survey data, 3 came from online searches and 16 were recommended by interviewees. Seven email addresses came back as undeliverable, and seven individuals declined. Sixteen initially agreed to be interviewed and of this group, 12 interviews were completed. Scheduling conflicts prevented the remaining four interviews.

Figure 10: Breakdown of Outreach

Source of Recruitment Contact Information	Number
Contact Information Found from 2021 Survey Data	70
Contact Information Found from Online Research	3
Contact Information Gathered from Snowball Technique	16
Total Email Invitations Sent	89
Results from Recruitment Emails	**Number**
Emails Returned Undelivered	7
Individuals Who Declined	7
Individuals Who Did Not Respond	59
Individuals Who Agreed to an Interivew	16
Number of interviews Conducted	12

Source: Author, 2023

Interviews lasted approximately 60 minutes and interviewees were asked a variety of questions. Initial questions focused on the organization's journey from learning about RPA to the current state of implementation. This included getting information about the number of RPA bots or automations in use. Interviewees were also asked about the factors that helped the organization during implementation and the factors that impeded implementation. Later questions probed interviewees' thoughts on factors that had been identified in the literature. The final question asked interviewees if there was anything they felt was important in implementation that I had not asked about. The Interview Protocol is found in the **Appendix E** which includes the interview questions. Interviews were audio-recorded and conducted via Zoom and the interviewer took notes as needed. Audio-recordings were transcribed with Zoom's transcription service and file names were coded so that identifying information could be stored separately from the transcription. The coding key was kept separate from the interview data. Audio recordings were deleted within 30 days of the interview. Transcriptions were saved in a Google drive folder through Virginia Tech, and I was the only one with access.

Data Analysis

This project used thematic analysis to identify factors across interviews that impacted RPA implementation. Kiger and Varpio (Kiger & Varpio, 2020) define thematic analysis as "a method for analyzing qualitative data that entails searching across a data set to identify, analyze, and report repeated patterns" (p. 847). Thematic analysis allowed for the identification of the pre-determined themes found in the RPA implementation and public sector innovation literature while also allowing for other themes to emerge.

Once each interview was transcribed and identifying information deleted, several rounds of analysis were conducted. Transcription was accomplished using the Zoom transcription tool. I

read through each transcription and verified questionable words using the video. I deleted identifying information from the interviews so they would remain anonymous. Once the interviews were cleaned, I coded each interview and reviewed each document manually rather than using software.

I first read through each interview for an overall summary and to familiarize myself with the interviewee's story. I read through each transcript a second time and highlighted the adoption process, and the factors interviewees suggested impacted implementation. I used the highlighted factors from the interviews and added sub-categories under each category to the data collection template found in **Figure 11**. The categories under each context (technological, organizational, and environmental) were taken from the literature review. Adding sub-categories allowed me to capture more detail. Most sub-categories of factors were easy to assign to a category. For example, discussions around money became a sub-category under resources. For those that were not readily apparent, I added them under the category of emerging themes. I read through the interviews after the data collection template was complete to ensure I had captured the essence of each interviewee's story and then I reviewed emerging themes to ensure I had not listed something as emerging that fit in a category.

The interview questions allowed me to collect descriptive data such as number of bots the organization had, the stage of maturity the interviewee felt the program was at, and how the organization was with overall technology adoption. I asked interviewees about the organization's RPA journey which allowed me to capture information about the stages of the adoption process

Figure 11: Data Collection Template

	Agency X
Stage of Maturity - Early, Moderate, Signficant	
#bots	
Overall technology adoption - early, average, late	
Interview Number	
Dissertation Code	
Stages of Adoption	
Awareness	
Attitude Formation	
Decision	
Initial	
Continued-Sustained use	
Type of function org performs	
Public sector specific issues	
Enablers	
Technological Factors	
Compatibility	
Security and Privacy	
Costs	
Organizational Factors	
Resources	
Supportive leadership	
Risk Culture	
Size	
Structure	
Training	
Intra-organizational support network	
Process Fit	
Public Value Awareness	
Environmental Factors	
External Collaboration	
Coercion/Regulations	
Emerging themes	
Challenges	
Technological Factors	
Compatibility	
Security and Privacy	
Organizational Factors	
Resources	
Supportive leadership	
Risk Culture	
Size	
Structure	
Training	
Intra-organizational support network	
Process Fit	
Public value awareness	
Environmental Factors	
External Collaboration	
Coercion/Regulations	
Emerging themes	
Specific Points	

Source: Author, 2024

and better understand where the organization was with implementation. Final questions focused on understanding the factors that impacted implementation.

Description of Interview Data

Figure 12 provides an overview of descriptive characteristics of the interview data. Twelve interviews were conducted representing nine agencies. One interviewee also had a department level perspective. This individual's bureau became the de facto lead for the department mostly because they were moving out with RPA. Interviewee roles in the organization ranged from senior management down to analyst with one interviewee being a contractor. Half (6) of interviewees were managers. Seven of the nine agencies' programs started between 2018 and 2020. Interviewees gave their perception of the stage of their program between early, moderate, and significant however, there did not seem to be any connection between how an individual described the stage of their program and the number of bots the organization had in use.

Figure 12: Description of Interviewees and Programs

Agency size (n=9)	
Less than 10,000	6
Betweeen 10,000-50,000	2
Department Level	1
Interviewee Role (n=12)	
Senior management	2
Director	2
Manager	6
Analyst	1
Contractor team member	1
Approximate Year Program Started (n=9)	
Not Started	1
2018	2
2019	4
2020	1
Did not answer	1
Stage of Program Description (n=12)	
Early	2
Moderate	4
Significant	4
Did not answer	2
Number of Bots in Use in Agency (n=9)	
None	1
1 to 50	2
51-100	1
101-150	2
151-200	1
Did not answer	2

Source: Author, 2024

Supporting Documents Description

An internet search as well as interviewee feedback identified several documents related to federal government RPA use. These documents do not specifically address the factors that impact implementation but do provide insight into best practices and were summarized in Chapter 2. **Figure 13** lists the supporting documents reviewed that are relevant to the research questions. Once the interview data collection template was complete, I reviewed the supporting documents and identified supporting points and any points that were different than either the interviews or the literature.

Figure 13: Relevant Supporting Documents

Relevant Document Name	Date	Type
Federal RPA CoP Documents		
RPA Playbook - Federal CoP	January 2020	Playbook
RPA Playbook - Federal CoP Addendumn	June 2020	Playbook
The State of Federal RPA	November 2020	Report
The State of Federal RPA	December 2021	Report
The State of Federal RPA	November 2023	Report
Other Organizations' Documents		
CIO Council RPA in Federal Agencies White Paper	Before January 2020	White Paper
Process Automation Benefits Are Not Being Maximized, and Development Processes Need Improvement	September 2020	Inspector General Report
Intelligent Automation Playbook: Volume 1 Robotic Process Automation	October 2019	American Council for Technology-Industry Advisory Council (ACT-IAC) Report
RPA in Federal Agencies How Federal Agencies Achieve More Through Robotic Process Automation (ACT-IAC)	March 2021	American Council for Technology-Industry Advisory Council (ACT-IAC) Report

Source: Author, 2024

The relevant documents are grouped into two categories: work completed by the Federal RPA CoP and reports and papers written by others. The Federal RPA CoP published an RPA playbook (*RPA Program Playbook*, 2020) plus three annual reports (*The State of Federal RPA*, 2020; *The State of Federal RPA*, 2021; *The State of Federal RPA*, 2023). The U. S. Chief Information Officers' (CIO) Council published a white paper on RPA (*Innovation Committee*

White Paper: Robotic Process Automation in Federal Agencies). The Department of Treasury Inspector General for Tax Administration produced a report on the benefits of process automation (McKenney, 2020) and the American Council for Technology-Industry Advisory Council (ACT-IAC) wrote two reports (Burrow, 2019; *RPA in Federal Agencies: How Federal Agencies Achieve More Through Robotic Process Automation*, 2021).

Chapter Summary

This chapter described my research approach and data collection tools and includes descriptive information regarding the interviews and supporting documents. I discussed my sampling decisions, my data collection process and my data analysis approach. Expert interviews were conducted with 12 individuals from nine agencies using an interview guide based on the literature review. The interviews were analyzed manually using thematic analysis and several rounds of coding. Additional supporting documents were collected and reviewed manually as well. Descriptive data is included in this chapter to provide context.

Chapter 5: It Was an Exciting Time

The interviews reflected both the possibilities as well as the difficulties individuals experienced in learning about and implementing RPA. One interviewee saw the potential in the technology and was hopeful that the organization would realize the benefits. The individual described the early days as an "exciting time." This chapter summarizes the findings from the 12 interviews representing nine agencies and is organized in four sections. The first section contains findings related to the innovation adoption process in organizations specifically around the stages of adoption. The discussion with interviewees gave me the opportunity to capture information about the various stages of adoption the organization went through and discuss where interviewees felt the organization was in implementation. The second and third sections focus on the findings regarding factors that impact implementation, and the last section presents findings related to public sector unique factors. Information from supporting documents is included were appropriate.

A couple of challenges arose quickly when reviewing the findings. I had expected my unit of analysis to be RPA programs at the agency. However, as the interviews began, I realized the interviewees represented RPA programs below the agency level, more like the bureau level. Only one interviewee represented an RPA program that was at the agency level. It appeared as though many of the interviewees did not have an agency level program or if there was one, did not reference it. Also, initially, my expectation was that the number of bots in use would give a sense of where an organization was in the implementation journey as it relates to continued-sustained use. It became evident during the interviews that this was not a valid assumption which will be discussed at greater length below.

As a reminder, three interviewees came from one bureau, two interviewees came from another bureau, and five interviewees represented one bureau each. One interviewee was at the agency level and one interviewee represented a bureau but also informally represented the department in some external engagements. Each interviewee described the bureau's or agency's RPA journey and the facilitators and barriers to implementation. References to specific agencies are Agency A through Agency I accompanied by interview number, I-1 through I-12 to keep responses anonymous.

Agencies' Adoption Process

Each interviewee was asked to talk about the organization's RPA journey. These discussions recounted how interviewees were introduced to the topic, the early stages of investigating the technology and how the organization moved into production. These discussions generally follow Zaltman et al's. (Zaltman et al., 1973) stages of the innovation process in organizations. Shown again in **Figure 14**.

Figure 14: Zaltman et al.'s Stage of the Innovation Process

Initiation			**Implementation**	
Knowledge-awareness	Formation of attitudes	Decision	Initial	Continued-sustained

Source: (Zaltman et al., 1973)

Most interviewees had similar experiences in which either a senior leader or a colleague mentioned RPA as something to consider (initiation - awareness). "Google it" was often used to described interviewees' first encounters with the technology (initiation - formation of attitudes). One agency found out about RPA through an innovation cell. The job of the innovation cell was to explore emerging technologies, assess the potential for the bureau and make recommendations on which ones the bureau should pursue. Following initial investigation, a decision (initiation – decision) was made to run a pilot (implementation – initial) and successful pilots progressed to increased use (implementation- continued-sustained).

Initiation Stage – Awareness

The first action in any of the organizations was simply being aware that RPA existed. Word of mouth was the primary mechanism either from a colleague or from a senior executive (i.e. leadership). Interviewee Agency A, I-1 found out from a colleague who thought that it would be useful with administrative processes.

> I actually came to learn about RPA from a colleague at another federal agency who asked if I'd ever heard about it. And, I said, no, I didn't. And he suggested that maybe I should look into it and learn a little bit about it because maybe there's some processes that it could help us kind of streamline and accelerate some of these administrative processes.

And another interviewee, Agency G, I-9, received an email from a colleague about a presentation on RPA as part of a federal innovation council. The interviewee was interested in how innovation and technology could be used for repetitive and cumbersome processes. "I was interested in what other agencies were doing. So I just went there as a kind of volunteer representative."

Others heard about it from senior leadership who had some knowledge of what it was but asked the interviewees to do some research. Agency D, I-4 stated "People just started talking about it and word got around. The [executive leadership] at the time just asked us basically, you know, this technology is coming out. We've heard about it. Can you guys do some research on it and figure out if this is something that would benefit us." And, Agency E, I-5 recounted a meeting with a senior leader "He called me in and he said, there's this robot that can do things in the computer and I was like, I don't understand. He's like just Google it and look into it and see whether we can do it."

Two of the interviewees were not at the bureau when RPA started but suggested that the technology leaning employees were aware of the technology and already using basic applications. These interviewees felt that the awareness may have been more bottom up from a

small group of innovators. Agency B, I-2 saw it as a combination of events such as the technology modernization legislation and the Office of Management and Budget (OMB) memorandum that came out during the first Trump administration and that there were people in the organization already using these tools to help their own work. Agency B, I-2 suggested it was through individual, staff-level employee efforts that got the RPA ball rolling in the bureau.

One agency had a different introduction to RPA. Agency F, I-8 discussed the bureau's innovation office whose job it was to find financial innovation. This office contracted out for a strategic study to look for ways of cost saving and mission quality and RPA came back at the top of the list. "RPA was the number one thing that came out of there. I would say one of the things that gave us license to move on RPA was this independent report that said if you really want to identify savings, here's a list and RPA was at the top."

Initiation Stage – Attitude Formation

Once interviewees became aware of RPA, different paths were taken to move toward decision. A few interviewees started with a Google search in order to read what they could find on the internet. In some instances, vendors played a role and, in some cases, the mix of circumstances in which a bureau found themselves impacted attitudes.

Google searches often led to RPA vendors who played some role in attitude formation. Interviewee Agency A, I-1 contacted several vendors and asked for presentations. The companies were eager to help and suggested they could automate the process of interest. Interviewee Agency A, I-1 had a process in mind to automate and then did the research. "So that's what I started and I worked on it for awhile. I tilted at that windmill for a good long while, probably over a year."

Others had different vendor experiences. Interviewee Agency D, I-4 reached out to potential vendors and found many did not have public sector RPA experience – "it was kind of a struggle to get support initially" while Interviewee Agency E, I-5 realized the vendor responsible for the financial system of record was starting to offer RPA solutions and had reached out directly to them and asked if the organization was interested. Interviewee Agency G, I-9 saw information about a GSA automation which seemed to have potential for the bureau as well. The individual reached out to the presenter and received a demonstration. Then GSA provided the presentation to agency leadership.

The bureau with the innovation cell used the strategic report as a springboard and requested volunteers from within the bureau to bring potential use case ideas forward for exploration. Not everyone was on board initially. So, while Interviewee Agency F, I-6 provided a volunteer, the individual downplayed potential involvement from the organization. "So they reached out for volunteers. And, honestly, I told [blank], fine volunteer, try not to get too involved. We don't have time for this. [blank] did the best [blank] could and came up with a potential use case and of course, it was picked."

Initiation Stage – Decision

Several interviewees discussed initial proof of concept approaches. It was difficult to tease out in some interviews what led to or even if there was a definitive decision to move forward with RPA. Of the nine agencies in the study, only one organization decided not to pursue implementation. Interviewee Agency A, I-1 spent quite a while, approximately a year, researching RPA as a potential solution for one of the administrative processes and ultimately felt it might not be a good approach. "The more and more I got to learn about it, the more and more I got to think, you know what, I think this is not the right technology for the problem." This was

echoed by both information technology (IT) leadership and organization leadership. IT leadership felt there was better technology to address the problem. And given IT leadership's position, executive leadership did not support moving forward. The decision was made not to adopt.

> My boss ultimately concluded now that I am learning more about this RPA thing, from the senior IT Manager, the power of the technology and kind of the sweet spot for the power, I'm not sure that it's worth the investment because I don't know that we're going to end up with anything that we can turn around and use and have work for us to address this problem so we ended up not making the investment."

Other interviewees discussed using a proof of concept. Agency D, I-4 discussed using a proof of concept to show senior leadership the value. The interviewee described the proof of concept as using the technology in a network environment that did not open the organization up to security concerns. Even then, the path was not easy. Several hurdles both from a security standpoint and also the fact that the vendor was a foreign owned company made the proof of concept a bit more challenging. Ultimately, they had a few use cases, chose one, and presented it to senior leadership and leadership loved it.

> And we basically had a cornered off development environment that is safe for us, kinda like a playground. We just started setting it up, seeing how it works and then really more importantly we started working with all the departments…..Let's start seeing what kind of use cases we can kind of come up with and figure out how to implement.

Agency F, I-6 also discussed the use of a proof of concept in order to gain leadership approval. The organization used mock data and downloaded trial software to keep the bureaucratic hurdles to a minimum. The team that had originally been skeptical was starting to get excited. They could see the potential. They presented the proof of concept and got approval to move into an official pilot phase. In another organization, Agency G, I-9 felt the GSA presentation to leadership led to the decision to move forward with a pilot program.

Interviewee Agency G, I-10 did not discuss a decision point but did describe how events unfolded. The individual heard about the technology in a brainstorming session, the individuals who brought it forward already had a few use cases in mind. Interviewee Agency G, I-10 had contractors with expertise on contract for a different effort and decided to try a few things. Rather than a deliberate senior leader decision, RPA use progressed as projects were successful.

Implementation Stage – Initial

For this project, I defined initial implementation as having a pilot project. This is in line with Zaltman et al.'s (Zaltman et al., 1973) view of initial implementation as somewhat of a trial period. Five of the 12 interviewees, Agency F, I-6, Agency F, I-7, Agency F, I-8, Agency G, I-9, and Agency G, I-10, representing two agencies, discussed their pilot projects or early stages of use. Agency A, I-1, previously discussed, stopped at the decision stage. Three interviewees, Agency B, I-2, Agency C, I-3 and Agency I, I-12, were not present in their organizations when RPA went into the pilot stage and could not offer information. One interviewee, Agency D, I-4, discussed having a proof of concept before a senior leader decision which was referenced in the earlier section. One interviewee, Agency H, I-11 described the journey, but did not signal a specific decision rather as pilot projects were successful, the organization continued down the path. Agency E, I-5 did not discuss pilot projects.

Two interviewees, Agency F, I-6 and Agency F, I-7, who were from the same organization, discussed how the pilot project was a funded collaboration between the bureau and the innovation team. Initially seven use cases were selected, but only two went forward. As they learned more about RPA, they understood which processes were a better fit and five of the original seven were not a good fit. Agency F, I-7 discussed the transition from the innovation team. It was unclear from the interview if this transition was immediately after the pilot when

"they finally let go, finally eased out of the picture and we're riding the bike without training wheels anymore." Agency F, I-8 also from this organization felt that the outside study recommending RPA was the impetus for leadership to let them run some pilot projects. Agency F, I-8 also discussed the transition from the innovation team to an operational home.

> Our job is innovation. We take ideas and operationalize them. But how long do we stick with it to see it scale? There's got to be a point where we sort of break it off and say, okay this is yours. And now we're gonna go back and find the new thing and do the exact same thing. And we had a lot of trouble finding where that line runs.

Interviewee Agency G, I-9 and Agency G, I-10, both from the same organization, described initial use as difficult. Agency G, I-9 indicated the intent was to use an automation another federal agency was already using and thinking the process chosen was not "overly complicated……and that started a long, convoluted journey." The process took significantly longer than expected, two years, to get a pilot project approved. The interviewee stated that it was not because someone did not want it to happen, but they ran into barriers such as security policy and procedures. In the end, they were able to show that the pilot project was successful. Agency G, I-9 did say it "was an exciting time." Interviewee Agency G, I-10 described the process as being alone in many ways without much help from outside the organization. "I feel like I was trying to be the founder of a new business of some sort." This individual felt that more could be done particularly on the funding side from central agencies such as the Office of Management and Budget (OMB) especially for automations that would be commonly needed across the government.

Implementation Stage – Continued-Sustained

Eleven of the 12 interviewees represented eight agencies that had moved past pilot projects and had automations in production. Agency B, I-2 considered the agency's use to be

moderate to significant. Initially, I had planned to compare programs by the number of bots in production as a potential avenue to show where an organization was on the continued-sustained use spectrum. This interviewee suggested number in use was not a good metric. This was also echoed in other interviews. As referenced at the beginning of this chapter, understanding the degree of implementation was not as straightforward as number of bots in production. Agency B, I-2 stated "Don't let the number of bots fool you. It's basically that they are doing heavy lifts…..So it's not necessarily the number of bots that's really the ROI." Return on investment (ROI) included things such as what the bot is producing versus the time it took to develop it. There are several ways to measure ROI including volume of transactions or whether the automation aligns with senior leader objectives. Agency B, I-2 also discussed the move toward business intelligence and in particular tools that are a part of Microsoft 365. The individual felt RPA was almost passed being an emerging technology and is becoming more like Microsoft Word, a normal part of people's software tools.

Agency C, I-3's organization moved from RPA only to an intelligent automation shop. RPA started in a part of the organization that was highly transactional, but to gain benefit in other parts of the organization, the team needed to include other types of automation. In this organization, RPA is not a stand-alone program, but it is one tool as part of their automation approach. Agency C, I-3 felt, as a few others also commented, that the "RPA space" in relation to other types of intelligent automation was muddied. This individual took over a functioning RPA shop and was asked to do more automation. Very quickly, the team realized that RPA only addressed part of people's problem. The team decided to look for options to fix the entire problems, not just a part of it.

> My office doesn't do just automation. In fact, we rarely do just automation. Most of it is "I have a problem and I need you to fix it and the problems includes

> automation but it also includes other things as well to give them a true solution……We've had a much bigger success story with that approach than trying to target just RPA. That's quite a bit different than most of the other agencies that I've ever worked with. Most of them have an RPA group and that's all they do and they only focus on RPA.

In their program, they are not running a significant number of RPA automations but have a vast amount of intelligent automations running each month. The State of RPA report published in 2023 (*The State of Federal RPA*, 2023) found that 26 of the 71 respondents had incorporated intelligent automations technologies as part of their program. As Agency C, I-3 stated, "I feel like the future of RPA is this muddled kind of mixed world that I'm living in today that I think others will eventually start to move to."

Interviewee Agency D, I-4 considered their use to be significant. This organization had also moved to intelligent automation implementing artificial intelligence with RPA. In addition, this agency utilizes citizen developers. Agency D, I-4 felt that scaling out the RPA team was important to success. From the interviewee's perspective, RPA use is "pretty much institutionalized now."

Agency E, I-5 felt the agency was at moderate use however, this organization's implementation was different than the other agencies represented. This agency used attended automations meaning that the automation ran on someone's computer. The other agencies represented used unattended automations that were housed in a virtual environment. Unattended automations are considered more advanced use of automation and typically have greater security requirements as well as cost. This interviewee felt there was more they could do with automation and had at least three ideas for the future. "We're still plucking away at it."

Agency F, I-6, Agency F, I-7, and Agency F, I-8 represented the same agency. Agency F, I-6 and Agency F, I-7 felt the agency was at moderate use with a lot more opportunity. Agency F,

I-6 said only 18 percent of divisions were using RPA and felt like they were at the tip of the iceberg. This organization uses a centralized governance model which means the RPA team does all the work. There are no contractors or citizen developers. The team has about 10 people who work on RPA full-time. The organization would like to bring 2-3 more people on, but it takes about a year to get someone trained and training new hires takes time away from developing RPA. "I'm in favor of sustained measured growth that we can handle while still hitting our metrics. So, we said three more is all we can handle at once so likely pulling these three people in, training them, getting them up to speed and then toward the end of that cycle, getting another set of people to go ahead and build." Also, the more RPA that is built, the larger percentage of time that staff will need to dedicate to maintaining rather than building new automations. Agency F, I-6 stated the organization was at Level 4 on the Federal CoP RPA maturity level which has five levels (*The State of Federal RPA*, 2021).

Agency F, I-7 felt there was more opportunity also, but that so far RPA implementation had not lowered costs to customers. The individual felt that perhaps they were "stymied to scale" in only being able to train a couple of people at a time.

> There's a lot of talk around scaling the enterprise and what else can we do? Are there more ROI?.....We're trying to climb a big mountain. We're definitely below the oxygen. We don't need oxygen where we're at, but I think we're looking at a summit that's up there, that's bigger, what I describe as quit dabbling with it and start to use it as a real strategic business tool.

While Agency F, I-7 feels there is much more that can be achieved, the individual felt positively about implementation. "I mean, my 18 years of experience in different roles, different levels, different spots, I haven't seen us take too many, and certainly to this degree, of idea to market. You know, idea to implement." As the interview was concluding, Agency F, I-7 asked, "when do you know you have saturated the market?".

> When do you know it's run its course?....What are the complimentary or adjacent technologies or opportunities that we should be looking at to become more generically a value creation center, and transformation center and less about a technology type. If you were to ask me, my opinion on these, I think we are talking about RPA far too much. I think we need to be talking about what business outcomes you want to achieve.

Agency F, I-8 did not talk much about continued or sustained use but did comment that the organization should have talked more about governance in the early stages and this lack of governance hurt them when it came to scaling.

> Now that we have this operationalized, how do we scale this to actually get the savings the report identified?.....I think we were so focused on getting RPA operationalized that we forgot about what does this look like for maintenance? In scaling perspective?.....I think we found it a home a little too fast without giving it the feeding it needed to thrive across the rest of the organization.

In addition, Agency F, I-8 felt that the organization did not build reassessment into the process to determine if RPA still made sense. The individual feels the market is changing and maturing and may be squeezing RPA out as companies are making technologies easier for people to use.

Agency G, I-9 and Agency G, I-10 were from the same agency although different than Agency F, I-6, Agency F, I-7, and Agency F, I-8. Neither interviewee indicated the number of automations in production, but Agency G, I-10 felt the organization was in the early stages of use. Agency G, I-9 was only part of initial use and could not comment much on continued or sustained use but did indicate that the organization now has an RPA program manager. Agency G, I-10 did not discuss continued or sustained use either but did comment that there's a lot of attention on artificial intelligence these days and not as much on RPA.

Agency H, I-11 said the organization used a crawl, walk, run approach by running a few pilot projects and then progressing from there. The interviewee did not indicate a specific decision point as mentioned earlier. However, this organization had the benefit of having information technology personnel with the right skillsets as well as a shared service data

platform in house which made the progression easier. The interviewee felt that moving from running attended automations on someone's computer to running bots on a virtual environment made a significant difference in the ability to scale. Two problems arose on desktop machines. First, developing RPA on one machine then transferring it to another machine to run did not always work out well if the computers were not on the same network with the same settings. Each machine's environment was a bit different so about 90 percent of the time, the automations had to be fixed. The second problem arose with time savings. When RPA is running on someone's desktop, no other work can be done on the machine as it will disrupt the automation. The individual cannot go off and do something else either because they need to have their identification card with them when they leave their desk yet, the card needed to stay in the computer while the automation ran. Changing to a virtual environment allowed the organization to scale. Agency H, I-11 stated the organization did not have as many automations in the pipelines as was desired because now the individual has other duties and does not have the time to do roadshows and look for potential processes to automate. Overtime, leadership interest has not given the RPA program the needed resources. Initially, the program got resources to stand it up and this was the individual's full-time job. Now, other issues require resources, and the individual has other duties. Leadership still considers it important but does not allocate the resources as before.

Agency I, I-12 came into the organization after the program was established. The individual feels they are at significant use. In the beginning, individuals were doing things within their areas, so the agency decided to consolidate things to reduce duplication and have oversight over what was happening. This allowed the agency to consolidate costs, enable auditability, and install cybersecurity controls. In the last two years, the agency has allowed employees to develop

bots on their own. These individuals are referred to as citizen developers. When asked if the agency was an early or late adopter of technology, the interviewee pushed back and said that was the wrong question. The individual felt that technology is a tool and what organizations should really focus on is digital business transformation that leads to efficiency and effectiveness.

Self-Reported Description of Use

Interviewees were asked how many automations were in use and also to describe where the organization was in its RPA journey – early stages, moderate use, or significant use and the responses are captured in **Figure 15**. Agency H did not respond, and Agency G was not aware of the total automations in use at the time of the interview.

Figure 15: Self-Reported Use

	Agency A	Agency B	Agency C	Agency D	Agency E	Agency F	Agency G	Agency H	Agency I
Stage of Maturity	Early	Significant	Significant	Significant	Moderate	Moderate	Early		Significant
Number of Automations	0	~15	100-150	85	5	110			165

Source: Author, 2024

Four interviewees felt their organization had a significant amount of RPA usage even though the number of automations reported by each varied substantially. Two felt their organization was at moderate use. Agency E had five automations in use, all of which were attended, but the interviewee felt usage was moderate. Agency A had no automations in use at the time of the interview and the individual felt they were still in the early stages. Agency G was not aware of the number of automations in use, but felt they were in the early stages of their journey. Almost all the interviewees felt that more could be done with automation in their agency.

Supporting Documents

The supporting documents did not discuss stages of implementation but did discuss the RPA program maturity model. This model is a method to evaluate an agency's use of RPA. As discussed in Chapter 2, the maturity model sets milestones across several areas and an agency's

RPA program is evaluated based on what milestones have been reached. The RPA Playbook provided details on what the model is, the four levels of the original model and how the model applies to each program area. The State of Federal RPA Report published in 2020 (*The State of Federal RPA*, 2020) included a fifth level in the maturity model that involved having 100 plus automations and monthly production of at least five, 300,000 hours of annualized hours created, government wide processes automated, 30 plus automations in the pipeline, seventy-five percent plus of unattended automation, and using advanced intelligent automation capabilities. The three annual reports (*The State of Federal RPA*, 2020; *The State of Federal RPA*, 2021; *The State of Federal RPA*, 2023) included overall maturity evaluations, as seen in **Figure 16**, for the programs that chose to participate in the annual surveys. One important note, it is not possible to determine if the same agencies participated in each survey.

Figure 16: Maturity Levels of RPA Programs from State of Federal RPA Reports

	FY19	FY20	FY21	FY22
Level 1	17	9	21	12
Level 2	3	6	17	23
Level 3	3	3	7	15
Level 4		5	4	4
Level 5				1

Adapted from: (*The State of Federal RPA*, 2020; *The State of Federal RPA*, 2021; *The State of Federal RPA*, 2023)

The Intelligent Automation Playbook developed by the American Council for Technology-Industry Advisory Council described common RPA automation stages as 1) proof of concept, 2) RPA pilot, prototype or minimum viable product and 3) expand and create new RPA implementations (Burrow, 2019). The other supporting documents did not discuss implementation stages or the program maturity model.

Factors that Facilitated Implementation

Factors that facilitated implementation came up in the interviews in two ways. First, each interviewee was asked directly "what factors helped the organization get where it is now in RPA

implementation?" And second, these factors arose during the overall discussion especially when interviewees discussed the organization's RPA journey.

Factors were categorized into the three contexts of the technology, organization, and environment framework. **Figure 17** lays out the categories, the factors found in literature, the number of interviews and number of organizations represented where each factor was discussed as a facilitator. The supporting documents did not specifically address factors that enabled RPA implementation, but some of the text in the documents add additional detail to interview identified factors and are added were appropriate.

Technological Factors

Technological factors included compatibility, security and privacy, and cost and none of these areas were discussed as facilitators in any of the interviews.

Organizational Factors

The most commonly discussed organizational factors were related to resources including money, people, time, expertise, and contractor support and the organizational factor of supportive leadership. One area identified in e-government and private sector RPA research, cost, did not come up in the interviews. Two additional organization-related categories of factors, collaboration within the organization and also the use of performance monitoring, were discussed.

Resources

Resources of some type were discussed in all of the interviews in which the organization had bots in production, which was 11 of the 12 interviews. Captured under resources was time, money, people, enthusiastic staff, citizen developer, contractor support, information technology infrastructure, and various types of knowledge and expertise.

Figure 17: Facilitating Factors Found in Interviews

	Number of Interviews that Included this Factor (n=12)	Number of Agencies Represented (n=9)
Technological Factors		
Compatibility	**0**	**0**
Security and Privacy	**0**	**0**
Costs	**0**	**0**
Organizational Factors		
Resources		
Time	**4**	**4**
Money	**3**	**3**
People	**2**	**2**
Enthusiastic people	**3**	**2**
Citizen developer	**1**	**1**
Contractor support	**5**	**3**
IT infrastructure	**3**	**3**
Institutional knowledge	**2**	**2**
Technical expertise	**4**	**4**
Functional /business expertise	**1**	**1**
IT expertise	**2**	**2**
Security expertise	**3**	**3**
Infrastructure expertise	**3**	**3**
Supportive leadership	**10**	**8**
Risk Culture		
Proof/successful pilot	**6**	**5**
OMB policy	**1**	**1**
Not leading in federal government	**2**	**2**
Size	**0**	**0**
Structure		
Center of Excellence	**2**	**2**
Centralized	**1**	**1**
Federated	**3**	**3**
Innovation Cell	**4**	**2**
Where RPA team is housed	**1**	**1**
IT system span of control	**1**	**1**
Training		
GSA support - mentor program	**1**	**1**
GSA support - CoP	**6**	**5**
GSA support - General	**3**	**3**
Hosted training	**5**	**5**
Help desk	**2**	**2**
Google, internet research	**3**	**3**
Intra-organizational support network		
General	**3**	**2**
Sharepoint/TEAMS	**2**	**2**
Process Fit		
Process Selection	**1**	**1**
Public Value Awareness		
Value proposition	**1**	**1**
Auditing	**3**	**3**
Environmental Factors		
External Collaboration		
Networked with other agencies	**1**	**1**
Software vendor - collaboration	**1**	**1**
Software vendor - information and engagement	**1**	**1**
Coercion/Regulations	**0**	**0**
Other Themes		
Organizational Factors		
Outside strategic study	**1**	**1**
Organizational collaboration		
Collaboration with IT personnel	**2**	**2**
Simplifying the message	**1**	**1**
Communication - to staff	**2**	**2**
Performance Monitoring		
Executive dashboard	**1**	**1**
Performance plans - automation	**1**	**1**

Source: Author, 2024

Time was mentioned as an enabler in four of the eleven interviews, and in particular when individuals had RPA as their full-time responsibility rather than having RPA as an additional duty. One interviewee, Agency B, I-2 felt that the organization's use of an innovation cell (captured later under organizational structure) enabled individuals to focus all of their time on the RPA effort. "One of the biggest mistakes organizations make is trying to take people who have day jobs and try and double task them……. It doesn't really work." There is a level of knowledge and expertise that is needed that just cannot be done with part-time people. Interviewee, Agency F, I-6 had similar thoughts. The organization started trying to implement RPA with people who had other primary duties and found the effort did not get off the ground. At this point, the organization began using people whose only job was RPA. Interviewee, Agency H, I-11, was fortunate to have RPA as a single focus in the early stages which helped get the program off the ground. Another interviewee, Agency E, I-5 talked about the time investment of working with a knowledgeable contractor to get a bot developed.

> It can be time consuming to work with a developer to develop a bot but I don't think people should let that hinder them from starting because you're gonna save time later. It's just like anything else, you have to spend the time to earn the time. I think that being able to sit down with a dedicated contractor who knew what they were doing as far as development of the bot and having us be able to clearly lay out what it was that we needed and then do the testing and implement and work with them on implementation really helped us.

Three interviewees discussed the role of money, meaning access to funds, as a facilitating factor. Money allowed for the purchase of software licenses, information technology infrastructure and the cost of contractors who had the expertise needed for implementation. The State of Federal RPA report published in 2023 (*The State of Federal RPA*, 2023) found that almost half (44 percent) of the 71 respondents had a line item in the budget dedicated to RPA.

Staff who were available to work on the program as well as enthusiastic staff members who championed the effort and worked to get resources were discussed as facilitators. One of the interviewees, Agency F, I-6, felt that staffing the RPA program with the right people made a significant difference in implementation. Originally, they used contractors as developers and found the contractors struggled to understand the complex business processes. The organization decided to hire functional experts from within the organization into their RPA program and this made a big difference. Now, they only hire (into full-time RPA positions) from within the business functions and then teach them RPA.

> The people we selected to work on the program were very important…..They are all 100% dedicated to RPA…..These folks didn't come from a background of developing. They came from budget and travel and marketing. Things like that but they had a technical bent, a lot of them before had tried to figure out ways to make things better in their own areas and had an interest in that. So it was kind of picking those people that were engaged in the project and excited about the project.

Another interviewee, Agency G, I-9 talked about the importance of having enthusiastic people in the program. These individuals worked hard to obtain resources and break down barriers. These were not people in leadership positions, but individuals who learned about RPA and believed in what it had to offer. Another interviewee discussed something similar in the fact that their program was really bottom-up and that some staff members had been doing RPA on their own just to make their jobs easier.

Citizen developer was brought up by one interviewee as a facilitator particularly in the continued-sustained use substage. RPA is a unique tool because the no code/low code aspect of it opens the door for individuals to automate parts of their job without having to hire developers. The individuals can develop the automation themselves, and these individuals are referred to as citizen developers. These individuals are full time employees within the business function with

an interest in technology and making their jobs easier. They get trained in how to use the software and, working within the agency's RPA framework, code applications to automate processes. These individuals have to balance RPA development with their assigned duties, but they can significantly augment the RPA program especially given their business line expertise. The State of Federal RPA report published in 2023 found 31 percent of survey participants were using citizen developers "to expand their RPA program's reach" (*The State of Federal RPA*, 2023, p. 9).

Contractor support is an area that is tied to time, staff availability and expertise. Five interviewees discussed contractor support as a facilitator; three of the interviewees were from the same organization. Organizations that did not have enough time, staff, or expertise and had funds were able to fill these gaps with contractor support. The three interviewees from the same organization talked about the role of contractors in the initial sub-stage. Agency F, I-6 stated, "We extracted some value from the contract work that we got, but a lot of it was documentation and helping us get through the original security things and getting our intake forms in place." And Agency F, I-7 stated

> We had a contractor as part of this pilot and the RPA center that they have does millions and millions of dollars all the time for private sector maybe a little bit in other places of government, so we got that prowess. We got that injection of expertise and tech know how and actually could set it up and get to testing it and using it. That seems like that was an imperative that was pivotal to having a fighting chance to get to a spot where we are doing a hundred or so of these in our system today.

One organization was fortunate to have a contract already in place doing other types of technology work and was able to easily access contractors to get the program started and then build it out. The RPA Program Playbook (*RPA Program Playbook*, 2020) acknowledged that RPA program resourcing strategies could either be fully contracted, fully government employees or a

hybrid approach. At the time of the Playbook development, the majority of agencies were using a hybrid model. This was reinforced by the December 2021 State of Federal RPA report (*The State of Federal RPA*, 2021) in which a key takeaway was "RPA programs developed varied team structures. Program teams balance federal and contract employees" (p.2). The report went on to breakdown the federal employee and contractor mix. Program and business analysts were 38 percent federal employees and 62 percent contractors. Developers were 28 percent federal employees and 72 percent contractors.

Knowledge and expertise were commonly discussed and came up both in discussions regarding pilot projects as well as discussions around scaling programs. Several types of knowledge and expertise were referenced as facilitating implementation. Cyber security, information technology infrastructure, and technical i.e. developer expertise were most commonly mentioned. Institutional knowledge, functional or business knowledge and general information technology expertise were also mentioned. The presence of knowledge and/or the ability to access the knowledge appeared to be key elements in implementation. It was difficult to discern from the interviews if the expertise was lacking in government or if the organization had the expertise but could not support providing that expertise to the project because they did not have enough manpower.

Technical expertise (i.e. knowledge regarding coding) was mentioned in four of the 12 interviews. As Agency D, I-4 said "And, really, you need, you know, developers." Regarding cyber security expertise, Interviewee Agency C, I-3 had cyber security knowledge when coming into the job, so the individual knew how to navigate the security environment. "I was fortunate because my past life at [blank] was in the cloud area, so I was doing a lot of security there and I

got really familiar with the security requirements and how to work security and that by far is the number one thing you can have in the federal space."

Information technology infrastructure expertise was also discussed by Agency D, I-4. The individual felt knowledge regarding information technology was important so that the infrastructure was setup correctly at the beginning in order to scale. In this organization, the program started on standalone computers. Moving to the cloud made a big difference. This sentiment was also expressed by Interviewee Agency H, I-11. Having this type of expertise allowed organizations to build out the right infrastructure. Three interviewees mentioned infrastructure, specifically moving to the cloud, as a facilitator to implementation. The RPA Program Playbook (*RPA Program Playbook*, 2020) addressed the need for technology infrastructure labeling this as part of the Program Technology as opposed to Program Management. The importance of resources to enable implementation was seen across interviews and includes a range of considerations such as money, staff, time, expertise, information technology infrastructure, and contractor support.

Supportive Leadership

Supportive leadership was mentioned in ten of the 12 interviews. It was actually mentioned in the interview in which the organization did not make it into a pilot project. Interviewee Agency A, I-1 felt that if the technology had been a good fit, that leadership would have supported the effort. Most individuals commented on supportive leadership providing resources for either the pilot project and/or into production. Supportive leadership was seen as breaking down barriers, putting aside money, or protecting individual's time who were supporting the program. As Agency B, I-2 stated,

> It takes the executive to basically say, hey, I'm willing to support this and talk to his or her counterparts to support it because a lot of times, these automations and

> these innovations, they cut across multiple different departments and that executive can be the top cover to say, yep, I directed my team to take a look at all these processes and your process owner and I need you to be part of those working groups to see where we can use technology to help.

Agency C, I-3 commented "You have to have at least a leadership that's willing to listen, understand what the benefits are, and you know, give you whether it's funding or the backing or the personnel, whatever it is to push forward." And, Agency D, I-4 stated,

> I think our CFO wanted to make this a priority. He was interested in innovating and innovation in general and also making sure that our staffing levels were appropriate and that the people who are working were doing things that need humans to work on, so he made it a priority to set asides funds for it.

Supportive leadership also set the tone of acceptance in the organization. Some interviewees felt that staff were more willing to accept or engage with the RPA program knowing that leadership supported it. One interviewee, Agency C, I-3, noted that the organization was undergoing budget cuts and expected the RPA program to experience cuts as well. Instead, the RPA program got additional funding because leadership wanted to dedicate more resources there.

> We recently had some budget cuts. Across the board, everyone was getting cut except me. I got an increase because they wanted to dedicate more resources and more effort into our space…..that's pretty surprising. I was not expecting not only not to get cut but to get more money and more people to keep pushing this side of the house. So that was sort of a leadership decision to say, look, we're backing you up. We want you to keep going with this.

While several interviewees discussed supportive leadership, two commented on government-specific aspects of leadership. In discussing the difficulties in accessing a particular data system, Agency G, I-9 described how the organization developed a workaround to get the project moving forward. Part of the reason, the interviewee stated, was because they had momentum and did not want to lose it. There was about to be a presidential administration change, and they were not sure if the incoming person would be supportive. "We had a political appointee that was very forward leaning and supportive, so we wanted to make sure we

capitalized on that." Agency F, I-7 discussed leadership support through federal government performance plans. One of the senior leaders put requirements in all the executive performance plans to maximize automation.

The FY22 State of Federal RPA report (*The State of Federal RPA*, 2023) highlighted that more than half of the 71 individuals who responded to the survey had an executive champion, regular engagement or ad hoc engagement with supportive leadership. In the report, while not explicitly stated, executive support most likely refers to Senior Executive Service personnel who have authority over programs and resources.

Risk Culture

Risk culture was primarily found in discussions of the pilot project and of successful pilot project moving organizations into production. A number of interviewees felt that successful pilot projects had a positive impact on moving into production and one interviewee stated the proof-of-concept effort led to a pilot project. Agency C, I-3 felt proving out the concept had a big impact.

> We rolled out some of these applications like the one I mentioned earlier, where we basically put our money where our mouth was, right? We showed them the value of using these low code applications and the automaton behind it so that they can get rid of these spreadsheets and things that they've been doing. So, part of it is just showing them……once you prove it, everybody wants it.

Two interviewees felt that not being a leader in federal government adoption was helpful in obtaining approval from leadership to start a pilot as it showed leadership they were not the first movers in this space and also there was some "fear of being left behind" which resulted in the approval to do it a pilot project. As Agency G, I-9 said,

> The federal working group had developed a lot of useful projects on why RPA is effective, important, why it's the future and so we were able to show that when we got to our approval and discussions with leadership. It was the how instead of the why because of all of that prior research. You know, quoting and aggregating

> government strategies on why it's important were already done for us. So that was really helpful. We weren't coming and saying here's a new, kind of shiny idea, as you said, this is actually federal policy to pursue this, and [agency] will be behind if we don't lean forward.

Size

Size of the organization as a facilitating factor was not mentioned in any of the interviews.

Structure

Factors related to organizational structure were discussed and included the type of governance in place such as centralized, federated, or a center of excellence, innovation cells, and span of control. There was no common governance approach among the interviewees with three interviewees describing a federated governance approach meaning policy and program guidelines were established in a central place and then project selection and development is decentralized. Two interviewees referenced having a Center of Excellence (CoE) however, the term was not clearly defined. One organization interviewed had a centralized approach where all policy, project selection, and development occurred in one location.

All interviewees who discussed governance felt their organization's approach worked well; however, interviewees from the organization with a centralized approach stated they must continually defend using the structure. When the organization moved to piloting RPA, the interviewees felt they were successful because they did not have people doing it part time. They had talked with other federal agencies early on and realized it was difficult for the agencies to get pilots off the ground with only using part time people (i.e. people who had other responsibilities in the agency). As Agency F, I-6 stated:

> We're frequently asked to defend how we're resourcing and staffing. They say, 'Have you considered this model?' Yes, and here's why. Three months later,

> ‘Have you considered this model?’ Yes and here’s why. We’ll answer those same questions. ‘Can you do citizen developers?’ Absolutely. Here’s the cost for implementing. The current team will no longer be able to build RPA because all we’re going to be doing is working with citizen developers, teaching them how to do it, reviewing their code, doing all those pieces. It’s very much an entirely different business model.

One interviewee with a Center of Excellence (CoE) felt moving to this model where the center supported the program by consolidating costs for infrastructure, and establishing guidelines for roles and responsibilities had a multiplier effect. The RPA Program Playbook (*RPA Program Playbook*, 2020) suggested agencies should choose the operating model that best fits their situation. The three COE models the Playbook highlights are centralized, federated, and decentralized.

The State of Federal RPA report published in 2020 (*The State of Federal RPA*, 2020) found most survey participants were at a Level 4, out of 5 levels, on governance.

> RPA programs are increasingly adopting a Center of Excellence model in which multiple customers within a larger organization receive services from one expert provider. This strategy enables the program to consolidate RPA spend within an agency and use government’s economies of scale in purchasing power for technology, licensing, and contract resources. (p.12)

To obtain Level 4 in operating model, agency operating models should cover strategy, performance, RPA investment and resourcing, technology management, compliance and control, and operational excellence. The State of Federal RPA report published in 2023 (*The State of Federal RPA*, 2023) found that 44 of the programs answering the survey had either a centralized or federated governance structure, up from 33 in FY 21.

In addition to governance, another type of structure interviewees discussed was the use of an innovation cell and this was mentioned in four interviews. These four interviews represented two of the nine agencies as three of the four interviewees were from the same organization. In

one of the organizations, an innovation cell was used to generate ideas for potential implementation. The cell was responsible for researching emerging technology, assessing its potential for use and then making recommendations to leadership. The cell contracted with a consulting firm to have a strategic assessment completed to understand what potential innovations existed in the market that may help them save money. Interviewee Agency F, I-8 felt that having RPA at the top of this type of study gave some validity when the individual asked to move forward with it. "Here's a list that would help you and RPA being at the top of that list, so I think my leadership bought into the idea and sort of was able to allow me to run some pilots and see what we find."

The other organization with an innovation cell felt that this type of cell gave focus to emerging technology and built expertise that could be used in the organization. As Agency B, I-2 stated, "You definitely need a separate entity or separate function setup for innovation or maintenance technology because they can focus on that full time, and they can build the appropriate strategy, and they have time to research and to build use cases." Two other points about structure came up in the interviews. One interviewee felt that the location of where the RPA team was in the organization helped as they were part of the bureau's information technology division. Another interviewee commented that at the beginning, the individual had complete span of control meaning that both the information technology functions, and the business functions were under the individual's control. This individual felt this type of authority was helpful.

Training

Training was referenced during the interviews in several ways such as training provided by GSA in support of a bureau's RPA program and technical training provided to developers.

Interviewees also discussed the use of Google when they first heard about RPA to understand the basics of the technology. GSA has a strong RPA program plus it houses the Federal RPA CoP. Several interviewees talked about early engagements with GSA and in particular receiving presentations on RPA and its capabilities before adoption decisions were made. The presentations were well received. One individual commented that more than one person after the presentation wanted their own personal bot! All the interviewees mentioned the Federal RPA CoP as a resource, but to be fair, the list of email addresses used as the starting point for selecting participants came from a Federal RPA CoP annual survey so this population would be familiar with the CoP.

The remaining six references of hosted training and help desk support are targeted to developers in the organization whether full-time or citizen developers rather than employees who are impacted by RPA. This is different from other technologies where users typically adopt a technology as part of their job (i.e. electronic mail). In the case of RPA, the "user" could be defined as the developer who is using the software to automate a process rather than the employee who is impacted by the automated process. The State of Federal RPA report published in 2023 (*The State of Federal RPA*, 2023) highlighted training within the agencies specifically geared toward building skills employees needed for an RPA program such as change management, process documentation and improvement, identifying stable data sets and in developing code.

Intra-Organizational Support Network

Intra-organizational networks, similar to training, seemed to impact employees who were a part of the RPA program or were developers rather than individuals who would be impacted by the technology. Only three interviewees discussed support networks with two of those stating

they have an internal community of practice. These communities primarily target citizen developers allowing them to share what they are working on and to receive additional help and training. It can also be a resource for individuals wanting to learn more about RPA.

Process Fit

One interviewee, Agency F, I-6, felt the process selected to be automated was an enabler in moving RPA forward. The same interviewee felt that because the individuals involved in the program were subject matter experts, they could choose processes they understood and that helped move the program forward. "We didn't try to bite off more than we could chew…we did not choose the most complex automations. We tried to start small, gain momentum, learn, then build because obviously, we learned on the job a lot." The RPA Program Playbook (*RPA Program Playbook*, 2020) includes a section on process selection and stresses the importance of selecting the right process. "Selecting the correct process is the most critical element of successfully launching an RPA pilot program" (p. 55).

Public Value Awareness

Public values include efficiency, effectiveness and the values associated with democracy (Bryson et al., 2014). One of the benefits of using RPA is an increase in efficiency so this value was foundational to RPA adoption. There were two other types of public values that were specifically mentioned in the interviews – value propositions and the ability to trace what actions the bot took and audit its actions. One interviewee felt that demonstrating value of RPA was a facilitator in adoption and three interviewees referenced the importance of auditability.

Environmental Factors

Two external factors, external collaboration and coercion/regulations, were found across e-government and public and private sector RPA literature, but only one area was identified as a

facilitator in the interviews. Two interviewees talked about external collaboration. One, Agency H, I-11, discussed the importance of going outside the organization and talking to people in agencies who had already explored RPA. A number of organizations were already using RPA and the interviewee talked to three or four of them. Interviewee Agency A, I-1 who did not move into a pilot production discussed the pivotal role that vendors played in the early stages as the individual was gaining awareness about the technology. "I learned people's names and their companies and so then I contacted those people and asked them to talk to me about it. And they did. They were most generous with their time…..I started to learn more….I contacted those companies and asked them to give me a presentation. They were really eager to help me…."

Lastly, a few interviewees mentioned Congressional and OMB policy as potential drivers of implementation which fall into the category of coercion/regulation. In describing why the organization looked at RPA as a potential solution, Agency B, I-2 felt a combination of factors came in to play including the IT modernization legislation and the OMB memorandum during the first Trump administration that specifically called out RPA as a potential technology solution for efficiency. These pieces in combination with individuals in the organization who were technology leaning resulted in an environment for new technology to gain a foothold. Agency G, I-9 referenced the OMB memo when talking with leadership to gain approval for an RPA pilot suggesting the organizations would be behind since there was federal policy to pursue it.

Coercion/regulations was found in supporting documents. Several of the documents (Burrow, 2019; *RPA Program Playbook*, 2020; *The State of Federal RPA*, 2020) referenced the President's Management Agenda (PMA), Cross-Agency Priority (CAP) Goal 6 "Shifting from Low-Value to High-Value Work" in discussing federal government RPA implementation. The

documents highlight that the PMA specifically called out RPA as an emerging technology to be considered.

Other Factors

Two other areas came up during the interviews – organizational collaboration and performance monitoring. These areas were also discussed in supporting documents. Interviewee Agency D, I-4 felt the collaboration the organization had with the Chief Information Officer (CIO) made a big difference in implementation particularly when it came time to get the security approvals needed. This type of collaboration was referenced in the RPA Program Playbook (*RPA Program Playbook*, 2020).

> Agency CIOs play a critical role in creating a successful environment for RPA development including the design of formal security protocols, credentialing, privacy processes, procurement of technology solutions and enterprise governance. A close, working collaboration between RPA program leadership and representatives of the CIO can expedite RPA throughput. (p. 6)

The December 2021 State of Federal RPA report (*The State of Federal RPA*, 2021) found that most survey respondents had "productive relationships with information technology (IT) departments" (p. 15).

Also found in the December 2021 State of Federal RPA report was a discussion of the United States Department of Agriculture RPA program dashboard which shows return on investment. The development and use of a program dashboard that included information on automation requests, the development process and production, operation and maintenance stages was highlighted as a program success. The State of Federal RPA report published in 2023 (*The State of Federal RPA*, 2023) found that reporting agencies used a variety of methods to measure performance including increased outputs, improved cycle time, improved customer experience, increase compliance, and increased accuracy. The report also found that 29 programs reported a

positive return on investment, four agencies reported a loss and six agencies reported breaking even.

Factors that Were Barriers to Implementation

Barriers came up in the interviews in two ways. First, each interviewee was asked directly, "What problems did you encounter and how did it impact implementation?" And second, barriers arose during the overall discussion, especially when interviewees discussed the organization's RPA journey. **Figure 18** shows the total references to each category of barriers. The majority of challenges interviewees discussed were regarding security and privacy policies, a technological factor, and resources, an organizational factor. There were some challenges with software vendors, an environmental factor, but not to the extent of the other categories.

Technological Factors

Both compatibility and security and privacy were discussed as challenges in the interviews. Two interviewees discussed the fragility of RPA as a challenge. Bots are developed to work with the current configuration of source software. When these systems get updates, changes may be made that impact bot operation. Often, users are not aware until the bot stops working. As Agency B, I-2 stated, "So sometimes if a particular update is pushed. It can break that new tool that just came into our system. There's all sorts of compatibility issues that will arise." This requires maintenance to the bot which is both unexpected in time and money as Agency C, I-3 pointed out. "I think the error rate over the life of the RPA is 90%. So, at some point it's going to break. So that was the biggest problem, right? You have to have a team of people ready to fix these things as they start to break."

Figure 18: Barriers Found in Interviews

	Number of Interviews that Included this Factor (n=12)	Number of Agencies Represented (n=9)
Technological Barriers		
Compatibility		
Technology - Fragility/Compatibility	**2**	**2**
Security and Privacy		
Security process	**8**	**7**
Security policy	**8**	**7**
Organizational Barriers		
Resources		
Time	**5**	**5**
Money	**3**	**3**
People	**2**	**2**
Citizen developer	**1**	**1**
Contractor Support	**2**	**2**
General lack of scalability	**1**	**1**
Compatibiliy with current IT systems	**1**	**1**
IT infrastructure/scalability	**2**	**2**
Lack of technical expertise	**3**	**3**
Supportive leadership	**1**	**1**
Risk Culture		
Fear of change/hesitant to move too quickly	**3**	**2**
Size	**0**	**0**
Structure		
Governance	**1**	**1**
Delineation between CoE and business area	**1**	**1**
Where RPA team is housed/organizational dynamics	**1**	**1**
Training		
Learning curve	**1**	**1**
Intra-organizational support network	**0**	**0**
Process Fit		
Wrong technology/Process Selection	**1**	**1**
Public value awareness		
Privacy as a value	**1**	**1**
Environmental Barriers		
External Collaboration		
Software vendor - general challenges	**2**	**2**
Software vendor - raised prices (vendor lock)	**1**	**1**
Coercion/Regulations	**0**	**0**
Other Themes		
Organizational Barriers		
Return on investment - not good at redeploying savings	**1**	**1**
Trying to automate everything	**1**	**1**
Organizational collaboration		
Lack of CTO/CIO/IT/cyber engagement	**1**	**1**
Communicating value	**1**	**1**

Source: Author, 2024

While compatibility was discussed, by far the most discussed challenge was security. Eight of twelve interviewees discussed security as a barrier. Two aspects of security came up. First, security policies and the processes used to adhere to these policies regarding software on the IT network were discussed. Before software can be used on a government network, users must get approval called an authority to operate. This approval comes from a senior federal

official, designated as the authorizing official, who is in a position to accept the risk associated with introducing an application to the information system and network (*Circular No. A-130 Managing Information as a Strategic Resource*, 2016). In the interviews, it sounded as though this was needed for each automation that was introduced to the network rather than one time approval to use RPA, however, that was not clear. Agency D, I-4 commented:

> Federal government security and all the other stuff, it could take you know upward to 6 months before you can even approval to use a solution. So, you know what you end up having and it's a big effort and it's tough is a lot of people who don't go to the trouble of trying to even find out if there's a better way to do something.…… a big security challenge. That was a big one for us. That was probably the biggest or I think it's a very long time to get the approvals that we needed.

Agency F, I-6 experience was not that technology personnel did not want to help but that the policies and procedures were not written for this type of technology. This required new ways of thinking which took time.

> The big barrier was security…. so as far as security. I just want to point out that no one in security was saying no. Their policies and procedures just weren't written in a way that that were friendly to RPAs. So, they were all willing to work with us and, but they had to figure out what needed updated, what approvals needed. So, everyone was willing to work with us. We didn't really come across anyone that was saying, absolutely not…. So, the policies and procedures just weren't written in a way that allowed a non-human to get in here or they didn't know what checks they needed to have and what audit documentation. It wasn't because people didn't want to. It was just we need to figure out the how.

Agency B, I-2 highlighted what the individual perceived as the security differences between private sector and federal government.

> The [agency] IT environment is very restrictive and that makes sense as a lot of sensitive information has to be protected. That presents challenges when you're trying to bring new technology into our environment. It's not like, you know, in industry. You can just bring in a new technology and within a week you have the technology up and running. When you try to bring in any kind of innovative technology into the [agency], you need to go through cybersecurity. And these things can take like years, right? Because of the complexity and all the issues that arise from trying to get any technology in.

A second type of security issue arose around gaining access to data residing in source systems. Even after an organization received approval to be on the network via an authority to operate, approval for the bot to interact with a source system was needed. This approval was given by the program manager who was responsible for the data on the source system. Interviewees ran into issues getting approval from the program manager. Agency F, I-6 ran into this problem.

> And, and then one case within [agency] they will no longer allow us to access that application. They said, 'you know, you do not have credentials. We will not let non-person entities in, so we had to shut that off. We had received at least tacit approval, to go into the system and perform what we did. And then they were doing some upgrades and changed the system. We had some additional questions, and a new person got involved and said, 'oh no, you don't'. And that was the end of it. So, it's just a person's decision. They kicked us out because if someone chooses to interpret a regulation a certain way, they can shut it off. In our case, it wasn't a big enough dollar amount, we would have spent more time fighting it up through the chain. If this was one of our million-dollar items, we would have put all hands on and pushed but it was at a low enough dollar amount that while it had an ROI we were going to quickly lose that ROI fighting the process.

Agency G, I-9 also ran into this problem. They had chosen a process another federal agency had automated, the system owner in Agency G, I-9's agency said no to allowing the bot access to the data.

> The other big challenge was what we decided on which we thought was pretty straightforward. It seemed good on paper, but the big challenge we ran into was the security protocols that went into having a third-party system access our [blank] data because the [data] system was designated as a highly sensitive system so we couldn't access the data directly. So that was a really big challenge and frustration. Even though we could show that [another federal agency] also used [this data] system and they were able to have the same technology access it. It really stalled the process. I mean, they all said we need the authority to operate, but even the programming, even once we got the authority to operate, the program manager still said, I don't want this technology touching my system.

The RPA Program Playbook (*RPA Program Playbook*, 2020) discussed technology policy as an area in which agencies should work closely with their information technology counterparts

to address early in the program. Obtaining security approvals early, specifically the ability to operate on the network or authority to operate, access to systems and access to data, can help agencies avoid this barrier. A key finding in the November 2020 State of Federal RPA report (*The State of Federal RPA*, 2020) was "RPA programs are meeting security requirements, but these requirements continue to limit program capabilities and impact" (p. 6).

Organizational Factors

While security, a technological factor, was the most discussed barrier, access to the resources needed to implement, an organizational factor, was the second most discussed challenge. Time, money and technical expertise came up most often as resource barriers. Regarding time, these discussions usually centered around the fact that interviewees were involved in RPA implementation as an additional duty meaning they had other job responsibilities. Agency E, I-5 summed up how lack of time on their part added to the difficulties in implementation.

> Time I would say…And then quite frankly, it was mostly on me to do a lot of the review of the business processes and the testing once it came through. I just have a lot to do. And so, because it was just one, essentially one person, kind of jammed up the works and it did create definitely a bottleneck as far as, you know, efficiency.

Another resourcing challenge was funding. Money was needed for software licenses, network infrastructure, and contractor costs especially if development and other area of expertise were contracted out. The federal government funding process begins two to three years out as agencies develop their funding requests, then it goes to the OMB, then to the President and over to Congress and finally into an appropriations act. This process takes about two years which makes it difficult get funding for emerging technologies and be responsive when new ideas come forward.

Agency G, I-9 described this process

> Our biggest challenge was number one, there were no set aside funds for this technology for these types of innovations to begin with, so we had to kind of beg and borrow from IT and special funds. And I think we even we might have even tried to use COVID funds at that time. But it all came down to money.
> I do know that our IT office did request out year funding for RPA. Whether or not those came through I'm not sure but because the federal requests, I mean that cycle is, you're requesting 2 to 3 years out kind of thing. We didn't have any available funds.

As a follow-on, Agency G, I-9 suggested access to a central pot of federal funding for the effort would have been helpful.

> Definitely just the lack of routine funding. There early on wasn't an innovation fund that we could pull from. So, we had to get a little creative. I think that's, I mean, a challenge throughout USG, but would just encourage, you know, when you have mandates or where they say, okay, this is a great idea government agencies implement. But there's no funding attached to it. It's hard to. It's hard to make it a priority.

Agency G, I-10 reinforced that idea and highlighted how much time was spent trying to find money.

> I mean, we were rolling up our sleeves and doing that extra work. And it's just, it's a lot of work, you know, budgeting and spreadsheets and all this business and trying to get the funds and you're burning up a lot of time to do it. It just seems like there should be just this a natural pot of money. At a central level that everybody is sharing.

Agency C, I-3 discussed how the program was creative in finding funds looking for ways to take advantage of different types of money available at the time.

> Funding is a big challenge. Anytime you need money to do anything you're gonna have to prove or request it in some way. So, what I've tried to be, I've tried to be pretty, I guess I'd call it inventive on how I might get some of those funding pieces. So, there's things around the agency where you can, you know, apply for funding and sort of to do pilot projects or prototype projects, things like that. So, we'll jump and grab those kinds of things. And that will enable maybe a new tool or a new connector.

The State of Federal RPA report from November 2020 (*The State of Federal RPA*, 2020) found similar funding issues. “Due to the federal procurement cycle, early RPA adopters must often wait one to two years to budget the resources necessary to make significant investment in an approved, enterprise production environment” (p. 14). The State of Federal RPA published in 2023 (*The State of Federal RPA*, 2023) quoted two survey respondents funding challenges. “Regular and consistent funding at a program level does not exist.” And “Approval for unattended, loss of contractor support, no funding” (p. 31).

The Intelligent Automation Playbook (Burrow, 2019) found that after initial implementation, thirty percent of RPA efforts fail due to lack of sustainment resources. Another challenge was access to the technical expertise needed for implementation, particularly developer knowledge. Agency B, I-2 talked about the challenges of not having technical expertise in the government and how this ties back to hiring and salaries as well.

> Technical expertise would be a barrier….A lot of the time we have to rely on contract support, which is not necessarily a bad thing. But, you know, over time you need to have just expertise be government dominant. So, all these new technologies that come online, normally what you have is you have to reach out to the contractors or the contractor workforce to be able to use the capabilities that you're looking for on the government side. And it's just by the nature of it, right? It's emerging technology so it takes someone from the private sector to teach the government before the government can have the expertise in there, right? So, there's that gap. Also, you know, if you take that a little further, a lot of times the government doesn't have the money to pay people that are really deep experts into it, so you almost need to go to the to the contractor sector to help the government to get up to speed with these technologies

Agency F, I-7 was concerned with the ability to have expertise resident in the government also.

> So, I think there's a certain amount of a balance between not outsourcing expertise or outsourcing, you know, labor scale. By doing it in house, I think the government's got a real workforce problem today. A lot of the youth are not coming to work for the government. A lot of the new graduates are not coming to work for the government. We're not able necessarily to compete as easily or to a successful degree as we'd like to grow our business by bringing on board data scientists and, you know, creative programmers, people who can walk and talk

> business and maybe a little in IT as well. So, I think that's some of the things that stymied us up till now.

Agency F, I-6 emphasized the difficulties in adding government employees particularly in this budget environment. “So again, we were able to get the resources, but within the program right now, there's not a lot of desire to add FTE with the current budgetary area so everybody's very cost conscious.”

Even when agencies have funding to hire contractors, sometimes even the companies do not have the quality of staff that is needed as Agency G, I-9 found out. “I will say the [contractor] developer was terrible, he eventually was fired by the company or was replaced and so I think our pilot took longer than it needed to because I just don't think their ‘subject matter expert’ was very good. So that was a little frustrating.” Overall, eight of twelve interviews, representing six agencies, discussed the use of contractors to some degree. Not all of these discussions were considered challenges, but the role of contractors was evident.

A few other areas of interest came up in the discussion one of which was the fear of change categorized under risk factors, a bad process fit and the presence of public values through the protection of individuals’ data. Three of the interviewees discussed employees concerns with the technology. By and large, interviewees were surprised at employee first reactions, but all of them felt after talking with staff about what RPA was and what it could do, they were able to get staff buy-in. Agency G, I-9 described this

> Also, the fear of change. A lot of the initial, and I was quite surprised by this. Well, maybe not surprised, but surprised at how widespread and how high up these concerns went that automation would equal the need to eliminate positions and that there would be this fear that new technologies would result in either layoffs or making certain positions no longer relevant. And so, I think we eventually got buy in, but I was surprised at how many questions we got asked about.”

The RPA Program Playbook (*RPA Program Playbook*, 2020) acknowledges that employees may be concerned about the use of RPA and suggests education and messaging and staff inclusion could aid in working through these concerns resulting in faster RPA adoption.

Agency D, I-4 talked about process fit and how the excitement of bringing in new technology led them to automations that likely were not good choices.

> The other thing too, which is probably the biggest and easiest pitfall is you just wanna automate everything. And one thing that we did not do a great job of initially is because we were excited about the technology. We thought it was really great, and we wanted to show it off. So, we really struggled with telling people no. There was one process specifically that we really needed automated, really great to do it. And we're like we're gonna do it, we're gonna figure this out. This technology is cool. And at the end of the day, we should never have automated that process. It took us way too long. It's still not a great automation because it was a process that wasn't stable enough.

Public values appeared as a barrier specifically in regard to the protection of individual data. Concern with the protection of individuals, in this case an individual's data, by a civil servant could be considered the exercise of public values. One interviewee felt that the reason a data system program manager denied a bot access to its data was because of the sensitive nature of the data in the system and the potential harms it could do to the individuals if privacy was not protected.

Environmental Factors

Environmental factors as barriers centered around software vendors and came up in two interviews. One interviewee talked about early difficulties getting approval to use a particular software vendor because the company was foreign owned which was not allowed by federal acquisition regulations. Then, one interviewee, Agency E, I-5 talked about how, after they started using a vendor, the vendor raised prices dramatically, but given where the agency was in implementation, it did not make sense to try to change to a different vendor.

> And then interestingly, I don't remember exactly the timing, but we use [vendor name] as our, whatever like the software to develop RPAs and handle them and in 2019, 2020, even in 2021, it was fairly affordable annual subscription. And then I don't know, past year or two, they really blew up and accordingly they changed our pricing structure. I don't know the exact details because we don't pay it directly. We pay for it through our contractor, but I was told that they tripled the price. And they said you can't just have this and this license you have to have this overall license which is extra.... The problem is when you are so dug into a certain technology, it's gonna cost you actually much more to rebuild everything on a new technology. So, you've already invested in this, so you don't really have a choice to go elsewhere. So, the costs have increased actually over the years. But I still think that it's well within the ultimate cost savings as far as.

Other Factors

A few other factors emerged in the interviews. Several interviewees discussed return on investment (ROI) and whether or not the automation is worth the amount of money being spent. One interviewee assessed ROI as three things – does it cost less to develop and maintain the bot than hours performed on the task, who in the organization wants the automation such as senior leadership or does it improve error rates. The RPA Playbook (*RPA Program Playbook*, 2020) lists a number of ways in which an organization can communicate the value of the RPA program including annualized capacity created in labor hours, average cost per automation, cost avoidance, error rates, and process velocity among other things.

One interviewee felt that the inability to deploy the savings was a challenge. RPA programs report various metrics, but the interviewee was not able to show that costs had been reduced. As Agency F, I-7 said

> I think it's probably fair to say we're not really good, and it probably kept us pretty small for a while, at the idea of the return on the investment. And what I mean when I say that we don't tell stories worth a darn and really there's a lot of stories to be told about value. Not just dollars and cents and hard black and white ROI you know cost and financial benefit.
>
> So I think that stymies us and I think in particular when you look at our organization that's transaction based or very much operational culture where we are infiltrated by accountants left and right, how do you create an accountability

> structure if you create this much gain on a bot, to redeploy that gain into some kind of dividend, a business dividend like lowering the price of that service or redeploying the personnel people associated with that business process to higher level work, things of that nature.
>
> So, what we had was just a bunch of money, cost moving from one pocket to another, or squeezing the balloon. It would just inflate somewhere else.

Public Sector-Specific Factors

This section highlights factors specific to the public sector and in particular U. S. federal government. Public values did come up in the data as identified above both as a facilitator by demonstrating value and auditability as discussed in an earlier section as well as a barrier in the concern for individual data such as the potential for data leaks, and the resulting impact to individuals as discussed above. Other public sector-specific factors that came up include policies and regulations specifically those regarding cyber security, the budget process, access to resources, and political appointee senior leaders and carrying out administration priorities.

Policies and regulations came up in interviews in two ways. First, two interviewees discussed the first Trump administration's OMB memorandum that named RPA as an automation to pursue. One interviewee felt this gave the effort validity with leadership and in this instance was a facilitator. Rules around security was the second way policies and regulations came up. As discussed earlier, security was a significant barrier to implementation. There was a general sense that these policies were overly restrictive and not applied uniformly across agencies. Another area of policy and regulation had to do with acquisition regulations and software vendor ownership. One interviewee discussed the difficulties of working with a company because they were foreign owned.

The federal government has a unique budgeting process that was mentioned in a few interviews. Budgeting is a 1.5 - 2-year process so it is difficult to respond to emerging needs.

Several interviewees talked about not having money to get the program started. In addition to the budgeting process, interviewees talked about the difficulty in hiring additional people because of limitations on number of personnel as well as the pay not being competitive with the private sector. Lastly, one interviewee talked about a presidential administration change with different priorities and concerns that the new political appointee would not be as supportive of the program.

Chapter Summary

Information gathered from 12 interviews representing nine organizations provided insight into interviewee experiences in the RPA journey. This chapter started with an overview of each organizations' RPA journey, then highlighted the facilitators and the barriers to RPA implementation. The chapter finished with public sector specific insights. Overall, agencies seemed to follow similar early journeys in finding out about and then piloting RPA. One of the organizations interviewed did not move to the pilot stage citing that they felt it was the wrong technology for the problem they were trying to solve. The 11 other interviews from eight agencies were in various stages of RPA implementation. One organization was only using attended automations which means the bots were operating on someone's desktop rather than in a virtual environment and interacting with other systems. Zaltman et al.'s (Zaltman et al., 1973) adoption phases were used to discuss each organization's RPA journey.

Findings related to facilitators and barriers to implementation were presented using the technology, organization, and environment framework. Categories taken from literature were used to organize factors. **Figure 19** summarizes the factors found in the literature to the factors found in this project's data. A few factors did not show up in the data: the technological factors of cost and the organizational factor of size. Organizational collaboration appeared in the data as

"Other Factors". This factor did show up in some areas of previous scholarship, but I did not include in my original list of factors. Therefore, it is not labeled as an emerging factor. Public sector factors other than public value awareness appeared in the data. These factors were mentioned a few times throughout the interviews.

Figure 19: Factors Across E-Government, Private and Public RPA Research and Interviews

Context	Theme	E-gov	RPA Private	RPA Public	Study Data
Technological					
	Compatibility	X	X	X	X
	Security and privacy	X	X	X	X
	Costs	X	X		
Organizational					
	Resources	X	X	X	X
	Supportive leadership	X	X	X	X
	Risk culture	X	X		X
	Size	X			
	Structure	X	X	X	X
	Training	X		X	X
	Intra-organizational networks	X			X
	Process fit		X	X	X
	Public value awareness			X	X
Environmental					
	External collaboration	X	X	X	X
	Coercion/Regulations	X	X	X	X
Other Factors					
	Organizational collaboration				X
Other Public Sector Factors					
	Federal budget process				X
	Resources policies				X
	Political appointments				X
	Software vendor concerns				X

Source: Author, 2024

As for facilitators, resources and supportive leadership were mentioned most often and both are organizational factors. Barriers associated with implementation were found in security and privacy, a technological factor and resources, an organizational factor. Resources were considered a facilitator if an organization had them and a barrier if the organization did not have them. Public sector unique factors included public values seen in the protection of individuals' data, policies and regulations including those related to data security, and acquisitions, the budget process, personnel hiring limitations and salary difficulties, and political appointments and the potential for changing administration priorities.

The next chapter, Chapter 6 discusses findings from this chapter in relation to the literature found in Chapter 3 and identifies key take-aways from the research.

Chapter 6: Where Do We Go From Here?

The interviews and supporting documents provide insight into what federal employees experienced when implementing robotic process automation (RPA) and address two research questions "What factors facilitate RPA implementation?" and "What factors are barriers to RPA implementation?". This exploratory study started with organizational innovation adoption literature to frame the implementation stage within the innovation process, then focused on two specific areas of innovation adoption – technology adoption, specifically RPA and public sector innovation adoption – to understand previously identified factors that impact implementation. The Technology, Organization, and Environment (TOE) framework was used to categorize these factors to provide context.

In general, the factors found in literature were also seen in the data but with some nuance and differences. Three preliminary insights were identified. First, resource availability was a facilitator and a barrier, and organizations made choices about the type of resource to use during implementation based on the constraints they were under at the time. Second, cyber security related barriers were the most common and included both policy and process. Third, most public sector specific factors differed from those found in previous work in public sector RPA implementation. This chapter discusses what was learned from the study, the theoretical and practical implications as well as study limitations and suggestions for future research. Call-out boxes are included in the chapter to provide highlights from the interviews and to give additional context.

Resources as a Facilitator and a Barrier

Resources came across as a facilitator and a barrier to RPA implementation. This category included time, money, people, citizen developers, contractor support and expertise. Access to

resources was critical to implementation and, if an organization had sufficient resources, it was identified as a facilitator in the data; if the organization did not have resources, it was identified as a barrier. Preliminary insights suggest that agencies made decisions about what type of resource to use during implementation based on the policy constraints they were under at the time. It appears there was flexibility in the type of resource that could be used to implement and

Figure 20: Resources Interview Insights

Interviewees shared stories that highlighted not only the importance of the various types of resources, but how resources were interchanged depending on the situation they were in at the time. Their stories also highlight how support leadership and decision-making impacted resources and resource availability. As one interviewee put it, "when you ask me what facilitated implementation, I will say resources. And when you ask me what the barriers were, I will say resources." Time, people, and money had the most direct relationship. One interviewee talked about how time consuming it was to work with a developer and if the individual could hire more people, the program could do a lot more. The individual felt leadership was supportive and found money for RPA, however it had probably cost more than leadership expected. Without additional money, this program continues to be one person doing it as "other duties as assigned" and one contractor.

Another interviewee considered resources to be a facilitator because the agency happened to have contractors on board that had RPA expertise who were already doing other types of work for the organization. The agency could utilize these contractors. This agency could not hire additional employees due to hiring restrictions so having access to contractors made all the difference. At the beginning of the program, the interviewee was allowed to do it full time, but now, the individual is back doing their regular job, and the program doesn't get as much attention because it's an additional duty. Leadership has been supportive but wasn't as focused as previously. As another person said, if you don't have leadership support, you don't have anything.

Some individuals talked about how there was not funding for RPA when it started so they had to find funding within the agency. They looked for opportunities such as IT modernization funding or COVID funding. One interviewee felt that there needed to be funds set aside when these initiatives are started in government since no one has planned for it in their budget. This person felt like the founder of a new business having to figure things out on their own and having to look for resources.

As far as personnel, some agencies used a mixed of civil servants doing it as an additional duty plus contractors, one agency was all full-time civil servants while other agencies had some full-time civil servants working with contractors. To sum it up, one person said "You need time, expertise, and money. And it takes an executive sponsor because if leadership doesn't want to do it, it will die."

these decisions varied across agencies. For example, if an organization was not able to hire additional government employees but had money, it contracted out for people and expertise. If the organization did not have money to contract out, it relied upon employees to pursue RPA as "other duties as assigned" or in some cases organizations changed the duties of a business line to focus on RPA full-time. Another avenue to address the shortage of personnel was to allow staff members to develop RPA bots as citizen developers which added developer capability without the cost of adding people. This was also done as "other duties as assigned". In agencies that put resources toward implementation, resources were seen as a facilitator. However, policy constraints impact the types of resources that are available, and this was seen as a barrier.

An interesting discussion arose regarding the relationship between resource availability, type of resource, and supportive leadership. Supportive leadership was also identified as a significant facilitator during implementation. Often times, leaders are the ones who make resource decisions within policy constraints. Leaders have some ability to decide how funding is distributed. In addition, leaders can emphasize implementation as a priority and, in turn, devote full time employees to the task and take risk in other duties. The data suggests a relationship may exist between the role (and degree) of supportive leadership and resource utilization within policy constraints.

Cyber Security as a Barrier

Cyber security or more specifically, the policies and processes in place to strengthen protection of the information technology network, the applications used on the network and strengthen the security of the data itself, was the most significant barrier found in this study. While e-government, and private and public sector literature recognizes security as an important factor, preliminary insights suggest two aspects of security were at play in RPA implementation

in the U. S. federal government context. One aspect is obtaining authorization to operate on the network and the second is gaining approval from system owners to access the data.

Regulations and policies have been established to protect U. S. federal government information technology systems and networks. The National Institute of Standards and Technology publishes Security and Privacy Controls for Federal Information Systems and Organizations that outlines security and privacy requirements to protect information systems, components, and services. These controls are mandatory for federal systems (*Security and Privacy Controls for Information Systems and Organizations*, 2020). As examples, this document requires federal agencies to have access control policies that outline who can have access and to what as well as requiring federal agencies to have audit and accountability policies and procedures.

Protection of the networks encompasses many things. Network security prevents unauthorized access. Access controls limit what systems and data an entity (human or non-human) can access. Data security involves encryption of data as well as data accuracy and reliability. The first security hurdle organizations typically ran into was understanding and navigating the authority to operate approval process that includes many of the mandated requirements. This authorization ensures that software introduced to the information technology network meet security and privacy standards to protect the system and the data within the system. The agency's authorizing official is a senior official in the organization who assumes risk for the security of the network and ultimately provides this approval. Once this approval is obtained, the software can operate on the network. For users, this process feels like an

administrative burden. The process can be daunting, it adds time, and in some cases months and years, to the implementation process and is based on the attributes of the technology.

Figure 21: Cyber Security Interview Insights

Cyber security barriers and experiences were similar across the interviews. One of the benefits of RPA is that someone does not need IT expertise to start using it and what often happens is that individuals interested in using RPA are not IT personnel, but individuals with functional knowledge who are the ones doing the work to be automated. Most of the people interviewed in this project fit that category and were not IT personnel. It was a challenge for many to understand and navigate the cyber security requirements. One interviewee, who had an IT background, talked about having worked in a different area previously and learned about cyber security requirements which meant the individual knew what to watch out for and what types of questions to ask. It was summed up in this way – "having institutional knowledge of how to best get past these security gates is important but it can be very challenging." Another interviewee noted that information in federal government systems can be sensitive and should be protected but that presents challenges such as the time it takes to get new technology approved for use with an authority to operate – it can take 6 months to years. This was a common sentiment across the interviews. The words interviewees used to describe the process were "challenging" "big effort" "tough" "very long time" "biggest hurdle" "slowed everything down" and "long, convoluted journey".

To add to the difficulties, one interviewee commented that every few months, the CIO's office would come back and ask the same types of questions about the technology and the interviewee would have to explain it again. In the IT personnel's defense, they think about how to keep non-human entities, which are usually malicious, out of the system. The Federal CoP's Playbook talked about partnering with agency CIO offices and while in a few cases, this worked out, others did not get much if any support from the CIO. Many were left to learn about the process and work through it on their own. If you consider that many of the interviewees were involved in RPA as an additional duty, this is time spent on meeting regulatory requirements and taking away from increasing RPA use.

Another aspect of security surprised several interviewees, and it was gaining access to data systems in order to automate a process. A few talked about having to develop "workarounds" because they couldn't get into a system even though another agency was allowing automations access to data withing the same type of system. This also added time to implementation.

The second hurdle came as a surprise to implementors. Even after an authority to operate was obtained, implementors needed to work with the individual data system owner to get approval for the bot to access the data system and therefore, the data. This individual had a lot of power. Given that some U. S. federal government data is sensitive especially data associated with individuals, some program managers were reluctant to allow a bot to access data because they

were concerned the data would be leaked or be hacked and potentially put an individual in jeopardy. Denial of access resulted in either a workaround in order to get the data or the inability to automate that part of the process. Preliminary insight suggests that program managers interpreted policy differently within an agency and also across different agencies. The non-human aspect of system access was new to decision-makers, so they did not have previous experience to rely upon. Inconsistent policy interpretation particularly around non-human entity access to a system and its data can result in inconsistent implementation of emerging technologies.

Figure 22: Cyber Policy Interpretation Interview Insights

> Obtaining an authority to operate authorization was a cyber security process challenge while access by non-human entities to a data system was a policy interpretation problem. One interviewee selected a process to automate as a pilot because another agency had already done it. They felt like it would be easier to get it off the ground. Even though they could show that another agency was allowing data access, the data system owner in their agency said no. "It really stalled the process." The interviewee stated that it wasn't without merit to be cautious because the system had data on vulnerable individuals, but they felt the system owner was being overly risk adverse.
>
> Another interviewee gave an example where a process had been automated with RPA for quite a while, but the code needed to be updated. A new data system owner had taken over and when the interviewee contacted the individual regarding the update, the new system owner would not let a non-human entity access the system, so the automation had to be shut down. As the interviewee said, "Because if someone chooses to interpret a regulation a certain way, they can shut it off." The interviewee noted that people are afraid of RPA and the dangers of it.

Public Sector Specific Factors

The public sector specific factor found in literature, public values was identified in the data and was both a facilitator and a barrier. However, several other public sector specific factors were found and were considered barriers. In the category of public value awareness, the results included two values discussed in previous public sector RPA research that were considered facilitators and also identified one value not discussed previously which was a barrier. Public

sector RPA adoption literature referenced public value awareness including efficiency and accountability as a factor in implementation (Frick, 2024; Ranerup & Henriksen, 2019). Efficiency and accountability were also found in this study. One of the benefits of RPA adoption is the efficiency the technology brings, and this benefit was seen as a facilitator of implementation. Accountability as a public value came through in this study as automation auditability also seen as a facilitator. A third instance of public value seen in this study was in the protection of individuals' data and was a barrier; this is related to cyber security issues discussed above. Protection of individuals' data is recognized as a public value in information and communication technology literature (Bannister & Connolly, 2014) and policies and regulations are in place in U. S. federal government to protect data privacy. Instances arose in interviews where one agency allowed bot access to a system and data while another agency did not allow bot access to the same type of system and data. The hesitancy of civil servants to allow a non-human entity to access individuals' data, seen in this study, was suggested to be based on data privacy concerns and was a barrier.

Figure 23: Public Value Interview Insights

> Continuing with the policy interpretation point, as the interviewee commented above, the data system owner was concerned about a non-human entity having access to sensitive data, and in that case, data regarding vulnerable populations. This concern appeared to drive the individual to deny access. The RPA team had to develop workarounds that resulted in a less efficient process. This is an example of where two public values were at odds and the civil servant had to make a choice between the two.

In addition to public values, four other public sector factors were identified which were not found in early public sector RPA work. The length and rigidity of the U. S. federal budget process, the impact of resource policies, the impact of federal acquisition regulations and the changing of priorities that come with an administration change which are exercised through political appointments were all identified as barriers.

Money is an important factor in RPA adoption and implementation allowing organizations to purchase infrastructure, personnel, and knowledge. To obtain money, U. S. federal government agencies go through the public budgeting process. This process is lengthy taking a year and a half at a minimum from the time Office of Management and Budget (OMB) sends out planning guidance for agencies to develop their budgets to the time in which it's acted upon by Congress (Fiorentino, 2024). Congress should pass legislation for authorization and appropriation of funds for specific types of agency activities before the start of the fiscal year 18 months later. However, it is common for final appropriations bills to be enacted several months late and for the country to operate under a continuing resolution which has spending limitations. Between FY1997 and FY2023, the U. S. federal government has not had on-time, final appropriations legislation 14 times (Aherne, 2023). It's hard to know 18-24 months in the future what emerging technologies should be funded and therefore, how much money and personnel to request. If an emerging technology is identified, agencies have to take funds from another program. Unlike their private sector counterparts, public sector leaders cannot take actions to increase revenue to enable near term funding. Public sector leadership budget discretion after appropriations and spending legislation has been passed is limited (Fiorentino, 2024) and with a slow and unresponsive budget process, new ideas and new technologies cannot be fully funded immediately which slows adoption and implementation.

Related to the budget process are the resource policies in place within U. S federal government. The federal budget process is lengthy and rigid, and this limits agencies' ability to react quickly to emerging technology. To adapt to the financial impacts, decision makers look to other types of resources particularly personnel. The data suggests that agency personnel perceive difficulty in adding new government positions particularly in agency headquarters. The data was

unclear on whether resource limitations were in place (or if there was simply a perception of limitation) and if so, who was making this decision.

Federal acquisition regulations have strict requirements, and these requirements impact implementation. Data suggests that RPA software vendors (different than the role of contractors captured under resources) have a significant role in adoption and implementation. This is common in both private and public sector adoption. The key difference between private sector RPA software vendor acquisition and public sector is the requirement for public sector agencies to follow federal acquisition regulations. These regulations restrict which companies an agency can contract with such as small start-ups that do not meet the requirements of doing business with the federal government or companies that are foreign owned. Acquisition regulatory burdens limit agency choices and add time to the adoption process.

Every four to eight years, presidential administrations change and with this change comes new priorities and new political appointments. The role of supportive leadership was found in the data and one aspect of leadership's impact was the potential for new leadership and new priorities in a presidential administration change. Leadership changes frequently occur in organizations. What is unique in the public sector is the change in priorities that can occur on the four-to-eight-year cycle. For instance, RPA gained a lot of traction in the first Trump administration in part because it was specifically recognized as an automation for efficiency in the President's Management Agenda ("Shifting from Low-Value to High-Value Work," 2018).

Figure 24: Political Appointment Interview Insights

> One interviewee who ran into security challenges said that they were starting to gain some momentum and decided to automate part of a process and develop workarounds in the areas that had security challenges. A new presidential administration was coming in and the individual felt the current political appointee was very forward leaning and supportive and the interviewee didn't know if the next person would be supportive. They wanted to make sure they capitalized on the current support.

Political appointees whose job it is to carry out the president's agenda move forward on these types of priorities. When a new administration comes in, new priorities are established and, at times, previous administration priorities are not only put on the back burner but can be cancelled outright. It can be hard for agencies to establish an enduring program in an environment of changing priorities.

These additional exploratory insights on public sector unique RPA adoption and implementation factors were not seen in the RPA public sector literature. There are two potential reasons for this. First, there is no scholarly research on U. S. federal government RPA adoption, so this is a new perspective and second, the public sector RPA research that does exist is primarily at the local level. Public sector experiences may be different between countries and also between local and national or federal government.

Implications for Theory

Public sector innovation and public sector RPA literature lacks a U. S. federal government perspective and results from this study suggest there are unique aspects to consider. These exploratory insights may also have impact on other types of emerging technology U. S. federal government is implementing or considering implementing. Each individual insight offers opportunities for further research and should expand to include other areas of scholarship such as the federal budgeting process, regulatory burden as well as the impact of political appointments which were outside the scope of this project.

U. S. federal government unique factors impact RPA implementation particularly policies regarding cyber security, budgeting, hiring, and acquisitions which tend to act as barriers. Some policy is generated through Congressional requirements, others through executive branch requirements, and still others are driven by agency policy. These policies may not take into

account new aspects of emerging technology and/or may not provide civil servants the latitude to manage resources at the speed necessary for implementation resulting in barriers. In this case, those barriers were found in resources and cyber security. As a result of policy constraints, executive leadership made decisions about how to allocate resources in varying ways. The intersection of policy constraints, leadership decision-making and attributes of emerging technology such as speed of discovery/rate of change and the impacts to implementation within U. S. federal government should be explored in more detail.

Federal employees, when faced with unfamiliar situations such as emerging technology, must interpret current policy. Evidence of this was seen by the inconsistency in decisions surrounding non-human entity access to individuals' data. Frick (Frick, 2024) suggests that regulations governments operate under are fused with public values as these stem from elected officials. Cyber security policy particularly those around data privacy and protecting individual data certainly represents an infusion of public value. However, while the policies themselves represent public value, the ways in which civil servants interpret policy may also be infused with public value.

There are two aspects of public values in information and communication technology implementation. There is the impact of the technology on public value and also the decision by bureaucrats on technology implementation which may drive choices between public values (Bannister & Connolly, 2014). In this study, the decision was not whether to implement the technology or not, but about how to implement. The most efficient implementation required non-human entity access to individuals' data however, this *most efficient* implementation might result in an impact to individual privacy – two public values at odds. In this study, the decision by the civil servant to err on the side of data privacy was seen as a barrier. In addition, individual civil

servants were able to make individual decisions regarding the tensions between these two public values driving inconsistency in implementation across organizations. The intersection between competing public values, discretion and the attributes of emerging technology implementation such as privacy concerns requires further study.

As far as the innovation process overall, this project used Zaltman et al. (Zaltman et al., 1973) to outline the phases of adoption to clearly articulate where implementation lies in the innovation process. These stages were introduced in Chapter 3 and are shown again in **Figure 25**.

Figure 25: Zaltman et al.'s Stage of the Innovation Process

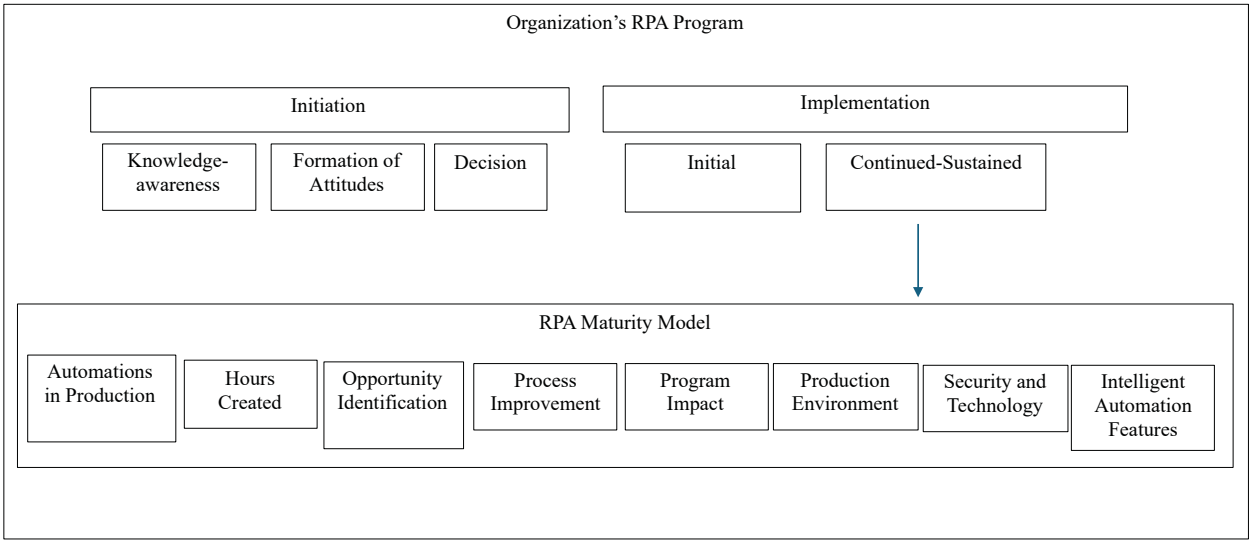
Initiation			**Implementation**	
Knowledge-awareness	Formation of attitudes	Decision	Initial	Continued-sustained

Source: (Zaltman et al., 1973)

Patterns were found across the data that showed organizations generally followed a progression from knowledge-awareness to formation of attitude to a decision then pilot projects as initial implementation. However, data from the project suggests there were three approaches to describing where an organization was in the continued-sustained substage of implementation. One focus was only on implementing RPA and implementation of additional bots within an RPA program. A second approach used the RPA maturity model, an RPA program assessment tool, developed by the Federal RPA Community of Practice. The third approach focused on RPA as part of a larger suite of automation capabilities and implementing a bot when a part of the process being automated required it. A closer look is needed at the continued-sustained substage to better define what occurs. An important element in the implementation process is the distinction between implementing a bot by developing and deploying it and implementing a program which enables bot development and scaling use within an organization.

Adding a technology specific approach to the implementation phase could address the complexities found in the continued-sustained sub-stage because the continuous cycle approach to RPA implementation presented by Sarilo-Kankaanranta and Frank (Sarilo-Kankaanranta & Frank, 2021) does not go far enough into understanding the degree of implementation. Combining Zaltman et al. (Zaltman et al., 1973) with the RPA Playbook (*RPA Program Playbook*, 2020) RPA program maturity model is one potential way to add detail to continued-sustained substage. This would move the innovation decision process from a generalist approach to a technology specific approach. An example of this is seen in **Figure 26**.

Figure 26: Example of Technology Specific Innovation Decision Process



Source: Adapted from (Zaltman et al., 1973) and (*The State of Federal RPA*, 2021)

Further research is needed to refine and test an RPA technology program specific innovation decision process. Other areas of scholarship such as change management may offer additional insight into the implementation process but was outside the scope of this effort.

The third approach did not have an RPA specific program focus, but from the perspective of an automation program in which numerous other tools were utilized. This approach was focused on automating a complete process and using RPA where it made sense. This type of

automation program was outside of the scope of this project, but the data suggests more research is needed to understand the innovation decision process and the implementation factors when technologies are bundled.

Implications for Practice

It is also important to recognize implications for practice found in this project. The data highlighted three points relevant to practitioners particularly in the continued-sustained sub-stage. First, organizations must fund RPA programs both with money and dedicated personnel. Second, organizations should continue to pursue emerging technologies around business intelligence rather than focus solely on RPA. Third, organizations should ensure strong partnership between the Chief Information Officer or Chief Technology Officer and the organization's RPA program to reduce the impact of security and privacy policies. Developing an automaton vision and strategy that includes appropriate resourcing, continued awareness of emerging technology, and whole-of-agency collaboration would help agencies gain the efficiencies and effectiveness these technologies promise.

Limitations and Future Research

This project has a number of limitations, and the findings are not generalizable. The work is informed by a limited number of interview participants from a limited number of agencies. While efforts were made to increase the interview pool, respondent numbers were small. There was not an easily accessible reservoir of information regarding federal government RPA managers and program participants. A list was obtained via GSA Freedom of Information Act (FOIA) request which skewed the pool to individuals who were part of the Federal RPA CoP. In addition, the list was several years old.

Another limitation became apparent during the interview process. Most of the individuals interviewed were at a lower level in the agency roughly about two levels removed from agency level decision-making and therefore, did not provide an agencywide perspective. For example, there is a staff that directly supports the agency leader, there is a level of leadership right under the agency leader, let's call it a directorate or division, and then within the director or division are sub-units such as a bureau. Most individuals interviewed were at the bureau level. Interestingly, it did not appear as though there was a higher-level RPA program in any of these cases however, that was not directly explored.

Project Summary

The federal government has emphasized RPA implementation since 2018 through memorandums, presidential management agenda direction, and the creation of an RPA Community of Practice (CoP) yet the technology is not as widely used as one would expect. Scholarly literature on RPA implementation, especially within the U. S. public sector, is limited. Assessments of U. S. federal government RPA implementation is primarily found in General Services Administration (GSA) surveys and annual reports. This project looked to contribute to gaps in the academic scholarship by exploring two research questions, "What factors facilitate RPA implementation? What factors are barriers to RPA implementation?"

The project consisted of three streams of scholarship – the adoption of innovation in organizations, technology adoption process, and the public sector innovation adoption literature. There is a great deal of scholarly research on innovation adoption and implementation, including the seminal work of Everett Rogers (Rogers, 2003) and follow-on work by Zaltman et al. (Zaltman et al., 1973), that provided models of the adoption process in organizations. A subset of innovation adoption work focuses on technology adoption, and another focuses on public sector

innovation adoption. When researching the factors that impact technology implementation, one of the categorizations used is Tornatzky et al.'s (Tornatzky et al., 1990) TOE framework. They believed that the context within which the technology is adopted and implemented matters.

Public sector scholars have investigated innovation adoption and implementation across the three major subfields of public administration: public management, public policy and e-government. A small number of researchers have looked at RPA adoption in the public sector outside of the U. S. and primarily at the local level. Combining RPA adoption and public sector innovation research provided a foundation from which to explore RPA implementation factors in the U. S. federal government.

Using TOE and factors found in the literature as a starting point, 12 interviews were conducted with individuals from nine agencies and a document review was conducted to begin to understand the factors that impact implementation. Several documents were found online to add additional context, and the majority of these documents came from the Federal RPA CoP. Three preliminary insights came from the data

1. Resource availability was discussed as both a facilitator and barrier and organizations made choices about the type of resource to use during implementation based on the constraints that were in place at the time.
2. Cyber security related barriers were the most common barrier found and included both policy and process.
3. Most public sector specific factors differed from the public sector RPA literature including tension between public values, the length and rigidity of the U. S. federal government budgeting process, resource policies, federal acquisition regulations, and

administration changes and, with that, changes in priorities exercised by political appointees.

Taken together, these insights suggest that federal employees operate under policy constraints that are unique to the U. S. federal government particularly those policies regarding cyber security, the budgeting process, personnel hiring, and acquisitions. Resources are critical in the implementation of technological innovation and leaders make decisions about types of resources to use within these policy constraints.

Public values play a role in technology innovation implementation. Previous research recognizes the presence of public value in policies and regulations particularly around data privacy however, an additional instance may occur in the discretion of civil servants to resolve public value conflicts during the implementation process. And, lastly, technology innovation adoption theory lacks specificity in the implementation stage and therefore, combining a generalist adoption approach with a technology specific approach during the implementation phase may fill this gap.

Future research should broaden to include more areas of scholarship in public administration and organizational theory and should explore:

1. The intersection of policy constraints, leadership decision-making and attributes of emerging technology such as speed of discovery/rate of change and the impacts to implementation within U. S. federal government. The data showed that resource decisions were impacted by policy constraints such as the federal budgeting process, hiring policies, and acquisition regulations. Scholarly work in leadership, complex organizations and bureaucracy combined with research into the impact of emerging

technology like artificial intelligence applied to the U. S. federal government setting could be informative.

2. The burden of regulations on innovation adoption in U. S. federal government – cybersecurity, budget process, resource policies and federal acquisition regulations. Scholarly research exists on regulatory impacts and applying insights from this line of literature to U. S. federal government internal operations would add more detail into the trade-offs civil servants make and the impacts.
3. The intersection between competing public values, discretion and the attributes of emerging technology implementation such as privacy concerns requires further study. The role of the individual in the implementation process was identified when civil servants made decisions to not allow non-human access to the data system. This highlighted a tension in public values which was resolved through individual discretion. Public value literature and bureaucrat discretion are areas of research that could be used to examine this more closely.
4. The impact on implementation of changing presidential administrations and their priorities as exercised by political appointees. There are various aspects of research into presidential administrations and political appointments. Given that many administrations come in with goals of efficiency and technology use, applying insights from these areas of research may shed light on impacts to innovation implementation.
5. An RPA technology program specific innovation decision process with focus on implementation. Other areas of literature such as change management and technology specific research could be useful in tailoring the innovation adoption process to fit emerging technologies.

This was an exploratory project designed to provide insight into U. S. federal agency RPA implementation. Given governments' interest in the efficiency and effectiveness that emerging technology brings (or purports to bring), understanding the factors that impact technology implementation can be beneficial both in academia as well as in practice. Academic scholarship lacks research into RPA implementation in government and it lacks attention to technology innovation implementation in U. S. federal government. For the practitioner, understanding what enables implementation as well as what challenges await, can allow individuals to better develop strategies around successful implementation.

Appendices

Appendix A: Bibliography

About Intelligent Automation. Retrieved January 3 from https://www.usda.gov/about-usda/general-information/staff-offices/office-chief-information-officer/digital-infrastructure-services-center-disc/intelligent-automation-center-excellence/about-intelligent-automation

Administration Actions on AI. United States Government. https://www.whitehouse.gov/briefing-room/presidential-actions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-and-use-of-artificial-intelligence/

Agarwal, P. K. (2018). Public Administration challenges in the world of AI and bots. *Public Administration Review*, *78*(6), 917–921. https://doi.org/10.1111/puar.12979

Aherne, D. C. H., Bill; Lynch, Megan S.; Murray, Justin; Saturno, James V. (2023). *Continuing Resolutions: Overview of Components and Practices*. Congressional Research Service Retrieved from https://www.congress.gov/crs-product/R46595

Ahuja, R. (2011). Research methods. In. Rawat Publications.

Akgün, E. Z., Gerli, P., Mora, L., & McTigue, C. (2024). Breaking barriers for breaking ground: A categorisation of public sector challenges to smart city project implementation. *Public Policy and Administration*, 09520767241263233.

Al-Slais, Y., & Ali, M. (2023, 26–27 Jan. 2023). Robotic Process Automation and Intelligent Automation Security Challenges: A Review. 2023 International Conference On Cyber Management And Engineering (CyMaEn),

Axmann, B., & Harmoko, H. (2020). Robotic process automation: An overview and comparison to other technology in industry 4.0. 2020 10th International Conference on Advanced Computer Information Technologies (ACIT),

Bagheri, S., & van de Wetering, R. (2024). RPA Ready? Unlocking Organizational RPA Readiness. Conference on e-Business, e-Services and e-Society,

Bankins, S., Denness, B., Kriz, A., & Molloy, C. (2017). Innovation Agents in the Public Sector: Applying Champion and Promotor Theory to Explore Innovation in the Australian Public Service. *Australian Journal of Public Administration*, *76*(1), 122–137. https://doi.org/https://doi.org/10.1111/1467-8500.12198

Bannister, F., & Connolly, R. (2014). ICT, public values and transformative government: A framework and programme for research. *Government Information Quarterly*, *31*(1), 119–128.

Baran, G., Berkowicz, A., Marzec, M., Sasak, J., & Szczudlińska-Kanoś, A. (2020). The opportunities and threats resulting from robotic process automation in public service development. *Zarządzanie Publiczne= Public Governance*(2 (52)).

Beerbaum, D. O. (2022). Artificial intelligence ethics taxonomy-robotic process automation (RPA) as business case. *Available at SSRN*.

Bernsteiner, R., Schlögl, S., Ploder, C., Dilger, T., & Brecher, F. (2022). Citizen vs. professional developers: differences and similarities of skills and training requirements for low code development platforms. Iceri2022 Proceedings,

Bérubé, M., Giannelia, T., & Vial, G. (2021). Barriers to the implementation of AI in organizations: Findings from a Delphi study.

Bjerke-Busch, L. S., & Aspelund, A. (2021). Identifying barriers for digital transformation in the public sector. In *Digitalization* (pp. 277–290). Springer.

Bozeman, B., & Youtie, J. (2020). Robotic bureaucracy: Administrative burden and red tape in university research. *Public Administration Review*, *80*(1), 157–162. https://doi.org/10.1111/puar.13105

Bryson, J. M., Crosby, B. C., & Bloomberg, L. (2014). Public value governance: Moving beyond traditional public administration and the New Public Management [research-article]. *Public Administration Review*, *74*(4), 445. https://doi.org/10.1111/puar.12238

Buchheim, L., Krieger, A., & Arndt, S. (2020). Innovation types in public sector organizations: a systematic review of the literature. *Management Review Quarterly*, *70*(4), 509–533. https://doi.org/10.1007/s11301-019-00174-5

Burrow, E. I., Sukmer; Paul, Anand; Bhatia, Manish; Buckley, Karen; Rissler, Gail. (2019). *INTELLIGENT AUTOMATION PLAYBOOK Volume 1: Robotic Process Automation*. https://www.actiac.org/system/files/Intelligent%20Automation%20Playbook%20Vol%201%20RPA%20Ver1_0.pdf

Chen, T., Gascó-Hernandez, M., & Esteve, M. (2024). The Adoption and Implementation of Artificial Intelligence Chatbots in Public Organizations: Evidence from US State Governments. *The American Review of Public Administration*, *54*(3), 255–270.

Cinar, E., Trott, P., & Simms, C. (2019). A systematic review of barriers to public sector innovation process. *Public Management Review*, *21*(2), 264–290. https://doi.org/10.1080/14719037.2018.1473477

Circular No. A-130 Managing Information as a Strategic Resource. (2016). Retrieved from https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/OMB/circulars/a130/a130revised.pdf

Coulthart, S., & Riccucci, R. (2022). Putting big data to work in government: the case of the United States border patrol. *Public Administration Review*, *82*(2), 280–289.

Criado, J. I., Alcaide-Muñoz, L., & Liarte, I. (2023). Two decades of public sector innovation: building an analytical framework from a systematic literature review of types, strategies, conditions, and results. *Public Management Review*, 1–30.

Critical Capabilities for Robotic Process Automation Summary. (2023). Gartner. https://www.gartner.com/en/documents/4633099

Cross-Agency Priority Goals Overview. General Services Administration & the Office of Management and Budget. Retrieved August 25, 2024 from https://trumpadministration.archives.performance.gov/CAP/overview/

da Silva Costa, D. A., Mamede, H. S., & Silva, M. M. d. (2022). Robotic Process Automation (RPA) adoption: a systematic literature review. *Engineering Management in Production and Services*, *14*(2).

Damanpour, F. (2020). *Organizational innovation: Theory, research, and direction*. Edward Elgar Publishing.

Damanpour, F., & Aravind, D. (2012). Organizational structure and innovation revisited: From organic to ambidextrous structure. In *Handbook of organizational creativity* (pp. 483–513). Elsevier.

De Coninck, B., Gascó-Hernández, M., Viaene, S., & Leysen, J. (2021). Determinants of open innovation adoption in public organizations: a systematic review. *Public Management Review*, 1–25.

de Sousa, W. G., de Melo, E. R. P., Bermejo, P. H. D. S., Farias, R. A. S., & Gomes, A. O. (2019). How and where is artificial intelligence in the public sector going? A literature review and research agenda. *Government Information Quarterly*, *36*(4), 101392–undefined. https://doi.org/10.1016/j.giq.2019.07.004

de Vries, H., Tummers, L., & Bekkers, V. (2018). The diffusion and adoption of public sector innovations: A meta-synthesis of the literature. *Perspectives on Public Management and Governance*, *1*(3), 159–176. https://doi.org/https://doi.org/10.1093/ppmgov/gvy001

Demircioglu, M., & Audretsch, D. B. (2017). Conditions for innovation in public sector organizations. *Research Policy*, *46*(9), 1681–1691. https://doi.org/10.1016/j.respol.2017.08.004

Demircioglu, M. A., & Van der Wal, Z. (2022). Leadership and innovation: what's the story? The relationship between leadership support level and innovation target. *Public Management Review*, *24*(8), 1289–1311.

Digital Government. https://obamawhitehouse.archives.gov/sites/default/files/omb/egov/digital-government/digital-government.html

Döringer, S. (2021). 'The problem-centred expert interview'. Combining qualitative interviewing approaches for investigating implicit expert knowledge. *International Journal of Social Research Methodology*, *24*(3), 265–278.

Enríquez, J. G., Jiménez-Ramírez, A., Domínguez-Mayo, F. J., & García-García, J. A. (2020). Robotic process automation: a scientific and industrial systematic mapping study. *IEEE access*, *8*, 39113–39129.

Eulerich, M., Waddoups, N., Wagener, M., & Wood, D. A. (2024). The dark side of robotic process automation (RPA): Understanding risks and challenges with RPA. *Accounting horizons*, *38*(2), 143–152.

Feeney, M. K., & Wang, S. (2016). Determinants of information and communication technology adoption in municipalities. *The American Review of Public Administration*, *46*(3), 292–313. https://doi.org/https://doi.org/10.1177/0275074014553462

Fernandez, D., & Aman, A. (2021). THE CHALLENGES OF IMPLEMENTING ROBOTIC PROCESS AUTOMATION IN GLOBAL BUSINESS SERVICES. *International Journal of Business and Society*, *22*(3), 1269–1282. https://doi.org/https://doi.org/10.33736/ijbs.4301.2021

Fernandez, D., Dastane, O., Zaki, H. O., & Aman, A. (2023). Robotic process automation: bibliometric reflection and future opportunities. *European Journal of Innovation Management*, *27*(2), 692–712.

Fernandez, S., & Wise, L. (2010). An exploration of why public organizations "ingest" innovations. *Public Administration*, *88*(4), 979–998. https://doi.org/10.1111/j.1467-9299.2010.01857.x

Fiorentino, D. A. (2024). *The Executive Budget Process Timeline: In Brief*. Congressional Research Service Retrieved from https://www.congress.gov/crs-product/R47088

Flechsig, C., Anslinger, F., & Lasch, R. (2022). Robotic Process Automation in purchasing and supply management: A multiple case study on potentials, barriers, and implementation. *Journal of Purchasing and Supply Management*, *28*(1), 100718. https://doi.org/https://doi.org/10.1016/j.pursup.2021.100718

Frick, N. (2024). *Barriers, Facilitators and Prerequisites for Robotic Process Automation Adoption in Public Administrations: A Systematic Literature Review* ECIS Proceedings,

Fujii, L. A. (2017). *Interviewing in social science research: A relational approach*. Routledge.

Gagnon, Y. C. (2001). The behavior of public managers in adopting new technologies. *Public Performance and Management Review P*, *24*(Part 4), 337–350.

Gasco-Hernandez, M., Nasi, G., Cucciniello, M., & Hiedemann, A. M. (2022). The role of organizational capacity to foster digital transformation in local governments: The case of

three European smart cities. *Urban Governance*, *2*(2), 236–246. https://doi.org/https://doi.org/10.1016/j.ugj.2022.09.005
Giest, S. N., & Klievink, B. (2024). More than a digital system: how AI is changing the role of bureaucrats in different organizational contexts. *Public Management Review*, *26*(2), 379–398. https://doi.org/10.1080/14719037.2022.2095001
Gil-Garcia, J. R., & Flores-Zuniga, M. A. (2020). Towards a comprehensive understanding of digital government success: Integrating implementation and adoption factors. *Government Information Quarterly*, *37*(4). https://doi.org/10.1016/j.giq.2020.101518
Greenhalgh, T., Robert, G., MacFarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of Innovations in Service Organizations: Systematic Review and Recommendations. *The Milbank Quarterly*, *82*(4), 581–629. https://doi.org/https://doi.org/10.1111/j.0887-378X.2004.00325.x
Hamm, P., & Klesel, M. (2021). Success Factors for the Adoption of Artificial Intelligence in Organizations: A Literature Review. AMCIS,
Harrison, D. A., Mykytyn, P. P., Jr., & Riemenschneider, C. K. (1997). Executive decisions about adoption of information technology in small business: Theory and empirical tests. *Information Systems Research*, *8*(2), 171–195.
Herm, L.-V., Janiesch, C., Helm, A., Imgrund, F., Hofmann, A., & Winkelmann, A. (2023). A framework for implementing robotic process automation projects. *Information Systems and e-Business Management*, *21*(1), 1–35.
Hofmann, P., Samp, C., & Urbach, N. (2020). Robotic process automation. *Electronic Markets*, *30*(1), 99–106.
Innovation Committee White Paper: Robotic Process Automation in Federal Agencies. Retrieved from https://www.cio.gov/assets/resources/robotics-process-automation-whitepaper.pdf
Johansson, J., Thomsen, M., & Åkesson, M. (2022). Public value creation and robotic process automation: normative, descriptive and prescriptive issues in municipal administration. *Transforming Government: People, Process and Policy*, *17*(2), 177–191.
Kiger, M. E., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical teacher*, *42*(8), 846–854.
Kraus, P., Fißler, E., & Schlegel, D. (2024). A typology of challenges in the context of robotic process automation implementation projects. *International Journal of Organizational Analysis*, *32*(11), 60–73. https://doi.org/10.1108/IJOA-11-2023-4100
Kurylets, A., & Goranin, N. (2023). Security Ontology OntoSecRPA for Robotic Process Automation Domain. *Applied Sciences*, *13*(9), 5568.
Lacity, M., & Willcocks, L. (2021). Becoming strategic with intelligent automation. *MIS Quarterly Executive*, *20*(2), 169–182.
Lindgren, I., Johansson, B., Söderström, F., & Toll, D. (2022). Why is it difficult to implement robotic process automation? Empirical cases from Swedish municipalities. International Conference on Electronic Government,
Marzouki, A., Chouikh, A., Mellouli, S., & Haddad, R. (2023). *Barriers and actions for the adoption and use of Artificial Intelligence in the public sector* Proceedings of the 16th International Conference on Theory and Practice of Electronic Governance, <conf-loc>, <city>Belo Horizonte</city>, <country>Brazil</country>, </conf-loc>. https://doi-org.ezproxy.lib.vt.edu/10.1145/3614321.3614334

McKenney, M. E. (2020). *Process Automation Benefits Are Not Being Maximized, and Development Processes Need Improvement*. Treasury Inspector General for Tax Administration

Meijer, A. (2015). E-governance innovation: Barriers and strategies. *Government Information Quarterly*, *32*(2), 198–206. https://doi.org/10.1016/j.giq.2015.01.001

Meijer, A. J. (2014). From hero-innovators to distributed heroism: An in-depth analysis of the role of individuals in public sector innovation. *Public Management Review*, *16*(2), 199–216.

Mergel, I. (2021). Open innovation in the public sector: drivers and barriers for the adoption of Challenge. gov. In *Digital Government and Public Management* (pp. 94–113). Routledge.

Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, *36*(4), 101385. https://doi.org/https://doi.org/10.1016/j.giq.2019.06.002

Meuser, M., & Nagel, U. (2009). The expert interview and changes in knowledge production. In *Interviewing experts* (pp. 17–42). Springer.

Miller, J. (2018). *4 bots relieve NASA employees from doing 'low-value' work*. Federal News Network. https://federalnewsnetwork.com/ask-the-cio/2018/05/4-bots-relieve-nasa-employees-from-doing-low-value-work/

Moser-Plautz, B. (2024). Barriers to digital government and the COVID-19 crisis – A comparative study of federal government entities in the United States and Austria. *International Review of Administrative Sciences*, *90*(2), 402–418. https://doi.org/10.1177/00208523231183566

Neumann, O., Guirguis, K., & Steiner, R. (2024). Exploring artificial intelligence adoption in public organizations: a comparative case study. *Public Management Review*, *26*(1), 114–141.

Novianto, N. (2023). Systematic Literature Review: Models of digital transformation in the public sector. *Policy & Governance Review*(2), 170–194%V 177. https://doi.org/10.30589/pgr.v7i2.753

Oswald, M., & Babuta, A. (2019). Machine learning predictive algorithms and the policing of future crimes: governance and oversight. *Policing and Artificial Intelligence (Dr John LM McDaniel and Prof Ken Pease OBE, eds., Routledge, Forthcoming 2020)*.

Pangarkar, T. (2025, January 14, 2025). *Robotic Process Automation Statistics 2024 By New Tech*. Retrieved January 17, 2025 from https://scoop.market.us/robotic-process-automation-statistics/#:~:text=Robotic%20Process%20Automation%20(RPA)%20adoption,in%20the%20next%203%20years.

Pencheva, I., Esteve, M., & Mikhaylov, S. J. (2020). Big Data and AI–A transformational shift for government: So, what next for research? *Public Policy and Administration*, *35*(1), 24–44.

Penttinen, E., Kasslin, H., & Asatiani, A. (2018). How to choose between robotic process automation and back-end system automation? European Conference on Information Systems 2018,

Plattfaut, R., & Borghoff, V. (2022). Robotic process automation: a literature-based research agenda. *Journal of Information Systems*, *36*(2), 173–191.

Plattfaut, R., Borghoff, V., Godefroid, M., Koch, J., Trampler, M., & Coners, A. (2022). The critical success factors for robotic process automation. *Computers in Industry*, *138*, 103646.

Promoting Innovation and Competitiveness. The White House. https://georgewbush-whitehouse.archives.gov/infocus/technology/tech4.html

Ranerup, A., & Henriksen, H. Z. (2019). Value positions viewed through the lens of automated decision-making: The case of social services. *Government Information Quarterly*, *36*(4), 101377.

Ranerup, A., & Henriksen, H. Z. (2020). Digital discretion: Unpacking human and technological agency in automated decision making in Sweden's social services. *Social Science Computer Review*, 0894439320980434.

Reddick, C. G., Cid, G. P., Ganapati, S., Bolívar, R., & Scholl, H. J. (2019). Determinants of blockchain adoption in the public sector: An empirical examination [Article]. *Information Polity: The International Journal of Government & Democracy in the Information Age*, *24*(4), 379–396. https://doi.org/https://doi.org/10.3233/IP-190150

Rich, R. C., Brians, Craig Leonard, Manheim, Jarol B., and Willnat, Lars. (2018). *Empirical Political Analysis: Quantitative and Qualitative Research Methods* (Ninth ed.). Routledge Taylor & Francis Group.

Robotics Process Automation (RPA) - Priorities, Benefits, and Considerations for CIOs. (2020). CIO Council Support. Retrieved October 26 from https://www.cio.gov/robotics-process-automation/

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed. ed.). Free Press.

RPA in Federal Agencies: How Federal Agencies Achieve More Through Robotic Process Automation. (2021).

RPA Program Playbook. (2020). https://digital.gov/pdf/rpa-playbook.pdf

Sapiyi, S., Suradi, N. R. M., & Mustafa, Z. (2024). Major Trends in Public Sector Innovation: A Bibliometric Analysis [Article]. *Jurnal Kejuruteraan*, *36*(2), 709–732. https://doi.org/10.17576/jkukm-2024-36(2)-29

Sarilo-Kankaanranta, H., & Frank, L. (2021). The continued innovation-decision process–a case study of continued adoption of robotic process automation. European, Mediterranean, and Middle Eastern Conference on Information Systems,

Savoldelli, A., Codagnone, C., & Misuraca, G. (2014). Understanding the e-government paradox: Learning from literature and practice on barriers to adoption. *Government Information Quarterly*, *31*, S63–S71.

Schedler, K., Guenduez, A. A., & Frischknecht, R. (2019). How smart can government be? Exploring barriers to the adoption of smart government. *Information Polity*, *24*(1), 3–20. https://doi.org/10.3233/IP-180095

Security and Privacy Controls for Information Systems and Organizations. (2020). Gaithersburg, MD: Joint Task Force Interagency Working Group Retrieved from https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r5.pdf

Sharma, C., Bharadwaj, S. S., Gupta, N., & Jain, H. (2023). Robotic process automation adoption: contextual factors from service sectors in an emerging economy. *Journal of Enterprise Information Management*, *36*(1), 252–274. https://doi.org/10.1108/JEIM-06-2021-0276

Shifting from Low-Value to High-Value Work, (2018). https://www.whitehouse.gov/wp-content/uploads/2018/08/M-18-23.pdf

Sobczak, A. (2022). Analysis of the conditions influencing the assimilation of the robotic process automation by enterprises. *Human Technology*, *18*(2), 143–190.
The State of Federal RPA. (2020). https://digital.gov/guides/rpa/state-of-federal-rpa/
The State of Federal RPA. (2021). https://www.gsa.gov/cdnstatic/state-of-federal-rpa-report-12-2021.pdf
The State of Federal RPA. (2023).
Syed, R., Suriadi, S., Adams, M., Bandara, W., Leemans, S. J., Ouyang, C., ter Hofstede, A. H., van de Weerd, I., Wynn, M. T., & Reijers, H. A. (2020). Robotic process automation: contemporary themes and challenges. *Computers in Industry*, *115*, 103162.
Tang, T., & Ho, A. T.-K. (2019). A path-dependence perspective on the adoption of Internet of Things: Evidence from early adopters of smart and connected sensors in the United States. *Government Information Quarterly*, *36*(2), 321–332. https://doi.org/10.1016/j.giq.2018.09.010
Thomas, D., & Yao, Y. (2023). Technology-Organization-Environment Meta-Review and Construct Analysis: Insights for Future Research.
Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). *The processes of technological innovation*. Lexington Books.
Vagnani, G., Gatti, C., & Proietti, L. (2019). A conceptual framework of the adoption of innovations in organizations: A meta-analytical review of the literature. *Journal of Management and Governance*, *23*(4), 1023–1062.
Van der Voort, H., Klievink, A., Arnaboldi, M., & Meijer, A. J. (2019). Rationality and politics of algorithms. Will the promise of big data survive the dynamics of public decision making? *Government Information Quarterly*, *36*(1), 27–38.
Wenger, E. (2011). Communities of practice: A brief introduction.
Wilson, C., & Mergel, I. (2022). Overcoming barriers to digital government: mapping the strategies of digital champions. *Government Information Quarterly*, *39*(2), 101681. https://doi.org/https://doi.org/10.1016/j.giq.2022.101681
Wirtz, B. W., & Müller, W. M. (2019). An integrated artificial intelligence framework for public management. *Public Management Review*, *21*(7), 1076–1100.
Wirtz, B. W., Weyerer, J. C., & Sturm, B. J. (2020). The Dark Sides of Artificial Intelligence: An Integrated AI Governance Framework for Public Administration. *International Journal of Public Administration*, *43*(9), 818–829. https://doi.org/10.1080/01900692.2020.1749851
Yarlagadda, R. T. (2018). The RPA and AI automation. *International Journal of Creative Research Thoughts (IJCRT), ISSN*, 2320–2882.
Yigitcanlar, T., Senadheera, S., Marasinghe, R., Bibri, S. E., Sanchez, T., Cugurullo, F., & Sieber, R. (2024). Artificial intelligence and the local government: A five-decade scientometric analysis on the evolution, state-of-the-art, and emerging trends. *Cities*, *152*, 105151. https://doi.org/https://doi.org/10.1016/j.cities.2024.105151
Young, M. M. (2020). Implementation of Digital-Era Governance: The Case of Open Data in U.S. Cities. *Public Administration Review*, *80*(2), 305–315. https://doi.org/10.1111/puar.13156
Zaltman, G., Duncan, R., & Holbek, J. (1973). *Innovations and organizations*. New York; Toronto: Wiley.
Zhang, C., Issa, H., Rozario, A., & Soegaard, J. S. (2023). Robotic process automation (RPA) implementation case studies in accounting: A beginning to end perspective. *Accounting horizons*, *37*(1), 193–217.

Zhang, H., Xu, X., & Xiao, J. (2014). Diffusion of e-government: A literature review and directions for future directions. *Government Information Quarterly*, *31*(4), 631–636. https://doi.org/https://doi.org/10.1016/j.giq.2013.10.013

Zhao, Y., & Fan, B. (2021). Effect of an agency's resources on the implementation of open government data. *Information & Management*, *58*(4), 103465.

Appendix B: Acronyms

ACT-ICT: American Council for Technology-Industry Advisory Council

CAP: Cross Agency Priority

COE: Center of Excellence

CIO: Chief Information Officer

CTO: Chief Technology Officer

CoP: Community of Practice

FOIA: Freedom of Information Act

GSA: Government Services Agency

IT: Information Technology

OMB: Office of Management and Budget

PMA: President's Management Agenda

PSI: Public Section Innovation

ROI: Return on Investment

RPA: Robotic Process Automation

TOE: Technology, Organization and Environment

Appendix C: Definitions

Adoption – a decision to make full use of an innovation as the best course of action available (Rogers, 2003, p. 21)

Antecedent – factors that must be in place for RPA adoption to succeed (Frick, 2024, p. 9)

Barrier – factors that might hinder or prevent RPA adoption (Frick, 2024, p. 6)

Facilitator - factors that have the potential to foster RPA adoption (Frick, 2024, p. 8)

Implementation – actual utilization of the innovation by organizational members as they perform their tasks (Zaltman et al., 1973, pp. 66–67). In this project implementation is defined as having an automation in pilot or production

Innovation – an idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003, p. 12)

Innovation Process - generation of the innovation, diffusion of the innovation, and adoption of the innovation (Damanpour, 2020)

Intelligent Automation – the application of advanced technologies such as Artificial Intelligence (AI), Robotic Process Automation (RPA), and machine learning (ML) to automate business processes in a way that mimics human-like decision making and reasoning. IA aims to automate tasks and processes not just by following predefined rules but by using advanced algorithms and machine learning models to analyze data and make decisions. (*About Intelligent Automation*)

Technology – tools or tool systems by which we transform parts of our environment, derived from human knowledge, to be used for human purposes (Tornatzky et al., 1990, p. 10).

Appendix D: Recruitment Email

INITIAL RECRUITMENT EMAIL

Subject line: Invitation to participate in a study on robotic process automation implementation

Dear ____,

I am writing to request your participation in my dissertation research which explores the factors that enable or inhibit RPA implementation within federal agencies. You have been selected based on your role as an RPA program manager in your organization.

The project is titled Virginia Tech IRB# 23-1239, Innovation Implementation in US Federal Government: Enablers and Barriers to Implementing Robotic Process Automation. To do this, I will conduct a series of interviews with US federal government RPA program managers across the spectrum of implementation from early stages to mature programs. I plan to use the results from the study to improve practitioners' understanding of the factors involved in successful implementation.

Participants will complete an interview lasting approximately one hour via videoconference. They will be asked to: (1) share their perceptions on factors that enable or inhibit RPA implementation and (2) provide details on the organization's RPA program and number of bots in pilot and production. Participants' individual identities and organization identities will be protected in reporting. Once this project is complete, I will share a summary of my findings with interview participants.

I appreciate your consideration and would be grateful if you choose to participate. Please reply to this email with your interest and/or to refer me to others who may be able and willing to share their insights.

Thank you for your consideration.

Sincerely,
Elizabeth Arledge, PhD Candidate
School of Public & International Affairs, Virginia Tech
Email: arledgee@vt.edu
Mobile: 850.566.5627

Appendix E: Interview Protocols

Introduction and oral consent

I am seeking your perspective on the factors that have enabled or inhibited robotic process automation implementation in your organization. We will walk through some open-ended questions, and I will ask clarifying questions and help pace the interview so that we can complete all of the questions in about one hour.

- Do you have any questions about this study before we begin?
- Do you agree to participate, and do I have your permission to create an audio recording of the interview?
    - **If yes, start audio recording – PRESS RECORD.**
    - **If no, thank you for your time and consideration.**

Interview questions (*notes for interviewer italicized and placed in parentheses***)**

1. What is your title and responsibilities in the organization?

    a. What is your role in RPA implementation?
    b. How long have you been in this role?

2. Please tell me about your organization's journey from learning about RPA to where you are now? (*If not covered in the description, follow-on questions)*

    a. Why did your organization decide to pursue RPA?
    b. What year did the first bot go into pilot production?
    c. What are the organization's current RPA use goals? The overall vision?
    d. Is there a written strategic plan? If so, can I get a copy of it?
    e. Is there other written documentation related to RPA implementation? If so, can I get a copy?
    f. How would you describe where the organization is on its RPA journey? (*Early stages, moderate use, significant use*)
    g. How many bots are currently in the production pipeline and how many additional bots are in use?
    h. Is the number of bots in pilot and production by month easily accessible? Can I get that information?

3. What factors helped the organization get where it is now in RPA implementation?
    a. Can you provide examples?

4. What problems did you encounter and how have they impacted progress toward greater or more effective implementation?
    a. Can you provide examples?

5. What kind of resources (financial and non-financial) does your organization need to adopt and implement RPA?

    a. Can you provide a few examples of how having sufficient resources versus not enough resources has impacted RPA implementation?

6. Are there instances where an RPA automation project did not move from pilot to production?

    a. Can you walk me through that effort?

7. Does your organization adopt and implement other, new-to-the-organization technologies?

    a. Can you give me an example?
    b. Do you consider your organization to be an early adopter, average or late adopter of new technologies?
    c. Did those innovations achieve expected goals? Why or why not?

8. Can you describe what staff roles are involved in RPA implementation?

    a. What role does leadership play in implementation?
        i. What level of leadership?
        ii. What is the impact?
    b. Does your RPA program have an executive sponsor?
        i. What role does this individual perform?
    c. What elements of implementation are centralized?
        i. Which are decentralized?
    d. What roles do contractors play in implementation?

9. What type of training do personnel involved in implementation or impacted by RPA implementation receive?
    a. Can you give me an example of how training has impacted implementation?

10. Are there support networks within the organization for informal support?
    a. How do people within the organization find out about RPA as an option?

11. Is there anything I haven't asked about that you feel has been an important element in the organization's RPA implementation journey?

12. What other RPA program managers would you suggest I talk to?