Chapter 1
Introduction

1.1 Welcome to the Information Systems Field!

Welcome! You are probably reading these lines because you have just commenced your journey to becoming a researcher or perhaps because you have started a doctoral degree or contemplate doing so or you are attending a postgraduate research course. Maybe you are reading this book because you are studying information systems (IS) or you are studying some other topic but heard about information systems and wanted to know more about it. Maybe you are doing research in a field that does not have a similar book.

In any case, here we are, so let us talk about the research discipline of information systems. A formal definition of information systems research is that *it is primarily concerned with socio-technical systems that comprise individuals and collectives that deploy digital information and communication technology for tasks in business, private, or social settings.* In this sense, the information systems research discipline is concerned with examining the **development, use, and impact of digital information and communication technology**.

We call information systems a socio-technical field because information systems scholars distinguish *technical* components, like tasks and technology (e.g., digital infrastructure, systems, platforms, hardware, software, algorithms, or data), from *social* components, like individuals and collectives (e.g., networks, governments, organisations, communities, groups, teams, societies), that develop and use digital technical information and communication components in social, cultural, economic, hedonic, psychological, or economic contexts. The information systems field always emphasises both social and technical components, along with the interactions between them because it is at this intersection that many of the most interesting problems and opportunities emerge. As one example, consider augmented reality: it has technological components as we need hardware and software like video, audio, or even sensory touch technology to be able to augment our perceived reality, and we also need to understand what part of social reality we want to augment (leisure or

J. Recker, *Scientific Research in Information Systems*, Progress in IS,
https://doi.org/10.1007/978-3-030-85436-2_1

business, games or work?). Augmented reality really lies at the intersection of the technological and social components of reality.

The socio-technical perspective that our field encompasses differentiates it from other fields. For example, most engineering fields, including computer science, emphasise technical components like hardware and software, while many business, management, economic, and broader social sciences emphasise social components (people and collectives of people). Information systems emphasises neither side over the other and sees phenomena, problems, opportunities, and outcomes as emerging from the interaction between them. The phenomena, problems, opportunities, or outcomes we study are often instrumental, such as efficiency and productivity, because information systems research tends to be taught and practised in business schools, but these elements can just as well be humanistic, such as well-being, equality, diversity, inclusion, and freedom.

A second cornerstone of the information systems field is its focus on *digital information and communication technology* artefacts. Information systems scholars are not interested in *all* technical artefacts that are featured in socio-technical situations—bicycles and chairs are artefacts that are of little interest to these scholars; they are instead concerned about those artefacts that enable users to access, store, manipulate, distribute, display, and communicate information. Among information and communication technologies, the information systems field's interest is primarily in *digital* technologies, that is, technologies that rely on digitisation, the encoding of analogue information into digital format (essentially, bits and bytes that contain 0s and 1s). This focus may sound restrictive, but keep in mind that many artefacts today—from airplanes to cars, from kitchen scales to sound systems and toothbrushes—contain digital components. The success of brands like Google, Apple, and Amazon exemplifies how digital technology components in long-standing artefacts like books and music players have changed not only the nature of these products (from books to e-books, from cars to digital mobility solutions) but sometimes also entire markets and society. Digital technologies like Twitter have changed political processes, and 3D printers are changing the construction, engineering, design, and even food industries. Entirely, digital artefacts like autonomous robo-traders, chatbots, and autonomous vehicles change how we deal with finances, solve problems in conversations, and move from one place to another.

The information systems field is fast, broad, and multidisciplinary. Technological advancements have been rapid and are increasing at an astounding pace. A life without the Internet, smartphones, social media platforms, and microblogging seems unthinkable now, but all are developments of just the past two decades. Developments like the miniaturisation of hardware, increasingly powerful microprocessors, inexpensive and reliable memory, broadband communication networks, and the efficient power management of technological devices have led to a widespread—even ubiquitous—uptake of digital information and communication technologies in businesses and our private and social lives. We have powerful computers in our pockets or on our wrists. In fact, today's smartphones are many times more powerful than the mainframe computer that the National Aeronautics and Space

Administration (NASA) once used to send astronauts to the moon. They are faster than the computer on board the *Orion* spaceship NASA is currently testing to go to Mars.

Information systems is also a broad field of research because digital technologies are part of many first-world human experiences. We plan holidays through automated recommender systems, we choose modes of transportation using shared mobility service platforms, and we engage in physical activity in response to signals from wearable devices. We use digital technologies, like computers and laptops, frequently at work and use these and other technologies, such as smart, connected devices, online social networks, and wearable devices, in other parts of our lives. We also develop technology ourselves. Long gone are the days when computer "nerds" sat in offices and programmed software; today, almost anyone, including (and perhaps especially) children, can deal with software development personally. We learn to program robots using Lego Mindstorms and publish our own websites, blogs, and podcasts.

Because digital information and communication technology are so pervasive and have such an impact on our lives, it should not be surprising that the study of digital information and communication technology is of interest to academic scholars in many disciplines. Scholars from multiple disciplines are addressing a variety of key questions pertaining to information systems, including the following:

- How do people use digital technology?
- How does digital technology contribute to organisational performance?
- How are organisations using digital technology?
- How can societal issues be resolved through digital technology?
- Can major challenges like climate change be addressed through digital technology?
- How can healthcare be assisted through digital technology?
- How do we use digital technology for learning?
- What role does digital technology play in global markets and local governments?
- How does digital technology help organisations innovate their business processes?
- How can digital technology contribute to greening the planet?
- How do people build capabilities for dealing with digital technologies and related issues?
- How can digital technologies improve the performance of highly specialised professionals, such as athletes?
- How can digital technologies improve the diversity and inclusion of marginalised groups?
- How can nations protect themselves and others from cyberattacks?
- How can digital technology contribute to improving democracy, equality, and peace?

The search for answers to these and other questions can take many forms, and the potential pathways to these and other questions are rooted in a variety of well-established fields of scientific inquiry. The following is an incomplete list of some of the most prominent types of inquiry:

- Scholars in information technology (IT), software engineering, and computer science study the technical and computational attributes of digital technology.
- Scholars in the social, behavioural, cognitive, and psychological sciences study individuals' exposure, use, appropriation, and general behaviours in digital technology domains.
- Scholars in organisational science, management, and business study how corporate environments shape and are shaped by digital technology.
- Economists study the large-scale effects of the diffusion and innovation of digital technology on organisations, markets, regulatory policies, and societies.
- Scholars in the environmental sciences study the impact of digital technologies on natural resources and environmental changes, like climate change.

Clearly, the study of the development, use, and impacts of digital information and communication technology involves a diverse array of questions and approaches, which makes information systems research both exciting and challenging. Research in this area is multifaceted and comprehensive, yielding insights from a variety of perspectives and lenses that increase our knowledge about the role of information systems in our lives and help make positive changes in our world.

Information systems research is also challenging because scholars in this field are exposed to a wide variety of theories, methods, approaches, and research frameworks from other research traditions. Making sense of information systems research and contributing to the current state of knowledge require a scholar to learn, critique, apply, and extend multiple forms of inquiry, learn multiple theories on various levels of abstraction and complexity, and consider multiple approaches to conducting research. Information systems research addresses a fast-moving target as the artefacts that are at the core of this research change quickly and often, even over the course of a single study. Such dynamism is more difficult to accommodate than the stability that is common in other disciplines.

I hope you take from this discussion the fact that information systems research deals with exciting, challenging, and innovative aspects of human existence. We live in an age when digital information and communication technology transcends and in some cases defines many of our experiences. Digital devices are everywhere and are changing everything. Many more digital objects (about 20 billion) are connected through the World Wide Web than people (about 8 billion), and they change what we do and how we go about our lives. Information systems research seeks to unravel the complexities and problems that stem from this digital transformation of the human experience.

1.2 Understanding Your Motivation to Pursue Research

Before we delve deeper into the domain of information systems and explore the intricacies of research in this domain, it is useful to revisit the reasons you embarked on this quest in the first place. What is your motivation? Is it the thirst for knowledge? Is it the desire to develop innovative solutions and create impact? Is it to use your degree as a stepping stone to a professional career as a thought leader in a particular field or industry? Is it curiosity related to the desire to explore an intellectual challenge or opportunity?

None of these answers is right or wrong, of course. They just outline possible intrinsic motivations to embark on a journey that will take you several years to complete. To find an answer for yourself, you can ask which of the three dimensions of motivation speak to why you are considering information systems research: ambition, dedication, and commitment.

One dimension is *ambition*. The ambition to complete a research degree like a doctoral degree to progress towards an academic career is different from the ambition to pursue a research degree to focus on thought leadership in industry or corporate careers. One of the differences lies in the emphasis on publishing scientific papers from your research work, which is bread and butter for an academic but less so for an industry professional.

Dedication refers to your level of enthusiasm for working on a new and intrinsically complex challenge for a substantial amount of time—even years. If your research topic does not excite you, it will be difficult to sustain your enthusiasm for working on it over a prolonged period. In fact, many of the dropouts with whom I have spoken have shared that they lacked dedication to the topic on which they were working.

Finally, *commitment* refers to the willingness to free the necessary time and resources to work on the research. Research work is often unstructured, open-ended, and risky, so pursuing the tasks that must be completed requires commitment. Particularly noteworthy obstacles to commitment include having to work a regular job while pursuing research and raising a family at the same time. Notwithstanding high levels of ambition and/or dedication, the commitment of time and resources may simply not be high enough to complete the research to the required level of quality. Completing research work while working part- or full-time is not impossible, but smart resource management and commitment must come with such work.

Your levels of ambition, dedication, and commitment will accompany you on your research journey and will change over the course of your research program. I have assisted many students through their journeys to their doctoral degrees (and have, of course, completed this journey myself); how their lives proceed over the course of their doctoral programs and how the changes in their private contexts influence their journeys in terms of ambitions, dedication, and commitment take many forms.

Whatever your motivation is and however the context of your studies may vary, one element remains stable: the journey of scientific training and education is, at its heart, a research journey. It requires you to be a scholar in the fullest sense, one who develops the habits of mind and ability to generate new knowledge creatively, conserve valuable ideas, and transform this knowledge and these ideas responsibly through writing, teaching, and application.

What will be required of you during this journey? Completing a research degree program will demand that you demonstrate your ability to conduct research that makes a unique contribution while meeting standards of credibility and verifiability:

(1) the ability to ask and frame important questions
(2) the ability to generate knowledge and assess, critique, and defend claims of having generated new knowledge
(3) a broad and deep understanding of important phenomena in your area of research and the ability to understand and critically evaluate current knowledge and its progression in that area
(4) understanding of theoretical and methodical approaches to examining and developing current knowledge

The journey is long and the challenges manifold, and many of us start not as fully developed scholars but as apprentices who are interested but not well versed in the domain or its theories and methodologies. Some of the key challenges that surround research training programs are lessons that are not taught in method textbooks or theoretical essays but come only through experience, personal observation, and advice from fellows and academics who are more experienced.

We set out now to discuss these important lessons and examine the key principles that inform a junior scholar on his or her path to becoming a researcher. The experiences and advice I offer in this book are drawn not just from the field of information systems but also from the "reference" disciplines: tangential but influential fields of research like behavioural and organisational psychology, management, business, economics, computer science, and social science.

1.3 The PhD Challenge

From now on, I focus on research training as part of a doctoral degree program, such as a PhD. Several of the points I make are also relevant to other degrees, such as a master's degree in science, a master's degree in research, or a postgraduate honours degree, but the doctoral program is by and large the main university program that teaches how to do research.

At Queensland University of Technology, where I completed my own doctoral degree, the PhD is awarded "in recognition of a student's erudition in a broad field of learning and for notable accomplishment in that field through an original and substantial contribution to [the body of] knowledge" (Queensland University of Technology, 2007). Other universities may frame this statement differently, but the essence of the requirement tends to be consistent. What does this apparently innocuous statement mean, and why is meeting its requirements difficult?

Most people equate this statement with "doing research," although doing so is misleading because research can mean many things. For example, we do "research" when we consider buying a new car. We may also "research" follow-up information about something we learned from the news. Consultants do "research" when they try to develop a problem solution for their clients. Similarly, software developers routinely do "research" when they design new applications.

However, these examples of research generally do not contribute to the body of knowledge and meet the research requirement for a doctoral degree. Should the iPhone app developers who brought us Fruit Ninja, Angry Birds, or Cut the Rope be awarded doctoral degrees for their innovative games? No. Most research is done in the colloquial sense of gathering existing information about a subject of interest, while research that is recognised as a scholarly activity searches for fundamental concepts and new knowledge that meet two key principles of *scientific research*:

(1) It contributes to the advancement of human knowledge.
(2) It conforms to systematic principles that govern the collection, organisation, and analysis of data, which are defined and accepted by scientists.

We will examine these two principles in more detail in Chap. 2. For now, we simply acknowledge that these two principles of research distinguish scholarly research from other types of research and that confirming to principles of scholarly, scientific research is a challenging task that, on successful completion, can be recognised by the receipt of a doctoral degree.

As all doctoral students, as well as the junior and senior academic faculty that assist them, inevitably learn, research is messy, goes back and forth, speeds up and slows down, and can lead to dead ends and changes in direction. Progress is not steady, nor is it always fully transparent or explicit. Therefore, a doctoral degree will not be awarded simply because we followed a particular research process mechanically; instead, the process of research is only the mechanism by which we seek to achieve an outcome that is worthy of recognition. We learn about research from scientific papers, books, and theses that address it, but all of these works are merely "reconstructed stories" written *ex post* (after the research) about what was done and what was found by doing it. These works reconstruct the research in a simplified way, brushing over the errors, mistakes, doubts, failures, and irrelevant results. In fact, most stories read as if the researchers knew all along what the results would be: "We studied a phenomenon, we conjured a theory, and guess what? Our evaluation with data showed that our theory was right!"

In short, research that is conducted in pursuit of a doctoral degree—in fact, any scientific research—is not a mechanical process. The research "construction" process is messy and characterised by trial and error, failure, risk-taking, and serendipity, so it requires perseverance through many iterations of inductive, deductive, and abductive reasoning, ideas and trials, tests, and retests. A friend of mine spent five years setting up, executing, and analysing experiments until his results confirmed his iteratively revised and redefined theory. It took Thomas Edison 2,000 tries before he succeeded with his first innovation. Two thousand! When I say research is a challenging task, I am not exaggerating.

One of the common misconceptions is that those who start a doctoral degree will complete it. Like many other university courses, the doctoral degree program is subject to attrition rates, unplanned extensions, and failure to complete. Statistics do not paint an optimistic picture:

- Fewer than 65 percent of students who start PhD programs finish them (Bowen & Rudenstine, 1992).
- Attrition in residential doctoral programs is as high as 50 percent in face-to-face programs (de Vise, 2010) and 50–70 percent in online programs (Rigler Jr. et al., 2017). In Germany, statistics vary. Attrition rates are said to be about 15 percent of doctoral students in social science disciplines and about 25 percent in engineering disciplines (Franz, 2015).
- Ten percent of doctoral students claim to have considered suicide, and 54 percent of doctoral students have felt so depressed at various stages that they had difficulty functioning (OnlinePhDPrograms.Net).
- In one study, 43 percent of participating graduate students reported experiencing more stress than they could handle, with PhD students expressing the greatest stress. More than half listed stress or burnout as a major concern, about a quarter cited feeling like outsiders, and nearly a third listed their relationships with professors as a cause of stress (Patterson, 2016).

Despite this somewhat gloomy picture, a doctoral degree can yield enormous opportunities. It provides an entré into research as a career, as many jobs in research, such as that of a university professor, require it. Doctoral degrees are also helpful in securing positions outside academia, along with attractive salaries. The immense personal gratification of completing the degree is one of many rewards. I sometimes say that it is statistically more likely that they will succeed in completing their PhD studies than they are to succeed in their marriages. I mean it as a joke, but there is some truth to it.

I think the rewards outweigh the challenges, but you should be prepared for the complexity and challenge of this journey as the process of earning a doctoral degree differs from that of any degree that precedes it. Consider the analogy Waddington (2007) provided to illustrate this point:

> *Elementary school is like learning to ride a tricycle. High school is like learning to ride a bicycle. College is like learning to drive a car. A master's degree is like learning to drive a race car. Students often think that the next step is more of the same, like learning to fly an airplane. On the contrary, the PhD is like learning to design a new car. Instead of taking in more knowledge, you have to create knowledge. You have to discover (and then share with others) something that nobody has ever known before.*

This analogy highlights that a doctoral degree cannot be earned by repeating, memorising, and/or using the bits and pieces of knowledge someone gives you. In the PhD process, students must identify, explore, and resolve a problem that has not been solved sufficiently—or even not been addressed at all. As a result, the student becomes the world's leading expert on that particular problem. That thinking also suggests that the supervisor(s) cannot take the student all the way through that process. They can guide, they can assist, and they can criticise, but they cannot hold the answer to the particular problem because then it would not be a PhD problem to begin with.

The problem of correctly interpreting the task, coupled with the problem of the definition of what scientific research is about, can lead to “interesting” but completely inappropriate PhD ideas, proposals, and strategies. Sørensen (2005) classifies these types of inappropriate views on PhD activities, all of which share a common trait: they are not examples of scientific research that warrants a doctoral degree:

- **The great idea**: “I’ve just had this great idea! I don’t know if anyone else has ever had the same idea, because I haven’t checked, and I’m new in this field. Anyway, my idea is brilliant, so I really would like to share it with you all.”
- **Other people’s idea**: “I have just read this great book that I really like a lot. I’ll just give you a short resume of the interesting points in the book and apply it to this situation over here.”
- **The software hacker**: “I just built this great computer system/software tool/mobile application. It is not based on previous theories or empirical findings. I am not very theoretical myself, but the system has a lot of fantastic features, and the interface is neat. Plus, people could really use it.”
- **The theory hacker**: “I’ve come up with this theory/conceptual framework/model/methodology. It is not related to other theories/conceptual frameworks/models or any empirical data for that matter. Most of the concepts have been defined differently by all the big-shot scholars in the field, but I just do not like their categories so I have invented my own. I think it must be better, though I haven’t checked.”

To avoid these and other pitfalls, the remainder of this book guides you through the jungle that is research by giving you some background on the essential principles of scientific research, helping you find important problems to address, guiding your choices of methods and analysis, and helping you develop and publish new findings and theory.

1.4 What This Book Is About

This book offers advice and guidelines for conducting good research as part of a doctoral education in information systems. Conducting good research requires students to train their minds to act in scientific ways–to think like researchers.

To that end, the book discusses both the essential and tangential challenges that are key to learning how to perform good research. Three categories of such challenges are reflected in the three parts that constitute this book.

Part 1, *Basic Principles of Research*, contains Chaps. 1 and 2 and is concerned with the key principles and concepts of the scientific research that constitutes the key exercise of the doctoral program. Chapter 1 addresses the requirements of a doctoral education.

Chapter 2 introduces information systems research as a science and revisits scientific research and the principles of the scientific method on which it is built.

Part 2, *Conducting Research*, contains Chaps. 3, 4, and 5 and is concerned with the three key stages involved in any research project. Chapter 3 addresses theorising, examining what a theory is, why we require them in research, how theories are composed, and how theories are developed and applied.

Chapter 4 concerns research design, which refers to developing a blueprint for executing a study of a particular phenomenon or problem of interest. The chapter discusses the formulation of research questions, the development of a research plan, and the choice of an appropriate research methodology.

Chapter 5 then presents key research methods that can be elements of the research design. Broadly, it distinguishes quantitative methods of inquiry from qualitative methods of inquiry and touches on other forms of research, such as design research and mixed methods.

Part 3, *Publishing Research*, contains Chaps. 6, 7, and 8 and is concerned with the stage of the research process that follows the actual research: publishing the findings from the study. This third part of the study addresses challenges that relate to the craft of communicating effectively and efficiently your research in the form of articles, reports, theses, books, and other outlets.

Chapter 6 explains how to develop articles about studies that have been conducted. Various writing strategies are exemplified, essential parts of good papers are reviewed, and advice is offered for handling peer reviews and dealing with rejections and revisions.

Chapter 7 addresses three aspects of ethical considerations in conducting and publishing research: ethics in research conduct, ethics in research publication, and ethics in research collaboration.

Finally, Chap. 8 contains some brief reflections of mine on this book.

1.5 Further Reading

This chapter forays into several areas about which more readings are available. For example, you may want to read more about the information systems discipline and its history. A good starting point is Hirschheim and Klein's (2012) excellent article about the field's history. Wanda Orlikowski also collaborated on several good articles about research on technology and organising (Orlikowski & Barley, 2001; Orlikowski & Baroudi, 1991; Orlikowski & Iacono, 2001).

If you want to learn more about socio-technical thinking and its role in information systems scholarship, I recommend the excellent article by Suprateek Sarker et al. (2019). Bostrom and Heinen's (1977a, 1977b) articles about socio-technical systems from the early days of the information systems field in the late 1970s and a number of articles that also introduce and review the socio-technical perspective (e.g., Beath et al., 2013; Bostrom et al., 2009; Briggs et al., 2010; Lee, 2001) can also give you a good grounding in the field.

If you want to learn more about what "digital information and communication technology" artefacts interest information systems scholars, you can read about the debates about IT or IS artefacts (Akhlaghpour et al., 2013; Kallinikos et al., 2013; Lee et al., 2015; Orlikowski & Iacono, 2001; Weber, 1987) and whether these artefacts reside at the core of the information systems field (e.g., Alter, 2003; Benbasat & Zmud, 2003; Lyytinen & King, 2006; Nevo et al., 2009; Sidorova et al., 2008; Weber, 2006). A range of articles explain the particularities of digital artefacts compared to other types of technological objects (e.g., Baskerville et al., 2020; Ekbia, 2009; Faulkner & Runde, 2019; Kallinikos et al., 2013).

Other good readings deal with the research student's journey. Avison and Pries-Heje (2005) compiled and edited a volume regarding the practices of and recommendations from leading information scholars about the pursuit of a doctoral degree in information systems. In the early days of the discipline, Davis and Parker (1997) also shared their recommendations in a book for doctoral students. Several discussion papers summarise advice from senior scholars to students and early-career academics (e.g., Dean et al., 2011; Dennis et al., 2006; Klein & Lyytinen, 1985; Lyytinen et al., 2007; Van Slyke et al., 2003; Venkatesh, 2011).

References

Akhlaghpour, S., Wu, J., Lapointe, L., & Pinsonneault, A. (2013). The Ongoing Quest for the IT Artifact: Looking Back, Moving Forward. *Journal of Information Technology, 28*(2), 150–166.

Alter, S. (2003). 18 Reasons Why IT-Reliant Work Systems Should Replace "The IT Artifact" as the Core Subject Matter of the IS Field. *Communications of the Association for Information Systems, 12*(23), 366–395.

Avison, D. E., & Pries-Heje, J. (Eds.). (2005). *Research in Information Systems: A Handbook for Research Supervisors and Their Students*. Butterworth-Heinemann.

Baskerville, R., Myers, M. D., & Yoo, Y. (2020). Digital First: The Ontological Reversal and New Challenges for IS Research. *MIS Quarterly, 44*(2), 509–523. https://doi.org/10.25300/MISQ/2020/14418

Beath, C. M., Berente, N., Gallivan, M. J., & Lyytinen, K. (2013). Expanding the Frontiers of Information Systems Research: Introduction to the Special Issue. *Journal of the Association for Information Systems, 14*(4), i–xvi.

Benbasat, I., & Zmud, R. W. (2003). The Identity Crisis Within the IS Discipline: Defining and Communicating the Discipline's Core Properties. *MIS Quarterly, 27*(2), 183–194.

Bostrom, R. P., Gupta, S., & Thomas, D. M. (2009). A Meta-Theory for Understanding Information Systems Within Sociotechnical Systems. *Journal of Management Information Systems, 26*(1), 17–47.

Bostrom, R. P., & Heinen, J. S. (1977a). MIS Problems and Failures: A Socio-Technical Perspective, Part I: The Causes. *MIS Quarterly, 1*(1), 17–32.

Bostrom, R. P., & Heinen, J. S. (1977b). MIS Problems and Failures: A Socio-Technical Perspective, Part II: The Application of Socio-Technical Theory. *MIS Quarterly, 1*(4), 11–28.

Bowen, W. G., & Rudenstine, N. L. (1992). *In Pursuit of the PhD*. Princeton University Press.

Briggs, R. O., Nunamaker, J. F., Jr., & Sprague, R. H., Jr. (2010). Special Section: Social Aspects of Sociotechnical Systems. *Journal of Management Information Systems, 27*(1), 13–16.

Davis, G. B., & Parker, C. A. (1997). *Writing the Doctoral Dissertation: A Systematic Approach* (2nd ed.). Barron's Educational Series.

de Vise, D. (2010, April). Nearly Half of Doctorates Never Completed. *The Washington Post*.
Dean, D. L., Lowry, P. B., & Humpherys, S. L. (2011). Profiling the Research Productivity of Tenured Information Systems Faculty at U.S. Institutions. *MIS Quarterly, 35*(1), 1–15.
Dennis, A. R., Valacich, J. S., Fuller, M. A., & Schneider, C. (2006). Research Standards for Promotion and Tenure in Information Systems. *MIS Quarterly, 30*(1), 1–12.
Ekbia, H. R. (2009). Digital Artifacts as Quasi-Objects: Qualification, Mediation, and Materiality. *Journal of the American Society for Information Science and Technology, 60*(12), 2554–2566.
Faulkner, P., & Runde, J. (2019). Theorizing the Digital Object. *MIS Quarterly, 43*(4), 1279–1302.
Franz, A. (2015). The Social Position of Doctoral Candidates within the Academic Field: Comparative Considerations Regarding Doctoral Program Attrition in Germany and the USA. *International Dialogues on Education, 2*(2), 44–54.
Hirschheim, R., & Klein, H. K. (2012). A Glorious and Not-So-Short History of the Information Systems Field. *Journal of the Association for Information Systems, 13*(4), 188–235.
Kallinikos, J., Aaltonen, A., & Marton, A. (2013). The Ambivalent Ontology of Digital Artifacts. *MIS Quarterly, 37*(2), 357–370.
Klein, H. K., & Lyytinen, K. (1985). The Poverty of Scientism in Information Systems. In E. Mumford, R. Hirschheim, G. Fitzgerald, & A. T. Wood-Harper (Eds.), *Research Methods in Information Systems* (pp. 123–151). Elsevier Science Publishers.
Lee, A. S. (2001). Editor's Comments: Research in Information Systems: What We Haven't Learned. *MIS Quarterly, 25*(4), v–xv.
Lee, A. S., Thomas, M., & Baskerville, R. L. (2015). Going Back to Basics in Design Science: From the Information Technology Artifact to the Information Systems Artifact. *Information Systems Journal, 25*(1), 5–21.
Lyytinen, K., Baskerville, R., Iivari, J., & Te'Eni, D. (2007). Why the Old World Cannot Publish? Overcoming Challenges in Publishing High-Impact IS Research. *European Journal of Information Systems, 16*(4), 317–326.
Lyytinen, K., & King, J. L. (2006). The Theoretical Core and Academic Legitimacy: A Response to Professor Weber. *Journal of the Association for Information Systems, 7*(10), 714–721.
Nevo, S., Nevo, D., & Ein-Dor, P. (2009). Thirty Years of IS Research: Core Artifacts and Academic Identity. *Communications of the Association for Information Systems, 25*(24), 221–242.
Orlikowski, W. J., & Barley, S. R. (2001). Technology and Institutions: What Can Research on Information Technology and Research on Organizations Learn from Each Other? *MIS Quarterly, 25*(2), 145–165.
Orlikowski, W. J., & Baroudi, J. J. (1991). Studying Information Technology in Organizations: Research Approaches and Assumptions. *Information Systems Research, 2*(1), 1–28.
Orlikowski, W. J., & Iacono, C. S. (2001). Research Commentary: Desperately Seeking the 'IT' in IT Research-A Call to Theorizing the IT Artifact. *Information Systems Research, 12*(2), 121–134.
Patterson, E. (2016). Why Do So Many Graduate Students Quit? *The Atlantic*. Retrieved February 4, 2021 from https://www.theatlantic.com/education/archive/2016/07/why-do-so-many-graduate-students-quit/490094/
Queensland University of Technology. (2007). *Appendix 9: Queensland University of Technology Doctor of Philosophy Regulations (IF49)*. QUT. Retrieved November 9, 2011 from http://www.mopp.qut.edu.au/Appendix/appendix09.jsp
Rigler Jr., K. L., Bowlin, L. K., Sweat, K., Watts, S., & Throne, R. (2017). Agency, Socialization, and Support: A Critical Review of Doctoral Student Attrition. In *3rd International Conference on Doctoral Education, Orlando, Florida*.
Sarker, S., Chatterjee, S., Xiao, X., & Elbanna, A. R. (2019). The Sociotechnical Axis of Cohesion for the IS Discipline: Its Historical Legacy and its Continued Relevance. *MIS Quarterly, 43*(3), 695–719.
Sidorova, A., Evangelopoulos, N., Valacich, J. S., & Ramakrishnan, T. (2008). Uncovering the Intellectual Core of the Information Systems Discipline. *MIS Quarterly, 32*(3), 467–482.

Sørensen, C. (2005). *This is Not an Article. Just Some Thoughts on How To Write One*. mobility.lse.ac.uk/download/Sorensen2005b.pdf

Van Slyke, C., Bostrom, R. P., Courtney, J. F., & McLean, E. R. (2003). Experts' Advice to Information Systems Doctoral Students. *Communications of the Association for Information Systems, 12*(28), 469–478.

Venkatesh, V. (2011). *Road to Success: A Guide for Doctoral Students and Junior Faculty Members in the Behavioral and Social Sciences*. Dog Ear Publishing.

Waddington, T. (2007). *Lasting Contribution: How to Think, Plan, and Act to Accomplish Meaningful Work*. Agate B2.

Weber, R. (1987). Toward a Theory of Artifacts: A Paradigmatic Basis for Information Systems Research. *Journal of Information Systems, 1*(2), 3–19.

Weber, R. (2006). Reach and Grasp in the Debate over the IS Core: An Empty Hand? *Journal of the Association for Information Systems, 7*(10), 703–713.