

Preface

The Fourth Industrial Revolution is picking up pace and will continue to have a profound effect on humans, business activities and the planet (Schwab, 2019). To compete in this rapidly evolving environment, organizations need to understand the impact of the Fourth Industrial Revolution on all spheres of society and the world as a whole, to plan proactively for future demands and opportunities, and to create a society where mankind and the planet can thrive. This will require collaboration between policymakers, scientists, civil society, technology champions, investors and people in general. Schwab cited in Marr (2018) expresses concern that “decision-makers are too often caught in traditional, linear (and non-disruptive) thinking or too absorbed by immediate concerns to think strategically about the forces of disruption and innovation shaping our future” (p. 1). Schwab calls for all leaders and citizens to work together, to put people first, to empower them to work and thrive in the Fourth Industrial Revolution.

As we move through the Fourth Industrial Revolution, people are becoming more concerned about the potential benefits and risks of digital technology and its impact. People are worried about the extent, the implementation and the effect digital transformation will have on their privacy, jobs and welfare. There is also the concern of global inequalities due to the digital divide amongst developed and developing countries. People fear that limited access to digital technology will negatively affect their ability to live and interact in a global world. In addition, the climate crisis is causing people to doubt the positive impact of accelerated technological development on the planet.

Business managers will be expected to navigate organizations and employees through this unknown territory of digital transformation and disruption. People therefore need to be educated and empowered to live and work in the era of the Fourth Industrial Revolution (Marr, 2018) – and beyond. Education plays a huge role in preparing people for the future workplace and providing the necessary knowledge and skills. An essential part of this is the fostering of new skills and capabilities (Rodny-Gumede, 2019). Education institutions unfortunately cannot fulfil this task alone and need to be part of the collaborative efforts of governments, industries

Preface

and societies. Schleicher cited in Al-Montser (2017) adds that people will need to continuously upgrade their qualifications and skills and become life-long learners to remain knowledgeable and employable.

Reinventing the future of work thus needs to be a whole-society effort – and finding long-term solutions will require ideas and initiative from every quarter. The World Economic Forum (2017) asserts that the cognitive abilities of humans are extremely important in the Fourth Industrial Revolution as humans have the ability to deal with complexity. Cognitive abilities will be critical as humans face challenges greater than ever before in human history as the planet remains under threat due to selfish ways and the ever-increasing impact of technology and automation.

This book explores how human imagination, creativity and responsible management can be used in the Fourth Industrial Revolution. The book takes a multidisciplinary perspective in its search for answers.

Imagination is a cognitive process which every human possesses. This capacity allows us to mentally create novel objects, people and ideas in our heads which are not perceived through the five senses. Imagination is the ability of the mind to build mental scenes, objects or events that do not exist (De Haas, 2014). Imagination, according to De Haas (2014) is “essential for anyone, especially for leaders, who not only have to lead people into the future but have to foresee the challenges not yet known that await mankind” (p. 3). Imagination is the lifeblood of great ideas and plays a vital role in human life and development. Human imagination is required to prevent the negative impact of unchecked technological advancement. Intellectual imagination is a conscious and deliberate process (Rush, 2018) that requires great effort and care. Imaginative fantasy is used to generate new ideas from scratch and is the soul of creativity.

Creativity is important for prosperity and economic growth (Hoffmann, Cropley, Cropley, Nguyen & Swatman, 2014). Creativity needs imagination, which is a key cognitive skill in the Fourth Industrial Revolution. Vandervelde (2018) explains that “creativity is tackling challenges, improving what exists today, and developing concepts determining our future”. He adds that creativity’s starting point is the idea that is generated while the end point is a concept that brings originality and value. Creativity, complex problem-solving skills and critical thinking are crucial to ensure that humans create and innovate technology responsibly to sustain the planet.

Never before has an ecological crisis presented as fundamental and serious a threat to humans at a global scale as climate change. Humans can no longer continue building capitalistic markets without consideration for the effect it has on the planet. Climate change has become real and in the Fourth Industrial Revolution, it will be more critical than ever before. Responsible management, using imagination and creativity to come up with better ways to overcome these difficulties, is essential – not only for prosperity but for survival. Wilhelm (2013) believes that climate change

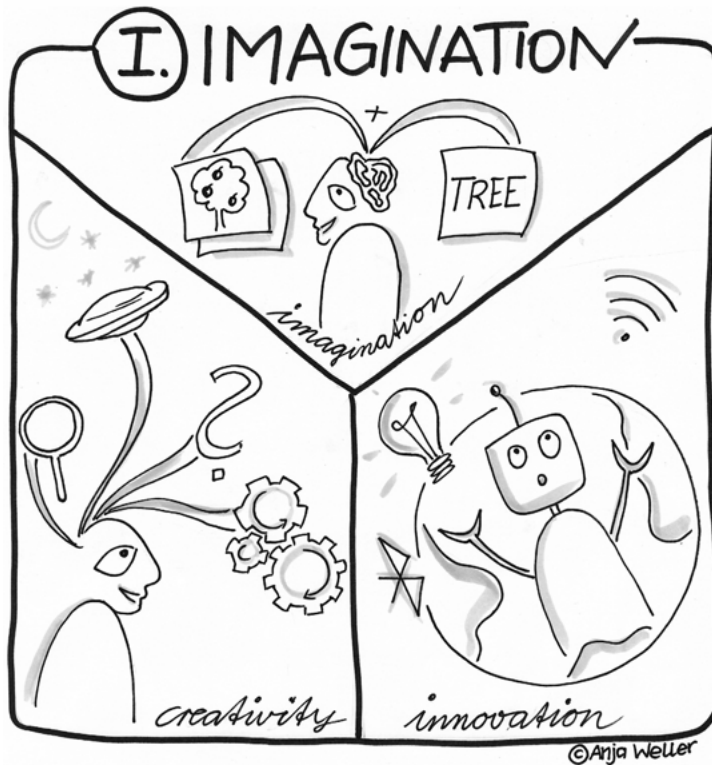
is a great challenge, but a solvable one, and business must be part of the solution. Every human has a role to play.

The book is divided into three sections.

SECTION 1: IMAGINATION IN THE FOURTH INDUSTRIAL REVOLUTION

“Imagination is the beginning of creation. You imagine what you desire, you will see what you imagine, and at last, you create what you will.”— George Bernard Shaw

Figure 1.



This section consists of three chapters with perspectives from India, France and Germany.

Preface

Chapter 1, written by Rajashree Chaurasia (India), is titled “On the Principles of Imagination and Creativity: Philosophy, Neuroscience, and the 4IR.” The author explains that imagination, creativity and innovation are interlinked insofar as one leads to the other. The chapter examines the historical perspectives of imagination through the eyes of famous philosophers and psychologists such as Aristotle, Kant, Hume, Descartes, Sartre, Husserl and Wittgenstein. Chaurasia then explores the neuro-biological connection between imagination and creativity and explains how this will contribute to advances in science, engineering and business in the Fourth Industrial Revolution and the imagination age.

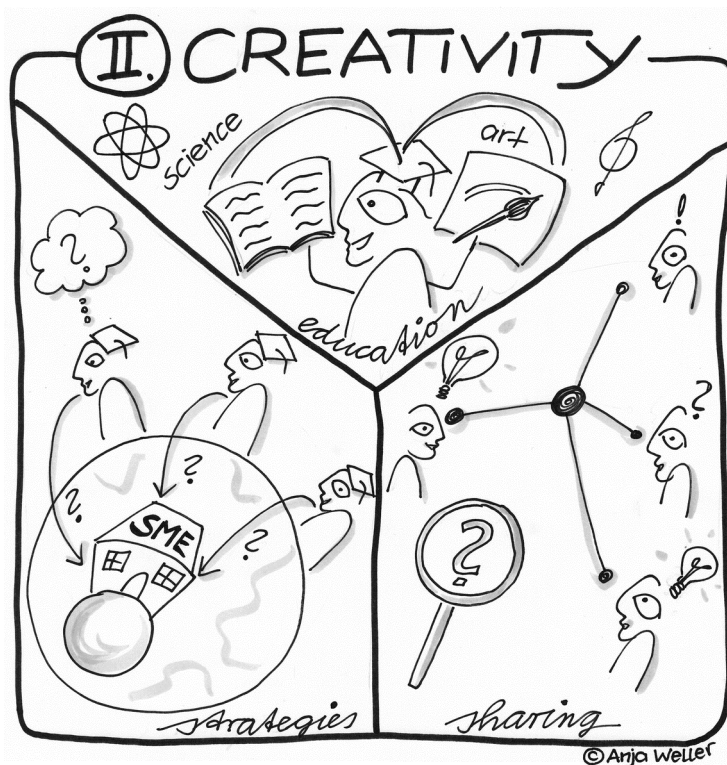
Chapter 2 contains the article, “The Imaginary Structure of the Fourth Industrial Revolution,” which was written by Dr. Thomas Michaud (France). The chapter focuses on how science fiction is increasingly involved in innovation processes in technological sectors. The imaginary, through design fiction, stimulates the creativity of engineers and innovators who work to create a better world through technoscience. Dr. Michaud talks about ‘imaginovation’, a synthesis of the terms ‘imagination’ and ‘innovation’, which will guide decision-making in the Fourth Industrial Revolution and beyond. Science fiction is thus becoming an integral part of collective psychology and is considered an essential element of contemporary technical imagination.

Chapter 3, written by Julien Bucher and Dr. Anja Weller (Germany), is titled “From the Visual Turn to Turned Up Visuality: Modes of Interaction in the Digitalized Era and Ways to Utilize Them.” This chapter explains how the humanities and social sciences discovered the new field of visual research in the 1990s. This field centres on ‘turns’ such as the imagic turn, the pictorial turn, the iconic turn and the visualistic turn. These ‘turns’ emphasize the importance of visibility (or the visual mode) which has shaped the direction of research. Today, almost 30 years later, the individuals are heavily influenced by the digitalization of technologies and the globalization of material and immaterial goods. These goods – products, ideas and imaginations – rely on certain ways of visual presentation, images and visual media in general. Visual-based alternatives to commonly used methods such as interviews or surveys are discussed, finishing off with a description of the creative interview, a qualitative instrument used to gain and explicate information and imaginations based on sketches and drawings made by respondents.

SECTION 2: CREATIVITY IN THE FOURTH INDUSTRIAL REVOLUTION

“Creativity is a currency in 4th industrial revolution.” - The SA Art Times Network

Figure 2.



This section consists of six chapters with perspectives from Germany, South Africa and the Ukraine.

Chapter 4, titled “Is an Artist a Better Scientist? An Empirical Analysis on the Impact that Artistic Activity has on a Scientist’s Achievement,” was written by Rebecca Frenz, Julien Bucher and Anja Herrmann-Fankhänel (Germany). This chapter takes a close look at three studies by Root-Bernstein, seeking to confirm his findings by conducting interviews with scientists who have an artistic avocation. The results show that art offers an escape for scientists to reorganize their thoughts. If scientists combine the two worlds of art and science, their scientific work directly benefits from their artistic pursuits.

Chapter 5, written by Prof. Ziska Fields, is titled “Cognitive Skills Development at Higher Educational Level in the Fourth Industrial Revolution: A Case for Creativity.” Prof. Fields explains that to compete in the Fourth Industrial Revolution, highly developed cognitive skills are critical. The chapter stresses that higher education

Preface

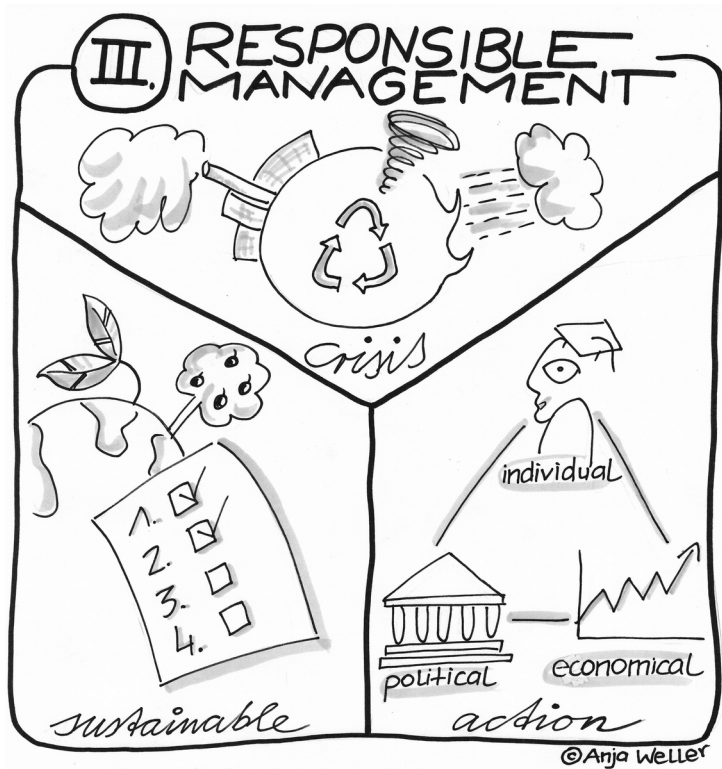
institutions need to place greater emphasis on cognitive skills development to meet the demands of the future workplace. Creativity is especially important in this regard. The chapter describes two ways of assessing creativity and three techniques for developing creativity for higher education in the Fourth Industrial Revolution.

Chapter 6 was written by Dr. Justine Walter (Germany) and is titled “SMEs in the 4th Industrial Revolution: Creative Tools to Attract Talent and Shape the Future of Work.” Dr Walter states that the Fourth Industrial Revolution is characterized by demographic developments that will provoke fundamental changes in the labour markets of many industrialised nations. This situation will especially affect Small and Medium-sized Enterprises (SMEs) in rural regions, with rapidly increasing numbers of retirees and an equally rapidly shrinking population of young people. If these companies want to maintain their levels of production in the Fourth Industrial Revolution, they will need to pursue new creative strategies to attract the best talent. All of this is true for Saxony, a highly industrialised German region with a large percentage of SMEs. The region has been hit hard by declining birth rates and high levels of emigration. Taiwan in South East Asia faces similar challenges. At the same time, many well-educated members of the young generation in both regions feel disrespected, underpaid and without prospects.

Chapter 7, titled “Knowledge Sharing and Creation in Virtual Teams: An Integrated Framework Based on Distributed Cognition Theory and Transactive Memory Systems,” was written by Dr. Evi Kneisel (Germany). The chapter takes a holistic look at social, technical and individual aspects of knowledge sharing and generation in virtual environments. The chapter proposes a socio-technical framework based on distributed cognition theory and transactive memory systems. According to Dr. Kniesel, in combination, these well-established social theories provide theoretical foundations for describing and understanding how groups of individuals organize shared activities and interact with technology to store, retrieve and use individual knowledge for joint problem-solving and innovation.

Chapter 8, written by Dr. Deonie Francesca Botha (South Africa), is titled “Knowledge Management and the Digital Native Enterprise.” Dr. Botha affirms that technology will change the way people work and will affect the operating model of organizations. Digital transformation will make work processes almost unrecognizable. In an age of rapidly evolving technologies, business models, demographics and even workplace attitudes will all shift concurrently. Change is thus not only constant but also exponential in its pace and scope. Dr. Botha states that knowledge management strategies support business processes in organizations. She uses case studies to show how knowledge management and the skillfulness of knowledge managers is important in the digital native enterprise.

Figure 3.



SECTION 3: RESPONSIBLE MANAGEMENT IN THE FOURTH INDUSTRIAL REVOLUTION

“The forces of the Fourth Industrial Revolution demand new forms of governance to safeguard the public good. Whether it will improve the human condition will depend on whether corporate, local, national, and international governance can adapt in time.” - Klaus Schwab

This section consists of two chapters with perspectives from Germany.

Chapter 9, written by Prof. York Ulrich Kautt (Germany) is titled “Ecological Crisis, Sociality, and Digital (Self-)Management.” This chapter focuses on the ecological crisis which is one of the most pressing problems of the present. Prof. Kautt discusses the importance of individual action for the ecological transformation of society and stresses that self-management is indispensable for such a transformation. Social reasons that prevent the development and implementation of new, pro-environmental

Preface

types of practice are described in the chapter and recommendations are made for a (yet to be developed) creative form of self-management.

Chapter 10 is titled “Through Harmonization of National Technical Regulations to Promote More Sustainability in Engineering Businesses: How to Stay Compliant, Efficient, and Sustainable in International Engineering Businesses.” The chapter was written by Dr. Julia Krause (Germany) who provides readers with insights into the complexity of engineering, delivering and constructing industrial plants while working in different countries. She explains that with different economic, social and environmental requirements on the one hand, coupled with challenges caused by globalization, digitalization and worldwide climate change on the other, it is vital to find ways for more sustainable project management and business models. This, according to Dr Krause, will inspire global players to consider sustainability development goals. Becoming an innovator will drive suppliers, clients and other stakeholders. The first step towards sustainable engineering processes in the globalized world is the harmonization of technical regulations worldwide.

In conclusion, the editors believe that the topics included in this book, contributed by authors from around the globe, will spur novel ideas, concepts and approaches to enrich the ongoing discussion on the importance of imagination, creativity and responsible management in the Fourth Industrial Revolution and beyond. They hope that this book will help future managers, students and academics to understand the importance of continuously developing their cognitive skills and to remain responsible and accountable in the new digital era which lies ahead.

Ziska Fields

Julien Bucher

Anja Weller

REFERENCES

Al-Montser, S. (2017). *Education in the 4IR*. In focus. Retrieved May 2, 2019 from <https://infocus.wief.org/education-in-the-4ir/>

De Haas, T. (2014, June 18). *The importance of Imagination* [About my brain]. Retrieved May 2, 2019 from <https://blog.aboutmybrain.com/the-importance-of-imagination>

Hoffmann, O., Cropley, D., Cropley, A., Nguyen, L., & Swatman, P. (2014). Creativity, requirements and perspectives. *AJIS. Australasian Journal of Information Systems*, 13(1), 1–18.

Marr, B. (2018). The 4th Industrial Revolution Is Here - Are You Ready? *Forbes*. Retrieved May 2, 2019 from <https://www.forbes.com/sites/bernardmarr/2018/08/13/the-4th-industrial-revolution-is-here-are-you-ready/#745335b1628b>

Rodny-Gumede, Y. (2019). *South Africa needs to think differently and embrace 4IR*. Retrieved June 22, 2019 from <https://mg.co.za/article/2019-03-08-00-south-africa-needs-to-think-differently-and-embrace-4ir>

Rush, J. (2018). *Understanding your Creative Engine — The 8 Types of Imagination*. Retrieved June 22, 2019 from <https://writingcooperative.com/understanding-your-creative-engine-the-8-types-of-imagination-5265ebdae79f>

Schwab, K. (2019). *Our global system has spun out of control. Here's how to rebalance it*. World Economic Forum. Retrieved June 22, 2019 from <https://www.weforum.org/agenda/2019/02/how-to-rebalance-our-global-system/>

Vandervelde, W. (2018). *When the box is the limit: Drive your creativity with constraints*. Amsterdam: BIS Publishers.

Wilhelm, K. (2013). *Return on stability: How business can increase profitability and address climate change in an uncertain economy*. Upper Saddle River, NJ: Pearson Education, Inc.

World Economic Forum. (2017). *Accelerating Workforce Reskilling for the Fourth Industrial Revolution: An Agenda for Leaders to Shape the Future of Education, Gender and Work*. White paper. Retrieved June 22, 2019 from http://www3.weforum.org/docs/WEF_EGW_White_Paper_Reskilling.pdf