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Kalle Lyytinen
Case Western Reserve University, kjl13@case.edu

Heikki Topi
Bentley University

Jing Tang
Rochester Institute of Technology

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Kalle Lyytinen
Case Western Reserve University
kjl13@case.edu

Heikki Topi
Bentley University

Jing Tang
Rochester Institute of Technology

Abstract:

This paper represents a report on the first phase of the Management Curriculum for the Digital Era (MaCuDE) disciplinary task force on information systems (IS). As its final goal, the MaCuDE project intends to recommend changes to business curricula based on the influence of digital technologies on business transformation, specifically, the widespread use of big data analytics (BDA) and artificial intelligence (AI) technologies in the organizations. In this report, we focus on describing the current status of both undergraduate and graduate IS curricula in business schools. Aligned with the most recent curriculum development work that the Association for Information Systems (AIS) and Association for Computing Machinery (ACM) have conducted, we highlight the growing importance of the BDA and AI topic areas in IS curricula. Based on the MaCuDE project survey conducted in early 2020, we summarize the core digital topics and tools that the programs covered based on a sample of global IS departments from 17 undergraduate programs and 23 graduate programs.

Keywords: Big Data Analytics, Artificial Intelligence, IS Curriculum Recommendations, Curriculum Design, Business Education, AACSB.

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1 Introduction

AACSB International's Digital Transformation Affinity Group (DTAG) was established in February, 2019. As its first major initiative, DTAG launched the Management Curriculum for the Digital Era (MaCuDE) project in 2019 for which PricewaterhouseCoopers (PwC) provided funding and Stevens Institute of Technology provided operational leadership. The MaCuDE project focuses on recommending changes to business curricula based on digital technologies' transformational impact on all organizations (no matter their type and size) and on exploring the impact that these changes have on the resources that business schools need. The initiative pays specific attention to the widespread use of big data analytics (BDA) and artificial intelligence (AI) technologies. The project comprises nine task forces that mostly explore the impact that digital technologies have on specific business disciplines or areas of practice, such as accounting, analytics, cybersecurity, finance, information systems, innovation, management, marketing, and future of learning/work. The project website at macude.org describes the initiative in more detail.

One MaCuDE disciplinary task force focuses on information systems (IS). The Association for Information Systems (AIS) and the Association to Advance Collegiate Schools of Business (AACSB) jointly formed this task force, which Kalle Lyytinen (Case Western Reserve University, MaCuDE IS Coordinator) leads in collaboration with Heikki Topi (Bentley University, AIS VP of Education 2017-2021). Jing Tang (RIT) serves as project coordinator. As with the other task forces, the IS group follows a three-phase work plan. The first phase focuses on describing the current status of IS curricula in business schools, the second focuses on exploring key recruiters' and industry leaders' views about the expectations for future graduates of IS programs in business schools, and the third focuses on developing curriculum recommendations based on the first and second phases and on integrating the findings into recommendations regarding future curricula. The IS group has finished the first phase and begun working on the second phase.

We recognize the potential insufficient clarify regarding the project's and its task forces' primary focus area. Both "big data analytics" and "artificial intelligence" are widely used terms that do not have universally accepted definitions even in individual scientific disciplines. For example, quickly reviewing recent commentaries and introductions to special issues on big data in the recent IS literature (Abassi, Sarker, & Chiang, 2016; Baesens, Bapna, Marsden, Vanthienen, & Zhao, 2016; Chen, Chiang, & Storey, 2012; Grover, Lindberg, Benbasat, & Lyytinen, 2020) reveals a broad range of varied perspectives to the topic. Furthermore, a multitude of conceptual connections link "big data" to various digital technologies beyond artificial intelligence, such as data management. Given the big data field's immature nature and the definitions' fluidity, we do not focus on fully conceptually clarifying these new technologies. In this report, we make the following assumptions and recognize several technological features that big data analytics and artificial intelligence exhibit:

- The terms big data and analytics highlight data's growing importance; its exponential growth; the integration capabilities that flow from social media, mobility, analytics, and cloud (SMAC) technologies; and the unprecedented opportunities to obtain insight that organizations gain from deploying these technologies. Similarly, the term artificial intelligence (AI) recognizes the growing role and importance of using novel and data-driven computational techniques and approaches to carry out tasks that manifest human "intelligence" at some level in areas such as natural language processing, image processing, pattern recognition, and others. These and related broad definitions include not only specific foundational technology features but also lower-level IT capabilities that these features enable and their specific organizational applications.
- These emerging IT phenomena share an inextricable link. Many organizational applications require that organizations use such capabilities to become genuinely transformative. For example, many AI application need data at an unprecedented scale to become useful relevant, while many big data applications apply AI-based approaches to analytics. Big data analytics and AI together enable new essential technology families such as the Internet of things (IoT).
- The term big data analytics covers not only the analytical processes and presentation approaches associated with big data but also the issues related to managing and governing the data and/or organizational tasks and functions such technologies.
- In the same way, artificial intelligence does not refer to any specific method or application area (such as machine learning or deep learning); rather, it covers various applications in organizational contexts, such as robotics, robotic process automation, natural language

processing, autonomous vehicles, and so on. It also covers other application areas such as new medical applications for predicting heart attacks or developing new ways to treat cancer.

- In many ways, big data analytics and AI together provide the current expanded technological foundation for innovating and addressing organizational tasks with similar goals to the goals that the IS discipline captured early on (e.g., goals around decision support systems, executive information systems, and business intelligence system) (Chen et al., 2012).

In this report, we introduce the MaCuDE project, discuss the role of the core topics of interest in the most recent existing curriculum recommendations IS 2010 (Topi et al., 2010), MSIS 2016 (Topi et al., 2017) and IS 2020 (Leidig & Salmela, 2021), and summarize the key findings from the project's first phase in which the IS task force collected primary data. We also discuss the ongoing integration of BDA and AI topics to IS curricula.

2 Key Activities of the Project

The MaCuDE IS Task Force publicly launched its work with a workshop at the International Conference on Information Systems (ICIS) in Munich in December, 2019. MaCuDE project leader and about 40 faculty members from all over the world attended this meeting.

In 2020, the task force began the first phase in which it primarily focused on collecting data about the current state of IS curricula and, in particular, on the role of big data analytics and AI. The task force first collected data from March to June, 2020. However, due to low participation rates, the task force collected additional data from August to September, 2020. We describe the data-collection process and results in Section 3. In early 2021, the task force launched the second phase in which it began conducting interviews with industry leaders.

To ensure that the project received broad-based, globally diverse expert guidance, it established an advisory board that comprised several leading senior IS scholars who have either participated in major curriculum initiatives (such as IS 2002, IS 2010, MSIS 2016), served in educational leadership roles in the IS community (such as AIS VP of Education), and/or are known for their current pedagogical or discipline-specific research in the big data analytics and artificial intelligence areas. Individuals on the advisory board have changed slightly over time; the following individuals have served on the board:

- Jan vom Brocke, University of Lichtenstein, Lichtenstein
- Helmut Krcmar, Technical University of Munich, Germany
- Bernard Tan, National University of Singapore, Singapore
- Mary Tate, University of Wellington, New Zealand
- Olivia Sheng, University of Utah, USA
- Joe Valacich, University of Arizona, USA
- Ramesh Venkataraman, Indiana University, USA

In 2020, the task force organized five advisory board meetings. In addition, the advisory board members participated in the task force's public workshop at ICIS in December, 2019 (that it organized jointly with the AIS Education Committee). About 50 IS faculty members from all over the world attended the event. Furthermore, the advisory board continues to play an advisory and executive major role in the second phase data collection.

The task force effort has closely aligned with the most recent curriculum development work that the AIS and Association for Computing Machinery (ACM) have conducted (IS 2020). Compared to the comprehensive review that the IS 2020 task force conducted on the undergraduate curriculum space, the MaCuDE initiative focuses on new competencies at various levels of IS curricula. Therefore, MaCuDE project IS group focuses more narrowly on the emergence of and need for new content related to big data analytics and AI.

Moreover, the task force will continue to explore possibilities to use curriculum data also from other sources, such as Eduglopedia and the Global IS Education Report derived from it. Eduglopedia is an online repository of IS program and course data that the University of Lichtenstein develops in collaboration with AIS. This relatively large repository contains data for over 4,000 courses across 400 universities globally. Gaining full benefits from the richness of the eduglopedia.org data will still require additional work.

3 IS Curriculum Recommendations

Computing disciplines—including the IS discipline—have a long tradition of using curriculum recommendations that professional and academic societies (primarily ACM, IEEE-CS, AIS, and ISCAP EDSIG) have developed. The IS discipline developed the first recommendations about 50 years ago. The AIS Council and ACM Education Board approved the most recent undergraduate recommendation, IS 2020, in March, 2021. At the graduate level, the most current recommendation is MSIS 2016. The need for change in some parts of the curriculum has been relatively constant due to fast changes in underlying technologies, solutions, and the expanding scope of technical and application topics that these programs need to cover. However, at their core, these curricula over the last 50 years have focused on socio-technical issues related to managing and delivering IT-based solutions that support organizational processes, decision making, and products and services. The need for such competencies has risen continuously over time even though the organizational forms associated with such activities have changed due to outsourcing to large IT service providers and cloud computing.

The curricular recommendations are not intended to be normative. Instead, they provide a framework of goals, content, and pedagogical methods that convey best current practices that educators can adapt to varied local conditions that cover technologies, faculty skills, and educational needs. Developing such recommendations is particularly important now when these recommendations are being developed for a truly global audience.

In this section, we briefly review the core topics in the most recent IS curriculum recommendations as background information. Figure 1 includes the highest-level categorization of core courses (MSIS 2006 and IS 2010) and related core competency areas (MSIS 2016 and IS 2020) for the last two versions of the graduate and undergraduate model curricula. We organize the table to also demonstrate similarities and differences between different versions.

MSIS 2006 Core courses	IS 2010 Core courses	MSIS 2016 Core Competency Areas	IS 2020 Core Competency Areas
	Foundations of Information Systems		Foundations of Information Systems
		Business Continuity and Information Assurance	Secure Computing
	Data and Information Management	**Data, Information, and Content Management**	**Data and Information Management**
Emerging Technologies and Issues			
Enterprise Models	**Enterprise Architecture**	**Enterprise Architecture**	
Implications of Digitalization or HCI		**Ethics, Impacts, and Sustainability**	**Ethics, use, and implications for society**
Integrated Capstone			
Strategy and Policy	**IS Strategy, Management and Acquisition**	**IS Strategy and Governance**	**IS Management and Strategy**
		IS Management and Operations	
Project and Change Management	**IS Project Management**		**IS Project Management**
IT Infrastructure	**IT Infrastructure**	**IT Infrastructure**	**IT Infrastructure**
Analysis, Modeling, and Design	**Systems Analysis & Design**	**Innovation, Organizational Change, and Entrepreneurship**	**Systems Analysis & Design**
		Systems Development and Deployment	Application Development / Programming

Figure 1. Core Courses in IS Curriculum Recommendations

The bolded rows indicate core topic areas that have shown significant stability across different recommendations: data and information management, Enterprise architecture, Impact and ethical implications of information systems, IS management and strategy, IS project management, IT infrastructure, and systems analysis and design. These core areas contain few surprises. We can easily recognize them as key areas in which IS program graduates should have competencies—particularly if we assume that they will manage and deliver IT-based solutions for organizations.

We note several observations given the ongoing change in the importance of the BDA and AI topic areas:

- The current high-level structure hides specific topics and competencies related to big data/data science/analytics in the data and information management area. Recently revised courses and textbooks in this area pay a lot of attention to data management challenges and technologies related to analytics' explosive growth, which we show when analyzing the reported course content in Section 4.
- No high-level list includes AI as a separate topic. Yet, many categories include topics related to AI and its applications, such as data and information management, Impact and ethical implications of information systems, systems analysis and design, IS management and strategy, and even IT infrastructure. All IS graduates require one competency in particular: the ability to build new technology capabilities by adopting emerging technologies into

organizational settings and specific tasks. With AI systems, this will preferably happen so that the systems will have capabilities to learn from their behavior.

- The most recent curricula includes security and programming/application development, which has brought detailed technical content and strength back to the curricula in a way that previous versions largely lacked (social/technical balance). One reason for the change has been the realization that IS graduates who do not at least functionally understand detailed programming tasks and secure system principles would have difficulties in addressing questions regarding how to deliver and manage securely and reliably organizational applications and in understanding the implications that can arise from failing to do so. Such pendulum movement between organizational and technical competencies will likely continue when big data analytics and AI topics need to be integrated into the model curricula[1].
- Ethical issues and implications are a significant addition to the MSIS 2016 curriculum, and this topic area has an essential role in IS 2020. Given the complex ethical issues that both big analytics and AI (and many other related technologies such as blockchain) raise, graduates require effective models and frameworks to analyze emerging technologies' implications and potential ethical and moral consequences. Both IS 2010 and IS 2020 include a core course in foundations of information systems at the undergraduate level. The community needs to continue to update recommendations regarding course content and goals. We believe that it would be important to have one specified also at the graduate level even when it is not mandatory in all specialized master's programs. In addition to ensuring that all business students have the critical IS competencies that they need to operate effectively in current technology-rich environments, specifications for such a core course from the community can serve as an important statement regarding the unique expertise. Ethical issues are particularly important in emerging topics related to big data analytics, which also call for understanding the relevant technology in a more detailed way. Furthermore, this is critical for the IS discipline's future positioning in the schools because several disciplines have begun to justifiably carve out a place in this space (marketing, operations, finance, and others).
- Aligned with the broad-based computing curricula overview and analysis in the Computing Curricula 2020 report, both MSIS 2016 and IS 2020 are anchored in a competency-based approach to specifying curricula. We believe that such approach provides a good foundation for effective collaboration with current and prospective organizations that employ IS students and enables one to compare structurally diverse groups of programs. It also aligns with AACSB accreditation approach and offers a way to evaluate in the outcomes of IS educational programs in business schools in a more systematic way.

4 MaCuDE IS Task Force Data Collection for Big Data Analytics and AI Content

The MaCuDE IS survey for the first phase was developed based on the generic MaCuDE project survey in early 2020 and distributed the first time to the intended recipients at the end of March, 2020. The first data-collection round finished in June, 2020. During this round, following guidance from the broader MaCuDE project, the survey was targeted to schools that had expressed an interest in joining the MaCuDE IS task force and actively contributing to the project. This list included 36 schools, and, during this round, it was extended to about 25 members of the AIS Education Committee and AIS Council. Furthermore, the survey was sent to 20 top-ranked schools in the US and 10 highly ranked schools in German-speaking Europe and 10 highly ranked schools in AIS Region 3 (Asia-Pacific). The task force hoped that reaching out to schools and individuals that had in one way or another demonstrated prior interest in the MaCuDE initiative, had received public recognition for offering leading innovative IS programs, or had participated in the work of the leading academic society in the discipline would yield a sufficient snapshot of the phenomena of interest. Despite multiple reminder rounds, the response rate remained quite low during the data-collection effort. The coronavirus disease of 2019 (COVID-19) pandemic significantly slowed down the survey process and made the data collection harder. In August and September, 2020, the task force extended the data-collection effort further to include the more than

[1] Based on our experiences with our own schools and discussions with many colleagues in other disciplines, we have observed that basic programming skills related mostly to Python and R have become standard content in disciplines such as operations, accounting, finance, and even marketing.

200 members of the MIS Academic Leadership Conference mailing list, which allowed project to reach out to a substantial percentage of IS programs at North American business schools.

In total, 31 universities responded to the survey at the program level. Altogether, they provided data regarding 34 undergraduate programs, 59 graduate programs, two executive programs, and one doctorate program. The graduate programs included 33 in information systems, 13 in analytics, and four in other focused IS specialties. The remaining belonged to disciplines outside the survey's scope (management, marketing, strategy, and accounting). The undergraduate programs comprised 22 in information systems and seven in analytics. In total, 15 universities responded to the survey at the course level and provided more information about the digital topics and technologies that the courses covered. Aggregating the information from course level to the program level, we get detailed information about 17 undergraduate programs and 23 graduate programs. The responding universities resided in Finland, Germany, Ireland, Italy, New Zealand, Singapore, Switzerland, and the United States. Despite numerous attempts as reported above and tight collaboration between the MaCuDE project and the AIS, we ended up with a small final sample since we collected data during the global COVID-19 pandemic.

One cannot easily perform detailed quantitative analyses when reviewing curriculum data from a globally distributed sample because fundamental program structures, course lengths, and terminologies vary significantly. Therefore, we derived our findings primarily from a qualitative program level review that we augmented with additional data that we extracted from analyzing course topics separately. We recognize that the sample's small size has a negative impact on the data's representativeness, and one should keep that in mind when reading our observations below.

At the undergraduate level, we derived four main observations based on the 14 IS and analytics programs:

1) At their core, most programs revolve around a basic IS curriculum model that aligns with the previous undergraduate model curriculum (IS 2010). They include core courses in a subset of the following area: fundamentals of IS, data and information management, systems analysis and design, IT infrastructure, application development, enterprise architecture, and project management.
2) Cybersecurity has emerged as a new topic.
3) As for the first focus areas, big data analytics, only the specialized analytics programs in the sample included courses in this area. When we conducted a separate course-level review (possible only for only a smaller number of programs) (see below), we found that these topics are covered mostly at the awareness level in other courses with a separate primary focus.
4) In exploring AI as the second major area that the projected considered, we found no evidence to suggest that core courses solely focused on AI or any of its subareas, such as machine learning. We found few undergraduate electives in this area. AI/ML was, however, introduced primarily at the awareness level in several courses with titles such as Digital Business: Technology and Transformation or Management Information Systems.

At the graduate level, we made the following observations:

1) Our limited data set includes several master's degree programs in analytics that IS departments offer. These programs varied significantly in their curricula, and we could not easily analyze their main focus and variations without reviewing all course content in detail (some examples course titles included Data Science for Business I and II or Data Analysis I and II). Common courses—in addition to foundations courses such as the ones that we list above—included programming for analytics (with Python or R), data warehousing, data visualization, data mining, and business intelligence. Furthermore, we found that the analytics programs used the degree title MS in Business Analytics the most frequently; some variants included Data Science with a specialty in Business Analytics and Master of IT in Business (Analytics).
2) In addition to the specialized analytics programs, five of the 16 (about 30%) of the IS programs included at least one core course with an analytics topic (such as general business analytics or data visualization).

3) In addition to analytics, the sample had four other programs that concentrated on a specialty IS area: master in business innovation, automotive and mobility management, marketing and supply chain management, strategy and governance of cyber risk. Typically, these programs did not include courses in all traditional core areas of master's degree programs in IS but might have content related to analytics or AI.
4) The sample contained few programs that provided entire courses that focused on AI/ML applications. One program offered a course in machine learning and another in AI techniques and applications. Based on the course level data provided, many programs identified AI topics at the awareness level in courses that primarily focused on another area.
5) Three graduate programs used the word digital or its derivative in their titles: governance of digitalization, digital business, and digital innovation. In some cases, "digital" was also added to other course titles, such as "Digital ISM Challenge", "Digital Work Practices", "Digital Business Transformation", "Digital Information Infrastructure", and "Digital Business Models".

Scholars who reviewed an initial version of this report—all highly experienced IS faculty members who represent the project's advisory board and the MIS Academic Leadership Conference group's members—suggested that the coverage of analytics and AI topics is actually broader in practice than the report reflected. They also recommended that, for more detailed results, the analysis should go deeper than the course level. To do so, one would need to analyze graduate competencies at a more granular level and across the courses and other learning experiences. We agree that a competency-based analysis of programs would be very informative. However, we do not know what incentives would make it possible to collect detailed data from departmental experts so that one could analyze such content more thoroughly.

In Tables A1 and A2 (see Appendix), we summarize the core digital topics and tools that reported courses covered based on the detailed course-level analysis we conducted. The tables summarize each course's main characteristics and aggregate them at the program level. We can see significant variation in the content and scope of topics related to big data and AI technologies that the courses covered. "Y" in the tables denotes that the program covered a specific topic or technology, while a blank means the program did not cover the topic or technology. "**Y**" in bold indicates that a high percentage of courses in the program included the specific topic or technology (at varying levels of intensity), while a "*y*" in italics means that a low percentage of courses in the program included the specific topic or technology.

5 Conclusion

In this report, we summarize the results from MaCuDE project's first phase that the IS task force conducted. In particular, we focus on the current status of and the recent developments in the extent to which IS curricula and related courses include big data analytics and artificial intelligence tools and topics based on a sample of global IS departments. We based our analysis on three sources: IS curriculum recommendations, primary data that the task force collected in 2020, and comments that advisory group members and participants that attended the two MaCuDE workshops in 2019 and 2020 offered. These initial results suggest that, at the undergraduate level, programs still cover both big data analytics and artificial intelligence topics at a relatively modest level except for specialized analytics-focused programs. The number of such programs has grown rapidly. At the graduate level, specialized analytics programs have become quite popular, and analytics topics have gained real estate also in general IS programs. IS curricula still only rarely cover AI topics and tools; separate modules in courses with a different focus mostly cover this area. In both analytics and AI, IS programs have interesting opportunities to grow that can generate additional value for both students and departments. The emergence of such topics also across several disciplinary curricula in business schools offers genuine opportunities for IS groups and departments to add value to business education and to collaborate with other departments. Such unique content and related competencies offered by IS departments need to be better articulated in course recommendations and ways of integrating IS topics to other course content.

We hope that, during the remaining part of the MaCuDE project, we will find more effective ways to reach out to IS departments around the world so that the community as a whole will be able to contribute actively to the project's future phases. We invite schools and programs to provide data about existing programs and to participate in articulating the increasingly strong contributions that our discipline can make to the business curriculum (both in its core and by offering strong majors and concentrations). We believe that, among its strengths, the IS discipline can enable organizational transformation with comprehensive organization-wide systems that incorporate advanced digital technologies, not as tools for

getting answers to individual questions but as essential integrated instruments of positive change. Our discipline is also uniquely positioned to analyze systems solutions' intended and unintended consequences and to enable facts-based ethical analysis. Future reports on the MaCuDe project's second and third phases have an opportunity to make a strong case for these and other strengths of our discipline—we invite all IS community members to contribute to articulating our discipline's potential contributions rigorously and convincingly.

Acknowledgments

This report has significantly benefited from the ample and rich comments, suggestions, and discussions by all advisory board members of MaCuDE project. We also acknowledge the valuable feedback and discussions by MaCuDE workshop participants at ICIS in 2019 and 2020. Such discussions have significantly strengthened this report's scope and content. Furthermore, we made an earlier version of this report available to the IS community through the AIS website and also shared it with the MIS Academic Leadership Conference mailing list with an invitation to provide feedback to the task force. Both channels resulted in valuable feedback from multiple departments, which the task force greatly appreciates.

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Appendix

Table A1. Data that Responding Universities Reported: Undergraduate Programs

#	University undergraduate programs	Course level										
		Topics					Tools					
	Program name	Big data/data science	AI / machine learning	Automation /algorithms	Blockchain	Design thinking	Python, R, SQL	Tableau, SAP, Splunk	JAVA, C, C#, C++, VBA	SAS, SPSS, EXCEL	ERP, CRM, SCM	Other
1	Applied Business Data Analytics certificate	Y	Y					Y		Y		
2	BA in Information Security/Applied Cybersecurity certificate				Y							Y
3	BS Accountancy	Y		Y			Y	Y		Y		
4	BS Business Data Analytics	Y	Y	**Y**			**Y**					Y
5	BS Computer Information Systems	Y	Y	**Y**	Y		**Y**	Y	*y*	Y		**Y**
6	Digital Business Innovation certificate											**Y**
7	BBA in Management Information	**Y**	Y	**Y**	*y*		**Y**	**Y**	Y	Y		*y*
8	Computer Information Systems	Y	*y*	**Y**			**Y**		Y		*y*	**Y**
9	BS in Management–Marketing Major	Y						Y		Y		
10	Bachelor of Science (Business)											
11	BSc Information Systems	**Y**	Y	Y	*y*							Y
12	Digital Business		Y	**Y**	*y*		*y*					**Y**
13	Bachelor of Business Administration in Information Systems (BBA-IS)	Y	**Y**	**Y**	*y*		**Y**		Y			**Y**
14	Business Administration	Y					Y			**Y**		
15	Management Information Systems	Y		**Y**			Y					
16	Bachelor of Business Administration	*y*	Y	**Y**		Y	Y	Y				
17	Cybersecurity Engineering			Y								

Y: High percentage
Y: Medium percentage
y: Low percentage
Blank: not mentioned

Table A2. Data that Responding Universities Reported: Graduate Programs

#	University graduate programs	Course level										
		Topics					Tools					
	Program name	Big data/data science	AI / machine learning	Automation /algorithms	Blockchain	Design thinking	Python, R, SQL	Tableau, SAP, Splunk	JAVA, C, C#, C++, VBA	SAS, SPSS, EXCEL	ERP, CRM, SCM	Other
1	Master of Accountancy	Y					Y	Y				
2	Master of Business Administration	**Y**	**Y**					Y				Y
3	MS in Business Analytics	**Y**	**Y**	*y*			**Y**	Y				*y*
4	MS in Information Systems Management	**Y**	**Y**	Y	*y*	*y*	**Y**	Y				**Y**
5	MS in Information Systems	Y	Y	Y						Y		
6	MS in Digital Innovation	**Y**	Y	**Y**	*y*		Y		**Y**		Y	Y
7	Master of Business Administration	Y						Y		Y		
8	MSc Business Analytics	Y	Y	Y								Y
9	Master of Computing (Information Systems)											
10	Master of Business Administration	Y					Y	Y		Y		
11	Executive Master of Business Administration	Y	Y	Y	Y							
12	Master in Food and Beverage	Y	Y	Y	Y							Y
13	Master of Business Adminstration (full time)	Y	Y	Y								Y
14	Automative and Mobility Management			Y								Y
15	MSc in Business Analytics	Y	Y	**Y**	*y*				*y*			**Y**
16	MSC in Information Systems Management	Y	**Y**	**Y**	*y*		*y*		*y*		*y*	**Y**
17	Master of Business Administration	Y	**Y**	**Y**	Y		**Y**		*y*			**Y**
18	Master of Science in Financial Technology	y	**Y**	**Y**	*y*		**Y**					*y*
19	Management Information Systems	**Y**	Y	**Y**	*y*		Y		Y	Y	Y	Y
20	Master of Business Administration	**Y**	*y*	**Y**								Y
21	Marketing and Supply Chain Management			Y								Y
22	Master of Information Management					Y						
23	Master of Professional Business Analysis	Y	Y	Y		Y						Y

Y: High percentage
Y: Medium percentage
y: Low percentage
Blank: not mentioned

About the Authors

Kalle Lyytinen (PhD, Computer Science, University of Jyväskylä) is Distinguished Professor at Case Western Reserve University. He is among the top IS scholars in terms of his h-index (93) and is the LEO Award recipient (2013). He is the chair of MaCude/IS project at AACSB. He has published over refereed 400 articles and edited or written over 30 books or special issues. His research focuses on the nature, dynamics, and organization of digital innovation, design work, requirements in large systems, and digital infrastructures.

Heikki Topi is a Professor and Chair of Computer Information Systems at Bentley University in Waltham, MA. His research focuses on systems analysis and design methods and processes, human factors and usability in the context of enterprise systems, and information search and data management. His research has been published in journals such as *European Journal of Information Systems*, *JASIST*, *Information Processing & Management*, *International Journal of Human-Computer Studies*, *Communications of the AIS*, *Journal of Database Management*, *Small Group Research*, and others. He is co-author of a leading data management textbook *Modern Database Management* and a new SA&D textbook *Systems Analysis and Design in an Age of Options*. He has contributed to international computing curriculum development and evaluation efforts in various leadership roles since early 2000s, including roles of co-chair in IS 2010 and MSIS 2010 and IS representative in CC 2005 and CC 2020. He serves currently as AIS VP of Education and on ABET CAC, and he has also served on ACM Education Board and on the Board of CSAB, representing both AIS and ACM.

Jing Tang is an Assistant Professor in MIS, Marketing & Digital Business at Saunders College of Business, Rochester Institute of Technology. She received her PhD from Case Western Reserve University. Her research primarily lies in digital innovations and digital strategies, with mixed methods and interdisciplinary theories from Information Systems, Marketing, and Strategy.