Data-Informed Decision-Making in Higher Education:

A Quality Improvement Study of The Council of Independent College's

Key Indicators Tool (KIT) and Financial Indicators Tool (FIT)

Joseph C. Miller and Leah Paulson Dunmire

Leadership and Learning in Organizations, Peabody College – Vanderbilt University

Advisor: Professor William Doyle

August 1, 2024

Table of Contents

Dedication

This document begins, as many do, with a recognition of those who have helped to see this capstone project through to completion. For those both named and unnamed, we thank you for your good humor and quick and ready advice, which has kept us motivated and focused on seeing this project through the end.

We would first like to express sincere gratitude and appreciation to our Capstone Advisor, Dr. William Doyle, and our secondary advisor, Dr. Eve Rifkin. Our capstone is a far better product than we could have anticipated because of your guidance. We, and our work, have greatly benefitted through your encouragement, mentoring, time, and patience; and we have become more thorough and mature scholar-practitioners from your instruction. We are honored to have these great scholars as our mentors, and we hope this work reflects well upon them. We also give thanks to Dr. Matthew Campbell, our LLO Capstone Director, for his kind nature and continuing reminders which have kept us organized. He has both kept us grounded and guided us to "see the light at the end of the tunnel." We would also like to extend a sincere and abiding appreciation for the faculty in Peabody College at Vanderbilt University (far too many to name here) without whom none of this would be possible.

We would also like to recognize the leadership at our partner organization, the Council of Independent Colleges, who have been the ideal partner for this year-long endeavor. We owe a huge debt of gratitude to CIC President Dr. Marjorie Hass, Dr. Jeff Woods, Ms. Ellen Peters, Dr. Mike Williams, and Dr. Jason Rivera for endorsing and supporting the capstone project. Their insight, feedback, and generosity manifested in every phase of this project from the initial framing of our problem of practice through the creation of our data collection tools and early reviews of our findings.

Leah would also like to thank her incredibly patient and supportive husband, Ben, and her parents, family members, and friends who have been her biggest cheerleaders through this journey. She would also like to shoutout LLO Cohort 13: your support, humor, and friendship has made even the toughest moments of this journey enjoyable. Leah is also immensely grateful for her Capstone partner, Joe, who has embodied a remarkable, steady leadership throughout this project and has truly been an A+ teammate. Thank you for keeping me grounded and for celebrating each and every small win along the way!

Joseph would like to thank his loving, supportive, and long-suffering family - first and foremost - his wife (Melissa) and children (Anna Claire, Jonah, and Camp) as well as the support, encouragement, and good-humor of his colleagues and friends at Vanderbilt University, Winthrop University, LaGrange College, Huntingdon College, and Austin Peay State University. Likewise, Joseph would like to thank the generous support of the Fuller E. Callaway Foundation and the Hatton Lovejoy Scholarship Program for their financial support towards the pursuit of the Ed.D. at Vanderbilt. Likewise, Joseph would like to express his deep gratitude and appreciation to his Capstone partner, Leah Paulson Dunmire for her diligence, determination, and direction at every phase of this capstone project and for being the absolute best colleague, partner, and friend throughout this project.

Introduction

Why this study? Why now?

To put this study into perspective, consider the following - since we began the Leadership and Learning in Organizations (LLO) program at Vanderbilt University in August 2021, over 50 private higher education institutions have closed, merged, or consolidated through acquisition by another institution. This information on college closures is kept updated through an ongoing study from Higher Ed Dive called "A Look at Trends in College Consolidation since 2016" that tracks these institutional changes (Higher Ed Dive, last updated June 18, 2024). These closures are happening at an accelerated pace – mostly affecting private, small enrollment, four-year institutions that are heavily dependent upon net tuition revenue from student enrollment for the major portion of their operating revenues.

In "The Innovative University: Changing the DNA of Higher Education from the Inside Out", authors Clayton M. Christensen and Henry J. Eyring predicted that the bottom 25% of every college and university tier would disappear or merge within the next decade (Christensen & Eyring, 2011). From their perspective, the business model of the traditional higher education institution was broken and unable to sustain itself in an era of increasing cost and competition. While many in the higher education community initially scoffed at the forecast in Christensen and Eyring's book (and the prediction has turned out not to be wholly accurate), the landscape of higher education is clearly changing as evidenced by this increase in closings and mergers. Many of the institutions that have closed have been long-standing institutions with rich and storied histories – many founded over 100 years ago. These institutions have served multiple generations of students and faculty and are vital to the ecosystem of American higher education. Likewise, these institutions have strong academic profiles and represent the gold standard of American higher education. Other authors have discussed aggravating factors like the demographic, economic, and cultural disruptions in higher education (McGee, 2015) and the broader decline in higher education market demand and supply of high-school graduates (Grawe, 2018) as compounding factors of closures and mergers. The current higher education climate is challenging, and we are at an inflection point that may chart the future of higher education for the next twenty-five years (or longer).

These rapid closures beg the question: what indicators exist that could help colleges and universities make strategic institutional decisions about their future and how would institutions use such indicators? Fortunately, the Council for Independent Colleges (CIC) has created a suite of data analytics reports specifically designed for independent colleges and universities to review their institutional data over a multi-year period to evaluate and identify trends. These tools, the Key Indicators Tool (KIT) and the Financial Indicators Tool (FIT), provide in-depth analysis of over 24 metrics, indicators, and ratios that can help college and university leaders chart the health and viability of their institutions. Leaders at CIC member institutions can use the data in the KIT and FIT benchmarking reports to understand the condition of their institutions compared to peer institutions and make strategic organizational decisions.

This year (2024) marks the 20-year anniversary of the creation of the KIT and FIT. In partnership with the CIC, our quality improvement project is the first time since the development of the KIT and FIT that an in-depth study has been conducted to evaluate these analytic tools. It

is fitting that in the 20th anniversary year of the KIT and FIT, we are conducting this study to deliver findings and recommendations to the leadership of CIC for the benefit of their organization and to KIT and FIT users at CIC member institutions. This research aims to provide actionable and meaningful insights that will enhance the end-user functionality of the KIT and FIT and offer recommendations that improve these instruments for the CIC.

The Council of Independent Colleges

The Council of Independent Colleges (CIC) is a 501(c)(3) organization that supports executive leaders at independent colleges and universities. The CIC offers conferences, seminars, publications, and other products and services with the goal of helping colleges and universities improve the quality of their educational and student outcomes and enhance their institutional visibility and performance. The CIC's member institutions are private, nonprofit colleges and universities in the United States and abroad. Nonprofit organizations that support independent higher education and two-year independent institutions are also eligible for membership. Presidents, provosts, and other senior leaders at CIC member institutions gain access to the CIC's programs, consultative services, networking opportunities, and a range of other valuable resources (knowledge base, research and benchmarking, grant assistance, and technology). The CIC employs approximately 30 staff who manage membership, conferences and events, research, and the internal functions of the organization. As of June 2024, the CIC's members include over 650 independent colleges and universities across the globe.

We could not dive further into our collaboration with CIC without also reviewing the tools which will serve as our area of focus for this quality improvement study. One of the many benefits the CIC offers its members is the use of their Key Indicators Tool (KIT) and Financial Indicators Tool (FIT), which deliver members customized benchmarking reports of their institution's performance compared to peer institutions. The tools produce a report that is a combination of a static, protected Excel document and a PDF output delivered annually to members free of charge. The KIT uses the latest available IPEDS (Integrated Postsecondary Education Data System) data to provide 20 indicators of institutional performance in four key areas: student enrollment and progression, faculty, tuition revenue and financial aid, financial resources and expenditures. The FIT uses IPEDs and IRS Form 990 data to provide an assessment of an institution's financial performance using four financial ratios – resource sufficiency, debt management, asset performance, and operating results – that are combined into a single index score. The KIT and FIT reports provide CIC members with nationally normed comparisons to empower institutional leaders with performance measures to improve their data-informed decision-making and strategic goals. Throughout this paper, we will refer to the KIT and FIT together unless otherwise specified.

Area of Inquiry

The Problem

Leaders at the CIC are concerned that the KIT and FIT are no longer serving college and university member institutions in a way that adds value to organizational decision-making. Without a clear understanding of how and why the KIT and FIT are being used by member institutions, the CIC is unable to gain insights to make improvements to the tools that could increase their value to member institutions. Several factors underscore why the CIC is interested in addressing this problem and their desire to understand how to improve the quality of the KIT and FIT to best serve member institutions. We conducted various root cause analysis exercises in consultation with our partners at CIC to identify the problem and project questions we pursued. The results of these exercises – a Balanced Scorecard, Fishbone Diagram, and McKinsey 7S – can be found in Appendix A.

First, while the CIC provides a range of consultative services, products, and conferences for member institutions at an additional cost to their membership fees, the KIT and FIT are available to all CIC member institutions for free as part of their membership subscription. However, because of the free access to the KIT and FIT, the CIC does not have a process to monitor the end-user functionality of the tools. This leaves questions around how the tools are used by member institutions and what the real market demand of the KIT and FIT are. Leaders at the CIC have discussed adding a subscription fee for access to the KIT and FIT to gain a better sense of the demand of the tools and to gain insights into how the tools are used by member institutions. However, there is a strong desire by CIC leadership and the CIC Board to continue to provide KIT and FIT reports to member institutions for free as part of the annual member subscription.

Secondly, the format in which the KIT and FIT are delivered has remained the same in its twenty year existence. The KIT and FIT are powered by Microsoft Excel macros that deliver a range of reports that are static and reflect an annual point-in-time comparison. While the Excel macros reports are full of comparative data points, the limitations of the software may constrain other ways that the KIT and FIT can provide value to member institutions. For example, the CIC leadership have discussed the possibility of transitioning the tools to a dynamic online dashboard supported through Microsoft Power BI or Tableau that would deliver a broader range of functionality and customizability to the reports. Knowledge constraints, however, are preventing the CIC team from making any immediate changes to the format of the KIT and FIT until CIC leaders can better understand member preferences on the data outputs of the tools.

Thirdly, the data itself is a constraint because the KIT and FIT reports are developed annually using cross-sectional data from the Integrated Postsecondary Education Data System (IPEDS). Access to the annual IPEDS data is made publicly available from the National Center for Education Statistics (NCES) so there is no confidentiality or proprietary information in the data set used in developing the KIT and FIT. The schedule of IPEDS data collection and release can be found in Appendix B. However, the process by which the KIT and FIT use the IPEDS data to deliver the reports is a confidential and proprietary method which is intellectual property

of the CIC. Therefore, if institutional researchers at CIC member institutions wanted to develop their own version of the KIT and FIT, they could do that using the publicly available IPEDS data. However, the CIC collects the updated IPEDS data annually and delivers the reports using the static Excel files. Therefore, both the collection of IPEDS data (which is reported annually) and the static nature of the Excel reports are constraining the design and functionality of the KIT and FIT. Leaders at the CIC have discussed gaining access to different data sets to power the KIT and FIT; however, this would require purchasing additional data sets, which can be cost prohibitive. One of the reasons why the CIC has been able to offer the KIT and FIT to member institutions for free is because the IPEDS data is free and publicly available. Therefore, the CIC will need to consider both the additional cost and reliability of other data sources if they choose to modify the KIT and FIT.

Lastly, CIC leadership is concerned that making changes to the KIT and FIT could be disruptive to their members who are accustomed to the current format and function of the reports. Specifically, there is discussion among the CIC leadership whether the KIT and FIT are beneficial at all to their members in their current state. Since the KIT and FIT were developed twenty years ago and are generated through Excel macros, most institutions could develop their own customized versions of KIT and FIT that could be just as, if not more, helpful. So, the CIC is considering whether the KIT and FIT are still relevant and useful given the availability of the data and capacity of individual leaders to replicate similar results. CIC leaders wonder if the KIT and FIT have served their purpose and outlived their usefulness. There is also concern that member institutions have become so dependent on the current format of the KIT and FIT that making modifications to the tools could do more harm than good. However, to navigate the course between these two concerns, the CIC seeks an external assessment from this study to inform how best to address the challenges.

Evidence

Our primary contacts at the CIC have anecdotal evidence from staff and member institutions about this area of inquiry. Our initial contact in discussing the project was Dr. Jason Rivera, Senior Director of Strategic Research. After Jason's departure, Dr. Jeff Woods, Vice President for Member Engagement, and Ellen Peters, Director of Strategic Research and Assessment became our primary contacts. A full scope of work was developed collaboratively and is linked in Appendix C. The first evidence supporting the necessity of this study is that a recent member survey aimed at identifying key areas of interest for research and the development of resources revealed that CIC members expressed interest in hearing how leaders at their member institutions are using data to inform decision-making at their institutions. The KIT and FIT– personalized measures of an individual institution's performance relative to peer institutions – are one way that the CIC has provided data to its member institutions. Assessing their effectiveness and use via this study was identified as a means of responding to this interest expressed by CIC members.

Secondly, before this study came to fruition, Jason proposed the idea of the KIT and FIT being modernized to a dynamic format to CIC staff and board members which was received positively., CIC does not currently collect data from its members about their use of the KIT and

FIT, though, which would address whether overhauling the tools would be a worthwhile use of time and resources. To support a drastic change of this tried-and-true tool, CIC staff hope to fill a knowledge gap: CIC member attitudes toward the tools. The data that fuels these tools comes from IPEDS (the Integrated Postsecondary Education Data System) so the data is static and, because the culture and financial performance of higher education institutions have radically shifted especially since the COVID-19 pandemic, data more than a year or two old is unhelpful for benchmarking. CIC members have expressed a desire for more dynamic data so the CIC has added reports to the KIT and FIT to address these needs. However, the CIC hopes to dive into member attitudes about the tools systematically to move forward in a way that best serves its members.

Stakeholders

Several groups affiliated with the CIC stand to benefit from the results of this project. First, the leadership of the CIC (including the staff and senior advisors) who have member-facing roles within the organization will be impacted by the results from this project, and any decisions CIC may make from the results and recommendations. In particular, the CIC staff who work with institutional research and those in member services who work closely with representatives from member institutions will be most directly affected by the findings of this study. For example, the research team may need to adjust to the KIT and FIT, which could require a substantial change in the data collection, data delivery modality, and accessibility of the current tools. Specifically, the original developer of the KIT and FIT is still responsible for making the updates to the program and continuing to perform maintenance to the tools for member institutions. The member services staff will also need to anticipate how the findings may affect their interactions with the individuals who use the KIT and FIT at member institutions.

Secondly, individuals from CIC member institutions are key stakeholders in this study. While college and university Presidents and Chief Academic Officers (Provosts, Vice Presidents for Academic Affairs, and Deans) are the primary contacts for CIC member institutions, the CIC is unsure whether they are the primary users of the KIT and FIT. Other individuals at CIC member institutions (including individuals in Institutional Research/Effectiveness, Chief Financial Officers, Chief Enrollment Officers, and Comptrollers) will be affected directly by any changes to the KIT and FIT. Therefore, the feedback from individuals at CIC member institutions who use the KIT and FIT is vital in conducting a thorough evaluation to determine the end-user functionality of the tools and what, if any, updates would be valuable. By engaging input and feedback from both groups of stakeholders (CIC leadership and college/university leaders from CIC member institutions), this project can help to address the problem area and reveal insights that can improve the quality of the KIT and FIT and enhance the member experience for CIC member institutions.

Research Synthesis Memo

Overview

Recent scholarship on data-informed decision-making (DIDM) within colleges and universities has identified that most higher education officials are not yet adept at using analytics to support institutional decision-making (Webber & Zheng, 2020). In a recent *Gallup* and *Inside Higher Ed*. survey of provosts and chief academic officers at U.S. colleges, only 16% of private university provosts and 19% of public university provosts believe that their universities use data effectively to inform campus decision-making (Jaschik & Lederman, 2019). Most scholars agree that robust data analysis alone is insufficient for leadership teams to engage in effective data-informed decision-making. Rather, decision-making processes are often reported as more important than data analysis alone in decision outcomes. For instance, a critical study by Lovallo and Sibony indicates that process matters more than analysis in data-informed decision-making by a factor of six (Lovallo & Sibony, 2010).

While access to the KIT and FIT is included in membership costs, the CIC does not conduct a monitoring process for member institutions' use of the tools. Without a clear understanding of how and why member institutions are using the KIT and FIT, the CIC is lacking crucial insights to make improvements to the tools that could deliver value in their data-informed decision-making. This observation is supported by Webber & Zheng's argument that "for data-informed decision-making to take root in higher education, we must have conceptual clarity on what defines data-informed decision-making and how it can be practiced" (Webber & Zheng, 2020, p. 5). Both conceptual clarity and operational understanding are important for discerning how the KIT and FIT can drive additional value for CIC member institutions.

This capstone project conducts a utilization-focused evaluation of the KIT and FIT to inform the CIC of the effectiveness and utility of the tools. The evaluation methods have been designed to determine the effectiveness of the KIT and FIT through a quality improvement study. Through this study, we seek to discern whether the KIT and FIT are useful, and *how* and *to what extent* they support data-informed decision-making for CIC member institutions.

Literature Synthesis

Considering the increasing importance of data-informed decision-making in higher education institutions, we have analyzed relevant literature and comparative tools to better inform the development of our capstone research. This synthesis summarizes key findings and insights from various recent articles and chapters which we have coded into four categories: effective data-informed decision-making, the role of data analytics tools in decision-making, decision-making strategies and processes, and executive leadership priorities and perspectives in higher education. The research and scholarly literature in these categories covers a range of context and industries; however, through our research, we have isolated articles and studies that closely align with our particular research and project questions. Below is a brief summary of each area and synthesis on the direction of scholarship.

Effective Data-Informed Decision-Making

As learning organizations, colleges and universities vary in how they make use of data and data analytics in their decision-making processes. Adopting varying degrees of using descriptive, predictive, and prescriptive analytics across institutions can have a profound impact on the type of data culture and the level of sophistication in data-informed decision-making at institutions. However, in an increasingly competitive marketplace for higher education, institutions must be able to take advantage of data in their decision-making process to remain competitive while prioritizing the operation of their core enterprise.

For example, research on higher education institutions reveals that analyzing data is crucial to decision-making processes at the college/university level (Webber & Zheng, 2020) and how institutional leadership can leverage data to enhance learning outcomes (Caspari-Sadeghi, 2023). These insights reveal the crucial nature of data-informed decision-making within higher education and that using data in decision-making is no longer an optional process for higher education institutions. Similarly, colleges and universities are challenged to capture and utilize data effectively; Improving data management strategies is identified as a need for university leadership (Borgman & Brand, 2022). Research is showing that institutions that are more successful at managing and utilizing their own institutional data are better positioned to make effective strategic decisions for the overall organization.

Additionally, organizations must be sensitive to their current data culture and data adoption across their campus. For instance, advancing from the use of predictive to prescriptive data analytics in higher education highlights a change in the culture and strategy of data-informed decision-making to drive different types of campus interventions (Parnell, 2022). Not only are institutions increasingly being called to use descriptive and diagnostic data analysis to drive strategic and operational decisions; but, they are also expected to deliver real-time analysis to report and monitor institutional progress. The rapid acceleration of the use of data analytics is considered a standard practice for data-informed decision-making in higher education.

Additional studies provide deeper insight into data analytics usage, exemplifying the desire and need for data-informed decision-making in higher education. A study by Kalim & Bibi (2023) highlights the need for higher education institutions to adopt data-driven decision-making. Their case study of a Chinese higher education institution emphasizes the importance of leveraging data to make informed decisions using an instructional model for data-driven decision-making (Kalim & Bibi, 2023). Likewise, using data for strategic data-informed decision-making is examined in a book-length study of more than 2,800 undergraduate institutions (using IPEDS data) to create a set of metrics for estimating market viability and risk of higher education institutions (Zemsky et al., 2020). These approaches demonstrate the benefits of using data in effective strategic decision-making and the requirements and responsibilities of institutions as they become more sophisticated in their campus data culture.

Role of Data Analytics Tools in Decision-Making

The use of data, data analytics, and data technology is increasingly crucial in enhancing the process and evaluative capabilities of decision-making processes within higher

education. There are varying levels of adoption and sophistication in the use of data analytics tools across institutional contexts: some are internally-developed and institution specific, while others are provided at a cost through service providers. However, the type of data analytics available to an institution needs to align with the strategic priorities of the organization and the intended use of the tools. Data analytics tools have increasingly become standard fixtures of the higher education landscape, and institutions have choices in their approach to using data analytics tools to support their strategic decision-making.

Data analytics tools can include a combination of institution-specific data and national and peer benchmarking data. One of the first approaches of creating comparative national data benchmarking program was researched in Kirby & Waugaman (2002). A joint effort of creating a national benchmarking program was co-sponsored by the Society of Research Administrators (SRA), The National Association of College and University Business Officers (NACUBO), and the higher education practice of KPMG from 1998 through 2000. The resulting database was made available to participating institutions through a web-based reporting and analysis tool, which allowed participants to customize and generate institution-specific peer comparisons in a variety of tabular and graphical formats (Kirby & Waugaman, 2002).

While data analytics can serve as powerful tools for strategic and organizational decision-making, they can also serve as robust operational and tactical decision aids. For example, an agile data analytics environment has proven to be valuable in crisis response situations, as evidenced by a case study of Ohio State University's rapid development of a COVID-19 dashboard system (Zheng et al., 2020). This case study demonstrates how the use of data analytics tools can accelerate decision-making across groups by delivering data in an accessible, clear, and contextual method. Understanding the utility and context of data analytics tools enables the development of a strong conceptual framework for tool usage. For instance, a framework surrounding the emergence of data analytics technology has been presented in an analysis of higher education institutions in Malaysia (Ashaari et al., 2020). Similarly, advances in new and emerging technologies are opening new contexts and conceptual frameworks for the development of data analytics tools. For example, some higher education institutions are beginning to explore deep learning algorithms (artificial intelligence) to optimize their financial management and overall decision-making at higher education institutions (Zang, 2022). While the utility, value, and context of data analytics tools varies across institutions; the use of the tools is crucial to understand how data analytics tools and technologies operate within institutional decision-making.

Decision-Making Strategies and Processes

A proliferation of scholarship on decision-making strategies and processes began to emerge in the mid-1970s with the research of social psychologists who began investigating individual and organizational patterns of behavior that continued to invest time and resources into failing strategies and projects (Bazerman et al., 1984; Sleesman et al., 2012; Sleesman et al., 2018). While most studies have addressed decision-making pitfalls and cognitive biases as an individual and organizational problem in decision-making, scholarship has also examined the conditions of productive decision-making strategies for organizations. Although the scholarship

identifies several drivers and causes for breakdowns in effective decision-making (including: escalation of commitment, overconfidence, sunk costs, self-justification, cognitive dissonance, denial, social costs, completion effects, and entrenchment) the factors of escalation of commitment, the sunk cost fallacy, and cognitive dissonance are cited as leading factors in breakdowns of effective decision-making (Schultze et al., 20212; Hsieh et al., 2015; Montecinos-Pearce et al., 2020). Below is a brief review of the insights from recent literature.

Researchers studying decision-making have identified the sunk cost fallacy as a significant contributing driver to the justifications for the escalation of commitment pattern of behavior (Feldman & Wong, 2018; Haita-Falah, 2017). Likewise, escalation of commitment is a crucial aspect of decision-making, as discussed by Bazerman et al. (1984), Sleesman et al. (2012), and Montecinos-Pearce et al. (2020). These sources examine the phenomenon of continued investment in a failing project and its implications for individual and group decision-making. The sunk cost fallacy is the irrational bias or behavior to continue to invest additional time, money, and resources into a course of action even after the course of action has been shown to be unprofitable and unproductive (Hafenbrack et al., 2014; Haita-Falah, 2017; Ohlert & Weißenberger, 2019). Researchers have identified that the same behavioral drivers that influence the sunk cost fallacy also contribute to escalation of commitment (Chung & Chend, 2018). Researchers have identified corresponding drivers between the sunk cost fallacy and escalation of commitment that are motivated by an individual or group's tolerance for risk, cognitive ability, and receipt of negative feedback (Qi et al., 2017; Haita-Falah, 2017; Feldman & Wong, 2018).

Scholarship has also identified how cognitive dissonance is a contributing driver of escalation of commitment (Bazerman et al., 1984; Chung and Chend, 2018; Klein & McColl, 2019). Cognitive dissonance theory suggests that when individuals hold two or more cognitions that are contradictory, they will feel an unpleasant state – dissonance – until they are able to resolve this state (Hinojosa et al., 2017). Researchers attribute the effects of cognitive dissonance as a driver of escalation of commitment as individuals and groups will seek a solution that provides cognitive consistency (Gawronski, 2012; Klein & McColl, 2019). While research correlating the mediation between cognitive dissonance and escalation of commitment is still mostly theoretical; recent studies have shown how factors like bias belief systems and risk management affect both cognitive dissonance and escalation of commitment (Gawronski, 2012; Qi et al., 2017). Finally, recent scholarship has suggested various ways that future research on cognitive dissonance can further build on the moderator and mediator impact of escalation of commitment (Hinojosa et al., 2017).

Recent scholarship also proposes metacognitive solutions to enhance decision-making and reduce the problem of escalation of commitment, in addition to identifying the factors and drivers that cause it. Most solutions to escalation of commitment favor a rational decision-management approach or an economic approach (Moser et al., 2013). Likewise, several researchers recommend the inclusion of a reflective practice method of prospective hindsight, or a heterogeneous group of decision makers. As de-escalation strategies in these groups, some individuals serve the role of "devils' advocates" while others facilitate decision aids and pre-decisional accountability limits as neutral observers (Metcalfe, 2017; Greitemeyer et al., 2009;

Moser et al., 2013; Wieber et al., 2015; Ohlert & Weißenberger, 2019). Similarly, objective discussions, dissent, and disinterested dialogue have emerged as valued skills in strategic decision-making (Garbuio et al., 2015). Both robust analysis and disinterested dialogue are factors that the researchers found to be most important while participating in the decision-making process, as determined by a person's skills and experience, and the criteria for the approval of the decision (Garbuio et al., 2015). These strategies for effective decision-making are crucial for organizations who rely on data and data analytics as tools to drive successful strategic decision-making.

Executive Leadership Priorities and Perspectives in Higher Education

Higher education leaders must balance a range of competing demands, constraints, and priorities while advancing the mission, vision, and purpose of their organizations. Knowing how to effectively use and interpret data is a growing skillset for higher education leaders and is a distinguishing characteristic of responsible and accountable decision-making. Future leaders in higher education must understand and communicate complex data across their organizations and facilitate a process for effective data-informed decision-making. Calls for transparency in decision-making and leadership accountability express the need of higher education leaders to clearly and confidently explain how data and data analytics are used in strategic decision-making.

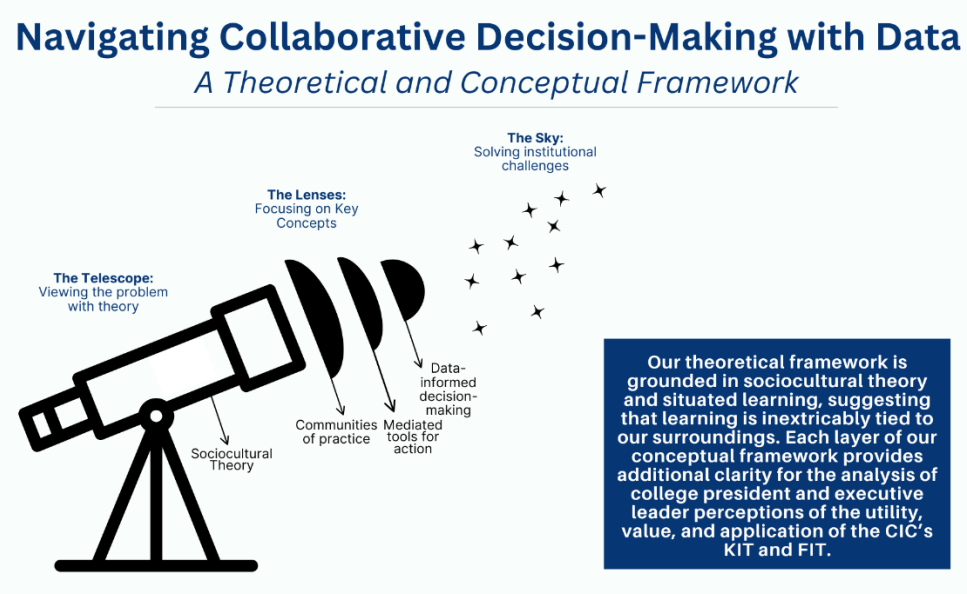
While these characteristics are increasingly important, not all institutional leaders effectively use data to set institutional priorities. An Inside Higher Ed survey of college and university chief academic officers provides insight on the perspectives and priorities of academic leadership in higher education institutions. The survey revealed that under 20% of chief academic officers at all institutional types (16% at private colleges, 19% at public colleges, and 19% at community colleges) rated their institutions very effective in using data to aid and inform campus decision-making (Jaschik & Lederman, 2019). This study reveals that many institutions still have challenges and opportunities in adopting a rich and robust data culture to drive organizational decision-making. Fortunately, there are studies that illustrate effective models and adoptions of data-informed decision-making in higher education. A study of executives at community colleges revealed they feel having data available for decision-making is essential to making methodical decisions and providing evidence that may lead to funding, satisfaction, student success, and college operational needs. Four themes emerged in executive decision-making: collaboration, cooperation, communication, and data sharing (Horst, 2020).

These sources highlight the increasing demand and significance of data-informed decision-making in higher education. They underscore the need for higher education institutions to make investments into their data analytics culture, use of data technology, adoption of data solutions, and promising decision-making practices to ensure informed and effective decision-making. Research suggests that institutions also need to invest in productive discussion and dialogue in their decision-making processes – not just in data analysis and interpretation alone. These sources also provide insight into the challenges, risks, and opportunities associated with data-informed decision-making, especially in the context of a rapidly changing higher education environment.

Conceptual Framework and Project Questions

Navigating Collaborative Decision-Making with Data: A Conceptual and Theoretical Framework

Figure 1.1



The "Navigating Collaborative Decision-Making with Data" framework is graphically represented above by a telescope – the theoretical framework – and lenses – the conceptual frameworks – through which we view the purpose of our research: to address institutional challenges using data-informed decision-making. The picture of these institutional challenges becomes clearer with each additional lens of analysis. The theoretical framework that grounds this research is sociocultural theory which recognizes the intersubjective and discursive practice of meaning-making that occurs between individuals, groups, and organizations (Boreham & Morgan, 2004). Rather than assuming that individuals are separated from their learning environment and social/cultural context, sociocultural theory affirms that individuals develop within the context of their interactions and engagements with others "as they make use of cultural tools, practices, and institutions" (Rogoff et al., 2002, p. 268). Similarly, Rogoff et al. (2002) argue that within this intersubjective framework, the unit of analysis is defined by the entirety of the sociocultural activity. According to their argument, the interactions between individuals, groups, and communities are examined as a composite within a sociocultural activity (Rogoff et al., 2002). According to this argument, the unit of analysis for this research is defined by the interactions that occur between the individuals and their communities of practice (CIC and CIC Member Institutions) as they participate in situated learning (using the KIT and FIT). Similarly, Rogoff et al. (2002) state that anchoring sociocultural theory as a unit of analysis in analyzing and evaluating communities of practice "allows us to see how cognitive processes extend across individual efforts, the participation of partners, and institutions and cultural traditions" (Rogoff et al., 2002, p. 269).

Sociocultural theory is the theoretical underpinning with which we view the first lens of our conceptual framework: the concept of communities of practice. Lave and Wenger (1991) define a community of practice as a group of individuals or agents who share a common desire to learn from and contribute to their individual abilities and experiences to a shared community. In this research, the communities of practice are identified as: (1) The Council for Independent Colleges (CIC) and (2) the CIC member institutions who use the KIT and FIT. Both communities of practice have their own sets of norms, membership, activities, and levels of participation that define the learning activities within each group. While the role of communities of practice serves as a component within Lave and Wenger's broader concept of situated learning, the emphasis in this research will focus on negotiating alignment between communities of practice (Chapman, 2021). In this instance, the communities of practice are not only engaged in learning activities within their own organization but are also learning between two communities of practice (i.e. between CIC and their member institutions). The activity of learning described in this research is based on the metaphorical notion of learning as participation, rather than learning as acquisition (Sfard, 1998).

Analyzing the distributive cognition between the CIC and CIC Member Institutions (according to sociocultural theory) informs the development of alignment between the communities of practice within situated learning. Therefore, this research measures the learning and interactions between the communities of practice (per sociocultural activity) of the KIT and FIT as the unit of analysis. Greeno and Gresalfi (2008) add that communities of practice often have learning trajectories that function and operate at more than one level at a time. As the analysis in this research demonstrates, learning takes place through the activity of conversations between two levels – the CIC and CIC member institutions. This quality improvement project evaluates how the CIC engages in learning by participation and the difference in the learning trajectory between the CIC and their member institutions.

Likewise, in "Mind as Action" (1998) James Wertsch evaluates ten basic assumptions regarding cultural tools for mediated action – the second lens of our conceptual framework – within sociocultural theory. In addition to recognizing the interactions between individuals, groups, and communities as sociocultural activity, Wertsch recognizes that distributive cognition includes both agents and their "cultural tools" as mediators of action (Wertsch, 1998). Therefore, the focus of our project questions and unit of analysis surround the utility, value, and learning trajectory of the KIT and FIT as "cultural tools for mediated action" (Wertsch, 1998). According to Wertsch, there is an irreducible tension between agents and their mediational means both to enable and constrain situated learning. In his analysis, Wertsch provides examples of agents using cultural tools to mediate action (e.g. the development of different materials used for the mediated activity of pole vaulting, a student using a mathematical algorithm – or calculator – to solve a multiplication problem, or an individual using language to express an idea). In each of these examples, an agent operates in connection with a cultural tool to mediate action. In the same way, the KIT and FIT serve as the cultural tool (as data analysis tools for organizational learning) between the communities of practice (CIC and CIC member institutions) to mediate action and participation in situated learning which contributes to organizational decision-making. In this research, we seek to evaluate the learning between and among the communities of

practice, using the KIT and FIT as a cultural tool for how mediated action positions situated learning between the CIC and CIC Member Institutions.

The sociocultural theoretical framework guides our empirical research and leads us to the final lens of our conceptual framework: data-informed decision-making (Abdou et al., 2021; Koci et al., 2018; Marzal et al., 2021; Shah, 2022). The KIT and FIT are data analytic tools, developed by the CIC, to assist higher education institutions in assessing their financial health and performance against various benchmarks. The KIT and FIT support data-informed decision-making for higher education institutions that impacts their strategic management, particularly in enrollment management, student affairs, and financial benchmarking. By leveraging data, institutions can use the KIT and FIT to gain deeper insights into institutional performance and strategic financial planning to make informed decisions and enhance overall institutional effectiveness. The KIT and FIT also help to inform methodologies essential for strategic planning, quality assurance, and the continuous improvement of CIC institutions (Humburg, 2012; Parada et al., 2018; Shen & Cooley, 2008; Shen et al., 2012).

The role of data tool utilization in higher education points to the substantial use of data as a cultural tool for mediated action to enhance data-informed decision-making among executive leaders. The use of data and data tools (like the KIT and FIT) for areas such as enrollment, student affairs, and financial benchmarking in higher education is a crucial aspect of institutional management and strategy (Jin et al., 2018; Kirby & Waugaman, 2002; Mitchell & Ryder, 2013; Zhi-dong, 2012). As CIC institutions participate in learning activities within their organization and make strategic decisions based on the interpretation of data, the KIT and FIT provide the data they can analyze to make organizational decisions. This tiered framework informs our project questions and is infused into each step of our data collection, analysis, and the formulation and communication of our recommendations.

Project Questions

Considering the framework for our research and the root cause analysis we underwent with our partners at the CIC, we identified three major themes that could address the knowledge gap around the KIT and FIT: member attitudes toward and perceptions of the tools. CIC was most interested in hearing the member voice before recommending any changes to the current process and presentation of the KIT and FIT reports. Our three research questions address the nature and quality of CIC member use of the tools, how members perceive the KIT and FIT's value to their decision-making processes, and how the tools inform decision-making at member institutions. These project questions are expanded in Table 1.1 including how they were carried through our research from data collection to analysis.

Table 1.1 Project Questions with Means of Obtaining Results			
Project Questions	**Data source**	**Data Collection Method(s)**	**Data Analysis Procedures**
What is the nature and quality of the CIC member use of the KIT and FIT?	**USAGE/UTILITY:** Nature and Quality Utility / Utilization Focused Member Usage Who uses it How it is used Frequency of use	• Survey - *high reliance* • Interviews (semi-structured, empathy) – *low reliance* • Focus Groups – *low reliance* • Content/Document Analysis	**Quantitative:** Univariate, Bivariate, Multivariate analysis. (bar graphs, chi-square, t-Test, ANOVA) **Qualitative:** Deductive Coding, Triangulation
How do CIC member institutions characterize the value of the KIT and FIT to their organization's decision-making process?	**VALUE:** Value of… Ability to create meaning Evidentiary Tool Data Analytics tool Helpful Data sources Data synthesis	• Survey – *medium reliance* • Interviews (semi-structured, empathy) – *high reliance* • Focus Groups – *high reliance* • Content/Document Analysis	**Quantitative:** Univariate, Bivariate, Multivariate analysis. (bar graphs, chi-square, t-Test, ANOVA) **Qualitative:** Deductive Coding, Triangulation
How do the KIT and FIT inform organizational decision-making for member institutions?	**KNOWLEDGE/PROCESS:** Inform Distributed cognition Decision-making Information sharing Knowledge generation Knowledge production	• Survey – *low reliance* • Interviews (semi-structured, empathy) – *high reliance* • Focus Groups – *high reliance* • Content/Document Analysis	**Quantitative:** Univariate, Bivariate, Multivariate analysis. (bar graphs, chi-square, t-Test, ANOVA) **Qualitative:** Deductive Coding, Triangulation

Data Collection and Analysis Report

Data Collection

To answer these three project questions, we adopted a mixed methods approach for data collection that included surveys, semi-structured interviews, a focus group, and document analysis. The mixed methods approach provides a high degree of rigor and fidelity to our data collection and analysis by sourcing data through multiple collection methods, analyzing quantitative and qualitative data separately, cross-referencing findings (after analysis), and triangulating the data for consistency and alignment (between document analysis, quantitative analysis, and qualitative analysis). To develop a comprehensive Data Collection and Analysis Plan for evaluating the impact of the Key Indicators Tool (KIT) and the Financial Indicators Tool (FIT) among members of the Council of Independent Colleges (CIC), we aligned the plan with the project questions. A full project timeline is linked in Appendix D and includes the time ranges for collection and analysis of data. The goal of this study is to understand the nature, quality, and value of KIT and FIT to institutional decision-making.

Data Needs

One of this project's overarching aims is to answer questions about the utility of the KIT and FIT. Therefore, the unit of analysis for this project is the utility of the tools in application to data, functionality, value, productivity, and decision-making. To answer the project questions, we collected data that explains (1) utility and usage, (2) value and perception, and (3) decision-making process and impact. Usage data include metrics on how often (frequency) and in what ways (procedure) CIC members institutions use KIT and FIT. This helps us to understand the nature and quality of tool use. Value and perception data include qualitative insights from users about the perceived value and impact of the KIT and FIT on decision-making (utility). This addresses the tools' value and informs their contribution to decision-making. Decision Impact data include specific examples or case studies where KIT and FIT have informed key decisions at members institutions. Various data collection methods were employed to answer each of the project questions. For instance, a survey instrument was developed to collect data for the first two project questions (regarding usage/utility and value) but was not as useful in collecting data for the third project question (regarding knowledge/process). These data are crucial for assessing both the quantitative extent of tool use and the qualitative impact on institutional processes.

Data Collection Instruments and Tools

We collected data sequentially starting with the survey to gather broad usage data and followed by interviews and focus groups to explore in-depth insights. Sequencing data collection allowed us to use our initial findings from surveys to inform interview protocols. Document analysis occurred throughout the survey and interview protocols.

Survey Creation and Dissemination

We worked with CIC leadership to co-create the survey questions in alignment, primarily, with our first two project questions about the nature and quality of usage and the perceived value of the KIT and FIT. The survey served as the primary means of collecting quantitative data on usage patterns and secondary means of collecting qualitative data on perceived value. Surveys included both closed (Likert, Frequency, Rating, Behavioral, Attitudinal) and open-ended questions. The survey included 27 questions total: 23 quantitative and four qualitative. Quantitative questions were a mix of binary forced-choice, ranking, Likert scale, and basic multiple choice. Qualitative questions were all free response. The survey was created in Qualtrics and was disseminated using an anonymous link. The full survey can be found in Appendix E.

Our sampling methodology for the survey relied on a non-probability sampling technique using a voluntary response sampling strategy among CIC member institutions. While a voluntary response sampling strategy is conventionally perceived to be a less rigorous sampling methodology, the utilization-focused nature of our quality improvement project supported this sampling methodology as the most appropriate approach for collecting survey responses. Since our project question specifically addresses the perceptions of value, usage, and data-informed decision-making among KIT and FIT users at CIC institutions, a voluntary response sampling strategy allowed us to identify our target population of CIC members and encourage volunteer participation in our research and data collection.

CIC deployed the survey to their membership via email through the CIC database. This allowed for a comprehensive distribution of the survey directly to member institution presidents, who could then either (1) complete the surveys themselves, or (2) forward the survey to the designated KIT/FIT power user on their campus. Working closely with CIC leadership on the survey development (survey questions, design and architecture, and solicitation) ensured that we developed a survey instrument that was calibrated for accuracy toward the KIT and FIT users. It also ensured that the instrument was focused on answering our first and second project questions. After finalizing the KIT and FIT survey draft, we pilot tested the penultimate version of the survey with a select test group of recently retired higher education Chief Financial Officers and Institutional Researchers for feedback and revision, which helped to improve the quality, validity, and reliability of the survey instrument. The pilot testing process led to a final round of revisions, based on expert feedback, and increased the construct validity of the survey.

Interview and Focus Group Recruitment and Questions

We worked with CIC leadership to co-create the interview questions in alignment with all three of our project questions but primarily with questions two and three about the perceived value of the KIT and FIT and their impact on decision-making. We wrote and followed a script for the introduction and closing of each session and asked seven questions during each individual interview and five questions during the focus group which each participant answered. The full list of interview and focus group questions can be found in Appendix F and Appendix G, respectively.

Interview and Focus Group participants were survey respondents who opted into additional follow-up. When analyzing survey responses, we followed up individually with these respondents via email. We initially offered two pre-set one-hour focus group times to all respondents and, for those that were unable to meet during the pre-set times, we scheduled individual 30-minute interviews with them at a time that worked better for their schedule. Respondents signed up for focus groups via a Microsoft Bookings link which allowed for six sign-ups per focus group and sent the participant a calendar invite upon confirmation. The individual interview times were set up via email and then confirmed using a Microsoft Outlook calendar invite. We used Zoom for all interview and focus group meetings.

Recruitment of Participants

Our partner organization sent multiple emails on our behalf to the presidents of their 650+ member institutions – a group of private, undergraduate four-year institutions – which deployed an online Qualtrics survey. The emails requested that presidents fill out the survey themselves or forward it to their primary KIT/FIT contact (often Chief Executives or Institutional Researchers). The survey asked each participant to share their experiences using the KIT and FIT and how the tools have aided their strategic decision-making. At the end of the survey, participants could opt into follow-up with us and provide their direct contact information. We then reached out to those who opted in and scheduled a focus group and individual interviews, both semi-structured to dive more deeply into the use and functionality of the KIT and FIT. Below are a few additional considerations.

- The development of surveys and interview protocols was informed by existing literature on educational tool assessment and the conceptual framework surrounding decision support systems in educational institutions. Our partner organization contacts were also included in this process and their feedback was considered before the deployment of the survey to ensure their comfortability with all questions.
- Participants were recruited through CIC member communications, targeting both frequent and infrequent users of the KIT and FIT for a balanced view. A copy of our recruitment email can be found in Appendix H.

Data Analysis

Document Analysis

We began our data analysis by reviewing and evaluating the KIT and FIT benchmarking reports, other CIC-specific documents, and similar data analytics tools. The CIC Leadership granted permission to access sample KIT and FIT reports (not institution-specific reports), in addition to evaluating publicly available information on the CIC website. We also evaluated the KIT and FIT benchmarking reports in comparison to other similar data analytics tools that are available on the market. To begin our analysis, we collected information from the following documents through the CIC.

CIC Internal Documents.

- KIT Sample Report A
- KIT Sample Report B
- KIT Sample Report C (in progress)
- FIT Sample Report
- Supplemental FIT (in progress)
- CIC Website

Sample versions of the KIT and FIT reports are publicly available on the CIC website and provide helpful examples of the information included in the institution-specific KIT and FIT reports. The KIT and FIT are powered by institutionally self-reported data annually from the Integrated Postsecondary Education Data System (IPEDS). IPEDS is a system of interrelated surveys of institutions across seven reporting areas: characteristics, prices, enrollment, student financial aid, degrees and certificates conferred, student persistence and success, and institutional human and fiscal resources. College and university officials report components of their institutional data directly to IPEDS according to an annual data collection schedule (See Appendix A). For instance, the dataset from the 2023-2024 IPEDS data collection year provides up to 250 variables available for analysis, with data collected over an eight-month period. IPEDS is the most frequently used data for studying institutional characteristics and is made publicly available on an annual basis from the National Center for Education Statistics (NCES).

We began our data collection and analysis by reviewing the KIT Sample Report (Parts A and B), as well as the FIT Sample Report. The KIT Sample Report Part A provides an institutional analysis using ten metrics (focused on enrollment, recruitment, progression, and faculty), with a comparison by region, financial resources, enrollment size, and Carnegie classification on each of the metrics. The KIT Sample Report Part B provides an institutional analysis on ten additional institutional metrics (focused on financial information like tuition revenue, financial aid, resources, and expenditures) with a comparison by region, financial resources, enrollment size, and Carnegie classification. Both the KIT Part A and Part B provide an individually customized report for CIC member institutions with regional and national comparisons, presenting data over a five-year trend period based on the four sorting criteria listed above (region, financial resources, enrollment size, and Carnegie classification). The FIT Sample Report is organized similarly to the KIT report (with five-year trend data and comparisons based on the four sorting criteria) and provides an institutional analysis on four core ratios for financial strength: resource sufficiency, debt management, asset performance, and operating results. The KIT Sample Report also provides a standard FIT Score based on a calculation of these standard measures and ratios, used to provide a range of institutional performance strategy recommendations in alignment with the FIT Score. Our analysis of the KIT and FIT sample reports provided crucial information that we used to create questions on the survey instrument, in the focus group, and in individual interviews. Likewise, our analysis of the KIT and FIT sample reports helped us better understand how users may be interpreting the data presented in the reports for institutional decision-making.

CIC is also in the process of releasing updates to the KIT (KIT Part C) and the FIT (the Supplemental FIT). The KIT Part C includes the same student information metrics included in the KIT Part A and KIT Part B, but with the student information broken-out between undergraduate students and graduate students. Member institutions who participate in the KIT Part C provide information directly to the CIC and are eligible to receive the KIT Part C with information earlier than the annual release of IPEDS data. While the KIT Part A and KIT Part B aggregate the reported institutional data, the KIT Part C is helpful for institutions with graduate programs to review their institutional data disaggregated between undergraduate and graduate students. Currently, 195 CIC member institutions are participating in the KIT Part C, which is roughly 30% of the CIC member institutions with active KIT and FIT accounts, and is roughly 57% of CIC members with active KIT and FIT logins. Similarly, the CIC has released a Supplemental FIT report that allows institutions to provide their IPEDS data directly to the CIC, voluntarily, and compare their institutional data against other institutions participating in the Supplemental FIT. The Supplemental FIT is particularly helpful for institutions who are interested in strategic and organizational planning and who are interested in obtaining comparative information earlier than the annual release of IPEDS data (as much as six months earlier than the annual IPEDS data release). Our analysis of the KIT Part C and the Supplemental FIT helped us understand the use and exchange of data between the CIC and CIC member institutions. It also helped us construct some of the forced-choice questions on the survey instrument (especially a question assessing willingness to provide data early and the types of data analytics tools most helpful for member institutions).

We also reviewed publicly available information on the CIC website regarding the KIT and FIT, as well as recent CIC Annual Reports, Newsletters, and Digests of Recent Research. These publicly available documents helped us gain a sense of how CIC member institutions are accessing information regarding the KIT and FIT, how the CIC shares information with member institutions, and the type of KIT and FIT user community support and training materials exist for the reports. This analysis was helpful in addressing the first and second project questions regarding the use and value of the KIT and FIT, as well as crafting questions for the survey, focus group, and interviews regarding end-user functionality and audience of the KIT and FIT. One example is the CIC's dedicated KIT and FIT section on their website (including four supplemental pages and linked PDF documents) that provides robust information on the structure and design of tools, how to download the KIT and FIT reports, benchmarking guidelines, access to sample reports, and a KIT/FIT consultation request form for members. While the CIC provides the KIT and FIT standard reports at no cost to member institutions, there is a nominal fee for institutions to access their KIT and FIT Comparison Group Report or to book an online KIT or FIT consultation.

Comparable Market Documents (External to CIC).

In addition to the document analysis conducted on the KIT/FIT and other CIC documents, we also evaluated similar higher-education data analytics tools. We selected similar tools based on a set of three criteria: (1) the tools use the same IPEDS data as the KIT and FIT, (2) the tools are structured with similar factors, metrics, and ratios as the KIT and FIT, (3) the

tools provide some type of comparative design as benchmarking analytics similar to the KIT and FIT. Using this set of criteria, we arrived at three comparative benchmarking tools for our evaluation. Below are the three similar data analytics benchmarking tools that we evaluated in comparison to the KIT and FIT.

- College Market Stress Test (Zemsky, Shaman, and Baldridge)
- College Viability App (Stocker)
- U.S. Department of Education - College Scorecard

Published in 2020, "The College Stress Test" (Zemsky, Shaman, and Baldridge) outlines a process for colleges and universities to evaluate their institutional IPEDS data to calculate an institutional financial risk score, called a "Market Stress Test Score" (Zemsky, Shaman, Baldridge, p. 40). The Market Stress Test Score is primarily focused on evaluating the change in an institutions' market position over an eight-year period in two broad institutional categories: enrollment and finances. The Market Stress Test Score can be calculated across different higher-education sectors of four-year private not-for-profit institutions, four-year public institutions, and two-year public institutions. Based on our analysis of the KIT and FIT, we evaluated the Market Stress Test Score specifically for four-year private not-for-profit institutions for our comparative evaluation. The Market Stress Test Score for four-year private institutions evaluates an institution's financial risk across four measures: (1) first-year enrollment, (2) first-year to second-year retention, (3) market price, and (4) ratio of endowment to expense. It is important to note that the KIT and FIT also include these four measures across their set of 24 metrics. While the KIT and FIT provide a more robust range of institutional variables, the approach offered by the Market Stress Test Score aligns, in principle, with the application-focused model of the KIT and FIT.

Secondly, we evaluated a paid subscription product called the "College Viability App" designed in 2021 by Dr. Gary Stocker, a medical-laboratory scientist and college administrator who is a self-taught higher-education data analyst. Similar to the KIT and FIT, and the Market Stress Test Score, the College Viability App uses institutional self-reported data from IPEDS and publicly audited institutional 990 information to create a suite of dashboards and reports across 21 metrics, similar to the KIT and FIT. Similar to the Market Stress Test Score, the College Viability App includes an executive analysis for both four-year, private, not-for-profit institutions and a version for public, four-year institutions. For our evaluation, we compared the private, four-year, not-for-profit version of the College Viability App with the KIT and FIT. The College Viability App is a comparative data analytics tool that allows the user to compare a specific institution against a total set of 1,297 four-year, private, not-for-profit institutions – using a set of filters for State, Institution Category, and comparison by Specific Institutions. The College Viability App is a dynamic Microsoft Power BI dashboard that uses annual IPEDS data to populate each of the metrics, using the last eight years of reported IPEDS data for trend comparisons. In an interview conducted with Dr. Stocker, he indicated that his desire in creating the College Viability App was to create a tool that would enable college leaders, students, parents, the media, and higher-education consultants with an easy-to-use financial health and

viability comparison as a consumer-reporting tool to evaluate and compare the financial health of individual institutions.

The final data analytics tool that we evaluated was the College Scorecard from the U.S. Department of Education. Users of the College Scorecard can evaluate and compare institutions across both public and private institutions with more than a dozen selection filters (similar to the KIT and FIT) including location, academic fields, degree types, graduation rates, average annual costs, acceptance rate, size and type of school. Access to the College Scorecard is free and available on a dedicated Department of Education website through a dynamic searchable database using IPEDS and OPEID (Office of Postsecondary Education Identifier) data. While the College Scorecard is designed as an institutional comparative research tool, the target audience is the higher education consumer (students and parents) interested in comparing institutions across categories of costs, graduation and retention rates, financial aid and debt, typical earnings, campus diversity, and test scores and acceptance rates. The sorting and filtering criteria on the College Scorecard is similar to the criteria of the KIT and FIT, and is dynamic, similar to the College Viability App. The College Scorecard also allows users to select and compare up to ten institutions across the range of institutional metrics, filters, and fields of study.

Each of these three data analytics tools offer a helpful comparison to the features and architecture of the KIT and FIT. For instance, while the Market Stress Test Score offers a static review of institutional IPEDS data across four measures to generate a risk score, the College Viability App and the College Scorecard generate comparisons through the use of dynamic filters. Both approaches use the same IPEDS data set that is used to power the KIT and FIT for institutional comparisons. Similarly, all three tools are focused centrally on comparing one institution against a comparison group of other institutions to detect trends, norms, and standards – similar to the KIT and FIT. While there are many similarities across these tools, there are a few differences worthy of note. For instance, while the Market Stress Test Score calculates a risk score (similar to the process of calculating a FIT score), the College Viability App and the College Scorecard do not calculate a grade or score for an institution. Also, while the College Viability App and the Market Stress Test Score examine data across a multiple-year period, the College Scorecard reports data from the most recently publicly available institutional-level IPEDS data only.

Qualitative Data Analysis

A thematic code was developed based on literature and the conceptual framework, focusing on themes like data-informed decision-making, communities of practice, comparative measures, and the four key focus areas of KIT and FIT: Financial, Enrollment, Region, & Carnegie Classification. Additional categories were included due to their frequency of mention throughout interviews and focus groups including Longitudinal Measurement, Visualizations/Style of Delivery, Strategy/Strategic Thinking, and Interactivity/Customizability; these additions are denoted with an asterisk in the table below. The full deductive code and key words mentioned frequently related to each are in Table 1.2. Both researchers independently coded the focus group transcript and came together to create the code and ensure it was reflective of the main themes. This exercise enhanced interrater reliability and ensured consistency of the transcript coding process.

Table 1.2 ***Deductive Code for Qualitative Data***		
#	**Theme**	**Key Words/Common Phrases**
1	Data-Informed Decision-Making	Data triangulation, benchmark data, data analytics
2	Collaborative Decision-Making/ Community of Practice	Communication with stakeholders Users/communities: Board of Trustees, President/President's Council, Cabinet, Senior Leadership, CFO, Presidential Peers, Provost, Admissions, Staff, Deans, Faculty
3	Financial	Endowment, Sustainability, Tuition, Revenue, Fundraising, Scholarships, Expenditures, Salaries, Debt Refinancing, Ratios (Operation reserve, change in net assets)
4	Enrollment	Retention, Size, Yield Rate
5	Region	*Direct mentions only*
6	Carnegie	*Direct mentions only*
7	Comparative Measures	Benchmarks, Competitive Landscape, Comparators, Institutions like us, Comparison Groups, Peers & Aspirant institutions
8	Longitudinal/over time measurement*	Trends, 5-year runway
9	Visualizations/Style of delivery*	Data visualization techniques, point & click resource, dashboards, graphic formats, portal-based resource
10	Strategy/strategic thinking*	Strategic pivot, strategic goals, long-term thinking
11	Interactivity/Customizability*	Slicers for urban/suburban/rural, "do it myself with a mouse click"

Quantitative Data Analysis

Drafting a comprehensive data analysis plan for the survey-based research portion of our project involved several structured steps. This plan guided the analysis of the 27-question KIT/FIT survey aimed at evaluating the utility of the tools in terms of their data, functionality, value, and impact on decision-making. The analysis focused on three main themes in alignment with our project questions: (1) utility and usage, (2) value and data, and (3) knowledge and process. The plan includes our approach to both univariate and bivariate/multivariate analyses to provide insights into the utility of these tools.

Data Preparation.

We first cleaned the data by addressing missing data, outliers, and inconsistencies in the survey responses. We ensured all survey questions were appropriately coded, especially for Likert scale items, to facilitate quantitative analyses and downloaded the “Data Dictionary” from Qualtrics to ensure all responses were analyzed correctly based on their placement in the survey. We then conducted a preliminary descriptive analysis to understand the data distribution

including mean, median, mode, and standard deviation for each question which was shared with our contacts at CIC upon closure of the survey before the full analysis was conducted. The interim report/snapshot we shared that summarized these results can be found in Appendix I.

We include both univariate and bivariate/multivariate evaluation methods in our quantitative data analysis. We relied on both methods to analyze and evaluate trends in survey response data across various factors and levels of the observations. Blending these methods in our quantitative data analysis allowed us to identify patterns and relationships in the data, evaluate the most relevant variables in the data, simplify the dimensions of the data, and cross-reference the data for any perceived outliers or inconsistencies. In the sections below, we summarize the methodology and analysis involved in both quantitative data analysis approaches.

Univariate Data Analysis.

We began our quantitative data analysis by organizing the single-factor survey response data to collect metrics on individual survey responses, percentages of responses by question, and create data visualizations on survey responses. In our design, we evaluated a range of single survey responses that address the first and second project questions regarding use and value of the KIT and FIT. We then isolated the KIT and FIT survey response data for single-factor univariate analysis. A full report of the univariate data analysis, including visualizations, is linked in Appendix J. Below is a listing of the univariate data analysis conducted on the survey response data:

- Forced Choice (bar chart and percentage): Complex/Interactive vs Simple Static
- Forced Choice (bar chart and percentage): Institution-Specific vs Comparative
- Forced Choice (bar chart and percentage): Internal Use vs External Use
- Yes/No (bar chart and percentage): Willing to share data with CIC?
- Likert perception (bar chart and percentage): Value of KIT/FIT?
- Likert perception (bar chart and percentage): Usefulness of comparison categories
- Likert perception (bar chart and percentage): Importance of presentation-ready?
- Categorical Choice (hierarchy chart and percentage): End-user audience?
- Categorical Choice (hierarchy chart and percentage): Departments use KIT/FIT?
- Categorical Choice (hierarchy chart and percentage): Your use of KIT/FIT?
- Categorical Choice (stacked bar chart, hierarchy chart, and percentage): KIT Indicators most useful?
- Categorical Choice (hierarchy chart, percentage): Your primary role?

For the univariate data analysis, we included data tables and data visualizations for survey responses that address the first and second project questions. Conducting a univariate data analysis first helped us identify dimensions and questions to combine as independent and dependent variables later for a bivariate and multivariate data analysis. Similarly, the univariate analysis revealed important trends about which metrics in the KIT and FIT were perceived as most useful and valuable to CIC members , who the intended audience of the KIT and FIT are, as well as the identification of KIT and FIT power users at CIC member institutions. Likewise, the univariate analysis helped us glean CIC member attitudes and preferences regarding the use of

data analytics tools and the willingness to share information directly with the CIC. Finally, trends and insights discovered in the univariate data analysis helped construct some of the follow-up questions in the focus group and interviews to address the third project question related to data-informed decision-making at CIC member institutions. This approach of beginning with a univariate data analysis proved helpful in later stages of the quantitative and qualitative data analysis, as is discussed in the following sections.

Bivariate/Multivariate Data Analysis.

After conducting the univariate data analysis, we moved on to the bivariate and multivariate data analysis. The three inferential statistical tests that we used for evaluating the survey data are t-Tests, ANOVA tests, and Chi-Square Tests for Independence. We selected these three tests to evaluate the discrete and nominal data from the survey responses as they relate the first and second project questions. For instance, we conducted t-Tests and ANOVA to compare the means between groups of responses from the Likert scale survey data, while we conducted Chi-Square tests for categorical survey data and to test for independence between observations in survey responses. We relied on t-Tests to address the first project question regarding KIT and FIT use, ANOVA to address the first and second project questions of KIT and FIT use and value, and Chi-Square to address the second project question regarding KIT and FIT value. In the results outlined, below, the t-Test results provide an evaluation of the differences between perceptions of the KIT and FIT's value based on the frequency of use. The ANOVA results also evaluate the differences between subjects perception of use and value across multiple levels of the KIT and FIT. Finally, the Chi-Square tests evaluate the relation between the perceptions of value across different levels of the FIT based on the level of annual use. The full statistical test results can be found in Appendix K.

In the sections that follow, we analyze and evaluate the results from each of the statistical tests. This structured data analysis plan ensured that the study comprehensively addressed the research questions concerning the utility of KIT and FIT, guiding strategic improvements and informed decision-making within the surveyed contexts.

Results

Using mixed methodology, we combined a survey, interviews, and focus groups to identify the following results. We first describe our process for analyzing our quantitative and qualitative results and then present the results by which project question(s) they directly address. We also include one section following the project questions that includes results that do not answer a specific project question but were critical in identifying our recommendations for the CIC.

Quantitative Results Process

We conducted four two-independent-sample t-Tests from a select group of results from the survey responses. We designed the t-Tests to evaluate the factors associated with the nature, quality, value, and usage of the KIT and FIT to answer the first and second project questions related to the nature and quality of the KIT and FIT (project question 1) and the value of the KIT and FIT reports (project question 2). For the t-Test design, we paired responses regarding the

perceived quality of the KIT and FIT (as the dependent variable) as a function of the respondents' use of the KIT and/or FIT (as the independent variable). All four of the t-Tests generated results that were statistically significant at conventional levels ($p<.05$) and with large effect sizes using Cohen's d ($d>.08$). The first two sets of t-Tests were designed to evaluate the perceived value of the KIT and FIT – the dependent variable - as a function of the recent usage of either the KIT or the FIT (used recently within the past two years or used longer than two years ago) – the independent variable. After running this first set of t-Tests, we then ran a second set of t-Tests to examine more closely the effect of annual usage of the KIT and FIT on the perceived value of the data tools. The second set of t-Tests evaluated the perceived value of the KIT and FIT – the dependent variable – as a function of recent usage practices of either the KIT or FIT within the past year (used either annually or monthly) - the independent variable.

Since we received different sample sizes from the survey responses, we conducted each of the two-independent-sample t-Tests twice to test for rigor and accuracy. First, we conducted the two-independent-sample t-Tests assuming unequal variance (a common practice when conducting t-Tests containing different sample sizes). Secondly, we then conducted each of the two-independent-sample t-Tests assuming equal variance. To do this, we used the pooled sample variance to find the estimated standard error for the difference in the sample sizes weighted toward the sample mean computed from the larger sample size. Thirdly, after conducting the t-Tests, we then generated descriptive statistics on the sample sets to discern how the results from the t-Tests align with the descriptive statistics on the sample sets. Finally, we discovered that the two-independent-sample t-Tests assuming equal variance (using the pooled sample variance) more closely aligned with the descriptive statistics from the sample sets. The only drawback to using the two-independent-sample t-Test approach in our study is that some of the sample sets were small ($n<14$) while the comparable sample sets were larger ($n>30$). In fact, in one t-Test that we calculated, we compared a sample set of ($n=66$) – a large sample size – against a sample set of ($n=11$) – a small sample size. While a larger sample size from both sets would have provided a better estimate of the sample variance, taking the pooled sample variance allowed us to weigh the variance in each sample by its respective degrees of freedom. Therefore, in our data analysis and findings, we report the results from the two-independent-sample t-Tests assuming equal variance, using a pooled sample variance.

We then conducted a series of four single-factor ANOVA tests (i.e. one-way between-subjects ANOVA) with multiple levels, focused on answering our first and second project questions regarding the use and value of the KIT/FIT. The first two ANOVA tests focused on answering questions of usefulness and value of specific KIT comparisons and indicators in strategic decision-making. The final two ANOVA tests helped to discern the usefulness and value of specific FIT strategy recommendations and FIT score ratings. Of the four ANOVA tests that we calculated, only one produced a statistically significant result at conventional levels ($p<.05$).

Finally, we conducted a series of 10 chi-square tests for independence - with seven complete results - to evaluate the relation between the perceptions of the value of the FIT performance strategy recommendations and the FIT score ratings based on the frequency of use, in alignment with our second project question. None of the seven successful chi-square tests

generated a statistically significant result at conventional levels ($p<.05$). The first set of six chi-square test examined the results from survey questions that rated the alignment of FIT scores with the FIT performance strategy recommendations – whether the recommendations were well-aligned or not well-aligned with the calculated FIT scores, as a function of the frequency of use. The second set of four chi-square tests evaluated the perceived weighting of proportional ratios used to calculate the overall FIT score – whether specific ratios should be weighted more, less, or at their current weight, as a function of the level of annual use. The results of all statistical tests are included in the tables below.

Qualitative Results Process

We transcribed our interviews and focus group using Zoom closed captioning. Because this was not wholly accurate, we then replayed the audio of each interview and live-edited the transcriptions to be a wholly accurate reflection of each interview. We sent the transcriptions to each participant for review and edited any discrepancies or concerns shared by them. We reviewed the final transcriptions using a deductive code (See Table 1.3below) which began with seven categories (numbers 1-7) which we determined from our document analysis of the KIT/FIT in combination with the literature around data-analysis tools. The four categories italicized (numbers 8-11) in the table below were frequently mentioned during interviews and focus groups and were added to the code and their mentions were counted during a second review of the transcriptions. Every mention of each category was highlighted in the transcription, with the possibility of being coded for multiple categories (ex. A phrase was coded as both "Financial" and "Data-Informed Decision-Making"). Key phrases used to identify each of the categories in our transcripts are also included below. We conducted another review of the transcriptions to pull out quotes from participants relevant to each project question.

Table 1.3: Deductive Code for Qualitative Data

#	Category	Key Words/Common Phrases
1	Data-Informed Decision-Making	Data triangulation, benchmark data, data analytics
2	Collaborative Decision-Making/ Community of Practice	Communication with stakeholders Users/communities: Board of Trustees, President/President's Council, Cabinet, Senior Leadership, CFO, Presidential Peers, Provost, Admissions, Staff, Deans, Faculty
3	Financial	Endowment, Sustainability, Tuition, Revenue, Fundraising, Scholarships, Expenditures, Salaries, Debt Refinancing, Ratios (Operation reserve, change in net assets)
4	Enrollment	Retention, Size, Yield Rate
5	Region	*Direct mentions only*
6	Carnegie	*Direct mentions only*
7	Comparative Measures	Benchmarks, Competitive Landscape, Comparators, Institutions like us, Comparison Groups, Peers & Aspirant institutions
8	*Longitudinal/over time measurement*	Trends, 5-year runway
9	*Visualizations/Style of delivery*	Data visualization techniques, point & click resource, dashboards, graphic formats, portal-based resource
10	*Strategy/strategic thinking*	Strategic pivot, strategic goals, long-term thinking
11	*Interactivity/Customizability*	Slicers for urban/suburban/rural, "do it myself with a mouse click"

Results by Project Question (1):
What is the Nature and Quality of CIC Member use of the KIT/FIT?

To answer our first project question, we asked a series of forced-choice and multiple-choice survey questions and analyzed them using univariate methods. The first few questions speak to the nature of KIT/FIT usage at CIC member institutions and were analyzed using univariate analysis. First, respondents identified the most direct end-users of KIT/FIT at their institutions as their Board of Trustees, Faculty and Staff, and Financial Stakeholders. Second, the departments/areas identified as most actively using the KIT and/or FIT were the President's Office, Finance Department/CFO's Office, Institutional Research, and Senior Administration. Third, respondents said that they use KIT/FIT reports most commonly for Institutional Self-Study/Research, Informing Senior Administrators and Boards of Trustees, Annual Benchmarking, and Peer Comparisons. These results are summarized here while the full results of these tests can be found in Table 1.4 below.

Table 1.4: Nature and Quality of CIC Member KIT/FIT Use

Type of Analysis	**Type of Question/ Test**	**Question**	**Result**
Univariate	Categorical Choice	Which audiences are the most direct end-users for KIT and/or FIT at your institution?	The most commonly identified direct end-users for KIT/FIT at respondents' institutions are Boards of Trustees (38%), Faculty and Staff (32%) and Financial Stakeholders (26%). Press and Social Media were also identified as a direct end-user by 2% of respondents while Parents and Alumni were each identified by 1% of respondents as a direct end-user.
Univariate	Categorical Choice	What departments/areas within your institution actively use the KIT and/or FIT?	The most commonly identified departments using KIT/FIT at respondents' institutions are the President's Office (20%), Finance Departments/CFO's Office (18%), Institutional Research (16%), and Senior Administration (14%). The following were identified with less frequency: Academic Affairs (7%), Academic Leadership (7%), Enrollment Management (6%), Human Resources (4%), Student Affairs (2%), and Trustees (1%). 4% of respondents shared that they were unsure who uses KIT/FIT.
Univariate	Categorical Choice	How do you use the KIT and FIT reports?	The most commonly identified ways respondents used KIT and FIT reports are for Institutional Self-Study/Research (20%), Informing Senior Administration (17%), Informing Board of Trustees (15%), Annual Benchmarking (14%), and Peer Group Comparisons (10%). The following were identified with less frequency: Informing Academic Leadership (8%), Annual Factbook/Reporting (6%), Accreditation Prep/Reporting (5%), Annual Consumer Data (2%), External Reporting (2%), and Audit Prep (1%).

These results were also supported by quotes from interviews and focus groups that are highlighted below. CIC Member participants articulated four uses of the KIT and FIT that speak primarily to the nature of tool use at their institutions. First, interview and focus group participants perceive the nature of the KIT/FIT as an information source particularly to be used in communications with institutional stakeholders. The KIT and FIT are baked into many president and senior leaders' annual processes of data-sharing within their institutional leadership as evidenced by the quotes in the first row of Table 1.5 below. Second, participants use the KIT and FIT for the specific purpose CIC advertises them to members: a benchmarking tool for comparison to peers. Participants shared how the KIT and FIT help them identify where they sit compared to peer institutions in a variety of areas and was even referred to as a "guiding light" to help institutions know whether they're performing competitively with their peers or are outliers in any specific areas.

Third, participants shared that they use the KIT and FIT to report on progress and goals year over year. The tools are used to identify trends, triangulate other data sources, and track progress/make adjustments to plans based on performance. Finally, speaking both to the nature *and* quality aspects of our first project question, participants shared that they use the KIT and FIT as a data source and see it as reliable. They find the tools to be a time-tested source of data, more accessible than others sources on the market, and overall a strong resource to help them report accurately on their operations. The themes that surfaced during interviews and focus groups are summarized here while these themes and supporting quotes can be found in Table 1.5 below.

Table 1.5: Nature and Quality of CIC Member KIT/FIT Use			
Theme of Quotes	**Supporting Quote 1**	**Supporting Quote 2**	**Supporting Quote 3**
KIT/FIT as an Information Source	"The CIC FIT and KIT document has been probably one of the major projects that I do right away in the fall for the president and the president's council."	“Every year I put a CIC document together based on the data and with assistance with the provost’s office, I'll put together some observations but recommendations as well.”	"Every year there's some concentrated effort to kind of check it against our strategy. I don't know where else I'd be able to do that and understand it as quickly now as I've come to without [KIT and FIT]."
As a Benchmarking Tool for Comparison to Peers	"It [gives] us a very good sense of where we [sit] with regard to an institution in a range of comparison groups: regional, enrollment scale, all that stuff. And in terms of how our ratio looks compared to some of those others institutions."	"A lot of times we’ve consulted [KIT and FIT] just to see whether or not we're in or out of alignment on key questions. So it's not really necessarily making a [specific] decision as it is a kind of guiding light to help us know whether or not we're in the mainstream of higher education or really outliers and in some particular area or another."	"We've used KIT and FIT for quite a while looking at our overall financial plan, long range financial plan behind the university. We have goals for endowment per student, average, etc., so looking at how we do that mix.”
KIT/FIT as a tool to report on progress & goals year-to-year	"We come up with a set of recommendations, progress on the recommendations from the year past, where we’ve grown, where have we maybe slipped back. Are there any trends that are showing from the data? So it's been a very useful tool for us."	"We've done [an exaggerated version of the Delta Cost Center study for about 20 years and so that gives us a way to generate data and then compare it against general data out of the FIT test to determine whether or not we’re performing in a sustainable manner."	"[KIT and FIT] is invocative , you know, it does, I think, strike the curiosity of those of us in leadership positions who really want to get a better sense of where are we."
Reliable Data Source	"We’re a believer in triangulating data, and but it is a major peg in that triangulation. We always say, well, what is CIC saying? It’s kind of like: who is your main doctor? You know, what are they telling you about the health of the institution?"	"KIT and FIT provide really good intelligence in terms of great benchmarking in terms of operations and other kinds of key indicators with regard to how we're faring as an institution. That's primarily what, where it has its greatest strength as a resource."	"I think it's very valuable because it's one of the few places that I can go to and find that data consolidated in a somewhat reasonably accessible way."

Results by Project Question (2):
How do member institutions characterize the value of the KIT and FIT to their organizations' decision-making processes?

To answer our second project question about the value of KIT and FIT to CIC members, we employed a mixed-methods approach, including survey, interviews, and focus groups. Our design and methodology provided a system to collect data from survey responses (first) and to detect themes that we could then explore further through focus groups and interviews (secondly). This design worked to preserve the fidelity of survey responses from the separate qualitative data collection methods, which we then triangulated through deductive coding, statistical analysis, and document analysis. The results from our mixed-methods approach offer insights into the perceived value of the KIT and FIT as functions of type, frequency, and quality of use – as well as identifying how the structure and ratios of the KIT and FIT influence the perception of value of these tools for organizational decision-making.

To begin, we asked a series of forced-choice and multiple-choice survey questions and analyzed them using univariate and bivariate methods. The full results of these tests can be found in Table 1.6 below. Our univariate analysis focused on identifying how users rated their overall perception of value of the KIT and FIT, which comparison categories were most useful, and which indicators were most useful. From our responses, 74% rated the overall value of KIT and FIT as Good (53%) or Excellent (21%). When rating the usefulness of the comparison categories of the KIT and FIT, the top responses reported that 63% of respondents rated Enrollment Size as Useful (41%) or Very Useful (22%). Also, 62% of respondents rated Financial Resources Quartile as Useful (46%) or Very Useful (16%), while 60% of respondents rated Region as Useful (42%) or Very Useful (18%). These univariate results offer insights on broad, general themes regarding KIT and FIT usage that help to set-up deeper evaluation through our bivariate statistical analysis.

We began the bivariate statistical analysis by generating a series of t-Tests to determine the perceived value of the KIT and FIT as a function of the frequency of use of the tools. The first two t-Tests explored how frequency of use of the KIT and FIT within the past two years affected the user's perceived value of the tools. The t-Tests indicate that frequency of use has a statistically significant effect on the perception of value of the KIT and FIT among users who had accessed and used the tools within the past two years. Respondents who reported using the KIT and FIT within the last year reported a stronger perception of value of the KIT and FIT tools. Similarly, the second set of t-Tests narrowed the question of perceived value down to the type of frequency of use of the KIT and FIT (used either monthly or annually). The t-Tests indicate that there is a statistically significant effect on the perception of value of the KIT and FIT among users who access and use the KIT and FIT on a monthly basis. These t-Test results point to a strong and statistically significant indicator that frequency of us affects the perceived value of the KIT and FIT.

We continued the bivariate statistical analysis by running a series of ANOVA tests to detect whether there is a difference in the perceived value in discrete indicators and metrics in the KIT and FIT. Three of the ANOVA tests did not reach significance in the perception of value

of KIT and FIT, while one did reach significance. Specifically, there was no statistically significant impact on the perceived value of the KIT and FIT as a function of the KIT and FIT institutional comparisons, the 20 KIT indicators, or the alignment of FIT scores with performance strategy recommendations. However, one ANOVA test delivered a statistically significant result in the different perceptions of agreement between respondents regarding the weighting scales of the four ratios used to calculate the overall FIT score. These ANOVA responses indicate that respondents think that the distribution of weights used to calculate the FIT score need realignment or recalibration.

We concluded our bivariate statistical analysis by conducting a series of ten Chi-Square tests (two different series) to explore the results generated from the one statistically significant ANOVA regarding the calculation of the FIT score. First, we hypothesized that using a Chi-Square test would detect which FIT score weight(s) would emerge as needing revision as a function of the type of annual use. Secondly, we hypothesized that the Chi-Square tests would detect which perceived FIT score(s) might be misaligned with the performance strategy recommendations, as a function of the type of annual use. However, of the ten Chi-Square tests that we generated, three were incomplete datasets and could not be calculated. Of the seven complete Chi-Square test, none generated a significant association with either the FIT score weights or the alignment of FIT scores and performance strategy recommendations as a function of the type of annual use. These inconclusive results may present an opportunity for further testing methods and evaluation using a different type of statistical test, or using qualitative methods.

Table 1.6: Value of KIT/FIT to Decision-Making			
Type of Analysis	**Type of Question/Test**	**Question**	**Result**
Univariate	Likert perception	Please rate your perception of the overall value of KIT and FIT.	74% of respondents rated the value of the KIT/FIT as Excellent (21%) or Good (53%) while 23% rated the value as Average and 4% rated it as Poor.
Univariate	Likert perception	Usefulness of comparison categories	63% of respondents rated Enrollment Size as Useful (41%) or Very Useful (22%). 62% of respondents rated Financial Resources Quartile as Useful (46%) or Very Useful (16%). 60% of respondents rated Region as Useful (42%) or Very Useful (18%). 51% of respondents rated Carnegie Classification as Useful (33%) or Very Useful (18%).
Univariate	Categorical Choice	KIT Indicators most useful?	The top seven KIT indicators respondents ranked most useful are Net Revenue Per Student (29%), Total Expense per Student (13%), Discount Rate (11%), Retention Rate (7%), Total Fall Enrollment (7%), Unfunded Institutional Aid per Student (7%), and Tuition Dependency (5%).
Bivariate	t-Test	Does recency of use of the **KIT** (within the past two years) have any effect on perception of overall value of the KIT/FIT?	Individuals who have used the KIT within the past two years ($M = 1.9394$, $SD = 0.6534$) rated their perceived value of the KIT/FIT significantly higher than individuals who have not used the KIT within the past two years ($M = 3$, $SD = 0.7746$). $t(75) = -4.85$, $p < .05$, $d = -1.58$
Bivariate	t-Test	Does recency of use of the **FIT** (within the past two years) have any effect on perception of overall value of the KIT/FIT?	Individuals who have used the FIT within the past two years ($M = 1.8793$, $SD = 0.6509$) rated their perceived value of the KIT/FIT significantly higher than individuals who have not used the FIT within the past two years ($M = 2.9091$, $SD = 0.7007$). $t(67) = -4.75$, $p < .05$, $d = -1.56$
Bivariate	t-Test	Does the nature of recent use of the **KIT** within the past year (used either monthly or annually) have any effect on perception of overall value of the KIT/FIT?	Individuals who report using the KIT on a monthly basis ($M = 1.3571$, $SD = 0.4972$) rated their perceived value of the KIT/FIT significantly higher than individuals who report using the KIT on an annual basis ($M = 2.1064$, $SD = 0.5983$). $t(59) = -4.26$, $p < .05$, $d = -1.30$
Bivariate	t-Test	Does the nature of recent use of the **FIT** within the past year (used either monthly or annually) have any effect on perception of overall value of the KIT/FIT?	Individuals who report using the FIT on a monthly basis ($M = 1.3571$, $SD = 0.4972$) rated their perceived value of the KIT/FIT significantly higher than individuals who report using the KIT on an annual basis ($M = 2.1667$, $SD = 0.5809$). $t(54) = -4.67$, $p < .05$, $d = -1.44$

Bivariate	ANOVA	Is there a difference in the perceived usefulness/value of the four KIT and FIT institutional comparisons (Comparison by Region, Comparison by Financial Resource Quartile, Comparison by Enrollment Size, Comparison by Carnegie Classification)?	A one-way analysis of variance did not reach significance, F [3, 290] = 0.59, p>.05 [η2 = 0.01], in detecting a difference in the perceived usefulness/value of the four KIT and FIT institutional comparisons.
Bivariate	ANOVA	Is there a difference in the perceived usefulness/value of the 20 different KIT indicators?	A one-way analysis of variance did not reach significance, F [19, 1254] = 1.31, p>.05 [η2 = 0.02], in detecting a difference in the perceived usefulness/value of the different KIT indicators.
Bivariate	ANOVA	Is there a difference in the perception of alignment of the FIT scores with performance strategy recommendations?	A one-way analysis of variance did not reach significance, F [5, 281] = 0.38, p>.05 [η2 = 0.01], in detecting a difference in perception of alignment between the FIT scores and the performance strategy recommendations.
Bivariate	ANOVA	Is there a difference in the perceived value of the weights used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More) across the four FIT score ratio criteria (Operating Reserve Ratio (35%), Debt to Expendable Equity Ratio (35%), Change in Net Assets Ratio (20%), Operating Margin Ratio (10%))?	A one-way analysis of variance reached significance, F [3, 192] = 4.49, p<.05 [η2 = 0.07], in the different perceptions of agreement between respondents regarding the weighting scales of the four ratios used to calculate the overall FIT score.
Bivariate	Chi-Square Test for Independence	How well aligned are the FIT scores with performance strategy recommendations? - Commit additional resources to advance mission (for FIT score 8 to 10)	A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X2 (1, N=45) = 0.53, p>.05. The chi-square statistic is 0.5321. The p-value is 0.465728. Not significant at p > .05.
Bivariate	Chi-Square Test for Independence	How well aligned are the FIT scores with performance strategy recommendations? - Encourage innovation to achieve mission (for FIT score 6 to 7)	A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X2 (1, N=45) = 0.04, p>.05. The chi-square statistic is 0.0367. The p-value is 0.848006. Not significant at p > .05.

Bivariate	Chi-Square Test for Independence	How well aligned are the FIT scores with performance strategy recommendations? - Perform a thorough review of institutional effectiveness (for FIT score 2 to 3)	A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X2 (1, N=45) = 0.04, p>.05. The chi-square statistic is 0.0367. The p-value is 0.848006. Not significant at p > .05.
Bivariate	Chi-Square Test for Independence	How well aligned are the FIT scores with performance strategy recommendations? - Implement significant institutional changes to achieve mission (for FIT score -1 to 1)	A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X2 (1, N=45) = 0.77, p>.05.
Bivariate	Chi-Square Test for Independence	How well aligned are the FIT scores with performance strategy recommendations? - Assess Department of Education compliance and institutional long-term viability (for FIT score -4 to -2)	A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X2 (1, N=45) = 0.07, p>.05. The chi-square statistic is 0.0731. The p-value is 0.786944. Not significant at p > .05.
Bivariate	Chi-Square Test for Independence	Please assess the weightings used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More). - Change in Net Assets Ratio (20%)	A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived agreement with the calculation of the overall FIT score, X2 (2, N=49) = 0.38, p>.05. The chi-square statistic is 0.3811. The p-value is 0.8265. The result is not significant at p > .05.
Bivariate	Chi-Square Test for Independence	Please assess the weightings used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More). - Operating Reserve Ratio (35%)	Invalid results. Incomplete data set.
Bivariate	Chi-Square Test for Independence	Please assess the weightings used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More). - Debt to Expendable Equity Ratio (35%)	Invalid results. Incomplete data set.

Bivariate	Chi-Square Test for Independence	Please assess the weightings used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More). – Operating Margin Ratio (10%)	Invalid results. Incomplete data set.

These quantitative results were also supported by quotes from interviews and focus groups that are highlighted below in Table 1.7. CIC Member participants articulated three key ways that the KIT and FIT reports are delivering value for their institutions. First, participants said that the KIT and FIT help them communicate and build support for priorities. Participants said that they use the data to communicate priorities to stakeholders like donors, faculty and staff; flesh out their state of the university address with institutional facts; and myth bust with trustees about their over-inflated views of other institutions and show their own progress in comparison. Second, participants said that the KIT and FIT reports encourage leaders to deep-dive into their own data. Participants shared that getting data from the CIC helps them guard against bias they could be subject to (or perceived to be subject to) in reporting their own data, expands their use of data and creates a complete data story, and supports decisions that may have been contested by stakeholders. Finally, participants said that the KIT and FIT reports support and guide strategic planning. Specifically, participants mentioned the multi-year reporting helps create solid institutional plans since you are not looking just at a one-year performance, and helps focus and energize administrators on the right strategy/pivots based on their actual performance. These demonstrated uses of the KIT and FIT reports show that the tools are both being used by and generating value for members. The themes that surfaced during interviews and focus groups are summarized here while these themes and supporting quotes can be found in Table 1.7 below.

Table 1.7: CIC Member Perceived Value of KIT/FIT			
Theme of Quotes	**Supporting Quote 1**	**Supporting Quote 2**	**Supporting Quote 3**
Helpful in Communicating & Supporting Priorities	"And so we've explained to donors, the community, and our faculty and staff why we have certain priorities, and why it's helping us and where we're vulnerable… it's helped me crystallize a message of how this place actually works financially, and what we need to do about it to keep it rolling and make it better."	"You have to let numbers tell a story…and I think that's probably the benefit: that then you can articulate a strategy around the picture to make it better. And it's pretty helpful, I think. So once or twice a year, we pull it out. And then when I do my state of the university address, sometimes I'll pull out a chart or two and let everybody see it and say, hey, here, this tells a lot about how we fund this thing here and, so, please pay attention enrollment and net tuition."	"[KIT and FIT] helps me myth bust with some trustees about graduation rates or you know what they think Stanford gets for a retention, right? I can quickly pull up a graph that shows, no, really [our institution] is not that bad, right? So, I think it's useful and quickly accessible information, and [they have] national and regional trends in a easily accessible way that you can't get easily in other tools."
Removes Bias/Encourages Deep-Diving into Internal Data	"At our institution, we just weren't using data as well as we needed to and so just being, you know, it just becomes a tool that helps us kind of forces us into some data and looking at our data story."	"It provides an external validation point or data set that…helps me guard against the biased perspective that I have just because it's me reporting my data about our institution. That gives me one more place where I can say: this is what a broader data set says, and it's not just [my] world view."	"Even higher ed intellectuals who supposedly are driven by facts, there is sort of moments when you look at the data and people sort of, they don't believe their lying eyes. And that's just, you know, part of the conversation too is that, well, I'm sorry you don't like the data, but this is the data. So we've had a lot of conversations about that, especially when we've tried to do things to move the needle when we thought that we were significantly out of alignment for."
Supports/Guides Strategic Planning	"It basically shows you the finances of our institutions are not a 12 month affair. You've got to have a strategy."	"These institutions need a strong financial plan…That's, for me, the big time value in this: we can paint a complex picture that shows the back end and then where we're going on the front end and how to keep our focus and energy on the right kind of pivots."	

The final analysis of what CIC members find most valuable about the KIT and FIT is reflected in Table 1.8 below. This table reflects the number of times each comparative category was mentioned throughout interviews and focus groups which highlights the importance of those mentioned most and decreased focus on those areas mentioned less often. 82% of total mentions across these four categories were about Institutional Finances (60%) and Enrollment (22%) while only a combined 17% were about Region (11%) or Carnegie Classification (6%).

Table 1.8

Frequency of Mention by Comparative Categories for Institutional Performance

Category	**Key Words/Common Phrases**	**Number of Mentions per Category**	**Percentage of Total Mentions of Comparative Categories**
Financial	Endowment, Sustainability, Tuition, Revenue, Fundraising, Scholarships, Expenditures, Salaries, Debt Refinancing, Ratios (Operation reserve, change in net assets)	97	60%
Enrollment	Retention, Size, Yield Rate	36	22%
Region	*Direct mentions only*	18	11%
Carnegie	*Direct mentions only*	10	6%

Results by Project Question (3):
How do the KIT and FIT inform organizational decision-making for member institutions?

CIC members shared that the KIT and FIT inform their decision-making by adding value, exemplified in Table 1.8 above, and in their ability to help leaders clarify their own goals for their organizations. One focus group participant said, “If you look at 3 or 4, 5, 6 various items in [the KIT and FIT], you can define in a sense what your business model is. And in the second sense, it can show you where you're vulnerable and you’d better double your efforts.” Another focus group participant shared that, “KIT and FIT gives you a five-year runway so you don't make a decision based on a hiccup or particularly generous year where you might misinterpret really what's happening.” In addition to its ability to help clarify and communicate institutional mission and goals, participants identified specific decisions that were made as an outcome of reviewing their KIT and FIT reports. These organizational decisions are each exemplified by a quote(s) shared by a participant in Table 1.9 below and include adjusting faculty salaries, dropping or investing in academic programs, investing in renovations, hiring staff, simplifying the admissions process, refinancing debt, right-sizing faculty and adjusting student-faculty ratios, and advocating for strategic investments. Participants in interviews and focus groups were quickly able to identify these and other specific decisions that had been impacted using data from their KIT and FIT reports.

Table 1.9: KIT/FIT Impact on Decision-Making	
Summary of Decision	**Quote Describing Decision**
Faculty Salary Adjustments	"The provost and I agreed that we wanted all of our faculty to be at or above the CIC [regional] Median. And so we use that median point as the floor for our salaries. And so then we made some salary adjustments based on that data that came from the KIT and FIT."
	"[Our board was] very concerned about the salary levels of our faculty and how we compared at the national as well as with the [regional] group that we were a part of with the CIC report. And as a result, we upped, we've changed our salary formulas. And we also have increased salary here."
Dropping or Investing in Academic Programs	We've looked at high traffic programs [lists specific programs] and there are several that have been kind of key feeders for us. And we've also delineated programs where they are being suspended to the point of being dropped and which, as you all know, we're really good at starting academic programs in higher end but we're not really good at closing them down. And we've just this year at the end of this year, there'll be 4 or 5 programs that will not be returning next fall."
Investing in Projects/Renovations	"Every year I put a CIC document together based on the data and with assistance with the provost's office, I'll put together some observations [and] recommendations. And one of the things that we're constantly looking at is the financial side of what because we've been building a lot here and so a lot of renovation, a lot of new projects, things like that."
Hiring Staff	"We just recently began to hire more faculty based on the data we've received. So that's one thing that has happened."
Simplifying Admissions Process/ Increasing Enrollment	"Something from the data that we have seen and some of the trends we're seeing that…you have prospective students coming into the pipeline and then they get kind of clogged up in the processes before they become a fully enrolled student at the institution…I can tell you now, looking things like the admissions, yield rate, looking at some of these factors…the admissions yield rate was one of the major components that helped us to take a look to see what was happening to us because we knew we were getting bogged down and so we now have more people working in admissions to help facilitate that, especially now that our student body is growing, it's become even more pertinent"
Refinancing Debt	"What we've utilized KIT and FIT for is taking a look at a lot of our ratios, particularly our financial ratios. And that's been helpful to us because we're currently in the process of refinancing our debt – the later stages of the process of refinancing our debt. So it's very good to get a sense of where we sit with regard to a number of key indicators, you know, overall debt, overall endowment resources, where we are with regard to change in our ratios, those kinds of things."

Right-sizing Faculty Size	"At [my previous institution], a lot of work that we did in terms of program prioritization and just getting a sense of what was a right size faculty for [our institution] based on a lot of those comparators. So I was [in an academic role] and…that's where we sat with the KIT and the FIT data and got a better sense of where to land. So not surprisingly we went from about 90-some faculty to you know, high 70s – 78, 79 – and in large part that was informed by what we saw on the KIT and the FIT that said, you know what? An institution with our enrollment really does, you know, regress to the mean at that high-seventies number a lot more than the low-nineties number."
Adjust Student-Faculty Ratio	"A couple of times we have examined our student faculty ratio to set an institutional policy on student faculty ratio. And so, we were looking at internal data, but we were also then benchmarking again CIC data as well and peers and aspirant institutions within that data."
Advocating for Strategic Investments	"We used [KIT and FIT data], in part, to get the board to realize we could take a few more financial risks towards a better future…and invest in some programs. So it was essential in showing the board that all of our cash on hand… it served as the impetus to help with some strategic investments."

Additional Results Highlighted for Relevance in Recommendations:

Additional information was gathered via survey and interview/focus group which speaks to general participant attitudes toward and stylistic preferences for data tools. These questions were univariately analyzed and provide context for our recommendations. 66% of survey respondents prefer complex/interactive data tools to simple/static ones while 87% of respondents prefer comparative tools to institution-specific ones. The majority (74%) of respondents also prefer a tool designed primarily for their internal use. The majority of respondents (51%) were also indifferent to whether the KIT/FIT is presentation-ready. Additionally, 91% of respondents are willing to give data annually directly to CIC in exchange for more timely KIT/FIT reports. These results are summarized here while the full results of these tests can be found in Table 2.1 below.

Table 2.1: Other Relevant Survey Results

Type of Analysis	**Type of Question/Test**	**Question**	**Result**
Univariate	Forced Choice	If you had to choose between CIC-generated data used for decision making, would you prefer to have more complex, fine-grained, and interactive information or would you prefer a simplified, summary, and static information?	66% of respondents prefer complex/interactive tools while 34% prefer simple/static tools.

Univariate	Forced Choice	If you had to choose between a tool that provides you more in-depth information about your campus or a tool that compares your campus to other campuses, which would you prefer?	87% of respondents prefer comparative tools while 13% prefer institution-specific tools.
Univariate	Forced Choice	If you had to choose between a tool that provides data designed primarily for your internal use or a tool that provides data that you could share with external stakeholders, which would you prefer?	74% of respondents prefer a tool designed primarily for internal use while 26% prefer a tool designed primarily for external use.
Univariate	Forced Choice	Would your institution be willing to share data directly with CIC annually if it meant more timely KIT and FIT reports?	91% of respondents would be willing to share data directly with CIC annually while 9% would not be willing to share data directly with CIC.
Univariate	Likert Perception	How important is it for you that KIT and FIT be presentation-ready?	51% of respondents responded neutrally while 14% rated presentation-readiness as Important (13%) or Very Important (1%) and 29% rated presentation-readiness as Somewhat Important (27%) or Not At All Important (4%).

CIC members also shared recommendations they have for the future of KIT and FIT which support the findings above about data complexity and internal use. Participants shared that the current format of the KIT and FIT – a series of PDF reports – can feel overwhelming and they have to dig for the data most useful for them. They offered suggestions to modify the existing format of the KIT and FIT to address this including the addition of a summary version of the key highlights through the entire report, expansion of the data points used in the KIT and FIT reports, and enhancement of the ability to customize and/or interact with the reports. They shared that they are becoming more accustomed to their data being presented in an interactive (dashboard/portal) format with the ability to choose which data points they would like to see at a given time. Including additional data points as requested by CIC members would offer an additional level of customizability not currently possible with the KIT and FIT which offers a standard set of data points to members which have been included in the tools since their creation. Participants also expressed a desire for CIC to facilitate connections between presidents struggling in certain areas with others who have experienced similar things. These recommendations by interview and focus group participants are detailed below in Table 2.2.

Table 2.2: User Recommendations	
Summary of Recommendation	**Quote Describing Recommendation**
Provide Summary Version of KIT/FIT with Highlights	"People, if they're not taking time to aggregate or pull things together, they may be missing out on what's actually happening because they see a part here, another one here, and not seeing it all together in one presentation. So that would be one thing I would recommend is just having to do with the formatting of the data and how it's being presented."
	"Of course it's our job, I think, as leaders to condense down what's most pertinent so I'm not sure what I could tell you other than maybe it's overwhelming."
	"Instead of giving us like, I don't know, it's like 50 individual PDFs, it'd be nice to have a single document to draw from… I'd like to take the beginning part when you're getting into the particular financial ratios…and combining them so the information will relating to all that is right there in one pocket rather than spread out over. Cause I think that's where people, if they're not taking time to aggregate or pull things together, they may be missing out on what's actually happening because they see a part here, another one here, and not seeing it all together in one presentation. So that would be one thing I would recommend is just having to do with the formatting of the data and how it's being presented."
Offer Customizability & Interactivity of KIT/FIT Reports	"In essence, I went through and I determined, kind of, the ones that I pulled out and now it's a pretty expected piece for us to look at. And then same thing with the board, only a few less charts and data points for them, but the same concept is like, you know, narrowing it down to where it's the piece that we need to look at."
	"I don't know if one of the slicers is urban/suburban/rural…I think that might become increasingly important for our institutions."
	"Is there an opportunity to make KIT and FIT less of a document and more of a portal-based resource? Maybe. 'Cause I'm getting more accustomed to reading these data in a portal/slicer/dashboard environment."
	"It'd be really nice if I could just do that myself with a mouse click and be able to do some of those comparisons."
Connect Struggling Presidents with others who have experienced similar things	"If you were especially thrown into a situation or you desire to pivot a strategic pivot: If we could find 5 people who were really good at this and had the data to back it up…if we could find those because this KIT and FIT, that might be one of the greatest services that we could provide. Not only struggling presidents, but presidents who wanna, you know, go after where the puck is going and how do you get there? And if other people have done it, you can just mimic that. You don't have to have all brilliant presidents. You can just be average like me and copy."

	"If there was a recommendation I would make to KIT, and or to the CIC group, is it would be great to have that same kind of information about the different offices…like business office provost's office, president's office, admissions, the foundation and anything like that. That's the one thing that's missing for us. And we really want to begin to take a look at that side of the house."
Expand Data Points in KIT/FIT	"There's probably also some things that I'd love for it to dig into in ways that it doesn't. As an example, when I look at a lot of the data points, it'll give percentiles for national comparison, 75th, but it doesn't do that regionally. It just gives me the regional median. And so for me, I really need and want to be able to see what that region looks like because then I get a better sense of what's going on in my competitive landscape and not just sort of in the higher education landscape. And so without having to go in and reconstruct that data myself, that would be something that would be very helpful to me."
Better Data Visualization in KIT/FIT Reports	"It is kind of clunky at times, I'll readily admit, and some of those charts are hard to read and I think that there has to be some better data visualization techniques out there that I've seen and some other things, and I hope that that's some of the things that CIC is thinking about is just the data visualization."

Triangulation of Results

Our research design included multiple elements to improve rigor and validity to ensure that our study maintains a high degree of integrity. First, our study triangulated multiple data sources. Specifically, our research involved a survey (deployed through the CIC), semi-structured interviews and focus groups, and a comparison of interview and survey responses with data collected through a document analysis process. Second, throughout the research process, we sought participant validation by providing the participants access to copies of the interview and focus group transcripts, and invited opportunities for participants to clarify statements through a follow-up interview and/or e-mail response process. Third, in the selection of multiple data collection methods, we strategically timed and sequenced the data collection methods, starting with our survey, then interview and focus groups, then follow-up interview and e-mail question response, with document/content analysis throughout. This strategic sequencing of methods allowed us to collect, with rigorous fidelity, precise feedback from participants. Finally, we used a mixed-methods approach in our survey to increase validity in our study. By alternating Likert-type survey responses (involving rating and frequency scales with behavioral and attitudinal questions) along with open-ended questions in the survey instrument, our data was coded for statistical data analysis including conducting Chi-Square tests, T-tests, and ANOVA (Analysis of variance).

Results from surveys and interviews were triangulated with document analysis to construct a more comprehensive understanding of the data. Analysis proceeded from quantitative to qualitative data, using the information from survey responses to inform deeper exploration in the qualitative interviews and focus groups. Beyond data collection, our research process also

included validity strategies in the data analysis and researcher positioning methods. Most importantly, maintaining a regular practice of dialogic engagement throughout the research within our research team (as research team debriefs) and with our critical friends/thought partners, stakeholders at CIC, and our capstone advisor ensured that we critically examined any latent or overt implicit or cognitive biases in our research. With a high degree of trust with our thought partners, we engaged in probing, deep, and pointed questions about our research goals and questions, the framing of our study, our social identity and positionality as researchers, and the interpretations from our research. For this process to work effectively, we agreed to guiding principles of honesty, trust, vulnerability, and transparency with our thought partners so that we were freely (and respectfully) able to question and critique the research and interpretation process and question any biases, subjectivities, and positionalities that could negatively impact the rigor of the process. Finally, throughout the research process, we (as a research team) engaged in the process of structured reflexivity by drafting regular memos at different stages of the research, maintaining research journals, and employing different mapping strategies as ways to enhance the validity of our research. Through a rigorous structured reflexivity process, we increased the interrater reliability as we reviewed and examined data and arrived at independent interpretations. Through these reflexivity exercises, we were able to both widen and narrow the aperture of our focus across the research process, and use these opportunities to maintain a practice of introspection and reflection on the progress, motives, methods, results, and interpretations of our research.

The validity strategies listed in this section were designed to increase the quality and rigor of our research design, data collection, and interpretation of our study. Through multiple processes of validation (triangulation, participant validation, strategic sequencing of methods, mixed-methods, dialogic engagement, and structured reflexivity) we aimed to detect any problematic areas of our research process and make any necessary course-corrections in our research as needed. Additionally, the validation process revealed insights as we engaged in research that led to novel approaches and directions that we did not detect at the beginning of the research process.

Limitations

Throughout this research, we noted any instance of a potential limitation. Concerns about respondent bias and data validity were addressed through methodological rigor, diverse sampling, and triangulation. Listed below are the limitations beginning with survey design and response rate, interview and focus groups participation, and limitations of the data itself.

Survey Limitations

By working with the leadership of the CIC, we allowed the survey to remain open for four weeks to optimize data collection, sending two additional reminder prompts before the survey closed. The survey deployed on Tuesday, March 12, 2024 and remained open through Monday, April 15, 2024 (34 days). We worked diligently toward a goal of 100 survey responses and ultimately secured 93 responses that we determined valid for use. Not all of the 93 respondents completed all 27 survey questions in their entirety (e.g. some respondents did not answer the FIT questions, but only answered the KIT questions); however, we did secure

enough responses to answer the full set of 27 questions. While we secured 100% completion on 63 of the 93 survey responses (68% of survey participants), the lowest response rate that we had on any individual question from the survey was 17%. This low response rate (17%) was present in 12 of the 93 submitted surveys (13% of survey participants) and is a function of respondents only answering questions that pertained to the KIT (excluding responses that pertained to the FIT). However, 71 of the 93 submitted surveys (76%) completed more than 60% of the survey in its entirety; while 22 of the 93 submitted surveys (24%) completed less than 50% of the survey. Therefore, the variance of response rate and the varying response volumes presented constraints in the type of data analysis that we could perform on the survey results, as we discuss below.

Survey Participant /Response Limitations

As mentioned previously, we strived for a goal of 100 survey responses from CIC member institutions to ensure that we would have sufficient sample sizes in our data analysis. Ideally, we hoped to secure a large sample size (n>30) for each sample data set in our data analysis. This means that for some of our t-Tests, we were comparing means from sample sizes as small as n=11. However, in lieu of securing 100 survey responses, we wanted to understand how well our total collected responses (n=93) compared to the total population of CIC member institutions who actively use the KIT and FIT. To understand how well our survey performed in proportion to the CIC membership, we collected information from the CIC Administrative Module (with permission from CIC) on the number of CIC member institutions with active KIT/FIT accounts and the number of CIC member institutions who have active KIT/FIT logins. Below is a breakdown of the active member usage and proportional KIT/FIT survey responses (bolded in the right-hand column).

Table 2.3: Survey Response Rate from Population of CIC Member Institutions

Respondents (Sample)	CIC Member Institutions by KIT/FIT usage	Response Rate as a Percent of CIC Institutions
93	CIC Member Institutions with Active KIT/FIT Accounts 650	**14%** (93/650)
93	CIC Member Institutions with Active KIT/FIT Log-ins 343	**27%** (93/343)
93	CIC Member Institutions with Active KIT/FIT Log-ins also accessing KIT part C 195	**48%** (93/195)
93	CIC Member Institutions with Inactive KIT/FIT Accounts 83	**N/A** – Not used in our data analysis

Source: CIC Administrator Module (access granted May 28, 2024)

Therefore, depending on whether we consider the participation respondent rate as a proportion of the active KIT/FIT accounts (14%) or the response rate as a proportion of the active KIT/FIT log-ins (27%), we are confident that not having a minimum of 100 viable survey responses affected the rigor and fidelity of our research. Similarly, limitations on the actual

sample sizes from our survey respondents created potential issues with the outcomes of our t-Test data analysis. For instance, if we would have had a lager sample size (n>30) for some of the samples in the t-Tests, the standard error would have been smaller. Similarly, a lager sample sizes would have provided a better estimate of the sample variance.

Interview and Focus Group Limitations

Our initial goal was to conduct two focus groups of five individuals each and five interviews. We had twelve respondents opt in for follow-up and because some individuals did not have availability in the research timeline or were unresponsive, our final research included seven individuals who were split into one focus group with four participants and three individual interviews. The total number of survey respondents who participated in follow-up was seven of 93 which is eight percent of the total survey respondents. We understand that our research timeline was abbreviated and our interview and focus group window was during a busy time for college presidents (May: when end-of-year commencements occur) which proved to be a limitation.

Data Analysis Limitations

As was discussed in the Data Analysis section, our t-Tests and ANOVA tests used survey response results with different sample sizes. This difference in sample size limited the types of t-Tests and ANOVA tests that we could calculate on the data sets. However, we accommodated for these constraints by conducting two varieties of t-Tests on each data set for analysis, and then determined which test type aligned more closely with the descriptive statistics from each sample set. For instance, for the t-Tests, we ran our calculations using a pooled sample variance weighted toward the sample mean from the larger of the two sample sizes. Similarly, we adjusted our selection of ANOVA tests using only single factor ANOVA tests, which is customary when performing statistical analysis on data sets with different sample sizes. Therefore, the difference in sample sizes had less of an impact for the ANOVA tests than it did for the calculations of the t-Tests. However, if we had received results with equal sample sizes, we could have run additional two-factor ANOVA tests, in addition to the single-factor ANOVA tests.

Findings and Recommendations Report

Findings

Informed by our quantitative (survey) and qualitative (survey, interview, and focus group) results, we identified six key findings that directly respond to our project questions. These findings identify the key users and audiences at CIC member institutions, the perceived value of the KIT and FIT as a whole and specific pieces of the tools that members find most valuable, how institutions are using the KIT and FIT reports to make decisions, and what members would most like to see in a data tool. Each finding is directly tied to the project question it answers – bolded next to the finding – and then followed by an explanation of relevant results that support these findings.

Key Finding 1: Of the KIT and FIT comparative categories for institutional performance, CIC Members most value key indicators related to Financial and Enrollment.

Of the KIT and FIT's four key comparison categories for institutional performance, CIC Presidents and executive leaders value Financial and Enrollment most, Region moderately, and Carnegie classification least. Survey respondents identified the top five most valuable KIT indicators, in order, as Net Revenue per Student, Total Expenses per Student, Discount Rate, Retention Rate, and Total Fall Enrollment. The top three of these can be categorized as financial indicators while those ranked fourth and fifth can be categorized as enrollment indicators. When asked specifically about the usefulness of each of these four areas, 63% of survey respondents said that Enrollment Size is useful or very useful; 62% said Financial Resources Quartile is useful or very useful; 60% said comparison by Region is useful or very useful; and 51% said Carnegie Classification is useful or very useful. While the distribution is not spread as far in this question, responses to the top most helpful indicators and the distribution of responses highlighting each of these areas support that Financial and Enrollment are most useful while Region and Carnegie Classification are less useful. While Carnegie Classification was ranked by CIC members as the least useful comparison category during this study, the classifications are expected to undergo changes in the near future that could change how CIC members would apply the classification as a comparison category.

To highlight and expand upon the high value placed on Financial and Enrollment markers are the number of mentions of each during interviews and focus groups (displayed in Table 1.8 in Results). 82% of the total percentage of comments coded about any of the four comparative categories for institutional performance were coded as Financial (60%) or Enrollment (22%) while Region (11%) and Carnegie Class (6%) were only mentioned for a combined 17% of all comments coded about any comparative category. This finding speaks directly to our first project question as it addresses both the nature and quality of CIC member use of the KIT and FIT in showing which indicators are utilized most *and* seen as most valuable.

Key Finding 2: The top users of KIT and FIT at CIC institutions are President's Offices, Finance Departments, and Institutional Researchers.

When asked which departments within their institutions are using the KIT and FIT (a "select all that apply" question), 20% of total responses identified President's Offices, 18% identified a Finance Department/CFO's Office, and 16% identified Institutional Researchers. The top three groups who made up 82% of survey respondents identified themselves as Presidents (33%), Senior Leadership (31%) or Institutional Researchers (18%). This finding speaks directly to our first project question which sought to discover the nature and quality of CIC member use of the KIT and FIT because it reveals the top users of the tools.

Key Finding 3: Boards of Trustees, Faculty and Staff, and Financial Stakeholders are the most frequently identified audience with whom the data in the KIT and FIT is shared.

When asked who the most direct end-user audience with whom the KIT and FIT are shared at CIC member institutions, 38% of total responses identified their Board of Trustees as their primary audience, 32% identified Faculty and Staff, and 26% identified Financial Stakeholders. This finding speaks directly to our first project question which sought to discover the nature and quality of CIC member use of the KIT and FIT because it reveals the top audiences for the tools.

Key Finding 4: CIC Members find the KIT and FIT valuable in their current state.

Of all survey respondents, 74% rated the current overall value of KIT and FIT as Good (53%) or Excellent (21%). The biggest perceived values of the KIT/FIT, as reported by CIC members in interviews and focus groups, are that it: (1) Provides unbiased data and external validation, (2) Balances accessibility and complexity, (3) Helps institutions tell their story, (4) Forces long-term thinking, (5) Identifies areas of concerns, and (6) Clarifies their focus and strategy. CIC president and executive leaders' ability to articulate clear and specific ways that the KIT and FIT are valuable to them demonstrates that they see value in the tools. This finding most directly speaks to our second project question about the value of the KIT and FIT.

Key Finding 5: CIC members are using the KIT and FIT reports to make decisions at their institutions.

Survey respondents identified the top five areas in which they are using the KIT and FIT most as Institutional Self-Studies/Research (20%), Informing Senior Administration (17%), Informing Boards of Trustees (15%), Annual Benchmarking (14%) and Peer Group Comparisons (10%). During interviews and focus groups, CIC presidents and executive leaders shared specific instances when the KIT/FIT reports have impacted institutional decision-making including: (1) Pursuing and sunsetting of academic programs, (2) Refinancing debt, (3) Right-sizing faculty, (4) Making strategic investments, and (5) Adjusting faculty salaries. This finding speaks directly to our third project question which sought to discover how the KIT and FIT are impacting decision-making at CIC member institutions as it highlights that A) the tools are being used for decision-making and B) how they are being used to make decisions.

Key Finding 6: CIC Members prefer data tools that are interactive/complex, comparative, and designed for internal use. Members are willing to share data directly with the CIC to achieve a tool that reflects these preferences.

In the context of data tools that can be used for decision-making, 66% of survey respondents prefer complex and interactive information to static, summary information which 34% of respondents preferred. 74% of respondents prefer data tools created for internal use as opposed to external use, and 87% prefer a comparative tool to one that provides in-depth information about an individual institution. When asked in interviews and focus groups what they would change about the KIT and FIT if they were recreating it from scratch, over half of participants mentioned a desire for a dashboard or portal-based format, and/or a desire for customizability using slicers or the general ability to pick and choose what information they see at a given moment. Participants expressed that interactivity and customizability would allow them to act on the data quicker because they could get to the specific information they need with a few clicks rather than searching for it in a larger document version of the same information. This finding speaks directly to our first and third project questions. The quality of the tools affect how members use them, and this information about member preferences serves as a starting point for CIC to make adjustments to the tools that could even better meet member needs.

Recommendations

This research culminated in three recommendations for the Council of Independent Colleges which are detailed below. Each is informed by the data collected from CIC presidents and executive leaders and is supported by the literature and documents we analyzed to inform this research. Two of these recommendations center on the format of the KIT and FIT reports while the other introduces an idea for additional user engagement around the KIT and FIT.

Recommendation 1: Enhance the interactivity of the KIT and FIT.

Members have requested a dashboard or portal-based version of the KIT/FIT that would allow them to customize the results they would like to see. One suggested method is to use software like PowerBI or Tableau and include slicers to allow individuals to view specific demographics including the current key indicators areas for institutional performance and others (mentioned in recommendation #3). PowerBI is a part of the Microsoft Office suite so because CIC already uses Excel files (also a part of the Microsoft Office suite) to create the KIT and FIT reports, PowerBI should require no additional cost whereas Tableau may require additional funding to support. Using an interactive format would allow CIC members to select which data points they would like to see at a given time, enabling a more customizable experience to address specific audience(s).

Moving the KIT and FIT from a data document to a dashboard is supported by the literature in Abdou et al. (2021) and in Mitchell and Ryder (2013). Abdou et al., recognize the proliferation of data consumption in our daily interactions and business processes, and the crucial importance for accurate and appropriate underlying data to promote data literacy and data-informed decision-making (Abdou et al., 2021). In particular, Abdou et al. highlight how data visualization elements and dashboards are increasingly popular and useful in higher education to

promote effective data consumption and data-informed decision-making. In their analysis, Abdou et al. focus on how the elements of dashboard design, accessibility, and usability – as well as the accuracy of the underlying data – provide a rich and robust end-user experience to drive effective data-informed decision-making. Mitchell and Ryder also examine specific strategic and operational uses of data dashboards in higher education for both assessment and performance management. Mitchell and Ryder's study provides helpful insight regarding the key indicators and considerations involved in developing and implementing dashboard tools (Mitchell & Ryder, 2013).

Recommendation 2: Create a KIT/FIT User Group or Peer Network.

Members expressed a desire to connect with peer presidents and executive leaders. We recommend that CIC offer an opt-in peer group that offers any/all of the following connection options. First, staff at the CIC could offer trainings to this network of presidents and key KIT/FIT contacts on how they can optimize the use of KIT/FIT data. Second, the CIC could use this group to connect leaders whose institutions are struggling in certain areas with leaders who were in similar circumstances but have improved/recovered from them. Finally, the CIC could create digital resources using a combination of strategies, advice, and research from institutions who have successfully grown or improved specific areas. Members who self-identify that they are struggling in a given area, then, can request these resources to review asynchronously and/or be connected with a leader who contributed to that source as recommended above. An additional benefit of creating a user group in which members would more regularly be discussing the KIT and FIT is creating awareness with this group and beyond about the opportunities to share additional data to receive KIT Part C and the supplemental FIT.

Ninety-one percent of survey respondents said they would be willing to share data directly with CIC so that more timely KIT and FIT reports can be created. The KIT and FIT are currently created as quickly as possible when IPEDS releases data; however, IPEDS does not release the data until it is already one year old. Participants expressed that in the current landscape of higher education, things are changing so quickly that data even a year old can feel obsolete.

Creating a data-informed decision-making user community – or user network – is consistent with research from Marzal et al. (2021) as well as Shah (2022) that examines how college and university leaders use data to inform decision-making. In Marzal et al., the researchers examined the effect of factors that influence university leaders' use of data to inform decisions, and noting that facilitating conditions have a substantial effect on user behavior. In other words, if users of data tools are supported by understanding how to make use of the technical infrastructure, they will be more likely to make use of data analytics tools to make data-informed decisions (Marzal, et al., 2021). Likewise, Shah (2022) argues that university leaders can improve the effectiveness of their decisions by integrating business analytics in the decision-making models (Shah, 2022). By examining how to use business data analytics in their decision-making process (whether descriptive, predictive, prescriptive, decisive, or basic analytics) university leaders can improve the decision-making process at the executive leadership level of their organizations.

It is also worth noting that the recommendation of establishing a KIT/FIT user community or user network is supported by the conceptual frameworks of Communities of Practice (Lave & Wenger, 1991) and Cultural Tools for Mediated Action (Wertsch, 1998). As KIT and FIT users make use of these tools, different users will interact with the tools along different learning trajectories (Greeno & Gresalfi, 2008). By expanding the learning network between the CIC and the KIT and FIT user communities of practice, institutions can make greater use of these tools for distributive cognition, situated learning, and organizational decision-making (Wertsch, 1998).

Recommendation 3: Expand the Data Used in the KIT and FIT.

While CIC members find value in the information the KIT and FIT currently provides, they expressed desire for the inclusion of additional data points in the KIT and FIT reports including staff retention and salaries (not just faculty), institution type (urban/rural/suburban and designations as minority-serving), and more specific regional comparisons. All of these requests are data points that are collected for IPEDS, where CIC pulls data for the KIT and FIT, and the titles of these categories are below.

- Staff Data Points– *all in IPEDS Human Resources [HR] category:*
    - Full-Time Staff (Employees)
      Student and Academic Affairs and Other Education Service Occupations
    - Institutional Information – all in IPEDS "Institutional Characteristics (IC) Category:
        - Institutional Characteristics Header (IC-H):
        - Historically Black College or University (HBCU)
        - Tribal College or University (TCU)
        - Locale (for urban/suburban/rural)
        - Information about these data points can be found at these links: *IPEDS source 1* and IPEDS sources *here* & *here*

This recommendation of leveraging an expanded set of data metrics for the KIT and FIT is also supported by a study conducted by Humburg (2012) which examined the use of expanded financial index metrics to drive strategic decisions regarding the financial health of community colleges in in Iowa. Humburg's study identified that institutions who used a more robust set of metrics (a financial index conceptual framework) directly related to their strategic financial analysis needs were able to improve student success rates and financial health of their institutions. By identifying the most prudent and appropriate metrics, colleges were able to analyze and leverage appropriate data for strategic institutional decision-making, not just for regulatory compliance purposes.

Conclusion

The results of this research suggest that data analytics tools have been and will continue to be valuable, and they must evolve to address ever-changing needs and possibilities. The Key Indicators Tool (KIT) and Financial Indicators Tool (FIT) are no exception in the world of higher education: the in-depth reports the Council of Independent Colleges (CIC) has provided have supported executive leaders in making strategic organizational decisions for over twenty

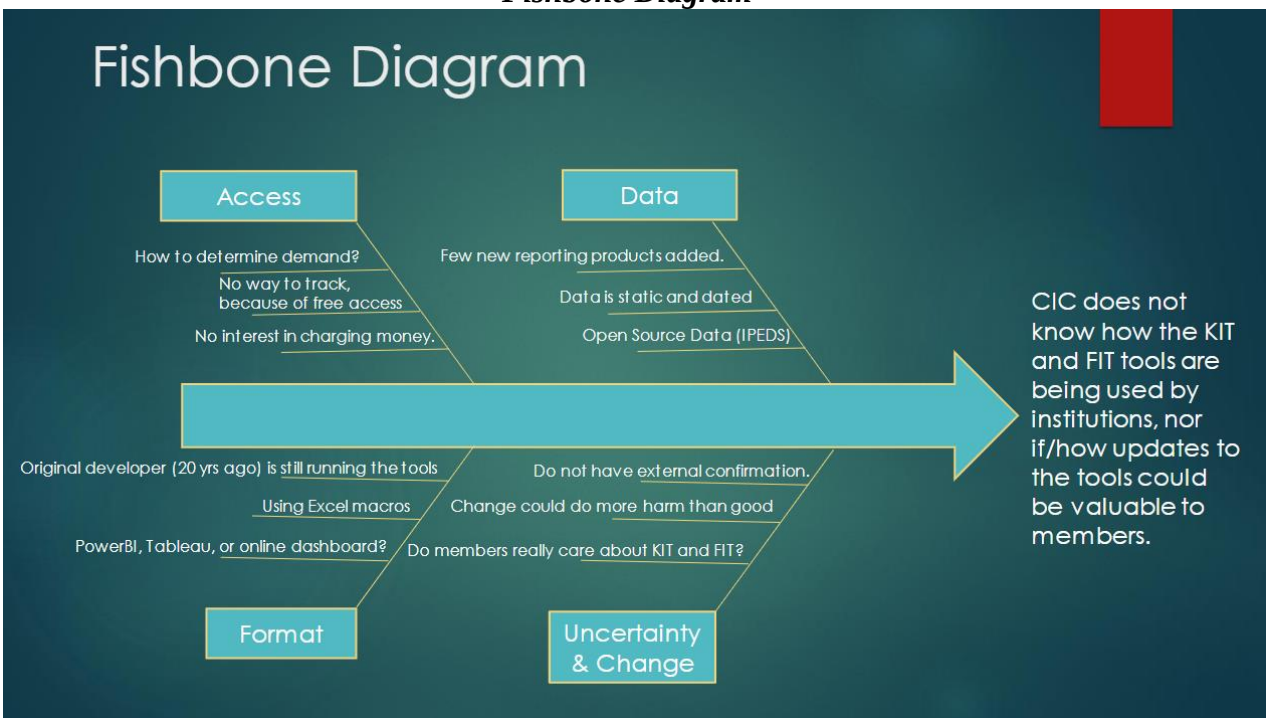
years. Executive leaders are using data to make decisions critical to the health and success of their institutions, and KIT and FIT have been primary data sources for many of these leaders. This project demonstrates not only how valuable the KIT and FIT's contributions have been, but how CIC can sustain that value by responding to member perceptions and needs. While the landscape of higher education continues to change, CIC's member institutions will need them as a trusted source more than ever.

Appendix A

Root Cause Analysis Instruments – all created September 2023:

McKinsey 7S

Fishbone Diagram



Balanced Scorecard

Financial Perspective

Goals	Measures
• Increase Revenue • Reduce Costs • Become Self-Sustaining	• Increase KIT/FIT Comparison Group Subscriptions • Increase KIT/FIT Online Consultations • Engage partnerships with other data firms/sources at a no-cost or sponsorship • Expand sponsorships in addition to RNL

Customer Perspective

Goals	Measures
• Accuracy and Measurement • End-User Support/Involvement • Relevant and Timely • New Features • Customized Reports	• Increased feedback from end users on how they are using the tools • Provide helpful and informative reports that assist institutional decision-makers • Simplify the process for data researchers and end users to request custom reports based on individual institutional needs • Add new features based on end-user functions and as new reporting tools become accessible.

Internal Business Perspective

Goals	Measures
• New products and services • Technology Investments • Resource investment	• Deliver at least one new product feature per year, or one additional service per year in response to customer and end-user feedback. • Invest in new technology platforms that allow end-users to download data and reports across different data analysis and statistical software (SAS, SPSS, R, Stata) • Hire additional research specialists and research assistants who can help fulfill report requests and complete additional data analysis.

Innovation and Learning Perspective

Goals	Measures
• Position as the industry-leading data analytics tool • Remain on the cutting edge of technology and reporting	• Provide updates to tool based on end user needs and request – increase feedback loop • Access the most up-to-date information from NCES and IPEDS

Appendix B
IPEDS 2023-24 Data Collection Schedule

IPEDS 2023-24 data collection schedule			
Topic	Opens	Keyholder close	Coordinator close
Registration* Report mapping Institution identification** IC-Header	August 9, 2023	Register by August 30, 2023	
Fall collection Institutional Characteristics (IC) Completions (C) 12-Month Enrollment (E12)	September 6, 2023	October 18, 2023	November 1, 2023
Winter collection Student Financial Aid (SFA) Graduation Rates (GR) Graduation Rates 200 (GR200) Admissions (ADM) Outcome Measures (OM)	December 6, 2023	February 7, 2024	February 21, 2024
Spring collection Fall Enrollment (EF) Finance (F) Human Resources (HR) Academic Libraries (AL)		April 3, 2024	April 17, 2024
* Registration contact information can be updated starting 08/09/2023 through 07/15/2024			
** Institution identification information can be updated starting 08/09/2023 through 06/01/2024			
IPEDS prior year data collection schedule (2022-23 collection)			
Topic	Opens	Keyholder close	Coordinator close
Fall collection (2022) Institutional Characteristics (IC) Completions (C) 12-Month Enrollment (E12)	September 13, 2023	October 18, 2023	November 1, 2023
Winter collection (2022-23)*** Student Financial Aid (SFA) Graduation Rates (GR) Graduation Rates 200 (GR200) Admissions (ADM) Outcome Measures (OM)	December 6, 2023	February 7, 2024	February 21, 2024
Spring collection (2023) Fall Enrollment (EF) Finance (F) Human Resources (HR) Academic Libraries (AL)		April 3, 2024	April 17, 2024
*** All revisions to cost of attendance data and SFA data must be made on SFA in the current year Data Collection System, where 3 years of data are available for revision.			
Data Feedback Reports: If you would like to upload a custom comparison group for your 2023 Data Feedback Report, you can do so 3/1/2024 through 07/15/2024.			

Appendix C
Scope of Work Memo

Evaluating the CIC KIT and FIT to enhance institutional data-informed decision making

Background:

Recent scholarship on data-informed decision making (DEDI) within colleges and universities has identified that most higher education officials are not yet adept at using analytics to support institutional decision making (Webber & Zheng, 2020). For instance, in a recent *Gallup* and *Inside Higher Ed*. survey of provosts and chief academic officers among U.S. colleges, only 16% of private university provosts and 19% of public university provosts believe that their universities use data very effectively to inform campus decision making (Jaschik & Lederman, 2019). Most scholars also agree that robust data analysis alone is not sufficient for leadership teams to engage in effective data-informed decision making. Rather, the process of decision-making is oftentimes more impactful than data analysis in decision outcomes. One important study by Lovallo and Sibony indicates that process matters more than analysis by a factor of six (Lovallo & Sibony, 2010).

To address the needs of higher education executive leadership teams to have access to relevant and actionable data for institutional decision making, the Council of Independent Colleges (CIC) developed the Key Indicators Tool (KIT) and the Financial Indicators Tool (FIT) which deliver CIC member institutions a customized benchmarking report of their institution's performance compared to peer institutions. The KIT and FIT provide CIC member institutions with nationally normed comparisons to empower institutional leaders with performance measures to improve their data-informed decision making and strategic goals.

Additionally, Webber & Zheng argue that "for data-informed decision making to take root in higher education, we must have conceptual clarity on what defines data-informed decision making and how it can be practiced" (Webber & Zheng, 2020, p. 5). Although CIC member institutions have access to the KIT and FIT as part of their member subscriptions (at no additional cost), the CIC does not have a process to monitor the access of end-user functionality of how the tools are used by member institutions. Furthermore, without a clear understanding of how, why, and whether the KIT and FIT are being used by member institutions, the CIC is unable to gain insights to make updates and improvements to the tools that could deliver value to member institutions in their data-informed decision making.

The goal of this program improvement and accountability evaluation (formative and summative) is to conduct a utilization-focused evaluation of the KIT and FIT to inform the CIC of the effectiveness and utility of the tools to enhance institutional data-informed decision making. The methods of this evaluation will be designed to determine the effectiveness of the KIT and FIT through an impact evaluation method. By doing so, we seek to discern not only ***if*** the KIT and FIT are useful, but ***how*** and to ***what extent*** they are effective to support data-informed decision making for CIC member institutions.

Project Questions:

- To what degree do CIC members access the KIT and FIT?
- How do members institutions of the CIC view the importance of the KIT and FIT as part of their organizational strategic data-informed decision-making process?
- To what degree do the KIT and FIT provide useful/actionable information for members institutions of the CIC to aid in their organizational strategic data-informed decision making?
- What impact has data provided by the KIT and FIT had on decision making for CIC member institutions?

Vanderbilt Students will be responsible for:

- Gathering information about the CIC's background and it's KIT and FIT. This will involve reviewing organizational documents and speaking with members of the organization via empathy interviews to unearth experiences with and attitudes toward these tools.
- Demonstrating positive communication with all involved CIC staff members and contacts from its member institutions.
- Examining relevant literature to support the research. Key areas include:
    - Use of data in higher education
    - Data-informed decision-making in executive leaders across contexts
    - High-stakes decision-making across contexts
    - Group-based Decision-making
    - *Internal literature to be reviewed: history of KIT/FIT, any CIC documents that mention the tools/using data from the tools*
- Surveying representatives of the CIC's member institutions about their experience and attitudes toward the KIT/FIT, their experience making data-informed decisions
    - Interviewing members who opt in via this survey about their experiences in these areas
- Analyzing all data collected in conjunction with literature to present findings and recommendations to the CIC's leadership which will summarize organizational and member views on the KIT/FIT, member attitudes toward the use of data in strategic decision-making, and organizational and member thoughts on the future of the KIT/FIT.
- Delivering a formal report to leadership at the CIC detailing the research process from its inception to its conclusion.

Organization Partners will be responsible for:

- Providing access to members of the CIC's staff and member institutions via a contact list and/or sending communication to members on Vanderbilt students' behalf.
- Arranging access to organizational documents relevant to the review of the KIT and FIT.

Stakeholders involved will be responsible for:

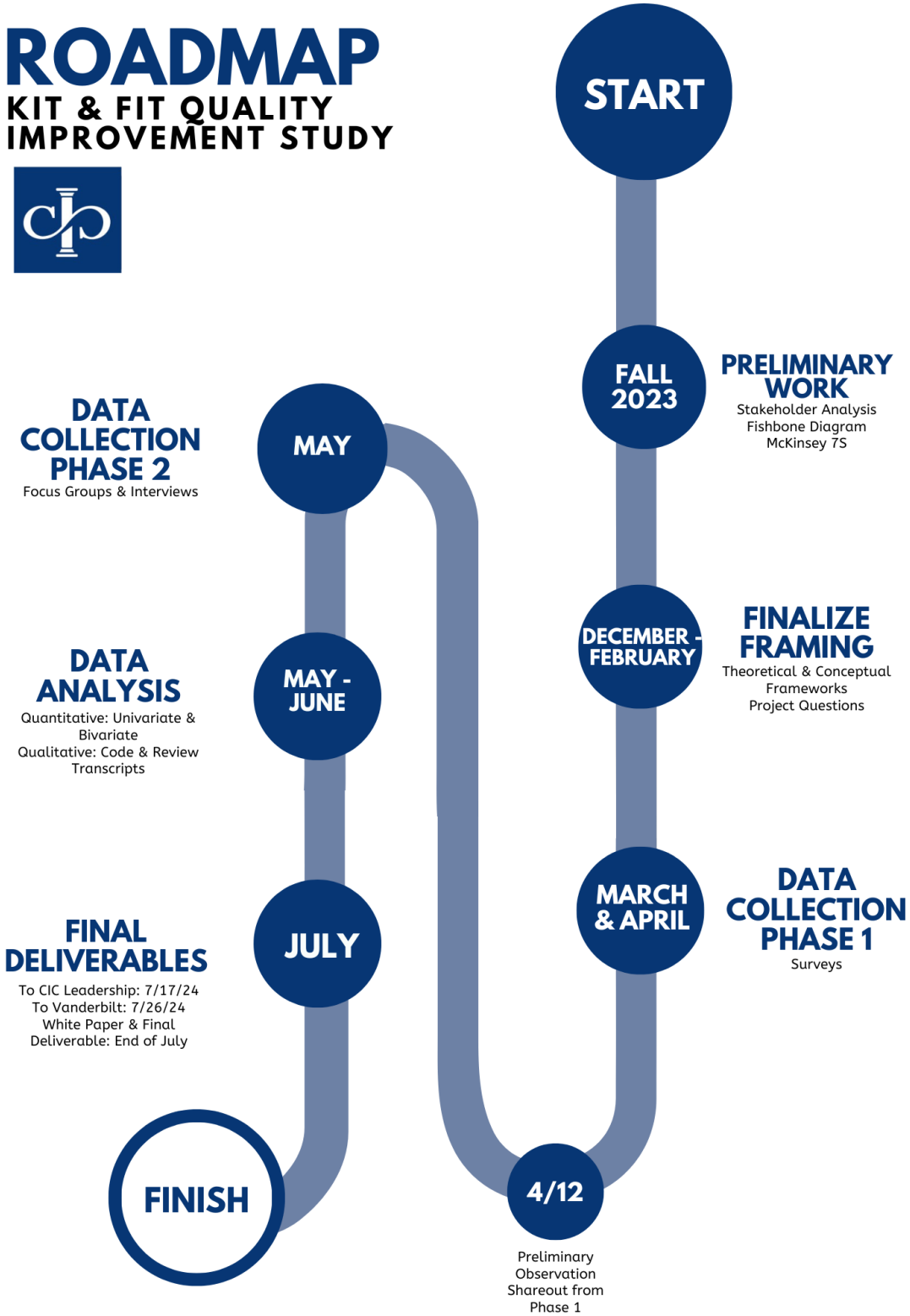
- Sharing user feedback about experiences with the KIT/FIT.

Key Contacts:

Student Name	Organization Name	CIC Stakeholder Names
Joseph C. Miller & Leah Paulson Dunmire	The Council of Independent Colleges (CIC)	Dr. Marjorie Hass (President) Dr. Jeff Woods (Vice President for Member Engagement) Ellen Peters (Director of Strategic Research and Assessment

Appendix D

Project Timeline



Appendix E
Survey Instrument

Survey of KIT and FIT for the Council of Independent Colleges

Start of Block: Introductory Page

The Council of Independent Colleges

Thank you for evaluating the Council of Independent Colleges' Key Indicators Tool (KIT) and Financial Indicators Tool (FIT). We are working to re-envision the benefit of KIT and FIT for the benefit of our members. Joseph Miller and Leah Paulson Dunmire are leading this effort on behalf of CIC to gather member insight on how the tools can be of most value.

We ask that you please complete this survey by April 12, 2024. After we have compiled results, we hope to speak with a group of volunteers interested in sharing more about their experience with the tools. Please indicate at the end of the survey your willingness to participate in a follow-up interview. Researchers will keep individual results confidential, and results will be shared in aggregate.

To view sample KIT/FIT reports, please visit this link.
https://cic.edu/insights/benchmarking-services/

If you have questions before completing this form, please reach out to Joe and Leah directly at Joseph.c.miller@vanderbilt.edu and Leah.c.paulson@vanderbilt.edu.

End of Block: Introductory Page

Start of Block: Analytical Tool Perception

1 If you had to choose between CIC-generated data used for decision making, would you prefer to have more complex, fine-grained, and interactive information or would you prefer a simplified, summary, and static information?

- ○ Complex/Interactive (1)
- ○ Simple/Static (2)

2 If you had to choose between a tool that provides you more in-depth information about your campus or a tool that compares your campus to other campuses, which would you prefer?

- ○ Institution-specific (1)
- ○ Comparative (2)

3 If you had to choose between a tool that provides data designed primarily for your internal use or a tool that provides data that you could share with external stakeholders, which would you prefer?

- ○ Internal Use (1)
- ○ External Use (2)

4 Would your institution be willing to share data directly with CIC annually if it meant more timely KIT and FIT reports?

- ○ Yes (1)
- ○ No (2)

End of Block: Analytical Tool Perception

Start of Block: KIT and FIT Tool Usage

5 What departments/areas within your institution actively use the KIT and/or FIT? *Check all that apply.*

- [ ] Academic Leadership (Deans, Department Chairs, Program Chairs) (1)
- [ ] Academic Affairs (2)
- [ ] Enrollment Management (3)
- [ ] Finance Department/CFO's Office (4)
- [ ] Human Resources (5)
- [ ] Institutional Research (6)
- [ ] President's Office (7)
- [ ] Senior Administration (8)
- [ ] Student Affairs (9)
- [ ] Unsure (10)
- [ ] Other (Please specify) (11) _____

X→

6 Which audiences are the most direct end-users for KIT and/or FIT at your institution? *Check all that apply.*

- [ ] Board of Trustees (1)
- [ ] Faculty and Staff (2)
- [ ] Parents (3)
- [ ] Alumni (4)
- [ ] Financial Stakeholders (5)
- [ ] Press and Social Media/Public (6)

7 How important is it for you that KIT and FIT be presentation-ready?

- ○ Not At All Important (1)
- ○ Somewhat Important (2)
- ○ Neutral (3)
- ○ Important (4)
- ○ Very Important (5)

---

8 How important is ease of navigation?

- ○ Not At All Important (1)
- ○ Somewhat Important (2)
- ○ Neutral (3)
- ○ Important (4)
- ○ Very Important (5)

9 How do you use the KIT and FIT reports? *Check all that apply.*

- [ ] Institutional Self-Study/Research (1)
- [ ] Annual Benchmarking (2)
- [ ] Annual Fact-Book/Reporting (3)
- [ ] Annual Consumer Data (4)
- [ ] Informing Senior Administration (5)
- [ ] Informing Academic Leadership (Deans, Department Chairs, Program Chairs) (6)
- [ ] Informing Board of Trustees (7)
- [ ] Peer Group Comparisons (8)
- [ ] Accreditation Prep/Reporting (9)
- [ ] External Reporting (State/Regional organizations) (10)
- [ ] Audit Prep (11)
- [ ] Other (12) _____

10 How useful is each of the following comparisons for your institution?

	Not At All Useful (1)	Somewhat Useful (2)	Neutral (3)	Useful (4)	Very Useful (5)
Comparison by Region (1)	○	○	○	○	○
Financial Resources Quartile (2)	○	○	○	○	○
Enrollment Size (3)	○	○	○	○	○
Carnegie Classification (4)	○	○	○	○	○

11 Please rate your perception of the overall value of KIT and FIT.

- ○ Excellent (1)
- ○ Good (2)
- ○ Average (3)
- ○ Poor (4)
- ○ Terrible (5)

Page Break

End of Block: KIT and FIT Tool Usage

Start of Block: KIT Usage

14 Please rate the level of usefulness of each of the KIT indicators.

	Not Useful At All (1)	Not Quite Useful (2)	Neutral (3)	Somewhat Useful (4)	Extremely Useful (5)
Total Fall Enrollment (1)	○	○	○	○	○
First-Year Enrollment (2)	○	○	○	○	○
Admissions Yield Rate (3)	○	○	○	○	○
Retention Rate (4)	○	○	○	○	○
Graduation Rate (5)	○	○	○	○	○
Student/Faculty Ratio (6)	○	○	○	○	○
Part-Time Faculty (%) (7)	○	○	○	○	○
Assistant Professor Average Salaries (8)	○	○	○	○	○
Associate Professor Average Salaries (19)	○	○	○	○	○
Full Professor Average Salaries (20)	○	○	○	○	○
Tuition Price (9)	○	○	○	○	○
Total Institutional Aid by Student (10)	○	○	○	○	○
Unfunded Institutional Aid Per Student (11)	○	○	○	○	○
Average Institutional Aid for First-Year Students (12)	○	○	○	○	○
Net Revenue per Student (13)	○	○	○	○	○

Discount Rate (14)	○	○	○	○	○
Tuition Dependency (15)	○	○	○	○	○
Endowment Assets per Student (16)	○	○	○	○	○
Instructional Expense per Student (17)	○	○	○	○	○
Total Expense per Student (18)	○	○	○	○	○

15 Of the indicators above, which do you find the most useful?

▼ Total Fall Enrollment (1) ... Total Expense per Student (21)

12 Have you used KIT in the past 2 years?

- ○ Yes (1)
- ○ No (2)

Page Break

End of Block: KIT Usage

Start of Block: KIT Experience Questions

Display This Question:
If Have you used KIT in the past 2 years? = Yes

13 How frequently do you use KIT?

- ○ Monthly (1)
- ○ Quarterly (2)
- ○ Annually (3)

Display This Question:
If Have you used KIT in the past 2 years? = Yes

16 Please rate the following KIT features as useful measurements for institutional comparison.

	Not At All Useful (1)	Somewhat Useful (2)	Average (3)	Useful (4)	Very Useful (5)
Individual Customization (1)	○	○	○	○	○
Scalable Charts (2)	○	○	○	○	○
Five-Year Trends (3)	○	○	○	○	○
Medians vs. Means (4)	○	○	○	○	○
Four Sorting Criteria (Region, Financial Resources, Enrollment Size, Carnegie Classification) (5)	○	○	○	○	○

Display This Question:
If Have you used KIT in the past 2 years? = Yes

17 What capabilities would you want KIT to have to better serve your institution's decision-making needs?

_____
_____
_____
_____
_____

End of Block: KIT Experience Questions

Start of Block: FIT Usage

18 Have you used the FIT in the past 2 years?

- ○ Yes (1)
- ○ No (2)

End of Block: FIT Usage

Start of Block: FIT Experience Questions

Display This Question:
If Have you used the FIT in the past 2 years? = Yes

X→

19 How frequently do you use the FIT?

- ○ Monthly (1)
- ○ Quarterly (2)
- ○ Annually (3)

Display This Question:
If Have you used the FIT in the past 2 years? = Yes

20 How well aligned are the FIT scores with performance strategy recommendations?

	Well Aligned (1)	Not Well Aligned (2)
Commit additional resources to advance mission (for FIT score 8 to 10) (1)	○	○
Encourage innovation to achieve mission (for FIT score 6 to 7) (2)	○	○
Implement initiatives to promote sustainability (for FIT score 4 to 5) (3)	○	○
Perform a thorough review of institutional effectiveness (for FIT score 2 to 3) (4)	○	○
Implement significant institutional changes to achieve mission (for FIT score -1 to 1) (5)	○	○
Assess Department of Education compliance and institutional long-term viability (for FIT score -4 to -2) (6)	○	○

Display This Question:
If Have you used the FIT in the past 2 years? = Yes

21 Please assess the weightings used to calculate the overall FIT score.

	Should be Weighted Less (1)	Agree with Current Weight (2)	Should be Weighted More (3)
Operating Reserve Ratio (35%) (1)	○	○	○
Debt to Expendable Equity Ratio (35%) (2)	○	○	○
Change in Net Assets Ratio (20%) (3)	○	○	○
Operating Margin Ratio (10%) (6)	○	○	○

Display This Question:
If Have you used the FIT in the past 2 years? = Yes

22 Beyond the ratios listed above, what other financial health indicators would you like to see in FIT reports?

_____
_____
_____
_____
_____

Display This Question:
If Have you used the FIT in the past 2 years? = Yes

23 What capabilities of FIT could better serve your institution?

_____
_____
_____
_____
_____

End of Block: FIT Experience Questions

Start of Block: Willingness for Follow-up

24 Would you be willing to speak confidentially to the researchers further about your experience using KIT and/or FIT? Your identity will be held separately from your responses.
If yes, please enter your preferred email in the text entry.

○ Yes (1) _____

○ No (2)

End of Block: Willingness for Follow-up

Start of Block: Institutional Characteristics

25 What is the name of your institution?

_____

26 What is your primary role at your institution?

- ○ Academic Administrator (1)
- ○ Faculty (2)
- ○ Information Technology (3)
- ○ Librarian (4)
- ○ President (5)
- ○ Institutional Researcher (6)
- ○ Senior Leadership (7)
- ○ Other (Please Specify) (8) _____

27 Over the span of your career, how many years have you worked with KIT/FIT at a CIC member institution?

- ○ 0-1 year (1)
- ○ 2-5 years (2)
- ○ 6-10 years (3)
- ○ 11-15 years (4)
- ○ 16-20 years (5)
- ○ > 20 years (6)

End of Block: Institutional Characteristics

Appendix F
Individual Interview Outline/Questions

INTERVIEW OUTLINE/SCRIPT

Confirm that participant is okay with recording before doing intro.

Intro: Thank you so much for taking the time to participate in this interview today. We want to reiterate the purpose of this study which is to get feedback from presidents and executive leaders at CIC member institutions about the KIT and FIT. We are hopeful that the results of our survey and these follow-up conversations will help advise CIC how KIT and FIT can be of most value to you all. As a reminder, we will keep individual comments you share with us today confidential and will remove any identifying information before sharing with CIC.
**Give an example of how we'll keep things confidential: would never provide a description of an individual that could be one of you (most likely, you'll be identified as "key decision-makers at institutions that use KIT/FIT" not "college president from a private school in Iowa"*

1. Walk us through your executive leadership team's typical decision-making process. Who is involved & what factors do you consider?
2. Describe a time when you and your leadership team used data or data analytics tools to engage an important decision-making process for your institution.
3. How do KIT/FIT played into your decision-making, if at all?
    - Reflect on a specific decision you and your team made and how you used data from the KIT and FIT to make that decision. *If you didn't use KIT/FIT, could it have been helpful?*
4. Tell us about a time you have sat down with senior leaders at your institution to review the data in the KIT and/or FIT. What was that conversation like?
5. How would you describe the value of KIT/FIT to your work/institution?
6. What do you think could improve the KIT/FIT to be of more value to your work/institution?
    - If you were an organization starting from scratch, what pieces would you find yourself wishing for on a comparative basis?
7. *IF TIME: Is there anything you wish we had asked you?*

Closing: Thank you again for spending time with us today. We will be transcribing this session and are happy to share the document with you in case there are any comments you'd like to elaborate on. We will end the recording now and are happy to hang back if you have any questions for us. Thank you again!

Appendix G
Focus Group Outline/ Questions

FOCUS GROUP OUTLINE/SCRIPT

Confirm that everyone is okay with recording before doing intro.

Intro: Thank you so much for taking the time to participate in our focus group today. We want to reiterate the purpose of this study which is to get feedback from you all, presidents and executive leaders at CIC member institutions, about the KIT and FIT. We are hopeful that the results of our survey and these follow-up conversations will help advise CIC how KIT and FIT can be of most value to you all. Our questions will start generally and progress in specificity; we intend for this to be a conversation and invite you to unmute and react to one another's responses throughout our time together. As a reminder, we will keep individual comments you share with us today confidential and will remove any identifying information before sharing with CIC.
**Give an example of how we'll keep things confidential: would never provide a description of an individual that could be one of you (most likely, you'll be identified as "key decision-makers at institutions that use KIT/FIT" not "college president from a private school in Iowa"*

1. Describe a time when you and your leadership team used data or data analytics tools to engage an important decision-making process for your institution.
2. How do KIT/FIT played into your decision-making, if at all?
    1. Reflect on a specific decision you and your team made and how you used data from the KIT and FIT to make that decision. *If you didn't use KIT/FIT, could it have been helpful?*
3. Tell us about a time you have sat down with senior leaders at your institution to review the data in the KIT and/or FIT. What was that conversation like?
4. For our final question, please take a moment to reflect on this, we would like to hear from each of you. What is the value of KIT/FIT to your work/institution and how would you describe that value?
5. *POTENTIAL ADD (if time): If you were an organization starting from scratch, what pieces of information do you find yourself wishing for on a comparative basis?*

Closing: Thank you again for spending time with us today. We will be transcribing this session and are happy to share the document with you in case there are any comments you'd like to elaborate on. We will end the recording now and are happy to hang back if you have any questions for us. Thank you again!

Appendix H
Participant Recruitment Email

The Council of Independent Colleges

KIT and FIT Survey

Dear [Member Name],

As CIC works to validate and develop our Key Indicators Tool (KIT) and Financial Indicators Tool (FIT), we are reaching out to you today with an additional request to help us evaluate the tools, reports, and process. Your feedback will help our team, led by Joseph Miller and Leah Paulson Dunmire, reenvision KIT and FIT for the benefit of our members.

Participation is voluntary and will consist of completing the survey linked below. This survey can be filled out by you or the person at your institution who most uses KIT and FIT (for decision making, presentations about the institution, etc.). Please share this email with the person best suited to evaluate KIT/FIT on your campus.

We ask that you complete the survey by April 12, 2024. In May and June, we hope to speak with a group of volunteers interested in sharing more about their experience with the tools. Please indicate at the end of the survey whether you are willing to participate in a follow-up interview. Researchers will keep individual results confidential, and the results will be shared in aggregate.

Complete the KIT and FIT Survey.

It should take about 15 minutes to complete.

If you have questions, please reach out to Joe and Leah directly at joseph.c.miller@vanderbilt.edu and leah.c.paulson@vanderbilt.edu.

Thank you for your support of CIC and this project.

Best regards,

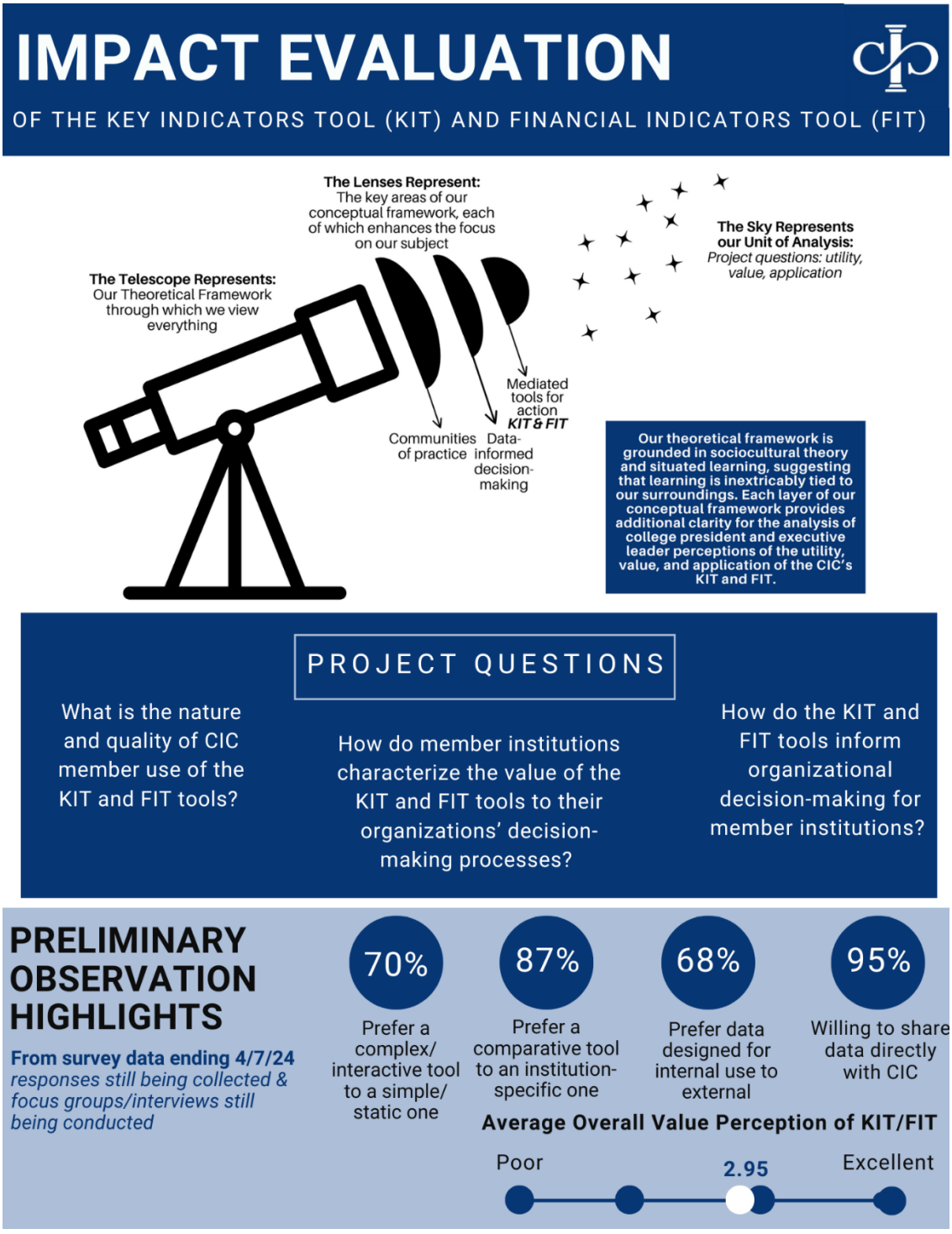
Ellen Peters
Director of Strategic Research and Assessment, CIC
On behalf of Joseph Miller and Leah Paulson Dunmire

Council of Independent Colleges
One Dupont Circle, NW, Suite 320
Washington, DC 20036-1142
Phone: (202) 466-7230

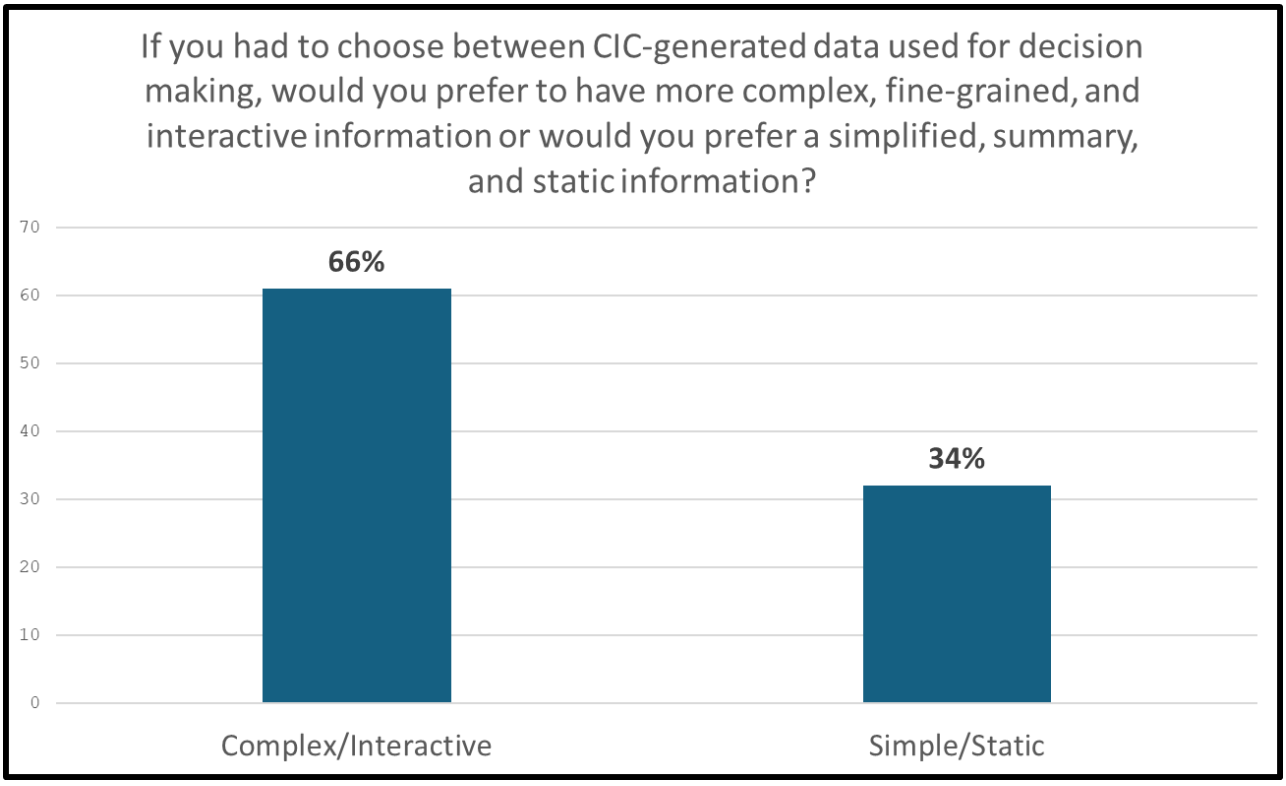
View this email with your browser.

Appendix I

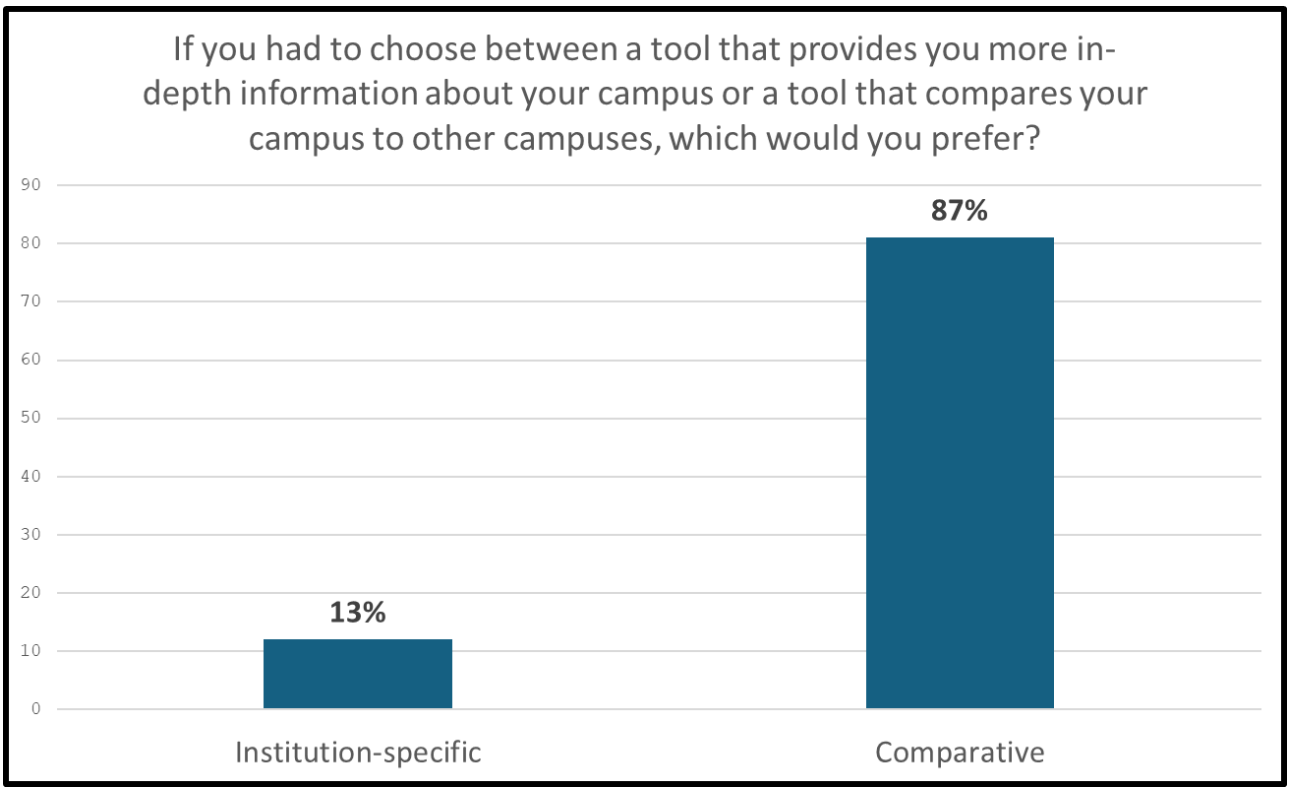
CIC Early Deliverable: *Delivered in person at CIC headquarters April 12, 2024*



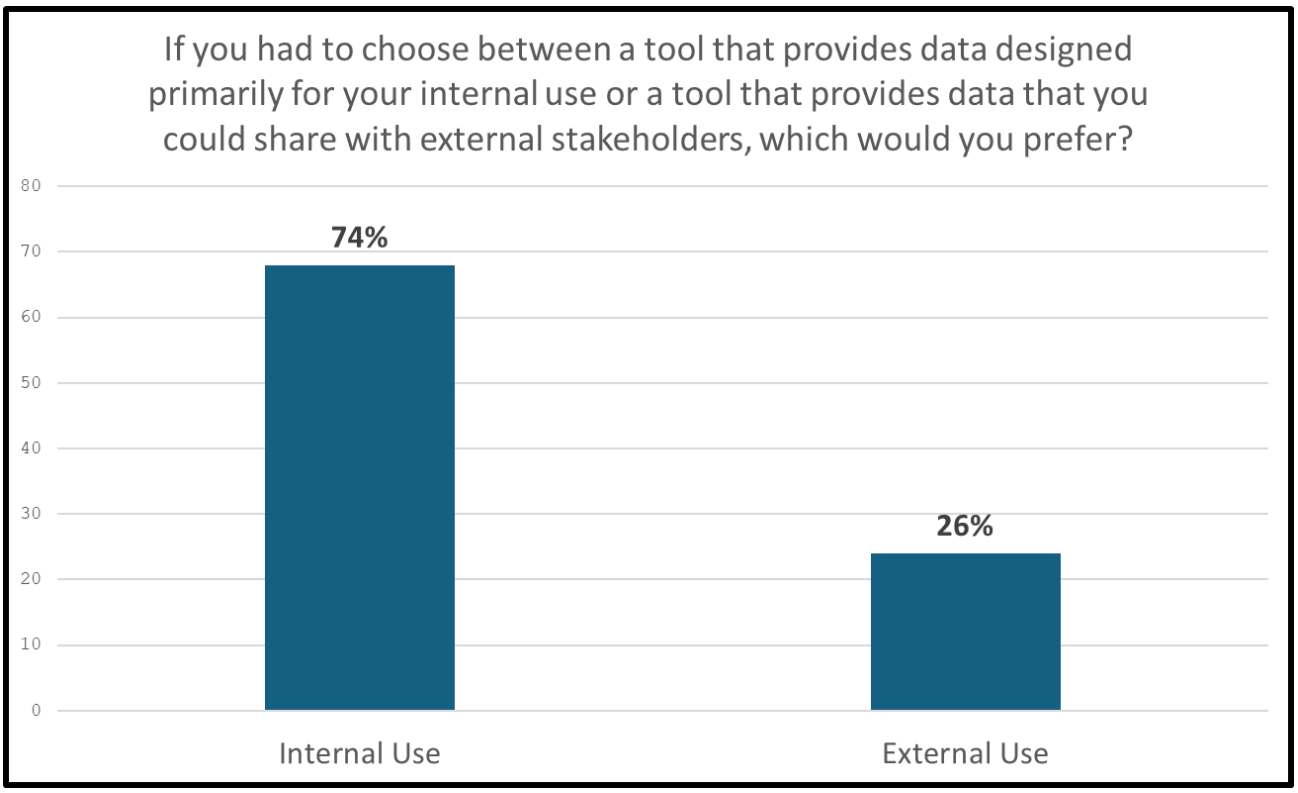
Appendix J
Univariate Survey Results



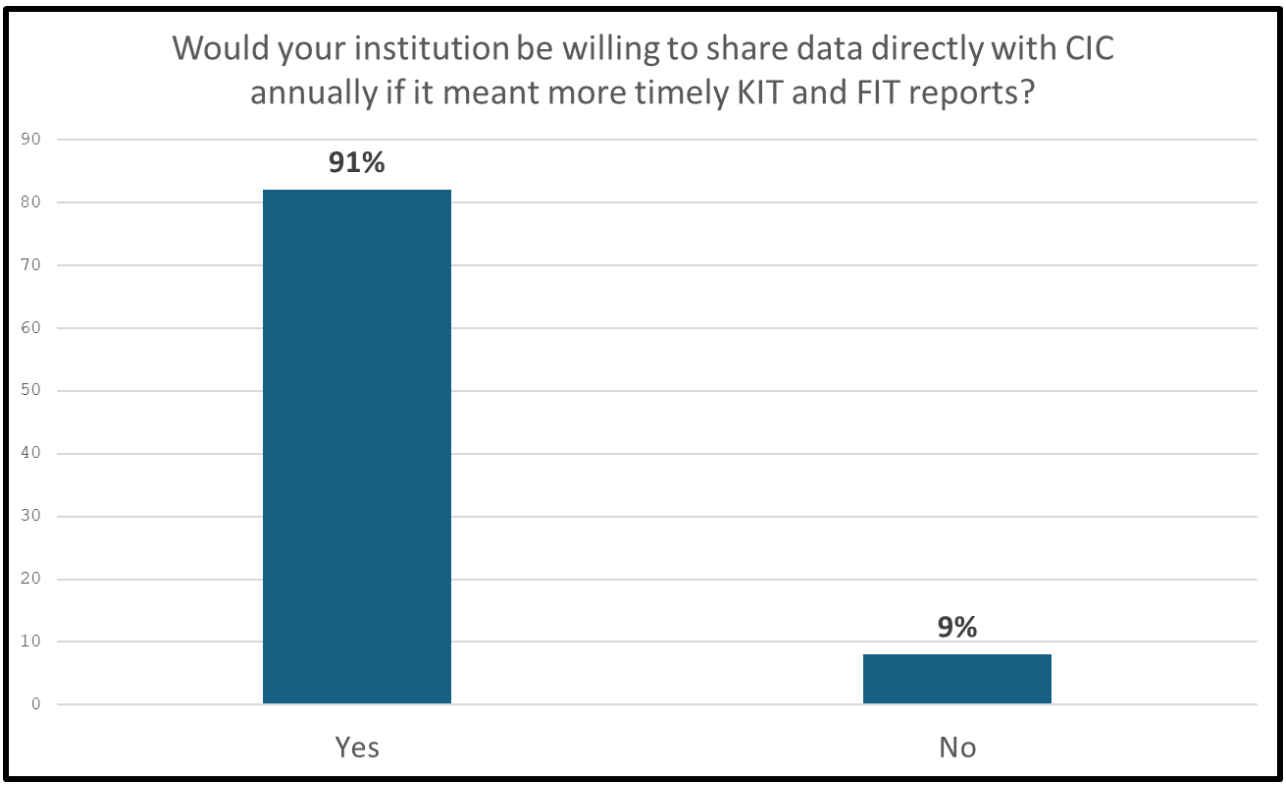
Row Labels	Count of Response	Percent
Complex/Interactive	61	66%
Simple/Static	32	34%
Grand Total	***n*=93**	**100%**



Row Labels	Count of Response	Percent
Institution-specific	12	13%
Comparative	81	87%
Grand Total	***n*=93**	**100%**

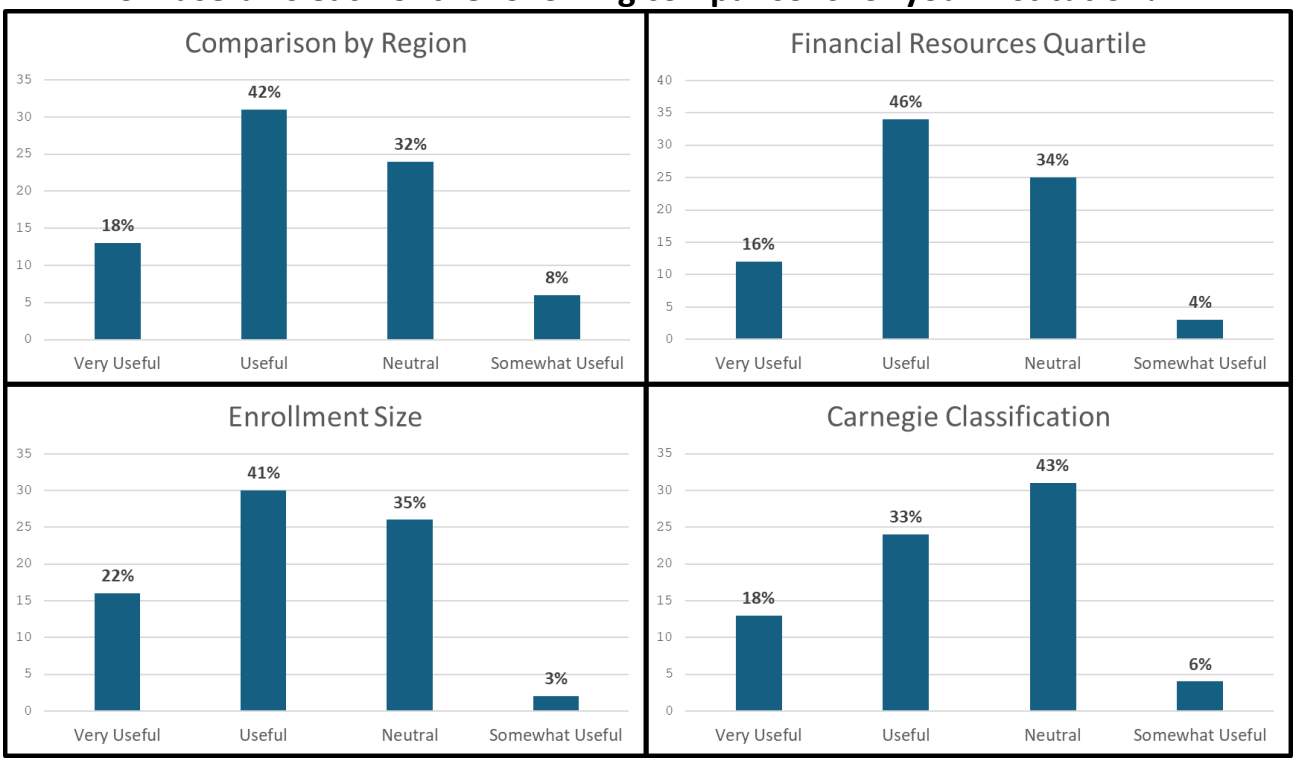


Row Labels	Count of Response	Percent
Internal Use	68	74%
External Use	24	26%
Grand Total	***n*=92**	**100%**



Row Labels	Count of Response	Percent
Yes	82	91%
No	8	9%
Grand Total	***n*=90**	**100%**

How useful is each of the following comparisons for your institution?

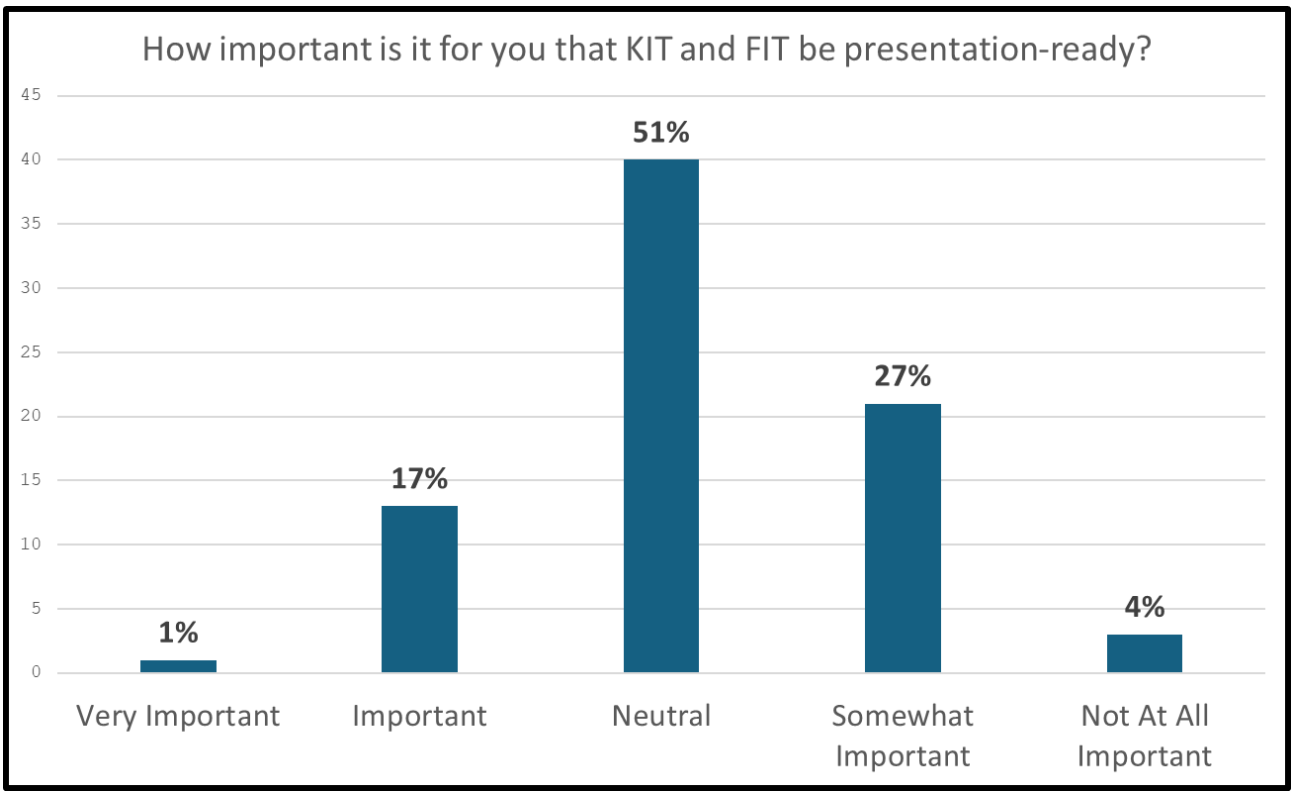


Comparison by Region	Count of Response	Percent
Very Useful	13	18%
Useful	31	42%
Neutral	24	32%
Somewhat Useful	6	8%
Grand Total	***n*=74**	**100%**

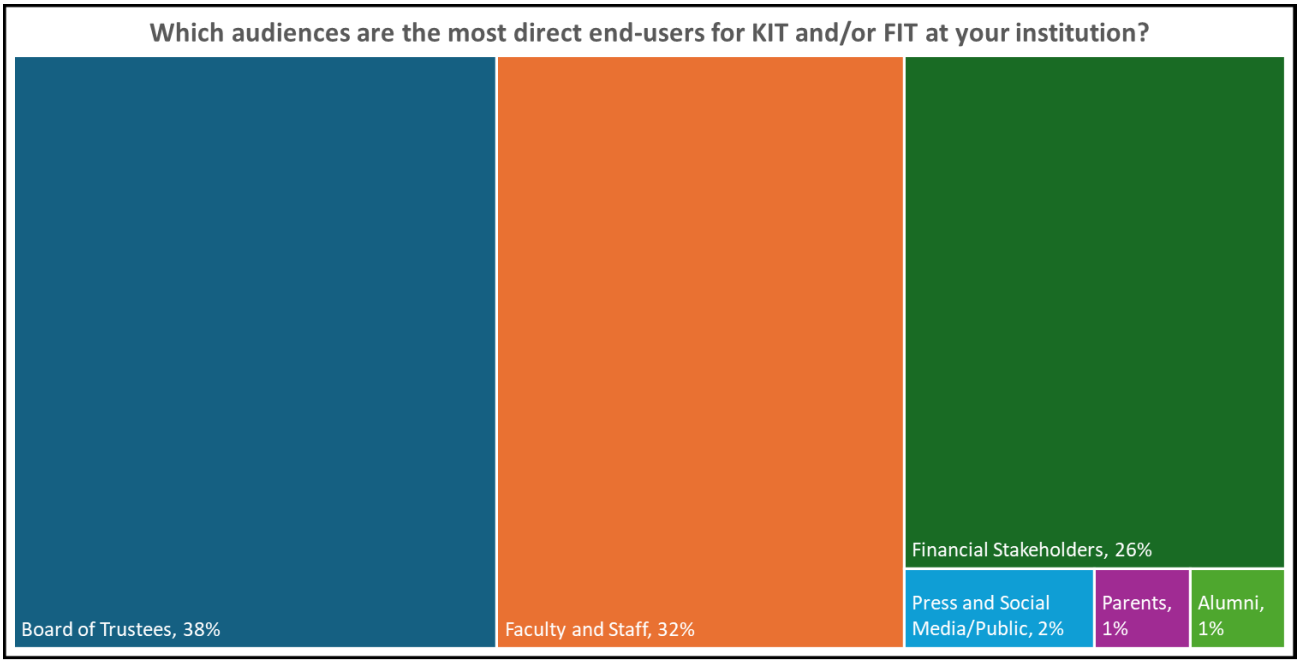
Financial Resources Quartile	Sum of Response	Percent
Very Useful	12	16%
Useful	34	46%
Neutral	25	34%
Somewhat Useful	3	4%
Grand Total	***n*=74**	**100%**

Enrollment Size	Sum of Response	Percent
Very Useful	16	22%
Useful	30	41%
Neutral	26	35%
Somewhat Useful	2	3%
Grand Total	***n*=74**	**100%**

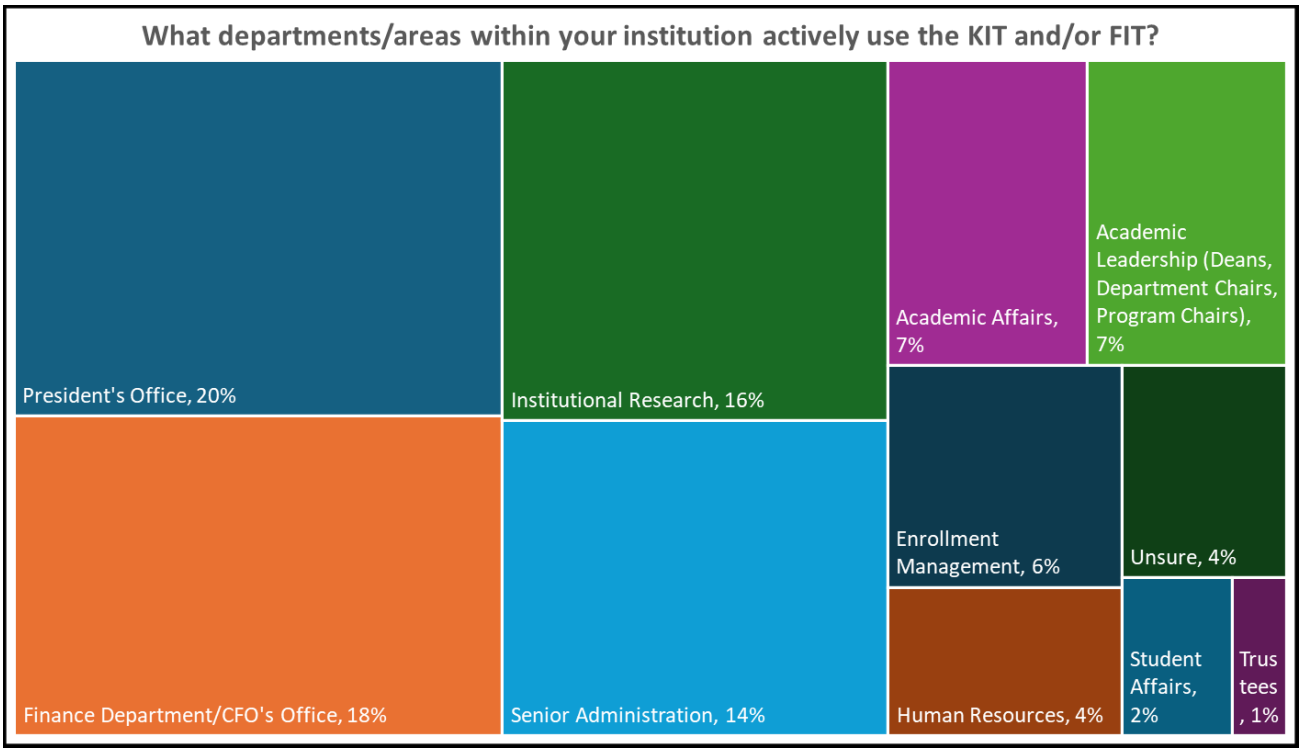
Carnegie Classification	Count of Response	Percent
Very Useful	13	18%
Useful	24	33%
Neutral	31	43%
Somewhat Useful	4	6%
Grand Total	***n*=72**	**100%**



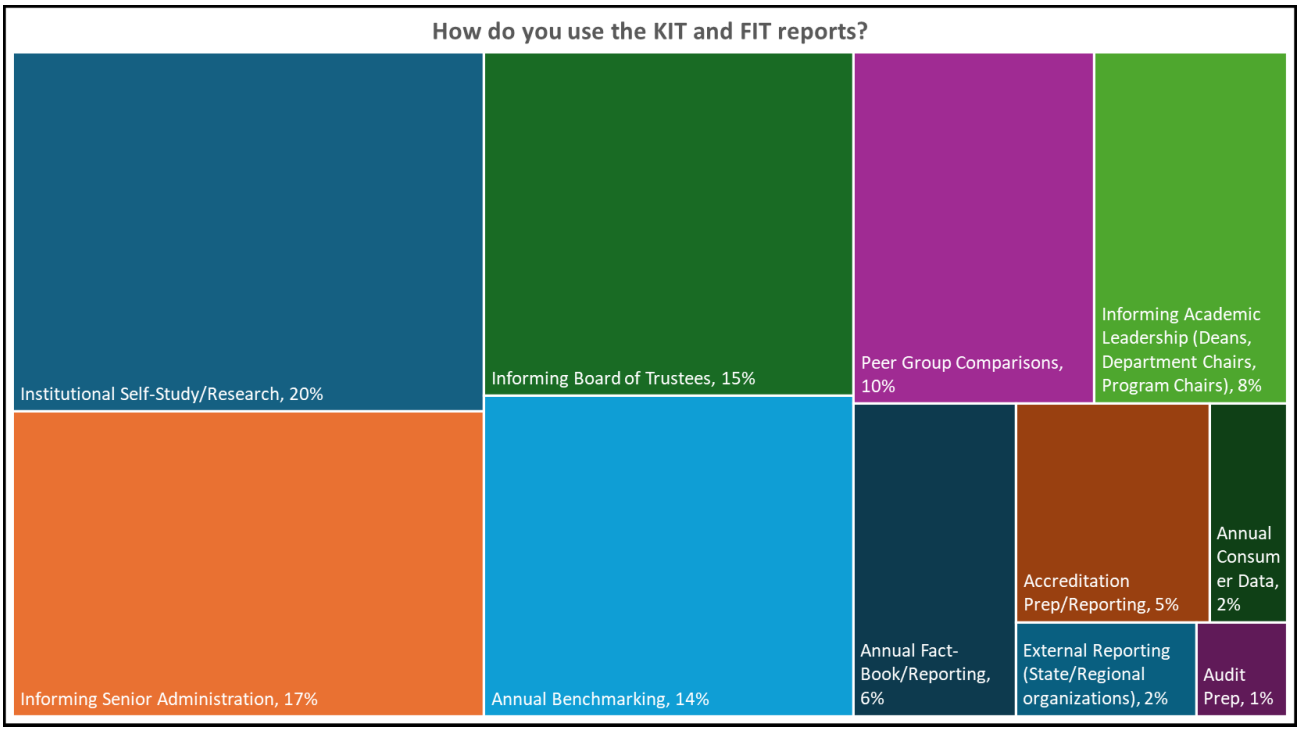
Row Labels	Count of Response	Percent
Very Important	1	1%
Important	13	17%
Neutral	40	51%
Somewhat Important	21	27%
Not At All Important	3	4%
Grand Total	***n*=78**	**100%**



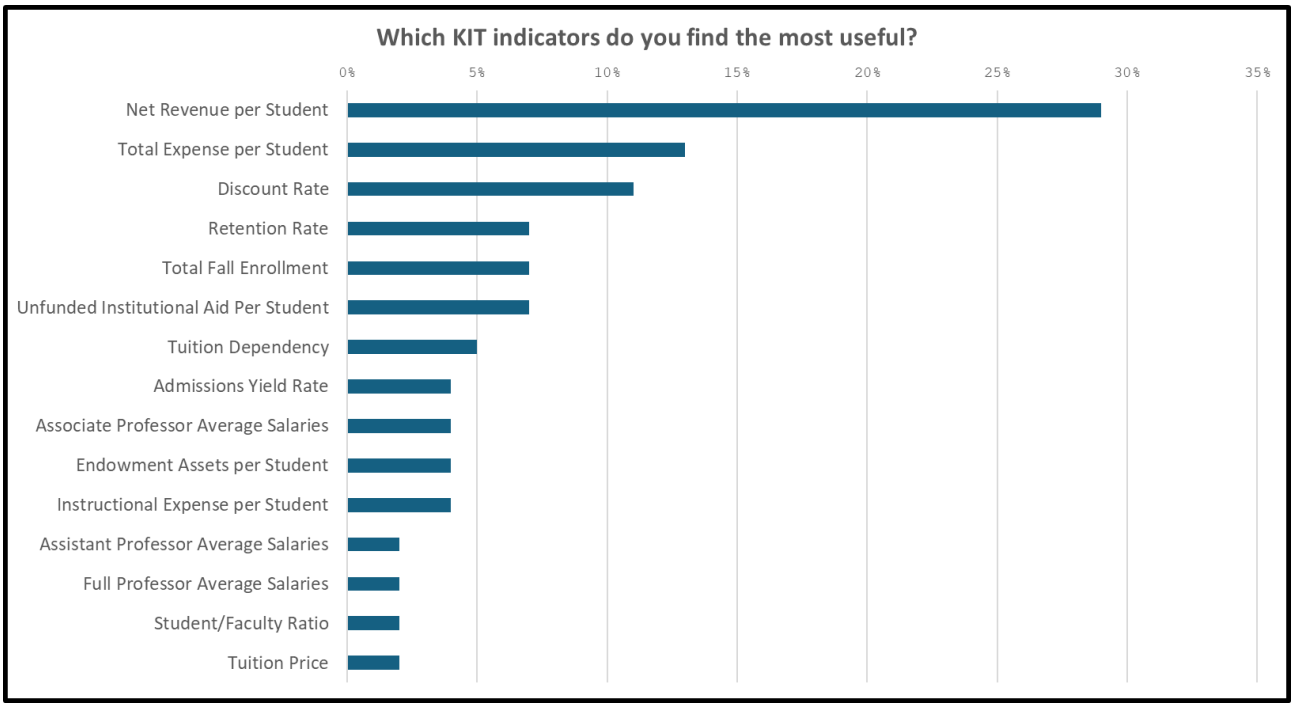
Question	Top Responses	Percent of Responses
Which audiences are the most direct end-users for KIT and/or FIT at your institution?	Board of Trustees	38%
	Faculty and Staff	32%
	Financial Stakeholders	26%
	Press and Social Media/Public	2%
	Parents	1%
	Alumni	1%



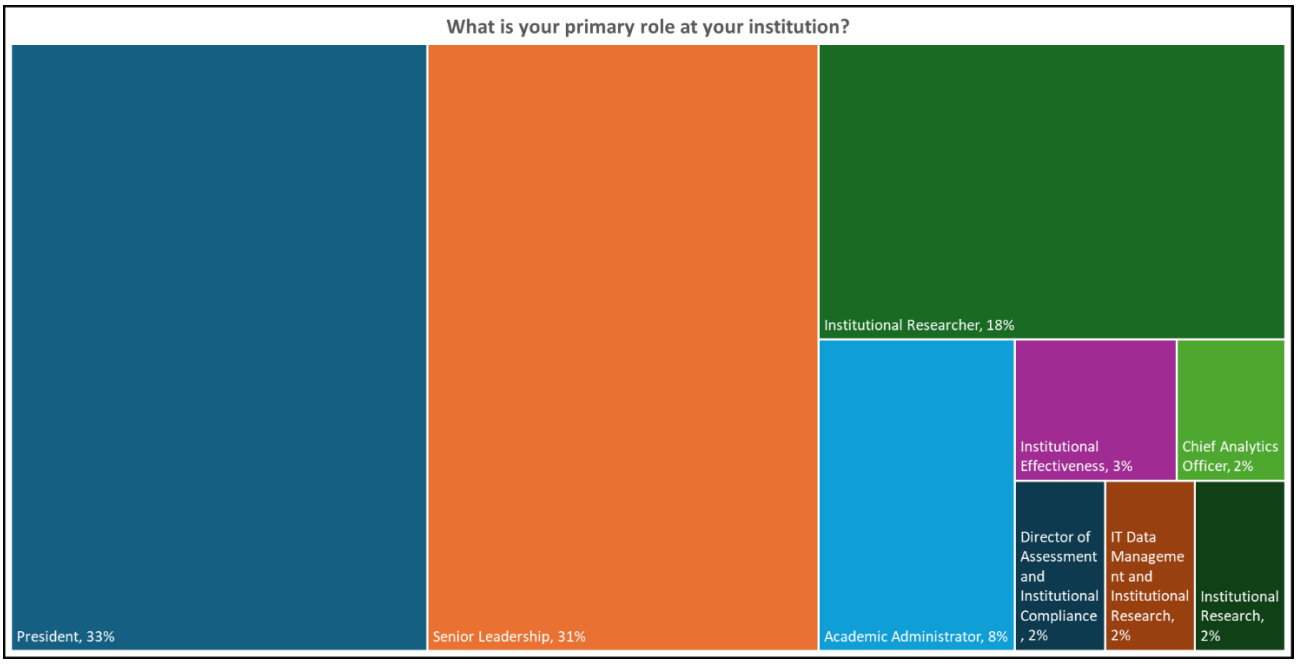
Question	Top Responses	Percent of
What departments/areas within your institution actively use the KIT and/or FIT?	President's Office	20%
	Finance Department/CFO's Office	18%
	Institutional Research	16%
	Senior Administration	14%
	Academic Affairs	7%
	Academic Leadership (Deans, Department Chairs, Program Chairs)	7%
	Enrollment Management	6%
	Human Resources	4%
	Unsure	4%
	Student Affairs	2%
	Trustees	1%



Question	Top Responses	Percent of
How do you use the KIT and FIT reports?	Institutional Self-Study/Research	20%
	Informing Senior Administration	17%
	Informing Board of Trustees	15%
	Annual Benchmarking	14%
	Peer Group Comparisons	10%
	Informing Academic Leadership (Deans, Department Chairs, Program Chairs)	8%
	Annual Fact-Book/Reporting	6%
	Accreditation Prep/Reporting	5%
	Annual Consumer Data	2%
	External Reporting (State/Regional organizations)	2%
	Audit Prep	1%



Question	Top Responses	Percent of
Which KIT indicators do you find the most useful?	Net Revenue per Student	29%
	Total Expense per Student	13%
	Discount Rate	11%
	Retention Rate	7%
	Total Fall Enrollment	7%
	Unfunded Institutional Aid Per Student	7%
	Tuition Dependency	5%
	Admissions Yield Rate	4%
	Associate Professor Average Salaries	4%
	Endowment Assets per Student	4%
	Instructional Expense per Student	4%
	Assistant Professor Average Salaries	2%
	Full Professor Average Salaries	2%
	Student/Faculty Ratio	2%
	Tuition Price	2%



Row Labels	Count of Response	Percent
President	20	33%
Senior Leadership	19	31%
Institutional Researcher	11	18%
Academic Administrator	5	8%
Institutional Effectiveness	2	3%
Chief Analytics Officer	1	2%
Director of Assessment and Institutional Compliance	1	2%
IT Data Management and Institutional Research	1	2%
Institutional Research	1	2%
Grand Total	***n*=61**	**100%**

Appendix K
Statistical Test Summary

t-Test Results

Question 1: Does recency of use of the **KIT** (within the past two years) have any effect on perception of overall value of the KIT/FIT?

t-Test: Two-Sample Assuming Equal Variances		
	Used in 2 years	***NOT Used in 2 years***
Mean	1.939393939	3
Variance	0.427039627	0.6
Observations	66	11
Pooled Variance	0.45010101	
Hypothesized Mean Difference	0	
df	75	
t Stat	**-4.854249096**	
P(T<=t) one-tail	3.21103E-06	
t Critical one-tail	1.665425373	
P(T<=t) two-tail	**6.42205E-06**	
t Critical two-tail	1.992102154	

Used KIT in the past two years	
Mean	**1.939393939**
Standard Error	0.080438159
Median	**2**
Mode	**2**
Standard Deviation	**0.653482691**
Sample Variance	**0.427039627**
Kurtosis	-0.585836621
Skewness	0.060350142
Range	**2**
Minimum	1
Maximum	3
Sum	128
Count	66

NOT Used KIT in the past two years	
Mean	**3**
Standard Error	0.233549683
Median	**3**
Mode	**3**
Standard Deviation	**0.774596669**
Sample Variance	**0.6**
Kurtosis	-1.111111111
Skewness	0
Range	**2**
Minimum	2
Maximum	4
Sum	33
Count	11

Estimated Standard Error	0.218490242
T-Value	-4.854249096
Cohen's d	-1.580880748

Result: Individuals who have used the KIT within the past two years (M = 1.9394, SD = 0.6534) rated their perceived value of the KIT/FIT significantly higher than individuals who have not used the KIT within the past two years (M = 3, SD = 0.7746). t(75) = -4.85, p < .05, d = -1.58

Question 2: Does recency of use of the **FIT** (within the past two years) have any effect on perception of overall value of the KIT/FIT?

t-Test: Two-Sample Assuming Equal Variances

	Used in 2 years	*NOT used in 2 years*
Mean	1.879310345	2.909090909
Variance	0.423774955	0.490909091
Observations	58	11
Pooled Variance	0.433794975	
Hypothesized Mean Difference	0	
df	67	
t Stat	**-4.754317995**	
P(T<=t) one-tail	5.48169E-06	
t Critical one-tail	1.667916114	
P(T<=t) two-tail	**1.09634E-05**	
t Critical two-tail	1.996008354	

Used FIT in the past two years	
Mean	**1.879310345**
Standard Error	0.085477861
Median	**2**
Mode	**2**
Standard Deviation	**0.650979996**
Sample Variance	**0.423774955**
Kurtosis	-0.58479419
Skewness	0.12170746
Range	**2**
Minimum	1
Maximum	3
Sum	109
Count	58

NOT Used FIT In the past two years	
Mean	**2.909090909**
Standard Error	0.211253637
Median	**3**
Mode	**3**
Standard Deviation	**0.70064905**
Sample Variance	**0.490909091**
Kurtosis	-0.452674897
Skewness	0.123342425
Range	**2**
Minimum	2
Maximum	4
Sum	32
Count	11

Estimated Standard Error	0.216599009
T-Value	-4.754317995
Cohen's d	-1.563516369

Result: Individuals who have used the FIT within the past two years (M = 1.8793, SD = 0.6509) rated their perceived value of the KIT/FIT significantly higher than individuals who have not used the FIT within the past two years (M = 2.9091, SD = 0.7007). t(67) = -4.75, p < .05, d = -1.56

Question 3: Does the nature of recent use of the **KIT** within the past year (used either monthly or annually) have any effect on perception of overall value of the KIT/FIT?

t-Test: Two-Sample Assuming Equal Variances

	Monthly	***Annually***
Mean	1.357142857	2.106382979
Variance	0.247252747	0.35800185
Observations	14	47
Pooled Variance	0.333599505	
Hypothesized Mean Difference	0	
df	59	
t Stat	**-4.260458663**	
P(T<=t) one-tail	3.72056E-05	
t Critical one-tail	1.671093032	
P(T<=t) two-tail	**7.44113E-05**	
t Critical two-tail	2.000995378	

Monthly	
Mean	**1.357142857**
Standard Error	0.132894358
Median	**1**
Mode	**1**
Standard Deviation	**0.497245158**
Sample Variance	**0.247252747**
Kurtosis	-1.838383838
Skewness	0.670360139
Range	**1**
Minimum	1
Maximum	2
Sum	19
Count	14

Annually	
Mean	**2.106382979**
Standard Error	0.087275774
Median	**2**
Mode	**2**
Standard Deviation	**0.598332558**
Sample Variance	**0.35800185**
Kurtosis	-0.112203703
Skewness	-0.033109527
Range	**2**
Minimum	1
Maximum	3
Sum	99
Count	47

Estimated Standard Error	0.175859
T-Value	-4.260459
Cohen's d	-1.297204

Result: Individuals who report using the KIT on a monthly basis (M = 1.3571, SD = 0.4972) rated their perceived value of the KIT/FIT significantly higher than individuals who report using the KIT on an annual basis (M = 2.1064, SD = 0.5983). t(59) = -4.26, $p < .05$, d = -1.30

Question 4: Does the nature of recent use of the **FIT** within the past year (used either monthly or annually) have any effect on perception of overall value of the KIT/FIT?

t-Test: Two-Sample Assuming Equal Variances

	Monthly	*Annually*
Mean	1.357142857	2.166666667
Variance	0.247252747	0.337398374
Observations	14	42
Pooled Variance	0.315696649	
Hypothesized Mean Difference	0	
df	54	
t Stat	**-4.668628212**	
P(T<=t) one-tail	1.0233E-05	
t Critical one-tail	1.673564906	
P(T<=t) two-tail	**2.0466E-05**	
t Critical two-tail	2.004879288	

Monthly	
Mean	**1.357142857**
Standard Error	0.132894358
Median	**1**
Mode	**1**
Standard Deviation	**0.497245158**
Sample Variance	**0.247252747**
Kurtosis	-1.838383838
Skewness	0.670360139
Range	**1**
Minimum	1
Maximum	2
Sum	19
Count	14

Annually	
Mean	**2.166666667**
Standard Error	0.089628648
Median	**2**
Mode	**2**
Standard Deviation	**0.58086003**
Sample Variance	**0.337398374**
Kurtosis	-0.073615686
Skewness	-0.014519393
Range	**2**
Minimum	1
Maximum	3
Sum	91
Count	42

Estimated Standard Error	0.1733965
T-Value	-4.668628
Cohen's d	-1.44077

Result: Individuals who report using the FIT on a monthly basis (M = 1.3571, SD = 0.4972) rated their perceived value of the KIT/FIT significantly higher than individuals who report using the KIT on an annual basis (M = 2.1667, SD = 0.5809). $t(54) = -4.67$, $p < .05$, $d = -1.44$

ANOVA TESTS RESULTS

Question 1: Is there a difference in the perceived usefulness/value of the four KIT and FIT institutional comparisons (Comparison by Region, Comparison by Financial Resource Quartile, Comparison by Enrollment Size, Comparison by Carnegie Classification)?

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Comparison by Region	74	273	3.689189	0.73769
Financial Resources Quartile	74	277	3.743243	0.604406
Enrollment Size	74	282	3.810811	0.648649
Carnegie Classification	72	262	3.638889	0.712833

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.193816	3	0.397939	0.588981	0.622666	2.635735
Within Groups	195.9354	290	0.675639			
Total	197.1293	293				

η^2	0.006056

Result: A one-way analysis of variance did not reach significance, F [3, 290] = 0.59, p>.05 [η2 = 0.01], in detecting a difference in the perceived usefulness/value of the four KIT and FIT institutional comparisons.

Question 2: Is there a difference in the perceived usefulness/value of the 20 different KIT indicators?

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Total Fall Enrollment	64	241	3.765625	1.007688
First-Year Enrollment	64	243	3.796875	0.958085
Admissions Yield Rate	64	242	3.78125	0.935516
Retention Rate	64	256	4	0.984127
Graduation Rate	64	254	3.96875	0.951389
Student/Faculty Ratio	64	244	3.8125	0.821429
Part-Time Faculty (%)	62	221	3.564516	1.06954
Assistant Professor Average Salaries	64	246	3.84375	0.705357

Associate Professor Average Salaries	64	246	3.84375	0.705357
Full Professor Average Salaries	64	249	3.890625	0.702133
Tuition Price	64	244	3.8125	1.075397
Total Institutional Aid by Student	64	257	4.015625	1.063244
Unfunded Institutional Aid Per Student	63	251	3.984127	1.112647
Average Institutional Aid for First-Year Students	63	252	4	1
Net Revenue per Student	64	265	4.140625	0.916419
Discount Rate	64	256	4	1.174603
Tuition Dependency	63	247	3.920635	0.912954
Endowment Assets per Student	63	242	3.84127	0.94214
Instructional Expense per Student	64	259	4.046875	0.807292
Total Expense per Student	64	264	4.125	0.777778

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	23.10692	19	1.216154	1.306652	0.168938	1.59482
Within Groups	1167.148	1254	0.93074			
Total	1190.255	1273				

η2	0.019413

Result: A one-way analysis of variance did not reach significance, F [19, 1254] = 1.31, p>.05 [η2 = 0.02], in detecting a difference in the perceived usefulness/value of the different KIT indicators.

Question 3: Is there a difference in the perception of alignment of the FIT scores with performance strategy recommendations?

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Commit additional resources to advance mission (for FIT score 8 to 10)	50	60	1.2	0.163265
Encourage innovation to achieve mission (for FIT score 6 to 7)	49	60	1.22449	0.177721
Implement initiatives to promote sustainability (for FIT score 4 to 5)	47	57	1.212766	0.171138
Perform a thorough review of institutional effectiveness (for FIT score 2 to 3)	47	58	1.234043	0.183164
Implement significant institutional changes to achieve mission (for FIT score -1 to 1)	47	61	1.297872	0.213691
Assess Department of Education compliance and institutional long-term viability (for FIT score -4 to -2)	47	60	1.276596	0.20444

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.348623	5	0.069725	0.376328	0.86477	2.24613
Within Groups	52.06253	281	0.185276			
Total	52.41115	286				

η^2	0.006652

Result: A one-way analysis of variance did not reach significance, F [5, 281] = 0.38, p>.05 [η2 = 0.01], in detecting a difference in perception of alignment between the FIT scores and the performance strategy recommendations.

Question 4: Is there a difference in the perceived value of the weights used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More) across the four FIT score ratio criteria (Operating Reserve Ratio (35%), Debt to Expendable Equity Ratio (35%), Change in Net Assets Ratio (20%), Operating Margin Ratio (10%))?

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Operating Reserve Ratio (35%)	49	96	1.959184	0.123299
Debt to Expendable Equity Ratio (35%)	49	94	1.918367	0.118197
Change in Net Assets Ratio (20%)	49	101	2.061224	0.267007
Operating Margin Ratio (10%)	49	109	2.22449	0.302721

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2.734694	3	0.911565	4.494759	0.004497	2.65164
Within Groups	38.93878	192	0.202806			
Total	41.67347	195				

η^2	0.065622

Result: A one-way analysis of variance reached significance, F [3, 192] = 4.49, p<.05 [η2 = 0.07], in the different perceptions of agreement between respondents regarding the weighting scales of the four ratios used to calculate the overall FIT score.

CHI-SQUARE TESTS RESULTS

Question 1: How well aligned are the FIT scores with performance strategy recommendations?
- Commit additional resources to advance mission (for FIT score 8 to 10)

Row Labels	Not Well Aligned	Well Aligned	Grand Total
Annually	7	28	35
Monthly	1	9	10
Grand Total	**8**	**37**	**45**

X^2	0.5321
df	1
p-value	0.4657
	0.4657

Result: A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X^2 (1, N=45) = 0.53, p>.05.

Question 2: How well aligned are the FIT scores with performance strategy recommendations?
- Encourage innovation to achieve mission (for FIT score 6 to 7)

Row Labels	Not Well Aligned	Well Aligned	Grand Total
Annually	8	27	35
Monthly	2	8	10
Grand Total	**10**	**35**	**45**

X^2	0.0367
df	1
p-value	0.8480
	0.8480

Result: A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X^2 (1, N=45) = 0.04, p>.05.

Question 3: How well aligned are the FIT scores with performance strategy recommendations?
- Implement initiatives to promote sustainability (for FIT score 4 to 5)

Row Labels	Not Well Aligned	Well Aligned	Grand Total
Annually	6	29	35
Monthly	3	7	10
Grand Total	**9**	**36**	**45**

X^2	0.8036
df	1
p-value	0.3700
	0.3700

Result: A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X^2 (1, N=45) = 0.80, p>.05.

Question 4: How well aligned are the FIT scores with performance strategy recommendations?
- Perform a thorough review of institutional effectiveness (for FIT score 2 to 3)

Row Labels	Not Well Aligned	Well Aligned	Grand Total
Annually	8	27	35
Monthly	2	8	10
Grand Total	**10**	**35**	**45**

X^2	0.0367
df	1
p-value	0.8480
	0.8480

Result: A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X^2 (1, N=45) = 0.04, p>.05.

Question 5: How well aligned are the FIT scores with performance strategy recommendations?
- Implement significant institutional changes to achieve mission (for FIT score -1 to 1)

Row Labels	Not Well Aligned	Well Aligned	Grand Total
Annually	9	26	35
Monthly	4	6	10
Grand Total	**13**	**32**	**45**

X^2	0.7727
df	1
p-value	0.3794
	0.3794

Result: A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X^2 (1, N=45) = 0.77, p>.05.

Question 6: How well aligned are the FIT scores with performance strategy recommendations?
- Assess Department of Education compliance and institutional long-term viability (for FIT score -4 to -2)

Row Labels	Not Well Aligned	Well Aligned	Grand Total
Annually	9	26	35
Monthly	3	7	10
Grand Total	**12**	**33**	**45**

X^2	0.0731
df	1
p-value	0.7869
	0.7869

Result: A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived alignment of the performance strategy recommendation, X^2 (1, N=45) = 0.07, p>.05.

Question 7: Please assess the weightings used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More). - Operating Reserve Ratio (35%)

Row Labels	Agree with Current Weight	Should be Weighted Less	Should be Weighted More	Grand Total
Annually	30	3	2	35
Monthly	13	1		14
Grand Total	**43**	**4**	**2**	**49**

Result: A chi-square test of independence could not be conducted on the data set due to incomplete observations in the data table.

Question 8: Please assess the weightings used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More). - Debt to Expendable Equity Ratio (35%)

Row Labels	Agree with Current Weight	Should be Weighted Less	Should be Weighted More	Grand Total
Annually	31	4		35
Monthly	12	1	1	14
Grand Total	**43**	**5**	**1**	**49**

Result: A chi-square test of independence could not be conducted on the data set due to incomplete observations in the data table.

Question 9: Please assess the weightings used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More). - Change in Net Assets Ratio (20%)

Row Labels	Agree with Current Weight	Should be Weighted Less	Should be Weighted More	Grand Total
Annually	26	3	6	35
Monthly	10	2	2	14
Grand Total	**36**	**5**	**8**	**49**

X^2	0.38
df	2
p-value	0.8265
	0.8265

Result: A chi-square test of independence showed that there was no significant association between the type of annual use of the FIT (monthly or annually) and the perceived agreement with the calculation of the overall FIT score, X^2 (2, N=49) = 0.38, p>.05.

Question 10: Please assess the weightings used to calculate the overall FIT score (Agree with Current Weight, Should be Weighted Less, Should be Weighted More). – Operating Margin Ratio (10%)

Row Labels	Agree with Current Weight	Should be Weighted Less	Should be Weighted More	Grand Total
Annually	22	3	10	35
Monthly	10		4	14
Grand Total	**32**	**3**	**14**	**49**

Result: A chi-square test of independence could not be conducted on the data set due to incomplete observations in the data table.

References

Abdou, N., Karimi, A., Murarka, R., & Swarat, S. (2021). Rigorous Data Validation for Accurate Dashboards: Experience From a Higher Education Institution. *IT Professional*, 23, 95-101.

Alexander, B. (2020). *Academia Next: The Futures of Higher Education.* Johns Hopkins University Press.

Arellano, P. (2017). Making decisions with data – Developing a community around data in your business. *IT Pro Portal*.

Ashaari, M. A., Amran, A., Ahmad, N. H., Bakri, H., & Nazri, S. (2020, June). Big data analytics technology capability and data-driven decision making in Malaysian higher education institutions: A conceptual framework. In *IOP Conference Series: Materials Science and Engineering* (Vol. 874, No. 1, p. 012021). IOP Publishing.

Atkins, R. G. (2022). *Start, Stop, or Grow? A Data-Informed Approach to Academic Program Evaluation and Management*. Advantage.

Bazerman, M.H., Giuliano, T. & Appelman, A. (1984). Escalation of Commitment in Individual and Group Decision Making. *Organizational Behavior and Human Performance,* 33(2), 141-152.

Bichsel, J. (2012). Analytics in higher education: Benefits, barriers, progress, and recommendations. EDUCAUSE Center for Applied Research.

Boland, R., Tenkasi, R., & Te'eni, D. (1994). Designing Information Technology to Support Distributed Cognition. *Organization Science*, 5, 456-475.

Boreham, N., & Morgan, C. (2004). A Sociocultural Analysis of Organisational Learning. *Oxford Review of Education, 30(3),* 307-325.

Borgman, C. L., & Brand, A. (2022). Data blind: Universities lag in capturing and exploiting data. *Science, 378*(6626), 1278-1281.

Brady, C., Forde, C. M., & Chadwick, S. (2017). Why your company needs data translators. *MIT Sloan Management Review*, (Winter), 14-16.

Carlson, S. (2024, March 8). Why it can be so difficult to gauge a college's financial health. *The Chronicle of Higher Education*.

Caspari-Sadeghi, S. (2023). Learning assessment in the age of big data: Learning analytics in higher education. *Cogent Education, 10(*1), 2162697.

Chai, S., & Shih, W. (2017). Why big data isn't enough. *MIT Sloan Management Review*, (Winter), 57-61.

Chapman, K. (2021). "Wait – it's a math problem, right?": Negotiated School Frames in Out-of-School Places. *Educational Studies in Mathematics*, 109, 661-676.

Christensen, C. & Eyring, H. (2011). *The Innovative University: Changing the DNA of Higher Education from the Inside Out*. Josey Bass.

Chung, S.H., & Chend, K.C. (2018). How Does Cognitive Dissonance Influence the Sunk Cost Effect? *Psychology Research and Behavior Management*, 11, 37-45.

The Council of Independent Colleges. (2022) *Financial Indicators Tool (FIT) - Sample Report 2022*: https://cic.edu/wp-content/uploads/2023/03/Sample-College-2022-FIT.pdf

The Council of Independent Colleges. (2022) *Key Indicators Tool (KIT) Part A - Sample Report 2022*: https://cic.edu/wp-content/uploads/2023/01/Sample-College-2022-KIT-Part-A.pdf

The Council of Independent Colleges. (2022) *Key Indicators Tool (KIT) Part B - Sample Report 2022*: https://cic.edu/wp-content/uploads/2023/01/Sample-College-2022-KIT-Part-B.pdf

Davenport, T. H., Harris, J. G., DeLong, D. W., & Jacobson, A. L. (2001). Data to knowledge

to results: Building an analytics capability. *California Management Review, 43*(2), 117-138.
Diaz, A., Rowshankish, K., & Saleh, T. (2018). Why data culture matters. *McKinsey Quarterly*, (September).
Drake, B. M., & Walz, A. (2018). Evolving business intelligence and data analytics in higher education. In C. Mathies (Ed.), *New Directions for Institutional Research*, 178. Wiley Periodicals, Inc.
Dziuban, C., Moskal, P., Cavanaugh, T., & Watts, A. (2012). Analytics that inform the university: Using data you already have. *Journal of Asynchronous Learning Networks, 16*(3), 21-38.
Ekowo, M., & Palmer, I. (2017). Predictive analytics in higher education: Five guiding principles for ethical use. New America.
Elgendy, N., & Elragal, A. (2016). Big Data Analytics in Support of the Decision Making Process. *Procedia Computer Science*, 100, 1071-1084.
Feldman, G., & Wong, K. F. E. (2018). When Action-Inaction Framing Leads to Higher Escalation of Commitment: A New Inaction-Effect Perspective on the Sunk-Cost Fallacy. *Psychological Science, 29*(4), 537–548.
Gaftandzhieva, S., Hussain, S., Hilcenko, S., Doneva, R., & Boykova, K. (2023). Data-driven Decision Making in Higher Education Institutions: State-of-play. *International Journal of Advanced Computer Science and Applications, 14*(6).
Garbuio, M., Lovallo, D., & Sibony, O. (2015). Evidence Doesn't Argue for Itself: The Value of Disinterested Dialogue in Strategic Decision-Making. Long Range Planning, 48, 361-380.
Gawronski, B. (2012). Back to the Future of Dissonance Theory: Cognitive Consistency as a Core Motive. *Social Cognition, 30*(6), 652–668.
Glazer, R., Steckel, J., & Winer, R. (1992). Locally Rational Decision Making: The Distracting Effect of Information on Managerial Performance. Management Science, 38, 212-226.
Gordon, K. (1999). Spreadsheet or database: Which makes more sense?. *Journal of Computing in Higher Education*, 10, 111-116.
Grawe, N. (2018). *Demographics and the Demand for Higher Education.* Johns Hopkins University Press.
Grawe, N. (2021). *The Agile College: How Institutions Successfully Navigate Demographic Changes*. Johns Hopkins University Press.
Greeno, J. & Gresalfi, M. (2008). Opportunities to Learn in Practice and Identity. In P.A. Moss, D.C. Pullin, J.P. Gee, E.H. Haertel, & L.J. Young (Eds.), Assessment, Equity, and Opportunity to Learn (pp. 170-199). New York: Cambridge University Press.
Greitemeyer, T., Schulz-Hardt, S., & Frey, D. (2009). The Effects of Authentic and Contrived Dissent on Escalation of Commitment in Group Decision Making. *European Journal of Social Psychology*, 39, 639-647.
Hafenbrack, A.C., Kinias, Z., & Barsade, S. G. (2014). Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias. *Psychological Science, 25*(2), 369–376.
Haita-Falah, C. (2017). Sunk-Cost Fallacy and Cognitive Ability in Individual Decision-Making. Journal of Economic Psychology, 58, 44-59.
Heavin, C., & Power, D. J. (2017). How do data-driven, data-based, and data-informed decision making differ?
Higher Ed. Dive. (Updated: 2024, June 18). *A look at trends in college consolidations since*

2016. Higher Ed Dive.
Hinojosa, A., Gardner, W. L., Walker, H. J., Cogliser, C., & Gullifor, D. (2017). A Review of Cognitive Dissonance Theory in Management Research: Opportunities for Further Development. *Journal of Management*, *43*(1), 170–199.
Ho, Y. (1980). Team decision theory and information structures. *Proceedings of the IEEE*, 68, 644-654.
Horst, R. M. (2020). *Higher Education Executives and Data-Driven Decision Making: A Phenomenological Study* (Doctoral dissertation, Concordia University (Oregon)).
Hsieh, K.Y., Tsai, W., & Chen, M.J. (2015). If They Can Do It, Why Not Us? Competitors as Reference Points for Justifying Escalation of Commitment. *Academy of Management Journal*, *58*(1), 38–58.
Humburg, D. (2012). Utilizing the Composite Financial Index as Strategic Financial Analysis for Measuring Financial Health and Student Success Rates among Iowa Community Colleges.
Jaschik, S., & Lederman, D. (2019). The 2019 Inside Higher Education survey of college and university chief academic officers – A study by Gallup and Inside Higher Education. *Inside Higher Education*.
Jin, M., Wang, H., Zhang, Q., & Luo, C. (2018). Financial Management and Decision Based on Decision Tree Algorithm. *Wireless Personal Communications*, 102, 2869-2884.
Kalim, U., & Bibi, S. (2023). Understanding data-driven decision making approach in Chinese higher education through the lens of Bakers model. *International Journal of Chinese Education*, 12(1), 2212585X231162120.
Kaspi, S., & Venkatraman, S. (2023). Data-Driven Decision-Making (DDDM) for Higher Education Assessments: A Case Study. *Systems*, *11*(6), 306.
Kirby, W., & Waugaman, P. (2002). Benchmarking in Sponsored Programs Administration: Using the Web to Analyze Nationwide Data Collection Results. (Shop Talk). *The journal of research administration*, 33, 37.
Klein, J., & McColl, G. (2019). Cognitive Dissonance: How Self-Protective Distortions Can Undermine Clinical Judgement. *Medical Education*, *53*(12), 1178–1186.
Knapp, M. S., Copland, M. A., & Winnerton, J. A. (2007). Understanding the promise and dynamics of data-informed leadership. In *Yearbook of the National Society for the Study of Education*, 74-104.
Kő, A., Francesconi, E., Kotsis, G., Tjoa, A. M., & Khalil, I. (Eds.). (2020). *Electronic Government and the Information Systems Perspective: 9th International Conference, EGOVIS 2020, Bratislava, Slovakia, September 14–17, 2020, Proceedings* (Vol. 12394). Springer Nature.
Koci, E., Thiele, M., Lehner, W., & Romero, O. (2018). Table Recognition in Spreadsheets via a Graph Representation. *2018 13th IAPR International Workshop on Document Analysis Systems (DAS)*, 139-144.
Lane, J. E., & Finsel, B. A. (2014). Fostering smarter colleges and universities – Data, big data, and analytics. In J. E. Lane (Ed.), *Building a Smarter University: Big Data, Innovation, and Analytics* (pp. 3-26). State University of New York Press.
Lave, J. & Wenger, E. (1991). Situated Learning: Legitimate Peripheral Participation. Cambridge, UK: Cambridge University Press.
Lovallo, D., & Sibony, O. (2010). The Case for Behavioral Strategy. *McKinsey Quarterly*, 2, 30-45.

Marr, B. (2018). Forget data scientists and hire a data translator instead? *Forbes Magazine Online*.
Martin, D. (2016). Data-driven versus data-informed-What's best for you? *Cleverism*.
Maycotte, H. O. (2015). Be data-informed, not data-driven, for now. *Forbes Magazine Online*.
Marzal, J., Bintana, R., & Utomo, P. (2021). User Acceptance of Data Informed Decision Making Portals: Application of the UTAUT Model and Leadership Styles. *Journal of Business Studies and Mangement Review*.
McGee, J. (2015). *Breakpoint: The Changing Marketplace for Higher Education*. Johns Hopkins University Press.
Metcalfe, J. (2017). Learning from Errors. *Annual Review of Psychology*, 68, 465-489.
Mitchell, J., & Ryder, A. (2013). Developing and Using Dashboard Indicators in Student Affairs Assessment. *New Directions for Student Services*, 2013, 71-81.
Montecinos-Pearce, A., Rodrigo, P., & Duran, I.J. (2020). When is Escalation of Commitment Unstoppable in Group Settings? An Iterative Economic Modeling Approach to Unveil the Dark Side of Group Decision Making. *Manage Decis Econ*, 41, 1387-1402.
Moser, K., Wolff, H.G., & Kraft, A. (2013). The De-Escalation of Commitment: Predecisional Accountability and Cognitive Processes. *Journal of Applied Social Psychology*, *43*(2), 363–376.
Ohlert, C. & Weißenberger, B. E. (2019). Debiasing Escalation of Commitment: The Effectiveness of Decision Aids to Enhance De-Escalation. *Journal of Management Control*, *30*(4), 405–438.
Parada, S., Blasco-Blasco, O., & Liern, V. (2018). Adequacy Indicators Based on Pre-established Goals: An Implementation in a Colombian University. *Social Indicators Research*, 143, 1-24.
Parnell, A. (2022). Advancing from Prediction to Prescription: Strategies for Proactively and Thoughtfully Addressing Students' Needs. *Journal of Postsecondary Student Success*.
Picciano, A. G. (2012). The evolution of big data and learning analytics in American higher education. *Journal of Asynchronous Learning Networks, 16*(3), 9-20.
Qi, W., Guo, X., Wu, X., Marinova, D., & Fan, J. (2017). Do the Sunk Cost Effect and Cognitive Dissonance Increase Risk Perception? An Empirical Study in the Context of City Smog. *Quality & Quantity*, *52*(5), 2269–2289.
Richards, G. (2016). Business Intelligence and Analytics Research: A Peek Inside the Black Box. *Int. J. Bus. Intell. Res.*, 7, 1-10.
Rogoff, B., Topping, K., Baker-Sennerr, J., & Lacasa, P. (2002). Mutual contributions of individuals, partners, and institutions: Planning to remember in Girl Scout Cookie sales. Social Development, 11(2), 266-289
Schultze, T., Pfeiffer, F., & Schulz-Hardt, S. (2012). Biased information processing in the escalation paradigm: Information search and information evaluation as potential mediators of escalating commitment. *Journal of Applied Psychology, 97*(1), 16–32.
Sfard, A. (1998). On Two Metaphors for Learning and the Dangers of Choosing Just One. *Educational Researcher*, 27(2), 4-13.
Shah, T. (2022). Big Data Analytics in Higher Education. *Research Anthology on Big Data Analytics, Architectures, and Applications*.
Shen, J., & Cooley, V.E. (2008). *Critical issues in using data for decision-making.* International Journal of Leadership in Education, 11, *319 - 329.*

Shen, J., Cooley, V.E., Ma, X., Reeves, P.L., Burt, W.L., Rainey, J., & Yuan, W. (2012). *Data-Informed Decision Making on High-Impact Strategies: Developing and Validating an Instrument for Principals.* The Journal of Experimental Education, 80*, 1 - 25.*

Sleesman, D.J., Conlon, D.E., McNamara, G., & Miles, J.E. (2012). Cleaning up the Big Muddy: A Meta-Analysis Review of the Determinants of Escalation of Commitment. *Academy of Management Journal*, 55(3), 541-562.

Sleesman, D.J., Lennard, A.C., McNamara, G., & Conlon, D.E. (2018). Putting Escalation of Commitment in Context: A Multilevel Review and Analysis. *Academy of Management Annals*, 12(1), 178-207.

Supovitz, J., & Tognatta, N. (2013). The Impact of Distributed Leadership on Collaborative Team Decision Making. *Leadership and Policy in Schools*, 12, 101 - 121.

Viberg, O., Hatakka, M., Balter, O., & Mavroudi, A. (2018). The current landscape of learning analytics in higher education. *Computers in Human Behavior, 89*, 98-110.

Webber, K,. & Zheng, H. (2020). Data Analytics and the Imperatives for Data-Informed Decision Making in Higher Education. In K. Webber & H. Zheng (Eds.), Big Data on Campus: Data Analytics and Decision Making in Higher Education (pp. 3-29). Johns Hopkins University Press.

Webber, K., & Zheng, H. (Eds.). (2020). *Big Data on Campus: Data Analytics and Decision Making in Higher Education*. Johns Hopkins University Press. Achieving the Dream. (2012). Building institutional capacity for data-informed decision making. Public Agenda Series #3.

Wertsch, J. (1998). Mind as Action. New York: Oxford University Press.

Zheng, H. Y. (2015). Business intelligence as data-based decision support system and its roles in support of institutional research and planning. In K. Webber & A. Calderon (Eds.), *Institutional Research and Planning in Higher Education – Global Contexts and Themes* (pp. 159-173). Routledge.

Wieber, F., Thürmer, J.L., & Gollwitzer P.M. (2015). Attenuating the Escalation of Commitment to a Faltering Project in Decision-Making Groups: An Implementation Intention Approach. *Social Psychological & Personality Science*, 6(5), 587-595.

Zang, Z. (2022). Analysis of Financial Management and Decision-Making in Institution of Higher Learning Based on Deep Learning Algorithm. *Mobile Information Systems, 2022.*

Zemsky, R., Shaman, S., & Baldridge, S.C. (2020). *The College Stress Test: Tracking Institutional Futures across a Crowded Market*. Johns Hopkins University Press.

Zheng, H. Y., Mayberry, E., & Stanley, L. (2020). Building an agile data analytics environment to support university decision-making: A case study of Ohio State University's rapid development of a COVID-19 dashboard system. *New Directions for Institutional Research, 2020*(187-188), 31-42.

Zhi-dong, S. (2012). Colleges and universities enrollment data fusion system based on information fusion. *Information Technology*.