

Amy Van Looy

# From Emerging Technologies to Business Opportunities

Interviews with Academics  
and Business Experts

 Springer

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Fictive representation. This simplified image represents the need for a forward-looking idea of digital work while embracing inclusivity and sustainability. Different digital technologies can be integrated to create synergy in a connected world. Courtesy: Amber E. D. M.

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and Business Experts

 Springer

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*To my two beloved daughters who still have open minds and whose curiosity is still triggered by the unknown. Accordingly, this book is dedicated to all who would like to wisely embrace a digital future at work.*

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## Preface

Before beginning, the reader is invited to consider what can be expected from this book.

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### Who Is This Book For?

This book is written as an international professional handbook that uniquely combines theoretical inputs with practical applications. Business people (ranging from employees to managers and executives) who wish to become acquainted with the basic terminology and diverse business aspects related to emerging digital technologies will profit from the book. This publication describes how to make the emerging topics work in real-life organizations by offering descriptions from academic leaders in the field along with information and advice from industry people. As such, this book can help professionals better prepare for a digital economy.

Additionally, the book targets undergraduate business students and computer science students. Other students interested in digital innovation, transforming an organization's way of working or IT management in general, are encouraged to read the book.

Moreover, thanks to its accessible layman's language using an interview style, the book is approachable to anyone wishing to know more about the potentially disruptive character of emerging technologies and their impact on the future of work.

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### How Does This Book Differ from Other Technology Books?

This book offers an overview of the essentials related to emerging digital technologies by taking a novel angle based on interviews with academics and business experts. The reader will be introduced to various strategic and operational aspects related to a selection of digital technologies and become acquainted with basic terminology while also overseeing critical reflections related to the underlying business cases. The book encourages readers to follow recent technology developments in the context of life-long learning. Because this book offers an introduction to a wide range of digital technologies, it serves as a complement to the more specialized books that (mostly technically) elaborate on a technology separately. Moreover, by using real-life cases

and expert interviews, this book complements the theoretical outlets on the subject (such as regular textbooks about information systems, strategic management, or innovation management) and especially extends them by demonstrating the practical implications of current market trends in the IT industry. Because the book intends to explain technology trends in an approachable manner, no prerequisites are needed. However, some basic knowledge of digital innovation, information technology, or management information systems might be recommended.

The unique selling points of this book are as follows:

- The reader obtains a timely overview and critical discussion of disruptive technologies. By taking a varied approach across multiple digital technologies, the reader can become acquainted with a wide range of organization-relevant considerations to strategically take advantage of contemporary opportunities.
- The book presents a series of in-depth interviews and examples in an approachable manner using layman's language. The focus is truly on knowledge sharing based on real-life experience and success stories.
- The book offers the reader critical reflections on a recent and hyped phenomenon of digital innovation and transforming organizations accordingly, based on a combination of academic insights and practical tips and tricks. As such, a bridge is established between research knowledge and managerial practices.
- Basic concepts and practices related to emerging digital technologies are explained to introduce the reader to the business essentials of technology-related trends. By describing and explaining such trends, undergraduates and professionals alike will better understand how to survive in a digital economy.
- Recent and relevant business cases demonstrate the practical implications of current market demands that challenge the IT industry.
- Each chapter offers a self-test and suggests further readings to learn and better comprehend the material.

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## How Is This Book Organized?

After two introductory chapters, dedicated chapters elaborate on a selection of digital technologies. Each chapter explains which terminology and basic knowledge are primarily involved in a specific technology and how technology adoption in a real-life business setting can look like.

- Chapter 1 “Introduction to a Digital Economy”
- Chapter 2 “Introduction to Selected Digital Technologies”
- Chapter 3 “Artificial Intelligence”
- Chapter 4 “Internet of Things”
- Chapter 5 “Virtual Reality and Augmented Reality”
- Chapter 6 “Digital Twin Technology”
- Chapter 7 “Blockchain Technology”
- Chapter 8 “3D Printing”
- Chapter 9 “Biochips”



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Each chapter is organized as follows. It starts with an abstract that summarizes the chapter's outline and is accompanied by a list of keywords characterizing the topic under study. The body of the text first introduces a specific digital technology, followed by one interview with an academic expert for further describing and explaining the technology and one interview with a business expert for illustrating a successful business case. Each chapter ends on a recap of the takeaways, supplemented by links to further readings for those who are eager to delve more into the chapter's topic as well as a self-test to challenge the reader's understanding of the topic.

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## **Disclaimer and Trademarks**

This book intends to give an objective state of the art of the digital landscape at a certain moment in time, without supporting one or another digital technology, tool, or online service. Being an international handbook, it does not intend to give specific advice to organizations. This book is an independent publication and has not been sponsored by any organization, product, or vendor mentioned in the book. All trademarks are the property of their respective owners. All interviewees have given their informed consent to participate in the interviews.

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## **We Would Like to Hear from You**

As digital technologies are situated in a rapidly evolving IT landscape, we are interested in your feedback to prepare a next version of this book ([Amy.VanLooy@UGent.be](mailto:Amy.VanLooy@UGent.be)).

Enjoy reading!

Ghent, Belgium

Amy Van Looy

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- Christian Janiesch, Technische Universität Dortmund (Chap. 4, “Internet of Things”)
- Selen Türkay, Queensland University of Technology (Chap. 5, “Virtual Reality and Augmented Reality”)
- David Jones, Aberystwyth University (Chap. 6, “Digital Twin Technology”)
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- Brecht Van Hooreweder, KU Leuven (Chap. 8, “3D Printing”)
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- Yves Jamers, HP Inc. (Chap. 8, “3D Printing”)
- Mark Verheijden, Qurin Diagnostics & Hans Dijk, Surfex Diagnostics (Chap. 9, “Biochips”)

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# Contents

<b>1</b>	<b>Introduction to a Digital Economy</b>	1
1.1	The Rise of a Digital Economy	1
1.2	Defining the Digi-related Concepts in a Digital Economy	4
1.2.1	Differentiating IT from a Digital Technology	4
1.2.2	Differentiating Digital Innovations	4
1.3	Central Role of a Digital Business Model	5
1.4	Agility as a New Way of Working	9
1.4.1	Agile Manifesto	9
1.4.2	Scrum	11
1.4.3	Lean Start-Ups	13
1.5	Takeaways	14
1.6	Self-Test	15
	References	16
<b>2</b>	<b>Introduction to Selected Digital Technologies</b>	19
2.1	Adopting a Digital Technology	19
2.2	Selecting Digital Technologies for This Book	21
2.3	Overview of the Subsequent Book Chapters	24
2.3.1	Interview Questions for Academic Experts	25
2.3.2	Interview Questions for Business Experts and Their Organization's Success Story	26
2.4	List of Experts and Case Organizations	27
2.5	Takeaways	29
2.6	Self-Test	30
	References	30
<b>3</b>	<b>Artificial Intelligence</b>	33
3.1	Introduction to Artificial Intelligence	33
3.2	Background of Artificial Intelligence	34
3.2.1	Terminology and Explanations	35
3.2.2	Current and Future Research	39
3.2.3	Sustainable Automation Concerns	41
3.2.4	Extra Hints	43
3.3	Success Story About Artificial Intelligence	44

---

3.3.1	General Case Information . . . . .	45
3.3.2	Planning . . . . .	49
3.3.3	Adoption and Case Evaluation. . . . .	50
3.3.4	Best-Practice Advice . . . . .	55
3.4	Takeaways . . . . .	57
3.5	Self-Test . . . . .	57
	References. . . . .	58
<b>4</b>	<b>Internet of Things . . . . .</b>	<b>59</b>
4.1	Introduction to Internet of Things . . . . .	59
4.2	Background of Internet of Things . . . . .	60
4.2.1	Terminology and Explanations . . . . .	61
4.2.2	Current and Future Research . . . . .	62
4.2.3	Sustainable Automation Concerns. . . . .	64
4.2.4	Extra Hints . . . . .	67
4.3	Success Story About Internet of Things. . . . .	67
4.3.1	General Case Information . . . . .	68
4.3.2	Planning . . . . .	70
4.3.3	Adoption and Case Evaluation. . . . .	72
4.3.4	Best Practice Advice . . . . .	75
4.4	Takeaways . . . . .	77
4.5	Self-Test . . . . .	77
	References. . . . .	78
<b>5</b>	<b>Virtual Reality and Augmented Reality . . . . .</b>	<b>79</b>
5.1	Introduction to Virtual Reality and Augmented Reality . . . . .	79
5.2	Background of Virtual Reality and Augmented Reality . . . . .	80
5.2.1	Terminology and Explanations . . . . .	81
5.2.2	Current and Future Research . . . . .	83
5.2.3	Sustainable Automation Concerns. . . . .	85
5.2.4	Extra Hints . . . . .	88
5.3	Success Story About Virtual Reality and Augmented Reality . . . . .	88
5.3.1	General Case Information . . . . .	89
5.3.2	Planning . . . . .	92
5.3.3	Adoption and Case Evaluation. . . . .	93
5.3.4	Best Practice Advice . . . . .	96
5.4	Takeaways . . . . .	97
5.5	Self-Test . . . . .	98
	References. . . . .	98
<b>6</b>	<b>Digital Twin Technology . . . . .</b>	<b>101</b>
6.1	Introduction to Digital Twin Technology. . . . .	101
6.2	Background of Digital Twin Technology. . . . .	102
6.2.1	Terminology and Explanations . . . . .	103
6.2.2	Current and Future Research . . . . .	106
6.2.3	Sustainable Automation Concerns. . . . .	108

6.2.4	Extra Hints . . . . .	109
6.3	Success Story About Digital Twin Technology . . . . .	110
6.3.1	General Case Information . . . . .	111
6.3.2	Planning . . . . .	113
6.3.3	Adoption and Case Evaluation. . . . .	114
6.3.4	Best Practice Advice . . . . .	117
6.4	Takeaways . . . . .	117
6.5	Self-Test . . . . .	118
	References. . . . .	118
<b>7</b>	<b>Blockchain Technology . . . . .</b>	<b>121</b>
7.1	Introduction to Blockchain Technology. . . . .	121
7.2	Background of Blockchain Technology . . . . .	122
7.2.1	Terminology and Explanations . . . . .	123
7.2.2	Current and Future Research . . . . .	129
7.2.3	Sustainable Automation Concerns . . . . .	131
7.2.4	Extra Hints . . . . .	134
7.3	Success Story About Blockchain Technology . . . . .	134
7.3.1	General Case Information . . . . .	136
7.3.2	Planning . . . . .	137
7.3.3	Adoption and Case Evaluation. . . . .	138
7.3.4	Best Practice Advice . . . . .	143
7.4	Takeaways . . . . .	144
7.5	Self-Test . . . . .	145
	References. . . . .	145
<b>8</b>	<b>3D Printing . . . . .</b>	<b>147</b>
8.1	Introduction to 3D Printing . . . . .	147
8.2	Background of 3D Printing . . . . .	148
8.2.1	Terminology and Explanations . . . . .	149
8.2.2	Current and Future Research . . . . .	151
8.2.3	Sustainable Automation Concerns . . . . .	154
8.2.4	Extra Hints . . . . .	155
8.3	Success Story About 3D printing. . . . .	156
8.3.1	General Case Information . . . . .	157
8.3.2	Planning . . . . .	160
8.3.3	Adoption and Case Evaluation. . . . .	161
8.3.4	Best Practice Advice . . . . .	164
8.4	Takeaways . . . . .	166
8.5	Self-Test . . . . .	166
	References. . . . .	167
<b>9</b>	<b>Biochips . . . . .</b>	<b>169</b>
9.1	Introduction to Biochips . . . . .	169
9.2	Background of Biochips . . . . .	170
9.2.1	Terminology and Explanations . . . . .	171

---

9.2.2	Current and Future Research . . . . .	176
9.2.3	Sustainable Automation Concerns . . . . .	178
9.2.4	Extra Hints . . . . .	181
9.3	Success Story About Biochips . . . . .	181
9.3.1	General Case Information . . . . .	182
9.3.2	Planning . . . . .	186
9.3.3	Adoption and Case Evaluation. . . . .	188
9.3.4	Best Practice Advice . . . . .	194
9.4	Takeaways . . . . .	196
9.5	Self-Test . . . . .	196
	References. . . . .	197
<b>Index.</b>	. . . . .	<b>199</b>

---

## About the Author

**Amy Van Looy** holds a PhD in applied economics. Before entering academia, she worked as an IT consultant. Being an associate professor at Ghent University, she coordinates the research cluster of process orientation at the Department of Business Informatics and Operations Management. Additionally, she is a research fellow at Vlerick Business School. She conducts courses on research methods, process management, technology innovation, and social media among others. Amy Van Looy received the Highest Award for Achievement at the Dale Carnegie Consulting Program in 2007, the Award for Best Contribution at the OnTheMove Academy in 2010, the faculty's PhD Tutor Award in 2022, as well as paper nominations (e.g., BPM2018) and paper rewards (e.g., BPM2019). The Belgian magazine *Data News* nominated her in the top 10 for Young ICT Lady of the Year 2014, and the nonprofit InspiringFifty Belgium recognized her as a tech role model in 2020 (i.e., for being one of Belgium's 50 most inspiring women in technology).

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## List of Abbreviations

24/7	Twenty-four hours a day, seven days a week
2D	Two-dimensional
3D	Three-dimensional
3DOF	Three degrees of freedom
3G	Third generation of wireless telecommunications technology or mobile network technology
4D	Four-dimensional
4G	Fourth generation of wireless telecommunications technology or mobile network technology
5G	Fifth generation of wireless telecommunications technology or mobile network technology
6DOF	Six degrees of freedom
ACM	Association for computing machinery
AI	Artificial intelligence
AM	Additive manufacturing
API	Application programming interface
AR	Augmented reality
ASEAN	Association of Southeast Asian Nations
ASR	Automatic speech recognition
B2B	Business-to-business
B2B2C	Business-to-business-to-consumer
B2C	Business-to-consumer
BMI	Business model innovation
BPM	Business process management
C#	C-Sharp
CAD	Computer-aided design
CCD	Charge-coupled device
CO <sub>2</sub>	Carbon dioxide
CoE	Center of Excellence
COVID-19	Coronavirus disease 2019
CPS	Cyber-physical system
CPU	Central processing unit
CRUD	Create, read, update, delete



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CxO	Chief X officer (i.e., a generic term to indicate a corporate officer or C-level manager). The letter “x” is to be replaced by an organizational domain (e.g., Chief Executive Officer, Chief Technology Officer, Chief Information Officer).
DevOps	Development and operations
DFV	Desirability, feasibility, viability
DLT	Distributed ledger technology
DNA	Deoxyribonucleic acid
e.g.,	Exempli gratia (Latin for “for example”)
EMC	Electromagnetic compatibility
EMEA	Europe, the Middle East, and Africa
et al.	Et alii (m)/Et alia (f) (Latin for “and others”)
EU	European Union
FFF	Fused filament fabrication
G20	Group of 20 is an intergovernmental forum comprising 19 sovereign countries, the European Union, and the African Union
GP	General practitioner
GPS	Global positioning systems
GPT	Generative pre-trained transformer
GPU	Graphical processing unit
HCI	Human–computer interaction
HMD	Head-mounted display
HQ	Headquarter
HR	Human resources
HTTPS	Hypertext Transfer Protocol Secure
ICT	Information and communications technology
i.e.,	Id est (Latin for “that is”)
IIoT	Industrial Internet of things
INVEST	Independent, negotiable, valuable, estimatable, sized appropriately, testable
IoT	Internet of things
IP	Intellectual property
ISO	International Organization for Standardization
IT	Information technology
LNBP	Lecture notes in business information processing
LNCS	Lecture notes in computer science
LOC	Lab-on-a-chip
LPBF	Laser powder bed fusion
Manuf.	Manufacturing
MEA	Microelectrode array
microCT	Microcomputed tomography
ML	Machine learning
MVP	Minimum viable product
NASA	National Aeronautics and Space Administration
NFC	Near-field communication

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NFT	Non-fungible token
p.	Page
PC	Personal computer
PCR	Polymerase chain reaction
PCT	Patent Cooperation Treaty
PLM	Product lifecycle management
POC	Proof-of-concept
PoS	Proof-of-stake
PoW	Proof-of-work
PTSD	Post-traumatic stress disorder
QR	Quick response
R&D	Research and development
RFID	Radio-frequency identification
RNA	Ribonucleic acid
ROI	Return on investment
SaaS	Software-as-a-service
s.d.	Sine die (no date of publication)
SIM	Subscriber identity module
s.l.	Sine loco (no place or page of publication)
SSS	Smart service system
STEM	Science, technology, engineering, and mathematics
SWOT	Strengths, weaknesses, opportunities, threats
TAM	Technology acceptance model
TCO	Total cost of ownership
TOE	Technology–organization–environment
UK	United Kingdom
USA	United States (of America)
UTAUT	Unified theory of acceptance and use of technology
UX	User experience
VR	Virtual reality
Web2	Second iteration of WWW with user-generated content and end user participation
Web3	Third iteration of WWW with decentralization, blockchains, and token-based economics
WIP	Work in progress
WWW	World Wide Web
XP	Extreme programming
XR	Extended reality

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# List of Figures

Fig. 1.1	Understanding the scope of a digital economy . . . . .	2
Fig. 1.2	Differences between the digital innovation gradations . . . . .	5
Fig. 1.3	Differences between strategic models, operational models, and outcomes . . . . .	6
Fig. 1.4	Value creation pyramid, including four value types . . . . .	7
Fig. 3.1	Icon to illustrate the chapter’s topic of AI . . . . .	34
Fig. 3.2	Camera-made image of corn, indicating anomalies (printed with permission). . . . .	46
Fig. 4.1	Icon to illustrate the chapter’s topic of IoT . . . . .	60
Fig. 4.2	Visualization of a dashboard showing IoT information (printed with permission). . . . .	75
Fig. 5.1	Icon to illustrate the chapter’s topic of VR–AR. . . . .	80
Fig. 5.2	Example of an immersive shopping experience, using a smartphone (Printed with permission) . . . . .	90
Fig. 6.1	Icon to illustrate the chapter’s topic of digital twin technology . . . . .	102
Fig. 6.2	Visualization of a digital twin (Printed with permission) . . . . .	111
Fig. 7.1	Icon to illustrate the chapter’s topic of blockchain technology . . . . .	122
Fig. 7.2	Visualization of an interface showing some blockchain information (Printed with permission). . . . .	141
Fig. 8.1	Icon to illustrate the chapter’s topic of 3D printing. . . . .	148
Fig. 8.2	Metal demonstration part (Printed with permission). . . . .	152
Fig. 8.3	Appearance of a 3D printer within the HP Metal Jet S100 solution (Printed with permission) . . . . .	157
Fig. 9.1	Icon to illustrate the chapter’s topic of biochips . . . . .	170
Fig. 9.2	Image of a biochip, indicating its relatively small size (Printed with permission). . . . .	183

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# List of Tables

Table 2.1	Technology adoption by adoption groups and adoption phases, based on Rogers (2003) and Gartner (2023a) . . . . .	21
Table 2.2	The seven digital technologies selected for this book . . . . .	23
Table 2.3	The list of academic experts. . . . .	28
Table 2.4	The list of business experts . . . . .	28
Table 2.5	The list of case companies . . . . .	29
Table 3.1	Passport of the academic expert in AI . . . . .	35
Table 3.2	Passport of the business expert in AI . . . . .	44
Table 4.1	Passport of the academic expert in IoT . . . . .	60
Table 4.2	Passport of the business expert in IoT . . . . .	67
Table 5.1	Passport of the academic expert in VR–AR. . . . .	81
Table 5.2	Passport of the business expert in VR–AR . . . . .	89
Table 6.1	Passport of the academic expert in digital twins . . . . .	103
Table 6.2	Passport of the business expert in digital twins . . . . .	110
Table 7.1	Passport of the academic expert in blockchains. . . . .	123
Table 7.2	A simplified example of financial transactions in a physical ledger book . . . . .	125
Table 7.3	Passport of the business expert in blockchains . . . . .	135
Table 8.1	Passport of the academic expert in 3D printing . . . . .	149
Table 8.2	Passport of the business expert in 3D printing. . . . .	156
Table 9.1	Passport of the academic expert in biochips . . . . .	171
Table 9.2	Passport of the business expert in biochips . . . . .	181

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## Abstract

This chapter places digital technologies in the context of more general phenomena, such as a digital economy, digital innovation, digital transformation, digitalization, and digitization. In this way, the reader is oriented to the wider playground in which organizations operate and make informed decisions about potential technological implementations. A distinction is also made between IT and a digital technology. Next, we delve deeper into the role of a digital business model when making those strategic decisions about using digital technologies in an organization and how this relates to an agile way of working and a Scrum approach. All these phenomena and concepts offer the required context to understand better and to position the remaining chapters in this book because they provide an overview as well as guidance in an important first chapter.

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## Keywords

Digital economy · Industry 4.0 · Industry 5.0 · Digital technology · Digital innovation · Digital transformation · Digitalization · Digitization · Agility · Scrum · Lean start-up

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## 1.1 The Rise of a Digital Economy

An increasing number of technology-driven business opportunities has arisen with a potentially high impact on how organizations operate and how individuals live. As such, those opportunities affect the economy and society at large. Although the notion of a digital economy is rapidly growing, its understanding is not new because a digital economy closely relates to the notion of an information society that is seen as the outcome of the third industrial revolution, namely, after introducing computers in the 1970s–1980s and later with the Internet’s impact in the 1990s. Moreover,