Exploring a Defense Agency's Organizational Barriers and Determinants to Cloud Migration: A Qualitative Single Case Study

Dissertation Manuscript

Submitted to National University

College of Business, Engineering, and Technology

in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Business Administration

by

MEENA FAHMY

San Diego, California

October 2025

Abstract

Government mandates require agencies to migrate agency data from an on-premise data center to the cloud because of the several benefits cloud computing offers. Cloud migration can be a complex and difficult undertaking for organizations; however, the potential benefits of migrating are substantial and could save taxpayers billions of dollars. The purpose of this qualitative single case study was to identify how the barriers and determinants influence the migration of data from an on-premise data center to the cloud within a defense agency. The study used a combination of two models to guide the framework: the technology, organizational, and environment model and the diffusion of innovation.

The researcher conducted semi-structured interviews with 16 participants who were credentialed to speak at an expert level about barriers and determinants encountered during an effort to migrate a defense agency's data to the cloud. The target population included defense agency employees directly participating in cloud migration activities, policy, and decisions. A total of 25 participants were identified based on their direct involvement and expertise with cloud migration efforts, and based on those parameters, a solicitation email was sent to the entire pool to volunteer their time to be interviewed. Interviews were conducted using Microsoft Teams. Transcription and recording features were utilized to create transcripts. A software named Dedoose was used to organize and analyze data for thematic analysis.

The study's results indicated that barriers or determinants that influenced cloud migration for the defense agency included training, planning, interdepartmental communications, processes, top management messaging, use of framework, accepting change, and migration benefits. Interview data suggested how each determinant and barrier influenced the migration effort. Organizational leaders could incorporate the results of this study into their cloud migration strategy. The study's

results have the potential for agencies to avoid added costs due to significant delays. Researchers can build on this study in several ways; for example, exploring different conceptual or theoretical frameworks to study the problem or consider studying the problem in the context of other organizational units.

Acknowledgements

I am grateful to God for the awesome journey and for all the friends who lifted me up along the way. To my beautiful, wise, and selfless wife, Marianne; you are the best. Thank you for giving me the space to work and grow during the program and rooting for me every step of the way. Joanna, Verena, and Baby Fahmy—I love you guys. I could not have completed this without you! You kids are at the center of every smile, laugh, and dream in our lives. Love you guys. Mom and Dad, thank you for always putting the three of us first and for your uncompromising belief in us. Your hard work and continued sacrifices are the foundation of so many gifts in our lives. I love you both. To my siblings, Marianne and Mark— thank you for being the best friends anyone could ever ask for. I love you guys.

A heartfelt thanks to the defense agency and to all the hardworking, dedicated, and talented civil servants and contract staff there. Thank you for working tirelessly to ensure service members and their families are cared for. This research would not have been possible without you and I am deeply grateful for your time and insights. A special thanks to everyone at the defense agency that supported my journey. Dr. Richie, Dr. Ekeledo, and Dr. Zhang—thank you for your mentorship, engagement, and for contributing to a shared vision of success. Thank you to the many researchers and scholars whose work laid a strong foundation for this study. As a civil servant, my hope is that this dissertation assists agency leaders in identifying blind spots and to better navigate the complexities of change—both at the micro and macro levels.

Table of Contents

Chapter 1: Introduction

Organizations across many industries, particularly within government, are adopting cloud computing at a rapid pace because of the unique advantages it provides at lower costs than operating in-house data centers (Krasniqi & Jaumin, 2021). Since 2010, the United States Congress has passed a series of appropriations and legislation that authorize agencies to invest in modernizing their organization's information technology (IT) infrastructure with cloud-ready products and services (Congress, 2022). Although on the surface, cloud technology can appear to be an optional alternative to operating in-house data centers, migrating data to the cloud is an inevitable effort that organizations in public and private sectors will be mandated to adopt because the resources required to keep up with the demand of today's system improvements and maintenance will eventually exceed current capabilities (Admodisastro et al., 2023).

For government agencies to take advantage of the benefits cloud computing offers and comply with mandates, they must migrate their data from an on-premise data center into the cloud. Ranganathan and Sampathrajan (2023) define cloud migration as the process of an organization moving data, applications, and other IT-related processes and equipment from an on-premise site, such as a data center, to the cloud. Cloud storage is typically provided by a cloud vendor at a remote location in which the vendor leases out storage space based on an organization's capacity and demand (International Business Machines, 2024). The Department of Defense (2023) has aligned its IT strategy by prioritizing cloud computing because of its benefits . Embracing cloud computing is consistent with industry standards since migrating organizational data to the cloud is part of a successful digital transformation strategy (Ranganathan & Sampathrajan, 2023) and offers many benefits.

There are several benefits of migrating data to the cloud, such as improving business processes and interoperability, maintainability, scalability, flexibility, availability, manageability, resiliency, reliability, costs, and data security (Admodisastro et al., 2023). Ahmed (2020) mentions an additional benefit is that organizations no longer have to cover the cost of maintaining data center hardware and software or the personnel required to operate it. Cloud providers furnish customers with state-of-the-art tools and resources, which allow organizations to utilize cutting-edge technologies that have better capabilities to improve products and services for their customers at a fraction of the cost (Ahmad, 2018).

Cloud computing helps to facilitate the increasing demand for remote work in both private and public sectors by bridging communication, knowledge sharing, and infrastructure gaps (Bhatti et al., 2022). Leveraging cloud technologies has become a best practice across organizations in several industries, such as healthcare (Osei-Tutu, 2020), banking (Jafari, 2022), manufacturing (Misra, 2021), and government (Shibambu, 2022) because of the advanced security and cost savings that cloud vendors provide to their customers. Organizations are also drawn towards cloud computing since it can optimize business processes and environments and create efficiencies with collaborative tools and the flexibility to securely access large amounts of data remotely from multiple endpoint devices (Bhatti et al., 2022).

Since organizational barriers often delay cloud migration (Cunha et al., 2020), this case addressed a serious need to explore how barriers and determinants can be identified in a government setting (Cunha et al., 2020). Exploring organizational barriers in migrating data to the cloud is relevant and warranted because of the significant benefits in cost savings, data security, and delivery of services that organizations experience after migrating their data to the cloud (Admodisastro et al., 2023). Although the benefits of cloud computing are clear, migrating

organizational data and applications from an on-premise data center to the cloud is an involved and challenging process due to many unforeseen variables (Ranganathan & Sampathrajan, 2023).

Ranganathan & Sampathrajan (2023) suggested that migrating data to the cloud is a complex effort that requires planning across many teams within an organization . Most organizations experience delays because they underestimate the effort and cooperation required to migrate data to the cloud. Cloud migrations seldom occur within anticipated timelines due to a lack of forethought in financial and resource planning, unclear goals, and familiarity with the migration process. The migration's complexity and organizational resourcing make it difficult for leaders to estimate migration timelines, which are typical reasons for delayed migrations, especially when security and compliance standards must be maintained during the migration.

Some examples of organizational barriers that cause delays include complexities in organizational areas such as service level agreements and staff readiness (Shuaib et al., 2019), as well as preparing resources and funding for cloud migration, responding to data transmission failures, ensuring all departments are working in tandem, and adequately training staff with the appropriate skillset required to migrate the data and operate in a new cloud environment (Ranganathan & Sampathrajan, 2023). Additional barriers include decisions regarding migration costs, design and planning, organizational acceptance, organizational acceptance, and technical configurations (Doroudi et al., 2024). Although the benefits of cloud computing are well-documented (Krasniqi et al., 2021), organizations still lack a streamlined and coherent migration framework to follow (Yadav et al., 2020). Organizations lack understanding regarding the preparation required and how specific determinants delay migrations (Doroudi et al., 2024).

Statement of the Problem

The problem addressed in this qualitative single case study is the unknown organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020). According to Cunha et al. (2020), understanding the organizational pressures and barriers of cloud migration has not been fully explored within government spaces. The costs to operate data centers are incredibly high compared to using a cloud vendor since cloud technology allows organizations to outsource significant amounts of information technology equipment and services (Amin, 2022).

Certain defense agencies spent nearly $200 million on data migration alone in 2023 (Department of Defense, 2023). Every year, additional funding is allocated to assist leaders in working through barriers of cloud migration while simultaneously pouring resources into existing data centers (Government Accountability Office, 2023). If all U.S. government agencies consolidated or closed data centers and utilized cloud technologies, an estimated cost avoidance and savings of $5.8 billion would be realized (Congress, 2022).

The costs of delaying cloud migration include (1) taxpayers continuing to fund costly data centers while government programs never reach the full computing potential that cloud services could provide, and (2) government programs experiencing resource restraints and limitations by operating aging systems with fewer capabilities (Cunha et al., 2020) while remaining vulnerable to cyber-attacks (Pang, 2022). It is projected that by 2025, nearly 95% of all United States workloads will require data to be retrieved or be reliant on cloud technology (Aruna et al., 2021). As cloud computing becomes the new norm, there is a critical need to better understand organizational barriers and create concrete models and clear strategies regarding migration, especially in areas of organizational readiness (Ahmad, 2018).

Purpose of the Study

The purpose of this qualitative single case study was to identify organizational barriers that influence the migration of data from an on-premise data center to the cloud (Cunha et al., 2020). The researcher employed a qualitative single case study in which interview data were collected and analyzed to determine organizational barriers contributing to cloud migration at a defense agency. The data represented cloud leaders' perceptions of organizational barriers during migration. Qualitative data were gathered exploring barriers in decision-making processes, fact-finding, adoption or acceptance, product selection, and vendor management at a defense agency's location headquartered in the national capital region.

The target of the study focused on cloud leaders at a defense agency. Leaders included government employees and contractors directly working in programmatic, technical, and functional areas where decisions regarding cloud migration are made. Participants were typically engaged with day-to-day cloud migration activities. Recruitment entailed sending an invitation letter in the form of an email to approximately 25 cloud leaders to conduct interviews using Microsoft Teams with transcription and recording. Interviews were conducted with participants from a defense agency headquartered in Northern Virginia and remote locations across the United States.

Qualitative data assisted in the development of a more in-depth understanding of organizational barriers surrounding cloud migration and the attitudes, cultures, and working knowledge of the cloud migration process (Eren et al., 2022). Dedoose was used to catalog and analyze interview data for themes. This study informs practice by sharing the results and themes among the defense departments and other government agencies, or possibly private sector organizations, too, where applicable. Although the results of this study will be specific to a single

defense agency, the breadth and depth of organizational themes are relevant to many government agencies planning to migrate their data to the cloud. Since the migration process is similar for most government agencies, the results of this study can add value to most government agencies' migration efforts regardless of mission or size.

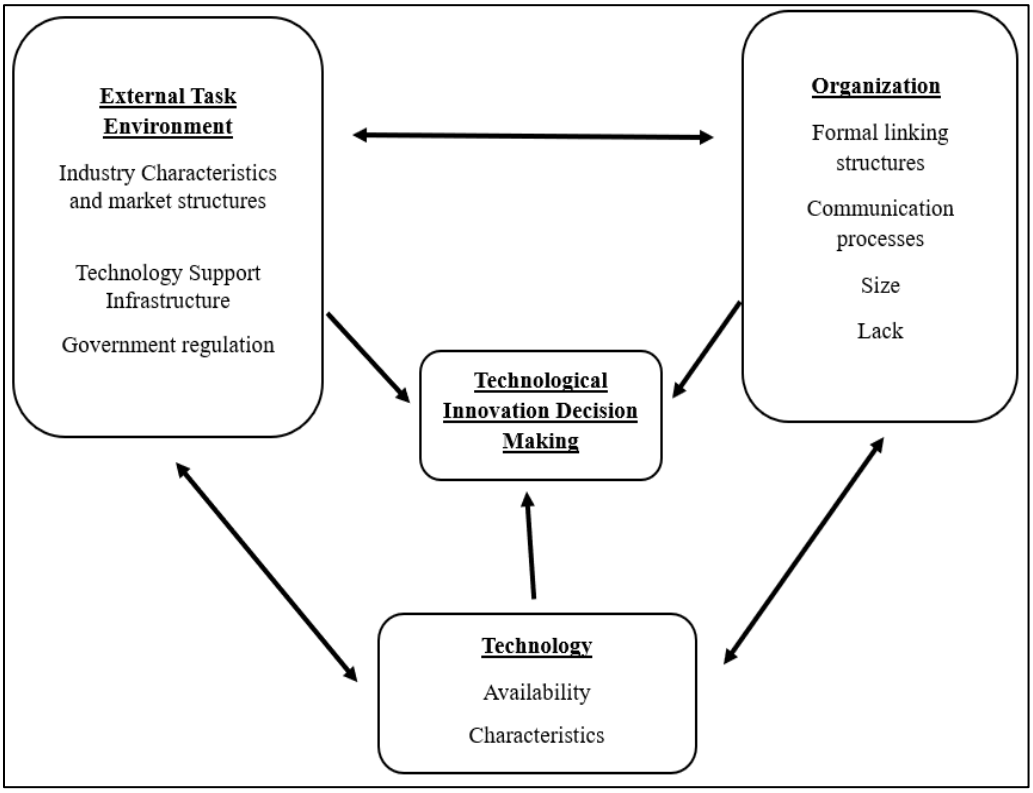
Introduction to Conceptual Framework

The conceptual framework that guided the study was the technology, organization, and environment (TOE) model and the diffusion of innovation (DOI). Both TOE and DOI have been used extensively to explore organizational barriers related to cloud migration and serve as a basis for researchers to build on existing literature and create additional models for cloud migration (Buckley, 2021). TOE and DOI models are standard models for exploring, identifying, and cataloging organizational barriers associated with cloud migration (Ahmed, 2020). The TOE model allows researchers to better understand how organizations accept and integrate technological innovations by examining technological, organizational, and environmental contexts associated and integrated with the innovation (Fleischer & Tornatzky, 1990). This case study demonstrated how the TOE model will be used to identify organizational barriers that influence data migration from an on-premise data center to the cloud.

The TOE model is widely accepted by researchers in exploring organizational characteristics of cloud migration, specifically by cataloging technological, organizational, and environmental determinants and their influence on adoption (AlKhalil, 2017). Additional factors or determinants the TOE model explores are integration-related challenges that identify formal and informal linking structures, communication processes, and top management and leadership behaviors (Fleischer & Tornatzky, 1990).

Figure 1

Technology, Organizational, and Environmental Model



Note. Figure 1 demonstrates the technology, organization, and environment framework in relation to a decision of adopting a technological innovation (Tornatzky, L.G., Fleishcer, M., 1990). From "The context of technological innovation: technology, organization, and environment model" by L.G. Tornatzky and M. Fleishcer, 1990, *Process of technological innovation,* Lexington Books, Lexington, MA. ICT, Information and Communication Technology.

The diffusion of innovation (DOI) proves helpful in measuring the success of how newer technologies, such as cloud services, are implemented within organizations (Doroudi et al., 2024). DOI categorizes technology adopters into five categories: innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). Understanding where organizational leaders

reside within each adoption category is key to understanding holistic organizational barriers associated with cloud migration because gathering data on adoption categories can reveal gaps related to cloud migration (Van Houtven et al., 2023).

Among the several frameworks that can be used for exploring technology acceptance, the DOI allows researchers to study acceptance or rates of acceptance when organizations deploy new technologies (Jafari, 2022). DOI allowed the researcher to understand the participants' values and perceptions better. These attributes must be studied because a common challenge organizations face is the rate at which new innovations are accepted or rejected by leaders based on their opinions, behavior, and the impact the new innovation has on their social networks (Rogers, 2003).

Introduction to Research Methodology and Design (Nature of the Study)

A qualitative single case study design was used to study the organizational barriers that influence data migration from an on-premise data center to the cloud. The qualitative single case study consisted of 16 interviews with cloud leaders at a defense agency. The nature of this research topic called for a qualitative case study because the study entailed interviewing leaders regarding organizational barriers to cloud migration. The results of this study may contribute to developing guidelines and best practices for defense leaders to adopt within future migrations, as well as provide value to other government agencies that must migrate their data to the cloud, where applicable. A case study was selected because it best explores the problem of identifying organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020) by focusing the study on one defense agency utilizing TOE and DOI.

Case studies assist researchers in exploring certain social phenomena (Yin, 2018). Given the history of cloud computing and how government mandates will shape the future for all

federal agencies, case studies are also preferred when researching a contemporary event with fluid past and recent influences (Yin, 2018). Additionally, case studies provide content-rich information that can be used in broader contexts for other organizations and can assist leaders in developing clear policies and best practices (Bloomberg, 2018).

Research Questions

The research questions that guided this qualitative single case study to identify the organizational barriers that influence the transition of migrating data from an on-premise data center to the cloud (Cunha et al., 2020) were as follows:

RQ1

What organizational barriers influenced migrating data from an on-premise data center to the cloud?

RQ 2

How have organizational barriers influenced the migration of data from an on-premise data center to the cloud?

Significance of the Study

As government agencies struggle to navigate complex requirements and decisions to integrate cloud technology into their organizations, better models and frameworks are needed to predict organizational compatibility and streamline the migration process (Ahmad, 2018). Leaders across the government have faced several barriers to migrating their organization's data to the cloud (Shibambu, 2022). Since cloud technologies have proven to be a more secure, affordable, and superior alternative to running a private data center, several agencies have been forced to migrate regardless of their level of preparedness.

Organizations must have clear strategies before migrating their data to the cloud (Ahmad, 2018). Exploration of the organizational barriers of cloud migration through the lens of the TOE model will contribute to the body of knowledge and tools that other agencies across the government can use to better prepare for cloud migration. By sharing knowledge of organizational barriers, other government agencies can streamline processes, identify opportunities and challenges, and coordinate personnel so that leadership is ready to anticipate and resolve organizational issues. Coupled with existing literature, the results of this study can assist leaders in preparing for critical organizational barriers related to migrating data to the cloud. The results of this study could be used to assist leaders in streamlining the cloud migration process, which would create significant cost savings for the government and deliver data in a more secure, reliable, and cost-effective infrastructure.

Definitions of Key Terms

Cloud Computing

The National Institute of Standards and Technology (2011) defines cloud computing as a model for enabling convenient and on-demand network access and services to a shared pool of resources that contain essential characteristics of on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service.

Cloud Migration

Cloud migration refers to the process of an organization moving data, applications, and other IT-related processes from an on-premise site such as a data center to the cloud (Ranganathan & Sampathrajan, 2023).

Cloud Storage

Cloud storage refers to computing space at a cloud vendor's off-site location (International Business Machines, 2024).

Data Center

A location where an organization stores computing machines and hardware that contains equipment such as servers, data storage drives, and network equipment for that organization (Amazon, 2024).

Summary

Cloud computing is a revolutionary technology and one of the most significant trends within IT services (Brzozowska-Rup, 2024). Organizations have the potential to save significant costs, improve the delivery of services, and store data securely when it is migrated to the cloud (Admodisastro et al., 2023). This study explored the problem of organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020) using the DOI and TOE conceptual frameworks. This qualitative single case study aimed to identify and catalog organizational barriers from a specific defense agency.

The results of this study are intended to assist leaders within the federal government in preparing for cloud migration and achieving positive outcomes for their agency. Research has suggested that poor resource planning and unfamiliarity with the migration process and its challenges are common predictors of successful cloud migrations (Ranganathan & Sampathrajan, 2023). The results of this study are also intended to educate influential defense leaders on factors or determinants related to successful cloud migration. Government agencies can minimize delays and take advantage of cloud computing benefits by identifying, anticipating, and resolving organizational barriers beforehand. The themes within this study can assist other government

leaders in responsibly planning for their organization's future migrations so that their respective agencies can enjoy the benefits of cloud technology.

Chapter 2: Literature Review

The purpose of this qualitative single case study was to identify organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020). The problem addressed in this qualitative single case study is the unknown organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020). This literature review is organized by relevant publications addressed in the problem and purpose statements of this research.

Organizations have struggled to migrate data into the cloud on time and within budget due to a lack of frameworks and available guidance (Cunha, 2020). The existing literature supports this claim, citing that delays and increased migration costs are mainly due to a lack of available frameworks to assist in cloud migration planning and preparation (Hussien, 2021). As a result, many discussions have evolved regarding the determinants and organizational barriers associated with IT systems and staffing for pre- and post-migration activities.

Organizations must have access to more comprehensive cloud frameworks to better anticipate common barriers and determinants for a successful migration (Yadav, 2020). This literature review provides a comprehensive overview and comparison of determinants such as leadership expertise of cloud computing, organizational readiness, staff training, organizational acceptance, technical configurations, and costs (Daroudi, 2024), as well as barriers related to organizational planning, data integrity challenges, technical integration, transition of legacy systems to the cloud, communication, and security. This study aims to tie in the need for a more comprehensive cloud migration framework with the existing literature so that government organizations can take advantage of the performance benefits, cost savings, and security that cloud technology offers (Bhatti et al., 2022). By leveraging a combination of TOE and DOI

models, the researcher will conduct a qualitative single case study to explore the scope of cloud migration barriers and determinants within a defense agency.

Database Search Engine Strategy

This literature review includes articles and conference presentations addressing organizational barriers influencing cloud migration. The following search engines and databases were used throughout this study: National University library database, Google Scholar, and global ProQuest Dissertations and Theses searches specific to National University publications. References included peer-reviewed articles, news articles, and official government reports. Examples of search terms and concepts that were entered in the referenced resources include but are not limited to, the following phrases: *cloud migration barriers, organizational challenges to cloud migration, technology, organizational, and environmental (TOE) cloud migration, diffusion of innovation (DOI) cloud migration, leadership challenges cloud migration, organizational acceptance of cloud, adaptive capacity cloud migration, technology acceptance model (TAM) cloud migration, and organizational planning of cloud migration*.

Conceptual Framework

The study's conceptual framework was the technology, organization, and environment (TOE) model and the diffusion of innovation (DOI) theory. Researchers have extensively used a combination of TOE and DOI to explore organizational barriers related to cloud migration (Buckley, 2021) because both tend to be the standard models for exploring, identifying, and cataloging organizational barriers associated with cloud migration (Ahmed, 2020). A combination of the TOE and DOI models was used for this study because of their proven records of assisting researchers in better understanding organizational barriers related to cloud migration (Amini & Javid, 2023; Alkhalil et al., 2017). Al Khalil (2017) added that although various model

combinations can be used to study organizational barriers related to cloud migration, both the TOE and DOI models complement each other very well. Amini & Javid (2023) presented other frameworks that have been used, such as the theory of reasoned action, the technology acceptance model, the motivation model, and the theory of planned behavior; however, they confirm Al Khalil's claim by asserting that the combination of TOE and DOI is one of the more commonly used and effective models. Abied et al. (2022) added that the combination of TOE and DOI models works hand-in-hand and has been used extensively by researchers in exploring barriers related to cloud migration.

Technology, Organizational, Environmental Model

The TOE model attempts to capture the contextual relationships between people, organizations, and politics by deploying new technology or innovation (Tornatzky & Fleischer, 1990). Additional factors the TOE model sets out to capture entail information on integration-related challenges, communication processes, and top management or leadership behaviors (Fleischer & Tornatzky, 1990). Concerning information technology, the TOE model allows researchers to better understand how businesses leverage their IT systems and has become a research standard in exploring guidelines for IT adoption (Adeyemo et al., 2024). The TOE model is widely accepted by researchers in exploring organizational characteristics of cloud migration, specifically by cataloging technological, organizational, and environmental determinants and the influence such factors have on adoption (AlKhalil, 2017). Ahmed (2020) added that the model is favorable among researchers because it helps to illuminate unique organizational characteristics and perspectives concerning cloud migration.

The TOE model allows researchers to better understand how organizations accept and integrate technological innovations by examining technological, organizational, and

environmental contexts associated with the innovation (Fleischer & Tornatzky, 1990). While the TOE model helps to explain factors that contribute to organizations integrating a new innovation, DOI helps to identify variables within each factor (AlKhalil, 2017). This case study will demonstrate how the TOE and DOI models can be used to identify organizational barriers that influence data migration from an on-premise data center to the cloud and the relevance of these barriers to the migration effort. Figure 2 illustrates examples of relevant TOE considerations when organizations choose to migrate their data to the cloud.

Figure 2

Three-Layer Hierarchy Factors Affecting Enterprise Architecture of Cloud Computing

Technology organization environment (toe)		
Technology	Related Improvement	- Cost Advantage - Efficiency - Flexibility - Capacity Management - Robustness - Security Concern
	Compatibility	- Easy to use - Usefulness
Organization	Top Management Support	- Vision for Long term - Commitment of Resources - Establishing Goal
	Organization Readiness	- Financial Readiness - Technological Infrastructure
Environment	Competitive Pressure	- Industrial Structure Variations - Relatively Economic Position Increase - New Business Peer Group
	Administration Regulation	- Management Inducement - Regulation, Strategy
	Technology Support Infrastructure	- Access to the Vendor - Suitable User and Technical Assistance - Provider Relationship

Note. Figure 2.1 illustrates the technological, organizational, and environmental considerations for organizations to consider before, during, and after migration of their data to the cloud, from

technology, organization, and environment framework in cloud computing by Ahmed, 2020, *Telemonika Telecommunication, Computing, Electronics, and Control* Article 18, issue 2.

TOE - Technological Context. Tornatzky and Fleischer (1990) defined technological contexts as "technical considerations and factors relevant to the internal and external technologies of an organization." Organizations adopt new technologies or innovations based on their willingness and capacity to become familiar with their benefits and how well an organization's existing capabilities can integrate with the innovation. Considerations may vary in scale depending on how open the organization is to adopting an innovation. While some organizations operate in a setting where technologies seldom evolve because they are met with rejection due to costs, resistance to change, or effort required to integrate, other organizations are more accepting of newer technologies and are open to adopting innovations at a quicker pace .

Tornatzky and Fleischer (1990) cited Tushman and Nadler (1986) in providing a framework that addresses considerations for the adoption of an innovation—they include: (1) incremental changes, which provide additional functionality or features at a manageable rate to an established product or process, (2) synthetic changes, which entails combining established ideas with alternate methods in creating new products or processes, (3) discontinuous changes which introduce significant new products or processes to the organization. Organizations can manage innovation integration by categorizing deployments into technocentric and socio-centric approaches (Tornatzky & Fleischer, 1990). Technocentric activities entail defining technical characteristics and developing detailed implementation plans around them. The organization re-balances workloads, positions, and processes to integrate the innovation with an existing technical system (Tornatzky & Fleischer, 1990).

Sociocentric activities include planning and pacing the implementation around social and organizational contexts which Tornatzky and Fleishcer (1990) cited Elmore (1978) in ways innovations can be deployed in both technocentric and sociocentric approaches: (1) systems management, where the implementation of an innovation is executed with a top-down approach using a systems management view by deploying the innovation using existing organizational systems, (2) bureaucratic process, where the implementation of an innovation is executed in a top-down approach by way of the bureaucratic process by updating organizational policies based on the evaluation and perception of top management, (3) organizational development, where the implementation of an innovation is executed in a top-down approach by way of organizational development through democratic means where individual and group needs are met through a participative process, and (4) conflict/bargaining, where the implementation of an innovation is executed by way of a bargaining process that typically produces a compromise of solutions. According to Tornatzky and Fleischer (1990), the conditions organizations must meet in order to consider a technological deployment successful include meeting the target users' needs or requirements, successfully integrating the innovation into an existing system, planning and executing the implementation well, providing proper maintenance and support post-implementation, and phasing out outdated systems or technologies.

TOE - Organizational Context. Tornatzky and Fleischer (1990) stated that organizational context includes the "informal linkages between employees, and the transactions carried out through decision making and internal communication…through these links, organizations can connect with knowledge producers, suppliers, and other information sources in their environment." The views and behaviors of an organization's top management play a critical role in understanding organizational contexts within the scope of a new innovation (Tornatzky &

Fleischer, 1990). Examples of activities in which top management views and behaviors can be expressed are deployment planning, communication releases, and shaping organizational policies and goals that support the successful deployment of the innovation (Tornatzky & Fleischer, 1990).

Any new innovation will require support and organizational changes to prepare teams with clear roles and responsibilities, and top management should focus planning efforts on defining those roles for successful implementation and updating technical standards, expectations, and information channels for how knowledge and communication are generated and circulated among the organization (Tornatzky & Fleischer, 1990). Top management can draw from several organizational tools, activities, and models to assist them in planning a successful integration of an innovation; one example includes organizational design. Tornatzky and Fleischer (1990) cited Tushman and Nadler (1986) in exploring ways to leverage organizational design when deploying an innovation. Examples include (1) creating teams, committees, and task forces of diverse subject matter experts to assist in problem-solving or uncovering opportunities during deployment, (2) developing synergies and integration between project managers with product and process development, and (3) maintaining formal meetings to allow groups to collaborate and share knowledge.

Tornatzky and Fleischer (1990) cited Tushman and Nadler (1986) again in outlining ways top management plays a role in organizational contexts at an enterprise level to deploy an innovation successfully. Examples include (1) developing and communicating an organizational strategy and core values concerning the innovation, (2) disseminating frequent communications to the organization explaining the importance of the innovation, (3) creating a reward system to encourage and reinforce the innovation's importance and relevance, (4) integrating the innovation

with the organization's history to promote an organizational culture rooted in invention, and (5) building a capable leadership team that demonstrates technical, social, and conceptual competencies (Tushman & Nadler, 1986).

TOE - Environmental Context. Tornatzky and Fleischer (1990) defined environmental context as the "arena in which a firm conducts its businesses, its industry, competitors, access to resources supplied by others, and dealings with the government." An organization's environment can present opportunities and constraints when deploying an innovation (Tornatzky & Fleischer, 1990). Organizations must adapt and pivot to create synergies among those opportunities and constraints with the stakeholders involved and factors such as regulations, customers, and suppliers (Tornatzky & Fleischer, 1990). An organization's ability to synergize such environmental factors is critical to its capacity to successfully deploy innovation and make good implementation decisions (Tornatzky & Fleischer, 1990).

Diffusion of Innovation

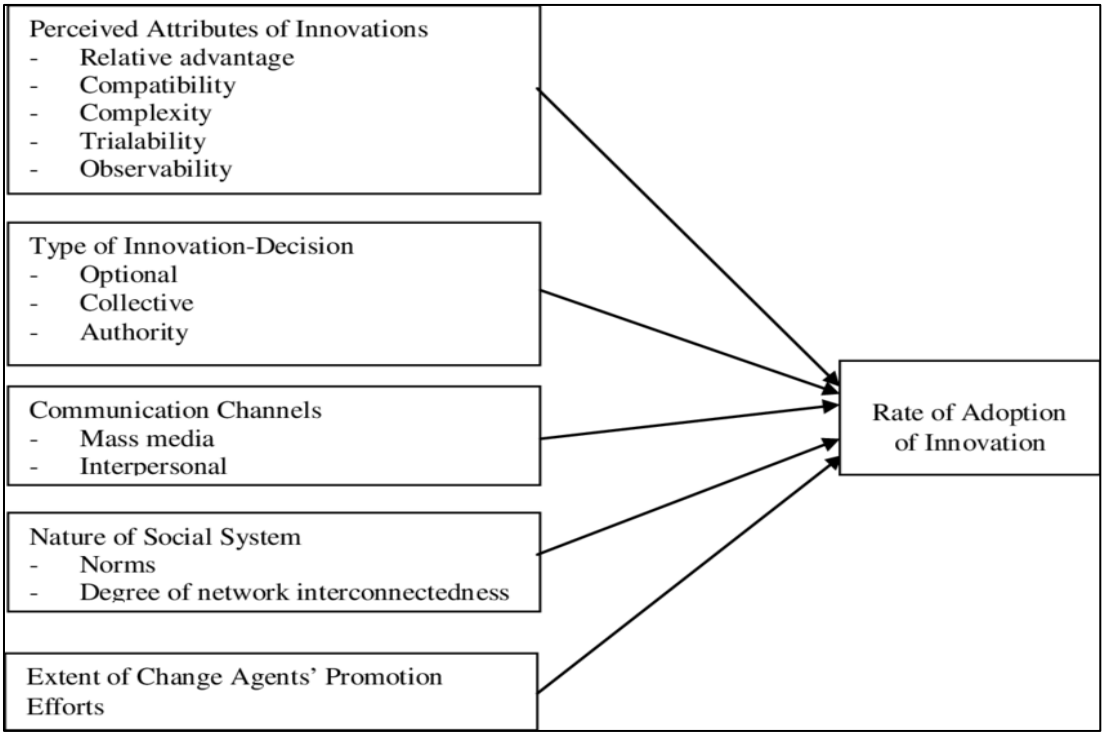
The DOI is a social theory derived from Everett Rogers's research in the seminal work Diffusion of Innovations, published in 1962 (Rogers, 2003). DOI examines how an innovation is communicated through channels over time within a social system and, ultimately, whether the innovation is rejected or accepted within a particular community (Rogers, 2003). Alkhalil (2017) defined the diffusion of innovation as "an established theory regarding the adoption of innovative information technology changes and how those changes are accepted from conception to utilization."

DOI focuses on attributes of a population's perceptions of technology acceptance and is widely recognized across several disciplines that explore outcomes of innovations (Boulahia, 2022). Jafari (2022) added that among the several frameworks that can be used for exploring

technology acceptance, the diffusion of innovation allows researchers to study acceptance or rates of acceptance when organizations release purposeful, planned, and systematic deployments of a new innovation. DOI guides this research because it provides a framework for understanding contributing factors to organizational acceptance across all levels, from leadership to users within a defense agency. It proves helpful in measuring an innovation's adoption rate and how that innovation is implemented within organizations (Doroudi et al., 2024). Rogers (2003) posited that five variables, along with sub-components, contribute to an organization's rate of adoption, as shown in Figure 2

Figure 2

Conceptual Model for Variables Determining the Rate of Adoption of Innovations

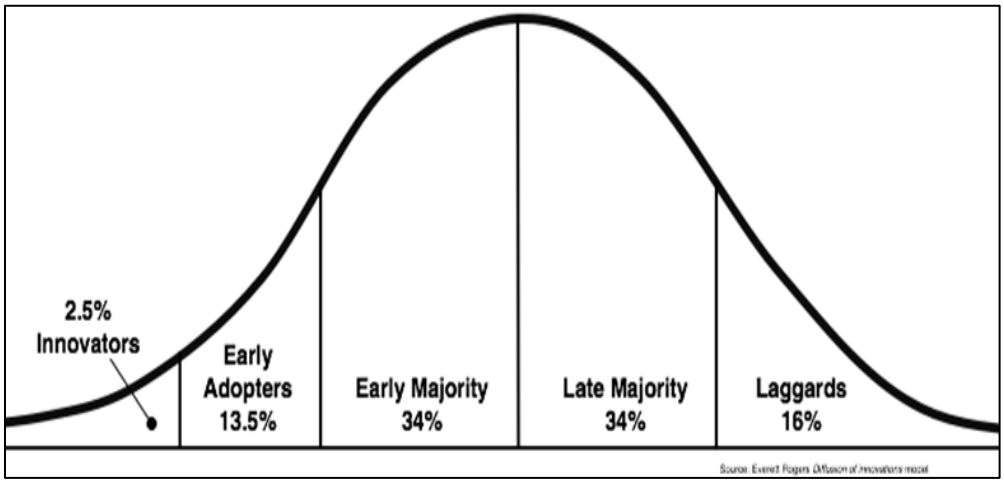


Note. The figure represents factors contributing to adoption rates when organizations attempt to deploy an innovation from "Diffusion of Innovations" by Everett Rogers.

Rogers (2003) stated that innovations are adopted over a specific sequence of time, categorized by the following adopter types: innovators, early adopters, early majority, late majority, and laggards. Figure 3 summarizes this notion by breaking down the time frame for any organization to adopt an innovation based on each category type. Each adoption type provides a criterion for innovativeness, or the orientation to which an individual adopts an innovation compared to others within the organization (Rogers, 2003).

Figure 3

Diffusion of Innovation Theory Distribution



Note. The figure illustrates the diffusion of innovation theory distribution. The distribution divides technology adopters into the referenced categories and converts them into estimated percentages within any given organization from "Diffusion of Innovations" by Everett Rogers.

The result of the DOI distribution measures the process adopters take to acquire or perform a new behavior, with population breakdowns of innovators making up 2.5%, early adopters making up 13.5%, early majority making up 34%, late majority making up 34%, and laggards making up 16% (Rogers, 2003). Each adopter passes through a series of stages to fully accept an innovative idea—the stages are the knowledge stage, the persuasion stage, the decision

stage, the implementation stage, and the confirmation stage (Rogers, 2003). Rogers (2003) stated that, depending on which category adopters are classified in, the nature of the conflicts, concerns, or hesitations in accepting the innovation can be predicted.

DOI lists five characteristics that can predict the speed in which an innovative idea is accepted within a group: (1) Relative advantage—perceiving clear advantages of adopting the innovation, (2) Compatibility—how the new idea fits into the culture of the organization (3) Complexity—understanding the idea and its ease of use, (4)Trialability—thorough testing of the innovative idea so that reliability, accuracy, and relevance is established, and (5) Observability—seeing other organizations successfully adopt and deploy the innovation (Rogers, 2003).

Understanding where organizational leaders reside within each adoption category is key to understanding holistic organizational challenges associated with cloud migration. Gathering data on adoption categories can reveal evidence gaps related to innovations (Van Houtven et al., 2023). By categorizing organizational leaders into adoption groups and better understanding the characteristics assigned to each group, the theory can predict cloud migration across defense agencies and possibly throughout the rest of the federal government.

Common challenges in such characteristics include top management's opinion and behavior towards accepting or rejecting the innovation, the speed or rate it takes to be accepted, and the innovation's impact on their social networks, including cultural or geographical contexts (Rogers, 2003). Although Tornatzky and Fleischer (1990) stated that an organization will ultimately adopt an innovation based on its willingness and capacity to become familiar with its benefits and how the organization's existing capabilities can integrate with the innovation, Rogers (2003) argued that it is difficult for most organizations to adopt innovations, even if the advantages to implementing it is clear to the organization.

Cloud Computing Background

Cloud computing was prototyped in the late 1900s, but the U.S. government began implementing policies and strategies centered on it by 2010 as it became more accessible and its benefits more apparent (Whitehouse, 2010). Cloud computing works by vendors providing a hosting environment at the vendor's off-site location where high-capacity computer and storage technologies are used to house and deliver data that customers may access from remote devices (Garg & Kumar, 2012). Vendors can provide this service by virtualizing an IT infrastructure of hardware capabilities such as servers and networking equipment (Adeyemo et al., 2024). Virtualization allows one single server to house several virtual servers, resulting in cloud providers being able to save costs on data center space and resources (Olabanji et al., 2024).

Cloud access is provided by a wide-area network that connects users with data centers and applications to the cloud environment (Olabanji et al., 2024). Data is delivered to users quickly by cloud providers using state-of-the-art technologies such as software-defined networking, load balancing, and content delivery networks (Olabanji et al., 2024), while cloud systems are protected by robust security capabilities such as authentication, authorization, data protection, and disaster recovery of data (Wulf et al., 2021). Cloud providers typically offer six common strategies for organizations to migrate their data from an on-premise data center to the cloud: (1) lift and shift, (2) refactoring, (3) re-platforming, (4) re-purchasing, (5) retiring, and (6) retaining (Varma, 2022).

Since cloud migration is still a relatively new concept, most organizations tend to couple the lift and shift with the refactoring strategies to migrate data (Varma, 2022). The lift and shift method typically involves copying data and processes from the current environment into the cloud and then working with experts to ensure the code and data are compatible with the new

environment (Varma, 2022). Although lift and shift with refactoring is standard practice for many government organizations, they are often time-consuming and costly (Varma, 2022). Adopting a different strategy could save time and money; however, one challenge it presents is the execution. Since much of the governance and technical expertise shaped itself around the lift and shift, then refactor strategy, resources for re-platforming could be limited. Other implementation and decision strategies, such as readiness, adoption, and testing, are also worthy of exploration (Alharthi, 2023).

The National Institute of Standards and Technology has published technical and operational guidance for government organizations regarding migrating data into the cloud (Department of Commerce, 2011). As a result, Congress passed a series of bills and guidance for government agencies to migrate their on-premise data into the cloud based on cost savings potential (Congress, 2022). Since most world governments tend to reside in the late majority and laggards (Cunha et al., 2020), it is not unusual for governments to adopt technologies after they have been thoroughly tested and vetted. Abied et al. (2022) added that since setting up cloud computing contracts for migration is a new process for the federal government, there are also unfamiliar challenges associated with security, availability, and trust for commercial third-party vendors.

Needed Frameworks to Meet Mandates

Cloud computing is a revolutionary technology and one of the most significant trends within IT services (Brzozowska-Rup, 2024), but comprehensive frameworks are still needed to accommodate the rapid growth of databases that typical organizations no longer have the resources to store (Hussein, 2021). As cloud computing continues to forge a path in the information technology landscape, industries and organizations have begun to write policies and

create expectations of mandatory adoption because of its benefits over in-house data centers (Ahmed, 2018). Since mid-2010, bills and mandates have been passed to encourage data center closures and consolidations. Allowing commercial third parties to house government data would help modernize agency processes, improve data security, and reduce operating costs (Congress, 2023).

The Federal Data Center Enhancement Act was passed to modernize capabilities and technologies for U.S. Government agencies storing data (Congress, 2023). The bill proposes that up to $5.8 billion can be saved by consolidating data centers and migrating data to commercial cloud providers (Congress, 2023). By allowing highly specialized commercial cloud vendors to store and manage government data, the government workforce can focus its efforts on programs related to the agency rather than continuing to manage the data on antiquated systems. Alkhalil et al. (2017) supported this notion by arguing that migrating data to the cloud frees IT specialists and professionals to focus on a broader spectrum of service delivery opportunities and challenges since they will no longer be responsible for hardware. Although many government agencies will eventually comply with mandates, industries still lack comprehensive frameworks to assist organizations with data migration (Cunha, 2020).

Although some cloud migration frameworks exist, such as the industrial domain-driven (Megargel et al., 2020) migration frameworks, they are still lacking (Yadav et al., 2020). There is also a need for specific resources to aid leaders in decision-making during the cloud migration process (AlKhalil, 2017). There is a need for more concrete models to predict organizational compatibility, as well as comprehensive cloud migration frameworks to provide more automated migrations (Ahmad, 2018). Organizations struggle with cloud migration due to complexities in virtualization technology, interoperability, service level agreements, and organizational readiness

(Shuaib et al., 2019). Additionally, a lack of regulations, conformity, and security creates concerns for cloud decision-makers and leaders (Ahmed, 2020). Krasniqi et al. (2021) added that a lack of familiarity with the migration process and a lack of framework often contribute to project delays.

Several factors must be considered when migrating data to the cloud and selecting the most appropriate cloud vendor (Alkhalil et al.,2017). While there is some existing literature regarding cloud computing architecture, benefits, and migration models, research regarding barriers and drivers of cloud migration is still very limited (Alkhalil et al.,2017). Although cloud vendors created migration resources and frameworks, the literature is typically unavailable to the general public due to its proprietary nature (Alkhalil et al.,2017). Organizations require better frameworks and guidelines to assist them with migrating data to the cloud (Garg & Kumar, 2012). Organizational leaders continue to struggle in making critical decisions due to the complexity of cloud migration (Alkhalil et al., 2017); however, a review of the literature suggests that most researchers are in agreement that comprehensive cloud migration frameworks are lacking and organizations should gear pre-migration efforts to seeking out a practical framework.

Defense agencies invested nearly $3 Billion in cloud technologies in 2023 (Government Accountability Office, 2023). However, several offices and centers are late adopters and continue to pour millions of dollars into outdated data centers, which require constant financial resources (Government Accountability Office, 2023). Although governments lack frameworks and face many organizational obstacles from technological, organizational, and environmental standpoints (Eren et al., 2022). A solid framework is important because it allows government agencies to secure the availability and integrity of data and mitigate risk from cyber-attacks for

millions of stakeholders. Migrating organizational data to the cloud is a complex process that requires buy-in from several departments across an organization.

When government agencies lag in migrating their data to the cloud, they (1) pay more money in operating costs and lose out on opportunity costs since they fail to reach the full computing potential from the power that cloud services provide (2) experience resource restraints and limitations by operating less efficient systems with fewer capabilities in supporting newer applications (3) neglect cost-savings opportunities by incurring high costs of operating data centers on premise (Cunha et al., 2020). When such risks are adequately mitigated, the host of benefits post-migration are well documented (Krasniqi et al., 2021).

Cloud Migration Benefits

One of the inherent benefits of cloud technology is the service capability of delivering data securely and quickly while saving organizations significant costs (Lebeda et al., 2018). By allowing highly specialized commercial cloud vendors to store and manage government data, the government workforce can focus their efforts on programs rather than IT. Cloud vendors typically offer 99.7%-99.999% uptime and use cutting-edge hardware, ensuring data availability and delivery. Cloud investments have yet to be taken advantage of in many offices, putting many stakeholders at risk.

There are several organizational benefits organizations can take advantage of after migrating their data to the cloud to optimize business processes, reduce costs, and utilize state-of-the-art technology (Bhatti et al., 2022). Cloud computing offers improvements in business environments by allowing organizations to deliver better and more efficient services to customers (Antonopoulou, 2020). Additionally, cloud computing can lower operational and IT investment costs (Bhatti et al., 2022), so organizations are no longer responsible for maintaining

their IT infrastructure (Adeyemo et al., 2024). By no longer hosting IT infrastructure equipment, organizations would immediately realize the cost savings associated with procuring, maintaining, and refreshing hardware and software (Bhatti et al., 2022).

An additional benefit of cloud is that vendors can provide technologies that allow the development of cloud-native applications, saving organizations time and money (Ahmad, 2018). Additional benefits include data centralization, ease of deployment, improved scalability and flexibility, data recovery, and, more importantly, security (Assaf, 2021). The added benefit of improved security is significant because cloud vendors can provide organizations with advanced security practices and data encryption (Bhatti, 2022) at a cost savings (Amini & Javid, 2023). For example, Amini and Javid (2023) highlight that cloud computing allows organizations to release rapid deployment, share and retrieve real-time data, and scale capabilities when demands surge.

Despite well-documented organizational and technical benefits relating to cloud flexibility, reliability, operational efficiency, and data accuracy (Omogoroye et al., 2023), there are some environmental drawbacks. Examples include a dependence on the cloud vendor's environment and capabilities and a possible decrease in the quality of customer and support services (Amin et al., 2021). Ahmed (2020) added that a lack of regulations and conformity raises unaddressed concerns about the future environment of cloud computing. However, it is important to consider that cloud allows organizations to function at higher capacities and implement better disaster recovery options (Alkhalil et al., 2017).

Bhatti et al. (2022) claimed that individual users also benefit from cloud technologies in addition to organizations and that cloud technologies provide users the convenience of accessing resources and data remotely from multiple devices. Leveraging available tools also improves organizational coordination by allowing users to openly and securely communicate, collaborate,

and share knowledge within the workspace (Bhatti et al., 2022). Cloud computing offers users immediate access to requests and services because of the elastic computing power available during surges or high-demand periods (Rodeghero & Tubre, 2020). Cloud computing uses cutting-edge technology that allows organizations to store and access large amounts of data while providing greater accessibility options, reliability, and performance for each end user (Bhatti et al., 2022). Additional benefits include improved maintainability, scalability, flexibility, availability, manageability, resiliency, reliability, costs, and security (Admodisastro et al., 2023).

Organizations can also take advantage of lower operating costs and access to virtually all the required storage space (Alkhalil et al., 2017). Some final benefits of cloud computing include auto-scaling, which allows resources to scale dynamically based on customer demands; security features that allow for continuous monitoring and threat detection; and compliance automation, where compliance checks and audits are streamlined (Mohammad, 2021). Although cloud computing offers clear benefits, organizations are still hesitant or reluctant to migrate their data because of the perceived control of outcomes that cloud vendors possess (Alkhalil et al., 2017).

Although one of the significant benefits of migrating data to the cloud is the cost savings it brings, there are conflicting views and considerations on whether the government could take advantage of this benefit (CIO, 2024). The costs of cloud packages continue to increase, and the nature of the complex pricing models vendors offer does not immediately translate into automatic cost savings (CIO, 2024), especially for government agencies. According to the Government Accountability Office (n. d.), the anti-deficiency act is an act that "prohibits federal agencies from obligating or expending federal funds in advance or in excess of an appropriation, and from accepting voluntary services," which would disqualify government agencies from taking advantage of discounted pricing by pre-paying for multi-year services, making them

subject to rate increases. This point of divergence in the literature will continue to be a point of contention for researchers to refute or support claims of cost savings; however, with rising hardware costs and only partial acceptance of cloud technology within the federal government, the divergence will likely continue until more cloud migration data and trends are established.

Cloud Migration Determinants

Many studies have explored determinants contributing to successful cloud migrations, such as technological preparedness, security and privacy considerations, and workforce expertise (Adeyemo et al., 2024). Determinants may vary depending on different organizations; however, they can typically be cataloged within technological, organizational, and environmental dependencies. The results of one study from 200 subject matter experts revealed that top management support and technological readiness are among the most critical determinants of successful cloud migrations (Abolvand, 2021). Similar studies were conducted, which indicate that security, policy, and compatibility were equally important (Bhardwaj, 2022; Basha et al., 2024; Adeyemo et al., 2024; Alkhalil et al., 2017; Abied et al., 2021) and cost savings, competitive pressure, and regulatory support as top determinants as well (Amini & Javid, 2023).

Numerous other determinants fall within the TOE and DOI frameworks, which are critical in an organization's ability to migrate its data to the cloud (Basha et al., 2024). Technological determinants include the effectiveness of data transfer, system operations, interface design, and integration (Wulf et al., 2021). Additional examples include data security or application compatibility-related issues (Gudimetla, 2016) and interoperability (Cresswell et al., 2022). Organizational determinants include leadership expertise in cloud computing, organizational readiness, staff training, organizational acceptance, technical configurations, and

costs (Daroudi, 2024), while other studies revealed the importance of developing proper scope and planning sessions (Ranganathan & Sampathrajan, 2023).

Environmental determinants include security and privacy (Daroudi, 2024), governance or regulations (Eren et al., 2022), and a growing skepticism of entrusting organizational data to commercial third-party vendors and its implications, such as cyber-attacks on the vendor, bankruptcy, and data loss, and a lack of clear legislation and governance on data storage was also seen as a significant determinant (Shibambu, 2022). Other studies suggest that potential determinants can also include security and privacy concerns (Abd Rahman et al., 2022), lack of clarity on organizational policy (Eren et al., 2022), environmental impacts (Abied et al., 2022), misaligned strategic behavior and communications (Krasniqi & Jaumin, 2021), lack decision-making among senior management (Badie, 2023), and poor attitude, culture, and working knowledge of cloud migration processes (Eren et al., 2022).

Regardless of the study, an emerging theme was the importance of top management leaders making unified decisions and providing support (Badie, 2023). Top management is responsible for the proper resource allocation, integration of services, and appropriate processes required to successfully migrate data to the cloud and integrate cloud computing inside the organization (Alkhalil et al., 2017). Tornatzky and Fleischer (1990) cited Dean (1988) in providing decision models that can guide top management decisions to help scope out determinants that could exist in a successful deployment to include (1) rational model, which entails subject matter experts conducting comprehensive research and analysis on best courses of actions for an organization, (2) bounded rational model, which proposes that although research and analysis were conducted, decision-makers and subject matter experts' rationale is limited by their knowledge, experience, and faculties and should be considered during the decision-making

process, (3) political model, which proposes that individuals or groups make decisions that align with their self-interests instead of decisions that benefit the collective organization, and the (4) garbage can model, which proposes that decisions are made based on the fragmented contexts of problems, solutions, and people.

Such models are specific to top management, but by leveraging TOE and DOI models, as many researchers have done before, similar determinants are expected to occur in the current study. Each organization will have varying determinants based on contexts, such as funding, mandates, and availability of resources. A review of the literature suggests that most researchers agree that organizations should identify determinants of a successful migration because planning for determinants will help better develop project milestones, goals, and timelines.

Cloud Migration Barriers

Tornatzky and Fleischer (1990) suggested that organizations can prepare their workforce for implementing an innovation by (1) forming an understanding of the innovation and how it relates to existing social and technical contexts within the organization, (2) establishing metrics to measure the effectiveness of the innovation and how it aligns with organizational goals, (3) factoring potential social, organizational, and technical issues or conflicts before implementing the innovation, (4) considering human resource changes based on capabilities regarding movement of people across different departments, creating working groups, and assigning clear roles and responsibilities for teams.

Organizational Planning

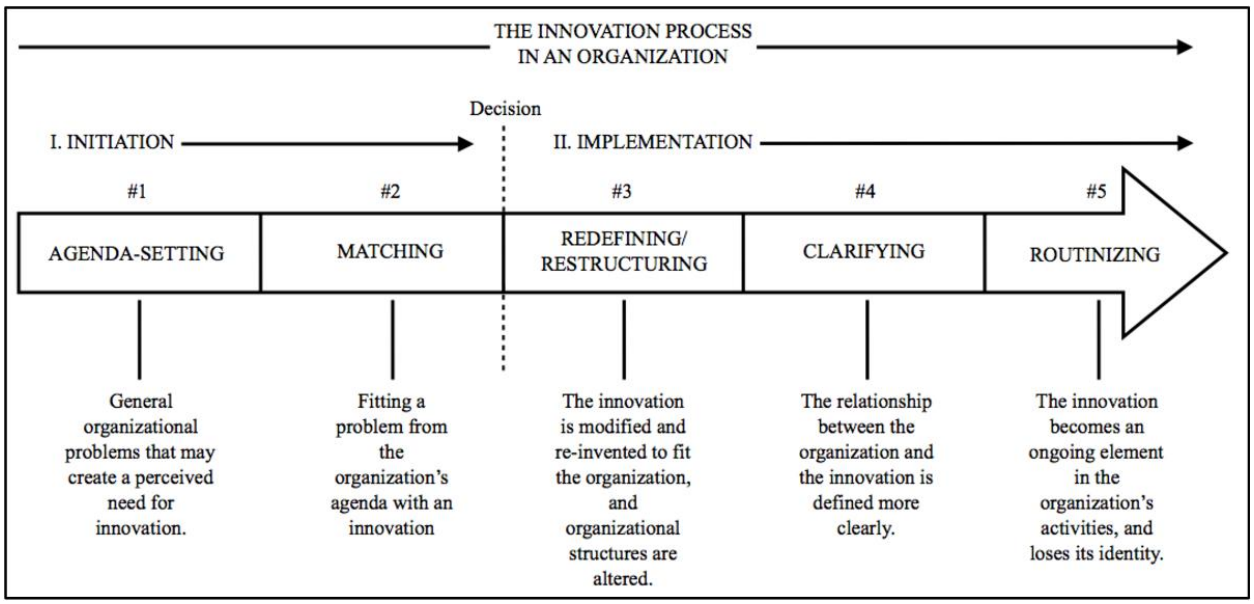
Ranganathan and Sampathrajan (2023) stated that careful planning is paramount to a successful migration. Migrating data to the cloud is a complex process that often includes challenges, variables, and unforeseen circumstances that require cooperation and planning across

several organizational departments (Ranganathan & Sampathrajan, 2023). As a result, organizations can experience migration delays due to a lack of dedicated and trained staff, technical issues related to data transmission, and a lack of interdepartmental communication (Ranganathan & Sampathrajan, 2023). Gudimetla (2016) added that such factors contribute to frequent outages and system failures during migration. In addition to the technical barriers, planning barriers can also include administrative functions such as vendor management, contract negotiations, and pricing, which are tied to the success of migration planning (Alkhalil et al., 2017).

Cloud migration projects have a greater chance of success when activities are carefully planned around strategy and resource alignment, comprehensive forecasting regarding labor and time is conducted, and proper funding sources are readily available (Ranganathan & Sampathrajan, 2023). Additional planning activities include establishing cost models, resource management, scheduling, and creating evaluation metrics (Buyya, 2023), using business cases, resource alignment, post-migration monitoring, and staff training (Ahmed, 2018). Poor planning could cause delays that stem from funding shortages, resource planning, undefined goals, and a lack of familiarity with the migration process (Ranganathan & Sampathrajan, 2023). Creswell (2022) reinforced the need for organizations to plan for migration costs, staff training, establishing a centralized migration framework, and cultural shifts in how cloud and data storage are perceived post-migration. Rogers (2003) also reinforced proper planning by stressing the importance of completing initiation activities before implementation, as seen in Figure 4.

Figure 4

The Innovation Process in an Organization



Note: Figure 4 illustrates the innovation process of an organization. The process demonstrates the phases included in initiating, making decisions on, and implementing an innovation within an organization from "Diffusion of Innovations" by Everett Rogers.

Alkhalil et al. (2017) claimed that although organizations must accept several risks in migrating data to the cloud, one of the most serious risks is a lack of working knowledge of the cloud environment and the effort required to migrate. Organizations can avoid cloud migration disruptions and delays by having a working knowledge of areas related to service level agreements, data ownership, and selection of cloud services (Alkhalil et al., 2017). Similarly, issues related to change management often arise during cloud migration (Gudimetla, 2016) because organizations abruptly put migrations on hold to gather requirements that should have been collected during the planning phases (Ranganathan & Sampathrajan, 2023). Leaders and decision-makers should plan for all areas of the planning and implementation phase by ensuring adequate support is in place to manage the migration (Cresswell et al., 2022).

Creswell et al. (2022) offered strategies to mitigate the impacts, such as setting up good support teams for implementation, change management, communication, and engagement. Gudimetla (2016) stated that strategic planning is an essential component of any organization's roadmap and that strategy around the planning, execution, and post-migration stages must be developed to support a successful migration. Gudimetla (2016) also stressed the importance of creating roadmap activities such as conducting pre-migration checklists and phases such as risk assessment, post-migration testing, and rollback strategies, which proved crucial. Parallel to the current literature, the importance of organizational planning and its elements will likely occur in the current study.

Data Integrity Challenges

Checking data integrity is an integral post-migration activity and should be included as a critical migration objective (Tao, 2020). Mohammad (2021) recommended that organizations create repositories of documentation containing rubrics and guidelines based on criteria rooted in successful data migrations to include data backup and recovery strategies, disaster recovery, data validation and testing (before, during, and post-migration), data integrity checks, data reconciliation, and consistency checks. Data testing is critical to the migration process (Hussein, 2021) and should be completed by utilizing monitoring and reporting tools to ensure that data is complete, accurate, and secure (Mohammad, 2021).

Data migration and reconciliation are often overlooked and could seriously impact the migration's success and users' data (Guravaiah, 2024). Mohamad (2021) asserted that maintaining data integrity is critical post-migration and that failure to test data could result in a lack of compliance, loss of customer trust, and legal issues. Organizations must also plan for compatibility between migration tools, systems, databases, and file formats to ensure data is not

lost or corrupted, which can be done by preparing a migration roadmap that contains clear milestones, timelines, dependencies, and contingencies, increases the chances of a successful migration (Mohammad, 2021).

Available migration tools can avoid delays and downtime during data migrations (Mohammad, 2021). Tools allow cloud teams to access up-to-date information on the migration process, such as data transfer speeds, which is particularly helpful for large volumes of data to be successfully migrated within anticipated timeframes, minimizing disruptions to customers and operations (Mohammad, 2021). Performance checks can also assist in identifying errors related to format and content, such as varying data between legacy systems and cloud systems, anomalies, duplicates, or irrelevant data (Vupputuri, 2024). Familiarity with toolboxes and performance checks allows organizations to measure the effectiveness of the migration (Mohammad, 2021).

Data validation is essential to the migration process in identifying compromises or vulnerabilities (Nivedhaa, 2024), such as data loss, breaches, and corruption (Mohammad, 2021). Some inherent risks of migrating data to the cloud can be mitigated by incorporating built-in validation checks to ensure a smooth migration process (Nanjappan, 2024) and identifying such compromises and vulnerabilities early on. Organizations should leverage available tools and best practices. Mohammad (2021) stated that organizations should employ good backup and recovery practices and run validation and integrity checks for accuracy to reduce the risk of compromises and vulnerabilities. Kundavaram and Negendra (2024) offered additional data integrity best practices and solutions, such as implementing real-time data verification protocols, automated consistency checks, and pattern-matching algorithms as part of the migration effort.

Complexities of Technical Integration

Cloud computing should integrate into an organization's processes and culture (Marquis et al., 2024). Successful cloud migrations will entail planning for the complete integration and alignment with existing IT policies, the current environment, and users' requirements (Adeyemo et al., 2024). Migrating legacy systems, especially during the data transfer from on-premise sites to a cloud provider's offsite, typically causes most organizations issues (Hasan et al., 2022). Among several, two examples fundamental to a successful integration include (1) conducting the necessary assessments to ensure that an organization and cloud's infrastructure and security parameters can accommodate the migration (Abied et al., 2021) and (2) selecting the proper migration method such as re-host, re-platform, re-purchase, refactor, retain, or retire (Ranganathan & Sampathrajan, 2023). Ranganathan and Sampathrajan (2023) have stated that although lift and shift is one of the most commonly used methods, it may not be the most effective one because of the time required to test and evaluate applications and data in a new cloud environment as well as educating staff on how to use new tools cloud tools. A lack of integration can often lead to migration delays because organizations underestimate the effort required, complexities, duration of time, and risks involved with migrating (Ranganathan & Sampathrajan, 2023). Ranganathan and Sampathrajan (2023) concluded that identifying potential roadblocks and mapping out a successful migration is crucial in a cloud migration effort. Similarly, Hasan et al. (2022) suggested that organizations can best prepare to migrate their data to the cloud by understanding the environmental risks, threats, and vulnerabilities that can prepare organizations to migrate their data to the cloud (Hasan et al., 2022).

A migration's complexity and organizational resourcing make it difficult for leaders to estimate migration timelines. These are typical reasons for delayed migrations, especially when

security and compliance standards must be maintained during the migration (Ranganathan & Sampathrajan, 2023). Alkhalil (2017) asserted that applications migrated to the cloud usually consist of many interconnected parts; each part requires careful attention to ensure they are correctly adapted to the cloud environment and that steps should be taken to consider factors contributing to successful integration. Examples include compliance and regulations, compatibility and interoperability, privacy, business processes, application portability, and security (Alkhalil, 2017). Organizations must navigate through complicated contexts in a fairly unstructured environment when making migration-related decisions (Alkhalil et al., 2017). Cloud vendors often provide migration tools to track progress, automate tasks, speed up migration, and minimize downtime to assist organizations in the new cloud environment (Gudimetla, 2016).

Transition of Legacy Systems to Cloud

Cloud computing is one of the fastest-growing technologies available today and is an inevitable undertaking that organizations will eventually face because of its proven success in delivering IT services and capabilities (Amin et al., 2021). Admodisastro et al. (2023) reiterated that eventually, it would be in organizations' best interests to migrate their data to the cloud because of the resources required to keep up with increasingly complex system improvements and maintenance and that by maintaining the current data center environment, organizations pay more money for less secure systems. Daroudi et al. added that when organizations continue to operate an on-site data center, they will continue to pay high costs for equipment, maintenance, and cooling. Meeting today's customer demands along with the cost of hardware, staff, and software to run a data center is much more expensive compared to the numerous benefits such as agility, flexibility, maintainability, and security that cloud vendors can offer (Admodisastro et al., 2023). The remote access and multi-device flexibility that the cloud offers consumers will

eventually require organizations to migrate their data to the cloud instead of pouring money and resources into continually renewing and maintaining older systems.

Older systems critical to an organization were likely developed using an architecture that constantly requires updates and improvements but eventually reaches end-of-life and requires costly replacements every few years (Admodisastro et al., 2023). Cutting-edge tools within cloud computing will soon outweigh the benefits of operating a data center from the cost savings of not needing to replace costly hardware (Adeyemo et al., 2024). Migration of such legacy systems, along with the operational training on how to leverage cutting-edge tools, is an important consideration when preparing to migrate data to the cloud (Ranganathan & Sampathrajan, 2023), making it paramount to have a trained workforce with the proper skills and certifications required for a successful migration (Gudimetla, 2016).

Since cloud computing is relatively new, organizations lack the training and technical expertise to migrate (Ranganathan & Sampathrajan, 2023). Daroudi et al. (2024) supported this claim by stating that organizations should go to great lengths to train their employees on cloud fundamentals and challenges surrounding compatibility, complexity, and security. Lack of training and understanding of the environment commonly leads to inaccurate predictions of timelines, costs, and the required effort to migrate (Ranganathan & Sampathrajan, 2023).

According to Al Khalil et al. (2017), organizations should also get trained on cloud requirements gathering, migration planning, security, and hands-on cloud training. Organizations should obtain a thorough knowledge of customer business requirements, cloud capabilities, regulations, and relevant contexts when migrating data to the cloud (Alkhalil et al., 2017). Training cloud subject matter experts, decision-makers, and leaders in cloud fundamentals and

general security will allow organizations to shape requirements better and ultimately roadmap how stakeholders will want to operate in the cloud post-migration. (Alkhalil et al., 2017).

Communication

Communication across leadership, technical teams, cloud vendors, and customers is crucial because how communication occurs throughout the organization contributes to the success of a cloud migration effort (Amini & Javid, 2023; Mohammad, 2021). Krasniqi and Jaumin (2021) added that communication is a key determinant of a successful migration. Mohammad (2021) stated that this is likely because engaging with organizational leaders, decision-makers, IT teams, and customers helps inform the migration process and shape requirements rooted in stakeholder expectations. Lack of communication, especially when coordinating resources for changing business requirements, can create unnecessary delays in the migration process (Ranganathan & Sampathrajan, 2023). When organizations invest time to communicate roles and responsibilities across different teams, they position themselves for a successful migration (Gleb, 2021).

Creating and maintaining clear communication channels between groups allows organizations to gain consensus on strategy, collect buy-in on important decisions from key stakeholders, and adjust to changing business requirements during the migration process to avoid unnecessary delays (Ranganathan & Sampathrajan, 2023). Communicating such activities is crucial, especially when analyzing stakeholder needs, requirements, and risks (Ahmad, 2018). Leaders and decision-makers can inspire confidence in cloud technologies by socializing the benefits of cloud computing early on (Adeyemo et al., 2024). Open and active lines of communication with stakeholders are crucial throughout the migration process (Gudimetla, 2016) and allow organizations to pivot or re-position requirements or costs, especially when

pricing, storage, transfer, or support requirements are not fully understood (Alkhalil et al., 2017). Compared to the current study, communication elements will likely be a significant barrier to cloud migration.

Security and Entrusting Third-Party Vendors

According to Ahmad (2018), in addition to a well-planned strategy, a thorough understanding of security requirements is essential in the decision-making and execution of a successful migration. Although subject matter experts should thoroughly understand security requirements, it is a significant barrier to migration (Brzozowska-Rup, 2024) and is a cause for concern (Bhatti et al., 2022). Alkhalil et al. (2017) added that privacy and data confidentiality are serious concerns as well; however, when security requirements are taken seriously, and best practices are followed, Ranganathan & Sampathrajan (2023) stated that data and applications have a positive impact on migration timelines and that failing to recognize security requirements properly could cause undesirable delays.

Risk assessments should be conducted before the cloud migration process begins, along with significant migration milestones (Amin et al., 2021). Organizations will typically assess security requirements related to data protection, disaster management, data theft or leaks, data privacy, access, and identity management (Bhatti et al., 2022). While assessing such requirements, organizations must come to a consensus regarding how much risk to accept in areas of performance, standardization of rules and regulations, costs, shared technology in a multi-tenant environment, vendor lock-in, and loss of control over managing data (Assaf, 2021).

Hasan et al. (2022) made several arguments related to the security risks that act as barriers to how organizations migrate their data to the cloud. Hasan et al. (2022) claimed that cloud security risks exist beyond cyberspace and that people's behaviors and actions pose

inherent risks that expose vulnerabilities and cyber-attacks. Some examples of those risks include a lack of comprehensive background checks of employees for vendors and customer organizations. Social engineering attempts to gather data on credentials and access are security concerns organizations should safeguard against. Common attacks include targeting users with weak credentials to access unauthorized devices, virtual machines, and shared networks (Hasan et al., 2022). The behaviors and actions of organizations could also increase risks when there is a lack of governance and oversight, information regarding contractual agreements or clauses that would require a lock-in of services, and service level agreements (Hassan et al., 2022).

An additional set of risks organizations must consider is how to assess contingencies related to the interconnectedness of cloud computing devices. Due to the nature of cloud computing, devices are interconnected within a cloud computing environment (Hassan et al., 2022). Cloud computing could be open to security concerns in areas of virtualization, storage, and network since it consists of several technologies where virtual machines are connected, and an attack could spread to gain unauthorized access to multiple devices (Hassan et al., 2022).

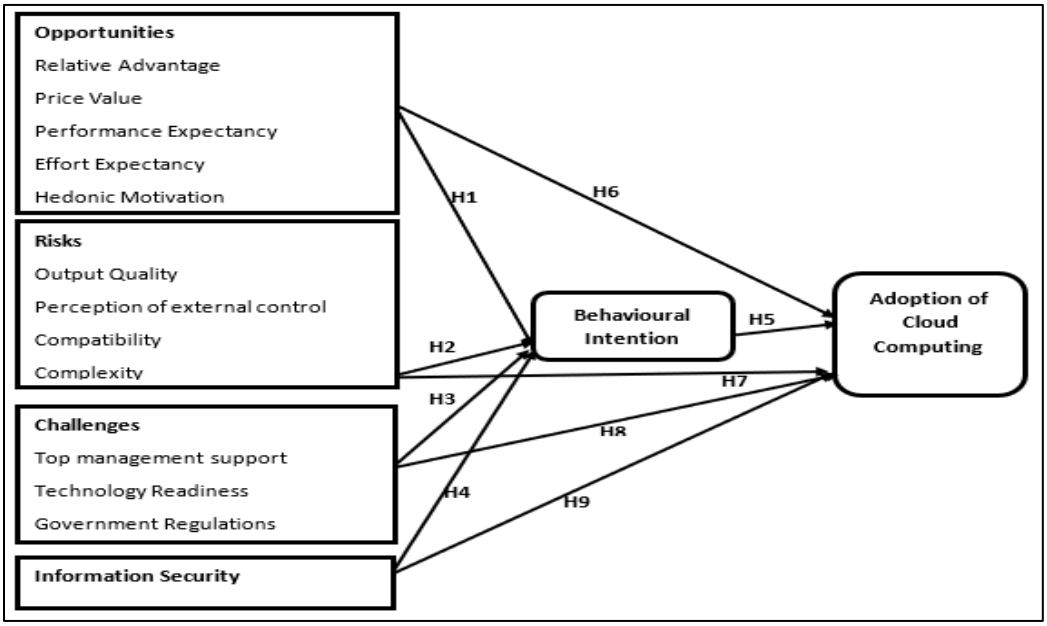
Trust must be built between organizations and cloud vendors (Cresswell et al., 2022). Vendors are responsible for enforcing the integrity of their operations by ensuring that their tools and safeguards effectively protect sensitive data and that they store data ethically and transparently (Cresswell et al., 2022). There are some possible security risks with teams being able to work remotely (Rodeghero & Tubre, 2020). Some security concerns organizations encounter include an over-dependence on cloud vendors and vendor lock-in (Mohammad, 2021).

Government data was always stored in government-run data centers, typically located on-site. Many organizational leaders are concerned about this change and are uncomfortable with allowing commercial companies to store government data. Although Shibambu (2022) claimed

government organizations are skeptical of entrusting third-party cloud vendors with sensitive data, Creswell et al. (2022) refuted that vendors have a responsibility to enforce the integrity of their operations by ensuring that their tools and safeguards protect sensitive data and that they store data ethically and transparently (Cresswell et al., 2022). The core discrepancy among researchers is a security concern related to behavioral intention. Athambawa et al. (2022) addressed behavioral intention by proposing a new cloud migration model centered on a secure migration. The secure cloud adoption model (SCAM), shown in Figure 2.5, addresses how to factor behavioral intention into a secure cloud migration (Athambawa et al., 2022).

Figure 2.5

Secure Cloud Acceptance Model



Note. Figure 2.5 illustrates the secure cloud acceptance model published by Athambawa et al. (2022). The secure cloud acceptance model was created based on the support of a review of relevant literature, existing cloud migration models, and survey results (Athambawa et al., 2022) from Secure cloud adoption model: novel hybrid reference model by Athambawa, A., Gapar, J &

Khathibi, A, 2022, *Indonesian Journal of Electrical Engineering and Computer Science* Volume 27 issue 2.

In addition to considering commonly known cloud migration determinants such as relative advantage, price value, performance expectancy, effort expectancy, technology readiness, and government regulation, Athambawa et al. (2022) provided a framework that factors relationships between behavioral intention and areas of cloud migration opportunity, risks, challenges, as it relates to security. The SCAM adoption model can benefit future researchers and organizations by providing critical guiding principles and considerations to factor into a cloud migration. Leaders and cloud decision-makers can use SCAM to determine levels of opportunity, risks, challenges, and information security during their planning stages of migration (Athambawa et al., 2022).

Summary

Cloud computing has emerged as one of the most significant contributions to information technology and is widely accepted as a staple in future technological investments (Adeyemo et al., 2024). The National Institute of Standards and Technology (NIST) (2011) defines it as "a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (network, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." There are several benefits organizations can take advantage of after migrating their data to the cloud; some include optimizing business processes, reducing costs, and leveraging state-of-the-art technology to store and deliver data to customers (Bhatti et al., 2022).

In response to the clear benefits of cloud, the United States government passed several bills to promote cloud computing, such as The Federal Data Center Enhancement Act. The act

was passed to modernize capabilities and technologies for U.S. Government agencies storing data (Congress, 2023), proposing that up to $5.8 billion can be saved by consolidating data centers and migrating data to commercial cloud providers (Congress, 2023). Although mandates to migrate organizational data to the cloud are in full effect across several industries, organizations still need more comprehensive and coherent cloud frameworks to assist them with migrating (Yadav et al., 2020).

Cloud migration frameworks are still in their infancy; however, several determinants fall within the TOE and DOI frameworks, which play critical roles in an organization's ability to migrate their data to the cloud and predict success (Basha et al., 2024). Examples include leadership expertise in cloud computing, organizational readiness, and costs (Daroudi, 2024), while other studies revealed the importance of developing proper scope and planning sessions (Ranganathan & Sampathrajan, 2023). Environmental determinants include security and privacy (Daroudi, 2024), governance or regulations (Eren et al., 2022), and entrusting third-party vendors with sensitive organizational data (Shibambu, 2022). In addition to determinants, there are organizational barriers that leaders must prepare for to ensure a successful migration; these include organizational planning, proper data integrity checks in place, understanding environmental considerations to allow for successful technical integrations, the process of transitioning legacy systems to the cloud, interdepartmental communications, and security.

Chapter 3: Research Method

The problem addressed in this qualitative single case study is the unknown organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020). Several agencies across the U.S. government are struggling to migrate their data to the cloud in many facets and incur high costs from delayed or failed migration attempts (Department of Defense, 2024). The case study has the potential to assist the studied agency and also act as a model for other agencies to follow in identifying challenges, barriers, and determinants associated with successful cloud migration. Yadav et al. (2020) state there is a lack of literature and available frameworks for governments to follow for cloud migration. Major decisions without a solid framework often have negative consequences, such as increased costs and migration delays. Most barriers are associated with preparedness levels, funding, and implementation.

The purpose of this qualitative single case study was to identify how organizational barriers impact the migration of data from an on-premise data center to the cloud (Cunha et al., 2020). The research employed a qualitative single case study methodology by interviewing employees directly involved in cloud migration activities in decision-making or leadership roles. This method explored existing barriers to better understand how delays or risks can be addressed. For example, it was used to evaluate IT managers' experiences of the complexities surrounding cloud migration within local government sectors in Australia (Ali, 2022). In the study by Ali et al. (2022), IT managers provided data in interviews about their experiences with the challenges encountered while migrating their local government data to the cloud. The data can assist organizations that lack strategies to conduct proper assessments and understand the complexities, demands, and priorities associated with cloud migration.

This chapter provides details on the research methodology the researcher utilized during the study and the rationale for selecting it, along with information on the population of interview participants, the solicitation process, and the number of participants, given the nature of the study. This chapter will also provide details on how interview data will be gathered, analyzed, and stored, along with instrumentation and study procedures. The chapter will conclude with details on assumptions, limitations, mitigations, delimitations, ethical assurances, and a summary.

Research Methodology and Design (Nature of the Study)

The researcher employed a qualitative single case study as the research design. Qualitative research methods were used to collect interview data from past and present government contractors and civilians at the defense agency being studied. Participants who were interviewed had a history of directly working on cloud migration efforts. Interviews were selected as a data collection method because they assisted the researcher with a better understanding of participants' perspectives on organizational barriers, challenges, and determinants associated with migrating data to the cloud. Given the nature of this study, the researcher found that employing a case study was the most effective design.

The first reason a case study was suitable for the nature of this study is that case studies are critical in supporting organizations in developing clear policies and best practices (Bloomberg, 2018). Although assisting other government agencies is a benefit, the primary reason a case study was selected was to better understand the internal challenges and barriers of the defense agency being studied. The literature review has demonstrated in several areas that many organizations, particularly government agencies, struggle to migrate their data to the cloud. A lack of regulation and conformity often causes delays or confusion among organizational

leaders regarding how to plan for a successful cloud migration (Ahmed, 2020). Shibambu (2022) adds that a lack of legislation and governance is a culprit of delayed or failed migrations. As a result, leaders struggle to make critical decisions (Alkhalil, 2017). The literature suggested that organizations lack clarity, guidance, and expertise when planning for cloud migrations. Since case studies have the potential to generate clear policies and best practices, which are crucial for organizations to have a successful migration, a case study was the best choice.

The second reason a case study was the most suitable design is that case studies provide rich information that can be used in broader contexts for other organizations (Bloomberg, 2018). Although findings will be specific to the defense agency, results can be relevant and beneficial to other government agencies. Barriers and challenges of cloud migration extend beyond the defense agency being studied; several, if not most, government agencies will eventually migrate their data to the cloud (Congress, 2023). According to the Federal Data Center Enhancement Act, U.S. government agencies can save up to $5.8 billion by consolidating data centers utilizing commercial cloud services (Congress, 2023). The results of this case study can be used by agencies across the U.S. government to avoid the tremendous costs associated with delayed or failed migrations (Department of Defense, 2023).

According to Ranganathan and Sampathrajan (2023), a lack of familiarity is a common reason delayed or failed migrations occur. Krasniqi et al. (2021) add that a lack of framework, coupled with a lack of familiarity, can also cause major migration delays or failures as well. The benefit of selecting a case study allows other government agencies to model their migrations after an existing study, giving leaders the opportunity to become familiar with the migration process and explore different frameworks during planning phases. By employing qualitative methods to interview leaders and subject matter experts, the researcher publishes a dissertation

that could act as a guide or playbook for other agencies to use, with the hope of outlining possible challenges or barriers and highlighting determinants that can assist them with their cloud migration efforts.

After careful consideration, the researcher chose not to select a quantitative methodology for this study. Although quantitative studies, regarding aspects of cloud migration, have been conducted (Zeng, 2025), the need to prove a hypothesis or draw comparisons from data was not necessary for the nature of the study. A study driven by quantitative methodology would lack key opportunities to collect valuable data consistent with the nature of the study. After considering several options, it became clear to the researcher that a qualitative methodology is consistent with the study's research questions and purpose.

The first consideration for a qualitative research method was ethnography. Ethnographic research entails a researcher studying a unique group and the qualifications or considerations associated with being an individual in that group (Bloomberg, 2018). Although an ethnographical study can be paired with a case study to better understand a culture's values, beliefs, and traditions (Jones-Hooker, 2023), these elements do not fully capture organizational barriers to cloud migration. Such factors could misdirect or weaken critical organizational barrier data collection tied to themes such as funding, decision-making, technical preparedness, and change management. Lastly, ethnographers immerse themselves fully into the studied environment and learn about cultural practices and social norms that make up the organization. This would have proven difficult given that the defense agency's cloud migration effort occurred in multiple locations across the United States, involved several teams, and was completed remotely for long durations of time.

The second consideration to use as a qualitative research method was grounded theory. Grounded theory entails a researcher suggesting a theory based on data that was collected and analyzed. It is commonly used when researchers know very little about the topic (Bloomberg, 2018). The researcher did not accept grounded theory based on the general claim that it appears to focus on the data itself rather than on the experience of the individual or institution (Bloomberg, 2018), which is key to the researcher's data collection.

The third consideration to use as a qualitative research method was narrative inquiry. Narrative inquiry focuses on how individuals give meaning to their experiences from their social and cultural environments (Bloomberg, 2018). The nature of the study called for a research method that would assist the researcher in finding results that could contribute to a practical cloud migration framework based on barriers and determinants. The researcher did not accept a narrative inquiry because the method is best used in studies that seek out how narratives contribute to the meaning of a topic rather than searching for conclusive answers or certainty (Bloomberg, 2018).

Population and Sample

The population for this study consisted of employees at a defense agency who were directly involved with a cloud migration effort and were influential in making financial, technical, and organizational decisions regarding the cloud migration. Types of leaders include subject matter experts, team leads, and those in administrative leadership positions such as chiefs and directors. The selected population is appropriate because each participant is directly involved with policies, decision-making, or approval processes tied to key areas related to the cloud migration effort.

Participants were selected based on having the credentials and experience to speak at length regarding organizational barriers that influence data migration from an on-premise data center to the cloud. Each participant had demonstrated direct experience working on a cloud migration effort. It is important to balance the number of participants and the depth of the study (Bloomberg, 2018). A total of 16 participants were interviewed in a semi-structured interview format. Each participant answered questions geared toward the technical, organizational, and environmental facets of cloud migration, along with questions regarding the impact of cloud adoption and acceptance of the new technology.

Given the nature of the study, interviewing a range of participants allowed the researcher to develop themes based on the perspectives and experiences of leaders in decision-making roles. Participants were recruited based on their experience and involvement with organizational barriers related to cloud migration. Each participant was recruited through an email inviting them to be interviewed about of the barriers and determinants of cloud migration at the defense agency.

The study included criteria for each participant. The criteria required that participants are current employees or were previously employed by the defense agency as a civilian or contractor, are actively or were previously affiliated with a team engaged in the planning, execution, or monitoring of migrating government data from an on-premise data center to the cloud, and has knowledge to answer interview questions regarding barriers or determinants related to migrating data to the cloud. Each participant was required to meet the criteria to participate in an interview. Participants were targeted members of cloud migration teams and were initially notified of the opportunity to interview.

Instrumentation

Interviews are one of the most important sources of data collection for case studies (Yin, 2018). The researcher was the primary instrument in the qualitative single case study to collect participant data through semi-structured interviews. A total of 16 interviews were conducted for this study. Appendix A contains a site letter for the defense agency, Appendix B includes a solicitation for participation, Appendix C includes a consent letter, Appendix D includes the interview protocol, and Appendix E includes a determination from the Department of Defense regarding IRB approval. Semi-structured interviews were favored because they allow researchers to collect valuable data from multiple perspectives that are unique to the study while providing flexibility and adaptability to probe for further clarity (Alhabsyi, 2022).

Member checking is a valuable tool that allows participants the opportunity to review their interview transcript for accuracy. It is the most appropriate tool for this case study because it enhances the validity of the collected data (McKim, 2023). Additionally, the researcher used a reflexivity journal. A reflexivity journal acts as a tool for the researcher to reflect on their role, assumptions, and influence throughout the duration of the study (Bloomberg, 2018). A reflexivity journal allowed the researcher to better understand the contexts of each participant. Documenting notes in a reflexivity journal is important since cloud migration efforts span multiple areas of an organization, and decisions from one team could have direct consequences for other teams.

Study Procedures

The first step of the study procedures was for the researcher to apply to and receive approval from National University's Institutional Review Board (IRB). The determination was made in conjunction with the Department of Defense that the study did not require IRB approval.

After the determination was made, the researcher sent emails to the targeted population of credible participants for the study with a solicitation to participate in the study, as seen in Appendix B. The researcher scheduled interviews with each participant using Microsoft Teams' scheduling feature for those participants who agreed to be interviewed.

Participation was voluntary. The researcher informed participants of their anonymity and that their identity and interview data would be completely protected following the interview. The researcher interviewed 16. Participants were in a leadership position and were directly involved with decision-making capacities related to cloud migration efforts.

On the interview day, the researcher conducted semi-structured interviews with open-ended questions over Microsoft Teams using the Microsoft Teams transcription and recording features. Interviews were recorded, and the transcription feature allowed the researcher to obtain a written copy of the transcript. The researcher also provided a copy of the written transcript to participants to review for the opportunity to modify responses. This opportunity allowed participants to review their answers and provide further clarity on them. Participants had four business days to provide final modifications to the interview transcripts.

Throughout the interview process, participants' identities and responses were coded and protected to conceal interview data and the identity of each participant. The researcher analyzed the collected data by comparing, cataloging, and coding data using Dedoose. The results will be used to identify barriers or determinants related to migrating data to the cloud. An overview of the study's interview protocol is shown in Appendix D.

Data Analysis

All interviews were conducted on Microsoft Teams, and the researcher leveraged the transcription feature to record the audio conversations. The interview transcripts were then

imported into Dedoose for analysis. The researcher utilized tools in Dedoose to identify and establish themes by organizing and categorizing data from the transcribed interviews. The researcher then employed Braun & Clark's six-phase method of thematic analysis, which includes familiarization of data, coding, searching for themes, reviewing themes, defining and naming themes, and writing up (Braun & Clark, 2013).

Familiarization with Data. Braun and Clark (2013) state that researchers must immerse themselves and become familiar with the collected data. For this study, the first step the researcher took to become familiar with the data was to read and listen to all the transcribed interview data from semi-structured interviews. By reading and listening to interview data several times, the researcher established a baseline knowledge of interview data and was prepared to engage with the analysis conducted in Dedoose. This step is critical to pair with the effort of Dedoose in analyzing the data because it provides coherence and requires the researcher to check the analysis and begin the coding process.

Coding. During the coding phase, the researcher created labels describing the data in relation to the study's research question (Braun & Clark, 2013). The researcher applied the coding step for this study by leveraging Dedoose. The researcher then tagged recurring data found within the semi-structured interview transcripts to create codes to search for a theme.

Searching for Themes. Braun and Clark define a theme as a "coherent and meaningful pattern in the data relevant to the research question" and add that a theme is a type of coding for the codes that have already been created. The researcher utilized tools within Dedoose to look for themes within the coded data. Each theme was composed of multiple codes to uncover themes across all codes.

Reviewing Themes. Reviewing themes is the process of checking that the themes are relevant to coded data and the entire data set (Braun & Clark, 2013). The researcher reviewed themes based on the multiple themes from coded semi-structured interview data. The researcher tied the uncovered themes to the relevance of the study's research question so that they can be defined and classified.

Defining and Naming Themes. According to Braun and Clark (2013), defining and naming themes entails researchers identifying the essence of each theme and writing a detailed analysis of each one. The researcher provided definitions and names for themes found in semi-structured interview data. Defining and naming themes is critical in contributing to the study's narrative.

Writing Up. Braun and Clark (2013) defined the process of writing up as "weaving together the analytic narrative and data extracts to tell the reader a coherent and persuasive story about the data." The researcher combined narrative and data extracts to communicate the study's results and share practical implications and considerations based on the findings. The researcher used Braun and Clark's six-phase method of thematic analysis to identify and analyze patterns within the data so that results may be drawn. The researcher employed Brayn and Clark's six-phase method of thematic analysis after member checking was completed. The researcher completed each phase of the process and after gathering results from interview data, completed the "writing up" phase.

Assumptions

Identifying and questioning assumptions is important because it can prevent researchers from becoming too comfortable with their biases (Clair, 2022). While this study could have additional assumptions, three were identified. The first assumption in the study was that

participants are actual employees or former employees of a defense agency who were involved in a cloud migration project and were honest in answering interview questions. Although the researcher is familiar with the cloud migration teams at the defense agency being studied and each participant's supervisor will be aware of the interview, there is a general assumption that the participant is currently or was previously directly involved with a cloud migration effort.

The second assumption in the study was that the experiences that participants had working on a cloud migration team translate into credible and well-informed interview responses. It is possible that the participant's responses or lack of response will not yield any value to specific interview question(s) being asked, or that data is provided about peripheral topics outside the scope of organizational barriers. The third assumption in the study was that organizational barriers existed when migrating data to the cloud. Cloud migration barriers exist across several government organizations (Cunha, 2020); however, it is assumed that, since cloud migration is a relatively new process and the effort is a high priority, at least some organizational barriers exist.

Limitations

The findings of this case study are specific to the defense agency. They may not be directly applicable in all cases across several organizations since each organization has unique complexities, processes, size, mission, regulations, budgets, and requirements that may not be fully translated in this study (Gudimetla, 2016). The open-ended semi-structured interview questions were rooted in organizational barriers specific to the case study at the defense agency, as it is common for case study strategies and practices to rely on the data being analyzed (Gudimetla, 2016). Another limitation is the rapid pace at which cloud technologies and

challenges evolve in how an organization shapes or perceives barriers or determinants (Gudimetla, 2016).

The geographical locations of participants across the United States are another limitation. Participants across geographical areas focused on specific tasks directly tied to their location, such as data center locations, organizational mission, and secondary sources of knowledge or activities related to cloud migration. This limitation was addressed by the researcher cross-checking data that participants claim is questionable or includes degrees of uncertainty with follow-up interview questions.

One final limitation was the variance of positions held by the population type. Analyzing data from government contractors to senior executives may yield complex, layered, conflicting, incomplete, or inaccurate data due to the differences in taskings, expectations, perceptions, and visibility of cloud migration efforts. This limitation was managed by reminding participants to focus simply on answering questions to the best of their ability and not become sidetracked or distracted from activities outside of their current role.

Delimitations

This research study explored the organizational barriers of cloud migration within a defense agency and has limited its data collection to participants' interview responses from a semi-structured interview. The study was delimited to participants who have either worked or currently work for the defense agency and are considered leaders, decision-makers, or subject matter experts in a role to impact changes or policy. The researcher was able to collect accurate data by limiting recruitment to subject matter experts, leaders, and employees with decision-making power to impact policy within the geographical locations in which the defense agency has a presence.

Ethical Assurances

In conjunction with a determination by the Department of Defense, the study received recognition and proper approval before data collection. There is minimal risk associated with this study and the researcher's ability to keep the participants' responses and identities concealed. Confidentiality and anonymity were achieved by following standard IRB rules and expectations and by saving all interview data on a password-protected cloud drive, which requires multi-factor authentication by the researcher to access.

The researcher's role in this study entailed conducting semi-structured interviews with employees at a defense agency where they are also employed. Authorities within the department of defense have emphasized the importance of securely migrating data to the cloud and expect organizations across the DoD to embrace the effort accordingly (Department of Defense, 2024). Given the significance of the messaging and communication of cloud migration, it may create a professional bias within the researcher to fill in gaps or imply certain pieces of information during the interview process. To mitigate or eliminate this bias, the researcher solely focused on the interview questions and only sought clarification for unclear or incomplete statements. In order to keep interview data accurate, follow-up clarification was not be sought out for differing or opposing views based on the researcher's professional experience with cloud migration.

Summary

A qualitative single case study was chosen for this study because it is the most appropriate choice given the study's nature. Case studies are the most appropriate design because the results can be generalizable and expand on theories (Yin, 2018). Case studies provide rich information that can be used in broader contexts for other organizations and can assist leaders in developing clear policies and best practices (Bloomberg, 2018), which aligns with the benefits of

this study. Although findings will be specific to the defense agency, results can be relevant and benefit other government agencies.

The qualitative single case study included interviews with 16 defense agency employees. Interview participants were limited to those with roles with decision-making capabilities or leadership roles directly supporting a cloud migration effort. This study used purposeful sampling to select its participants. Participants must also know the financial, technical, and organizational decisions regarding cloud migration. Examples of roles include subject matter experts, team leads, and those in administrative leadership positions such as branch managers and division directors. The participant pool was selected based on the credentials and experience to speak at length regarding organizational barriers that influence data migration from an on-premise data center to the cloud.

The researcher used a reflexivity journal and uploaded associated interview artifacts in the appendices. After the data were collected, Dedoose was used to identify and establish themes by organizing and categorizing data from the transcribed interviews. The researcher then employed Braun & Clark's six-phase method of thematic analysis, which includes familiarization of data, coding, searching for themes, reviewing themes, defining and naming themes, and writing up (Braun & Clark, 2013).

The study's limitations include (1) the rapid pace at which cloud technologies and challenges evolve in how an organization shapes or perceives barriers or determinants (Gudimetla, 2016), (2) the geographical locations of participants across the United States, and (3) the variance of positions held by the population type. The study is delimited to participants who have either worked or currently work for the defense agency and are considered leaders, decision-makers, or subject matter experts in a role to impact changes or policy. The researcher

collected data by limiting recruitment to subject matter experts, leaders, and employees with decision-making power to impact policy within the geographical locations where the defense agency has a presence.

Chapter 4: Findings

The purpose of this qualitative single case study was to identify organizational barriers that influence the migration of data from an on-premise data center to the cloud (Cunha et al., 2020). The problem addressed in this qualitative single case study was the unknown organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020). This chapter will provide an overview of the study's trustworthiness, results, themes and subthemes, comparison of the results to literature, and summary. Each section addresses a specific component of the study and how it ties back to the study's research questions.

The focus of this study was to better understand the types of organizational barriers and determinants that influence the migration of data to the cloud. Two research questions were formulated so that participants had the opportunity to share their knowledge, experiences, and insights into what they believed were key barriers and determinants. The study's purpose was to identify organizational barriers and determinants that influence the migration of data to the cloud. Each research question was crafted to gather data in support of the underlying need for a more comprehensive framework that organizations could leverage for migrating data to the cloud (Hussein, 2021). This qualitative case study allowed the researcher to explore participants knowledge, experience, and insight by interviewing them using Microsoft Teams. The following research questions guided the study.

RQ1

What organizational barriers influenced migrating data from an on-premise data center to the cloud?

RQ 2

How have organizational barriers influenced the migration of data from an on-premise data center to the cloud?

Trustworthiness of the Data

Trustworthiness allows researchers to evaluate how their findings authentically represent the reality of the phenomena, experiences, or persons being studied (Bloomberg, 2018). This section will provide an overview of how credibility, transferability, dependability, and confirmability was used to establish trustworthiness of the data. Dedoose software was used to assist the researcher in this study with identifying and organizing themes and subthemes.

Credibility

Bloomberg (2018) stated that credibility refers to whether participants' perceptions align with the researcher's depiction of them. The researcher took steps to capture the statements and sentiments of each participant accurately by recording and verbatim transcribing their interview responses using Microsoft Teams. To achieve credibility, the researcher conducted member checks to elicit confirmation of transcript accuracy and completeness. Member checking directly impacted the interpretation of results by providing participants an additional opportunity to add, remove, or modify interview responses within four days of receiving the transcript copy. The most significant way member checking directly impacted the data was by allowing one participant to provide additional insights into details regarding rehearsal of concept drills.

Transferability

The goal of qualitative research is to develop findings that can be applied to similar contexts and environments based on researchers' settings and communities (Bloomberg, 2018). Transferability is the extent to which a study's findings can be applied to other similar contexts

(Bloomberg, 2018). Although it is the reader's responsibility to determine the transferability of a study (Bloomberg, 2018), transferability was achieved by providing readers with information about the study's parameters, methodology, and limitations. Additionally, participant information describing their role and function related to cloud migration, as well as sampling methodology, was provided to ensure transferability since participant information and purposeful sampling are important when articulating transferability (Bloomberg, 2018). These efforts directly impacted the interpretation of results because they provided context and clear boundaries in answering interview questions that are consistent with similar studies.

Dependability

Bloomberg (2018) stated that dependability refers to the stability and consistency of data over time. Dependability was achieved in this study by consulting with experts to confirm emergent themes during the data analysis process. Additionally, the researcher documented detailed steps of the research process to include how data was collected and analyzed. These activities directly impacted the interpretation of results ensuring that emergent themes and the research process provided a transparent and proven pathway to results while remaining consistent to similar studies.

Confirmability

Bloomberg (2018) stated that confirmability is concerned with establishing that the findings and interpretations are derived directly from the data. The researcher kept a reflexivity journal to achieve confirmability. Identifying and questioning assumptions is important because it can prevent researchers from becoming too comfortable with their biases (Clair, 2022). A reflexivity journal allows the researcher to better understand the contexts of each participant along with their own assumptions because it acts as a tool for the researcher to reflect on their

role, assumptions, and influence throughout the duration of the study (Bloomberg, 2018). Keeping a reflexivity journal directly impacted the interpretation of results considering entries and the impact my role as a member of the defense agency could have. No entries or observations yielded any significant impacts to the results of this study.

Results

The researcher worked with the National University Institutional Review Board (IRB) and it was determined that IRB approval was not necessary based on a joint-determination of the department of defense and National University seen in appendix E. After the determination was made, the researcher contacted the defense agency for permission to use government email addresses to contact cloud subject matter experts and conduct interviews using Microsoft Teams. Department of defense leadership approval was provided, found in appendix A. The researcher emailed 25 participants and interviewed 16 participants using the script found in Appendix B. The participant pool was selected based on the participants' credentials and experience to speak at length to organizational barriers and determinants that influence data migration from an on-premise data center to the cloud.

Interviews were conducted between June 2, 2025, and July 1, 2025. One-hour time slots were scheduled for all 16 interviews; however, the approximate range was from thirty minutes to one hour and twenty minutes. Each interview was conducted, recorded, and transcribed using Microsoft Teams. The researcher reviewed each transcript for transcription errors and sent it to each participant to check for accuracy and provide them with the opportunity to modify, remove, or add responses. The identity of each participant, along with their responses, was concealed by assigning each participant a numerical identifier.

The study consisted of 16 participants. Table 1 illustrates a summary of participant demographic categories. Demographic categories entailed: numerical participant identifiers, employee type (contractor or government civilian), employment status (current employee or a previous employee no longer working at the organization), and role. The role category's organizational ranking in terms of leadership position is as follows: team lead, supervisory, program, and then director.

Table 1

Participant Demographics

Participant	Employee Type	Employment	Role
Participant 1	Contractor	Current	Team Lead
Participant 2	Contractor	Current	Supervisory
Participant 3	Contractor	Current	Supervisory
Participant 4	Contractor	Current	Supervisory
Participant 5	Contractor	Current	Supervisory
Participant 6	Civilian	Previous	Supervisory
Participant 7	Civilian	Previous	Director
Participant 8	Civilian	Current	Director
Participant 9	Civilian	Current	Program
Participant 10	Civilian	Current	Program
Participant 11	Civilian	Current	Director
Participant 12	Civilian	Current	Program
Participant 13	Civilian	Previous	Director
Participant 14	Civilian	Current	Director
Participant 15	Civilian	Previous	Director
Participant 16	Civilian	Current	Director

Note. Table 1 illustrates the assigned demographic information to participants of this study.

The researcher employed Braun & Clark's (2013) six-phase method of thematic analysis, which includes (1) familiarization of data, (2) coding, (3) searching for themes, (4) reviewing

themes, (5) defining and naming themes, and (6) writing up. The results of this study captured several organizational barriers and determinants that could impact migrating data to the cloud. The emerging themes which were associated with research questions were organized and categorized in Table 1. Fourteen interview questions were asked to each participant, along with varying follow-up questions to clarify comments or positions. There were a total of 8 themes and 5 subthemes derived from interview data. Dedoose was used to upload all 16 interview transcripts in order to uncover categories and themes seen in Table 2.

Table 2

Research Questions and Themes

Research Question	Themes and Subthemes
RQ1: What organizational barriers influenced migrating data from an on-premise data center to the cloud?	1. Lack of Training 2. Planning • Requirements Planning • Resource Planning • Rehearsal of Concept Drills
RQ2: How have organizational barriers influenced the migration of data from an on-premise data center to the cloud?	3. Interdepartmental Communications 4. Process • Authority to Operate • Bureaucratic Processes 5. Top Management Messaging 6. Lack of Framework 7. Unwillingness to Accept Change 8. Migration Benefits

Note. Table 2 illustrates and organizes the themes and sub-themes found in this study.

Research Question 1

Research question 1 explored what organizational barriers influenced the migration of data from an on-premise data center to the cloud. This research question aims to identify organizational barriers that could influence the success of migrating data to the cloud. The categories, themes, and subthemes associated with this research question can be found in table 2.

The study revealed that several barriers and determinants existed that influence the success of a cloud migration. Barriers included lack of training, lack of requirements and resource planning, and a lack of framework which hindered progress of the effort. Determinants included utilizing rehearsal of concept (ROC) drills and escalations paths being detrimental activities or behaviors in the migration's success.

Theme 1 Lack of Training. Lack of training was a dominant barrier which 13/16 participants reported influenced migration to the cloud. The theme was mentioned 25 times during interviews. In regards to staff preparation, Participant 4 claimed that the "staff was not trained well or skilled" while Participant 11 mentioned that there were "periods of time the team did not possess the technical knowledge required to perform tasks." Similarly, Participant 4 echoed this statement by sharing that it was apparent early on in the project that the staff were not prepared. As a way to support the migration, Participant 12 mentioned that they enrolled in training classes during the cloud migration project since the work was outside of the scope of their day-to-day responsibilities, and they were untrained in their role for how to support the migration effort.

Theme 2 Planning. Planning and associated subthemes were mentioned 58 times by all 16 participants as barriers that influenced migration to the cloud. Subthemes included requirements planning, resource planning, and rehearsal of concept drills. General comments regarding planning were made by all participants. Participants 9 and 14 shared that planning was the most significant barrier, while Participant 6 likened the cloud migration experience to building a car as it is being driven.

Subtheme 1 Requirements Planning. Requirements Planning was mentioned 26 times by 10 out of the 17 participants as a barrier that influenced migration to the cloud. Participant 5

focused on the appropriate time that should have been dedicated to planning the cloud migration effort by stating: They needed at least six months to a year or more of actual planning going through and talking with everybody and figuring out how this migration was going to work before they even started to execute on any of it.

Participant 8 expands on this by outlining the importance of documenting requirements before kicking off the effort in order to fully capture systems data, owners, and dependencies; they mentioned:

> What we learned was when we migrate our systems and like ops, it talks to this database also, right and that's on a different server. In their head, they were just getting it from one database, but that was like some tables or shooting up some triggers.

Subtheme 2 Resource Planning. Resource planning was mentioned 21 times by 12 out of the 16 participants. Participant 15 explains that the cloud migration effort lacked accountable employees that took responsibility for the effort by claiming "Nobody basically having the responsibility, yet everybody having the responsibility. Nobody was the decision maker unless it went all the way to the top and then they always wanted more and more information." Participant 14 adds that better resource planning was required to ensure contracts were in place to support the effort by sharing "We didn't have contracts in place. We didn't have contract support. We had a lack of manpower initially as well." Participant 12 touches on resource planning by claiming that they were asked to assist with the migration despite not having the technical background or training due to lack of resources "I'm a developer, right? A software developer. I was tasked to do IT OPS. You know, because they had nobody else to do it and I did accept it."

Subtheme 3 Rehearsal of Concept Drills. Rehearsal of concept (ROC) drills were mentioned 3 times by 3 out of the 16 participants. Participant 13 emphasized the importance of conducting ROC drills by claiming that "A key factor in our success, we carried out ROC drills

for each migration. Those included preparation, execution, post migration tasks, decision making as well as comms."

Participant 11 explained the benefit of ROC drills by stating:

> I think the biggest thing was making sure that we had shared our plan and we also did what I think is one of the key events was the rehearsals prior to doing the full migration. We rehearsed with all of the different sites that were involved and basically did a dry run, walked through of, you know, step by step.

Participant 6 also mentioned the importance of ROC drills and how it allowed different teams across the organization to get informed on their roles regarding steps and events related to the migration:

> Everyone has to be on board. Everybody needs to know what the steps are. That's why we would have frequent rehearsal of concept drills, what we call roc drills. We would do a part 1 and a part 2 where we get all the people involved with a particular migration on a call…Those ROC drills lasted as long as they needed to last in order to dot all the I's and cross all the T's.

Research Question 2

Research question 2 explored how the organizational barriers influenced the migration of data from an on-premise data center to the cloud.

Theme 3 Interdepartmental Communication. Interdepartmental communication was mentioned 15 times by 9 out of the 16 participants. Participant 6 stressed they significance of interdepartmental communication by stating "interdepartmental communication is key and everybody's got to be informed." Participant 7 described the challenges of interdepartmental communication, why it was desperately needed, and its negative impact on certain teams:

> I think that (interdepartmental communication) was an issue I think within the organization there is definitely a breakdown in communication and sharing of plans between the cyber group, the systems or IT Operations group, and the development groups. I think the other aspect of that from an organizational design point of view, there were things that were misaligned. There was a whole separate effort for Dev SEC OPS, which really comes down to the automation of software moving through the pipeline that

> was treated as this whole separate thing when in fact it's instrumental part of going to the cloud.

Participant 15 reflected on how interdepartmental communication could have been improved in hindsight by sharing:

> I do believe that's (interdepartmental communication) where we could have done better. I think there's a lot of places where again the communication wasn't happening simply because people had their own idea of how it should work, they didn't want to hear anybody else's idea and that included my side of the fence and so communication became a challenge.

Theme 4 Process. General statements regarding process barriers were reported by 3 out of the 16 participants 8 times. Participant 10 makes the general claim that the organization suffered from lack of processes:

> The other part was that we were lacking infrastructure for a long time and processes and we're still suffering from this. The enterprise was not set up for one cloud environment and one type of implementation, and what we were trying to do was outside of those standards, both in environment and in tools and processes.

Additional participants comment extensively on subthemes within processes to include getting approval for authority to operate inside of the Department of Defense environment and delays caused by bureaucratic processes.

Subtheme 1 Authority to Operate. Authority to operate was mentioned 10 times by 5 out of the 16 participants. An approval for Department of Defense Authority to operate entails the submitting defense agency to provide documentation for each migrated application. Participant 4 explained the process for completing and submitting the documentation was unclear, which ultimately complicated the process:

> To get an ATO (authority to connect) approved, there's a lot of documentation required and that's a DoD, but seems like some DoD (agencies) are more complicated than others, meaning I think we may be asking a lot more than what I see let's say some defense programs I know that deploy much easier.

Participant 5 adds that the documentation requirements for an authority to connect had changed during the submission process by stating:

> What would happen is they would get down to nearly the final steps for approval then it was discovered there was something wrong which would have to reset the whole process or the documents themselves that were part of the ATO process would change. They would be updated from like higher departments or somebody like that so that that is what really caused the delays.

Subtheme 2 Bureaucratic Processes. Bureaucratic processes was mentioned 15 times by 6 of the 16 participants. Participant 7 explained that all the levels of controls in place caused major delays in actions that could have taken significantly less time:

> Frankly, in the environment, because of all of the controls, you have to put around all those environments, you don't have that freedom. You still have to ask for someone to do something that if you had access to the console of the cloud and you were in a class, you would it would take you 5 minutes to do but because of all of the organizational controls, they wrap around it, it takes 18 months.

Participant 12 described that segmented processes generally took longer to complete actions and contributed to delays:

> It just takes long. That's what I've been told. Some of the processes is outside of our organization. It goes to another organization to process it, approve it and then and get it. I believe they just approved it and gets partially processed and then it implemented in our organization internally… it's just every time you do something you have to wait for other teams to jump on it. Why is it taking too long? I would say some of it is red tape.

Theme 5 Top Management Messaging. Top management messaging was mentioned 20 times by 8 of the 16 participants. Participant 15 stated the importance of communicating the priority of cloud migration "Through prioritization and keeping those priorities front of mind, constantly talking about, I think the leadership did a very good job certainly above me…Stomping their feet on those (cloud migration) priorities and what it is that we were working towards." Participant 14 also mentioned the importance of prioritization across the different teams "The agency has disparate teams that all have different priorities, and if there's not a concerted effort from leadership to drive the prioritization of cloud migration across the

different teams." Participant 8 asserted that communicating priority was an important factor to the success of the migration:

> Support from the senior leadership that cloud migration is our number one priority for the organization. That was the biggest success factor because what happened was across the organization, everybody had their mission and everybody wants their own priority but when the message came down from the top that was basically saying the cloud migration is everyone's responsibility.

Theme 6 Lack of Framework. Lack of framework was mentioned 9 times by 5 out of the 16 participants. Participant 7 stated that although two frameworks were provided, neither was useful "I don't know what kind of framework was used because the DoD CIO had a framework and the cloud vendor had a framework but none of them proved to be very helpful or useful with aiding the migration." As a result, the defense agency created their own framework, as clarified by Participant 8 "Develop documentation on how you migrate, but this is before even DoD published it. We developed our own, not just a migration strategy but migration process."

Theme 7 Unwillingness to accept change. Unwillingness to accept change was mentioned 12 times by 6 of the 16 participants. Unwillingness to accept change is directly related to the diffusion of innovation model being used as one of the conceptual frameworks of this study. Participant 11 shared that one of the most significant barriers was getting employees that had been supporting the data center for 25+ years on board with migrating the data to the cloud: "The barriers were those folks that just didn't want to change the way things were done and how they were used to doing things for the last 25, 30 years. You know we've always done it this way."

Participant 9 similarly mentioned how the effort was met with resistance from seasoned employees:

> There was a lot of resistance because these systems have been, what they call on premise, which is a local data center that our team manages. So they've been running, you know

> 30-40, I don't even know the exact number of years straight, so there's a lot of hesitance. Fear.

Participant 5's views also contributed to resistance to change as well:

> I think one of the big ones (barriers) was getting buy-in... People that have been entrenched with how they do things and were not really wanting to change. From an organizational standpoint, I think that was one of the bigger items is getting everybody in the upper echelon to agree because everybody was just kind of so set in their ways. So that was a bit of a challenge, I believe for everybody in trying to convince folks, it's like this, this needs to happen…but it's just the nature of the beast when it comes to migrating a legacy system into some new technology.

Theme 8 Migration Benefits. Migration Benefits were mentioned 10 times by 7 out of the 16 participants in this study. Participant 1 explained how migrating data to the cloud benefited the technical staff of the organization by stating:

> I think some of the benefits that they've taken advantage of is the connectivity within the environment. I know on Prem we had issues with things being down or inaccessible and I haven't heard people complain or raise those issues as much with the cloud migration…so modernization and accessibility to their applications were improved from what I've seen.

Participant 12 added that since migrating, the cloud is a "much simpler environment in most cases. The benefit is, I believe, the availability of the software." Participant stated that one of the major benefits of migrating to the cloud was a decrease in the number of outages the organization and its customers have experienced:

> We're starting to get to the point where we're actually getting to see the benefits of being in cloud versus remaining on premise and operating the way we used to. The outages have decreased, you know, and the complexity of our network has decreased…So I think overall, going to the cloud was a great thing for us.

Comparison Results to the Literature Review

Results of this study were consistent primarily with determinants, barriers, and challenges found in the associated literature. The study's literature review included themes of organizational needs for a more coherent cloud framework, migration benefits, general determinants, organizational planning, data integrity challenges, technical integration, transitioning legacy systems, communication, and security concerns with entrusting third-party vendors with

government data. The study either touched on or had strong similarities with the literature for 8 of 9 themes. Security concerns with entrusting third-party vendors with government data did not emerge as a significant theme. The two frameworks the study employed were the diffusion of innovation and technology, organizational, and environment model. Both frameworks have been extensively used to explore the topic of organizational barriers related to cloud migration (Buckley, 2021) and have consistently illuminated themes of the study.

The first conceptual framework used was the technology, organization, environment (TOE) model. The TOE model attempts to capture the contextual relationships between people, organizations, and politics when deploying new technology or innovation (Tornatzky & Fleischer, 1990). The framework provides a lens of perceiving the interactions and relationships into technological, organizational, and environmental perspectives. Nearly every theme of the study is rooted in the TOE framework; technological examples the process challenges brought about the technical requirements for authority to operate while organizational examples include a lack of resource planning and training. Finally, environmental examples include a lack of framework and the challenges it posed in operating in a new cloud environment.

The TOE model also helped to capture integration-related challenges, communication processes, and top management or leadership behaviors which were tied to other themes such as requirements planning, interdepartmental communication issues, and top management messaging. Such elements were critical to the study and contributed to the understanding of how migration to the cloud was influenced. The TOE model provided adequate support with organizing interview data to better understand the associated barriers and determinants of cloud migration.

The second conceptual framework that was used was the diffusion of innovation (DOI). DOI examines how an innovation is communicated through channels over time within a social system and, ultimately, whether the innovation is rejected or accepted within a particular community (Rogers, 2003). When examining how an organization accepts or rejects a new innovation, DOI categorizes technology adopters into five categories: innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). The major theme that tied in with the DOI conceptual framework was "unwillingness to accept change" which was mentioned 12 times by 6 out of the 16 participants. The data reported that an unwillingness to accept change led to direct delays of the cloud migration effort. Jafari (2022) stated that the benefit of utilizing DOI is to better understand organizational acceptance in regards to systematic deployments of a new innovation, which is what the study aimed to do.

The themes found in RQ1 include lack of training, planning, documentation, rehearsal of concept drills, lack of framework, priority, and top management messaging. Of the stated themes, lack of training, planning, framework, and top management messaging emerged the most from the current literature. Compared to the research study, the mentioned themes were consistent with the literature and were commonly mentioned by participants. Alternately, an emerging theme which has not emerged from current literature was the importance of rehearsal of concept drills conducted before the migration occurs. Although planning is a common theme, the idea of conducting simulations or practice migrations was rarely, if ever, discussed.

The themes found in RQ2 include communication, process, data issues, vendor selection, unwillingness to accept change, funding, and migration benefits. Of the stated themes in research question 2, communication, emphasis on processes, and unwillingness to accept change emerged the most from the current literature. Compared to the research study, the mentioned themes were

consistent with the literature and were commonly mentioned by participants. Alternately, some of the study's themes and subthemes emerged from the study that have not emerged from the literature yet. These themes and subthemes include the importance of daily scrum meetings, proper support from outside teams, and the importance of collaboration tools.

According to interview data, the most common themes influencing the cloud migration effort are a lack of planning, training, and the importance of top management messaging. These themes are fairly consistent with the literature regarding these topics. Ranganathan and Sampathrajan (2023) address the importance of planning by stressing that careful planning is paramount to a successful migration. Daroudi (2024) outlines that staff training is one of the most important determinants of a successful cloud migration. Mohammad (2021) supports that top management communication lets decision-makers, IT teams, and customers be informed in the migration process and shape requirements rooted in stakeholder expectations. Participants in this study did not mention some key themes within the literature. Examples include a lack of clarity regarding organizational policy (Eren et al., 2022), interoperability issues (Cresswell et al., 2022), data security (Gudimetla, 2016), and overall security, policy, and compatibility-related issues (Bhardwaj, 2022; Basha et al., 2024; Adeyemo et al., 2024; Alkhalil et al., 2017; Abied et al., 2021). Although some interview data touched on related themes, participants did not address the listed themes.

Summary

The purpose of this qualitative single case study was to identify organizational barriers that influence the migration of data from an on-premise data center to the cloud (Cunha et al., 2020). The problem addressed in this qualitative single case study are the unknown organizational barriers that influence data migration from an on-premise data center to the cloud

(Cunha et al., 2020). The researcher collected interview data from 16 participants from employees at a United States defense agency. All 16 interview transcripts were imported into Dedoose to assist the researcher with identifying themes and conducting analysis. The interview data yielded 8 themes and 5 subthemes.

The themes found in this study were consistent with determinants and barriers rooted in current literature. The results of this study also builds on the current literature pertaining to organizational barriers and determinants that influence migration of data to the cloud by adding insights into communication, requirements planning, and lack of training. Themes presented in chapter four will be discussed and analyzed in the next chapter. Chapter 5 will consist of a broader discussion of major findings, ways the case study ties in with existing research, implications, recommendations for practice, and future research.

Chapter 5: Discussion, Recommendations, and Study Summary

The organizational barriers and determinants presented in chapter four will be discussed in this chapter along with a review of the study's problem and purpose statements. The problem addressed in this qualitative single case study is the unknown organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020). The purpose of this qualitative single case study was to identify organizational barriers that influence the migration of data from an on-premise data center to the cloud (Cunha et al., 2020). The researcher explored this problem by employing qualitative methods with a qualitative single case study research design. The organizational barriers and determinants presented in Chapter Four will be discussed in this chapter, along with a review of the study's problem and purpose statements.

Semi-structured, open-ended interviews were conducted as a data collection method, which allowed the researcher to better understand participants' perspectives on organizational barriers, challenges, and determinants associated with migrating data to the cloud. Given the nature of this study, the researcher found that employing a qualitative single case study was the most effective design. The researcher conducted interviews using Microsoft Teams and used transcription and recording features to save interview data as transcripts. Transcripts were uploaded into Dedoose to organize and analyze interview data for themes and subthemes.

In the context of the defense agency, the results of this study indicated that activities and behaviors associated with organizational planning, team processes, interdepartmental communications, and employee training were among the top barriers and determinants that influence the success of a cloud migration. The findings of this case study are specific to the defense agency and do not contain any significant factors that may have influenced the

interpretation of the results. They may not be directly applicable in all cases across organizations or industries since each organization has unique complexities, processes, size, mission, regulations, budgets, and requirements that may not be fully translated in this study (Gudimetla, 2016). The open-ended semi-structured interview questions were rooted in organizational barriers specific to the case study at the defense agency. This chapter includes a discussion of the study's results, recommendations for practice, recommendations for future research, and a study summary.

Discussion

The study's results are consistent with and support the growing field of research involving organizational barriers or determinants that influence cloud migration. Additionally, the results of this study and the literature surrounding the study are positioned to assist leaders and decision-makers across several industries at a global level. The results of this study have directly addressed the research problem by providing determinants influencing cloud migration, revealing barriers or challenges, and confirming the need for a more comprehensive framework that organizations and leaders could use when migrating data to the cloud. The problem addressed in this qualitative single case study is the unknown organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020).

The barriers and determinants that influenced cloud migration within the defense agency included a lack of training, planning, interdepartmental communications, clarity on processes, top management messaging, an unwillingness to accept change, and the benefits of migrating to the cloud. The most significant implications within the study are that participants believed planning, interdepartmental communication, and a lack of training were major barriers that influence cloud migration efforts. A lack of processes and framework was also a barrier that

influenced the migration. While these barriers negatively influenced data migration to the cloud, positive determinants included top management messaging and cloud migration benefits.

Research Question 1: *What organizational barriers influenced migrating data from an on-premise data center to the cloud?*

The organizational barriers that influenced migrating data from an on-premise data center to the cloud include a lack of training, planning, interdepartmental communications, clarity on processes, top management messaging, an unwillingness to accept change, and the benefits of migrating to the cloud. The organizational barriers and determinants identified in this study are consistent with the themes, challenges, barriers, and determinants found in current literature regarding cloud migration. The implications of this study contribute to the ongoing problem of government organizations lacking comprehensive frameworks to aid them with data migration to the cloud (Cunha, 2020).

Organizations can take advantage of the study's results by acknowledging and planning for relevant barriers and determinants within their own contexts to avoid additional costs or delays to migration. Poor planning could cause delays that related to funding shortages, resource planning, undefined goals, and a lack of familiarity with the migration process (Ranganathan & Sampathrajan, 2023). Examples relevant to this study include providing adequate training for existing staff and ensuring that subject matter experts or new employees being onboarded to organizations have been vetted by managers familiar with the required knowledge or skillset needed to lead migration efforts. Krasniqi et al. (2021) explains the significance of this example by claiming that a lack of familiarity with the migration process and a lack of framework often contribute to project delays.

Although mandates and funding parameters could rush cloud migration within particular organizations, it is critical to develop clear plans and requirements, especially in regards to dedicated or trained staff and interdepartmental communication (Ranganathan & Sampathrajan, 2023). Barriers related to requirements and planning were identified as significant causes for delays, which influenced the migration. Barriers consistent with current literature include establishing cost models, resource management, and scheduling (Buyya, 2023). Multiple themes indicate that requirements were not necessarily known during the migration process, and additional or changing requirements were often revealed midway or at the tail end of migration efforts.

Themes emerged that were consistent with the study's conceptual framework. For example, the theme of staff's unwillingness to change is directly related to the diffusion of innovation. Using the diffusion of innovation as one of the conceptual frameworks allowed the researcher to gain perspective on the importance of how the impact of rejecting or delaying acceptance of cloud migration could negatively impact an organization's culture and progress. The theme informed other areas of the study, tied to why delays occurred and how they possibly could have been avoided.

Similarly, the theme of top management messaging and support is an instrumental component of the technology, organization, environmental framework, which was also used in this study. Top management messaging was a major theme in the study and contributed as a positive attribute, which helped the defense agency with their cloud migration process by providing clarity and priority to the effort.

Research Question 2: *How have organizational barriers influenced the migration of data from an on-premise data center to the cloud?*

The mentioned barriers and determinants influenced data migration to the cloud through the themes of interdepartmental communication, internal processes, top management messaging, an unwillingness to accept change, and migration benefits. Several behaviors and outcomes associated with each theme led to delays or complications in the cloud migration effort. One example that participants reported was the challenges involved with selecting a cloud vendor. Participant 11 stated that there were some struggles with sticking to decisions regarding cloud vendors, packages, and product support, which contributed to confusion and delays. An understanding of processes also disrupted timelines, causing delays as well. Participants 1 and 2 reported delays in approvals and process gaps when handing off specific tasks to neighboring teams. However, one determinant that helped create confidence within the organization was top management messaging. 12 out of the 16 participants reported that the messaging was generally a positive action taken by the agency to support cloud migration.

The study's results are relevant to practice today because it helped to identify systemic barriers or determinants tied to the success of a cloud migration. By considering the results of this study, organizational leaders can save costs, avoid delays, and create effective conditions and environments to plan for a successful migration. Many challenges associated with barriers are solvable and manageable if proper steps are taken to address and prepare for barriers ahead of time. Leaders can focus on the lack of training, planning, interdepartmental communications, clarity on processes, top management messaging, an unwillingness to accept change, and the benefits of migrating to the cloud by adopting certain recommendations for practice.

Recommendations for Practice

This section will provide recommendations for practice based on the results of this study. The study's recommendations include creating communication plans, scheduling planning

sessions, documenting requirements, driving top management messaging, and conducting quarterly town hall meetings. Although the results of this study are specific to the defense agency, each recommendation could be transferable to a wide spectrum of organizations across industries. Leaders who are in the early stages of cloud migration are welcome to consider recommendations since each recommendation is not necessarily limited to information technology departments within the federal government space. Organizational leaders may implement specific steps that would be uniquely beneficial to their own organization's migration effort.

Communication plans

The theme of interdepartmental communications was mentioned 15 times by 9 of the 16 participants. One recommendation is to map out communication channels and etiquette, and determine service level agreements for responses within teams and among teams. This recommendation is rooted in the literature. According to Amini and Javid (2023) and Mohammad (2021), communication across leadership and stakeholders is crucial because the way communication occurs throughout the organization contributes to the success of a cloud migration effort. Krasniqi and Jaumin (2021) also add that communication is a key determinant of a successful migration.

Several departments within an organization, ranging from finance to information technology, are responsible for the success of the cloud migration. Within each department are several teams that are assigned key roles, which contain specific functions. When organizations create communication plans, departments and the teams within them can better understand expectations between taskings and handing off specific tasks. By following clear communication plans, teams can work in conjunction with one another or build coalitions to solve complex

migration problems or make layered decisions that involve buy-in or approval from multiple departments. Organizational leaders could benefit from this recommendation by working with department heads to first establish clear points of contact, document each team's escalation process, and determine communication strategies among stakeholders before migration efforts begin.

Scheduled planning sessions.

References to scheduled planning sessions were mentioned 20 times by 6 out of 16 participants. Participants 6 and 13 likened the experience of migrating to the cloud with building a car while it is being driven, emphasizing the need for more frequent planning sessions breaks across teams. One recommendation is for directors and supervisory leaders to conduct scheduled planning sessions where challenges, successes, and the path forward are addressed. Participant 6 supported more planning sessions and conveyed the importance of them as a space to communicate problems to all stakeholders early.

This recommendation is rooted in the current literature. Ranganathan and Sampathrajan (2023) explain that planning is paramount to the success of a migration and migrating data to the cloud is a complex process that involves facing challenges, variables, and unforeseen circumstances which requires cooperation and planning across several organizational departments. The defense agency did have some recurring planning sessions, which 3 of the 16 participants mentioned were helpful. Participant 13 stated the meetings were very helpful because they allowed stakeholders to have questions answered and action items to be tracked by several teams. Although planning sessions were reported to be a positive influence in the migration, the sessions did not extend throughout the entire migration effort and were often cut short midway through migration efforts. Organizational leaders could benefit from this

recommendation by scheduling rhythmic planning meetings across teams. At a director level, leaders could implement quarterly and monthly planning sessions that analyze constraints and challenges due to budgeting, technical challenges, and resource allocation, as well as assessing the overall trajectory of the effort.

Requirements Planning

Requirements planning is an essential part of the migration process. According to the study, 10 out of 16 users mentioned the influence of requirements planning 26 times. Different participants struggled to understand specific requirements throughout the migration process. For example, while Participant 4 struggled with understanding requirements related to general dependencies, Participant 2 struggled with documentation of requirements as it relates to traceability and ownership of assets. Both participants explained that a lack of requirements led to delays for their roles during the migration process. One recommendation is to ensure requirements are documented and agreed upon among stakeholders. This recommendation is rooted in the literature. In regards to requirements, Creswell et al. (2022) stressed the importance of setting up good support teams for implementation, change management, communication, and engagement.

Participant 5 mentioned that the defense agency could have easily dedicated an additional 6-12 months to requirements planning for the migration. The defense agency was met with several challenges with very few experts on hand to help navigate through them; however, identifying and documenting requirements could have spread the expertise among several teams. Additionally, many technical requirements involved in-depth consulting with customer service and finance teams to work with the vendor in selecting the best possible platform, packages, products, and services while remaining within budget.

Organizations will likely experience a smoother transition to the cloud by conducting in-depth planning sessions, creating clear document templates for requirement changes, and employing standard project management techniques and methodologies. Such activities will be particularly helpful when making decisions that impact multiple stakeholders across several teams. Organizational leaders could take advantage of this recommendation by documenting requirements and setting up the proper tools and resources to track any new or modified requirements so that proper sourcing and funding is secured.

Ensure top management messaging communicates priority and benefits

One recommendation is to ensure clear, consistent, and persistent messaging from top management to the organization about the priority and benefits of cloud migration. According to the study, 11 out of 20 participants believed top management messaging positively influenced the defense agency's cloud migration. The overall feedback was that delivering top management messaging was important to allow supervisors and directors to prioritize cloud migration and balance workloads around migration efforts. This recommendation is rooted in the literature of the conceptual framework of this study. Tornatzky and Fleischer (1990) cited Tushman and Nadler (1986) by outlining the how top management messaging involve two key activities that influence the successful deployment of an innovation which are (1) developing and communicating an organizational strategy and core values concerning the innovation and (2) disseminating frequent communications to the organization explaining the importance of the innovation.

In addition to top management messaging, top management support is a critical part of TOE framework (Tornatzky & Fleischer, 1990). By incorporating clear and consistent messaging, top management can communicate and incorporate cloud migration efforts into the

organization's fiscal, cultural, and performance areas. Leaders could work together in socializing the migration and its importance into the organization's culture. Organizational leaders could take advantage of this recommendation by incorporating cloud migration into the fabric of the organization’s day-to-day operations. Cloud migration efforts could be reported in senior leader meeting agendas and performance objectives while encouraging supervisors and technical staff alike to accept and adopt upcoming changes. According to Tushman and Nadler (1986), this is completed by creating reward systems to encourage or reinforce the innovation’s importance and relevance, integrating the innovation within the culture, and building leadership teams with technical, social, and conceptual competencies.

Conduct Quarterly Town Hall Meetings

The current study suggested that acceptance of new technology was a significant barrier. 6 out of the 16 participants stated that several key employees were unwilling to accept the new changes that the cloud would bring to the organization. Participants reported that the employees were generally uncooperative because some felt that transitioning to cloud technologies would jeopardize their jobs since data center operations were one of the agency’s core functions. Others stated that since migrating to the cloud was a mandate, there were few opportunities for voices to be heard.

One recommendation is collecting feedback from concerned employees and conducting town hall meetings addressing concerns and answering questions. This recommendation is rooted in the current literature. According to Adeyemo et al., 2024, leaders and decision-makers planning for cloud migration, can inspire confidence by regularly socializing the benefits of cloud computing. Socializing the benefits of cloud computing in quarterly town hall meetings can assist staff with giving them clarity, providing them a forum to voice questions or concerns,

and discuss how their role within the effort will be impacted. Participant 15 mentioned there were rumors circulating over concerns about job security; however, the rumor was untrue and employees instead needed to retool and develop skillsets in the new cloud environment.

Town halls can help to educate employees, dispel rumors, and encourage staff to accept changes associated with cloud migration. Although the defense agency conducted town halls, they covered a variety of topics and included the entire workforce; however, by creating specialized town halls dedicated to cloud migration, top management has opportunities to provide transparency and reassurance to teams with the intent to minimize sabotage, disruption, or delays. Town hall meetings have the potential to be particularly helpful for the workforce population that is unwilling or uncomfortable to accept the changes associated with cloud migration. Organizational leaders could take advantage of this recommendation by scheduling routine town halls which help to provide clarity to the workforce about major milestones within the cloud migration effort.

Recommendations for Future Research

The research conducted in this study is consistent with research rooted in literature related to organizational barriers and determinants that influence migration of data to the cloud; however, there are some recommendations for future research.

Recommendation 1: Focus on Segmented Participants

The first recommendation for future research is to segment research participants. The study's participants included two group types: contractor and civilian groups, and then further classified employee rank by team lead, supervisory, program, and director status. Since the study gathered data from various leaders responsible for making decisions and driving the migration

effort, researchers could focus future studies by segmenting one group or subgroup of the population.

For example, researchers could focus on cloud migration barriers and determinants as they relate to contractors. Cloud migration is often an ecosystem of departments and leaders working together, but there is not much research in the current literature that segments contractor or direct-hire perspectives of cloud migration. A different research recommendation could be to focus on a specific subgroup, such as directors or supervisors, instead, and study their interactions or the effectiveness of leadership styles while employing a longitudinal case study. Additional topics for a longitudinal case study could also include organizational dynamics of executive teams as they pertain to the role and responsibilities of decision-making processes, adopting mandates, disseminating communications or messaging, and planning.

Recommendation 2: Explore One Barrier or Determinant

The second recommendation is for researchers to explore only one organizational barrier or determinant of cloud migration. Researchers could study the progression of a barrier or determinant and its influence on cloud migration throughout the effort. Organizations will each face unique challenges; however, many of the barriers and determinants reported in this study are universal and are not unique to the defense agency studied. For example, researchers could study the impact of cloud training for the workforce on migration efforts. Researchers are welcome to employ quantitative methods; however, a qualitative multi-case study could reveal the perspectives and experiences of multiple organizations in comparing training or lack of training as a determinant or barrier influencing cloud migration. By focusing on one barrier or determinant, researchers can explore more comprehensive depths and breadths of one barrier or determinant as opposed to several.

Recommendation 3: Explore other Conceptual or Theoretical Frameworks

The third recommendation is to explore other conceptual or theoretical frameworks in studying the problem. The current research implemented the technology, organization, and environmental (TOE) model and the diffusion of innovation (DOI). Although a combination of these two models is common, future researchers could consider exploring other models or model combinations regarding organizational barriers or determinants that influence the migration of data to the cloud. Some cloud adoption models and theories that researchers have leveraged on the topic include theory of reasoned action (Fishbein & Ajzen, 1975), social cognitive theory (Bandura, 1986), technology acceptance model (Bagozzi, 1989), theory of planned behavior (Ajzen, 1991), and unified theory of acceptance and use of technology (Venkatesh & Morris, 2003). Although these models and more have been used in previous research, the combination of TOE and DOI is more common (Buckley, 2021). Researchers are welcome to use a variety of models or model combinations to explore organizational determinants or barriers related to cloud migration.

Recommendation 4: Consider Cloud Migration in other Organizational Units

The fourth recommendation is to consider studying data migration to the cloud in other organizational units. Cloud migration is a significant organizational effort that requires several organizational units, such as finance, human resources, information systems, information technology, and customer relations departments, to work together. Although this research focused on information technology teams, future researchers could explore other organizational units. For example, since human resources are often tasked with hiring employees and providing organizational training, researchers could explore human resource barriers related to onboarding subject matter experts, or enterprise-wide training resources as it relates to cloud migration. 12

out of 16 participants reported that either a lack of training or lack of proficiency from newly onboarded experts negatively influenced cloud migration.

Additionally, researchers could focus efforts on more specialized departments rather than general departments. For example, studying barriers and determinants as they relate to a specific department, such as data management, is also recommended. There is a growing abundance of research on the important role of barriers and determinants that influence data management practices such as real-time monitoring, error handling processes, data integrity or consistency checks, along with data reconciliation, and audit trails (Mohammad, 2021). Organizational barriers and determinants could also be explored in adjacent fields such as data governance, security and privacy, cybersecurity, or information assurance within the context of this sphere of research and practice.

Recommendation 5: Critique of Current Study

The fifth recommendation for further research is to critique the current study. While future researchers could conduct studies to reaffirm the study's findings, researchers may also conduct studies that oppose the results yielded in this study, critique the methodology used, or argue basic assumptions of the study such as the need for a framework or cloud migration altogether. Perhaps researchers may posit assumptions about the methodology or further explore research findings that oppose modern practice. Researchers may propose quantitative or qualitative methodologies to explore an array of criticisms or oppositional argument in relation to the current study. Researchers are welcome to challenge the considerations and contexts of any part of the methodology choice or results of this study.

Study Summary

The problem addressed in this qualitative single case study is the unknown organizational barriers that influence data migration from an on-premise data center to the cloud (Cunha et al., 2020). The barriers and determinants that influenced cloud migration within the defense agency that the study revealed included a lack of training, planning, interdepartmental communications, clarity on processes, top management messaging, an unwillingness to accept change, and the benefits of migrating to the cloud. The barriers and determinants yielded in the study are consistent with the literature surrounding the topic. This study is important because it provides insights for future organizational leaders to consider or adopt as part of a strategy or framework when planning migration efforts.

This study contributed to the growing research involving organizational barriers or determinants when migrating data to the cloud. The results demonstrated the importance of key insights tied to training, planning, communication, and change management. The study's results address the research questions and can be used to assist future researchers, practitioners, and leaders in better understanding organizational barriers and determinants involving cloud migration. Although there were no significant areas of divergence, some data points within the study suggested new determinants that positively contribute to the cloud migration. Areas where this study highlights new insights include the significance of daily meetings and conducting rehearsal of concept drills prior to migrations. Although both mediums are specific to this study, daily meetings and rehearsal of concept drills are new determinants which are transferable to other organizations across any industry that contributes a unique and original finding which contributes to the current literature.

References

Abd Rahman, A., Jayeola, O., Mahomed, A. & Sidek, S. (2022). Cloud computing adoption in small and medium enterprises (SMEs): a systematic literature review and directions for future research. *International Journal of Business & Society, 23*(1), 226–243. https://doi.org/10.33736/ijbs.4610.2022

Abdul Rasak, M., Alhabsyi, M., Mashuri, S. & Syam, H. (2022). Semi-structured interview: A methodological reflection on the development of a qualitative research instrument in educational studies. *Journal of Research & Method in Education (IOSR-JRME) 12*(1), 22-29. https://doi.org/10.9790/7388-1201052229 https://www.iosrjournals.org/iosr-jrme/papers/Vol-12%20Issue-1/Ser-5/E1201052229.pdf

Abied, O., Ibrahim, O. & Mat Kamal, S. (2021). Proposing a Conceptual Model for Cloud Computing Adoption in the Libyan E-Government. *2021 7th International Conference on Research and Innovation in Information Systems (ICRIIS), Research and Innovation in Information Systems (ICRIIS), 2021 7th International Conference On,* 1–6. https://doi.org/10.1109/ICRIIS53035.2021.9617042

Abied, O., Alfadli, I. M., Binjumah, W. M., Ibrahim, O., Ithnin, N., Kamal, S., & Nasser, M. (2022). Probing determinants affecting intention to adopt cloud technology in E-Government systems. *Sustainability, 14*(23). https://doi.org/10.3390/su142315590

Abolvand, N., Harandi, S. & Tarani, D. (2021). A survey on adoption factors of cloud-based enterprise systems and their differences in Iranian SMEs. *International Journal of Business Information Systems 36* (2). https://doi.org/10.1504/IJBIS.2021.112825

Adebiyi, O., Oladoyinbo, O., Olaniyi, G., Olaniyi, O. & Omogoroye, O. (2023). Electricity consumption (kW) forecast for a building of interest based on a time series nonlinear

regression model. *Asian Journal of Economics, Business and Accounting, 23*(21), 197-207. https://doi.org/10.9734/ajeba/2023/v23i211127

Adebiyi, O., Oladoyinbo, O., Olaniyi, G., Olaniyi, O. & Omogoroye, O., (2023). Electricity consumption (kW) forecast for a building of interest based on a time series nonlinear regression model. *Asian journal of economics, business and accounting, 23*(21), 197-207. https://doi.org/10.9734/ajeba/2023/v23i211127

Adeyemo, I., Oladoyinbo, O. & Oladoyinbo, T. (2024). The TOE theory and cloud computing: Exploring factors affecting the adoption of cloud computing. *International Journal on Cybernetics & Informatics 13* (4). https://doi.org/10.5121/ijci.2024.130404

Adigwe, C., Ajayi, S., Marquis, Y., Olabanji, S., Oladoyinbo, T. & Olaniyi, O. (2024). AI-Driven cloud security: Examining the impact of user behavior analysis on threat detection. *Asian Journal of Research in Computer Science, 17*(3), 57–74. https://doi.org/10.9734/ajrcos/2024/v17i3424

Adigwe, C., Okunleye, O., Olabanji, S., Oladoyinbo, T. & Olaniyi, O. (2024). AI for Identity and Access Management (IAM) in the cloud: Exploring the potential of artificial intelligence to improve user authentication, authorization, and access control within cloud-based systems. Authorization, and Access Control within Cloud-Based Systems (January 25, 2024). *Asian Journal of Research in Computer Science 17*(3), 38-56. https://doi.org/10.9734/ajrcos/2024/v17i3423

Admodisastro, N., Hasan, M., Muhammad, M. & Osamn, M. (2023). Legacy systems to cloud migration: A review from the architectural perspective. *Journal of Systems and Software 202.* https://doi.org/10.1016/j.jss.2023.111702

Ahmad, N., Hoda, N. & Naveed, N. (2018). Strategy and procedures for Migration to the Cloud Computing. *2018 IEEE 5th International Conference on Engineering Technologies and Applied Sciences (ICETAS), Engineering Technologies and Applied Sciences (ICETAS), 2018 IEEE 5th International Conference*, 1–5. https://doi.org/10.1109/ICETAS.2018.8629101

Ahmed, I. (2020). Technology, organization, environment framework in cloud computing. *Telemonika Telecommunication, Computing, Electronics, and Control 18* (2), 716-725. https://doi/org/10.12928/TELEMONIKA.v18i2.13871 https://telkomnika.uad.ac.id/index.php/TELKOMNIKA/article/view/13871

Ajayi, S., Marquis, Y., Olabanji, S. O., Oladoyinbo, T. & Olaniyi, O. (2024). Proliferation of AI tools: A multifaceted evaluation of user perceptions and emerging trend. *Asian Journal of Advanced Research and Reports, 18*(1), 30-55. https://doi.org/10.9734/ajarr/2024/v18i1596

Alam, S., Samad, A., Shuaib, M. & Siddiqui, S.T. (2019). Why adopting cloud is still a challenge?—A review on issues and challenges for cloud migration in organizations. *Adv. Intell. Syst. Comput. 904,* 387–399. https://dx.doi.org/10.1007/978-981-13-5934-7_35

AlHarthi, D. N. (2023). Secure Cloud Migration Strategy (SCMS): A Safe Journey to the Cloud. *Proceedings of the International Conference on Cyber Warfare & Security,* 1–6.

Ali, O., Ghasemaghaei, M., Ghassan, B. & Shrestha, A. (2022). Assessment of complexity in cloud computing adoption: A case study of local governments in Australia. *Information Systems Frontiers 24,* 595-617. https://doi.org/10.1007/s10796-021-10108-w

Alkhalil, A., John, D., Sahandi, R. (2017). An exploration of the determinants for decision to migrate existing resources to cloud computing using an integrated TOE-DOI model. *Journal of Cloud Computing: Advances, Systems, and Applications 6*(2). https://doi.org/10.1186/s13677-0160072-x https://journalofcloudcomputing.springeropen.com/articles/10.1186/s13677-016-0072-x

Allen, K. D., Christensen, L., Coffman, C. J., Decosimo, K., Drake, C., Grubber, J. M., J. M., Hastings, Hughes, S. N., Malo, T. L., Shea, C. M., Sperber, N. R., Sullivan, C., Tucker, M., Van Houtven, C. H., Wang, V. & Zullig, L. L. (2023). Ready, set, go! The role of organizational readiness to predict adoption of a family caregiver training program using the Rogers' diffusion of innovation theory. *Implementation Science Communications, 4*(1). https://doi.org/10.1186/s43058-023-00447-x

Amazon. *What is a Data Center?* Accessed on September 20th, 2024 from https://aws.amazon.com/what-is/data-center/

Amin, G., Babaeikiadehi, S. & Shirvani, M. (2022). A decision framework for cloud migration: A hybrid approach. *IET Software, 16*(6), 603–629. https://doi.org/10.1049/sfw2.12072

Amin, R., Rahaman, M., Siddhartha, V. (2021). Opportunities and challenges of data migration in cloud. *Engineering International 9*(1). https://doi.org/10.18034/ei.v9i1.529

Amini, M. & Javid, N. (2023). A multi-perspective framework established on diffusion of innovation (DOI) theory and technology, organization, and environment (TOE) framework toward supply chain management system based on cloud computing technology for small and medium enterprise. *International Journal of Information Technology and Innovation Adoption 11*(8). https://doi.org/10.1145/3447432.3447439

Antonopoulou, H., Giotopoulos, K., Halkiopoulos, C., & Theodorakopoulos, L. (2020). E-business and cloud computing services in Greek companies during economic recession. *International Journal of Business and Management Review,* 8(2), 66-75. https://doi.org/10.2139/ssrn.4153968

Aruna, M. G., Hasan, M.K., Hassan, R., Islam, S., Mohan, K. G. & Sharan, P. (2022). Cloud to cloud data migration using self sovereign identity for 5G and beyond. *Cluster Computing: The Journal of Networks, Software Tools and Applications, 25*(4), 2317–2331. https://doi.org/10.1007/s10586-021-03461-7

Assaf A., Iishamsir A. & Muhammad, M. (2021). Benefits and Risks of Cloud Computing in E-Government Tasks: A Systematic Review. *E3S Web of Conferences, 328, 04005.* https://doi.org/10.1051/e3sconf/202132804005

Athambawa, A., Gapar, M., Johar, M. & Khathibi, A. (2022). Secure cloud adoption model: novel hybrid reference model. *Indonesian Journal of Electrical Engineering and Computer Science 27*(2), 936-943. https://doi.org/10.11591/ijeecs.v27.i2.pp936-943

Badie, N., Hussin, A., Lashkari, A. Singh, D. & Yadegaridehkordi, E. (2023). A SEM-STELLA approach for predicting decision-makers' adoption of cloud computing data center. *Education and Information Technologies: The Official Journal of the IFIP Technical Committee on Education,* 1–53. https://doi.org/10.1007/s10639-022-11484-9

Basha, N., Ho, J., Subramaniam, A. & The, R. (2024). The mediation role of top management support in the adoption of cloud computing in Malaysian SMEs. *International Journal of Management and Enterprise Development 23* (1). https://doi.org/10.1504/IJMED.2024.138452

Bhardwaj, A., Goundar, S. & Sathye, M. (2022). Determinants of Mobile Cloud Computing Adoption by Financial Services Firms. *Journal of Information Technology Research (JITR), 15*(1). https://doi.org/10.4018/JITR.299921

Bhatti, S. H., Hassan, A., Hwang, Y. & Shujaat, S. (2022). To adopt or not to adopt? The determinants of cloud computing adoption in information technology sector. *Decision Analytics Journal, 5*. https://doi.org/10.1016/j.dajour.2022.100138

Bloomberg, L. D. & Volpe, M. (2018). Completing Your Qualitative Dissertation: A Road Map From Beginning to End. SAGE Publications, Inc.

Boulahia, J. A., Hadjouni, M., Menzli, L. J. & Smirani, L. K. (2022). Investigation of open educational resources adoption in higher education using Rogers' diffusion of innovation theory. *Heliyon, 8*(7). https://doi.org/10.1016/j.heliyon.2022.e09885

Brzozowska-Rup, K., Nowakowska, M., & Zdradzisz, M. (2024). Cloud computing in the Polish public administration: current state and development prospects. *Technological Forecasting & Social Change, 205*. https://doi.org/10.1016/j.techfore.2024.123500

Buckley, K., Lawan, M. M. & Oduoza, C. F. (2020). Proposing a conceptual model for cloud computing adoption in upstream oil & gas sector. *Procedia Manufacturing, 51*, 953–959. https://doi.org/10.1016/j.promfg.2020.10.134

Buyya, R. & Tianzhang, H. (2023). A taxonomy of live migration management in cloud computing. *ACM Computing Surveys, 56* (3), 1-34. https://doi.org/10.1145/3615353

CIO. (2024). *Rising Cloud Costs Leave CIOs Seeking Ways to Cope.* Gross, G. Accessed on March 10th, 2025 from https://www.cio.com/article/3496509/rising-cloud-costs-leave-cios-seeking-ways-to-cope.html#:~:text=Several%20factors%2C%20including%20price%20increases,leaders

%20to%20revisit%20cloud%20costs.&text=If%20you're%20stressing%20over,between%20cloud%20services%20and%20regions

Clair, C., Melvin, T., Taylor, J. & Saylor, M. (2022). Researcher Bias: How your assumptions on technology affect research of older adults. *Frontiers in Public Health* 10, 1-4. https://doi.org/10.3389/fpubh.2022.1034497

Clarke, V. and Braun, V. (2013) Teaching Thematic Analysis: Overcoming Challenges and Developing Strategies for Effective Learning. *The Psychologist 26*, 120-123. http://www.thepsychologist.org.uk/archive/archive_home.cfm?volumeID=26&editionID=222&ArticleID=2222

Cresswell, K., Hernandez, A., Sheikh, A. & Williams, R. (2022). Key challenges and opportunities for cloud technology in health care: semi structured interview study. *Journal of Internet Medical Research 9* (1). https://dx.doi.org/10.2196/31246

Cunha, A., Janssen, M., Matheus, R., & Pinheiro, L. (2020). Towards a framework for cloud computing by governments: Leaders, followers, and laggers. *The 21st Annual International Conference on Digital Government Research.* 155-163 https://doi.org/10.1145/3396956.3396989

Doroudi, F., Kamyab, R. & Nejad, A. (2024). Assessment of the status and factors influencing the adoption of cloud computing in knowledge-based companies Case Study: Kerman Science and Technology Park. *International Journal of Information Science and Management (IJISM) 22*(1), 17-29. https://ijism.isc.ac/article_709475.html

Eren, P., Koc, B. & Sener, U., & (2022). Determinative Factors of Cloud Computing Adoption in Government Organizations. *2022 3rd International Informatics and Software*

Engineering Conference (IISEC), Informatics and Software Engineering Conference (IISEC), 2022 3rd International, 1–6. https://doi.org/10.1109/IISEC56263.2022.9998286

Fleishcer, M. & Tornatzky, L.G. (1990). The context of technological innovation: technology, organization, and environment model. Lexington Books.

Garg, K. & Kumar, V. (2012). Migration of services to the cloud environment: Challenges and best practices. *International Journal of Computer Applications 55*(1). https://doi.org/10.5120/8716-7105

Gleb, T. (2021). Systematic Cloud Migration: A Hands-On Guide to Architecture, Design, and Technical Implementation. Apress.

Gudimetla, S. (2016). Azure in action: Best practice for effective cloud migrations. *Neuroquantology 14* (2), 405-455. https://dx.doi.org/10.48047/nq.2016.14.2.959 https://www.neuroquantology.com/open-access/%2522Azure+in+Action%253A+Best+Practices+for+Effective+Cloud+Migrations%2522_14201/?download=true

Hasan, A., Ibrahim, H., Ouda, A., Shyaa, M. & Yousif, Al. (2022). The impact of cloud computing on network security and the risk for organizational behaviors. *Webology 19*(1). https://doi.org/10.14704/WEB/V19I1/WEB19015 https://www.webology.org/data-cms/articles/20220122110416amWEB19015.pdf

Hussein, A. (2021). Data migration need, strategy, challenges, methodologies, categories, risks, uses with cloud computing, and improvements in its using with cloud using suggested proposed model. *Journal of Information Security 12*(1). https://doi.org/ 10.4236/jis.2021.121004 https://www.scirp.org/pdf/jis_2021011814491338.pdf

International Business Machines. (2024). *What is Cloud Storage?* Accessed on October 3, 2024 from https://www.ibm.com/topics/cloud-storage

Jafari., Kardan Moghaddam, A. & Rajaei. (2022). Determining Effective Factors in Cloud Computing Acceptance Using Rogers' Diffusion of Innovation Model and Davis' Technology Adoption Model (A Case of Financial Institution*). Journal of Electrical and Computer Engineering Innovations, 10*(1), 175–194. https://doi.org/10.22061/jecei.2021.8057.470

Jones-Hooker, C., & Tyndall, D. E. (2023). Application of case study research and ethnography methods: Lessons learned. *Applied Nursing Research, 73*, 151713. https://doi.org/10.1016/j.apnr.2023.151713

Kavita, C., Khare, A. & Yadav, S.K. (2020). ASK approach: A pre-migration approach for legacy application migration to cloud. *Adv. Intell. Syst. Comput. 1042,* 15–27. https://doi.org/10.1007/978-981-32-9949-8_2

Krasniqi, A., Jaumin, A., & Xhemal, Z. (2021). Cloud computing adoption factors in various organizations: A systematic literature review. *2021 44th International Convention on Information, Communication and Electronic Technology (MIPRO), Information, Communication and Electronic Technology (MIPRO), 2021 44th International Convention On, September, 1364–69*. https://doi.org/10.23919/MIPRO52101.2021.9597182

Kundavaram, K. & Nagendra, V. (2024). Automated data migration in cloud environments: Challenges and solutions. *International Journal of Computer Engineering and Technology (IJCET), 15*(6), 262-274. https://doi.org/10.5281/zenodo.14065654

Lebeda, F., Zalatoris, J. & Scheerer, J., (2018). Government cloud computing policies: Potential opportunities for advancing military biomedical research. *Military medicine 183* (11-12), 438-447. https://doi.org/10.1093/milmed/usx114

McKim, C. (2023). Meaningful member-checking: A structured approach to member-checking. *American Journal of Qualitative Research 7*(2), 41-52. https://doi.org/10.29333/ajqr/12973 https://www.ajqr.org/download/meaningful-member-checking-a-structured-approach-to-member-checking-12973.pdf

Megargel, A., Shankararaman, V. & Walker, D.K. (2020). Migrating from monoliths to cloud-based microservices: A banking industry example. pp. 85–108. https://doi.org/10.1007/978-3-030-33624-0_4

Misra, S. & Singh, S. (2021). Exploring the challenges for adopting the cloud PLM in manufacturing organizations. *IEEE Transactions on Engineering Management, Engineering Management, IEEE Transactions on, IEEE Trans. Eng. Manage, 68*(3), 752–766. https://doi.org/10.1109/TEM.2019.2908454

Mohammad, N. (2021). Data integrity and cost optimization in cloud migration. *International Journal of Information Technology & Management Information Systems (IJITMIS) 12*(1), 44-56. https://iaeme.com/MasterAdmin/Journal_uploads/IJITMIS/VOLUME_12_ISSUE_1/IJITMIS_12_01_004.pdf

Nanjappan, S. (2024). Understanding data migration: Process, types, and best practices. *International Journal of Computer Engineering and Technology (IJCET) 15*(4), 882-896. https://doi.org/10.5281/zenodo.13609132

National Institute of Standards and Technology. (2011). *The NIST Definition of Cloud Computing.* Accessed on September 20, 2024 https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf?lspt_context=gdpr

Nivedhaa, N. (2024). Towards efficient data migration in cloud computing: A comparative analysis of methods and tools. *International Journal of Artificial Intelligence and Cloud Computing (IJAICC), 2*(1), 1-16. https://iaeme.com/Home/article_id/IJAICC_02_01_001

Osei-Tutu, K. & Song, Y.-T. (2020). Enterprise Architecture for healthcare information exchange (HIE) Cloud Migration. *14th International Conference on Ubiquitous Information Management and Communication (IMCOM), Ubiquitous Information Management and Communication (IMCOM),* 2020 14th International Conference On, 1–8. https://doi.org/10.1109/IMCOM48794.2020.9001677

Pang, M.-S., & Tanriverdi, H. (2022). Strategic roles of IT modernization and cloud migration in reducing cybersecurity risks of organizations: The case of U.S. federal government. *Journal of Strategic Information Systems, 31* (1). https://doi.org/10.1016/j.jsis.2022.101707

Ranganathan, C. S., & Sampathrajan, R. (2023). Cloud Migration Meets Targeted Deadlines. *2023 4th International Conference on Electronics and Sustainable Communication Systems (ICESC), Electronics and Sustainable Communication Systems (ICESC), 2023 4th International Conference On*, 672–676. https://doi.org/10.1109/ICESC57686.2023.10193104

Rogers, E. (2003). *Diffusion of Innovations* (5th edition). Free Press.

Shibambu, A. (2022). Migration of government records from on-premises to cloud computing storage in South Africa. *South African Journal of Libraries & Information Science, 88*(1), 1–11. https://doi.org/10.7553/88-1-2128

Strahringer, S., Westner, M. & Wulf, F. (2021). Cloud computing adoption: A literature review on what is new and what we still need to address. *Communications of the Association for Information Systems, 48*(1), 44. https://doi.org/10.17705/1CAIS.04844

Tao, X., Yang, C., Wang, S. & Zhao, F. (2020). Data Integrity Checking Supporting Reliable Data Migration in Cloud Storage. In: Yu, D., Dressler, F., Yu, J. *Wireless Algorithms, Systems, and Applications. WASA* 2020. Lecture Notes in Computer Science, vol 12384, 615-626. Springer, Cham. https://doi.org/10.1007/978-3-030-59016-1_51

United States Congress (2022). *Federal Secure Cloud Improvement and Jobs Act of 2021.* Accessed on September 11, 2024 from https://www.congress.gov/bill/117th-congress/senate-bill/3099/text

United States Congress (2022). *Federal Data Center Enhancement Act of 2022.* Accessed on September 11, 2024 from https://www.congress.gov/bill/117th-congress/senate-bill/4629/text?r=4&s=7

United States Department of Defense. (2023). *Department of Defense Information Technology and Cyberspace Activities Budget Overview.* Accessed on September 11, 2024 from https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2024/FY24_ITCA_Budget_Overview_Final.pdf

United States Department of Defense. (2024). OSD Cloud Migration Strategic Vision. Department of Defense. Accessed on April 2, 2025 from

https://dam.defense.gov/Portals/47/Documents/IMT/OSD%20Cloud%20Migration%20Strategic%20Vision%20FINAL.pdf?ver=YlGARfCjhDZX_912d5q37w%3D%3D

United States Government Accountability Office. N.D. *Antideficiency Act.* Accessed March 10th, 2025 from https://www.gao.gov/legal/appropriations-law/resources

United States Government Accountability Office (2019). *Is the Cloud Saving Government Money?* Accessed on March 10th, 2025 from https://www.gao.gov/blog/2019/06/27/is-the-cloud-saving-the-government-money

United States Government Accountability Office (2023). Cloud Migration: DoD Needs to Improve Tracking of Data User Fees. Accessed on July 6th, 2024 from https://www.gao.gov/products/gao-23-106247

United States National Institute of Standards and Technology. (2011). *Federal Cloud Computing Strategy. Accessed on March 10th, 2025 from* https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/egov_docs/federal-cloud-computing-strategy.pdf

Varma, K. M., & Se, G. B. (2022). Efficient scalable migrations in the cloud. 2022 IEEE/ACIS 7th International Conference on Big Data, Cloud Computing, and Data Science (BCD), Big Data, Cloud Computing, and Data Science (BCD), 2022 IEEE/ACIS 7th International Conference On, 3–6. https://doi.org/10.1109/BCD54882.2022.9900725

Vupputuri, J. (2024). Data migration to cloud – strategies, challenges, and best practices. *International Journal of Computer Engineering and Technology (IJCET) 15*(5), 1084-1092. https://doi.org/10.5281/zenodo.14027912

Yin, Robert K. Case Study Research and Applications: Design and Methods. SAGE Publications, Inc, 2018.

Appendix A

On-Site Letter Permission Form

National University

National University IRB
9338 Lightwave Ave., San Diego, CA 92123
irb@nu.edu

Date: 14 April 2025

Hello NU IRB,

My name is Ms. Trena Jones and I am the Directorate Director for Technical Service at the Defense Manpower Data Center, Defense Human Resources Activity.

I have reviewed Meena Fahmy's study, and I understand that they are recruiting participants who meet all of the following criteria:

1. Participants are actively or were previously employed by the defense agency as a government civilian or government contractor
2. Participants who are actively or were previously affiliated with a team engaged in the planning, execution, decision-making, or monitoring of migrating government data from an on-premise data center to the cloud.
3. Participants that have knowledge to answer interview questions regarding organizational barriers, challenges, or determinants related to migrating data to the cloud.

I grant permission to Meena Fahmy to do the following:

1. Conduct one on one interviews using Microsoft Teams with 10-25 employees directly involved in a cloud migration effort.
2. Utilize Microsoft Teams recording and transcription feature to securely save interview files.
3. Store and handle interview data securely to ensure confidentiality of each interviewee's identity and responses.

If you have questions and would like to reach me, please do so at trena.l.jones2.civ@mail.mil or (210) 565-4148.

Thank you for your time,

JONES.TRENA.LEATRICE.1126318380 Digitally signed by JONES.TRENA.LEATRICE.1126318380 Date: 2025.04.14 15:32:26 -05'00'

Ms. Trena L. Jones
Director
Technical Services Directorate
Defense Manpower Data Center (DMDC)

Appendix B

Solicitation to Participate email

Good day,

My name is Meena Fahmy and I am a doctoral student at National University conducting research on organizational barriers related to cloud migration. I am recruiting employees that meet the following criteria:

1. Participants are employed or were previously employed as government civilians or contractors by the defense agency being studied.
2. Participants are or were directly involved in cloud migration efforts.
3. Participants have knowledge to answer interview questions related to challenges, barriers, or determinants related to cloud migration.

If you are interested in participating in this study, please contact me at M.Fahmy6529@o365.ncu.edu

Thank you.

Meena Fahmy

Appendix C

Consent Letter

Introduction

Good day. My name is Meena Fahmy. I am a doctoral student at National University conducting a research study on organizational barriers related to cloud migration. The name of this research study is "Exploring a Defense Agency's Organizational Barriers and Determinants to Cloud Migration: A Qualitative Single Case Study**."** I am seeking your consent to participate in this study. Your participation is completely voluntary, and I am here to address your questions or concerns at any point during the study.

Eligibility

You are eligible to participate in this research if you:

1. Are employed or were previously employed as a government contractor or civilian at the agency being studied.
2. Are or were currently directly involved in cloud migration efforts.
3. Have knowledge to answer interview questions related to challenges, barriers, or determinants related to cloud migration.

Activities

In this study, participants will:

1. Participate in a transcribed and recorded virtual interview for approximately 30-45 minutes.

Risks

There are no foreseeable risks or discomforts associated with this study.

Benefits

If you participate, there are no direct benefits to you. This research may increase the body of knowledge in the subject area of this study.

Privacy and Data Protection

I will secure your information with these steps: coding each interviewee to ensure the confidentiality of the participant's identity and responses. Data will be stored in a password-protected drive which requires multi-factor authentication for access.

This data could be used for future research studies or distributed to other investigators for future research studies without additional informed consent from you or your legally authorized representative.

I will securely store your data for 3 years. Then, I will delete electronic data and destroy paper data.

How the Results Will Be Used

The results of this study will be published in my dissertation. The results may also be shared in a presentation or publication. The identity of the participants will be concealed.

Contact Information

If you have questions, you can contact me at: M.Fahmy6529@o365.ncu.edu and at 410-370-2687.

My dissertation chair's name is Dr. Katherine Richie. They work at National University and is supervising me on the research. You can contact them at: Richiekatherine@nu.edu and at 651-301-0446.

If you have questions about your rights in the research or if a problem or injury has occurred during your participation, please contact the National University Institutional Review Board at irb@nu.edu.

Voluntary Participation

If you decide not to participate, or if you stop participation after you start, there will be no penalty to you.

Recording

The interview will be recorded and the audio will be transcribed.

Dual Role

This research is being conducted in my role as a National University doctoral student, but I also hold a role as an IT Specialist for the defense agency being studied.

Appendix D

Interview Protocol

Introduction.

Good day. My name is Meena Fahmy. I am a doctoral student at National University and am conducting research on organizational barriers related to cloud migration.

I will be interviewing you today to better understand the types of barriers that exist and what role they played with data migration to the cloud. This interview will consist of approximately 14 open ended questions. You may skip questions you do not wish to answer. Are you ready to begin the interview?

Interview Questions.

RQ1: What organizational barriers influenced migrating data from an on-premise data center to the cloud?

1. In your perspective, what are organizational barriers that contribute to a delayed cloud migration?
2. How did these barriers From a requirements perspective, what challenges existed when selecting a cloud vendor?
3. How did the role of organizational planning, such as staff preparation, technology acceptance, interdepartmental communication, and funding, play in the success of the cloud migration?
4. What factors or determinants contributed to the success of cloud migration? What are some that contributed to the effort's delay?
5. How did the organization prepare for and accept the integration of cloud technologies into its daily business process?

6. What challenges were associated with decommissioning on-site equipment once all the data was migrated to the cloud?
7. Please speak about the factors that contributed to the migration's success.
8. Please expand on these factors and why they contributed to the success of the migration.

RQ2: How have organizational barriers influenced the migration of data from an on-premise data center to the cloud?

9. In what ways have organizational barriers influenced migration delays or failures?
10. Please speak to how plans and activities were communicated among multiple sites across the United States and any challenges that arose.
11. Please explain why the cloud migration effort's success was so important and whether cloud migration benefited the organization and its customers.
12. If a framework was used to aid the defense agency in migrating data to the cloud, please speak to its effectiveness in the effort's planning, executing, and monitoring phases. *Note:* a framework could be provided by either the defense agency or the vendor.
13. Please speak to the importance of communication from top management on initiatives and how requirements and taskings were communicated across teams.
14. If any data issues arose, how did the organization respond to them?

Transition. You have answered all of the interview questions, please feel free to share any final comments you would like to include.

Conclusion. This concludes the interview. I will provide you with a transcript of an interview for you to review for accuracy. Kindly, review and return the transcribed interview with any

comments within four business days. The information you provided in this interview may be helpful in better understanding organizational barriers to cloud migration. Your identity and responses will be kept confidential for three years then destroyed. Thank you for participating in this study.

Appendix E

Department of Defense Determination for IRB Approval

DEPARTMENT OF DEFENSE
COMPONENT OFFICE OF HUMAN RESEARCH PROTECTION
DEFENSE HUMAN RESOURCES ACTIVITY
4800 MARK CENTER DRIVE
ALEXANDRIA, VA 22350-4000

10 Dec 2024

TO: Meena R. Fahmy, DMDC

FROM: Ms. Rhonda Allen, Director, DHRA Component Office of Human Research Protection

SUBJECT: Human Research Protection Program Determination of **Not Human Subjects Research**

TITLE: Defense Manpower Data Center (DMDC) Cloud Migration Study **(DHRA20250008N)**

REFERENCE: (a) DoDI 3216.02, "Protection of Human Subjects and Adherence to Ethical Standards in DoD-Conducted and -Supported Research"

Organizational Background and Authority: The Defense Human Resources Activity (DHRA) is a Department of Defense (DoD) Field Activity established as DoD Components by law, the President, or the Secretary of Defense to provide for the performance, on a DoD-wide basis, of a supply or service activity that is common to more than one Military Department. Field Activities are authorized by 10 U.S. Code 191, "*Secretary of Defense: authority to provide for common performance of supply or service activities.*" Oversight function of such, per 10 U.S. Code 192, *"Defense Agencies and Department of Defense Field Activities: oversight by the Secretary of Defense"* requires the Secretary of Defense to assign responsibility for the overall supervision of each Defense Agency and Department of Defense Field Activity.

The DoDD 5100.87, *"Department of Defense Human Resources Activity."* (Change 1 Approved 6 April 2017) outlines the mission, organization and management, responsibilities and functions, relationships, and delegated authorities for DHRA as the primary support organization to USD(P&R) for policy purposes. The DoDD 5100.87 requires DHRA to: "maintain current and historic central repository of the DoD administrative data (referred to as "Human Resources Information"), analyze such data," and "collect, provide, and utilize this information for the benefit of decision makers of the Department of Defense, and, to "perform such other duties as may be assigned by the Secretary of Defense or the USD(P&R)."

Project Description: The intent of this activity is to explore and document organizational challenges and obstacles related to the Defense Manpower Data Center's (DMDC) migration of applications and data to the cloud. In order to assess the organizational challenges, interviews will be conducted with subject matter experts (SME) that have experienced challenges migrating DMDC data to the cloud. No identifying information will be collected (names, etc.) and answers will remain confidential. In addition, transcriptions will be non-attributional.

Interviews will take approximately 45-90 minutes and will be recorded on Microsoft Teams. A set number of questions will be asked of each participant; the requirement to follow-up and/or clarify information will be dependent on the participants' responses. Interview questions will be based on organizational challenges which include but are not limited to the following themes: decision-making, communications, vendor management, workforce capacity, organizational culture, and technology acceptance. There will be no descriptive questions related to specific technologies, activities, content, or partnerships associated with DMDC. No access to DMDC data being migrated to the cloud is required; the primary focus of this activity is on the organizational challenges experienced with DMDC cloud migration. Support for this project was provided via official memorandum by Ms. Trena Jones, Director, DMDC Technical Services Directorate.

DHRA COHRP Review: This activity does not meet the regulatory definition of "human subjects research" per the Common Rule at 32 CFR 219, *"Protection of Human Subjects,"* and DoDI 3216.02, *"Protection of Human Subjects and Adherence to Ethical Standards in DoD Conducted and Supported Research,"* which indicates specific activities that are excluded from the regulations that govern research with human subjects. One such exclusion is: ***"Activities, including program evaluation and surveys, user surveys, outcome reviews, and other methods, designed solely to assess the performance of DoD programs where the results are only for the use of government officials responsible for the operation or oversight of the program being evaluated."*** It is important to note that in this definition, "program," is intended to be synonymous with process, policy, practice, atmosphere, etc.

When an activity is determined to be excluded from the regulations that govern research with human subjects, there is no longer a need to analyze the regulatory definition of "research" per 32 CFR 219 to determine if an activity is "systematic" or "generalizable," or if the inclusion of humans in the activity meets the regulatory definition of a "human subject." However, it is noteworthy to add that this project is not designed to contribute to generalizable knowledge (a broader societal endeavor) and does not meet the definition of a human subject per 32 CFR 219: ***"a living individual about whom an investigator conducting research obtains. (1) Data through intervention or interaction with the individual, or (2) Identifiable private information.*** Though humans will participate, their input does not constitute "about whom;" the focus is on assessing the organizational challenges of the DMDC cloud migration.

The Director, DHRA COHRP is the Human Research Protection Program (HRPP) review authority for DHRA/P&R sponsored and/or conducted activities that may include "human subjects research." Per the DoDI 3216.02, only a designated HRPP reviewer can determine if a project meets the definition of research with human subjects. This review is considered the official DoD HRPP determination and is solely in reference to the applicability of the regulations that govern research with human subjects to this specific project; it is not an overall authorization to execute this project. There may be additional, ancillary reviews required that are not under the purview of the DHRA COHRP.

Should you have any questions, please feel free to contact me at Rhonda.c.allen3.civ@mail.mil.

Recoverable Signature

X Rhonda C. Allen

Rhonda C. Allen
Director, DHRA Component Office of Human Res..
Signed by: ALLEN.RHONDA.COLLEEN.1395901547

Rhonda Allen, MAS, CIP
Director, DHRA COHRP