

Exploring State Chief Information Officers Involvement in Information Technology Strategic Planning for Remote Collaboration

Shawn Na¹, Darlene Russ-Eft², Linda Naimi², Scott Hutcheson² and Omar Diaz³

¹SAIC, 12010 Sunset Hills Road, Reston, VA, U.S.A.

²Department of Technology Leadership & Innovation, Purdue University, West Lafayette, IN, U.S.A.

³MITRE Corporation, 7525 Colshire Dr, McLean, VA, U.S.A.

Keywords: State Chief Information Officers, Information Technology Strategic Planning, Remote Collaboration.

Abstract: State Chief Information Officers (CIOs) have a vital role in information technology (IT) organizations; this role leads and sponsors information system (IS) programs, ensures operations, and provides technologies and digital capabilities for their organizations. Previous studies (Eiras, 2010; Haffke et al., 2016; Mitchell, 2015; Muller, 2011; Roberts et al., 2014) have discussed CIOs' effectiveness in organizational management, the skillset and credentials for the role and responsibilities involved in leading the IT organization. Compliance with Presidential Executive Orders 13571 and 13576 requires the federal government to undertake appropriate steps to streamline and improve digital services and to deliver an efficient, effective, and accountable federal government. At the state government, the CIO position is established in each of the 50 U.S. and is tasked with overseeing and managing the state information technology (IT) and information system (IS). Investigating CIOs' involvement in dealing with IT initiatives in their organizations can identify practices leading to successful implementations (Porfirio et al., 2021). This research sought to contribute to the body of knowledge and aimed to highlight the State CIOs' involvement in IT strategic planning.

1 INTRODUCTION

The term CIO was first used in the early 1980s and later associated with the main responsibilities of planning, operating, and managing an organization's IT resources, IT investment, and IT management as a corporate executive leader (Ostrowski & Helfert, 2011). The Clinger-Cohen Act of 1996 mandated the position of CIO; this individual would take the steps necessary to implement and manage IT and processes through policies and strategic plans to meet organizational business and mission needs (Government Accountability Office, 2001). CIOs exist in many industries, including commercial, private, and government industries, as well as various research and academic institutes; they strive for their organization's success by meeting their goals and objectives. However, previous studies have focused on the CIO role in the private sector and federal government. Scant research literature pertaining to State CIOs is available (De Tuya et al., 2020), and limited information is present about State CIOs (McCarthy et al., 2021). This research adds to the understanding of how the State CIO's involvement in

IT strategic planning led to the execution of strategies and actions enabling remote collaboration, and it provides a contribution to the literature and suggestions for future research

2 PROBLEM

More research is needed concerning IT strategic planning, given that work to date has shown a high failure rate in such initiatives (Brown, 2019). State CIOs need to understand the importance of IT strategic planning to meet the organization's business and technology needs. Despite over 50 years of research and practice, the track record for IT projects remains very poor, with a failure rate of over 70% (Li, 2020). Many industry reports emphasize the importance of drive and the strategic need for IT investments. Some reports from the U.S. Government Accountability Office (GAO) cover topics on U.S. federal government CIOs, and reports from the National Association of State Chief Information Officers (NASCIO) covering topics on U.S. state government CIOs are also available. However, the

current literature includes limited information about State CIOs (McCarthy et al., 2021). A gap exists in the literature pertaining to State CIOs' involvement and the implications of IT strategic planning and remote collaboration during the height of the COVID-19 pandemic.

3 PURPOSE AND RESEARCH QUESTIONS

The purpose of this research, with a complete version appearing in Na (2024), was to investigate State CIOs' involvement in IT strategic planning for enabling remote collaboration during the COVID-19 pandemic. A State CIO is appointed in each of the 50 U.S. states as a senior executive to lead and manage information technology (IT) and information systems (IS). This research sought to contribute to the body of knowledge that addresses the ways in which State CIOs are involved in IT strategic planning, as not much is known about this subject area or discussed in the current literature. Beyond the research scope, definition, and context, the research findings could also contribute to studies of State CIOs, for which limited research exists (De Tuya et al., 2020).

The main research question and sub-questions for this research were as follows:

1. In what ways were State CIOs involved in IT strategic planning to enable remote collaboration for their organization's remote workforce at the height of the COVID-19 pandemic?

- 1a. Identify and categorize State CIOs' involvement in IT strategic planning to enable remote collaboration.

- 1b. Analyze State CIOs' involvement in IT strategic planning to enable remote collaboration.

4 LITERATURE REVIEW

The purpose of the literature review was to provide background and information on current issues involving State CIOs. A concept map was generated to depict the relationships between the subject areas researched. The literature review showed the current depth of the subject area of interest and provided some ideas for the research methods.

The literature search process was limited to the years December 2019 to December 2023 and included only texts in English. Engineering Village (Compendex and Inspec), <https://www-engineeringvillage-com/>; IEEE Xplore,

<https://ieeexplore-ieee-org>; and ProQuest (Dissertation and Theses), <https://www.proquest.com/> were selected for the relevant literature search. All three databases are used by researchers and have well-maintained reputations as sources of literature reviews. Engineering Village allows literature searches on many sources and can be filtered by keywords, phrases, language, date range, and source types. IEEE Xplore is the main source for any IEEE-affiliated publications, which are scholarly peer-reviewed articles from IEEE conference proceedings and journals. ProQuest allows dissertation searches on the topic of interest from all affiliated institutes and filtering by dates.

The scope of the sample included database searches for journal articles, trade journals, magazines, and dissertations, including IEEE Xplore, ProQuest, and Engineering Village (Compendex and Inspec databases). The time period was scoped from December 2019 to December 2023. The sample was collected to help prepare for document analysis, and all types of documents were considered for sample size. The National Association of State Chief Information Officers (NASCIO) serves as a community that provides resources to State CIOs. Within the resource center, there were numerous reports and surveys from State CIOs' inputs and their involvement in annual events (<https://www.nascio.org/resource-center/>). The information available from this site was examined as well.

Due to the COVID-19 pandemic, many government organizations had to shift the work environment to ensure that staff could work from remote locations. IT departments were the entities responsible for ensuring the customers' IT needs were met. The State CIO led transformational initiatives as a system owner and an authorizing owner (AO). Video conferencing and collaborative team tools allowed end users to conduct meetings, take notes, brainstorm, and continue to engage actively online in a manner similar to typical in-person office meetings (NASCIO, 2021). This new work environment paradigm enabled IT organizations to continue to push for IT initiatives to meet customer needs, which State CIOs were ultimately responsible for leading and managing. Brown (2019) emphasized the lack of academic research, given the growth in practice.

The State CIO has the authority to manage and govern IT and IS. To ensure technology and security management of accessibility, connectivity, interoperability, resiliency, and business continuity to meet and align with business goals.

IT strategic planning provides a solution to

strategy, operations, and tactical mindset within traditional bureaucratic organizations. Collaborative forecasting and the creation of short-term and long-term goals help to encourage the organization's goals and objectives (Mayer & Mayer, 2020). Typically, an IT strategic plan is an output of an IT strategic planning process. IT strategic planning should be an ongoing exercise as technologies continue to evolve, and strategy serves as a "placemat" for technological directions and analysis of IT investment opportunities (Titthasiri, 2010). A technology strategic plan is critical for an IT organization to lay out its vision and goals as well as priorities in technologies to evaluate, acquire, and implement.

The National Association of State Chief Information Officers (NASCIO) is a nonprofit organization that supports networks and resources for State CIOs. This organization was founded in 1969 and serves to represent State CIOs and IT executives and managers. NASCIO's mission is to assist U.S. state-level governments with excellence in leadership, business, technology, and management and support with business and technology innovation, as well as IT service delivery. They host two conferences a year that are open to both state-level senior government executives and representatives from companies and organizations.

5 METHODS

This research utilized the grounded theory research method (e.g., Charmaz & Thornberg, 2021; Glaser & Strauss, 1968). To do so, a comprehensive literature search on the topic of State CIOs' involvement in IT strategic planning was conducted, as described below:

1. Conduct a comprehensive literature search on the topic of State CIOs, IT strategic planning, and remote collaboration for the data collection.
2. Conduct the grounded theory analysis from the data collection with triangulation.
3. Apply computer-assisted qualitative data analysis software (CAQDAS) to validate the grounded theory analysis of State CIOs, IT strategic planning, and remote collaboration.
4. Construct a Course of Action (COA) for the State CIO's involvement in IT strategic planning.

In qualitative research, the researcher's worldview is important to clarify. This study utilized constructivism and pragmatism. Constructivism as a worldview assumes that the researcher intends to examine the views of a research idea being studied from many perspectives (Kivinen & Riestela, 2003).

This would allow the researcher to construct the meaning of the research idea being studied through historical data and to interpret the meanings of personal and societal experiences. This research focused on better understanding the knowledge available and how the world responds.

The research method involved locating records pertinent to this research topic. Database sources, including ProQuest, Engineering Village (Compendex and Inspec databases), and the NASCIO website online database, were utilized to search for published articles and related sources. After all relevant search results were located and examined, records were reviewed to remove any duplicates. Only full-text articles were considered for the research, and any records that did not meet the study criteria were removed. Study criteria identified for this research included literature search findings solely scoped to State CIOs, State CIOs' involvement in IT strategic planning, and state-wide IT strategic planning by State CIOs.

There are two ways to examine document content: content analysis and thematic analysis. Content analysis enables the researcher to identify meaning and relevant passages; thematic analysis provides the researcher with patterns or themes from document data (Document Analysis, 2016). The sources of data were identified using peer-reviewed databases and documents from the National Association of State CIOs (NASCIO) website online database. An iterative research process of document collection and document analysis was used to identify new insights and to address the research problem (Busetto et al., 2020).

In qualitative research, triangulation increases research data reliability. Its purpose is to find multiple sources of data evidence (Tellis, 1997). Triangulation in qualitative research allows cross-checking of evidence collected from multiple sources and enhances understanding of the research problem from a larger perspective (Bhandari, 2022).

The aim of grounded theory is to produce or construct a process inherent to a subject area of inquiry and generate a theory grounded in the original data that will lay a foundation for a framework to describe the relationship between methods and processes (Chun Tie et al., 2019). Grounded theory is a systematic approach to conducting research, collecting data, and undertaking analysis. In grounded theory studies, the researcher's or researchers' focus starts at the beginning of the research process, and they construct and interact with the data throughout the research process (Charmaz & Thornberg, 2020). The grounded theory research

method allows the researcher to collect rich data on a topic of interest and develop theories inductively (Bhandari, 2023). It involves multiple sources and references to review, examine, and analyze from experience and guidance. After the literature review, categories and themes were developed using the grounded theory method. Next, computer-assisted qualitative data analysis (CAQDAS) software (an NVivo product developed by QSR International) was used to validate the categories and themes developed. According to SAGE Publications (2020), this software functions as a repository for the data ingested and allows users to code to investigate text parsing and text search queries. NVivo software is an internationally renowned commercial program available in multiple languages for Apple Mac and Microsoft Windows. The software can be applied to text data and provides visualization and analytical representations.

6 RESULTS

All 50 states' State CIO websites were identified and researched for IT Strategic Planning. From searches conducted, relevant reports were identified as part of the sample data to review, along with initial peer-reviewed results from the various databases. A text search query was conducted to determine an occurrence of word frequency results. After a systematic review of database searches and exclusion of non-related, non-applicable, and duplicative sources, a total of 134 document sources, including eight peer-reviewed literature sources, 110 State CIOs government reports, and 16 reports from NASCIO, StateScoop and GovTech media sources dated from December 2019 to December 2023 were identified as sample data for the document analysis. The results were prepared to describe the analyses completed for each research question. These appear below.

State CIOs' involvement in IT strategic planning to enable remote collaboration for their organization's remote workforce in the height of COVID-19 pandemic (1)

When the first series of news reports on COVID-19 broke the news in December 2019 and the first cases were reported in January 2020, State CIO websites published the 2019 annual report and 2020 IT strategic plan and roadmap. With the advent of COVID-19 and the quick response to shifting the workforce to remote collaboration technology to

allow them to work from alternate locations, State CIOs' activities were captured in 2020 annual reports and 2021 IT strategic plans. Furthermore, annual reports from 2021, 2022, and 2023 included State CIO office project activities conducted to support remote collaboration technologies. Additionally, IT strategic plans from 2022 and 2023 elaborated the future plan to ensure remote work locations and collaboration to conduct business and operations. All literature sources from State CIO websites and other sources of data collected showed the State CIOs' involvement in enabling remote collaboration at the height of the COVID-19 pandemic through the changes made in IT strategic planning.

Identify and categorize State CIOs' involvement in IT strategic planning to enable remote collaboration (1a)

Remote collaboration technology such as Microsoft 365 (M365), Google Workspace, Amazon Web Services (AWS) Workspaces, Zoom, Cisco Webex, and Microsoft Teams have been available to the workforce before the COVID-19 pandemic, and these technologies were expanded to a larger scale of users due to an increased demand due to the COVID-19 pandemic and transitioning of workforce into working remotely. Other IT hardware, such as computers, laptops, tablets, mobile devices, and printers, were identified to be purchased and distributed to the workforce for use in remote locations. The State CIOs had to respond quickly and make a critical strategic decision on shifting the workforce to work remotely and ensuring proper IT support was provided. From the data collected, document analysis was conducted, and the grounded theory approach identified and categorized State CIOs' involvement in IT strategic planning to remote collaboration.

Analyze State CIOs' involvement in IT strategic planning to enable remote collaboration (1b)

Various changes made to the state-level organizational IT infrastructure during the height of the COVID-19 Pandemic rapidly shifted the state government workforce to work at alternate locations with remote collaboration technology. State CIOs' involvement in IT strategic planning to enable such remote collaboration changed the paradigm of the modern work environment. A new remote or teleworking policy was put into effect, and this also changed the regular business rhythms and processes of conducting business. There were numerous records

and reports available from State CIO IT Strategic Planning websites to analyze State CIOs' involvement in IT Strategic Planning to enable remote collaboration. With the quick and sudden responses required due to the state of emergency with the COVID-19 pandemic and the reporting of new cases on a daily basis, State CIOs had the executive authority to make strategic IT decisions that changed the IT landscape for its workforce.

Due to the scarcity of literature, there is a lack of connection between these research findings and the previous research. Due to COVID-19, Federal CIOs made decisions and assisted in the transition of the workforce to remote work and utilized remote collaboration. According to the 2020 Federal CIO Survey, COVID-19 accelerated federal IT modernization and investment to accommodate and shift to remote work (Professional Services Council, 2021). A report from International Data Corporation (IDC) published in 2020 stated that over 2000 organizations and companies globally transitioned their workforce and operations to remote operations and allowed real-time collaboration (International Data Corporation, 2020).

Based on the research findings and discussion of the results of analyses, COAs are identified for consideration for future State CIOs. The list below is prioritized based on the discussion of the research findings and analyses of the results.

- State CIO should consider IT Strategic Planning as a continuous process, not a one-time shelfware that captures a snapshot of the IT organization's project status and initiative needs.
 - Instead of conducting this activity periodically to deliver an IT Strategic Plan, such IT Strategic Planning should be undertaken as a continuous process to review, assess, and update the Plan regularly.
- State CIOs should coordinate and collaborate regularly to share information and knowledge regarding the emerging technological *outlook* as connected with IT Strategic Planning, and they should embrace and adopt public-private partnerships (PPPs) to align investment and works accordingly.
 - Institutionalizing IT Strategic Planning with all levels of stakeholders' involvement, assuring knowledge management and information sharing, and engaging with PPPs could better prepare for emerging technology outlook and the next highly risked event or crisis.
- State CIO should consider having an overarching enterprise IT architecture to represent how IT Strategic Planning fits with the organization's

vision, mission statement, IT roadmap, IT strategy, ITIM, ITAM, ITSM, and other applicable references.

- The discipline of enterprise IT architecture is critical to State CIOs to map all current operational IS, as well as IT systems and applications within the organization's system security boundary. Continuous review and assessment of "as-is" or current architecture and preparations and planning for "to-be" or future architecture would further aid in mapping different components of IT Strategic Planning with State CIO's future vision and strategy.
- State CIO should consider defining measurable and meaningful metrics to evaluate successes, achievements, and return on investment (ROI) from IT Strategic Planning.
 - Quantitative measures and meaningful metrics for State CIOs to consider may include the following within the scope of IT Strategic Planning on an annual basis:
 - Number of IT acquisitions planned versus actual.
 - To determine the variance between planned versus actual on IT acquisitions made.
 - Duration of each IT acquisition from planning to post-award.
 - To determine the variance between planned versus actual duration on IT acquisitions awarded.
 - IT budget planned versus actual.
 - To determine the variance between planned versus actual on the annual IT budget.
 - Total cost of ownership (TCO) on IT infrastructure (e.g., cloud, on-prem).
 - To determine the TCO on IT infrastructure and IT landscape that State CIO is managing and planning for future vision and strategy.
 - % of IT budget for innovation, prototyping, internal research and development (IR&D).
 - To determine % of the IT budget being spent for innovation and prepare for future emerging technological outlooks.
 - Number of IT projects by categories: initiated, completed, on hold, stopped.
 - To determine the progress of IT projects.
 - Number of IT requirements received (new or customer support) by customer-based.

- To determine the types of IT requirements based on different customers to justify future IT budget requests.
- State CIO should provide process training on IT Strategic Planning to all relevant stakeholders to ensure institutionalization and a thorough understanding of the requirements.
 - Institutionalization of IT Strategic Planning will take time and effort to prepare and train all levels of stakeholders. Such training needs to reflect the latest contents and developments. The frequency of training taken by the workforce, end-of-training exam scores, and training surveys could be captured for future training content and delivery improvement opportunities.

A limitation of this research was that both the preliminary database search results and the final search results revealed a scant number of literature reviews and studies on the topic of interest. The scarcity of literature may have impacted the quality of this document analysis research. The number of sources found on State CIOs may have been a limitation of this research when publications were not available to the public. The types of sources found may have been a limitation to the research when non-journal articles or dissertations were located from literature review searches. The data collection approach may have decreased generalizable findings, as the data that need to be collected and reviewed included other types of CIOs related documents from various industries and government sectors. Thus, qualitative research for future studies on this topic should consider how to generalize involvement by other types of CIOs and IT strategic planning. Finally, this research may be limited to repeating to cover all facets of State CIOs and IT strategic planning implications.

The present work represents an extension of previous work undertaken by the authors (Na & et al., 2024). Future research is recommended for researchers interested in the subject matter of the State CIOs. Future researchers could use the findings to conduct the Delphi Method with a selected number of State CIOs. In further rounds of the Delphi Method, all 50 State CIOs could receive an online survey request. The Delphi Method is a rational approach to research real-world practice by focusing on structured communication analysis of individuals who could provide subject matter expertise to meet the goal of a consensus (Brady, 2015). This research method is applicable when there is an existence of a group of

experts available for participation. The Delphi Method has been applied in IT management related research. It provides a means to improve the efficiency and effectiveness of technology and business management within private, public and government sectors and to bring a group of experts geographically dispersed together as a structured and organized panel group to communicate for suggestions and recommendations for improvement opportunities (Skinner & et al., 2015).

7 CONCLUSIONS

The research findings contribute to reducing the gap in the literature and body of knowledge that COAs are for consideration for future State CIOs. Furthermore, additional contributions to a gap in the literature in this subject matter are essential for future researchers, the State CIOs, and their stakeholders. State CIOs could further explore how to integrate these COAs into future IT strategic planning processes or how to implement these action items to enable existing IT strategic planning. As a leader, manager, and practitioner of the position of State CIO, successful planning, execution, management, and operation are all vital to achieving vision, goals, and objectives. Future research related to this topic could strengthen the commitment to public service from current and future state-level employees and a desire to achieve capabilities and deliveries of IT services within the organizational business and technological needs.

REFERENCES

- Axelos. (n.d.). What is ITIL? <https://www.axelos.com/certifications/itil-service-management/what-is-til>
- Axelos. (n.d.). What is IT service management? <https://www.axelos.com/certifications/itil-service-management/what-is-it-service-management/>
- Barnett-Page, E., & Thomas, J. (2009). Methods for the synthesis of qualitative research: A critical review. *BMC Medical Research Methodology*, 9(1). <https://doi.org/10.1186/1471-2288-9-59>
- Bhandari, P. (2023, January 16). Triangulation in research, guide, types, examples. Scribbr. <https://www.scribbr.com/methodology/triangulation/>
- Bongiorno, G., Rizzo, D., & Vaia, G. (2018). CIOs and the DT: A new leadership role. Springer.
- Bougie, R., & Sekaran, U., (2019). Research methods for business. Wiley.

- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/qrij0902027>
- Brady, S. R. (2015). Utilizing and adapting the delphi method for use in qualitative research. *International Journal of Qualitative Methods*, 14(5), 1–9. <https://doi.org/10.1177/1609406915621381>
- Brown, N., & Brown, I. (2019, September 17–18). From digital business strategy to DT – how? A systematic literature review. In C. Villiers. (Chair). Proceedings of Association for Computing Machinery South African Institute of Computer Scientists and Information Technologists (SAICSIT), 13(1), 1–8. Skukuza, South Africa. <https://doi.org/10.1145/3351108.3351122>
- Busetto, L., Wick, W., & Gumbinger, C. (2020). How to use and assess qualitative research methods. *Neurological Research and Practice*, 2(1), 1–10. <https://doi.org/10.1186/s42466-020-00059-z>
- Charmaz, K., & Thornberg, R. (2020). The pursuit of quality in grounded theory. *Qualitative Research in Psychology*, 18(3), 305–327. <https://doi.org/10.1080/14780887.2020.1780357>
- Chief Information Officer, 62 O.S. § 34.11.1. (2014). Oklahoma office of management and enterprise services. <https://oklahoma.gov/omes/legal/statutes/62/34-11-1.html>
- Chun Tie, Y., Birks, M., & Francis, K. (2019). Grounded theory research: A design framework for novice researchers. *SAGE Open Medicine*, 7(1), 1–8. <https://doi.org/10.1177/2050312118822927>
- Dalkin, S., Forster, N., Hodgson, P., Lhussier, M., & Carr, S. M. (2020). Computer assisted qualitative data analysis software (CAQDAS; NVivo) to assist in the complex process of realist theory generation, refinement and testing. *International Journal of Social Research Methodology*, 24(1), 123–134. <https://doi.org/10.1080/13645579.2020.1803528>
- De Tuya, M., Cook, M., Sutherland, M., & Luna-Reyes, L. F. (2020). The leading role of the government CIO at the local level: Strategic opportunities and challenges. *Government Information Quarterly*, 37(3), 1–9. <https://doi.org/10.1016/j.giq.2017.01.002>
- Eiras, J. C. (2010). *The practical CIO: A common sense guide for successful IT leadership*. Wiley.
- Finley, G. (2021, April 23). What it takes to succeed as a state CIO (contributed). GovTech. <https://www.govtech.com/workforce/what-it-takes-to-succeed-as-a-state-cio-contributed.html>
- Ghawe, A., & Brohman, K. (2016). CIO leadership characteristics and styles. *AMCIS 2016 Proceedings*, 5(1), 1–10. <https://core.ac.uk/download/pdf/301368883.pdf>
- Glaser, B. & Strauss, A. (1968). *The discovery of grounded theory: Strategies for qualitative research*. AldineTransaction.
- Haffke, I., Kalgoas, B., & Benlian, A. (2016, December 11–14). The role of the CIO and the CDO in an organization's digital transformation. In B. Fitzgerald, & J. Mooney (Co-chairs). *International Conference on Information Systems (ICIS) 2016 Proceedings*, 3(1), 1–20. Dublin, Ireland. <https://aisel.aisnet.org/icis2016/ISSStrategy/Presentations/3>
- Indeed. (n.d.). State chief information officer. <https://www.indeed.com/viewjob?jk=5549e5db580fb31b&tk=lgpltp1rrki8p800&from=serp&vjs=3>
- International Data Organization. (2020). IDC Futurescape: Worldwide IT industry 2021 predictions. <https://www.idc.com/getdoc.jsp?containerId=US46942020>
- Kane, G. (2019). The technology fallacy: How people are the real key to digital transformation. *Research-Technology Management*, 62(6), 44–48. <https://doi.org/10.1080/08956308.2019.1661079>
- Kansas Executive Branch Information Technology. (2022, October 1). 2022 3-year IT plan update. https://ebit.ks.gov/docs/default-source/kito-documents/3yearplan/2022_ebit_3year_project_plan_final.pdf?sfvrsn=d8006317_2
- Kivinen, O., & Ristelä, P. (2003). From constructivism to a pragmatist conception of learning. *Oxford Review of Education*, 29(3), 363–375. <https://doi.org/10.1080/03054980307442>
- Korstjens, I., & Moser, A. (2017). Series: Practical guidance to qualitative research, part 4: Trustworthiness and publishing. *European Journal of General Practice*, 24(1), 120–124. <https://doi.org/10.1080/13814788.2017.1375092>
- Mayer, M., & Martin, M. C. (2021). The influence of technology on the strategic planning process. In K. Mehdi (Eds.), *Encyclopedia of organizational knowledge, administration, and technology*, (pp. 798–811). IGI Global. <https://doi.org/10.4018/978-1-7998-3473-1.ch057>
- McCarthy, P. M., Sammon, D., & Alhassan, I. (2021). Digital transformation leadership characteristics: A literature analysis. *Journal of Decision Systems*, 2021(1), 1–31. <https://doi.org/10.1080/12460125.2021.1908934>
- McKinsey & Company. (2018, October 29). Unlocking success in digital transformations. <https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/unlocking-success-in-digital-transformations>
- Mitchell, J. (2015). *Staying the course as a CIO: How to overcome the trials and challenges of IT leadership* (1st ed.). Wiley.
- Muller, H. (2011). *The transformational CIO: Leadership and innovation strategies for IT executives in a rapidly changing world* (1st ed.). Wiley.
- Na, S. (2024). *Exploring state Chief Information officers involvement in information technology strategic planning for remote collaboration* [Dissertation]. Purdue University Graduate School. <https://doi.org/10.25394/PGS.25148990.v2>
- National Association of State Chief Information Officers (NASCIO). (2020, January 16). The future state CIO. How the role will drive innovation. <https://www.nascio.org/wp->

- content/uploads/2020/01/FutureStateCIO_DrivingInnovation.pdf
- National Association of State Chief Information Officers (NASCIO). (2020, March 12). COVID-19 planning and response guidance for state CIOs. https://www.nascio.org/wp-content/uploads/2020/04/NASCIO_COVID19_PlanningforStateCIOs_v2.pdf
- National Association of State Chief Information Officers (NASCIO). (2021, March 30). Yesterday, today, and tomorrow. A resilient and adaptable state IT workforce. https://www.nascio.org/wp-content/uploads/2021/04/NASCIO_ResilientWorkforce_3.2021.pdf
- National Association of State Chief Information Officers (NASCIO). (2021, October 11). The 2021 state CIO survey. <https://www.nascio.org/wp-content/uploads/2021/10/2021-State-CIO-Survey.pdf>
- National Association of State Chief Information Officers (NASCIO). (2021). State CIO leadership in government innovation and transformation. <https://www.nascio.org/wp-content/uploads/2019/11/State-CIO-Leadership-Final.pdf>
- National Association of State Chief Information Officers (NASCIO). (2023, April 25). Actively managing the IT investment portfolio. https://www.nascio.org/wp-content/uploads/2023/04/NASCIO_EPM-Playbook-2023-A.pdf
- Ostrowski, L., & Helfert, M. (2011). What next for the CIO? A maturity-based approach. UK Academy for Information Systems Conference Proceedings 2011. 38(1). 1-19. <http://aisel.aisnet.org/ukais2011/38>
- Pistentis, N. (2023). One institution's approach to collaborative IT strategic plan development. Proceedings of the 2023 ACM SIGUCCS Annual Conference. 2023(1). 15-17. <https://doi.org/10.1145/3539811.3579561>
- Porfirio, J. A., Carrilho, T., Felicio, J. A., & Jardim, J. (2021). Leadership characteristics and digital transformation. *Journal of Business Research*, 124(1), 610-619. <https://doi.org/10.1016/j.jbusres.2020.10.058>
- Professional Services Council. (2021, January 12). 2020 Federal CIO survey. Accelerating and managing IT modernization during uncertainty. <https://www.pscouncil.org/ciosurvey>
- Regan, R. (2019, April 10). 7 Strategies of the successful state CIO. LinkedIn. https://www.linkedin.com/pulse/7-strategies-successful-state-cio-rock-regan/?trk=portfolio_article-card_title
- Roberts, D., Watson, B., & Cramm, S. (2014). Confessions of a successful CIO: How the best CIOs tackle their toughest business challenges (1st ed.). Wiley.
- Skinner, R., Nelson, R. E., Chin, W. W., & Land, L. P. W. (2015). The Delphi method research strategy in studies of information systems. *Communications of the Association for Information Systems*, 37(2). 32-63. <https://doi.org/10.17705/1cais.03702>
- StateScoop. (2021). How post-pandemic IT priorities are shifting. <https://cdn.statescoop.com/post-pandemic-it-priorities-shifting-government-higher-education.pdf>
- Stone, A. (2020, October 23). Digital states survey 2020: Cloud is more critical than ever. GovTech. <https://www.govtech.com/computing/digital-states-survey-2020-cloud-is-more-critical-than-ever.html>
- Tellis, W. M. (1997). Application of a Case Study Methodology. *The Qualitative Report*, 3(3), 1-19. <https://doi.org/10.46743/2160-3715/1997.2015>
- Titthasiri, W. (2000). Information technology strategic planning process for institutions of higher education in Thailand [Doctoral dissertation, University of Pittsburgh]. ProQuest Dissertations and Theses Global.
- United States Office of Personnel Management. (2022, December). Status of telework in the federal government report to congress fiscal year 2021. <https://www.opm.gov/telework/documents-for-telework/2021-telework-report.pdf>
- Virginia IT Agency. (2022, September 24). 2022-2024 IT strategic plan. https://www.vita.virginia.gov/media/vitavirginiagov/it-governance/agency-it-strategic-plans/2022-2024/ITSP_FY22-24_202_summary.pdf
- Whitehurst, J. (2015). Driving digital transformation: New skills for leaders, new role for the CIO. *Harvard Business Review*, 1-19. <https://hbr.org/resources/pdfs/comm/RedHat/RedHatReportMay2015.pdf>
- Wood, C. (2022, January 7). What makes a good state CIO? StateScoop. <https://statescoop.com/what-makes-good-state-cio/>