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THEOLOGICAL EXPLORATIONS

VOLUME 3

The reality of a radically changing world is beyond dispute. The notion of the Fourth Industrial Revolution is a heuristic key for the world of emerging technologies such as artificial intelligence, nanotechnology, quantum computing, big data, the internet of things, and biotechnology. The discussion of emerging technologies and the Fourth Industrial Revolution highlights urgent questions about issues like intention, function, risk, and responsibility. This publication stimulates further reflection, ongoing conversation, and eventually the production of more textured thinking. The conversation with technology and with thinkers on technology, holds the promise of a certain fecundity, the possibility to see deeper into human evolution, but also, may be, into the future of humankind.

South African scholars are at the forefront of the thinking around opportunities and challenges posed by recent world-changing developments in technology, including machine learning and artificial intelligence. In this book scholars from various fields attempt to describe the influence of these technologies on theology, human directiveness, future ethics, university transformation and religious leadership. The chapters in this book will inspire and educate present and future scholars far beyond the subject field of theology.

Prof. Corli Witthuhn
Vice-Rector: Research, University of the Free State

Theology is always in need of reinterpretation in light of societal shifts. This very important book advances an exciting and critical relationship between theology, ethics and education on the one hand and the disruptions of our technological society on the other. The authors collectively achieved to highlight key themes that require further reflection as we chart our way into unchartered social and ethical waters.

Prof. Piet Naudé
Professor of Ethics, University of Stellenbosch Business School

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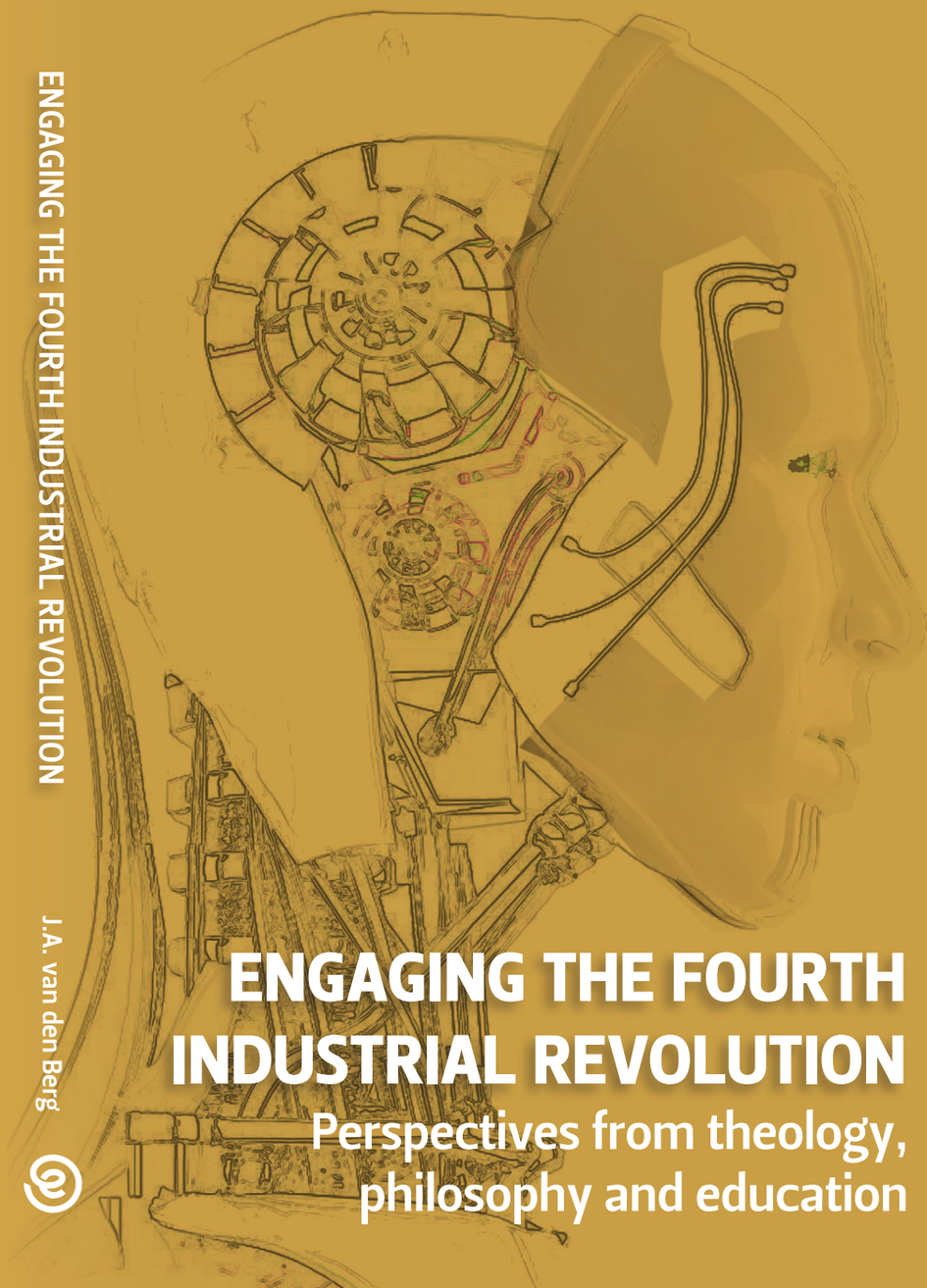
ENGAGING THE FOURTH INDUSTRIAL REVOLUTION
J.A. van den Berg



ENGAGING THE FOURTH INDUSTRIAL REVOLUTION

Perspectives from theology, philosophy and education

J.A. van den Berg
EDITOR

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INTRODUCTION TO THE SERIES

The ***UFS Theological Explorations series*** is an initiative of the Faculty of Theology and Religion at the University of the Free State (UFS), situated in Bloemfontein, South Africa. History, both in South Africa and worldwide, has shown that solid academic research is vital for stimulating new insights and new developments, not only to achieve academic progress, but also to advance human flourishing. Through this academic series, the Faculty of Theology and Religion at the UFS hopes to contribute to worthy causes such as these.

The university wishes the research conducted by its staff to be relevant and innovative within the South African context. In addition, the research should have an international impact and visibility and should encourage national and international collaboration. The type of research published in this series is focused on achieving these goals. Accordingly, *UFS Theological Explorations* publishes only research that is of a high academic standard, has been thoroughly peer-reviewed and makes an important academic contribution to fundamental theological issues on both national and international levels. Furthermore, we maintain that good research should not only be aimed at creating significant new academic knowledge but should also be a deliberate attempt to include various and even opposing perspectives. Finally, we believe that it is especially important that research takes into account the social context within which we generate new knowledge.

This series contains both monographs and collected works. In the case of the monographs, one or more researchers work on a particular topic and cover the subject matter extensively. In this way, the monographs make a significant contribution to original research. In the case of the collected works, a group of researchers from various theological and other disciplines work together on a particular topic. The collected works contribute new insights on the research question from different perspectives and thus advance scholarship collectively.

The Editorial Board trusts that *UFS Theological Explorations* will have a positive and lasting impact on theological agendas all over the world! A special word of appreciation to Jan-Albert van den Berg, the editor of this volume, for his hard work and dedication in seeing this project through. Rian Venter also assisted greatly in conceptualising the project and bringing it to a fruitful end, and, accordingly, we also express our heartfelt gratitude to him for his valuable inputs.

Francois Tolmie

Series editor: UFS Theological Explorations

INTRODUCTION TO VOLUME 3

Engaging the Fourth Industrial Revolution: Perspectives from theology, philosophy and education

Jan-Albert van den Berg

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1. Orientation

The reality of a radically changing world is beyond dispute. How to name our time, how to gauge the meaning of changes and the implications thereof, and how to navigate possible responses all require continuous reflection. Reference to the dawn of a "Fourth Industrial Revolution" has been thrust upon the agenda of academic institutions and the question of employability has been registered with an acute urgency. For those doing theology in the context of a public university, participation in this discourse is unavoidable. Questions arise as to how to frame or theorise the challenge.

These important orientations and considerations were also highlighted at a strategic planning meeting of the Faculty of Theology and Religion of the University of the Free State in February 2019. The discussion on this strategic priority led to the decision to investigate the theme of the Fourth Industrial Revolution from an academic perspective, and thus this research project was born.

2. Contextual perspectives

During the past half a century, theology has been practised with an increased sense of context and perspective. Theology cannot escape reading the signs of the times, and discernment has become a critical intellectual virtue. Doing theology "under conditions of" post-modernity, globalisation, or

post-coloniality has become commonplace. Accordingly, theologians have actively started to re-imagine their task in the light of multiple cultural and intellectual "turns", whether to language, to the Other, to experience, to the post-metaphysical, or to the body. They have accepted that they live in an age of extremes, anger and contingency. The determining impact of technologies has often been overlooked. Together with the appreciation of rationality, metaphysics, alterity, and ecology, technology should become a major conversation partner. The notion of the "Fourth Industrial Revolution" is a heuristic key for the world of emerging technologies such as artificial intelligence, nanotechnology, quantum computing, big data, the internet of things, and biotechnology. Human civilisation has entered a fundamentally new era, with the fusion of the physical, digital and biological spheres, and with the underlying basis in advances in communication and connectivity. Often the discourse on the Fourth Industrial Revolution is accompanied by promises of improved quality of life for societies and by warnings of potentially disruptive effects.

3. Focus

The focus of the research project was the new emerging reality that moved beyond the digital revolution involving cyber-physical systems, and the question as to how that related to theology. A reciprocal and mutual interaction was envisioned – a challenge to theology and a challenge from theology. The nature of the impact on theology as well as the potentially enriching contribution of theology to the discourse needed to be explored. Accordingly, on 29 and 30 July 2019, several prominent and influential thinkers from multidisciplinary fields participated in a discussion on the topic "The Fourth Industrial Revolution, Emerging Technologies and Theology" at the University of the Free State. Papers from the multidisciplinary fields of theology, philosophy and education read at this conference are presented in this third volume of the *UFS Theological Explorations* series and titled *Engaging the Fourth Industrial Revolution: Perspectives from Theology, Philosophy and Education*.

3.1 Clarifications and perspectives

In the first contribution, "Technology and Theology: Finding the Real God", Prof. Louis Fourie (University of the Free State) emphasises that the Fourth Industrial Revolution is essentially driven by the confluence of several technological innovations, such as artificial intelligence, robotics, the internet of things, nanotechnology, quantum computing, and biotechnology. These tightly integrated technologies tend to blur the lines between the physical, digital, and biological spheres jointly referred to as cyber-physical systems. Technology is increasingly becoming embedded within societies, objects and even our human bodies. The impact of the Fourth Industrial Revolution thus resulted in dramatic changes in industry, markets, employment trends, society, culture, and even the balance of global power. Unfortunately, technology is never neutral. The values of its designers are encoded in the technology and reflect the desires of its users. Although modern technology is a great blessing, it also creates serious problems. Theology will, therefore, have to position itself in terms of this unfolding utopian and millennialist religion of technology. Theological reflection is also needed, since technology is not a mere artefact, but transforms human beings, their relationships, decisions and the values according to which they live.

By plotting the contours of the Fourth Industrial Revolution and their effect on the lived experiences of human beings, Prof. Ruard Ganzevoort (Vrije Universiteit, Amsterdam, The Netherlands) attempts to name the present. With his contribution "Close Encounters of the Fourth Kind. A Theological Essay About New Technologies", he briefly introduces emerging technologies. This is followed by a critical reflection on the ambivalence of technological innovations. Based on these orientations, he discusses how new technologies serve and shape our lived experience, spirituality, and self-understanding. It is argued that these new technologies challenge notions of human uniqueness, knowledge, and transcendence. They, therefore, require a critical assessment of the future validity of fundamental concepts such as religion and spirituality.

The issue of theological methodology is addressed in view of the question of how the practice of doing theology should be re-envisioned in the light of the emerging realities. In his contribution, "Theologising Emerging

Technologies?", Prof. Rian Venter (University of the Free State) draws attention to the radically new social condition with regard to emerging technologies and advocates a dialogue of theology with technology. The study explores what such a conversation could potentially imply for the practice of doing theology. According to him, the contours of the symbolic world of the Christian faith should be identified, but he emphasises that this should be coupled with a deliberate hermeneutical approach to doing theology which will allow openness and imagination. "Theologising" technology entails situating challenges within this matrix and engaging with them in an interpretative manner most creatively.

He describes the vitality of the Christian faith to encounter new challenges and highlights the surplus of the meaning of this faith, together with its capacity for absorption and resistance. In the light of this background, Venter suggests that two basic postures could be identified – embrace and resistance. He stresses that theology should move beyond conventional positions and allow itself to be transformed by the myriad new realities, and refers to questions such as transcendence, the nature of reality, the identity of humankind, social flourishing, and the meaning of life.

In addressing perspectives on philosophies of technology, Prof. Johann Rossouw's (University of the Free State) contribution entitled "The Fourth Industrial Revolution: A Case of South African Techno-messianism", provides the reader with a critical look at the notion of the Fourth Industrial Revolution as conceived by its inventor, Klaus Schwab, founder and director of the World Economic Forum. Building on Bernard Stiegler's concept of industrialisation as the ongoing externalisation of consciousness, primarily through what he calls "orthothetic mnemotechnologies from film to digital", the author discusses the problematic nature of Schwab's concept. The quick South African embrace of this concept is diagnosed as a case of techno-messianism of a colonial nature, namely, a naive techno-optimism coupled with a cultural cringe that so often characterises former colonies.

3.2 Explorations and re-imaginings

As part of further explorations and re-imaginings with the emphasis on anthropology, Prof. Danie Veldsman's (University of Pretoria) contribution, entitled "From Harari to Harare: On Mapping and Theologically Relating the

Fourth Industrial Revolution with Human Distinctiveness", questions how one should relate the discourse on human uniqueness to the possibilities being created by newer technologies. As vantage point to a theological engagement with the Fourth Industrial Revolution, the author draws on recent questions and remarks by the Jewish historian Yuval Harari on the realities we have to face in our contemporary world in order to explore its significance and implications for our understandings and redefinitions of being human, specifically of human distinctiveness in relation to our technologised world. Radically forced by contemporary multidisciplinary transversal discourses from its traditional (cognitive) comfort zones and anthropological constructs in isolation, theological anthropology has to redefine and find its feet anew in mapping the relational and theological significance of human distinctiveness with technology.

Prof. Anton van Niekerk (Stellenbosch University) addresses the important aspect of ethics in his contribution, "What is the Shape of Future Ethics?" This study thus deals with the fundamental question: Do the technological developments of the Fourth Industrial Revolution justify our acknowledgement of new forms of ethics or do they ask a radical rethinking of the nature of what we currently regard as ethics? This question is approached and discussed within the ambit of an overarching perspective in terms of which we could frame the phenomenon of the Fourth Industrial Revolution and which provides enough access to enable us to make a few provisional remarks about the topic under discussion. This wide frame is the possibility and phenomenon of radical biomedical human enhancement, with the ultimate prospect of the emergence of a new (post-)human species. In this respect, attention is paid to Kurzweil's apocalyptic, differences between robots and human beings, the issue and possibility of unlimited longevity, the relationship between normal and radically enhanced individuals, a moral heuristic for the slowness of nature (drawing on Bostrom and Sandberg), and the question as to whether human nature as such is something we ought to preserve at all costs. The author draws the following conclusions: Responsibility is the most important moral category, now and in the future. The Fourth Industrial Revolution is essentially a reflection of the growth of our power over nature and society. More power must mean the acceptance of a more developed and more focused sense of responsibility. A heightened sense of responsibility is the

most important disposition that comes to mind when one reflects on the alleged "place of Christian ethics" in such a new world. The key is, as always in ethics, the adoption of a sense of responsibility, driven by a sustained vision of a humanised world.

3.3 Worlds of knowledge and work

Reflections on the worlds of knowledge and work start with an investigation into the university, curricula and pedagogics. Prof. Francois Strydom and Mr. Heinrich Prinsloo (University of the Free State) address possibilities in their contribution, "Towards Transforming University Pedagogy and Curricula for the Fourth Industrial Revolution." Numerous examples where technology have deeply disrupted every aspect of society are evident in the Fourth Industrial Revolution. This contribution uses the VUCA (volatility, uncertainty, complexity and ambiguity) analysis in guiding an exploration of challenges and opportunities that universities face as a result of the Fourth Industrial Revolution. The authors explore the effect of the Fourth Industrial Revolution on the three primary drivers of Higher Education in the 21st century, namely quality, performance, and accountability. The study shares a strategic approach to navigating the complexities of a VUCA future, Higher Education drivers in South Africa's complex learning and teaching environment. It also reflects on the philosophical assumptions that could inform one's learning and teaching strategy, as well as the priorities of such an approach that will enable the transformation of curriculum and pedagogies.

In her contribution to theological education, Prof. Marilyn Naidoo (UNISA) provides perspectives on "Embracing the Fourth Industrial Revolution: Adaptive Changes for Sustainable Distance Theological Education." The wide-ranging expansion of the internet and the technological advances in Higher Education compel theological education to reflect on these influences and potentials. The digital revolution confronts many theological institutions' fundamental approach to learning that has traditionally shaped pedagogical practices, even the long-term effect of our very humanness. To thrive in this uncertain climate, educational practices need to be reconceptualised. Adaptive changes are required that embrace new teaching and learning design: focusing on a constructive pedagogy, learning through

interpretative communities and paying attention to the professional development of educators. Because technology is here to stay, educators must start to integrate technology into pedagogy, and engage students more actively and strategically. How educators respond to this incredibly complex time will determine the sustainability of theological education.

In his contribution, "Religious leadership and the Fourth Industrial Revolution: Towards a Competency Framework", Prof. Ian Nell (Stellenbosch University) contributes to new thinking regarding Christian leadership, which is necessitated by radical social and technological new realities caused by the Fourth Industrial Revolution. One finds evidence of these profound transformations in our society in the reform of socio-economic systems, the development of new business models, and even the disruption of several public sectors on an unprecedented scale. These are all features of our VUCA world. These deep-seated changes confront leadership in all sectors of society with unique challenges. Looking through the lens of leadership at the nature and extent of these changes, one becomes aware that transformations can be observed on the macro-, meso- and micro levels of society. The religious sector is, unfortunately, not immune to this disruption. A competency framework is developed and a number of competencies are identified that may help equip the leaders of religious communities face the challenges of the Fourth Industrial Revolution.

In the last contribution, specific attention is paid to liturgical practices and, more specifically, to the future of liturgy and ritual in the light of emerging technologies. In order to venture into this future, thanatechnology is used to explore the landscape of offline and online liturgy. In their contribution, "The Impact of Emerging Technologies on Liturgical Practices: A Thanatechnological Exploration", Prof. Cas Wepener (Stellenbosch University) and Dr. Nicolaas Matthee (Stellenbosch University) indicate that new and emerging technologies have enhanced the possibilities for the study of religious practices. These technologies not only provide more modalities for the study of human religious expression but also allow for the creation of completely new spaces of expression. There is a new and nascent area in liturgy and ritual studies that engages the challenges posed by the Fourth Industrial Revolution. To explore this reality, thanatechnology is used to investigate the landscape of offline and online liturgy. This thanatechnological exploration resulted in

two key findings: the concept of narrative identity as a fundamental part of the liturgical and ritual expression in the context of emerging technologies and the re-imagining of liturgical space and time as they relate to spaces and rituals rooted in new contexts. In conclusion, the authors briefly discuss the possible implications of these findings, illuminating the impact of emerging technologies on liturgical practices.

4. Conclusion

In several of the contributions, one comes across references to the work of the Israeli historian Yuval Noah Harari. A brief note here may be pertinent. Harari has become a celebrity intellectual, especially for his books *Sapiens: A Brief History of Mankind* (2014), *Homo Deus: A Brief History of Tomorrow* (2016) and *21 Lessons for the 21st Century* (2018). Two dominating thoughts make his work so intriguing: his interest in macro-historical processes, describing how *homo sapiens* reached their current condition, and his profiling of the consequences of a biotechnological world. The close connection between humans and their tools stand out starkly in Harari's narratives. Especially his vision of the future is most relevant to this project. The dystopian future of the transformation of the human by advances in technology makes captivating reading and challenges philosophers, theologians and educators to engage with the consequences of current developments. The focus on algorithms and dataism as a new religion, in a sense, maps the direction reflection should take. Especially the decoupling of intelligence and consciousness asks for serious thinking. Some of his predictions, especially about "unemployable" persons, highlight the imperative of the ethical dimension in all of this. Although Harari's work comes at an opportune time and articulates vast fields of knowledge, one can also not accept it uncritically. His books have had a mixed reception. Some reviewers have rightly pointed out the need for a greater sense of contingency when dealing with history, and for more hesitance to extrapolate from current trends. The future is too unpredictable, and processes are too complex to distil some law for development.

It appears that the contributions in this volume indicate that, although the revolutionary change caused by digital developments is accepted, the concept of the Fourth Industrial Revolution is not necessarily used at an international

level, in general. Alternative concepts are so-called "emerging technologies" and "digital economy". As the character and nature of knowledge within a new digital environment change dynamically, the following should be exploited: a new quest for human uniqueness, focus on related ethical challenges, as well as issues with and a quest for expressing the reality of transcendence.

Based on these reflections, further enquiries should be lodged about including these perspectives in the theological curriculum, developing short courses, expanding and establishing awareness for a digital economy of knowledge, nurturing a sensitivity for the significance of interdisciplinarity in handling this, and exploring the significance of the spiritual and psychological effects.

It is a given that the developing nature of a digital landscape changes human existence forever. To address these perspectives within a tertiary environment, concrete strategies need to be developed. Such strategies may uncover benefits for academic excellence, community relevance and religious resonance. This volume of exploratory essays stresses the growing importance of technology and hopes to stimulate further reflection. The future of human civilisation will be intimately linked with and arguably decisively determined by technology.

The contributions do not pretend to give definitive answers to pressing challenges; they rather point to the realisation of inattention, neglect of a serious engagement with scholarship on technology, for example, with the philosophy of technology as a developing field of study. In theology, for instance, this dialogue is non-existent. Much has been done in terms of the philosophy of science, but very little in terms of technology. Whereas the first generation of thinkers on technology emphasised the negative impact on society, the contemporary position displays much greater diversity and sophistication, from which much could be learned.[1] The present moment is, arguably, one of a quest for an interpretative grammar. The discussion of emerging technologies and the Fourth Industrial Revolution highlights urgent questions about issues such as intention, function, risk and responsibility.

1 For a good overview, see Franssen, Lokhorst & Van de Poel (2018), Philosophy of technology. In: E.N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, Fall 2018. [Online]. Retrieved from https://plato.stanford.edu/archives/fall2018/entries/technology [4 March 2020].

Matters including the nature of human practices, moral agency, and the precise role of ethics surface. If the present volume could stimulate further reflection, ongoing conversation, and eventually the production of more textured thinking, it has succeeded. At stake is nothing less than ultimate questions – questions about human uniqueness, about transcendence, about flourishing, but also about justice.

Technology should not only be judged but should also be allowed to stimulate thinking and to unsettle intellectual conventions. The conversation with technology, and with thinkers on technology, holds the promise of a certain fecundity, the possibility to see deeper into human evolution, but also, maybe, into the future of humankind.

Jan-Albert van den Berg
University of the Free State, Bloemfontein

Chapter 1

Technology and theology: Finding the real God

Louis C.H. Fourie

1. Introduction

Never in the history of humankind has humanity progressed technologically at the current exponential rate. Since the institution of agriculture, repeated technological revolutions have transformed the economy and society at an increasing velocity of disruption, making the anticipation of the impact on society very difficult (Stahl, Timmermans & Flick 2017). Over the past centuries, the industrialisation of the world experienced several phases or revolutions, characterised not only by new technologies but also by important social transformations, as well as shifts in power systems (Philbeck & Davis 2018).

2. The industrial revolutions

The First Industrial Revolution or "steam era" (~1760–1850) introduced mechanisation based on the power of water and steam. This led to a major increase in productivity and output and indirectly also to urbanisation with the factory as the centre of community life, poverty, railroads, the steamship, the creation of regional and global market economies, the rise of democratic governments and an emerging middle class (Philbeck & Davis 2018).

The Second Industrial Revolution (~1870–1945) was introduced by electricity. This led to mass production and assembly lines, as well as standardisation, technical complexity and precision in manufacturing. This revolution also brought large-scale infrastructure (electricity grids and public transport) and numerous innovations including telephone, radio, gas

turbines, motor cars and aeroplanes (Philbeck & Davis 2018), and slowly people were introduced to the innovative world of technology and science.

The Third Industrial Revolution started around the 1950s with the emergence of semi-conductors, computerisation, automation and the internet, which brought about a digital transformation. In particular, the exponential increase in computing power and communication technology established new methods to produce, process and disseminate information and thus created a more interconnected and complex world (Philbeck & Davis 2018; Schwab 2016). Pervasive digital technology automated production and took supply chains global.

Following mechanisation and electrification, and building on the digital revolution and automation, we find ourselves in the initial stages of what is popularly termed as the "Fourth Industrial Revolution". This entails a new generation of sophisticated and game-changing technologies that are transforming the world into a highly connected and intelligent place (Schwab 2016). Intelligence is embedded in everything, including business processes. Technologies such as artificial intelligence, machine learning, cloud technology, smart robotics, the internet of things, and big data are the drivers of the age of "intelligentisation."

3. The Fourth Industrial Revolution

The exponential growth of the Fourth Industrial Revolution is characterised by the tight and intelligent integration of different technologies, seamlessly combining the spheres of the digital, physical and biological (jointly referred to as "cyber-physical systems") with a significant social and economic impact (Philbeck & Davis 2018). A global race to change the future of manufacturing is on. Countries are feverishly preparing and re-skilling for the Fourth Industrial Revolution to ensure a significant piece of the world economy. The race is also partly about expensive labour cost countries that are intelligently automating manufacturing to fiercely compete with cheap labour cost countries, as well as competing with each other to be the dominating and global industry leader.

Just as prior industrial revolutions, the Fourth Industrial Revolution brought about major changes in how people live, work and travel, as well as how

businesses and governments function (Fourie 2019c). As with former industrial revolutions, it leads to immense technological progress and at the same time causes large social disruptions, changes in the global economic balance of power, and a loss of jobs, freedom, security and faith, thus raising serious theological questions (Stahl et al. 2016; Stückelberger 2018; Waters 2015).

It reflects a fundamental set of shifts in human identity, culture, society and how we experience the world (Philbeck & Davis 2018).

In human history, single agents (e.g. steam, electricity and computerisation) usually led to major societal changes. But today the world is experiencing several confluent shifts that are reshaping society, culture, biology and ethics. The world is at a critical point in history when change will not only become combinatory and exponential but inevitable and irreversible (Leonhard 2016).

4. Major technological drivers of the Fourth Industrial Revolution

The Fourth Industrial Revolution is driven by several technological innovations (Stahl et al. 2017) of which the most important are discussed below.

4.1 Artificial intelligence

One of the most important role players in the Fourth Industrial Revolution is artificial intelligence or "smart" machines that mimic human intelligence, can perform complex tasks with little or no human intervention, and are capable of self-learning (Leonhard 2016). Artificial intelligence is increasingly taking on the decision-making and implementation role of humans and is expected to outclass humans in all tasks in the future and would, therefore, change professions such as law, accounting, and medicine. Due to machine and deep learning capabilities, the role of artificial intelligence in self-driving cars, chatbots, diagnosis and decision-making in healthcare, and keyhole surgery is ever-expanding. Artificial intelligence has even expanded into the artistic and creative realm creating works of art and fashion, composing poetry, stories, humour, music, movies, and media content.

4.2 Bio-engineering

Parallel in importance to the impact of artificial intelligence is human genome editing. The main driving force behind the editing of human DNA is to eradicate disease and possibly even end death. Both artificial intelligence and gene editing will certainly determine the future of the human species (Leonhard 2016).

4.3 The internet of things

The internet of things is an ecosystem of connected devices and sensors incorporated into numerous objects used daily. These objects – devices, vehicles, machines, smart home appliances, and other items – constantly collect and exchange data via the internet, which are analysed in real-time and used to make improvements. When machine learning is added, the internet of things applications automatically identify patterns and detect anomalies in smart sensor and device data such as temperature, pressure, air quality, humidity, vibration, and sound. It is also used to predict equipment failure ahead of time, discover fraudulent behaviour in banking, predict the risk and cost of car insurance based on the driving behaviour of the driver, and predict possible crime hotspots ahead of time.

4.4 Robotics

The combination of artificial intelligence (in particular, machine learning, deep learning, and cognitive computing) and robotics to deliver artificially intelligent robots will transfigure the way we live and work. Artificial intelligent robots, using deep artificial intelligence and computer vision, are increasingly displaying inimitable personalities and human emotions. They can identify and remember people and have "evolving" personalities to adapt to their owners. Furthermore, they can interpret users' facial expressions, vocal intonations and linguistic patterns, proactively start conversations rather than responding to users' commands, and simulate emotions like empathy.

4.5 Self-driving cars

Autonomous cars are revolutionising transport and will usher in an era where many people will no longer own a vehicle, thus changing how we live and travel.

Unfortunately, the advance of the autonomous vehicle will have a momentous impact on the employment of certain people like chauffeurs, taxi drivers and truck drivers.

4.6 Three-dimensional printing

The significant advances made in 3D printing form the basis of digital or additive manufacturing and will change the manufacturing industry and its traditional supply chain forever (Fourie 2019c). 3D printing enables the design, prototyping and eventual manufacturing of parts and products to be much more time-efficient than traditional manufacturing methods. Since 3D printing is based on the just-in-time (JIT) manufacturing principle, it reduces the size of unused inventory and thus the capital layout (Fourie 2019c). 3D printing breaks away from the methodology of traditional manufacturing processes, since the product is manufactured layer by layer (additive manufacturing), instead of manufacturing through the machining of raw materials where some material is removed (subtractive manufacturing) or by using the antiquated techniques of casting and forging (Fourie 2019c). The medical sector is one of the early adopters of 3D printing with the bio-printing of human organs, skin and even small human hearts.

4.7 Nanotechnology

Nanotechnology involves the control of matter on the atomic and molecular levels. Numerous research projects are being undertaken in the fields of nanotechnology and material sciences, leading to several ground-breaking discoveries (Fourie 2018a). It is particularly interesting that at atomic- or sub-atomic levels the physical and chemical attributes of matter are different, causing matter to behave very differently. Non-transparent copper becomes transparent at a sub-atomic level, while gold (normally very unreactive) becomes chemically very active. And when densely compacted into a nano-tube, normally soft and brittle graphite (a crystalline form of carbon) becomes exceptionally hard (Fourie 2018a). Nanotechnology is widely used in nanoscopic titanium dioxide or zinc oxide sunscreens, scratch-resistant car bumpers, wound dressings, corrosion-resistant paints, and in nanochips. Carbon nanotubes are roughly one nanometre wide and one to two hundred times stronger than steel. The use of carbon nanotubes is quite common

in motorcar parts and sporting equipment such as baseball bats and tennis racquets (Fourie 2018a).

But what excites scientists the most is the prospect of creating exceptionally small machines or nanobots from individual atoms. These nanobots are so miniscule that millions of them could easily be injected into the human bloodstream to check for infections or cancer. When infections or cancer are found, the nanobots could eliminate detrimental bacteria and toxins and also destroy the malignant cancer cells and tumours (Fourie 2018a). In the field of medicine, nanofibres were effectively used on mice in the case of spinal cord or brain damage. The nanofibres promote the growth of nerve cells and thus assist in the regeneration of the damaged spinal nerves (Fourie 2018a). In the nanomedicine age, different kinds of nanobots, such as microbivoral phagocytes (artificial white blood cells), clottocytes (artificial blood platelets) and respirocyte nanobots (artificial mechanical red blood cells), will increasingly be used as very accurate drug delivery systems, viral, bacterial, anaemia and cancer treatment tools, or for miniscule surgery (Fourie 2018b).

4.8 Quantum computing

Current computing power is just too limited to solve many of the incredibly arduous and convoluted problems of our time. However, quantum computing builds on the imaginative world of quantum mechanics and due to its immense power and speed could be the answer to solve these complex problems. To attain this power and speed, quantum computers use the distinct properties of matter at the sub-atomic or nano level. The power makes quantum computers useful for analysis and forecasting (Fourie 2019a). As quantum computers become more powerful, perhaps through the successful use of time crystals or one of the other approaches, they will transform computing and business paradigms by solving computational problems that are currently intractable for classical computers (Fourie 2019b).

4.9 Virtual and augmented reality

Virtual reality is widely used in simulators for educational purposes and is hugely popular in the entertainment environment such as gaming and the growing eSports market. Augmented reality is making great progress in all industries; from augmented reality mirrors in retail store change rooms than

can change the colour and other features of dresses with a touch of the screen, to medical students gaining expert knowledge of surgery (Fourie 2019d). Augmented reality augments the information stream received by a user by superimposing a real-time, virtual layer in the form of graphics, text, audio or video onto the information stream from the real world. The additional information layers are usually provided via a live camera feed into the display of the user's headset or smart device. This mixed feed allows the user to be simultaneously in touch with the virtual and physical world. This context-sensitive, real-time information allows users to focus on their work without having to continuously consult a computer screen (Fourie 2019e, 2019f). Exciting developments are happening in the field of augmented reality such as the superimposition of digital information (health, navigation, weather and points of interest) on smart contact lenses (Fourie 2019g, 2019h).

4.10 Materials science

In the past, the path of civilisation and even history has to a large extent been governed by specific technological progress. The technologies around stone, bronze and iron played such an important role in the shaping of ancienthistory, the moulding of societies and the creation of economic power and domination, that eventually entire eras were named after these materials (Fourie 2019i). Now, a new material, graphene, has been discovered that could potentially alter the future and reshape our world. This material has the characteristics and capability to disrupt current technologies and could introduce countless innovations (Fourie 2019i; Stahl et al. 2017; Waters 2015). Graphene is an amazing material of super strength and flexibility. It is a hundred to two hundred times stronger than steel and can easily stretch by about 25 per cent Simultaneously, it is so light that if a sheet of graphene would cover a football field, it would weigh less than one gram. Graphene is further a much better heat conductor than silver or copper and also a super electricity conductor. It can transmit a massive 97 to 98 per cent of light (in contrast to glass with only 80 to 90 per cent) and is impermeable for gasses (Fourie 2019k). Graphene quantum dots are very effective in the treatment of brain injuries, strokes, multiple sclerosis and heart attacks, while graphene has proved especially valuable in theranostics and targeted drug delivery (Fourie 2019j).

5. The impact of Fourth Industrial Revolution technology

Each of the first three industrial revolutions brought about profound change, not only concerning technology but also society. How people lived, worked and communicated changed dramatically – from farm to factory, country to city, and manual to mechanical production. The Fourth Industrial Revolution is no different. From intelligent robots to biologically engineered humans, the new era will bring numerous changes and ethical challenges to sectors, society, and social norms (Philbeck & Davis 2018; Waters 2015). Especially four technologies, namely genetic engineering, robotics, artificial intelligence and nanotechnologies, have the power to alter human nature and society. Genetics may enhance and alter the human germline to enhance intelligence, stop age retardation, create designer babies and regenerate organs. Robotics and artificial intelligence may create autonomous machines more intelligent than humans. In addition to the amazing graphene, nanotechnology may introduce many more super materials, as well as nanobots that could roam our bloodstreams and change medicine forever (Bradley 2007).

5.1 Automation, artificial intelligence and the elimination of jobs

The Fourth Industrial Revolution is effecting major changes in the character of work, as well as the local and global job market (Butler-Adam 2018). Automation and artificial intelligence will eventually eliminate many unskilled and skilled jobs (Kanwar & Balaji 2018; Xing & Marwala 2017). In the coming years, driverless cars will replace taxis, software will replace translators, drones and robots will replace soldiers, and sensors, computers, robots and context-aware databases will replace medical examiners and surgeons (Edmiston 2014). However, although numerous jobs will be destroyed, work will not be destroyed. Millions of new jobs will be created, demanding new skills, highly trained professionals and the ability to understand, employ, manage and use new technologies (Butler-Adam 2018). The loss of jobs will initially be in fields such as data capture, administrative and supervisory work, but will thereafter start impacting manufacturing, mining and farmworkers before affecting more skilled people like accountants, lawyers and doctors. Wherever any decision-making formula is known, artificial intelligence will soon be able to perform decision-making responsibilities better than people. Any workers, who are paid high salaries just because they have merely learned known knowledge or the code of decision-making, are in danger.

The replacement of humans by robots and the resultant loss of jobs may complicate the human-machine relationship and change the social dynamics amongst people (Stahl et al. 2017; see Green 2018).

5.2 The power of large corporates

Big data emanating from Hadoop super-computing clusters, the internet of things, and ubiquitous sensors is so extensive and complex that in most cases it can only be processed by large corporations like Facebook and Google (Edmiston 2014). Unfortunately, this gives undue power to these large corporations since the controllers of data control people and the world. Gilens and Page (2014) refer to this as "the corporate takeover of humanity".

5.3 Dehumanising of people

Closely related to the above is that people are no longer regarded as creations but as mere products defined by an artificial intelligence algorithm. Everything that exists becomes rooted in an algorithm and life is merely an enormous process of data processing. This results in the dehumanising of humans to beings with only utility value instead of a value based on their creation by God (Gilens & Page 2014).

5.4 Technocratic oligarchy

A careful study of the huge investments made in Fourth Industrial technologies by the large corporations points to the control of the future by a relatively small group of extremely wealthy people – a technocratic oligarchy (James 2017). Although this economic elite may not have governmental positions, they control industrial and financial power and dominate the economy. Due to biased pluralism, policies tend to mostly benefit corporations, large organisations and businesses, as well as professional associations (Gilens & Page 2014). The practical implication of a technocratic oligarchy is that many of the Fourth Industrial technologies, such as genetic engineering, nanobot treatment, advanced medicine, robotics and many other innovative technologies, will not be affordable by the majority of people who lack the resources.

5.5 Isolation from nature

Due to an increasing focus on the virtual world, humans are becoming isolated from nature. The technological revolution contributes to this alienation since it encourages people to leave the farm and countryside for the city and eventually the internet and the digital world. People live in an era of virtuality where the culture of virtuality transcends time and space (Van den Berg 2012). People typically consume pictures of things instead of the "thing" itself, for example, Pinterest and virtual reality applications (Edmiston 2014). This "cocooning", as described by Popcorn and Marigold already in 1997, may cause people to become isolated from nature and the creation of God. Losing touch with reality may cause people to ignore the importance of the community and the need of people around them.

5.6 False sense of autonomy

Technology often reinforces a false sense of autonomy and independence. Due to the substitution and augmentation by technology, people do not see the value of interaction with other people. This notion is also carried over to religion, fostering the notion that the community of believers is not needed.

The consequence of this dissipated sense of community and self-serving autonomy is that strangers and people in need become invisible and that people believe that the virtual space is an authentic substitute for reality, physical space and real relationships (Stahl et al. 2017; Waters 2015). Many technologies give humans more control over their environment and life by enhancing their cognitive and motor abilities. However, this is a false sense of autonomy since as people become more dependent on technology and technology is controlling their daily lives through hidden algorithms, they effectively have less autonomy (Stahl et al. 2017). Although people may not always be aware of it, technology to a large extent controls our behaviour, emotions, thoughts, moods, and action. Due to embedded artificial intelligence, technology is even making an increasing number of decisions on our behalf. However, digitisation also makes the tracking of users and their digital footprints in the cyberworld possible. The personal data gathered in this way is often presented to consumers under the pretence of personalisation. Inadvertently, consumers thus end up replicating their choices of the past preventing autonomy and even a different self or

group image. This partly contributes to the current political apathy and erosion of democracy that is becoming common in the Western world (Kouppanou 2015; Stiegler 2011).

5.7 Trans- and post-humanism

Technological progress suggests that machines will soon be able to take over tasks traditionally assigned to humans, such as understanding language and complex image recognition. The integration of humankind and machine is also gaining traction through augmented reality, direct broadband brain-computer interfaces, microchip brain implants, and artificial organs and limps created through bioengineering and nanotechnology (Leonhard 2016). Already in 1966, the use of technology to enhance a human's mental and physical capacities led to the creation of the term "transhumanism" as the indication of a stage between the "human" and "post-human" where the intellect and physiology of human beings are greatly enhanced by sophisticated technologies (Miller 2004). The focus of transhumanism is mainly to technologically enhance human beings to extend their lives. Eventually, this intermediary stage of transhumanism will lead to a "post-human" species in the future that might be able to live eternally due to ground-breaking research in the fields of biotechnology, medical science, computer science, nanotechnology, and artificial intelligence. "Post-human" refers to a beyond-human stage of infinite mental and physical augmentation and modification, immortality, as well as age and disease resistance (Miller 2004). Although greatly enhanced, the physical body of humans that are no longer limited by disease and ageing still carries the inherent risk of accidents and physical damage. Therefore, the ideal is to finally dispose of the physical body (the "hardware") after the content of the human brain has been conveyed to a robot body or a super-computer to sustain the human consciousness (the "software") (Bradley 2007). This "mind uploading" is the ultimate goal where the union of human and intelligent machine finally sets the human consciousness and intellect free from its physical, biological and time constraints (Edmiston 2014; Van den Berg 2012; see Ferrando 2013; Paura 2016).

Transhumanism is based on the foundational belief that the current form of human beings is a comparatively early phase on the developmental path of *homo sapiens.* Therefore, humans should be improved through technologies

that can eliminate disease, disability and mortality, and also greatly augment human mental and physical capacities (Vicini & Brazal 2015; Waters 2006). The term "post-human" refers to a hypothetical future species (*homo technicus* or *techno sapiens*) that is no longer unambiguously human by current standards due to cybernetic enhancements and self-perfection (Padgett 2005; see Ranisch & Sorgner 2014). In future, it will be difficult to know what is real since the idea of the natural will disappear. Organs will be regularly replaced and designer babies will be born through genetic editing of stem cells. Humans will become increasingly "godlike" and give up their humanness for non-biological intelligence and technological "fixes" (Verdoux 2011; see Leonhard 2016). Due to the increase in intellect, reasoning, and logic, technology may become an instrument of human arrogance (Schwenger 2016).

6. Non-neutrality of technology

Unfortunately, technological artefacts are never morally neutral instruments in non-neutral human decisions but affect humans on an existential level (Cloete 2015; Dyer 2011). The conception and values of designers are encoded into the material and structure of their technology and reflect the desires of its users (Lizut 2016; Philbeck & Davis 2018; Waters 2015). Emerging technologies, therefore, reshape what it means to be human by co-creating our *Lebenswelt* (Cloete 2015; Lizut 2016; Van den Berg 2012). Over the years of human existence, technology has permeated the human culture and now touches almost every single aspect of our lives. It influences our ethics, values, decisions (Dyer 2011) and faith (Padgett 2005; Schwenger 2016). Unfortunately, we often uncritically embrace technology – especially the younger generation (Dyer 2011). Magezi's (2015:1) unqualified statement that "[t]he penetration of technology into every sphere of people's lives suggests that technology has to be embraced" illustrates that some theologians consider technology as neutral and the adoption of technology as inevitable without any theological consideration of its impact. It is important to comprehend not only the technologies used by humans but also the impact that these may have on human beings, with particular reference to the desired future state of *homo sapiens* (Kouppanou 2015). The development of autonomous technologies like artificial intelligence, robotics, autonomous cars, and military weapons that decide whom to attack, redefine the human-technology relation and its

moral dimension regardless of whether we are realists, phenomenologists or relativists. Proper analysis of the impact of each technology is needed (Lizut 2016). Technology can be the engine of economic development and the source of remedies for all kinds of diseases, but it can also be a danger to our natural environment and the cause of even more superficial interpersonal relations (Schwenger 2016; see Padgett 2005). Technology is never free from a cultural, political and hermeneutical context and is at a deeper level thus also not free from preconceived values and rationality (Barns 2005). Technology shapes human culture, human consciousness, social and cultural practices, as well as true and false worship (Edmiston 2014; Roy 2002).

Technology, and in particular the Fourth Industrial Revolution, also causes a shift in people's understanding of themselves, other people, God, space and time. This is evident from new epistemologies, etiologies, futurologies, methodologies, language and values that are giving shape to new forms of existence (Joubert 2010). Today technology, not human nature sets the limits for human living. It is important to remember that technological choices are often really decisions about the kind of society we want to build (Cloutier 2015).

7. Indications for a conversation between technology and theology

7.1 The importance of theological reflection

As is evident from the previous discussion, we find ourselves in the midst of a technological environment, which has serious implications for the theological discourse with technology (Cloete 2015). Unfortunately, theology has retreated from civil discourse, in particular from debates in which a theological perspective is much needed, such as stem cell gene editing (Caiazza 2005). And when discussions between theology and science do take place, technology is often ignored (Padgett 2005). Verdoux (2011) is adamant that no discipline can afford to ignore the impact of emerging technologies. Van den Berg (2012) also emphasises that since Fourth Industrial technologies are influencing our view of being human, the future effect of these emerging technologies on the structure of life and society will have to be studied carefully. Since the church is a part of society (Magezi 2015), this means per implication that the church

is also not free from the impact of technology and this necessitates theological discussion. A well-balanced theological reflection will have to include:

- a theological anthropology, because humanity is the agent who creates technology and is also the object of technology;
- the theology of Christ as the new creation, because created nature is an object of technology and technology is implemented in the sphere of creation;
- hamartiology, because the presence of sin in humans and in the created world impinges on every thought or action, and thereby also on technology; and
- eschatology, because the phenomenon of "technology" is prominent in the *eschaton* (Schwenger 2016).

To avoid the risk of being merely partial, theology should approach the encompassing character of technology comprehensively by referring to all relevant dogmatic fields (Schwenger 2016). In the past, the theological conversation with technology has often been limited to cyber ethical discussions. Cyber ethics is indeed important since it is to a great extent the ethics of emerging technologies that influence human behaviour, human-nature relations, ways of thinking and acting, community life, perspectives of past and future, culture and religion, and economy and politics (Stückelberg 2018). However, the theological conversation with technology should not be limited to the field of ethics.

7.2 Digital exclusion and unemployment

The exponential development of technology creates widely shared concerns about fairness and equity since it may result in even greater inequality within societies, countries and the world. The theological debate will thus have to carefully consider the impact of technology on access, digital inclusion and the participation of socio-economically marginalised people (Stahl et al. 2017). The problem of digital exclusion is exacerbated by the new skills required by Fourth Industrial technologies and the resultant loss of jobs. The theological conversation will have to raise the question of how all of society can benefit and not be marginalised by the technological progress of the Fourth Industrial

Revolution. A new proletariat of the disadvantaged, who finds it impossible to benefit from the digital revolution due to a lack of skills and unemployability, is already becoming visible in some parts of the world (Stückelbelger 2018). One of the greatest potential risks of the Fourth Industrial Revolution is growing economic inequality in the world with a resultant negative impact on social stability and fragmentation (Stückelberger 2018).

7.3 Being human and the notion of the imago Dei

Emerging technologies are profoundly changing our concept of being human (Cloete 2015; Van den Berg 2012). According to Verdoux (2011), the technological modification of the human body and mind leads to organism-artefact hybrids in an increasingly human-built environment. This hybridisation raises the important issue of what it means to be human (Marais 2013), as well as the question how humanness could be preserved in the midst of rapidly developing and comprehensive technological transformation (Leonhard 2016). The issues of humanness immediately raise the question of what is meant by the Biblical statement that humans are created in the *imago Dei*. And what is personhood? Could a robot with an uploaded human mind ever be recognised as a person? What is consciousness? Could a machine ever become self-aware? (Efiong 2015).

7.3.1 The concept imago Dei

Although it is claimed that the notion of the *imago Dei* fundamentally distinguishes the human being from artificial intelligence, the interpretation of the concept varies widely and has significant inferences for the theological conversation with regard to the uniqueness, dignity and rights of human beings versus intelligent machines (Marais 2013). According to Van Huyssteen (2004), some of the interpretations of the concept, namely the substantive, functional, relational/existential and eschatological interpretations, will experience problems with including future trans- and post-humans in their understanding of the concept (see DeLashmutt 2006; Peters 2018). Although the substantive interpretation of the *imago Dei* concept lost its prominence in current theological thinking, its comprehension of the *imago Dei* as reason, rationality and intellect would probably apply to most trans- and post-humans. The functional (representatives of God on earth) and relational (capacity of

humans to have relationships and personal encounters) interpretations of the *imago Dei* concept will have more difficulty in including trans- and post-humans in their understanding of it, but it is not impossible, due to the newest developments in robotics. Zwiegler (2015), however, does not think that artificial intelligence is capable of such a relationship since it is given by God. Proponents of the eschatological interpretation, according to which the *imago Dei* in humans lies in their ability or capacity to transcend themselves, or the openness with which they are living with regard to themselves, their fellow human beings, the world and their future (Marais 2013), will find it more difficult to include trans- and post-humans in their understanding of the *imago Dei.*

Anne Foerst (2000, 2004) follows a symbolic interpretation of the concept *imago Dei* and argues that humanoids share in the *imago Dei* due to their the emotive, social, and communicative facets and are thus creations that are entitled to be treated with the same esteem and gentility as human beings. According to socialists, sociability is based on the expectedness of human behaviour that rises above any prejudice based on a difference in form. Foerst (2000, 2004) therefore argues that an intelligent robot must be part of humanity since it can communicate emotively in human symbols. Any robot, which is a social creature like a human and is incorporated into the human community by humans as one of them, is a person and welcomed by God (Foerst 2000; see DeLashmutt 2006). Interesting is that Foerst bases her view on the actions of humanoids and not on the traditional views of having a soul or displaying patterns of intelligence. However, the quasi-religious inclination of Foerst to view technologies as objects of concern leads to an idealised appraisal of technology. Her cogitations that artificial intelligent beings could have a genuine relationship with a loving and caring God, reflect the arrogation of advanced technology to much more than a created tool (DeLashmutt 2006). According to DeLashmutt:

> [S]uch techno-theological hopes reflect an inauthentic form of theological discourse, which short-circuits the transcendent movement of theology towards that which is truly other and seeks to create an immanentist basis of existential hope (DeLashmutt 2006:171).

In contrast to Foerst, Van Huyssteen (2004) maintains that only human beings, of all animals, plants and living beings, are created according to the *imago Dei*

and have been invited to stand in a personal relationship with God. Green (2018) quite correctly argues that the image of the human found in eco-theological discourse meets many of the needs for interdisciplinary theological responses to intelligent robots and artificial intelligence. Eco-theology addresses humans' anthropocentrism, patriarchy, and estrangement from each other and the world. Robots and artificial intelligence reveal much about human arrogance in placing themselves at the centre of the universe, marginalising and oppressing other humans, and consuming in unsustainable ways. The eco-theological view of the human as a relational, holistic, contextual, and embodied being may be an indispensable resource for these twenty-first-century theological conversations. The paradox at the core of human existence is that while humans are made in the image of God, they are still part of a world burdened by the collective and personal effects of human rebellion against God (Harrison & Debergue 2015).

7.3.2 The challenge of biotechnology

New developments in biotechnology and gene editing are challenging many of the beliefs underlying Christian anthropology. They provide the modern person with a new understanding of human life, ethics and morality, supplanting the religious understanding transferred through the ages (Barns 2005). The lives and future of people are now experienced as in the hands of biomedical technology and not in the hand of God anymore. Unfortunately, the more science and technology assist people to understand the world and themselves and to manipulate their circumstances, the less sure they become about the broader meaning and purpose of being human. It is often their beliefs that give unconditional significance to human beings (Barns 2005). Humans can thus easily become "servo-mechanisms" that are subjected to the operating conditions imposed by the technology (Brey 2000).

7.3.3 Trans- and post-humanism

Transhumanism wants to escape the fatalities and limitations of humanity by realising a prolonged life in an altered form, a life free from disease and pain, and augmented cognitive abilities. Neo-Irenaean Mark Walker, among others, believes this growth process can be amplified through gene modification such as the CRISPR-Cas9 methodology. Through genetic engineering, scientists

can enhance the quality of human life and help them to demonstrate more of the *imago Dei*. The theological conversation will thus have to engage the underlying concepts of the implementation of genetic engineering. After all, every technological transformation carries with it human fallenness (Peters 2018). Technological notorieties such as Ray Kurzweil and Hans Moravec favour the idea of mind uploading. Currently, Dmitri Itskov, the Russian entrepreneur and billionaire, is investing much money and effort in his 2045 Initiative to transplant persons' consciousness from their physical bodies to powerful computer equipment (Geraci 2010). As in the case of other transhumanists, he aims to free humanity from the physical, biological and cognitive restraints, as well as from mortality. Once the human mind is uploaded to a computer, it would be unshackled from the relatively slow speed of neurons and the limited memory capacity of human beings (Checketts 2017). Then humans would become truly post-human.

Transhumanists' vision of the future post-human is that it will be a greatly advanced and immortal super-intelligent being introducing a new era in history (Simon 2018). This view seems to contradict Christian theology, which sees the transformation of the human race rather as making them more human and not post-human. Humans are time-bound and therefore subject to death. To experience true humanity is to experience forgiveness of sin in Jesus Christ and to one day be resurrected from the dead. Human believers are thus becoming who they truly are in Jesus Christ. However, the full *imago Dei* will only be achieved eschatologically (Peters 2018).

Some basic assumptions of the transhumanists require theological deliberation and evaluation:

1. Technology is intrinsically good and is the solution to every human problem or inadequacy.
2. Technology offers humans the independence to infinitely alter the human body that is nothing more than mere software. Immortality depends on frequent backups of this software.
3. The aim of transcendent immortality (Peters 2018).
4. The personal independence and technological ability of humans have no limits and therefore humans are entitled to plan their lives as they wish. Each individual can choose which technologies should be applied in life

and death. There is no accountability to anyone; the pursuit of happiness is individual (Vicini & Brazal 2015).

The whole transhumanist idea of person and society raises serious theological disquietudes. Such an interpretation of human life, health, well-being, and independence from a technological perspective is mechanistic and deterministic. Christian theology will have to engage with the dichotomisation of humankind and the disengagement from the suffering of Jesus on the cross by creating the post-human (Vicini & Brazal 2015). Theology will further have to engage with the ideas of Kurzweil (2005) regarding the necessity of a "new religion" as an alternative to traditional perspectives on God and the destiny of the human race.

7.3.4 Being human

It seems that the concept of *imago Dei,* as found in Genesis 1:27, has unfortunately largely lost its orientational power due to secular thinking and the remarkable progress of science and technology. For some, this concept is now merely a symbol of a world that does not exist anymore (Marais 2013). However, theologians concerned about the voice of theology in the world of today cannot ignore this important source of spiritual orientation and opportunity for self-criticism (Van Huyssteen 2004). It is an indispensable basis for reflection on the meaning of being human in the technological age (Marais 2013). A serious theological reflection on human ontology against the backdrop of a post-human world is thus needed (Barns 2005). The technological enhancement of people by improving their capacities and life changes the view of being human, including the concepts of authenticity, normality, human dignity, and the idea of health (Stahl et al. 2017). The technology of the future may be able to save humans from their finitude and mortality, but sadly the turning of human flesh into mere data will devaluate the Word made flesh (Waters 2015). Not even biological or cognitive enhancement will turn sinners into saints. Only the grace of God can redeem human beings and help them to become who they truly are (Peters 2018). Since theologising is a cognitive function, any modification of the intellectual abilities of humans will entail a change in their capacity to theologise. What would be the superhuman perspective of God? (see Verdoux 2011).

7.4 The salvation of humankind

The modern person often sees the salvation of humankind as in the hand of technology instead of the hand of God as proclaimed by the traditional religions. This technological salvation typically includes technologies such as sentient artificial intelligence, mind-uploading technology, and resurrection by copying. Eventually, technology will restore the Edenic utopia of no scarcity, disease or death (Geraci 2016). The hope of human beings in a post-human future depends squarely on their ability to secure salvation from universal and individual heinousness through the mediation of technology. Unfortunately, the very technologies that are envisaged by post-humanism to liberate humans from existential dilemmas problematise the very humanity seeking liberation (DeLashmutt 2006). A sound Christian approach to technology keeps in mind that technology is not neutral and comprises both curse and blessing. It is neither ultimate doom nor the way to salvation. Rather, salvation, as it is offered in the gospel, is needed also in the technological world. Salvation includes forgiveness for and salvation from the addiction and destruction of technology. Only Jesus Christ offers deliverance to a new life of freedom – freedom from the world and its demands, including technology (Schwenger 2016).

7.5 Alienation through virtual reality

Some people see the virtual world as an artificial escape from reality (Joubert 2010). Often a plenitude of artificial and manipulated virtual friendships replace deep face-to-face connections, resulting in highly selfish worlds with little care about other people or their needs. Virtual reality increasingly replaces real human beings with objects, thus alienating humans from the real world and fellow humans (Stahl et al. 2017). People prefer to withdraw into their manipulated cocoon of convenience and immediate satisfaction (Joubert 2010). Virtual reality further collapses the borders between human and machine (Cloete 2015) and becomes so real that it could create an alternative spiritual universe of amazing blessings without God. Quite often virtual reality casts a "spell" on its users and becomes addictive because it provides an escape from real-life, which may not be as pleasant and controllable. The focus on the virtual world could even be disruptive to God's created order and could alienate human beings from God (Edmiston 2014). Even more problematic is that different moral rules often apply in the virtual

world (Stahl et al 2017). The concern in virtual reality is that a technologically created virtual world is often so mesmerising that it bypasses the user's responsibility for reasoning (instrumental reasoning). Virtual reality programmes relate to a certain vision of the world and encourage the user to perceive the world as dictated by the technology (DeLashmutt 2006). This practice *inter alia* raises important theological questions about what constitutes a true community, the quality of interpersonal relationships in a virtual society, the interplay between "real" identity and "constructed" identity, and the experience of God's presence in a virtual world (Harrison & Debergue 2015).

7.6 Technological enhancement for an elect few

The deepest problem with the development of a technocratic oligarchy as described above is that technological enhancements, robotics, artificial intelligence, genetic manipulation and innovative medicine would only be available to the wealthy few that can afford it. This situation warrants theological discussion since not all people will have equal access to new technology or the newest medicine. But a deeper theological discussion is needed since it seems as if a dual eschatology is developing. The poor who trust in God for their healing and daily care believe in the perfection of human life in the life hereafter, where all diseases are healed, tears are wiped away and death does not exist. Affluent people, however, believe that modern technology will give them an enhanced and eternal life.

7.7 A technological utopia

The idea of a technological Edenic utopia closely associated with bioengineering, artificial intelligence, and human genetics drives the ideology of technological advancement. The envisioned utopia entails a world where technology eliminates the need to work, where all humans share in the profusion of resources, and where technology solves all problems (Leonhard 2016). Disease and mortality now become solvable technical problems that can be overcome through technology (Barns 2005; Harari 2017). The techno-enthusiasts are thus urging people to embrace the next step in their evolution and transcend humanity, which practically means merging biology with technology, altering and augmenting their minds and bodies, and becoming

superhuman (Leonhard 2016). Harari (2017) also points out that after scientists and technologists have conquered famine, epidemics and war, the focus will turn to achieving immortality, happiness, and, ultimately, divinity. Upgrading *homo sapiens* to *homo Deus*, however, will be a gradual process. Eventually, the promise of the serpent in the Garden of Eden of *eritis sicut Deus* will come true. Humans will become divine and they will no longer have a God to compare themselves to, thus also fulfilling Nietzsche's vision of the death of God and the *Übermensch*. However, the future could just as well entail a dystopian society governed by powerful computers, super-intelligent humanoids, intelligent bots and agents, algorithms, and cyborgs – or perhaps by the wealthy humans who own the technology. It is quite possible that in this dystopian society the genetically inferior and humans not enhanced by technology might be marginalised or even enslaved (Leonhard 2016). The technological utopia of the future must, therefore, form part of the theological conversation. Questions that should be discussed are whether human transcendence through technology is sustainable, whether humans should rather live within the limits of their created reality, and whether a technological utopia is possible since the final destiny of the world totally depends on God (see Schwenger 2016).

7.8 A technological eschatology

It is interesting to note that the influence of Christian eschatology has been so profound that post-Christian movements such as transhumanism retained the eschatological hope that the current imperfect world would be replaced by a new, eternal and perfect world (Geraci 2016). According to singularity exponents, the current imperfect world does not have many years left before the dawn of the new world that will be governed by machine intelligence. But it was Hans Moravec (1999) who worked out the detail of the transhuman eschatology according to an exponential curve. As machines surpass the intelligence of human beings, humans will start to transfer their consciousness to computers or intelligent robots and thus connect to the combined cosmic intelligence, which Moravec named the "Mind Fire."

It is interesting that exponents of singularity have incorporated the apocalyptic beliefs of Christianity, but replaced faith in God with evolution or the so-called "law of accelerating returns" (Geraci 2016; Kurzweil 2005). It is,

however, important to theologically evaluate how the technological eschatology contrasts with Christian eschatology. Christian faith holds on to a God who transcends the human world and eschatological hope of a non-technological "kingdom of God." Without eschatological hope, the life of Christians will end with the abilities of modern technology. In contrast to the techno-secular rationality of a technological worldview, God provides an alternative ethic of love and peace (Padgett 2005). Despite everyday experiences, Christians are not under the control of technology, but they are citizens of God's eternal kingdom, which has already begun and which will have its expected completion (Schwenger 2016).

In Christian eschatology, there is a mysterious relationship to the reality of personal death. Since Christians believe that all human lives are in the hands of God it requires them to submit their lives to the wisdom of God. In contrast to the post-human eschatological hope of a radical extension of life, Christians believe that death has been conquered by Christ's resurrection and that all believers one day will triumph over death when they are resurrected (DeLashmutt 2006, 2009).

The technological possibilities that will be experienced in the following years will certainly surpass any dreams but will introduce many new ethical issues: that only people with the financial means will be able to afford extended human lives, changing the future of the human species through genetic editing of stem cells, and the demise of ageing and death, which practically may mean that the wealthy will live forever while people without means still cannot afford basic medication (Leonhard 2016).

7.9 When artificial intelligence and humanoids become humanlike

The yearning of humans to create a counterpart for themselves is not new and has been contemplated as early as the second century BCE in Greek mythology. However, scientific and technological research vastly increased in the past few years, leading to sophisticated robots and artificial intelligence systems, now embedded into almost all aspects of human life ranging from warfare, remote-controlled surgery, self-driving cars, and many more (Green 2018). Currently, humanoid robots and artificial intelligence systems already display behaviours and actions that were once unique to humans. Not since the time of the Neanderthals have humans experienced anything so

humanlike and displaying "uniquely" human cognitive, social, and motor skills. Humanoids and artificial intelligence challenge all beliefs about the human, especially that they are special or unique. Theologians basing human worth on human uniqueness now experience that their arguments are dissolved by developments in strong artificial intelligence (Green 2018). Unfortunately, the outcomes of scientific efforts in this area are ambiguous. While certain aspects of artificial intelligence enhance the quality of life of mostly privileged people and facilitated unprecedented international and intercultural communication, robots and artificial intelligence are also a destructive force (see Schwenger 2016).

As robots and artificial intelligence continue to develop, theologians will have to respond to the above-mentioned changes on theological and ethical grounds. The human efforts to create intelligent humanoids include redefining intelligence and challenging longstanding ideas about what constitutes a human. This will lead to the emergence of many new theological questions around the future sharing of the earth with robots and artificial intelligence (Green 2018). Theologians will also have to look at the shadowy side of humans and their societies. Robots and artificial intelligence could easily be used to amplify human greed or for violence and destruction (Green 2018). The huge amount of money invested in military applications of robots and artificial intelligence should alert theologians that robots might be used very differently from the idyllic picture that Foerst (2004) painted with regard to the robots Cog and Kismet. Theologians will have to examine robots and artificial intelligence as objects of despair and hope, estrangement and reconciliation, oppression and liberation, and will thus have to monitor the application of automated robots and artificial intelligence in biomedical, industrial, and military settings (Green 2018). Important debates are needed about being human, humans values, how we should relate to the rest of the world, how increasingly humanlike robots and artificial intelligence will change people, their self-understanding, their relationships, their social structures, societies, and social justice. However, a critical engagement with all aspects of robotics and artificial intelligence calls for improved theological literacy about robots and artificial intelligence. The lack of literacy is one of the contributing factors why efforts to address the significance and impact

of these technologies in theological terms have been somewhat scattered and disorganised (see Green 2018).

Eco-theologians argue for a worldview grounded in "cosmogenesis", which decentralises the human and rather follows a holistic approach of the human in relation to the rest of creation. These critical voices reveal that the anthropology found in theological literature on robotics and artificial intelligence may represent an incomplete portrayal of the human as the locus of wisdom and relationality and should be expanded to include all relationships, including societies and ecosystems. The centrality of humankind, and the elevation of intelligent machines to divine status by some, calls for debate by theologians (Geraci 2007; Green 2018).

7.10 Finding the real God

It is within the ambit of current technology to "heal the sick and make the blind see, the lame walk, and the deaf hear" (see Mt 11:5), but it can simultaneously also engross people and shift their focus from that which is really of importance. When people are so enchanted by technology that they do not critically question it, they are in grave danger of enslavement (Dyer 2011). As technology gradually displaced religious belief in the modern age, it has led to techno-secularism and a quasi-religion with a theology that emerged from a techno-culture (Caiazza 2005; Padgett 2005). DeLashmutt (2006:1) argues that technology "has given rise to a cultural mythology, typified by post-human discourse, which offers a competing theological model to the model offered by Christian theology." According to Roy (2002), technology with its practices linked to consumerism and a rejection of altruism is the fastest growing and most powerful religion in the world. Humans (often unintentionally) place an indefensible and naive trust in technology. They tend to believe that technology can fix all problems. Human well-being is increasingly dependent upon medical technological progress. Eventually, technology will overcome the old enemy of finitude and mortality via singularity or the uploading of human consciousness to a computer or robot. This leads to secularisation and displaces the Christian belief that human life falls within the providence of God (Barns 2005). Technological transhumanism contradicts true Christian transhumanism where believers receive eternal and spiritual bodies at the resurrection (Edmiston 2014).

Human control over biological processes and genetic manipulation is increasing. However, recent developments in biotechnology and especially gene editing of stem cells raise serious ethical questions regarding the justifiable scope and boundaries of genetic manipulation. It seems as if the human species is finally decommissioning natural selection by taking control of its own biological future (Verdoux 2011). This biotechnological self-control and self-transformation of *homo sapiens* are often referred to as "playing God" (Habermas 2003; see Walton 2013). Humankind will have to consider – also through theological conversation – what it wishes to become (see Doyle 2017).

The above thinking demonstrates the object of human faith of techno-believers, even though they may not be aware of it. Regrettably, this conflicting faith in technology distorts the relationship with God and neighbour (Waters 2015). These effectively "idolatrous" beliefs are in stark contrast with traditional Christian theology that affirms finiteness and death as a normal part of human life and God as the only true object of faith (see Edmiston 2014). When people currently look at their manipulated technological environment they praise the creativity of technologists. Previously when people looked at the world around them, they praised the greatness of God (Caiazza 2005). Thus, technology is slowly displacing the Divine from everyday life as people become more dependent on technology than on God (Edmiston 2014). Technology, drugs and microsurgery have replaced prayer, thus replacing Divine intervention by non-divine choice.

8. Conclusion

There is little doubt that the technology disruptors of the Fourth Industrial Revolution abound and will increasingly influence our lives and the world in the years to come. Artificial intelligence, human genome modification, the internet of things, quantum computing and nanotechnology, amongst others, will become important game-changers in future (Leonhard 2016:12) and promise humans a utopian future of enhanced abilities, the absence of disease and immortality. Unfortunately, this has led to humans placing undue trust and faith in technology for their salvation and future. Technology is not a mere artefact, but transforms people and shapes their decisions, values and relationships (Cloete 2015). The disruptive attributes of cyber-physical systems will require new ways of thinking about technology and how we use it

(Philbeck & Davis 2018). It is thus imperative that theology carefully considers the implications and ethics of technology at all stages of the development and implementation of technology (Philbeck & Davis 2018). Theology will also have to position itself with regard to the unfolding utopian and millennialist religion of technology, as well as the challenge of transhumanism if it is to remain relevant (Walton 2013).

The eschatology, soteriology, and anthropology purveyed by faith in technology stand in stark contrast to Christian theology and fail to see real transcendence (DeLashmutt 2006). At the centre of Christian theology is Jesus Christ, the Saviour of humankind, who has been crucified on a horrendous piece of deformed technology of the cross. Yet in his resurrection, Christ transformed the cross into a symbol of victory over sin and death. Until Christ will conclude his redemptive and restorative work with his second coming, Christians must live in faith and hope in a world that is inundated by technology (Dyer 2011).

In this debate, it is interesting to note that humans tend to place themselves in the centre. However, we have slowly come to realise that we live on a midsized planet within one of the billions of galaxies. An important theological question is: Are humans indeed the centre of God's creation? The answer to this question will influence our view of artificial intelligent and post-human beings, as well as our view of what it entails to be truly human (Drees 2012). In the final instance, there is only one question to be answered: Who is the real God? Is it technology or the God of the Bible who gave his only Son, a God that transcends our world and promised an eternal kingdom that can only be established by himself and therefore lies beyond the capabilities of technology? For the Christian believer, only the living God can be the true power and object of faith and hope.

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Chapter 2

Close encounters of the fourth kind: A theological essay about new technologies

R. Ruard Ganzevoort

1. Introduction

The astronomer Josef Allen Hynek is – to my knowledge – not frequently mentioned in theological literature, but his work has probably influenced more people's theological self-understanding than all the contributions in this book. After the Second World War, the United States Air Force hired him as consultant scientist in projects on what were then called "flying saucers". Starting as a sceptic aiming to debunk the seemingly hysterical reports, he transformed "from skeptic to – no, not believer because that has certain 'theological' connotations – a scientist who felt he was on the track of an interesting phenomenon" (Hynek 1977:26-27). For this moment I leave aside his apparent need to distance himself from theology, although that would be an interesting starting point to reflect on our discipline. Hynek's impact came through a classification of unidentified flying objects (Hynek 1972:98ff.), which lent its name to the epic Spielberg movie *Close Encounters of the Third Kind*. According to Hynek, who served as scientific consultant to the movie, there are three levels of close encounters. "Close encounters of the first kind" refers to seeing an unidentified flying object (UFO) within 200 yards. The second kind involves interaction of the UFO with the environment. The third kind refers to a situation when humans actually see the occupants of a UFO, be they humanoid or otherwise. Subsequent writers added more kinds of encounters, including alien abduction, direct communication and the emergence of hybrid alien-human creatures.

Apart from the obvious reference between the chapter title, "Close Encounters of the Fourth Kind" and the Fourth Industrial Revolution, this background narrative seems meaningful to start our reflections on the new technologies and our human self-understanding. As we know from art history and the study of popular culture, the social, economic, technological, political, and cultural contexts are essential to understand how a piece of art and the surrounding popular perceptions come into existence. We can see this as part of what Ricoeur would call the world behind the text and it is one of the three essential dimensions to establish the meaning of the text. The context for the widespread interest in extra-terrestrial life was in my view related to two major contextual factors. On the one hand, we see in that era of the Third Industrial Revolution the technological innovations, which made it conceivable that we could move and communicate beyond limitations experienced before. And on the other hand, this was the time of the Cold War, a period of several decades in which the earth's superpowers were in a standoff situation due to their prolonged feud and arms race. After the end of the Cold War, UFO-research was in decline, although under the Trump administration there seems to be a kind of resurgence (Bender 2019), which would support the hypothesis that geopolitical antagonism and technological innovation are indeed key factors in the interest in UFOs.

It is then not such a big step to the theme of this volume, the Fourth Industrial Revolution. This little detour at the beginning may help us to reflect not only on those technological innovations but also on our interest in these innovations. I hope it may serve as an invitation to self-reflexivity and to consider the possibility that our interest in the technological development we are experiencing may itself resonate with the socio-cultural and geopolitical context of our days. Our times are indeed defined by new technological developments, but also by new geopolitical challenges. Instead of the bipolar deadlock of the Cold War, we now face a multipolar fragile balance with the USA, Russia, China, Europe, and some others aiming for superpower positions. At the same time, we may reach the phase where nation-states become obsolete. Their economic power and intel position are often outshined by the tech giants and multinational companies and the most threatening violence is deployed by terrorists and other non-state actors. Our reflections about the technological innovations are thus located in a world of radical

uncertainty and global interconnectedness, two prominent themes also for the theological reflection we will embark on a bit later.

In this contribution, I will first outline what I understand to be the Fourth Industrial Revolution. I follow this with a reflection on utopian and dystopian perspectives on the future. In the next section, I explore three key areas in which the Fourth Industrial Revolution affects the realm of religion: data, body, and connectivity. The theological reflections in the following section focus on human uniqueness, fragile knowing, and transcendence. Finally, I conclude that the Fourth Industrial Revolution changes religion in a fundamental way.

2. The Fourth Industrial Revolution

Founder of the World Economic Forum, economist Klaus Schwab (2016) coined the term "Fourth Industrial Revolution". He claims that we are on the brink of a new era in which technology advances so fast that it should be called a revolution. Although the concept as such can be disputed, the technological developments merit our reflection.

The First Industrial Revolution was the transformation to new manufacturing processes from the mid-1700s onwards. This radically boosted the whole economy, gave new opportunities and a growth of wealth for many, but also changed the relations between the labourers who could not afford to buy the technologically advanced production means and became dependent in new ways on the factory owners who had the capital. Urbanisation increased as a result of the centralisation of labour and new social issues emerged. The icon of this period is the steam engine.

The Second Industrial Revolution was marked by mobility and communication, facilitated by the development of larger systems like railroads, telephone networks, sewage, and gas and water supply. Electrification was a major technological driver, and globalisation, rapid transportation and mass communications were some of the important outcomes. Here the icon could be the telephone. Globalisation became more prominent during this era, including the increased possibilities of transnational trade. The deployment of new weapons and technologies changed wars from relying mostly on direct physical combat to fighting the enemy from a distance. The development of the modern nation-state is closely related to this Second Industrial Revolution.

In the Third Industrial Revolution, we saw the emergence of electronics, nuclear energy (and weaponry), biotechnology, and, in sum, the development of automation and data processing. The robot is the icon of this third period of massive innovation. With increasing speed, we learned to accommodate to the innovations in home electronics and we grew accustomed to the idea and then the fact of space travel and moon landings. The emergence of the internet, the World Wide Web, open to the public since 1993, has led to a whole new virtual space in which people started to interact. On the one hand, this increased the digital divide between those who can access endless amounts of information and those who cannot. On the other hand, especially since the rise of mobile internet, countless people, even in less developed areas, have by now become netizens. Trade and production became decentralised and even more transnational: The elements of one single product (like a pizza) can originate from a dozen or more countries. This era was also the time for de-development of multilateral international organisations like the European Union and the United Nations.

Just like in earlier stages, the Fourth Industrial Revolution builds on the accomplishments of the previous ones, but with an accelerated pace and radicalised nature. While it took the telephone 75 years to reach 100 million users, Instagram needed only two years and the game Candy Crush only one (Schwab 2018). The computing power of the simplest smartphone dwarves the high-end computers of a decade ago. Automated processes, mobility, systems, and connectivity all come together in this Fourth Revolution, which promises to be as disruptive as all the revolutions before. Central to this Fourth Industrial Revolution is the blurring of the boundaries between the real and the virtual, hybridisation of the human and the technological, radical data-driven processes, and artificial intelligence. As we are only beginning to see the possibilities of cyberwarfare, bitcoin-based financial trade, 3D-printing of goods locally (thus reducing the transportation of physical goods), and post-nation-state communities, it is difficult to predict the effects of the Fourth Industrial Revolution on how we structure our societies.

3. Dystopian and utopian futures

To assess the possible effects of these innovations on human life, it is helpful to consider the character of the main technologies. Dialoguing with a group of experts, Schwab (2018) summarises four main groups of technologies:

- New computing technologies, which allow for new approaches to data and the interface between data and the real world.
- New materials and artificial intelligence, which reshape the physical world and the way we move and function.
- New bio- and neurotechnologies and augmented reality techniques, which change the way we interact with ourselves, the others and the world.
- New approaches to energy, earth, and space, which engage a redefined integration with the environment.

Schwab is not a prophet of doom and his analysis is far from the dystopian views that others may hold. He claims that like its predecessors, the Fourth Revolution has the potential to generate a new exponential rise in the global economy and human well-being. Although his liberal views of economy seem to equate economic growth with well-being, he also understands that it has significant risks for vulnerable populations and environments, especially because we lack the adequate systems of control and governance and our institutional safeguards are dysfunctional and obsolete in light of these new challenges. For that reason, he states that we should take a value-driven approach to the Fourth Industrial Revolution and make sure that the benefits are distributed fairly, that risks and harms are being remedied, and that the developments will remain human-led and human-centred.

At this point, the voice of the Israeli historian and futurologist Yuval Harari enters the conversation. In his epic books *Sapiens* (2014) and *Homo Deus* (2016a), Harari answers the question of how humans have ended up controlling the earth and whether there is still a future ahead of us. In *Sapiens* he describes our history until now, explaining how the cognitive revolution allowed us to work in larger communities thanks to the development of shared narratives and morality. The agricultural revolution allowed us to domesticate animals and plants alike and develop a stable existence. The industrial

revolution allowed us to move beyond our natural and physical limitations. In *Homo Deus*, he explores how these developments are more and more a matter of data processing and questions rather gloomily the future of humankind given that other creatures are much better at data processing and that our human algorithms are outlived by the intellectual superpowers of modern technology. In effect, Harari claims, these developments are no longer human-led and human-centred. Even though his third book, *21 Lessons for the 21st Century* (Harari 2018), aims to provide a constructive and pragmatic approach to these developments, Harari's future is basically the end of *sapiens*: Humans are no longer necessary because different species with artificial intelligence will take over. That future has no more space for humans than the old world had for Neanderthal-humanoids and dinosaurs.

Both Harari's more dystopian view and Schwab's more utopian perspective acknowledge that the future is by definition ambivalent and that the key question is how to take a moral stance and find the wise responses to the challenges ahead. In the end, Harari seems to opt for individual meaning and even spirituality (although he critiques the idea of individual uniqueness), whereas Schwab advocates a social-liberal ethics of protecting the vulnerable. It is precisely this ambivalence that makes our attitude toward this technological future resonate with the search for extraterrestrial life, not knowing whether they will come to bring us new knowledge and perspective, or eternal annihilation. It sounds as if we are back in the garden of Eden, hesitating at eating the fruit from the tree of knowledge.

The same ambivalence can often be observed in perspectives on technology from the perspective of theology and Christian philosophy. Writing in the heydays of the Third Industrial Revolution, Jacques Ellul's Christian philosophy, for example, sees technology as the central driving force of society. Whereas his inspirator Karl Marx explains the capitalistic society with economic categories, Ellul sees the technological rationalism and efficiency-driven processes as the hallmark of modern society. He claims explicitly in the foreword to his third major book on the subject, *The Technological Bluff,* that he has never been against technique (as he calls it) but "I want to alert people to the future potential of technique and to the risks entailed by its growth so that they might be able to react and to master it, lest otherwise it escapes their control" (Ellul 1990:xiii). Later in his book, Ellul

criticises the Christian naiveté apparent, for example, in the World Council of Churches in his days, who approached technology only in a descriptive sense without any critical assessment, except the mundane claim for fair distribution – a claim that Schwab puts at the heart of his value-approach (Ellul 1990:398-399; Schwab 2018:29ff.). What is needed, Ellul claims at another place, is a radical voice from outside, a dialectic response that acknowledges the distinction between the order of truth and the order of reality (Ellul 1985:186). Our response to the ambivalence of technology should not only be ethical, but deeply theological, reflecting on the need for a transcendent perspective.

At this point, it may be relevant to clarify the futurological approach taken here (Van den Berg & Ganzevoort 2014). Based on the differentiation between various levels of actualisation – the real, the probable, the possible, and the impossible – we can opt for three different attitudes toward the future.

1. The realm of the impossible yields visionary utopian/dystopian approaches that clarify our fundamental values and principles.
2. The realm of the probable invokes adaptive approaches, fostering adequate responses to what is inevitable.
3. The realm of the possible requires a designing attitude, creatively looking for new and desirable options that bring us the best possible future.

The approach in this essay is primarily adaptive, exploring the ambivalences and inviting reflections about the best responses.

4. Data, body, and connectivity

The ambivalence of technological advances in the Fourth Industrial Revolution can be seen more clearly if we zoom in on some of the major domains of technological progress and the fundamental issues pertinent to those domains. It is of course rather arbitrary to choose these domains, and I will let myself be informed by both the analyses of Schwab and others and the artistic dramatisation of the future by the television series *Black Mirror*, in which the makers explore the possible effects of social media and augmented reality on our memories, morals, social interaction, and identity. *Black Mirror* for that reason can be seen as a critical portrayal of the Fourth Industrial

Revolution's effect on human experiences and interactions. I will focus on the lived experience of users because that will be my connection to the field of lived religion. I will not speak directly to issues like work and unemployment, or the effects of constantly performing the self on Instagram; although that would be important as well, I will look at data, body, and connection.

4.1 Data

At the heart of the digital age we live in and of the Fourth Industrial Revolution, is the preponderance of data. It is not hard to see the effect of this data-driven world on our lived experience. Our memories are supported significantly by the ability to store and retrieve information. This was already the case when humans started to write and create images, for example, in prehistoric cave paintings, but with the digitalisation of everything, our memories are much more easily captured, processed, stored, and found again. Facebook regularly reminds me of what happened one year ago or of the photos I exchanged with particular friends. This brings to mind what was already slipping into oblivion.

The data-driven society has a lot to offer. As long as our internet connection works, we have endless amounts of information at our fingertips. We are no longer limited by the capacities of our brain functions. And our choices about what to read or see or where to go can indeed be more informed than it used to be. On the level of communities and society, big data approaches allow for new knowledge about threats to our safety and well-being and for our governments taking more adequate measures to protect us from medical risks, terrorist attacks, and energy shortage, to name but a few of the obvious advantages.

But these advantages of the abundance of information are of course coupled with some major downsides and risks. The digital divide implies that the privileged have more access to all this information and more ways of using it to their advantage than the underprivileged. This is even more true for those who control the data flows. In that sense, the role of data today equals the role of capital during the earlier industrial revolutions. Whoever controls the data is at the winning end of the economic developments, as is increasingly the case in the platform-industry. Some of the major new companies do not produce, process, or handle goods, but only work with data. The largest hotel

chains, Booking.com and Airbnb, own no accommodation. The largest taxi-company, Uber, does not run cars. The largest media-companies, Facebook and YouTube, do not produce content. They own the data flows and exert their data-based power to users at both ends. Serious critical issues regard privacy, data ownership, and the right to be forgotten. European governments for this reason, have taken measures to limit the powers of the tech giants in efforts to protect individual citizens (Wolford 2019). Those same individuals, however, often willingly or naively allow those giants access to their most personal information in exchange for some benefits like playing a game.

Following Ellul, however, we should not stop at these descriptive and simple protective measures but ask what the dominance of data means. Harari goes as far as claiming we live in the age of "Dataism", the philosophy – or religion, he says – "that the universe consists of data flows, and the value of any phenomenon or entity is determined by its contribution to data processing" (Harari 2016a:428). Harari also avers:

> Dataists further believe that given enough biometric data and computing power, this all-encompassing system could understand humans much better than we understand ourselves. Once that happens, humans will lose their authority, and humanist practices such as democratic elections will become as obsolete as rain dances and flint knives (Harari 2016b).

Free data flowing is imperative and this will entail a shift of authority:

> Just as divine authority was legitimised by religious mythologies, and human authority was legitimised by humanist ideologies, so high-tech gurus and Silicon Valley prophets are creating a new universal narrative that legitimises the authority of algorithms and Big Data (Harari 2016b).

When feelings, opinions, convictions, beliefs, bodily functions, and choices are all defined as data flows processed by the suboptimal algorithms of our human brains, then it seems to make sense to replace these algorithms by the much more advanced systems available today. Anyone browsing through Amazon or Netflix will have experienced the many instances we are advised to watch a specific film or buy a particular book based on the past behaviour of ourselves or others. Harari suggests that our e-readers will soon be able to read our emotions and reading responses and adapt the reading material or the suggested titles to our responses. This will factually inverse the data flowing process of reading and increase the capacity to influence us: Instead of

the reader accessing the reading material (data) available through the reading device, the device will access the personal data in the reader.

4.2 Body

This development links data to our body, the second domain of radical innovations. Modern medicine is built on solid data. We rightly trust lab results and CT-scans instead of relying on the self-report by patients. Large data sets give new insights into the development, treatment, and prevention of diseases. This can reach the point where we let our medical decisions be based on statistics rather than factual complaints. Harari refers to the case of actress Angelina Jolie who learned from a genetic test that she was carrying a dangerous mutation of the BRCA1-gene, which according to statistics gave her an 87 per cent probability of developing breast cancer. Although at the time Jolie did not have cancer, she decided to pre-empt the disease and undergo a double mastectomy (Harari 2016b). She is not the only one. In the Netherlands, a few hundred women yearly have their breasts removed for this precise reason. However, medical researchers announced in July 2019 that their meta-analysis showed that this preventive procedure is not necessary at all and that half-yearly check-ups suffice. One could ask how much emotional suffering has ensued from the trust we have put in these statistics.

But body-related technological innovations go further than data and statistics. Many techniques have been developed to remedy our bodily imperfections and overcome our limitations. High-tech implants make up for our natural weaknesses or our non-compliance with cultural standards for beauty. So, what does the perfectibility of our bodies mean? Again, on the one hand, it removes or reduces a lot of the suffering people experience. Admittedly, there are serious issues with the unfair distribution of medical possibilities. Research investments are usually targeted at diseases prevalent in the Western world, leaving few resources to combat, for example, childhood diarrhoea, which still claims half a million lives a year, predominantly in South Asia and sub-Saharan Africa. But even so, medical care has improved around the globe and in many places, our chances of surviving have increased. On the other hand, human enhancement and perfecting our bodies may come at a price we are not willing to pay. Will we still accept the birth of imperfect children, and will society still allow us to do so? How will we relate to our bodies when they

are increasingly objectified and possibly instrumentalised? Is there still space for different physical abilities, or will we move toward standardisation of the human body? If we do, will we not lose our individuality as we move along? And will we, with all bodies developing the same high level of capabilities, still be able to enjoy the Olympic Games?

Obviously, our most radical limitation is death, and the search for longevity-causing DNA is, therefore, the holy grail of modern medicine. Whereas previous generations spoke about the *ars moriendi*, the art of dying, our life span expectancy has already doubled and we are to take seriously the possibility that we could live much longer than even today, if not forever. In the *Black Mirror* episode "Be Right Back" (2013), this is stretched even further by contemplating the possibility that our memories of a deceased partner and data retrieved from video and audio sources can be combined with robotic (or if you want cyborg, Graham 2002) technology into an artificial reproduction of that loved one. This way we can live on with that partner as if (s)he had not died. The emotional and social complications of this technique are presented as deeply problematic.

4.3 Connectivity

Data, body, and person converge with the social in the domain of global connectivity. The rise of social networks has shown how easily we can get connected and how each platform attracts specific constituencies and stimulates specific types of behaviours. From the semi-political debates to digital lynch mobs on twitter to business opportunities on LinkedIn or self-visualisation on Instagram, social networks mirror our social exchanges in the real world, without the boundaries of time and space. One salient feature of this connectivity is the possibility on many platforms to like, endorse, or support your post, thus facilitating social approval. The number of likes then becomes a measure of likeability and we can use the metrics to assess who is worth following. Although this is not fundamentally different from the dynamics in a classroom or at an academic conference, the scale and semi-anonymous nature of the processes bring it to a whole new level. This is portrayed in a horrifying way in the *Black Mirror* episode "Nosedive" in Season 3 (2016), where everybody rates everybody and where many societal benefits are only available for individuals with an average score above a certain

threshold. Individuals with a 4+ average are entitled to rent better cars and are invited to social gatherings where 4- individuals are not welcome. The episode shows the ruthlessness of the system, the ensuing lack of empathy, and the dramatic cost of falling outside the social system – even though there is also one character who lives as an outcast and who is perhaps socially disadvantaged but also the most liberated of all.

If that sounds far-fetched, the Chinese government is developing a social credit system in which personal scores will be generated based on one's actions and communications. Benefits are available if your scores go up, including "qualification for personal credit loans, easier access to sharing economy services (e.g., renting of bikes or cars), fast-tracked visa applications, preferential treatment at hospitals, and free health check-ups" (Kostka 2019:1568). At present this is not yet one integrated system but a series of pilot systems by governmental and commercial entities.

Astonishingly, at least to the Western mind, is the high rate of approval of this system, especially among the more socially advantaged and better-educated citizens in China. Instead of fearing their loss of privacy, they see primarily advantages and benefits (Kostka 2019). This exemplifies the ambivalence of technological developments. Our networks certainly cost a lot. We surrender our privacy. We let our worth be defined by others and more and more also by certain algorithms we do not even understand. We yearn for the approval we receive from the anonymous masses and in doing so we become completely focused on extrinsic values. But at the same time, this connectivity allows us previously impossible communications. Everybody can find a dedicated community to blend in, even if you were the odd-one-out in the local community. Individuality and social standardisation are both facilitated by this increased connectivity.

5. Theology

I stated in the beginning that our world is characterised by radical uncertainty and global interconnectedness. Our obsession with modern technology may perhaps aim at reducing this uncertainty by creating better data and stronger control of our bodies and of our social interactions. Our fears regarding technological innovations are likewise connected to this uncertainty and to the loss of our position in the world for us as individuals and for humankind

as a whole. After the masters of suspicion, Marx, Freud, and Nietzsche had already decentred humankind, the technological advances of our days turn this into a lived experience. This leads to fundamental theological challenges regarding our human uniqueness, the fragility of our knowledge, and transcendence. In my opinion, we are not at the point where we can answer those challenges, so the most important thing to do is identify the crucial questions.

5.1 Human uniqueness

The abundance of information in our data society questions our fundamental human self-understanding and therefore relates directly to theological anthropology. The first serious challenge regards our human uniqueness. In 2018, the European Parliament discussed the need to attribute a limited legal status of personhood to robots in order to be able to hold them accountable (Delvaux 2017). The resolution referred to Frankenstein, the Golem, and science fiction writer Isaac Asimov and states:

> [I]n the scenario where a robot can take autonomous decisions, the traditional rules will not suffice to give rise to legal liability for damage caused by a robot, since they would not make it possible to identify the party responsible for providing compensation and to require that party to make good the damage it has caused (p. 242).

This neatly emulates instalment 39 of *Star Trek: The Next Generation*, where the android Lt-Com Data is on trial: "I am taking part in a legal hearing to determine my rights and status. Am I a person or a property?" Practical theologian Elaine Graham (2002) rightly picks up on this in her analysis of our views of humanity and human personality in light of the transhuman. The key question then is whether we can still see ourselves as qualitatively different from animals and robots.

Taking it a bit further: If artificial intelligence equals and surpasses our mental abilities, including creativity and ethical discernment, and if neurosciences show that our measurable brain functions can explain many of our cognitive processes, not unlike other animals, what does this mean for the idea of *imago Dei*, the crown of creation, and stewardship?[1] Not that we did a good

1 Eva van Urk (MA) is presently working at VU Amsterdam on an NWO-sponsored PhD project on this very topic.

job at that; the disastrous effects of the Anthropocene should evoke a new cosmic humility in us instead of repeating the sometimes victorious language of classical theological anthropology. It would be a blessing for this earth to see humans go extinct, so who are we anyway? Have we not lost the moral right to exist as humans given our destructive track record and should we not simply yield to beings who will do better than we did?

We probably need to acknowledge that we are not unique. Both animals and artificial intelligence have shown smart decisions, judgment, and creativity, which means we need to rethink our ideas about the nature of humans themselves. Rather than considering humans as the only species able to generate world-encompassing knowledge about other species, maybe we must conclude that we are just not intelligent enough to understand their intelligence. Or spirituality for that matter. My cats are usually very zen and they relate in many ways to their Higher Being – me. What is so different from my relation to God? Already twenty years ago Ray Kurzweil (2000) wrote about the possible spiritual experiences in the sophisticated machines we are developing. If humans are more like animals than we may want to acknowledge and if artificial intelligence entities are more like us than would serve our pride, why do we think that only humans are spiritual? What does that tell us about our views of humankind (and what does it reveal about our conceptualisation of spirituality)?

5.2 Fragile knowing

The second serious challenge regards the fragile nature of our knowing. If anything, the discussions about data processing, intelligence and memory critique the whole notion of knowing and put into question our ability to know at all. The technological developments invite us to move forward in efforts to know and remember more, but they leave us with the uncanny awareness that our knowledge is even more limited than we thought and that what we thought to know is most possibly a self-delusional haphazard misunderstanding of coincidental perceptions and observations. If the human mind is at best suboptimal in generating knowledge, perhaps we should let go of our aspirations to establish the truth and embrace our limitations and fragility. Theologically speaking, this resonates with a long tradition from negative theology to Barthian and post-modern perspectives, teaching us that

transcendence implies that the sacred and truth are elusive and beyond our grasp. It is the awareness that all we can ever experience and observe are the *vestigia Dei*, the "traces of God", where the sacred has passed by but cannot be observed directly.

Perhaps this should also lead to a renewed appreciation of the art of forgetting. Theology has come a long way in appreciating memory and remembrance, but there is something to be said for forgetting as well. Our memories are, after all, limited and usually flawed, so it may be wise not to put too much weight on them. Some of those memories are such a burden that we would be better off without them. Trauma studies teach us that commemoration may be a good thing but memory itself can be our fiercest torturer. Perhaps we can find inspiration in the prophet Isaiah's promise that God forgets the sins of his people (Isa 43:25). What a blessing would it be if we could forget the grudges we hold against each other or the pain and suffering others have inflicted upon us! A theology of forgetting could be part of the liberating quest to let the past go and allow the future to be open again, precisely because it moves beyond the deterministic perspective based on the idea of an unmalleable past.

The fragile knowledge of the easily forgetting human does justice to the epistemological transcendence of the sacred, always just beyond our intellectual grasp. This refers not only to God. It also refers to our past, our future, and our encounter with other humans. Our intellectual honesty dictates that we accept our intellectual fragility and that we acknowledge the fragmented nature of our knowing and existing. Practical theologian Henning Luther (1992) spoke for this reason about our fragmented identity as a key feature of late modern society and as a key concept for theology. A unified and defragmented identity, he concluded, is only possible if we denounce the ruins of our past, the unfinished scaffolding of our future, and the life-changing dynamics in the encounter with the other. In other words, our identity can move beyond the fragments only in death.

5.3 Transcendence

If fragile knowledge points to transcendence, we may find the third serious challenge in rethinking transcendence. This relates to the question of how the domination of our lived experience by data systems can be interrupted. As mentioned before, Ellul suggests that we need this system to be countered

from the outside, which implies a transcendent perspective. The theological challenge then will be to develop a language that acknowledges the dialectical dynamics between the system and the fragments, between the theory-of-everything that Dataism promises and the fragile limited knowledge of our human existence. This interruptive language should not position itself completely outside the data discourse, as that would make it irrelevant. It should acknowledge the central role data play in our societies and the many positive effects it has brought about. At the same time, it should speak up for the sake of not-knowing, of being irrational, of following your heart – even when one knows that that heart is probably the limbic part of your brain following well-orchestrated external impulses. To do so, we do not need theological moralists and prophets of doom, but artists, players, and lovers. Revelation then should not function as a claim to truth, overpowering the reality we live in, but as the receptively experienced possibility of transcendence (Ganzevoort 2006). Revelation is the experience that continuously makes us doubt what we see, not the absolute ground on which we can build our convictions.

6. Religion and theology

Having explored some of the major domains of technological advances and their ambivalent meanings – data, body, and connectivity – and the theological challenges regarding our human uniqueness, fragile knowing, and revelation, the last part of my contribution will reflect on the concepts of religion and spirituality themselves. If the world we live in is indeed radically changing, are the concepts we use to understand that world still valid? See, for example, the concept of spirituality that I challenged earlier in light of the discussion about human uniqueness. I would start with the assumption that also after the Fourth Industrial Revolution it will be meaningful to speak of religion and spirituality, but only if we adjust some of the categories often used to study it.

Most importantly, perhaps, we have to reconsider the central roles we have usually given to the doctrinal and institutional dimensions of religion, and instead focus more on its limbic and playful character. Much research deals with organised religion and the convictions people hold about the transcendent. It assumes that religion implies that one holds certain convictions about a

transcendent reality to be true and to correspond to the ontological status of that transcendent reality. This (modern) view has two fundamental problems.

First, augmented reality shows us that the real and the virtual can blend in a way that makes it almost impossible to differentiate between transcendence and immanence, implying that ontology is not what it used to be. We cannot simply approach transcendence as yet another level of reality that we can discuss with quasi-empirical concepts. Swiss Reformed theologian Emil Brunner already wrote in his reflections on the Apostolic Creed:

> To the merely inquisitive question, "Is there a God? I should be interested to know whether or not there is one," silence is the sole possible answer. ... God is neither an object of scientific investigation nor something that we can insert in the treasure of our knowledge, as one mounts a rare stamp in a special place in an album – there it is, finest and costliest of all. God is not something in the world, the eternal being, the divine inhabitant of the world. God is not in the world at all, the world is rather in God. God is not within your knowledge, your knowledge is in God (Brunner 1954:1-2).

Dialectically formulated, Brunner objects to the modern ontological approach to transcendence and advocates a more relational perspective. Our awareness of virtual realities may offer us a new language and theological repertoire to think of transcendence as another virtual dimension of reality, as something that can be real and unreal at the same time.

Second, neurosciences teach us that our cognitive structures, such as our convictions, are not necessarily the driving forces in our human existence. Our behaviours and experience are better understood from complex brain processes including our limbic responses to sensory stimuli. This holds not only for trauma, sexuality, and leisure, but also for religion. The meaning of incense or organ music is not defined by some theological concept about the liturgical narrative, but by our nose and ears, directly connecting with the synapses in our limbic system and evoking emotional responses. Religion then is better understood as a limbic process, partaking in a massive multi-player game in which we encounter a virtual reality and play out the various roles that are available to us.

To understand that playful world, it is only of limited value to focus on the institutional structures. Those in charge of that structures were considered to be authorised to define what is within the boundaries of a tradition and what is not. By implication, this assumes that there are clearly delineated religious traditions that we can study. Nowadays, however, the traditional guardians of the spiritual capital of our societies are eroding. Religion today is a disruptive market with radically new business models and governments uncertain whether and how they should regulate it. How to deal with transnational religiously inspired internet-based extremism? How to manage the many religious start-ups aiming to cash in on the unfulfilled spiritual needs of the masses?

7. Conclusion

In a world of radical uncertainty and global connectivity, religion has become messier. Our fundamental drivers are not found in cognitive content but in pain, desires, and power. Our theological concepts are very helpful tools for analysis and reflection, but they should not be disconnected from our limbic and physical existence. And the changes in the religious field do not come primarily from new theological insights or religious leaders, but from changing power dynamics, new encounters through migration and communication, and changing ways in which we experience our bodies, our minds, and the other. Theology is not the feature film, not the main story, but the subtitles we use for better understanding. But if that is the case, theologians should ask themselves whether they do understand the language they are trying to translate.

I define religion as the transcending patterns of action and meaning emerging from and contributing to the relation with the sacred (Ganzevoort 2009). What is held to be sacred, however, can change from person to person and from era to era. As fundamental values are changing over time, so does religion. Where individual expression becomes more important and consumers become content producers, religion changes from following tradition to mixing and matching one's own. Where the real and virtual merge and humans start to acknowledge they are less unique than they thought, religion changes from putting humans centre stage to understanding ecological embeddedness and becoming more receptive to the possibility of other life forms and other

dimensions and realities. We may need theology at some point to understand the aliens, that is, the receptiveness of humans for alterity. We are experiencing unprecedented encounters with a world we do not know. Close encounters of a fourth kind.

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Chapter 3

Theologising emerging technologies?

Rian Venter

The discussion of emerging technology and the Fourth Industrial Revolution usually develops into a treatment of impacts on various spheres of life. For theology, this trajectory of the discourse is crucial and should be faced head-on. On the most basic level, it becomes one of facing questions of turning to itself with a self-reflective gaze. Which space is allocated to theology in this public conversation? What contribution could theology make? How does theology engage with these developments? The aim of this study is to contribute to this moment of turning to self-examination and addressing the question of how theology could encounter the changes, how theology could frame them with her own intellectual apparatus. In short – how do we theologise emerging technologies? The argument will proceed in three moves.

1. Naming the present

A first step in such an approach is to do the obvious – calling attention to the radical changes underway in society. One may even argue that the awareness of the wider social horizon has become acute with the coming of a Cartesian turn in the theology of Schleiermacher, the realisation that the conditions for thinking theology have irrevocably changed. The theologian should read the signs of the time and rethink the way theology speaks. It is precisely the *logos* of theology which has appeared with a heightened sense.[1] Or to formulate it differently: the identity question cannot escape the one of relevance. Much of the energy of theology during the last fifty to seventy years has been consumed by attempts to come to terms with deep and fundamental changes. Labelling, naming the shifts in material, cultural, and epistemic conditions has come to

1 See Tracy's (1994:37) remarks in this regard. He considers the *logos* the "particular horizon of intelligibility".

populate theology and heuristic terms like "post-modernity", "globalisation", "post-secularism", "post-colonialism" have gained prominence in theology. The impression of a sensitive observer is that there is no abatement, the changes keep morphing, and newer labels continue appearing, like "post-truth" era and "Fourth Industrial Revolution".

What should unavoidably be voiced here is the question whether human civilisation is not experiencing a new "axial age", whether the present moment with the configuration of all the transformations does not signal precisely such a qualitative new track.[2] The contemporary technological developments, with the myriad other "revolutions", may justify such a naming. At stake may be the formation of a new human self, not only with new capabilities, but with a different consciousness, with vastly different sensibilities, and with new understandings of "flourishing".[3] Obviously, a claim like this should be argued with circumspection. Even if one entertains only the possibility of such a new dawn, the implications for theology are far-reaching, calling, at least, for yet another form of theology, a techno-theology. This may be an addition to a growing spectrum of theologies – like animal, disability, migration, eco-, queer, intersectional, or astro-theology – or it may even be more comprehensive, registering a reality which transcends the others.

The emergence of a world of radical new technologies and a new era for human civilisation brings with it a heightened sense of history as an evolving project. This can be amply seen in the work of the Israeli scholar Yuval Harari. His work on the future – *Homo Deus* (2015) – was preceded by a broad presentation of the history of humankind – *Sapiens* (2011). This sense of "big history", from the Big Bang to the Anthropocene,[4] has not been part of the

2 For excellent discussions of the axial age, see Bellah & Joas (2012).

3 Taylor (2012:35) considers the "most fundamental novelty of all ... the revisionary stance towards human good in Axial religions". The received understandings of human "flourishing" were called into question. Something similar is precisely at stake in the advocacy of a Fourth Industrial Revolution.

4 See also the important book by a scholar of "Big History", Christian (2018). He identifies eight critical thresholds in history. The notion of "Anthropocene" and its discussion in the context of technology are of importance here. This new geological age signifies an epoch in which the collective imprint of human activity is so pervasive that the earth system is being destabilised. The editors of the recent work on *Religion in the Anthropocene* (Deane-

conventional theological agenda. Theologians have been aware of a "*triptiek van de geschiedenis*" (see the book by Van't Spijker 1981) – world, salvation and church history – but this pales against recent versions of history and underlines their myopic historical sense. An appreciation of big history will strengthen an understanding of the evolutionary nature of reality, and the dawn of a surprising future. Acceptance of big history may have a disruptive epistemic effect on theology and contribute to deflating certainties about God's work in history; more complex and nuanced versions of divine agency need to be construed.

2. Advocating a new dialogue

One may argue that theology has always been a dialogical enterprise, starting with a dialogue with Greek philosophy by the Apologists and continued throughout the missionary movement with culture. Maybe the idea of a "dialogue" with other disciplinary fields and non-religious practices has become more pronounced since the second half of the twentieth century. The theology-science and the theology-arts dialogues have become most important endeavours. Ironically, the one with technology has not been prominent. In 2006, Foerst refers to theology and technology as "a new frontier"; Burdett in a recent article assessing the field of science and religion pleads for "a greater dialogue with science and technology studies" (Burdett 2017:758). Many theologians have been aware of older and ground-breaking studies, like those by the sociologist J. Ellul (1964), and the philosopher H. Jonas (1984), but have not pursued their prophetic intuitions with thorough investigations. More recently one finds attempts to venture into "theologies of technology", like the articles by Barns (2005) or Schwenger (2016), or the book by Waters (2016), which convey noteworthy perspectives. One should also mention as a sign of the growing awareness of the importance of technology the encyclic by Pope Francis, *Laudato Si*. In this treatment of the ecological crises, the letter also attends to technology (Francis 2015: par. 102-114, 130-136), welcoming the benefits thereof, but also warning sternly against the dominance of a "technocratic paradigm" (Francis 2015: par. 106). This pastoral letter deserves careful study as it contains important theological

Drummond, Bergmann & Vogt 2017:2) stress the interplay of power, history and ethics – notions which are of utmost relevance when technology is the focus of discussion.

emphases (see Green 2017:6-16 for a discussion). The time for a detailed and comprehensive dialogue between theology and technology is overdue.

3. Intimating a proposal

The critical question, and the focus of this study, is how to go about the growing reality of technology in society from a theological perspective. In the following sections, I outline in a modest and preliminary fashion one possible theological approach.

3.1 Informed speaking

It is obvious that the central concepts employed should have fairly clear referents. What precisely do we refer to when speaking of "technology",[5] "emerging technology", and "Fourth Industrial Revolution"? Rotolo, Hicks and Martin (2015:1828), for example, in their study on "emerging technology" highlight the challenge of definition and opt for identifying five key attributes: radical novelty, relatively fast growth, coherence, prominent impact, and uncertainty and ambiguity. Usually the list of such phenomena becomes inexhaustible and includes information technology, nanotechnology, biotechnology, robotics and artificial intelligence. The Wikipedia article "List of Emerging Technology" conveys a sense of the overwhelming reality of application in diverse fields like aviation, medicine, military, entertainment, and IT to mention only a few. The work by Klaus Schwab is important for understanding the Fourth Industrial Revolution, and one should attend carefully to his emphases, the disruptive effects of the convergence of the new technologies, the reality of "altering the human being" (see Schwab 2018:155ff.),[6] and how he frames the ethical implications.

Although a person like Schwab is emphatic that technology is not value-neutral and identifies perspectives like the dignity of the human person, the

5 The question of definition is quite crucial. Dusek (2006:31-36) discusses various approaches to defining "technology" and considers a system approach as the present consensus view as it incorporates understandings of technology as hardware or as rules. Such an approach can also account for the notion that technology could assume a life of its own beyond human control.

6 Philbeck & Davis (2018:19) refer to the "shifts in human identity".

common good, and stewardship, it remains conspicuously secular. The notion of Caiazza (2005) of "techno-secularism" comes to mind here, the idea that technology has displaced religion.[7] In a recent article, Waters (2015) raises the question of whether technology has not become the new religion. At stake here, in the background, is something that Charles Taylor (2004:23) refers to as "social imaginary". A meaningful dialogue presupposes not only knowledge of the actual technical manifestations, but also the deeper implicit assumptions providing a world of reference to the innovations.

To enter into the proposed conversation implies that the theologian should also be acquainted with developments in the disciplinary field of theology itself. Much could be said in this regard, but the more recent proposals about the constructive and interdisciplinary nature of doing theology are most pertinent.[8] Doing theology does not entail the mere repetition of traditional positions, but a creative hermeneutical re-articulation of fundamental beliefs in conversation with other disciplinary fields and sources of knowledge.

The practice of conversation will have to be taken with the utmost seriousness. References to multi- and interdisciplinary methodologies have become fashionable in contemporary theology. The question may be raised about actual exchanges by disciplinary practitioners. The dialogue with technology will require a steep learning curve for theologians. For example, what does an "algorithm" exactly entail and what are the implications? On the other hand, the contribution of theologians, apart from the predictable ethical concerns, will have to be clarified. What do theologians bring to the table that does not cause embarrassment, but opens indispensable perspectives?[9]

3.2 The Christian symbolic world

After these introductory comments, which I consider as unavoidable, I move to the heart of the argument: how to theologise. Against the background of twenty centuries of giving an account of the cognitive dimension of the Christian faith by intellectuals like Augustine, Thomas, Calvin, Schleiermacher and

7 His article provoked quite some reaction; see e.g. Padgett (2005).

8 See here the studies by Wyman (2017) and Lovin & Mauldin (2017).

9 See the short but constructive treatment of this question by Deane-Drummond, Johnson, Fuentes & Lovin (2013).

Barth, one is quite aware of the complexity of the task. One reflex may be to refer to the Bible and adopt a textual argument. In some of the articles referred to (e.g. Barns and Schwenger) the suggestion is to explore specific doctrines, for example, anthropology. I propose that the Christian faith fundamentally entails a comprehensive vision of reality. Systematic theology, on the basis of various sources (like the Bible), construes precisely such a coherent symbolic world. In a recent article, the South African scholar Klaus Nürnberger (2018) raises the question about the nature of systematic theology – "Explication of a symbolic universe or contextualisation of a redemptive message". Although his preference is for contextualisation, I believe the notion of "symbolic world" is most apt and should not be seen as opposing any contextualisation. To engage the technological developments, and their totalising thrust, theology should suggest such a frame of reference.

Much of the fruitfulness of dialogue will depend on how the Christian vision is construed. The weakness of identifying individual texts or doctrines is that the integrated and comprehensive nature of the vision is lost. The following six elements form the matrix of such a coherent religious world: the reality of a personal triune God, the cosmos as creation, the human as *imago Dei*, the unique phenomenon of particularisation (in Israel and Jesus Christ), the possibility of transformation or a *novum*, and a teleological historical process. Serious qualifications should immediately be mentioned: This is the utter minimum, and each one of these elements has been subjected to diverging interpretations. In another purview, which allows more detailed exposition, one could provide more recent trends of interpretation.[10] It is critically important to stress here that this proposal in no way amounts to a conventional dogmatic approach which operates merely deductively. What is suggested is that one enquires after a grammar which would allow some link to the historic identity of the faith, but at the same time an openness to employ that grammar to speak afresh, creatively and imaginatively. Coupled with this proposal is an understanding of theology as hermeneutical, that is, an approach which sees re-interpretation of the faith as an inescapable task. Doing theology does not imply repeating traditional positions, but exploring, critiquing, and re-visioning established views.

10 It may suffice to refer to two recent excellent volumes on systematic theology – Van den Brink and Van der Kooi (2012) and Kärkkäinen (2019).

Here one may highlight only a few contemporary perspectives, especially in systematic theology that are relevant to the dialogue with technology. In new trajectories in the doctrine of God, the emphasis on "future" was a major development; a theologian like Moltmann (1967:16) argued that eschatology should be re-appreciated and God be re-imagined with "future as his essential nature". The dialogue with science has prompted theologians to re-visit the traditional doctrine of creation, to re-think the conventional separation of creation from providence, and to argue for a more integrated understanding of a reality that is continuing. Jenson (1999:14), for example, suggests that God did not create a thing, but rather a history – "a history that is a world". Christian anthropology has not escaped revisioning, and the "turn to relationality" is also reflected in more recent approaches to understanding the human self in terms of community. Especially the work by Shults (2003) who provides a nuanced account of this "turn", may be mentioned. Christology has become the terrain of an astonishing range of new interpretations, reflecting numerous new sensibilities. In conversation with evolution the notion of "deep incarnation" has emerged, and one participant in this discourse, Gregersen, explains that more is at stake than that Christ merely assumed human "flesh"; instead "the whole malleable matrix of materiality" is involved (Gregersen 2010:176). Incarnation refers to the "entire realm of humanity, animality, plant life and soil" (Gregersen 2010:182). Such an expansion of Christology also necessitates a broadening of the scope of the doctrine of salvation. Salvation becomes cosmic in nature. In addition to this inclusivity, the very metaphors to express the transformation that God through Christ and the Spirit effected have been re-imagined. "Flourishing" has become particularly apt to make sense of salvation for a new era and the work of the South African theologian Nadia Marais (2015) can be mentioned in this regard. In Christian eschatology, the conversation with science also proved to be most productive, for example, the volume of essays by theologians and scientist on the theme of the "end of the world" (see Polkinghorne & Welker 2000) evidences how the scope of inquiry and the demand for publicly warranted truth claims acquired prominence. These few examples about more recent interpretations of dimensions of the Christian matrix underline the idea that the formal texture of the Christian vision remains pertinent, but that it is continually being interpreted to make sense of new challenges.

To do theology, to theologise emerging technology, is to situate the new phenomena in the context of this vision, this symbolic world. This would potentially allow a "thick interpretation". The dimensions of the Christian faith articulate some of the most profound questions raised in intellectual history: questions of transcendence, of the nature of reality, of human uniqueness, of messianism, of salvation and of historical telos. Taken together as an integrated vision they allow an interpretative context for discerning the nature, the impact and the promise of technology.

3.3 Vitality of the Christian faith

The specific nature and potential of this symbolic world should be explored in more detail. It appears that this vision may have three outstanding features which may render a dialogue with emerging technologies quite fruitful. These characteristics may also be viewed as the fuel for the enduring vitality of the Christian faith as such.

A fruitful surplus of meaning marks the vision that makes it a hermeneutical treasure house. It seems if every era can generate new resources for orientation, for sense-making from this religious tradition. The broad narrative structure of the vision – from origin to destiny – permits precisely this. If this is coupled with a canonical text comprising an immense range of text-types one starts to get a glimpse of the fecundity of the tradition. The fascinating stories of exodus, of exile and return, of the dialectic of crucifixion and resurrection, and of two opposing final cities have again and again invited new interpretations. If this is further linked to a kaleidoscopic profile of the divine who astonishes through violence and pathos, a religious matrix is formed with inexhaustible interpretative potential.

This reservoir of meaning is closely connected to a second trait of the faith – a tenacious ability for absorption, a capacity to integrate new ideas. One example may illustrate this: With the relational turn in philosophy, with the dawn of the post-modern era and the prominence given to notions like "hospitality" and "gift", Christian theology annexed the new sensibilities, and reinterpreted them. This tendency to appropriate insights may go back a long way: The formation of the YHWH faith displayed a similar dynamics

– an ability to incorporate ideas from the environment.[11] This hermeneutical flexibility may be prompted by an urge for survival, or it may signal the persistent vitality of the tradition.

A full portrayal of the Christian world requires, however, mentioning of a third capacity: an irrepressible ability for resistance. There is not only the capacity for accommodation, but also for refusal and even confrontation. A history of the faith could arguably be written from this dialectic: adoption and refusal. A sensitive antenna for forms of idolatry and injustice has been obstinately present.

The three features or three capacities are intimately interwoven. The trajectories which (systematic) theologies could take reflect the diverging configurations: Some thinkers are more creative than others, some are more accommodating, some are more defiant. All three faculties would be required for engagement with a new technologised world.

The intellectual challenges posed to theology will become increasingly more complex. What the future might entail cannot be necessarily extrapolated from the present; surprises might prove overwhelming. What has been suggested in this study – that the Christian faith has an inherent surplus of meaning – may eventually prove in need of revision. The possibility is quite real that changes might reveal the heuristic exhaustion of theology, that it might reach its limits of sense-making. Confessional theology, with its deductive reasoning and its propensity for closure, may hardly be equipped for future challenges. The reservoir of the meaning of the faith requires a corresponding theological imagination. One may argue that only a theology with a pronounced sense of adventure, openness and imagination would be able to cope, to participate, in the quest for sense-making. A conversation with various art forms, for example, literature and film, may support theology with idea-generation. For example, recent work by the novelist Ian McEwan (2019), and the television series *Westworld* (2017), convey in a profoundly touching manner the dilemmas of cyber-anthropology – artistic expressions from which theology could learn.

11 Miller (2000:2429) describes this as "Yahweh out of the gods", "The gods in Yahweh" and "Yahweh against the gods".

3.4 Two postures

In the light of the mentioned perspectives, one may move to some tentative conclusions. A basic Christian engagement with emerging technologies may assume one of two postures: one of "embracing" and one of "resistance". Both should, however, be taken in a pregnant sense. Before this is explained, one qualification may be voiced. Although reference to "emerging technologies" is employed in a generalised sense, a legitimate and satisfactory use should be concrete and discriminatory; the reference should be to specific instantiations.

"Embracing" should signify more than a mere welcoming of some positive impact, for instance, medical or communicational. One often encounters this in the literature. Such an attitude is opportunistic and even hollow. Some accounts of the rise of modern science credit the Christian faith for stimulating exploration of nature (see, for example, the work by Hannam 2009). Because the world was perceived as God's creation, scientific study was encouraged. There was a "metaphysical cornerstone" for the drive for science (Hannam 2009:340). The critical question is whether the Christian faith and theology could function in similar fashion today. Could there be impulses for stimulating the development of technology, or has the drive been fully secularised? I stress this point for a specific reason. Religion has become associated with inhibition, instead of generation. When a faith like Christianity posits a profound Mystery at its centre, it should be fecund, in an analogical sense, for human activity and agency. Here the matrix becomes operative: If the triune God is salvific and intends comprehensive healing and well-being, and creation is emergent and the eschaton is already present, some argument could be developed for encouraging and supporting technological innovation. A theology of technology should intentionally opt to move beyond the facile conventional options and explore creative postures that suit the sophistication of present technological advances.

It may be important to emphasise the inclusive nature of "embracing". It refers also to welcoming, to listening, which are part of conversation. In a theology-technology dialogue, reciprocity is crucial. Conventionally, theology used to issue warnings about the misuse or overreach of technology. Emerging technologies amount to a relatively new social condition that forces theology to some disciplinary introspection. The elements of the "symbolic world" of

the Christian faith are confronted with serious challenges. The very nature of creation, the human, salvation and transcendence are radically questioned.[12] The dialogue can re-vitalise theology; it can motivate theology to think deeply about its established matrix and eventually employ new sensibilities and perspectives.

At the same time and with equal fervour, Christian faith should prophetically caution against the dark side of a new axial age. The drive to totalisation, the implicit triumph of horizontal transcendence, the dehumanisation of persons, the decline of the human community, and one-dimensional conceptions of flourishing – all require vehement "resistance". The task of theology could be one of raising alarm about the deeper impulses and impact present in emerging technologies.

Specific tracks of development could confront Christian faith and theology with profound dilemmas. One well-known example could be merely mentioned here as an illustration: the possibility of post-humanism.[13] Should there be downright rejection, or – paradoxically – a welcoming of the expansion of the creaturely world? A possibility like this may challenge theology to stretch the boundaries of hermeneutical creativity. The conspicuous trend is to submit denunciation and neglect the articulation of substantial alternatives.

A typical theological take on difficult questions cannot neglect the importance of discernment, an ancient spiritual practice. It is interesting how contemporary philosophers have stressed the need for this in our time. Kearney (see, for example, 2011) has proposed a "diacritical hermeneutics"; Venmans (2019) pleads for a retrieval of "discretie". There are no absolute answers; there are no timeless principles that can be merely casuistically applied in an era of technological ubiquity. From case to case, a decision needs to be made. Theologically, the movement of the Spirit should be discerned.

12 One South African theologian who has correctly grasped this is Cornel du Toit. See, for example, his 2016 article.

13 For terminological clarification, see Ferrando (2013). For positions by two well-known theologians, see Scott (2004) and Peters (2018).

4. Whispering a conclusion

The perspectives raised in this study are only some dots and when connected will not amount to a clear profile for a theology of technology. They are intimations towards a theological engagement. The three moves of the argument propose that the radical changes underway be acknowledged, that intellectual engagement with emerging technology be prioritised, and that a comprehensive Christian approach be construed. The future could be beyond our present anticipations and could require a response from the Christian faith beyond imagination.

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Chapter 4

The "Fourth Industrial Revolution": A case of South African techno-messianism

Johann Rossouw

1. Introduction

The South African public sphere does not often focus on technological concepts. It was thus initially quite surprising to hear talk of the so-called "Fourth Industrial Revolution" start practically overnight, perhaps from early 2018, just after the annual South African delegation to the World Economic Forum at Davos, Switzerland, led by President Cyril Ramaphosa, returned to the country. What was even more surprising was the lightning speed with which the concept was adopted, not only by Ramaphosa and other members of his government, but also by some public university leaders.

After the wilderness years under the traditionalist former South African president, Jacob Zuma, it was initially a breath of fresh air to hear talk of such a seemingly futuristic concept, instead of the ongoing fight for a better past of which South African politicians apparently never tire. And yet, precisely the speed with which the concept of the "Fourth Industrial Revolution" was adopted should have raised some suspicion, since post-apartheid South Africa has by now quite a record of obfuscating deep structural problems and poor policies with conceptual buzzwords. "Affirmative action" and "black economic empowerment" enriched a happy few simply for who they were rather than for what they did, and all this at the expense of the unhappy many lacking the necessary networks and connections to be "empowered". "Transformation" atrophied into a barely disguised policy of racial replacement. "Decolonisation" for a while channelled the anger of the disaffected youth but made not an

iota of difference to the self-imposed colonial pursuit of places in the Anglo-American "world rankings" of universities.[1] And so on and so forth.

There is thus reason to suspect that the concept of the "Fourth Industrial Revolution" has to be treated with circumspection. As will be argued below, this circumspection is not only warranted by the post-apartheid tendency at conceptual shallowness, but also by the dubious nature of the concept itself – as well as its origins and the circles in which it is propagated. In order to argue the case for this circumspection, a thorough understanding of industrialisation

1 One of these "world rankings" of universities, the Shanghai-based Academic Ranking of World Universities (ARWU), displays a strong Anglo-American bias, not only because most of the universities in its top 100 tend to be from the Anglo-American cultural sphere but also because of the rating criteria that are used, as it is described in *Le Monde* (2019/8/15):

> To establish its ratings the ARWU uses a quantitative approach to research-centric indicators, such as the number of alumni and lecturers who have won a Nobel Prize or a Fields Medal (in mathematics), the number of publications in scientific journals of reference (*Nature, Science*), and the number of citations in certain indexed journals.

But this constitutes by no means a comprehensive evaluation of an institution. It does not measure the pedagogical investment, nor the quality of student guidance or infrastructure, nor the social impact of its research. Moreover, it was conceived first and foremost to measure the performance of universities focusing more on natural sciences than on social sciences since it only takes into account publications in English. "These ratings could be misleading if they are not put into perspective," says Timothée Toury, lecturer and researcher in physics and former director of training at the Troyes University of Technology. "Major French research organisations such as the National Scientific Research Centre [and others] that produce about half of all French research are not taken into account" (Nunès and Gourdon; my translation from the French). On a similar note, a world-renowned scholar based at a major British university told me personally in 2016 of how somebody involved with one of these ranking lists once offered to have one of the scholar's former employers – another British university – bumped higher up on the list in exchange for a bribe.

The above are some of the reasons why I recently wrote elsewhere that these rankings

> include the world in the same way that the Americans refer to their national baseball competition as the "world series", while baseball is played in the rest of the world with the same enthusiasm as is the case with bobsleigh outside a handful of far northern countries (Rossouw 2019).

and the Industrial Revolution is first required, for which the work of the contemporary French philosopher, Bernard Stiegler (b. 1952) is essential.

2. Stiegler: Technics and the human

Stiegler begins his work with the publication of his trilogy *La technique et le temps* (*Technics and Time, 1*) (1994 [1998]; 1996 [2002]; 2001 [2011]. Régis Debray,[2] who introduced me to the work of Stiegler, described him to me as a "Heideggerian technophile" – an apt description in the light of the Stiegler of *Technics and Time* setting out to argue (especially in the first volume) against the Heidegger *Being and Time,* and later in the essay "On the Question Concerning Technology", that technics does not threaten to close off our lifeworld, but instead in principle co-constitutes our lifeworld – and this because technics are in Stiegler's view not only a form of memory, but also equates to Heidegger's notion of the life that I have not lived myself (facticity).

Stiegler argues for technics as a form of memory, drawing on the work of the French paleo-anthropologist, André Leroi-Gourhan, for whom early human consciousness and toolmaking co-constitute each other. The first stone knife began its existence as an idea in the consciousness of a human, and in the act of making that stone knife the consciousness of the toolmaker was externalised in the act of making the tool. With regards to Neanderthalian toolmaking, Stiegler writes that

> cortex and equipment are differentiated *together, in one and the same movement*. [It is] a singular process of structural coupling in *exteriorisation* that we are calling an *instrumental maieutics*, a "mirror proto-stage" in the course of which the differentiation of the cortex is determined by the tool just as much as that of the tool by the cortex ... (Stiegler 1998:158, his emphasis).

2 Régis Debray (b.1940), under whom I studied for a Diplôme des Études Approfondies (D.E.A) in the philosophy in study of systems at the University of Lyon-3 from 2001 to 2002, is himself a notable philosopher of technology, especially in the cadre of the discipline of the study of cultural transmission that he established, known as mediology. For an introduction to his work, see Debray (1996, 2000).

Moreover, every time that another stone knife is made, it is a repetition of that first act of toolmaking and its concomitant externalisation of consciousness, and as such an act of remembering. The first stone knife and all subsequent stone knives are thus acts of memorialisation of the first act of the making of a stone knife. This is how Stiegler describes it, referring to the first tool as the stereotype, and subsequent reproductions of the first tool or stereotype as "the material trace", and to early human consciousness as the "archaic cortex":

> [T]he memory of the stereotype is kept ... *in the material trace of the stereotype in which the pre-existing tool itself consists, repeated, duplicated by its "maker" and guiding the latter much more than being guided by him or her?* In this sense, the archaic cortex and equipment are codetermined ... (Stiegler 1998:158, his emphasis).

A further important phase in technics as memory is entered with the invention of recording technologies in the form of writing, beginning with cuneiform in ancient Mesopotamia and hieroglyphics in ancient Egypt. This is important in the evolution of technics as memory since it is a clearer manifestation of technics as memory, but also since it begins to alter how we remember and think. These changes are demonstrated clearly with what Stiegler sees as a key event in the history of recording technology (or mnemotechnics as he calls it), that is, the Greek adoption of the alphabet.[3]

The Greek adoption of the alphabet is a watershed in human history, for when the Greeks adopted the alphabet a number of consequences that would shape human history took place. These include stabilisation and standardisation of the shared stock of knowledge of the community (Stiegler calls this "the pre-individual fund", which, in my view, equates to tradition), the codification of the law (by Solon), greater access for the community to its shared stock of knowledge, and a greater potential for critical reflection upon this shared stock of knowledge, which Stiegler sees as the pre-condition of ancient Greek philosophy. Stiegler denotes this watershed moment in the history of humanity and of recording technology with the notion of orthographics, that is, a recording technology distinguished by its ability to provide a much more faithful recording and rendering of the past than what was hitherto possible.

3 For Stiegler's discussion of the implications of the Greek adoption of the alphabet, which I summarise here in a few paragraphs, see Stiegler (2009:12–64).

In Stiegler's view, the Greek adoption of the alphabet introduces a period in human history that he refers to as the "orthographic epoch", of which the apex is the printed word following on Gütenberg, and which comes to an end with the Industrial Revolution. Why is this so?

3. Stiegler: Industrialisation

In Stiegler's view, the Industrial Revolution is not so much distinguished by the mechanisation of production through technologies such as the steam engine, the internal combustion engine, the use of fossil fuels as a source of energy, and electricity, but rather through the development of several new recording technologies that he sees as so significant that he thinks that what is industrialised in the Industrial Revolution is human memory and consciousness itself.[4] These new mnemotechnologies include the photograph, the phonogram, film, radio, television, the computer, the internet and digital recording technologies such as the CD, the MP3, and so forth. All these recording technologies are means to externalise, record and disseminate contents of human consciousness, as can, for example, be seen with film.

A film begins as an idea in the mind of a filmmaker, who then writes a script, films and edits it, and finally distributes it through a studio and cinemas. That, in turn, leads to a process whereby the film audience "adopts" through watching the film that which began as the content of consciousness of the filmmaker, and when this happens it may even lead to the altering of the consciousness, behaviour and desires of the audience member.[5] In Stiegler's view, through the efficient use of film, television, radio and the music recording industry, the United States of America succeeded during the 20th century to project the "American way of life" on a global scale, thus creating

4 For Stiegler's discussion of industrialisation as the industrialisation of human consciousness and especially human memory, which I summarise in this paragraph, see Stiegler (2009:97-187).

5 For Stiegler's discussion of why and how the human consciousness is so prone to a quick adoption of a film and its contents, including the adoption by film viewers worldwide of "the American way of life", which I summarise in this paragraph, see Stiegler (2011:35-130).

a global market for American products, an individual consumer lifestyle, and a global sphere of American influence.

It is also important to note that for Stiegler industrialisation as the externalisation and dissemination of the contents of human consciousness is an ongoing process, which is why it makes no sense to talk of a "First", "Second", "Third", or "Fourth" Industrial Revolution. It should also be noted here that technological change has already, since at least the earlier influential French philosopher of technology, Jacques Ellul (1973:89), been seen as a self-augmenting or autocatalytic process – and more and more it would seem that it is also a process of which the execution speeds up the process. Technological change happens faster and faster, and the speed at which things happen and are done keeps on increasing, until where we have probably already crossed a critical threshold beyond which intelligent human reflection on what is happening can no longer take place as it used to – things happen too fast for us to process. An older contemporary of Stiegler, the French philosopher Paul Virilio (1932-2018), made this the central theme of his work from his breakthrough book, *Speed and Politics*, published already in 1977, in which Virilio warned of the moment when critical decisions that may determine the future of humanity would have to be taken at a speed faster than what humans can handle.

Stiegler has his own significant take on this phenomenon with his concept of the performativity beyond human consciousness (Stiegler 2009:122-126). What Stiegler refers to with this concept is the phenomenon where decisions that shape reality and our experience of reality are taken as it were quasi-automatically and beyond conscious human reflection, for example when an event is identified as newsworthy and then spreads around the world through media networks and their audiences without the time to reflect properly on the event. In this regard, a telling anecdote is told in the documentary film *The Great Hack* (directed by Amer and Noujaim, 2019) by Brittany Kaiser, a former employee of Cambridge Analytica, when she relates how on the day *The Guardian* newspaper broke the scandal involving Cambridge Analytica's misuse of private data of Facebook users, the story was carried worldwide by more than 30 000 media outlets, rendering Cambridge Analytica completely unable to cope with all the media enquiries that were addressed to them.

Stiegler refers to the changes in human consciousness, human memory, the nature of the event, how we see history, our experience of time and space, and so forth that are brought about by the rise of these new recording technologies as "the orthothetic epoch" since these technologies have an even greater ability than various forms of writing technologies to give a precise rendering of what is recorded. And yet he also warns of how this greater precision also skews our experience of reality, since no recording technology is able to record everything there is to record, and since we still need our consciousness and some norms of processing what we experience to make sense of what is recorded, and also of what we experience (Stiegler 2009).

A further important point is that as new industrial technologies appear, up to and including the latest forms of recording technologies such as nano- and digital technologies, these technologies share two characteristics. First, later technologies develop as it were in technological "lineages" from earlier technologies (here Stiegler draws on the work of Bertrand Gille) with the implication that later technologies often build on, incorporate and rely on earlier technologies in the line (Stiegler 1998:40-43). One can, for example, not use digital technologies without electricity. Second, the development of ever more advanced recording technologies also goes hand in hand with ever more advanced symbolic representations of reality (relying on ever more developed forms of literacy and numeracy), which Stiegler refers to with his concept of "grammatisation" (Stiegler 2011:172). Each new recording technology involves its own forms of grammatisation. But just as later technologies build on earlier ones, to master newer forms of grammatisation, one requires earlier forms of grammatisation – for example, without first learning to read, write and do sums one will not be able to learn coding, the periodic table or the mapping of the human genome.

A number of implications follow from the above:

- To participate in ongoing industrialisation, a country has to first master and crucially also maintain earlier technologies, recording technologies and various forms of grammatisation.
- If a country is not able to keep abreast with ongoing industrialisation, it will not be able to enter the later phase of industrialisation;

- Since the industrial countries of the world shape the world, those countries who do not industrialise are shaped by the industrial countries.
- The history of Western colonisation is inconceivable without the role of industrialisation – those who industrialised were able to subjugate those who were not industrialised, and so former colonies who want to overcome their colonial nature cannot do this without establishing and maintaining the necessary industrial technologies and their concomitant forms of grammatisation.
- If such countries do not succeed in this, and then try to enter the industrial economy as it were during its most developed latest phase, they unleash such powerful forces on themselves that they can only end in new forms of colonial subjugation to those who truly understand and control ongoing industrialisation.

4. A "Fourth Industrial Revolution"?

Against this background, we may now weigh up the concept of the "Fourth Industrial Revolution" to see whether it is of any use to understand the history and the continuing unfolding of industrialisation – or not.

The concept of the "Fourth Industrial Revolution" was invented by Klaus Schwab (b. 1938) and introduced in his book *The Fourth Industrial Revolution* (2016). Schwab's background is in engineering, economics and management. He is the founding director of the World Economic Forum (WEF) and a member of the opaque Bilderberg group. The Bilderberg group has over the years faced accusations of being a very influential group that is neither transparent nor democratically accountable. The WEF, in turn, has often been criticised for espousing a type of capitalism that threatens democracy and deepens global inequality. Mention is made of this because, as will become clear later in the work, this is of great relevance to make sense of the influence that the "Fourth Industrial Revolution" has so quickly gained in South Africa, since, as will be argued in a moment, the influence of the concept can certainly not be ascribed to its heuristic value in aiding humanity to make sense of the challenges that ongoing industrialisation poses. Let us now turn to Schwab's definition of the "Fourth Industrial Revolution".

Schwab claims that so far there have been three industrial revolutions, and that the fourth one is currently unfolding. In his view, the "First" Industrial Revolution ran from about 1760 to 1840, was triggered by the construction of railroads and the invention of the steam engine and "ushered in mechanical production". The "Second" Industrial Revolution "started in the late 19th century" and ran into the "early 20th century", and "made mass production possible, fostered by the advent of electricity and the production line" (Schwab 2016:11-12).

Skipping what seems to be about five decades (and making no mention in passing of the industrialisation of murder in the two world wars, including the industrialised genocide of Jews, Gypsies and homosexuals perpetrated by the Nazis) he then claims the "Third" Industrial Revolution began in the 1960s, and "is usually called the computer or digital revolution because it was catalysed by the development of semiconductors, mainframe computing (1960s), personal computing (1970s and 80s) and the internet (1990s)" (Schwab 2016:11).

This brings him then to the "Fourth" Industrial Revolution that

> began at the turn of this century and builds on the digital revolution. It is characterised by a much more ubiquitous and mobile internet, by smaller and more powerful sensors that have become cheaper, and by artificial intelligence and machine learning (Schwab 2016:11).

He admits that

> [d]igital technologies that have computer hardware, software and networks at their core are not new, but in a break with the third industrial revolution, they are becoming more sophisticated and integrated and are, as a result, transforming societies and the global economy (Schwab 2016:11).

This "revolution", however, "is not only about smart and connected machines and systems" since "[o]ccurring simultaneously are waves of further breakthroughs in areas ranging from gene sequencing to nanotechnology, from renewables to quantum computing." What then truly distinguishes the "Fourth" Industrial Revolution is "the fusion of these technologies and their interaction across the physical, digital, and biological domains" (Schwab 2016:12).

To be fair, and of relevance to the South African context, Schwab does stress that the "Second" Industrial Revolution must still be experienced by the roughly 17% of humanity (roughly 1.3 billion people) who still lack electricity, while the "Third" Industrial Revolution still awaits the more than half of humanity (roughly four billion people) who still do not have internet access (Schwab 2016:12). Thus, with reference to Stiegler's analysis of industrialisation, and in line with what I have argued concerning the implications of Stiegler's analysis, Schwab does signal an awareness that one or the other phase of industrialisation cannot be entered into without having first mastered the earlier phases – but this is about as much as one can say in favour of Schwab's understanding of industrialisation. Let us know critically assess his concept of industrialisation.

For a start, Schwab gives no indication that he understands that industrialisation is first and foremost the industrialisation of human consciousness and memory. This is why – somewhat ironically for the professed capitalist that he is – he fails to spell out the implications of the "First" and "Second" Industrial Revolutions, except (and this is where the irony comes in) for referring in good old Marxist fashion to production: first, the mechanisation of production and then mass-production. About the massive socio-political effects of industrialisation from 1760 to 1960 he has nothing much to say. These effects include Western imperialism and colonialism in the Middle-East, Asia and Africa, the rise of the nation-state first in industrialised countries, the growth in global economic equality between "the West and the rest", and, as has already been pointed out, industrialised warfare and killing in the 20th century – symbolised and prefigured by the use of the Gattling gun in colonial wars between the European industrial powers and anti-colonial forces in the just-mentioned parts of the world.

Second, Schwab clearly has next to no grasp of industrialisation as the industrialisation of human consciousness and memory. He makes no mention of the recording technologies from the photograph and the phonogram onwards, except for mentioning the computing technologies of the so-called "Third" Industrial Revolution, and makes no mention of the impact that these technologies have had on democracy, the state, culture, our experience of space, time, the event and the nature of history, or on education. This is undoubtedly because Schwab sees and thinks about technology in narrow

economic terms, which leads him at least later in his book to mention the threat that the current crop of industrial technologies such as artificial intelligence, including algorithms, could pose to worldwide socio-political stability. If Schwab did have a proper grasp of the nature of industrialisation as the industrialisation of human consciousness and memory, he would be able to see that all the technologies that he mentions as part of the "Fourth" Industrial Revolution (artificial intelligence, machine learning, gene sequencing, nanotechnology and quantum computing) are but further stages in the externalisation of human consciousness and memory. Moreover, if Schwab did have this insight into the nature of ongoing industrialisation, he would have had no need to proclaim a discontinuous understanding of industrialisation as four different "revolutions", which simply mystifies the very real challenges that humanity is, in fact, facing as a result of industrial technologies such as artificial intelligence, machine learning and algorithms – as is only too well illustrated by the Cambridge Analytica scandal.[6]

The most one can say in favour of Schwab's "Fourth" Industrial Revolution is that it is at least an attempt to invite people to think about technology, economy and society, albeit not a very successful attempt. Why, then, has this weak concept gained so much traction so quickly in South Africa, and what risks does the quick adoption by parts of the country's governing and university leadership entail?[7]

5. Enduring colony

To answer the first question, South Africa's enduring colonial nature first has to be evoked. Elsewhere I have discussed nine characteristics of South Africa

6 This study is not the place to discuss these challenges and promises at length, but it essentially boils down to a spectrum of choices ranging from anti-democratic "surveillance capitalism" (Zuboff 2019) to a truly elevated collectively intelligent society as Stiegler advocates for with his notion of the "new *otium* of the people" (Stiegler 2011:139, 156-159). See also Stiegler's analysis of the threats and possibilities posed by automation (Stiegler 2016).

7 On a recent visit to Austria and France I could find no oral or printed reference to the "Fourth Industrial Revolution". I was also recently told of a South African postgraduate student who wanted to undertake a study on this weak concept in New York, and who was turned down since the concept was not seen as worthy of study.

that have remained unchanged since the late 19th century to the present, and which testify to the fact that this country is for practical purposes still a colonial society (Rossouw 2018). For this article, at least three of these characteristics are relevant.

First, South Africa's model of excellence is always sought outside the country. This explains why the weak concept of the "Fourth Industrial Revolution" gained not only overnight traction in South Africa but is now practically state dogma.[8] Mention has been made that Schwab's WEF is associated with a type of capitalism that threatens democracy and the ecology. This, however, has never stopped the ANC-government from sending an annual delegation to this dubious gathering. This annual delegation took on much greater significance since the current president of the ANC and South Africa, Cyril Ramaphosa, started to lead this delegation. As of 2018, shortly after Ramaphosa's election as president of the ANC and then of the country, the "Fourth Industrial Revolution" was suddenly on everybody's lips. The only conceivable explanation for this hasty adoption of this weak concept is that it must be understood as part of a desperate attempt by a modernising president to convince the WEF-circle and its powerful investors that he is in touch with the latest cutting-edge thought and policymaking.

I state this as the only conceivable explanation not just because the "Fourth Industrial Revolution" is such a weak concept, but also because in the light of two other enduring colonial characteristics of South Africa and in the light of two disastrous results of the ANC-government it simply makes no sense to suddenly want to adopt the latest industrial technologies, which is presumably the intent of hoisting the government's flag on the pole of the "Fourth Industrial Revolution". The two enduring colonial characteristics in question are, first, the persistent neglect of South Africa's indigenous languages, and second, the extractive nature of the South African economy that enriches a small intermediary elite acting as agents for foreign capital, and

8 In June 2019 in my capacity as academic head of the Department of Philosophy at the University of the Free State I received an email from the Office of the Deputy Vice-Chancellor: Research ordering me to state if and how the "Fourth Industrial Revolution" is taught in our departmental curriculum – ostensibly this order ultimately came from the Department of Higher Education.

making the country dependent on foreign capital inflows, that is, systemically handicapping the country's sovereignty.

The persistent neglect of South Africa's indigenous languages in post-apartheid South Africa has meant that the great majority of schoolchildren who matriculate[9] do so with a poor command of the English language, which is, besides Afrikaans, the only widely-spoken South African language that can supply one with the necessary forms of grammatisation to successfully adopt and adapt ongoing industrialisation in and to South African conditions. The ANC government's failure to build a successful education system has led to a weakening of the various forms of grammatisation that existed in the country at the advent of democracy in 1994. This has, in turn, weakened the country's ability to keep abreast with new forms of grammatisation, and hence with new forms of ongoing industrialisation.

This is particularly salient in the ANC's fixation on academic universities at the expense of the old system of technikons and vocational colleges. While failing to invest sufficiently in academic universities and while neglecting the technikons and vocational colleges (except for renaming the technikons as "technical universities"), the ANC government has through its policy of "massification" flooded the academic universities with academically ill-equipped matriculants, of whom the vast majority fail at university.

Moreover, genuinely innovative and quality technical parastatals such as the national electricity company, ESKOM, South African Airways, the South African Broadcasting Corporation and the vast majority of the nearly 700 state-owned enterprises were essentially plundered through corrupt practices, turned into job agencies for ANC cadres, and generally neglected. In a word, this can be called the ANC government's humiliation of technics, which always goes hand in hand with humiliation of the human. As a result of this, the country now has the highest Gini-coefficient in the world, as well as the highest annual per capita protest rate in the world; protests in which technical infrastructure vital to the lives of poor and middle-class South Africans, such

9 Here I do not even discuss the effect of the neglect of SA's indigenous languages in public schooling on the disastrous dropout rate of SA schoolchildren. In this regard, the respected researcher, Nic Spaull of Stellenbosch University, proposes that roughly half of South African schoolchildren that start Grade 1 eventually matriculate, that is, complete Grade 12. See for example "High dropout rate in SA's school system" (2015).

as trains and buildings, are often destroyed to "get the attention" of a negligent government.

In other words, after 25 years of the neglect of public education and the humiliation of technics, to now suddenly proclaim that South Africa must join the latest phase of ongoing industrialisation is completely disingenuous. In a country where road maintenance, water and electricity supply are all deteriorating at an alarming rate, that is, where the previous phases of successful South African industrialisation have been neglected, it is purely wishful thinking to claim that South Africa must now join the "Fourth Industrial Revolution". A particularly salient example of this disingenuity was President Ramaphosa's invocation in his 2019 State of the Nation Address of the building of a new "smart city", while most existing South African cities are struggling with crumbling infrastructure, water and electricity supply, crippling debt, overpopulation and violent crime. It is more apt to describe the president's invocation of a smart city as a quasi-mystical incantation, a sort of symbolic censing of a mostly semi-literate, ill-informed population in the English language that they can only adopt poorly because of their poor education. Stated differently, the president's incantations of the "Fourth Industrial Revolution" and a "smart city" are nothing but a sort of sectarian messianism, where in a quasi-mystical and completely irrational fashion a term is religiously incanted as if it would magically make all the troubles of this broken world disappear.

6. Techno-messianism

This techno-messianism – both in the sense of a quasi-mystical incantation of a term and in the sense of treating technology as the great saviour – in all likelihood relates to the enduring South African colonial characteristic of an extractive and barely sovereign economy. It would seem that the presidential hope here is that these incantations by himself and by that faction of the governing and university leadership who in a cult-like fashion play-act at being modern would magically and mystically convince the WEF-circle to begin investing in South Africa again.

In the real world, however, the real risk that such techno-messianism carries for South Africa as still a colonial society, and with even fewer forms of grammatisation and less functioning industrial assets from earlier phases of industrialisation, is that by trying to now hastily adopt the latest forms of industrial technology would simply reassert the colonial nature of this country. If this country was to now, for example, adopt automatisation, algorithms and machine learning in the same poorly considered way as the poorly considered flirtation with the weak concept of the "Fourth Industrial Revolution", what would become of the jobs of low-skilled workers?[10] Or what new levels of manipulation would semi-literate South African consumers be subjected to? Surely the recent government-sanctioned scrapping of the debt of poor South African consumers, a debt which is undoubtedly a function of the combination of their semi-literacy and manipulative marketing techniques, cannot be repeated *ad infinitum* by an increasingly cash-strapped government.

In closing: Despite the ill-conceived policies, as well as the systemic mis-management and abuse of education and technics by the ANC government, some hope may be gained from the remarkable inventiveness of, amongst others, South African commercial agriculture and the private manufacturing industry, both of which have adapted exceptionally well to the highly competitive global environment, and despite a government that for the most part treated these sectors of the economy with neglect and often open hostility. These sectors of the economy, and here and there pockets of technological excellence that remain in the country's neglected and battered public university system, have, in fact, managed to remain abreast of new forms of grammatisation and ongoing industrialisation. They are positioned to participate in ongoing industrialisation, and they should receive all the support that they can. Hopefully, they can form part of a new socio-political alliance with the professional and underclasses in South Africa that can bring about the genuine social, economic and political change that this highly creative society is capable of, and so desperately needs. This, however, will require a sober and thoughtful engagement with grammatisation and ongoing industrialisation, and a swift recovery from the techno-messianism of the current president and his modern play-acting followers.

10 Even Schwab (2016:73) sees automation as a danger to low-skilled jobs.

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Chapter 5

From Harari to Harare: On mapping and theologically relating the Fourth Industrial Revolution with human distinctiveness

Danie P. Veldsman

1. Introduction

Exciting, explorative, thought-provoking, compelling, challenging, powerful, innovative, overwhelming, bewildering, appalling, disruptive, ideologically screwed, subversive, disillusional – and so I can continue. Just some of the wide-ranging – from highly appreciative to sharply critical – descriptive terms utilised in literature for the contemporary and demographically differentiated discourses on technology[1] and technological developments in the 21st century.

One of the many and more recent influential conversation partners that have indeed contributed to the intensity, direction and width of the discourses on technology, is the Israeli historian and a professor in the Department of History at the Hebrew University of Jerusalem, Yuval Noah Harari.[2] For me, the worth of his contribution to the contemporary discourses lies mostly in

1 The term "technology" comes from the Greek word "*techne*". It can be understood as craft, art, and knowledge. In an oversimplified explanation, it can be described as consisting of three elements, namely tools (that is, the machines, chemicals, instruments), processes (that is, techniques and methods) and social contexts (that is, the very different contexts in which it is used and developed).

2 Harari is the author of the international bestsellers *Sapiens: A Brief History of Humankind* (2014), *Homo Deus: A Brief History of Tomorrow* (2016), and *21 Lessons for the 21st Century* (2018).

the different kind of questions that he poses and the problematic issues that he raises, the vast technological networks that he explores and integrates into his humanistic viewpoint, his critical dissection of many sacred moments and viewpoints of being human, exploring, integrating and connecting the past, present and future on a spectrum from delightful and entertaining to disturbing and worrying – and even more in-between! If I had to label – which is not that easy – his approach as presented in his book *Homo Deus*, I would suggest the following descriptive term for Harari: a humanist-charismatic algorithmatician! In this study, I will take my vantage point from the remarks and questions that the humanist-charismatic algorithmatician Harari poses. Against this background, I will give a brief sketch of the interpretative context for attending to his remarks, namely that of the Fourth Industrial Revolution. From the context, I will subsequently move to the specific focus of the study, namely human distinctiveness and technology. With a simple (but forced!) play of words with Harari, I have chosen the Zimbabwean capital city of Harare to signify and represent – and nothing more – my focus on human distinctiveness. Therefore, the title: "From Harari to Harare". Lastly, I will engage with the mapping and the theological relating of the Fourth Industrial Revolution with human distinctiveness.

2. Questions and remarks by Harari

In my short exposition of the questions and remarks by Harari, I will concentrate on those from his *Homo Deus* that I deem relevant for the focus of my argument.

For Harari, there is no reason within the context of contemporary engineering whether "biological, or cyborg engineering or the engineering of non-organic beings in which we have gone from amoeba to reptiles to mammals to *sapiens* to think that *sapiens* is the last station" (Harari 2016:5). Not only is *sapiens* not to be considered "the last station", they will have to acknowledge that "they are not unique in possessing the neurological substrates that generate consciousness" (Harari 2016:142). Over all of these centuries of all kinds of developments and upheavals, one thing has, however, remained for him a constant: humanity itself (see Harari 2016:52-3). At present, nobody really has a clue where we are heading in such a rush nor can anyone stop it (see Harari 2016:59). It is, therefore, necessary to think about humanity's

"new agenda" (Harari 2016:63). Where does religion fit into the new agenda for Harari? And how will religion and technology relate in the new agenda? Since religion – that is "created by humans rather than by gods", and "defined by its social function" – gives meaning to our lives, we will not accept that it represents, according to Harari, "mere fiction" (Harari 2016:170). In the "twenty-first century, we will create more powerful fictions and more totalitarian religions than in any previous era". But Harari has also a special place in mind where he envisages it will come from, namely Silicon Valley! That is where "hi-tech gurus are brewing for us brave new religions that have little to do with God, and everything to do with technology" (Harari 2016:409). With the help of "biotechnology and computer algorithms these religions will not only control our minute-by-minute existence, but will be able to shape our bodies, brains and minds, and to create entire virtual worlds complete with hells and heavens". Being able "to distinguish fiction from reality and religion from science" will, therefore, become more difficult but more vital than ever before (Harari 2016:207). For Harari, there exists an "intimate connectedness" between religions and technology. The two of them, according to him, will "always dance a delicate tango" (Harari 2016:313), and in dancing the tango, "technology often defines the scope and limits of our religious visions" (Harari 2016:314). At the same time an intrinsic danger lurks for religion in its dance with technology, namely if it should lose touch with the technological realities of the day, it will forfeit its ability even to understand the questions being asked (Harari 2016:314). But the dance also entails another possible dangerous outcome with a yet outstanding question: If scientific discoveries and technological developments "split humankind into a mass of useless humans and a small elite of upgraded superhumans", or if authority shifts altogether away from human beings into the "hands of highly intelligent algorithms", then liberalism will collapse. What new religions or ideologies might fill the resulting vacuum and guide the subsequent evolution of our godlike descendants? (Harari 2016:408). One strong (strongest?) possibility for Harari may be: "New techno-religions may conquer the world by promising salvation through algorithms and genes" (Harari 2016:409). So therefore: Techno-humanism agrees that *homo sapiens* has run its course. We should use technology in order to create *homo Deus* – a much superior human model (Harari 2016:410). And to conclude on this note, Harari states that

the "most interesting emerging religion is Dataism, which venerates neither gods nor man – but data" (Harari 2016:427).

Indeed, more than a provocative religious-technological Hararian mouthful! In what context(s) must we try to make sense of these remarks and questions posed by Harari? His humanistic take on the world of the 21st century is that of a world in a firm grip of the Fourth Industrial Revolution.

3. The Fourth Industrial Revolution

The German engineer-economist Klaus Martin Schwab, the founder and executive chairman of the World Economic Forum, coined the term "Fourth Industrial Revolution"[3] to signify the current technological revolution people live in, and to explore how the world is transforming, that is, inevitably affecting the way people see themselves live, interact, and work.[4] The markers of the Fourth Industrial Revolution can be captured and described by the acronym DIVAS (see Veldsman 2019). They are:

- ***D***igitisation: Making everything, anything and anywhere computer-readable and process-able. Examples are smartphones, voice and facial recognition and augmented reality.
- ***I***nterconnectivity: Everyone/everything talking to everyone/everything. Examples are the worldwide web, social media, the internet of things, "the cloud" and virtual collaboration platforms (such as Skype).

3 If our current world is then described as in the grip of the Fourth Industrial Revolution, what characterised the earlier revolutions? The following short descriptions capture the core of the earlier revolutions, namely steam as a power source (First Industrial Revolution), electricity (Second Industrial Revolution), and information (Third Industrial Revolution). Our current world, in the grip of the Fourth Industrial Revolution, is characterised by the seamless, intelligent (or smart) integration of multiple disciplines and sectors into a single whole.

4 The following exposition relies on an unpublished summary of the Fourth Industrial Revolution by industrial psychologist Theo Veldsman (2019) from the University of Johannesburg.

- ***V***irtualisation: Being present and delivering on an ongoing basis in cyberspace, anything, anywhere, anytime, anyhow, for anyone. Examples are smartphones, and voice and facial recognition.[5]
- ***A***utomation: Performing a process or practice, and taking decisions and actions, through technological means with no/minimum human mediation. Examples are robotics and 3D printing.
- ***S***mart: Generating data from everything/anyone, affecting machine learning through feedback and/or turning data into intelligence through decision-making algorithms in order to take focused real-time, in time, validated, predictive action. Examples are artificial intelligence and machine learning.

The radical significance of the new redefined technologised world with its influential markers that we are living in cannot be ignored – whatever continent we find ourselves in today! The English theologian Kallistos Ware rightly said:

> All technology is going to affect people, one way or the other. But there comes a point where the effect is unacceptable because it is making this world more difficult for other human beings to live in (Ware 2017:24).

To further illustrate and contextually substantiate the remark that the impact of our technologised world cannot be ignored, and Ware's emphasis on the unavoidable effect of technology, the following general examples must suffice.

The initial declaration of the Parliament of World Religions calls for serious reflection on our technologised world. It captures in a simple but straightforward formulation of what is at stake:

> Today we possess sufficient economic, cultural, and spiritual resources to introduce a better global order. But old and new ethnic, national,

5 To briefly elaborate on two hugely popular social-technological examples. Facebook – as Dave Yauk (2018) remarks – has already turned friendship into a number, Twitter has already turned poetry into a hashtag. And in his critical comments on the brand name Apple and its valuation of the Apple Watch according to Tim Cook as the "most personal device we've ever created", Yauk asks: "[I]s Apple now turning knowing someone into something more closely resembling adornment, a piece of jewellery? Are 'persons' now only for display?". Yauk (2018) therefore urges the reader: "We must think long and hard about the words we are using to describe things, and more significantly, how we use technologies to form our lives and thus our ideas, and in what manner we allow our hearts to depend on such definitions, conceptualisations, and at heart: such things."

> social, economic, and religious tensions threaten the peaceful building of a better world. We have experienced greater technological progress than ever before, yet we see that world-wide poverty, hunger, death of children, unemployment, misery, and the destruction of nature have not diminished but rather have increased. Many peoples are threatened with economic ruin, social disarray, political marginalization, ecological catastrophe, and national collapse (Parliament of World Religions 1993).

A crucial remark: Greater technological progress than ever before, yet even greater misery, economic ruin and ecological catastrophes. Or as Jeffrey Shaw alarmingly – echoing Harari's statement that nobody really has a clue where we are heading – puts it:

> The whole massive complex of technology, which reaches into every aspect of social life today, implies a huge organization of which no one is really in control, and which dictates its own solutions irrespective of human needs or even reason (Shaw 2018:152).

Reaches into every aspect of social life today? Yes, it does. Therefore:

> The importance of technology in our time can hardly be overestimated. Technology is ubiquitous and all areas of life are influenced by it, such as work processes, mobility, relationships (especially the realm of communication), leisure activities and health (Schwenger 2016:44).

Not only does it reach into every aspect of our social lives today, it simultaneously radically influences and changes the many multi-various ways in which we try to make sense of our lives.[6] As "perfect storm of technologies"

6 If I turn specifically to the continent of Africa, the importance of technology and its significant role is greatly emphasised in official documentation. A few examples must suffice. From the first to the last page (nineteen times in all) of the influential Agenda 2063 that has been compiled by the African Union (AU) for an Africa where "all is not well", the importance of technology is strongly emphasised. Deeply conscious that Africa stands at crossroads, and determined to transform the continent and ensure irreversible and universal change of the African condition, it formulates as Aspiration 1 the following:

> We aspire that by 2063, Africa shall be a prosperous continent, with the means and resources to drive its own development, with sustainable and long-term stewardship of its resources and where: African people have a high standard

that are paving the way for transformative changes in the way we live and radically disrupting – at a whirlwind pace – almost all sectors of life, it is insightfully described as a blurring of boundaries between the physical, digital and biological worlds (McGinnes 2018). Franssen, Lokhorst and Van de Poel (2018:1) therefore correctly emphasises its societal impact: "It is largely by technology that contemporary society hangs together. It is hugely important not only as an economic force but also as a cultural force."

With the strong emphasis on the important role and impact of technology that not only "holds" societies together but represent a cultural force, I turn to reflection on "being human" in a world that is firmly in the grip of the Fourth Industrial Revolution.

> of living, and quality of life, sound health and well-being; Well-educated and skilled citizens, underpinned by science, technology and innovation for a knowledge society is the norm and no child misses school due to poverty or any form of discrimination (AU 2015:2).

And:

> By 2063, African countries will be amongst the best performers in global quality of life measures. This will be attained through strategies of inclusive growth, job creation, increasing agricultural production; investments in science, technology, research and innovation; gender equality, youth empowerment and the provision of basic services including health, nutrition, education, shelter, water and sanitation (AU 2015:3).

Another example from Africa. In his short article "The 'Fourth Industrial Revolution': Potential and Risks for Africa", Ross Harvey (2017) of the South African Institute of International Affairs, formulates a brief wake-up call: "There are serious advantages to being a first mover in technology. Governments should be building clear strategies that entail all the benefits of a Fourth Industrial Revolution. If not, they risk being left behind". A risk being left behind? Does this indirectly imply that technological developments are not neutral? It is strongly and widely debated whether technological developments are neutral. It is argued that there are two sides to the arguments, given the understandings or – better formulated – conceptualisations of technology in the hands and minds of *homo technicus* (no longer *homo sapiens*!). They change worldviews; they dominate cultures and lifestyles; for Heidegger, it is a "way of thinking", but then new thinking distinct from nature. It is very often not a "blessing" (Padgett 2005:578). It rather begins – in the criticism of Jacques Ellul – to function as a substitute religion in which Technique is the new sacred, the locus of meaning and value, the object of adoration and sacrifice,

4. Reflecting on human distinctiveness

More than thirty years[7] ago, the German systematic theologian Wolfgang Pannenberg wrote (in his translated *Anthropology in Theological Perspective*):

> Christian theology in the modern age must provide itself with a foundation in general anthropological studies. We are not dealing here with a position that one may or may not decide to accept (Pannenberg 1985:15).

And:

> Modern anthropology no longer follows Christian tradition in defining the uniqueness of humanity explicitly in terms of God; rather, it defines the uniqueness through reflection on the place of humanity in nature and specifically through a comparison of human existence with that of the higher animals (Pannenberg 1985:27).

Pannenberg's remarks are of fundamental importance and have vast implications for our traditional anthropological constructs that have been theologically formulated mostly in isolationistic ways. A South African student of Pannenberg that did just that what Pannenberg proposed, and who has become one of the international leading figures in reflection on human uniqueness/distinctiveness, is Wentzel van Huyssteen. In my exposition that

and the hope of salvation (Gill 1998:155). Modern technology unavoidably possesses a certain amount of agency (Herzfeld 2009:6). The question that should accompany technological developments and utilisations should always be whether values and intentions are taken into account. The kind of questions that should be asked are wide-ranging. Ellul's 76 questions are in my opinion, extremely helpful in this regard, covering ecological, social, practical, ethical, vocational, metaphysical, political and aesthetic considerations (Ellul n.d). If these wide-ranging issues are combined with specific ethical considerations on medical and pharmaceutical technology, communication technology, genetic engineering, stem cells and therapeutic cloning, nanotechnology, genetically modified crops, energy technology, human artificial intelligence, vast fields open up, deeply challenging and invitingly to be addressed responsibly simply because – as stated above – technological utilisation and developments imply agency. And agency can and should be influenced, if not guided, by theological considerations for many good reasons, especially regarding embodied personhood, human flourishing and dignity, values, enduring relationships and communal life.

7 The very same argument is already presented by Pannenberg two decades earlier than the thirty years ago that I mention here, namely in his *Was ist der Mensch?* (1962).

follows, I will engage with the way in which he approaches the question on what makes us human, or then more specifically, unique/distinct.[8]

4.1 Relating theology and science

The foundation that Van Huyssteen proposes for his theological exploration of human uniqueness is labelled as a post-foundational approach and ultimately determined by a very specific understanding of human rationality,[9] namely as transversal reasoning. As a vantage point, he poses the question:

> Can Christian theology, as a disciplined reflection on religious experience, ever really claim to join this postmodern conversation, and if it does, will it be able to maintain its identity in the conversation without retreating to an esoteric world of private, insular knowledge claims? ... How does theological reflection relate to other modes of intellectual inquiry, and especially to natural scientific knowledge, which very often is accepted unchallenged as the ultimate paradigm of human rationality in our times? (Van Huyssteen 1997:1-2)

Relating theological reflection to other modes of intellectual inquiry becomes for Van Huyssteen, on the one hand, a quest for intelligibility and on the other hand, it entails a fall from epistemological innocence. The former, namely the quest for intelligibility,[10] finds expression in interdisciplinarity (specifically of theology and science). In this sense Van Huyssteen sees his

8 For the following discussion of Van Huyssteen, I make use of my earlier article (Veldsman 2008) in which I have given an overview of the developments within Van Huyssteen's post-foundational approach.

9 For Van Huyssteen, human rationality embodies the most unique of our human abilities. He calls it a pragmatic skill as we seek to solve specific empirical and conceptual problems, be accountable to experience, and give the very best reasons for what we think, feel and believe. In this view, then, rationality is a deeply social practice, embedded in the experiences and narratives of our daily lives as these are contextualized by the radically interpretative nature of all our experiences (Van Huyssteen 2017:144).

10 The quest for intelligibility can best be described as a search for good reasons for hanging on to certain beliefs, good reasons for making certain moral choices, and good reasons for acting in certain ways (Van Huyssteen 1999:269).

theological design as public theology,[11] that is, a theology on a journey to find its public voice (Van Huyssteen 2017:143). The latter, namely the fall from epistemological innocence, entails the acknowledgement that science cannot claim rationality at the expense of religious faith and theological reflection (Van Huyssteen 1999:2). They share rational resources. We should rather be exploring the epistemological questions of the nature of explanations and explanatory claims, operative in different disciplines (see Reynhout 2006:8). Van Huyssteen coins the term "postfoundationalism" to refer to his own attempt to split the difference between foundationalist certainty and non-foundationalist relativism by being contextual, but also intersubjective, committed but also fallibilist, provisional but also explanatory.

With his post-foundationalist notion of rationality comes three "eye-openers" from a unique link between theology and the sciences. The first eye-opener relates to context, that is, that theology and the sciences, albeit in different domains of human culture, are contextually rooted. The second eye-opener relates to epistemology, that is, the shaping role of interpreted experience and tradition. How and why and from where we say what we say about God, the world and our relationships shapes the values – epistemic and non-epistemic – of our reflection. The third eye-opener relates to interdisciplinarity, that is, the crossing over or transgression of disciplinary boundaries to widen and deepen our reflection. Following Calvin Schragg, Van Huyssteen brands the latter as "transversal" (see Van Huyssteen 1999:8-9). Transversality[12] is characterised by the interpretative linking together and extension of various discourses, modes of thoughts, and action. Transversality not only represents the convergence of our multiple beliefs and practices, our habits of thought and attitudes,

11 Van Huyssteen (2017:143) explains more elaborately: Public theology is a theology that can and should claim the right to a democratic presence in the interdisciplinary, political, and cross-contextual conversation that constitutes our public discourse, including the discourse in the secular academy.

12 Elsewhere he writes:

> The notion of transversality ... provides a philosophical window to our wider world of communication through thought and action, and teaches us to construct bridge theories between disciplines, while respecting the disciplinary integrity of reasoning strategies as different as theology and the sciences (Van Huyssteen 2017:145).

our prejudices and assessments, but it also reveals the shared resources of our respective reflective strategies and reasoning (see Van Huyssteen 1999:136).

For the post-foundationalist Van Huyssteen (1997:136), a new and promising understanding of interdisciplinary dialogue now emerges: In interdisciplinary conversation, the degree of transversality achieved will ultimately depend on the effectiveness of our dialogue across the boundaries of different domains, and on the understanding we achieve in our interaction with one another.

4.2 Evolutionary epistemology

Van Huyssteen (2006) works out his new and promising emerged understanding of interdisciplinarity in his *Alone in the World? Human Uniqueness in Science and Theology*.[13] His emerged understanding has brought him to the fundamental question on how to approach and understand rationality itself, that is, on its evolutionary origin. It was the very question that he pursued in his earlier and preceding work *Duet or Duel* and now argumentatively seeks to unfold in its evolutionary and epistemological implications. He insightfully states:

> Evolutionary epistemology ... reveals the biological roots of all human rationality and should therefore lead precisely to an interdisciplinary account of our epistemic activities. The basic assumption of evolutionary epistemology is that we humans, like all other beings, result from evolutionary processes and that, consequently, our mental capacities are constrained and shaped by the mechanism of biological evolution (Van Huyssteen 1998:xiii-iv).

The interdisciplinary discourse that unfolds finds concrete expression in two related endeavours, namely the developing of a comprehensive epistemology (characterised by biological rootedness, that is, all knowledge is grounded in human evolution) and the exploration of human uniqueness/distinctiveness where no single defining characteristic of what it means to be human can be taken[14] across and over the boundaries of the respective disciplines (that is,

13 *Alone in the World?* is the published version of his Gifford Lectures at the University of Edinburgh, Scotland (Van Huyssteen 2006).

14 Elsewhere Van Huyssteen clearly states: We "grasp at an intuitive level that capacities like language, self-awareness, imagination, consciousness, moral awareness, symbolic

theological and scientific reflection finding a shared research trajectory). From these two related endeavours flow two specific epistemological liberations, namely epistemic narcissism (only our way of coming to knowledge is valid) and epistemological tribulism (our gathered knowledge in our specific domain captures all there is to acknowledge). Thus, from the shared trajectory between theological and scientific interdisciplinary reflection on human uniqueness convincingly emerges – as the result of interactions between early humans and their lifeworlds – a human propensity for metaphysical and religious belief. Within the Christian tradition, the doctrine of the *imago Dei* represents the most influential anthropological concept for Van Huyssteen, and he subsequently argues for a creative rethinking of the notion. It is a creative re-thinking of *imago Dei* and emerged human uniqueness that, on the one hand, provides an argument for the plausibility and comprehensive nature of religious and theological explanations for a phenomenon as complex as *homo sapiens* (see Van Huyssteen 2006:113ff.). Scientific notions of human uniqueness, on the other hand, help us to ground theological notions of human distinctiveness in the reality of flesh-and-blood, real-life, embodied experiences. It is this very creative interdisciplinary rethinking that enables theological reflection to steer clearly and insightfully away from overly complex abstractions.

4.3 Paleo-anthropology

Van Huyssteen's own re-thinking of human distinctiveness creatively unfolds from contemporary paleo-anthropology[15] (Van Huyssteen 2006:163-215). The prehistory of the human mind reveals the remarkable cognitive fluidity

behaviour, and mythology are probably the defining elements that really make us human" (Van Huyssteen 2016:175).

15 Why specifically paleo-anthropology? Van Huyssteen explains insightfully:

> An interesting part of our self-perception is that it is often the less material aspects of the history of our species that fascinate us most in the evolution of modern humans. We seem to grasp at an intuitive level that issues like language, self-awareness, imagination, consciousness, moral awareness, symbolic behaviour, and mythology are probably the defining elements that really make us human. Yet exactly these elements that most suggest humanness are often the least visible in the prehistoric record. For this reason, paleoanthropologists correctly have focused on more indirect but equally

(a concept that he has taken over from Steven Mithen) of our mental abilities.[16] Subsequently, Van Huyssteen widens his interdisciplinary discourse, engaging linguistics, neuroscience and neuropsychology. Three important insights unfold, namely, the naturalness of religious awareness (that is, our emergent capacity for spirituality) as a universal human attribute, the significance of religious imagination and a revisiting and interdisciplinary re-thinking of the notion of *imago Dei*. The most important emphasis of Van Huyssteen's (see 2006:261ff.) creative re-thinking can be summarised in his interdisciplinary proposal on human uniqueness, that is, on personhood in terms of imagination, symbolic propensities and cognitive fluidity. And on this very point, Van Huyssteen's close argumentative connection with Pannenberg's earlier quoted plea surfaces clearly, namely that it is a proposal that is undertaken from humanity's close ties with the animal world. What does this interdisciplinary undertaking entail?

4.4 Van Huyssteen's transversal answer to what makes us human

For Van Huyssteen, the transversal answer to what makes us human points to the "self" and "personhood"! Taking early hominid evolution as his vantage point, he argues that some of our most distinctive traits like consciousness, imagination, sexuality, moral awareness, language, and the religious disposition, present us with a robust notion of embodied personhood, which strongly affirms the emergence of symbolic religious behaviour (Van Huyssteen 2017:157). In a recent publication, Van Huyssteen also points to the latest developments in evolutionary theory in which scientists are now expanding on Darwin's contribution (Van Huyssteen 2017:168ff.) He specifically emphasises the contribution by Jablonka and Lamb in their book *Evolution in Four Dimensions*. What Van Huyssteen especially finds promising is their argument for a broader understanding of evolution. Not only should the genetic dimension come into evolutionary play, but also on the epigenetic, the behavioural, and the symbolic dimensions. Epigenetic

plausible material pointers to the presence of the symbolic human mind in early human prehistory (Van Huyssteen 2017:167).

16 Van Huyssteen (2017:149) elaborates on its importance: "[T]he cognitive fluidity of our minds allowed for the possibility of powerful metaphors and analogy, without which science, religion, and art could not exist".

inheritance is found in all organisms, behavioural in most, and symbolic only in humans (Fuentes 2009:13; Jablonka & Lamb 2005:1-8). They convincingly argue that "many organisms transmit information via behaviour, and thus acquisition of evolutionary relevant behavioural patterns can occur through socially mediated learning". Furthermore that "symbolic inheritance comes with language and the ability to engage in information transfer that can be complex and of high density". And of great importance for the focus on human distinctiveness beyond the confines of traditional neo-Darwinian approaches, they conclude that

> what makes the human species so different and so special, and what makes us human, lies in the way we can organise, transfer, and acquire information. It is, therefore, our ability to think and communicate through words and other types of symbols that make us different (Jablonka & Lamb 2005:193-231).

Special and different? I now turn to a closer exploration of the relationship of being human (distinctiveness) and technology that opens up the emphasis on special and different.

4.5 Distinctiveness and technology

To address the question on the relationship of being human and technology and the emphasis on special and different, I take as vantage point the earlier remarks by Harari on his understanding of the close relationship between religion and technology. With his qualified and dismissive take on religion, I do not agree. For Harari, religion as a sense-making activity to our lives represents mere fiction. However, let me immediately qualify my disapproval. It is not disapproval that is argued in any exclusive, hermeneutical-insensitive, fundamentalist and un-pluralistic manner. From the preceding exposition on human distinctiveness and early hominid evolution, we are presented with a robust and interdisciplinary notion of embodied personhood, which strongly affirms the emergence of symbolic religious behaviour. Differently stated: We are presented with the naturalness of religious behaviour. Religious awareness, understood from this perspective, is not functionalised as Harari – in my opinion – explicitly does as a vantage point for his approach to religious behaviour.[17]

17 See his earlier remark on religion in which he states that religion is created by humans rather than by gods and defined by its social function (see Harari 2016:170). By

If we then move from this vantage point of the naturalness of religion to reflection on technology, we must have clarity on where we are speaking from, and how we are speaking about technology. The "where" finds an answer in embodied personhood. The "how" finds an answer in "public" and inter-disciplinary transversality. It is these very two answers that transversally connect our interdisciplinary reflection on being human and technology. And from the connection, we can return to the remarks by Harari. It is indeed – as he emphasises – vital to think about a new agenda for our world in the grip of the Fourth Industrial Revolution, whether we are upgraded in due course or not, whether we still have to discover if we are the last station or not, whatever dance religion and technology – whether delicate tango or rumba or bolero – we will be doing. The most important point of all the remarks that he makes is that religions that lose touch with the technological realities of the day – in this article insightfully captured and described for the Fourth Industrial Revolution in the concepts of digitisation, interconnectivity, virtualisation, automation and smart (cf. Theo Veldsman) – forfeit their ability even to understand the questions being asked.

For all religious and theological reflection on their respective contextual journeys in finding their public voices on the question of what it means to be human, it unavoidably has two determining implications. On the one hand, it entails that we must step out hermeneutically from the twilight zone of abstraction and isolation, and step into a contextual understanding of being human, being human as humans of flesh and blood, as embodied persons in close connection to the animal world. Whereas – to self-critically argue the point as an example within a more progressive Christian theological tradition of reflections today – the Bible hermeneutically no longer simply fell from the sky, their "humans" unfortunately and their religious dispositions in many of these very same traditions "fell and still fall from the sky" – and in this interpretative sense, also "their tools". These traditional discourses have not yet lost their epistemological innocence and are very much embedded in epistemological tribulism. Hermeneutically, we have to break free from these traditional discourses. Our evolutionary evolvement as humans, distinctively characterised by capacities like language, self-awareness, imagination,

functionalising religion, it is reduced to a mere activity (projection) or need (neurotic) of being human and subsequently stripped of its inherent properties.

consciousness, moral awareness, symbolic behaviour, and mythology represent the coordinates of our theological mapping of the relational significance of a contemporary religious stance, that is of *religare* in the true sense of the word, namely as "binding us, connecting us" to a Transcendent Creator of all that is. It is in the Transcendent Creator that we as co-creators live, "have our being" (Acts 17:28) and at the very same time our "technological moving". For me, it is a "being" and "moving" that can be captured in the phrase of a face-to-face encounter in our everyday lives of flesh-and-blood. It is in precisely the characterisation of the face-to-face encounter, that is, the faces of embodied personhood and the materialised/concrete face of the sciences, namely technology, that will enable an interdisciplinary and transversal sense-making of the encounter. But then a sense-making that is accompanied and guided by a clear and deep discernment of the very properties of the two distinct faces engaged in a tango (or whatever dance!) – as Harari typifies the encounter. The former, namely "to have our being", requires in the face-to-face encounter unfolding the bigger integrated personal story of being human, characterised by complexity, relationality and connectedness, sociality and community, feeling and emotions, friendship, intimacy, liberation, empathy and self-sacrifice, pursuits of beauty, of ethical values, of responsibility and justice, celebrating their multi-dimensional expressions of our deepest, highest and broadest imaginary actions through culture, art and music. In short, it should represent as relational mapping our guide to and on the territories of technological innovations, aware that it can touch and transform nearly every dimension of the natural world around us (Cole-Turner 2016:21). Its innovational spectrum is indeed vast: medical and pharmaceutical technology, communication technology, genetic engineering, stem cells and therapeutic cloning, nanotechnology, genetically modified crops, energy technology and human artificial intelligence. In all its appearance that we are engaged with face-to-face, that is as "embodied" faces and "the tool-faces of the sciences" in our everyday life experiences, two closely connected and intertwined dimensions unfold. On the one hand, technological innovations in their amazing and mind-boggling enhancement and enrichment and broadening of human flourishing, but on the other hand, being seriously and critically sensitive to the awareness that technological utilisation and developments imply agency; we will have to come to ethical terms with superficial (inauthentic) similarities and false equivalences. This to me is the

most crucial and important point to argue from the relationship between human distinctiveness and technology. It will require deep discernment between the "stories" of being human as embodied persons and the "stories of tools" where the latter represent a "pale imitation" of humanness that very easily in its everyday differentiated face-to-face encounters does not only bring about human flourishing, but can also become concrete stories of marginalisation, oppression, injustices and disruption. We will continuously have to ask: What power structures, what values, what intentions are part and parcel of our (embodied)face-to-(tools)face encounters?

5. Conclusion

To summarise and conclude: In the impressive and life-changing territories of technological innovations,[18] human distinctiveness should guide our relational mapping for (ethical) discernment and the unmasking identification of superficial similarities and false equivalences in the everyday face-to-face encounter of the narratives of embodied personhood and that of the narratives of our tools. It has to face technology (read "the Fourth Industrial Revolution") as an unavoidable cultural force that affects every fibre of human existence and every concrete Hararean context where human beings are pursuing human flourishing and ethical discernment. And for this very deep reason, it spontaneously prompts a (revised and broadened) theological interdisciplinary and post-tribulistic epistemological response within contemporary (transversal) discourses on human distinctiveness.

18 In this regard, Ron Cole-Turner (2016:22) highlights the connection with "trans-humanism", that is, the view that human beings should develop and use technology to transcend the biological limits of humanity. Insightfully he refers to the Italian poet Dante Alighieri (1265–1321) who described human transformation by inventing a new word – *trasumanar* in Italian – telling us that to go beyond the human is something that not even a poet can describe in words. It is Dante's word, *trasumanar*, that has re-entered our vocabulary as "transhumanism".

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Chapter 6

What is the shape of future ethics?

Anton A. van Niekerk

1. Introduction

What is meant by the "Fourth Industrial Revolution" is currently well established. Schwab and Plutschinski are among many authors who succinctly circumscribe what the concept refers to.

> The First Industrial Revolution used water and steam to mechanise production. The Second used electric power to create mass production. The Third used electronics and information technology to automate mass production (Shwab 2016).

To this Plutschinski adds:

> Now based on a completely digitalized world the 4th Industrial Revolution is characterized by a fusion of technologies that is blurring the lines between the physical, digital and biological spheres. The possibilities will be multiplied by emerging technology breakthroughs in fields such as artificial intelligence, robotics, the internet of things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, material science energy storage and quantum computing (Plutschinski 2017).

I will not explore the concept of the Fourth Industrial Revolution any further since that is the task of several other contributors to this project. I will, from the outset, concentrate on exploring the relevance and consequences of this development for both our understanding and application of ethics.

One more conceptual clarification, however, is required, namely that between ethics and morality. "Morality", in my understanding, refers to the universal, demonstrable and observable social phenomenon that people of all known cultures submit their behaviour to the demands of obligation. Put more

simply: All people that we are aware of, acknowledge and accept that it is a legitimate question to ask whether an action is right or wrong/good or bad. "Ethics", on the other hand, is the outcome of a more intellectual enterprise, namely reflection on the nature of the difference between right and wrong, as well as the development of argumentative strategies ("theories") in terms of which the difference between right and wrong/good and bad actions can be established and motivated.

Note that I reserve these practices as appropriate for and belonging to the domain of the existence of adult members of the species *homo sapiens sapiens*. I assume that moral and/or ethical precepts do not apply to human children (i.e. more or less under the age of ten) and non-human animals (i.e. "do not apply ..." in the sense of us being able to hold children and animals morally accountable for their immoral actions). This limitation of the applicability of ethical precepts will be important when, later on, I make a few remarks about the applicability of ethics on creatures that as a result of technological innovations resemble, though in significant degrees also differ from, adult human beings.

It turns out that the Fourth Industrial Revolution yields a plethora of ethical issues – way too many (and in some cases too complex!) to cover in a study such as this. In a recent statement regarding which issues the Centre for Applied Ethics at Stellenbosch could try and cover within the context of a new to be constituted School for Data Science, the following topics were identified (mainly by my colleagues Susan Hall and Hannes Smit):

- Issues concerning privacy. To the extent that technological sophistication in accessing and manipulating databases and their applications increase, people's universally acknowledged right to privacy and the security of personal information could increasingly become compromised.
- Issues concerning informed consent. For example, difficulties around ensuring transparency concerning the use of personal data, and reflection upon the different models of consent that would be appropriate in different contexts.
- Issues concerning the ownership of personal information.

- Issues concerning so-called "algorithmic bias", namely ways in which human biases can be encoded in algorithms.
- Matters related specifically to business ethics. For example, the ethical management of data supply chains, and how to extract useful knowledge from huge sources of data.
- The general need for critical thinking skills to enable students to critically evaluate practices related to big data, to spot sophisticated sources of misinformation, and so forth.
- Issues concerning decision-making by autonomous systems, for example, how a self-driving car would weigh human lives where an accident that will harm at least one person is unavoidable.
- Issues concerning the economic impact of increased automation, for example, how would society have to politically readjust if feared job losses are realised and if humans become redundant in many spheres of economic life?
- Issues concerning who will be held accountable for the actions of autonomous systems. To refer to the self-driving car example again: Who is to be held liable in the case of the malfunction of such technology that results in serious injury or death of passengers of others that are involved?
- Issues related to genetic algorithms, which inevitably end up operating in a way that no person fully understands, and how to responsibly interact with such systems.

Special vigilance will be required to find workable solutions to the issues just raised. In a position paper on the World Economic Forum website titled "The 4 Big Ethical Questions of the Fourth Industrial Revolution", Mildred Solomon identifies four central and overarching questions that need to be addressed in reflection on responsible ways of managing the emerging technologies of the Fourth Industrial Revolution:

1. "Should the technology be developed in the first place? Should it, for example, at all be allowed to produce autonomous, lethal weapons or militarized robots?" (Solomon 2016). Another example is the possibility of geo-engineering. Should certain countries or regions be allowed to manipulate climatic conditions conducive to their interests in a way that

might seriously harm the interests of people living elsewhere? The answers to these questions seemingly provoke a self-evident negative answer. Yet we are living in a world in which permutations of these possibilities are already rife.

2. "If the technology is going to proceed, to what ends should it be deployed?" (Solomon 2016). Here we enter the network of questions pertaining to the issue of human enhancement, be it at a cognitive or even a moral level. I leave it for the moment since I deal with this issue in more detail later on.

3. "If the technology is to go forward, how should it proceed?" (Solomon 2016). A pertinent example in this respect is the issue of so-called "gene-drives". I quote:

> Gene drives are technologies, which in combination with CRISPR Cas9 gene editing, can exponentially increase the prevalence of specific genetic elements in a whole population of certain kinds of wild plants or animals. Right now, for example, gene-drives are being considered as a way for controlling and even eradicating mosquitoes that are disease vectors for human illnesses like malaria and Zika. [Mosquitoes are indeed generally believed to be the world's most dangerous animals in relation to humans!] The National Academies' report encourages the development of gene drive technology, but calls for carefully paced research, first in laboratory settings and small field studies, before engineered organisms are released into the wild (Solomon 2016).

4. "Once norms have been set, how will the field be monitored to ensure adherence?" (Solomon 2016).

The fundamental question to be addressed in the rest of this contribution then is: Do the technological developments of the Fourth Industrial Revolution justify – let alone compel – us to acknowledge new forms of ethics or a radically rethinking of the nature of what we currently regard as ethics? It is still too early to answer that question comprehensively. The Fourth Industrial Revolution, particularly as far as the development of artificial intelligence is concerned, challenges us in unprecedented ways to account for the range and identity of moral actors and the nature of the impacts that might have moral relevance. It challenges us to rethink not only the claim that ethics essentially pertains to that which is human. It also challenges us, in ways that are more

particular than we ever would have thought, to rethink the very nature of the human or our humanity itself.

Space does not allow me to analyse every aspect of the Fourth Industrial Revolution in order to try and assess its ethical acceptability or its implications for our understanding of ethics. We almost of necessity require some overarching perspective in terms of which we could frame the phenomenon of the Fourth Industrial Revolution and which provides enough provisional access to the problematic to enable us to make a few provisional remarks about the topic under discussion.

I have decided to choose the possibility and phenomenon of "radical biomedical human enhancement", with the eventual prospect of the emergence of a new (post-) human species, as the integrating perspective on the basis of which the Fourth Industrial Revolution and its ethical ramifications will henceforth be analysed.

2. A new species on the way – and what is new about that?

It is a well-known fact that our species – *homo sapiens* – has been evolving over the past two million years. The evolution has been driven by a process that Charles Darwin called "natural selection" (Darwin 1971:80-127). Natural selection is something that simply happens to all living species. No species – including ourselves – exerts any control over it. One of the significant aspects of the Fourth Industrial Revolution is that such control is about to become available to us. John Harris argues persuasively that only now, for the first time, evolution based on natural selection is coming under our control (Harris 1998:171-241, 2007).

Our species has always been characterised by the fact that we are the subject of enhancement; we have always improved our bodily abilities and functions (Harris 2007:19-35). Hence the prospect of an eventual situation that might be called "post-humanism". This debate will form part and parcel of the Fourth Industrial Revolution. What do we mean by "post-humanism", and what is its relation to "transhumanism"? Hava Tirosh-Samuelson explains:

> Due to genetic engineering, humans are now able not only to redesign themselves, presumably in order to get rid of various limitations, but also to redesign future generations, thereby effecting the evolutionary

> process itself. As a result, a new *post-human* phase in the evolution of the human species will emerge, in which humans will live longer, will possess new physical and cognitive abilities, and will be liberated from suffering and pain due to ageing and diseases. In the post-human age, humans will no longer be controlled by nature; instead, they will be the controllers of nature. Those who welcome the post-human phase are known as transhumanists (Tirosh-Samuelson 2011:31).

"Post-humanists", in short, refers to the (members of the) "new species" that might arise because of radical human enhancements. "Transhumanists" refers to individuals alive today who welcome and propagate the development of "post-humans".

It can safely be claimed that no other species has, over the past millennia, enhanced itself to the extent that the human species has. Most of these enhancements have taken the form of technologies and institutions. We, for example, enhance our muscle power using technologies such as freight vehicles and cranes. We also create institutions which are essentially ways of working together to attain achievements that are to our benefit. Universities are examples of institutions where this is achieved. The question is whether these radical enhancements can also apply to our bodies and our minds, and whether this can (and will), eventually result in a kind of "super-species". The latter refers to a kind of species, based on what we currently know as humanity, but of such a nature that their continuity with our species is no longer evident. Is it possible that our unmasking of the secrets of the human genome will enable us to reach such results?

I have formulated this problematic as follows:

> The idea of super-humans is, of course, in itself not new. We know it from an avalanche of science fiction, epitomised by fictional characters [like Superman, Batman and the like]. The big difference between traditional fantasies of super people and the current debate, is, however, the fact that the idea of post-humanism has now become a serious talking point of science. With the revolution in biomedical and genetic sciences, we have reached a point where fantasy and reality seem to move towards each other with accelerating speed. What else can be the explanation for top-level research universities like Oxford, Cambridge, The University of California (LA) and many others in recent years creating a number of eminent research centres to explore

> this very possibility? What has happened to justify such developments which, a mere decade or two ago, would have created the impression of utterly unfounded flights of fantasy, unworthy of serious academic or scientific attention? (Van Niekerk 2014:121)

3. Kurzweil's apocalyptic

Ray Kurzweil, a prominent apologist for the idea of the Fourth Industrial Revolution, provides an answer to the latter question. In one of his well-known books, he develops the idea of the so-called "law of accelerating returns". This law can attain effects in what the future holds for over time (see Kurzweil 2005). Kurzweil argues that the changes that we are about to see in the future will occur at a tempo that is not analogous to the rate of change that we have seen in the past.

Kurzweil argues that "the rate of exponential growth is also growing exponentially". According to him, technology will develop so rapidly that it will result in what he calls a "singularity" which will be created by the "force of super intelligence". The singularity is a condition about which we can currently know very little, if anything.

It articulates a kind of technology will develop at such a rapid pace that, as he claims elsewhere,

> [W]ithin a few decades, machine intelligence will surpass human intelligence, leading to the Singularity – technological change so rapid and profound that it represents a rupture in the fabric of human history. The implications include the merger of biological and non-biological intelligence, immortal software-based humans, and ultra-high levels of intelligence that expand outward in the universe at the speed of light (Kurzweil 2001:1).

All of this may well be a somewhat melodramatic overstating of the case for post-humanism. The important point that Kurzweil makes, however, is that if we take the pace of technological growth seriously, we may well encounter technologies that grow so rapidly that they may have a profound effect on the life forms from which they originated.

It, therefore, seems almost inevitable that a new species might, in the end, be our destiny. Max More claims in this regard that "humans are but a

transitional stage standing between our animal heritage and our post-human future" (More, quoted in Tirosh-Samuelson 2001:23). Nick Bostrom defines transhumanism as "a way of thinking about the future that is based on the premise that the human species in its current form does not represent the end of our development but rather a comparatively early phase" (Bostrom 2003:26).

It is often claimed the name *homo sapiens* will become inappropriate for what humans might become. The name *robo sapiens* is then suggested instead. There is a very distinct possibility that this new species will be the outcome of a significant merging of biological tissue and machine technology, driven by artificial intelligence of some sort.

The claim made by thinkers such as Ray Kurzweil and Yuval Harari (see the latter's international bestseller *Homo Deus. A Brief History of Tomorrow*, 2016) is that "post-human" creatures of this nature will operate purely in terms of algorithms that in principle are fully comparable to those that drive and operationalise the human brain, and that will also be designable and repairable by the creatures themselves.

What do we mean by "algorithms"? Harari defines this central concept as follows: "An algorithm is a methodical set of steps that can be used to make calculations, resolve problems and reach decisions. An algorithm is not a particular calculation, but the method followed when making the calculation" (Harari 2016:97).

We use an algorithm to calculate the average of two numbers. Carefully following a cooking recipe to bake a cake, is applying/using an algorithm. Beverage vending machines operate via the application of an algorithm. Harari goes further with this last example:

> [T]he man pressing the buttons and drinking the tea is also an algorithm. A much more complicated algorithm than the vending machine, but still an algorithm. Humans are algorithms that produce not cups of tea, but copies of themselves (like a vending machine which, if you press the right combination of buttons, produces another vending machine). The algorithms controlling vending machines work through mechanical gears and electric circuits. The algorithms controlling humans work through sensations, emotions and thoughts (Harari 2016:97-99).

In short, we will in all probability reach a point where the human experience could and will, on the basis of brain simulation by artificial intelligence, in principle be captured, imitated and possibly even improved by a kind of advanced machine technology that operates almost purely via algorithms and, because of that, will be able to simulate the algorithms that are operative in the human body and brain.

In the rest of this chapter, I would like to discuss several critical questions about issues raised by the kind of, and (particularly ethical) implications of, the radical human enhancements that will allegedly be made possible by, amongst others, the algorithm-based artificial intelligence that will become so prevalent and prominent in the Fourth Industrial Revolution.

The first critical question that I would like to pose in this respect, is how plausible the claim is that human behaviour could by and large be simulated and in many respects replaced by the artificial intelligence produced by the Fourth Industrial Revolution.

4. Differences between robots and humans

At a recent conference in the Netherlands, the Dutch philosopher from the University of Humanistics in Utrecht, Joachim Duyndam, offered an interesting analysis of possibilities in this regard in discussion with the argument in Harari's *Homo Deus* (2016). Wherein would the essential differences between humans and sophisticated robots lie? Some would suggest that a significant difference between the two resides in the ability of judgment. A robot might be a good referee in a game of rugby, yet instances might occur where judgments are required that robots could not handle. There is a difference between the data processing occurring in robots and the judgments of humans. Harari's argument, of course, is that that which we regard as judgment in the alleged subjective sense is also a form of (organic) data processing. According to Harari, there is also no fundamental difference between organic and inorganic data processing; all occur in accordance with the dictates of algorithms, including human thought processes (Harari 2016).

In response to these strong claims by Harari, we could, drawing on Duyndam's work, proceed to nevertheless identify and analyse a series of significant differences between robots and humans. Robots are unable to hesitate – a

characteristic so typical of humans. Decisions based on mechanic algorithms simply occur once provoked by the algorithm. A key aspect of our humanity is our capacity to "think again" – to hesitate. Related is our human capacity for self-reflection, namely our hesitance to simply accept and coincide with the outcome of algorithmically prescribed processing. This means that I am conscious of myself; I take distance from myself; I am concerned with myself. In Heidegger's terms: My existence is a perpetual exercise in self-interpretation. Who I am, is never fixed, and always the outcome of (new) choices and decisions.

Not only can humans, other than robots, hesitate. A human can also err or make mistakes ("hulle kan hulself vergis"). Mistakes/errors are actions that warrant, and indeed generate, requests for pardon or absolution. How does one possibly conceive of a construed algorithm that is designed to make mistakes? Yet, to make mistakes constitutes a key element of what it means to be human! Mistakes, in turn, yield the experience and practice of guilt and forgiveness. Can those experiences ever be associated with the algorithmic prescriptions of robotic behaviour?

Another seemingly unique human trait is the phenomenon of melancholia, of a poignant reminder of and hankering after something which is now absent, but at some time was present. As a counterpoint, humans can indeed also enjoy themselves, with the phenomenon of feasting (like eating and drinking together) as the prototype. Is it conceivable that the act of feasting could be the outcome of a greatly non-organic algorithm that in principle could be switched on and off? Further related to the capacity for enjoyment and festivity is the phenomenon of addiction. Maybe addiction can indeed be a trait of robots. Humans, however, also have the ability to spontaneously counter addiction, to seek balance, to restore harmony. How is that conceivable in the life of robots?

A final human trait that we could list is the capacity for sympathy and empathy. I also am orientated towards the future in full knowledge that the future is never guaranteed. What makes me human is the fact that I can be hopeful towards the future. That closely ties in with our capacity to embark upon lasting relationships. I can love and be loved; I can make a friend and be a friend.

This brings us back to the first alleged difference between humans and robots that was suggested: the capacity to make judgments. These judgments occur in formalised settings, such as when a judge makes a verdict in a court of law. Notable of these formalised judgments is the possibility or opportunity of appeal, which suggests the fallibility of the judges. (See in this respect Hart 1948 and Ricoeur 1981.) Yet, we also judge in a variety of non-formalised settings – in everyday life when we, on a daily – sometimes hourly – basis have to exert practical wisdom (Aristotle's "prudence" or *phronesis*) when making moral judgments. *Phronesis* (a notion that I have analysed more comprehensively elsewhere; see Van Niekerk 2013, as well as Aristotle 1953 and Bernstein 1986) is the exertion of prudence or practical wisdom in situations where one has some guiding norm to consider, but when that norm requires application in some practical situation, for example, when a lecturer has to decide about the situation of a student that missed a compulsory test, but the student can provide evidence of a serious personal crisis that precipitated his absence.

Note, before we investigate other dimensions of radical biomedical enhancements, how each of the factors in terms of which I questioned the compatibility of humanity and robotic behaviour, link with key dimensions of our understanding of ethics. To hesitate, to make mistakes, to experience guilt or melancholia, to judge in formalised and non-formalised settings – all of these are dispositions, actions and orientations that are uniquely tied to our ethical consciousness. It is not at all self-evident if and how such dispositions can be translated into the algorithms that drive the behaviour of machine technologies. The human dimension of ethics is not to be underestimated.

5. Unlimited longevity?

One of the dramatic alleged traits of the new species to emerge from enhancement technologies is that of considerably extended longevity. In this respect, it is appropriate to refer to Aubrey de Grey, a very vocal exponent of the development of technologies that might dramatically extend life expectancy. De Grey calls himself a "biogerontologist". He is currently the "chief science officer of the SENS" (Strategies for Engineered Negligible Senescence), a foundation that he has created in Cambridge, allegedly with the aid of the university there. De Grey's central claim is that we must learn to think of old age, not as a "natural destiny" and outcome of the duration of our existence

on earth. Old age rather refers to what he calls a "cluster of diseases" that are all in principle curable or reversible. The effect would be an indefinite extension of our lifespan, if only the necessary and relevant research could be done to facilitate this. In his own words: "We can grow old without becoming aged" (De Grey 2007).

De Grey claims that about every disease or degeneration of the human body can be what he calls "reverse-engineered". We tend to think that this is a process that will only become effective when one is already of advanced age. De Grey disagrees. This "reverse-engineering" of organs and body parts ought to start much earlier. Nobody is, after all, interested in an indefinite life extension based on the body of, for example, someone who is 90 years of age. If ageing is to be stopped, it must start roundabout the age of 40. In a widely circulated TV interview, De Grey claimed that the first human individual who will continue living to the age of 1000 has, in all probability been born already. De Grey is also quite confident that he is that individual!

I have written as follows on this topic:

> It is a pity that the possibility of radical life extension or increased longevity has captured so much attention in the debate and tends to become most closely associated with public perceptions of trans-humanism. To my mind, this possibility offers one of the least plausible claims regarding the possible benefits of post-humanism. I cannot but agree with Bernard Williams, who already in the 1970s identified the probability of sheer boredom as arguably the most persuasive argument against the prospect of indefinite longevity [Williams 1973]. If I were to last 1000 years, and we take 100 years as a reasonable duration for, for example, a career, it would imply that I would have time for embarking on 10 different careers. I can see the fun in a second, or maybe a third career, but thereafter sustained career changes would become ridiculous and boring. [For a further discussion of this point, see Agar 2010:112-115.] Furthermore, if radical life extension is prone to be limited to a few, as it surely will be for a very long time, what would the implications be for the relationship between these few Methusela's and the rest of us? [See Genesis 5:22-27. According to this story, Methusela was the man who lived to be the oldest ever – 969 years.] Could we ever be friends? Could we ever be taken seriously by people who have lived hundreds of years before us? I do not know anybody who wishes to live forever – particularly when

> they are on in years. There is much to be said for the idea that life acquires much of its meaning and urgency in view of the fact that we are finite and mortal. What is the sense of doing good, committing sacrifices for others and taking chances if the postponement of such actions has no consequences, and the opportunity for such actions could always come again? What do we live for if we live forever? In this regard, I am attracted to the following argument of Tirosh-Sameulson: "Since the human is an *organism* rather than a mechanical device, human beings undergo the cycle of birth, maturation, aging, and death, which exemplifies the rhythm of creation and the gift of life" [Tirosh-Sameulson 2011:41] (Van Niekerk 2014:122).

6. What if "normal humans" are one day inferior/"disabled" compared to post-humans?

We might also wonder about what the relationship might be between so-called "normal people" and the race of post-humans of the future. In this instance, I am not necessarily talking about robots or cyborgs, but more likely about post-humans that would physically resemble us greatly, but that would by and large be our intellectual, physical and probably also our moral superiors. (For the moral issues associated with the idea of moral bio-enhancement, see Palk 2018.) Are we able to conceive that we will one day be able to live in peace and tranquillity with people who, in effect, are a different species from us, yet whose physical and mental state is based upon us as a species? When reflecting on this, conjecture is inevitable. I, therefore, cannot come up with infallible answers to all the possibilities that might present themselves in this regard.

Interesting scenarios have, however, been developed by the Harvard bio-ethicist Daniel Wikler in a provocative book chapter titled "Paternalism in the Age of Cognitive Enhancement: Do Civil Liberties Presuppose Roughly Equal Mental Ability?" (Wikler 2009). Suppose, asks Wikler, we find ourselves in the hypothetical situation where we live together with people who are in every respect – physically, mentally and intellectually – our superiors. Would it be morally appropriate for them to act paternalistically towards the rest of us? If this possibly sounds outrageous, we ought, according to Wikler, bear in mind that we, on our part in the present, do act paternalistically toward both children and mentally handicapped people without harbouring any apparent moral scruples about it.

The particular question here is whether the mental and intellectual superiority of the "post-humans" (i.e. their superior knowledge and judgment) could give them the right to infringe on the competence of the rest of us. By "competence" I mean the right to make our own decisions. The answer to this question depends on how the notion of "competence" is to be understood. Wikler distinguished between two notions of "competence", one which is called "relativistic" and the other which is called the "threshold" notion of competence.

I have explained Wikler's distinction as follows elsewhere: In the case of the "relativistic" notion of competence:

> [W]e could ... point out the relative differences in intellectual ability between average people and the intellectually disabled, as well as to the corresponding [probable] difference in favourable outcomes of key decisions when made by these two categories of people. We could then develop a "rule of thumb" which stipulates that if the two groups' IQ's differ by (let's say) 28 points or more (irrespective of where on the overall scale the highest and lowest score falls), one group would be regarded as "smart" and the other as "dull", and the first would be therefore considerably more competent.
>
> Compare this to what Wikler calls a *threshold concept of competence* [or what Rawls would call a "range property"]. In this case, that which determines that one person is competent and the other not, is not the relative difference between them in respect to intelligence, but rather on which side of an *absolute threshold* their intellectual capacities fall. Therefore: if you meet the minimum threshold [for example an IQ of 90], you are competent, irrespective of whether you score 90 or 140. [For this argument in more detail, see Wikler 2009:345-349.]
>
> Whereas Wikler argues that a future group of post-humans probably will be morally justified to act paternalistically towards the unenhanced, Buchanan, in turn, argues this matter in terms of such a "threshold concept of human rights". That means that such enhanced people will not have the right to infringe my human rights once I meet the basic threshold [Buchanan 2011:212-217]. I certainly prefer this latter argument.

> Of course, we ought to be cautious of the possibility of creating a super-species whose set of morals might clash head-on with our own and who have the power and intelligence to disown the rest of us and plunge our world into greater chaos than it already knows. But there is, of course, another possibility, namely the possibility that these smart descendants of ours might immeasurably improve our world, and might even succeed in persuading the majority of us of a deeper and more profound meaning that resides in our values – an understanding of our professed values that might actually persuade the majority of us that it is not only necessary to believe in a better world, but that such a world is attainable through measures and initiatives that we are too selfish or ignorant to realise or implement (Van Niekerk 2014:120).

7. A moral heuristic for the slowness of nature

We now turn to, as far as I am concerned, a much stronger argument in favour of post-humanism and radical human enhancement. I draw for this argument on insights of the philosophers Bostrom and Sandberg (2009).

For many people, one important question remains: To what extent is it wise to develop technologies or drugs that "interfere" with nature? It is often feared that, because of our limited knowledge of the consequences of such interference, nature might, in some way, "take revenge" on us. Accompanying this fear or reservation, the concern often comes to the fore in an alleged deep-seated conviction, expressed in the question: "Does nature not know best"?

On the face of it, this is not a very intelligent question since it can be so easily shown that we "interfere" with nature all the time: Every time we work on a computer, speak on a telephone or take medicinal drugs, we "interfere with nature". Bostrom and Sandberg, however, for the sake of developing their heuristic for arguing when enhancement technologies would be in order, are prepared, purely for argument's sake, to assume the wisdom of the claim that "nature knows best". The implication of the latter conviction would then be that nature, via the process of evolution and natural selection, would have provided for most of our needs. Yet we know that is not the case; we consistently fall short of drugs and technologies that will enable us to cope better with our environment.

To illustrate Bostrom and Sandberg's argument, I have used the following example elsewhere:

> Take ... our current-day urgent need for a significantly elevated capacity to do mathematics in all people, and let's suppose (contrary to what probably is the actual case) that mathematical prowess is something that can be isolated in some gene(s) and manipulated to become prevalent in a population. We all need it, and yet we are all witnesses to our education system's lamentable and seemingly sustained inability to deliver this skill; (hence the ever-growing industry of remedial math classes). Why has nature not produced this skill in (most of) us through natural selection? The answer is simple. About 10 000 years ago, when our ancestors lived in caves and were hunter-gatherers, they required very little mathematics to survive; being able to count to ten, was more than sufficient. It took a mere 10 000 years from that time until the present – a time in which we direly find ourselves in need of mathematical skills. A period of 10 000 years in evolutionary time is hardly a blip on the radar screen; it is way too short to enable "nature" to succeed in getting us to successfully select for mathematically skilled children, rather than the specimens that currently occupy our schools and, in large numbers, fare dismally at mathematics (Van Niekerk 2014:123).

If "nature" has not provided what most of us need so dearly in the world in which we find ourselves (i.e. mathematical prowess), then it is morally in order for us to develop enhancement methods and technologies to provide for the shortfall. This argument is the "heuristic" that Bostrom and Sandberg developed (Bostrom & Sandberg 2009:377-380). The implication, which will be inevitable, will then be that these technologically facilitated powers will also be induced into smart people who in all probability already have them.

8. Human nature as a moral desideratum

We must bring the argument in this chapter to a conclusion. What are we to make of post-humanism, as it is bolstered by the arguments of the transhumanists? Three conclusions seem to me to be inevitable. The first is that we are not being naive or gullible about science and technology. They are very important – often redemptive – parts of the world in which we live. But they are not value-free. What can be achieved through science and technology is by no means always good. The "can"-question certainly

does not always imply the "ought to" question. Philosophers have often warned against the "natural fallacy", namely, the fallacy that derives an "ought" from an "is". Remarkable achievements have been forthcoming from science and technology, yet we have also seen that science and technology can unleash the most destructive forces that we are aware of – forces that are aptly symbolised in the names Hiroshima, Chernobyl and Auschwitz. When we then take note of the possibility of moulding beings with comparably remarkable features, vigilance is called for. We will have to inform ourselves very carefully of what is happening in respect of the development of these technologies and resultant "advancing new species", and we will have to be comprehensively persuaded that what is on offer in this regard, is really to everyone's demonstrable benefit.

At the same time, we will have to stay on guard not to stifle progress. A second point that I wish to make here, is to call upon readers to try and imagine for ourselves how remarkably different our current world is from the one of our ancestors of 200 or 300 years ago. Imagine what their impression of this world might have been, had it ever been possible to resurrect some of them from the dead.

> With our knowledge and skill sets of driving fancy cars, globe-trotting, spending most of our days in front of computer screens and – the one I understand least – conducting the bulk of our communication (and even knowledge acquisition) by means of small, rectangular-shaped, hand-held bars called "cell-phones", we would undoubtedly appear like a super-race to them. Now ask the question: If the world, and we with it, could have changed so much in so relatively short a time-span, what is prone to await us over the next century or two? (Van Niekerk 2014:120)

It would therefore hardly be wise to abandon the developments that we see around us – including what is claimed in the name of a possible ensuing post-humanism – to the proverbial graveyard of blanket moral condemnation. It has already been said and needs to be said again: Self-enhancement has always been a very typical human endeavour. Being aware of what we have attained in our current world, I venture to pledge that nobody in his or her right mind would prefer to live in the world of 200 or 300 or more years ago. And if we have learned with relative ease to meaningfully inhabit the world we currently

know, why is it rational to expect that the world of the future will necessarily be uninhabitable?

My final point is to warn against a fallacy that occurs all too often in the debates and literature about enhancement and possible post-humanism. This is the fallacy of seriously entertaining the idea that the notion of "human nature" – that which is prone to change considerably or even disappear in the future – represents a moral desideratum, namely an entity with superior moral worth and status and that has to be preserved at all costs. Exactly because of the enhancements that have accompanied our existence as a species since the earliest time, human nature has also always changed. Do we seriously think that "human nature", as we know it today, is significantly similar to that of our ancestors of 4 000 or 6 000 years ago?

Let me again quote what I have, in this regard, written elsewhere:

> *Why should it be morally required of us to maintain and preserve human nature as we currently know it, at all costs?* ... if we are to elevate "human nature" to the level of something that we are morally obliged to preserve at all costs, bear in mind that we are then compelled to accept and preserve the reality of human nature "warts and all"! Human nature, after all, is not only that which manifests itself in our ultimate human and moral role models, such as Jesus, Mohammed, Mother Theresa and Nelson Mandela. Part of the fabric of "human nature" is, unfortunately, also the likes of Stalin, Hitler and Jack the Ripper. If we believe that "human nature" is to be preserved in its current spectrum of varieties, they/these possibilities are part of the baggage we wilfully have to take on board for a proper understanding of all aspects of "human nature" (Van Niekerk 2014:123-124).

9. Conclusion

What, then, is in store for "a future ethics" if the developments alluded to earlier actually come to fruition? There is only space for a few brief remarks. Firstly, ethics as the outcome of reflection about the difference between right and wrong will become more important than ever. Knowledge, science and technology are not value-free, and this will not change in the future. What will be unusual, is the emergence and prevalence of life-forms or machines

imitating life forms and that are capable of harmful behaviour if not well controlled. The control exerted over these phenomena to prevent harm will become an ever-increasing part of the ethics of the future. What will or ought not to change, is the intuition that the most important category of ethics is responsibility. The Fourth Industrial Revolution is essentially a reflection of the growth of our power over nature and society. More power must mean the acceptance of a more developed and more focused sense of responsibility. One would also hope that the manifest extension of the spheres of influence that the Fourth Industrial Revolution might open up will generate a more open and pronounced public discourse and debate about the direction we wish to steer with the help of these new developments. This in particular also pertains to how the benefits of the Fourth Industrial Revolution will be distributed in society amongst all who can benefit from them.

A heightened sense of responsibility is, finally, the most important disposition that comes to mind when one reflects on the alleged "place of Christian ethics" in such a new world. Two meanings can be attached to the notion of "Christian ethics". The first is a moral code and set of prescriptions that are directly derived from the Bible. If this is what "Christian ethics" amounts to, I have little hope for its survival or development. The Bible is a document that originated in cultural contexts that have no understanding of the lifeworld of people living in something like the Fourth Industrial Revolution.

"Christian ethics" could, however, have a second meaning. That is the call to thrive in the freedom which God enabled us to inherit as the result of the recreation of the world that is facilitated by the redemptive work of Christ as God's essential self-revelation and humanity's redeemer. Here the key is, as always in ethics, the adoption of a sense of responsibility, driven by a sustained vision of a humanised world. How we should live and what we should do in the future is not something to be intuited by handling the Bible as a source of moral oracles that reflect no insight into the demands of our time. How to live and what to do is the outcome of thinking for and acting by ourselves, thereby pursuing the vision of a new heaven and new earth that will eventually merge, and that we will inhabit on the basis of whatever forms of knowledge and technology that we find possible to utilise and develop responsibly.

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Chapter 7

Towards transforming university pedagogy and curricula for the Fourth Industrial Revolution

Francois Strydom & Heinrich Prinsloo

1. Introduction

The disruptive effect of the Fourth Industrial Revolution and technology requires Higher Education to change and adapt to a fast-changing world. Technology has made Higher Education more accessible to people across the globe, which in turn created new challenges and disruptions across educational fields and disciplines. Students have access to Higher Education resources with countless possibilities in terms of flexibility, methodologies and approaches. They can complete university degrees through the help of resources never available before. Some of these resources include artificial intelligence that assists students to write and argue topics through its assistance of predictive text, web-based access to endless amounts of e-books, journals and articles and downloadable videos of recorded lectures from institutions across the globe covering an array of topics.

Technology also affects how we work, learn and live. It is also disrupting, compelling, driving and innovating Higher Education in powerful and unpredictable ways. How Higher Education responds, approaches and disseminates the challenges brought forth by the future world of the Fourth Industrial Revolution, and especially its emphasis on technology, is a crucial and pivotal point. One of the many challenges is the inevitable and continued change that universities are and will be faced with. What will the university of the future look like, what will its students look like and how will the realities of the Fourth Industrial Revolution transform curricula and pedagogies?

In a world where Higher Education is regarded as one of the pivotal mechanisms by which the world and community are prepared for the workforce, the Fourth Industrial Revolution brings (especially in how it predicts the use of automation and artificial intelligence) new challenges to the future purpose of universities. The ways in which curricula and pedagogies are shaped and formed must provide meaningful and sustainable solutions through sound research and applicable theoretical approaches.

According to Gleason (2018:5), Higher Education institutions were predominantly intended to prepare students and communities to "meet the needs of past industrial revolutions with mass production powered by electricity." This becomes very problematic as students and communities are not being optimally prepared for a world with greater automation. Universities are, therefore, faced with challenges to transform their curriculum and pedagogies to prepare students to face the ever-growing list of challenges that the Fourth Industrial Revolution will bring. How universities scale, implement and adapt curriculum and pedagogical approaches to develop higher-order thinking skills that would enable students and communities to continuously grow and learn, is thus important.

2. The impact of emerging technology on Higher Education

The use of technology is not something new, especially not in the Higher Education context. Research shows significant emphasis on the adoption of educational technology over the last decade (Alexander et al. 2019; Flavin 2012; Johnson et al. 2015). The impact of emerging technologies used in Higher Education is often described as being disruptive (Anderson & McGreal 2012). Several emerging technologies have done just this; they have disrupted the way we learn and teach. As an example, social networks have completely changed the way students engage with one another on a social level. Technologies are changing the way we interact with students and how we learn and teach. The disruptive impact on how we learn and teach will invariably have an impact on how we learn and train people in the workplace.

The Fourth Industrial Revolution is a concept that is intricately linked to emerging technologies. It is described as a movement which will change and "shape the future of education, gender and work" (Gleason 2018:207). Emerging technologies are widely described as the vehicle or driving force

behind what gives the Fourth Industrial Revolution its momentum. We should not handle the realities surrounding the Fourth Industrial Revolution without considering the history of the First, Second and Third Industrial Revolutions and how education in general adapted and responded to each of these in the past. Most literature contextualises the First, Second and Third Industrial Revolutions predominantly within American, German, and European contexts.

2.1 The First Industrial Revolution (1770–1860)

The First Industrial Revolution caused a more diverse approach to Higher Education. Selection and various options were introduced, providing students with a diversity of courses. Overall adoption of the German model, especially in terms of research, occurred, which saw a global rise of universities. Research and development were developed in most American universities by using the German and predominant European models, focusing mainly on developing graduate programmes and research centres in engineering, medicine and natural sciences (Gleason 2018; Niosi 1999).

2.2 The Second Industrial Revolution (1860–1900)

The Second Industrial Revolution was caused by an era of emerging manufacturing technologies through the use of electricity. This era saw an increase in access to Higher Education, especially in Europe and the United States. Students of institutions were described as the "industrial class" and institutions predominantly aimed at creating newly trained technicians and engineers. Institutions like Stanford University (1885) greatly benefitted from the Second Industrial Revolution as they were constituted as a result of "new industries such as railroads, oil and steel" (Gleason 2018:218). The rise of educational institutions and new curricula across the world provided economic expansion and manufacturing capacity at a rate previously unachievable. This, in turn, caused Higher Education to further development research-driven initiatives across the world.

2.3 The Third Industrial Revolution (1980–1990)

The Third Industrial Revolution is characterised as an era during which computerisation and web-based interconnectivity as emerging technologies were

adopted widely. Most of this innovation and applications are only reaching its impact in some countries today causing widespread speculation on whether some countries are ready to embrace the Fourth Industrial Revolution. Higher Education especially has seen wide adoption of web-based connectivity and computerisation. Across the world access to Higher Education is observed as increasing at a high scale. One of the biggest developments in Higher Education is the use of online and blended learning modes of delivery. The 2012 phenomenon of Massive Open Online Courses (MOOCs) attests to Higher Education being more open and accessible across the world than ever before. Online, tech-enabled learning is seeing increased growth, but Reeves (2015) warns that research and development in the last few decades are lacking, especially in terms of potential shortfalls that emerging technologies bring to Higher Education.

3. Higher Education in the Fourth Industrial Revolution

To analyse the impact of the Fourth Industrial Revolution on Higher Education we make use of a VUCA (volatility, uncertainty, complexity and ambiguity) analysis. The VUCA analysis approach was originally founded in a US military context to offer a method in dealing with new and challenging realities. Bennett and Lemoine (2014) indicate that this approach has been adopted more readily in the last decade, and Reeves (2015) points to the use of this approach in Higher Education. In this chapter, we consider the implications of the three core drivers of 21st-century Higher Education, namely quality, performance and accountability through the lenses of VUCA. Having explored the implications in this regard, the chapter will share a strategic approach to navigate the complexities of a VUCA future, Higher Education drivers and the new complex South African learning and teaching environment.

3.1 Volatility and educational quality

In a VUCA analysis, "volatility" refers to what is unstable and unknown. The disruptive impact of technology means that all aspects of quality education are influenced. Furthermore, the complexity of quality Higher Education in the 21st century has increased as is shown by the discussion below.

Ruben (2017) indicates that demands such as rising tuition costs, pressures from the world of work, political uncertainty, and poor preparation by secondary school systems of entering students contribute to uncertainty regarding quality. The South African context poses additional challenges:

- A shortage of educational infrastructure and the high cost of resources, accompanied by socio-economic injustices and inequalities of the past, are but some of the issues faced by South African education institutions (Taylor & Yu 2009; World Economic Forum [WEF] 2018).
- The World Economic Forum report, which looked at the overall quality of various country's education system, placed South Africa "137th out of 139 countries" (Baller, Dutta & Lavin 2016:232).

3.2 Uncertainty and educational performance

The volatility around education quality has a direct implication for the performance of Higher Education Institutions. A continuous discussion is taking place on the criteria, standards and expectations of Higher Education. New approaches to performance have started to focus on "access, participation and opportunities for success, for all students, across all types of institutions, and the collective impact and benefit of tertiary education on and for society" (Hazelkorn, Coates & McCormick 2018:7). Higher Education Institutions need to create campus environments that maximise students' chances of success through the development of employable skills by transforming their pedagogical approaches and curricula.

3.3 Complexity and accountability

The interplay between quality and performance demands on Higher Education Institutions is further complicated by the demands of multiple stakeholders. These stakeholders include students, lecturers, parents, governments, employers and communities. South African curricula must consider the demands of professional and statutory bodies, but also critically engage with decolonisation. Pedagogical innovation is thus necessary, focusing on how face-to-face class time and use of technology online may be blended in teaching and learning practices. It is also critical to consider how universal design principles may be used to create inclusive learning spaces.

3.4 Ambiguity and developing citizens for a future world

Bennett and Lemoine (2014) describe ambiguity as a situation where there is doubt about cause-and-effect relationships. The disruptive impact of technology on all aspects of Higher Education and society makes it difficult to predict the competencies, skills and values needed in the future. Therefore Higher Education needs to reflect carefully about which attributes it needs to develop in the graduates it produces. These graduates will have to be able to deal with the volatility, uncertainty and complexity of a world where the cause-and-effect relationships are continuously changing.

4. An approach to designing teaching and learning for the future

In the light of the complex interplay between volatility, uncertainty, complexity and ambiguity (VUCA), as well the implications of all of this on quality, performance and accountability we would like to share a strategic approach to position South African institutions influenced by the Fourth Industrial Revolution. It is based on environmental scanning and benchmarking as well as a careful reflection on challenges faced in the context of a South African institution. The external environmental scan included analyses of the EDUCAUSE reports from 2011–2019, as well as learning and teaching strategies of selected international institutions. The national perspective scan and benchmarking included analyses of teaching and learning strategies of five peer universities, as well as consideration of relevant national policies and frameworks. From an institutional perspective, the environmental scanning needs to include strategic plans, strategy documents and plans, as well as institutional data and faculty learning and teaching strategies.

4.1 Philosophy of learning and teaching

Kravchenko and Kyzymenko (2019) emphasise that the Fourth Industrial Revolution and its effects must be approached through a multifaceted analysis of socio-philosophical, philosophical and anthropological issues with ethical considerations to ensure that universities innovate in such a way that responsibility and quality dominate. Therefore, a highlighted strategic approach needs to highlight philosophical assumptions or beliefs about learning and

teaching underpinning this strategy, namely, learning-centeredness, caring, inclusiveness, flexibility and quality.

4.1.1 Learning is at the heart of a university

Learning has always been at the heart of universities' existence. Both research and teaching are focused on learning. Academics learn by means of research by using specific methods and criteria, whereas 21st-century teaching is focused on facilitating the learning of students, using specific methods, media and criteria (Light, Cox & Calkins 2009).

A focus on learning differs significantly from a focus on teaching. From the early 1990s, several authors have highlighted a paradigm shift in Higher Education pedagogy (Fink 2013), one from a teaching (or an instruction-centred) paradigm to a learning-centred paradigm. In the early 2000s this led to learner- or student-centred teaching approaches (Weimer 2002). More recent research has highlighted that student-centred teaching is problematic in the context of a developing country due to barriers experienced in human resource capacity, material resources capacity, diverse cultural interactions, questions around how authority and agency of staff and students shift in the process, and the perennial problems of implementing reform (Schweisfurth 2011). Some researchers have proposed that a learning focus can help to resolve the tensions between teacher and learner paradigms (Kirschner 2018).

Table 1 illustrates how a learning-centred approach helps to integrate the teacher- and learner-centred approaches.

Table 1: Comparing teacher-, student-, and learning-centred teaching

	Teacher-centred	Student-centred	Learning-centred
Learning approach	Teacher-centred	A learner-centred approach aimed at individual study and collaboration through ICT	Graduate attributes (learning outcomes) and assessment determine flexible learning experiences needed
Teaching assumption	Teaching requires expertise	Teaching requires considerable training and is complex	Teaching is complex and requires considerable training as well as enabling environments

	Teacher-centred	Student-centred	Learning-centred
Lecturer purpose	The lecturer lectures her/his subject and is focused on classifying and sorting students	The lecturer coaches and facilitates (guides on the side) and is focused on developing students' competencies and talents	The lecturer designs material and experiences that actively engage students in learning and facilitate knowledge, skills and attitude development
Student	Passively filled with knowledge	Actively discovers, constructs and transforms knowledge	The learner as a motivated individual
Responsibility for learning	The student expects that the teacher knows and controls	The student has responsibility for self-direction and relies on the teacher when necessary	Alternation between control and self-responsibility
Learning design	Focused on identification, definition and memorisation (lower-order skills)	Focused on metacognitive skills like information search, communication, collaboration (higher-order skills)	Universal design focusing on understanding students, as well as facilitating learning and knowledge transfer focused on definition, identification, and memorisation of lower and higher order metacognitive skills
Assessment	Norm-referenced (grading on the curve); multiple-choice questions and end of course student ratings are typically used	Criterion-referenced (grading to predefined standards); portfolios, performances and continuous assessment methods of teaching are typically used	Blend of formative and summative assessment focused on attaining defined learning outcomes

	Teacher-centred	Student-centred	Learning-centred
Technology use	Typically used for practice and drill purposes, textbook and chalk-and-talk substitution	Problem-solving, communication, collaboration, information access, expression	Technology enables a flexible learning environment enabling various types of learning in various contexts
Knowledge	Transferred from academics to students	Jointly constructed by students and academics	Blend of transfer and construction between students and academics
Power	The lecturer conceptualises the learning outcomes and criteria	The students decide on their own learning outcomes and criteria	Together the lecturer and students decide what the learning outcomes and criteria will be based on societal and practical experiences
Climate	Traditional and cultural uniformity	Cultural diversity, variety, personal esteem and commonality	Diversity (cultural, etc.), inclusivity, personal esteem, and commonality

Source: Adapted from Kirschner (2018) and Campbell and Smith (1997, in Fink 2013:22).

4.1.2 Caring as key to learning, understanding and empowerment

For effective learning and teaching, it is essential to create an environment for staff and students where they feel cared for but to also sustain democracy (Swartz, Gachago & Belford 2018; Tronto 2018). Letseka (2012:57) argues that "*Ubuntu* reveres human life, dignity, respect, caring and compassion". Studies in Higher Education indicate that the focus on caring and sharing in *ubuntu* transcends ethnocentric notions of uniqueness. Therefore, learning and teaching at an institution will be empowering if it is based on caring, dignity, respect, and compassion for students and staff.

4.1.3 Inclusivity to embrace diversity and to create a sense of belonging

Designing for inclusivity and accessibility is at the heart of Universal Design for Learning (UDL). UDL is a design method that prioritises this and emphasises designing teaching and learning for people at the margins, in this way making it better for all students (Rhodes Barone & Dean n.d.). UDL was initially developed for students with disabilities (students at the margins) but has developed into a mainstream approach for curriculum design and learning and teaching to create learning environments embracing the diversity that students bring to universities and that assists them to thrive. In addition, UDL principles align well with a learning-centred approach (Al-Azawei Serenelli & Lundqvist 2016). Therefore, a learning and teaching approach that is based on UDL principles can create inclusive learning environments (face-to-face or digitally) that both embrace diversity and create a sense of belonging.

4.1.4 Flexibility to enable resilience and adaptability

Research on class attendance highlighted that class attendance is affected by many factors ranging from socio-economic challenges (money for travel vs. money for food) to concerns regarding the quality of teaching, to individual learning preferences that are not aligned with a lecturer's (Centre for Teaching and Learning [CTL] 2018c). In light of these challenges, the report recommends the development of a blended (hybrid) learning environment that makes use of innovative course design, creating a flexible learning environment where students have flexibility in how, where and when they learn. The Department of Higher Education and Training (DHET) defines "blended learning" as "the provision of structured learning opportunities using a combination of contact, distance, and/or Information and Communications Technology (ICT), supported by opportunities to suit different purposes, audiences, and contexts" (DHET 2014). In developing a flexible, blended learning environment the institution gives students resources, creates resilience and allows them to learn at different times in different ways. Furthermore, the learning and teaching environment should be adaptable in the face of interruptions to the academic programme (such as political disruptions and load shedding). The main challenge, however, to implementing this model is the excessive cost of data.

4.1.5 Quality, which embraces evidence, innovation, and excellence

In 2004, the Higher Education Quality Committee (HEQC) described quality in education employing a framework based on national goals, priorities and targets and conceptualised it as transformative, purposeful and monetary valuable (Lange & Strydom 2018). Although this conceptualisation still holds, changes in the global and local environment require a much greater emphasis on the use of evidence. More specifically, the use of data analytics is necessary to understand how students think, behave and learn, as well as what they are able to do after completing their qualifications (Kuh et al. 2015; Strydom, Kuh & Loots 2017). The performance and accountability pressures around delivering more graduates that are employable is a global reality. Therefore, a focus on quality in learning has to embrace evidence (data and data analytics), as well as innovative curriculum and learning design to enable the UFS to offer a learning experience that provides graduates with value for money, but also with a transformative experience. To achieve excellence in learning and teaching will require a commitment to continuous improvement and research (i.e. the Scholarship of Teaching and Learning, SoTL).

Having explored philosophical beliefs and assumptions of a strategic approach to teaching and learning, the focus moves toward the strategic priorities that institutions should consider when positioning teaching and learning in a Fourth Industrial Revolution context. There priorities are aimed at addressing the drivers of quality, performance, and accountability through the use of, among other, technology as well as data analytics.

4.2 Strategic priorities

4.2.1 Fostering the development of graduate attributes

With the rise of the Fourth Industrial Revolution, the onus is on Higher Education Institutions to produce employable, work-ready graduates (Barrie 2006; Butler-Adam 2018; De la Harpe & David 2012; Griesel & Parker 2009; Soffel 2016). One way to articulate the contribution that graduates can make in the workplace is through graduate attributes. Graduate attributes are the description of qualities that are developed through the acquisition of a university degree and are seen internationally as one of Higher Education's critical

outcomes (Barrie 2006; De la Harpe & David 2013). More universities are moving towards the clarification of the quality of the education they provide. In this regard they refer to the necessary skills, knowledge and characteristics that graduates will be able to demonstrate, beyond their studies, in order to manage employability in a rapidly changing world, thus requiring attributes that are supplemental to, and extend beyond, disciplinary knowledge (Barrie 2007; Coetzee 2014; De la Harpe & David 2013; Griesel & Parker 2009). Therefore, the development of graduate attributes at the UFS is paramount for positioning the institution and its graduates uniquely in both the South African context and globally. Furthermore, the definition and assessment of graduate attributes will serve as a measure for how these skills can be developed at an institution, and at which level these skills are offered throughout an undergraduate programme. The purpose of clear and implementable graduate attributes to enhance graduate employability and position students in the job market in a manner that makes them stand out. Such graduate attributes need to be developed in integrated ways that are mutually reinforcing. International best practice shows that leading universities use an evidence-based approach, which includes assessments within disciplines to develop these attributes (Jankowski & Marshall 2017). This approach allows graduate attributes to further enhance the quality of undergraduate education.

Recommended graduate attributes for students

The World Economic Forum identifies the following specific foundational core skills that underpin graduate attributes: literacy, numeracy, scientific literacy, ICT literacy, financial literacy, and cultural and civic literacy (Soffel 2016). For example, at the UFS these skills are learnt through foundation courses (academic literacy, lifelong learning skills, and mathematical literacy), UFS101 (first-year seminar module), and other faculty-specific courses. Building on this foundation work, Table 2 provides the updated eight UFS graduate attributes.

Table 2: Proposed attributes with definitions

Attribute	Definition
Academic competence	Academic competence refers to the knowledge, skills and attitudes (including values) that students develop through their interaction with discipline-specific content. Critical to academic competence is lifelong learning, which is an all-purposeful learning activity undertaken on an ongoing basis to improve knowledge, skills and competence. Lifelong learners are curious, take initiative, learn independently, transfer knowledge, and reflect on their learning.
Critical thinking	Critical thinking is a habit of mind characterised by the comprehensive exploration of issues, ideas, artefacts and events before accepting or formulating an opinion or conclusion.
Problem-solving	Problem-solving is the process of designing, evaluating and implementing a strategy to answer an open-ended question or achieve a desired goal.
Oral communication	Oral communication is a prepared, purposeful presentation designed to increase knowledge, to foster understanding, or to promote change in the listeners' attitudes, values, beliefs, or behaviours.
Written communication	Written communication is the development and expression of ideas in writing. Written communication involves learning to work in many genres and styles. It can involve working with many different writing technologies and mixing texts, data and images. Written communication abilities develop through iterative experiences across the curriculum.
Community engagement	Community engagement is working to make a difference in the community life of our communities and developing the combination of knowledge, skills, values and motivation to make that difference. It means promoting the quality of life in a community, through both political and non-political processes. In addition, community engagement encompasses actions wherein individuals participate in activities of personal and public concern that are both individually life enriching and socially beneficial to the community. Finally, community engagement includes an understanding of the social and cultural diversity in our country, whereby students value and respect different cultures and are able to analyse and solve problems with people from different backgrounds and cultures.

Attribute	Definition
Ethical reasoning	Ethical reasoning is reasoning about right and wrong human conduct. It requires students to be able to assess their ethical values and the social context of problems, recognise ethical issues in a variety of settings, think about how different ethical perspectives might be applied to ethical dilemmas and consider the ramifications of alternative actions. Students' ethical self-identity evolves as they practise ethical decision-making skills and learn how to describe and analyse positions on ethical issues (Association of American Colleges and Universities [AAC&U] 2010).
Entrepreneurial mind-set	Entrepreneurial mind-set is the set of attitudes, skills and behaviours that students need to succeed academically, personally and professionally. These include initiative and self-direction (leadership), risk-taking, flexibility and adaptability, creativity and innovation, critical thinking and problem-solving. Other definitions include the ability to see opportunities, marshal resources and create value. An entrepreneurial mindset applies to all spheres of life. It enables citizens to nurture their personal development, to actively contribute to social development, to enter the job market as an employee or as self-employed, and to start-up or scale-up ventures which may have a cultural, social or commercial motive.

Source: Network for Teaching Entrepreneurship (https://www.nfte.com/entrepreneurial-mindset/); Bacigalupo et al. 2016; Yorke & Knight 2006.

Student learning and success as the focal point

Expanding accessibility to Higher Education Institutions and increasing students' chances of success are two of the critical challenges facing global Higher Education (Kinzie & Kuh 2017; Strydom et al. 2017). At the UFS, a student success strategy adopted the following definition of student success: "Growing numbers of graduates with diverse backgrounds (while decreasing achievement gaps) participating in high-quality learning that results in personally, professionally and socially valuable attributes" (CTL 2018b:2). This definition focuses on not only increasing the number of graduates but also reducing historic and contemporary achievement gaps between different races and genders. It also commits the institution to provide high-quality learning, enabling students to develop graduate attributes that will improve

their chances of employment and enabling them to add valuable contributions in developing as democratic citizens of South Africa (CTL 2018b).

The UFS success strategy commits the university to the following primary drivers of success:

- Development of a comprehensive, integrated approach to student success: All responsible stakeholders should streamline their efforts to enable student success through curricular and co-curricular activities. This strategy requires the identification and termination of isolated, disorganised, or boutique programmes, thus bringing together efforts and different stakeholders to ensure collaborative efforts.
- Implementation of literature-informed, empirically-based approaches to student intake, learning, success, transition, and the assessment of learning outcomes, ensuring effectiveness and quality.
- Developing a cultural system of student success between different centres, departments, units institutionally and between post-school stakeholders such as schools, universities, Technical Vocational Education and Training (TVET) and community colleges, the provincial government, and employers.
- Application of clear pathways monitoring student learning, success and completion through real-time data systems and analysis to identify at-risk students.
- Enactment of a student success mindset encapsulating an asset-based narrative within institutional and student belief in talent development.

Curriculum responsiveness

A critical challenge faced by South African Higher Education Institutions is the challenge of transforming the curriculum (Lange 2017). A curriculum can be defined as consisting of different parts: the explicit curriculum, for example, reading, assessments and practicals; the hidden curriculum, which is the dominant university values and culture; and the null curriculum, which is what a university chooses to leave out of the curriculum (Le Grange 2016). Calls for the decolonisation of the curriculum during the #FeesMustFall protests highlighted how students questioned what they are learning and how it related to them and their context. Therefore, curriculum transformation

requires the careful exploration of "the relationship between curriculum, knowledge and identity" (Lange 2017). Mbembe (2015) indicates that a transformed curriculum can help to create a university characterised by universal inclusion and radical sharing, otherwise known as a non-racial university. Le Grange (2016:6) indicated that decolonisation "does not necessarily involve destroying Western knowledge but decentring it or perhaps deterritorialising it (making it something other than what it is)." Building on the notion of *ubuntu* and the work of Chilisa (2012), Higher Education suggests that a decolonised curriculum should be based on the Fourth Industrial Revolution, namely:

- **Relational accountability**: All parts of the curriculum (explicit, hidden and null) are connected and has to be related to the South African context.
- **Respectful representation**: The curriculum needs to create opportunities for indigenous people to raise their voices and share their knowledge. They should also have the opportunity to be acknowledged, for example, by the inclusion of researchers from Africa and other developing contexts.
- **Reciprocal appropriation**: Universities, and more specifically academics, need to ensure that learning, teaching, and research further the development of society.
- **Rights and regulation**: Ethical protocols need to be observed by academics to ensure that the indigenous people are acknowledged for their knowledge ownership (where appropriate) and attribution.

Other demands on the curriculum include that it should promote inclusivity and enhance the academic success and employability of students while developing them as responsible citizens that can contribute to society. The integration of UDL principles in curriculum renewal is essential to promote inclusivity and an awareness of diversity. The intentional integration of graduate attributes at the programme and module level will furthermore help to promote employability. A curriculum renewal processes must involve representatives from industry, as well as students and business advisory boards.

Flexible learning and teaching design

Developing a blended (hybrid) learning environment that makes use of innovative course design to create a flexible learning environment where students can learn in different ways at different times, is critical to ensure that

graduates are equipped with the necessary digital literacy skills that they need to succeed in the 21st-century work environment. Therefore, the adoption of a blended learning model where face-to-face class time and educational technology-enhanced learning and teaching methods are integrated is strongly encouraged. Blended learning is an internationally recognised learning and teaching approach that, if implemented effectively, has been proven empirically to increase academic achievement and student engagement. The following are identified as key principles of effective blended learning design:

- Blended learning should support and enable outcomes-based learning through backward course design.
- Instructional methods should integrate face-to-face and technological approaches in a meaningful way, taking into account both the type of content and the pedagogical affordances of available educational technology.
- Courses should be designed using a UDL framework, accommodating diverse students by incorporating design for different learning needs.
- Both face-to-face and educational technology components should be integrated into a comprehensive whole, as opposed to standalone, disconnected segments.
- Effective blended learning design, in a South African Higher Education context, requires instructional approaches resilient enough to hold in times of disruption.
- Academics should be adequately skilled to enable effective blended learning course design, while students should have the necessary skills to navigate both technological and face-to-face components of their courses successfully (Meintjes 2018:56-57).

Institutions have a responsibility to provide a learning and teaching environment that includes both physical learning spaces and infrastructure enabling flexible learning and teaching design. This should also take account of the provisioning of appropriate educational technologies.

Empowering academics for the 21st century teaching

Academics are expected to balance their role as disciplinary experts and researchers with their role as university teachers. These roles are equally important and should both be developed, incentivised, and rewarded (DHET 2018; Kamel 2016; Sorcinelli et al. 2005; Subbaye 2018). University structures should be in place to strengthen university teaching through appropriate professional development opportunities and reward systems for excellent teaching. In line with the framework for enhancing academics as university teachers (DHET 2018) an institution should prioritise the following in order to empower academics for university teaching:

- **Enable continuous professional development (CPD) for university teachers**: This includes, but is not limited to, development opportunities for academics to learn the necessary skills to effectively design their courses and use blended learning approaches. Also, academics should have opportunities to develop a sound understanding of curriculum decolonisation and be equipped to be effective teachers in the Fourth Industrial Revolution.
- **Establish and maintain university teacher development structures, organisations and resources**: Institutions should maintain centralised structures that prioritise the professional development of academics (such as a Centre for Teaching and Learning and the Human Resources Department), as well as decentralised structures (such as faculty-based teaching and learning offices).
- **Ensure that academics are recognised and rewarded for the work that they do as university teachers**: Good quality university teaching should be incentivised and rewarded through both support and recognition. This should be reflected in university promotion and performance management policies. In addition, awards systems such as the annual teaching and learning excellence awards should be maintained and promoted on an institutional level.
- **Advance university teaching through leadership development**: Initiatives that are aimed at developing leadership qualities, such as the Academic Leadership Programme, should be in place for both academic staff and professional staff who support learning and teaching.

- **Promote knowledge production and knowledge sharing about university learning and teaching**: The institution should encourage and give an opportunity for research on learning and teaching. In addition, forums should be available at which knowledge of learning and teaching can be shared. The development of capacity for researching learning and teaching should be prioritised.
- **Develop expectations of academics in their role as university teachers**: Expectations for academics' role as university teachers should be clarified and stipulated in institutional documents such as employment contracts, performance management plans, and the workload model. Teaching should also be regularly evaluated through self, student, and peer review mechanisms.

Quality-focused, research-led learning and teaching

As indicated earlier, quality is one of the central drivers ensuring universities' survival in the 21st century (Hazelkorn, Coates & McCormick 2018). Quality in teaching and learning has increasingly become focused on the evidence that helps us to understand how students think, behave and learn, as well as what they are able to do upon completion of their Higher Education qualifications (Coates 2014; Kuh et al. 2015). The evidence (qualitative and quantitative) is generated through institutional data warehouses, an early warning system, a student tracking system, as well as surveys and teaching and course/module-level evaluation forms. Data analytics in Higher Education enhances such an evidence-based focus. Individual feedback can be given to students on how they are progressing and necessary support systems can be implemented by using student data to develop algorithms and software solutions. (Parnell et al. 2018). The impact of both data analytics, course/module evaluations and other evidence depends on scholarly teaching and the SoTL:

> Scholarly teaching is grounded in critical reflection using systematically and strategically gathered evidence, related and explained by well-reasoned theory and philosophical understanding, with the goal of maximizing learning through effective teaching (Potter & Kustra 2011:3).

Whereas SoTL is

> the systematic study of teaching and learning, using established or validated criteria of scholarship, to understand how teaching (beliefs, behaviours, attitudes, and values) can maximize learning, and/or develop a more accurate understanding of learning, resulting in products that are publicly shared for critique and use by an appropriate community (Potter & Kustra 2011:2).

Internationally, the importance of strong institutional quality assurance systems is critical if one wishes to develop a culture of quality that can engage with national regulatory systems (King 2018). Therefore, institutions need to ensure the development of well-aligned quality assurance systems (CTL 2018a).

5. Conclusion

Our reflection on VUCA as well as the need for quality, performance and accountability raises the age-old question, namely: What is the role of universities, especially curricula and pedagogy, in creating a better 21st-century society? Using the new UFS learning and teaching strategy we illustrated that philosophical assumptions need to inform thinking about curricula and pedagogy as well as the strategic priorities that should be focused on to position a university in the Fourth Industrial Revolution in South Africa. A university that can meet the challenges of a new industrial revolution will need to be characterised by agility, research, repositioning and experimentation. Agility is needed to promote quality through the redirection of resources to adapt quickly to a changing learning and teaching environment. Research is needed to better understand how technology and data can be leveraged to improve student success and other university performance outputs. Universities need to reposition themselves to meet the accountability demands of various stakeholders. This will require creating new offerings and developing new platforms promoting constructive interaction between the institutions and their stakeholders. Finally, universities should embrace experimentation that will allow them to better address the ambiguities faced in a complex Fourth Industrial Revolution. This will allow them to keep creating pedagogical environments that maximise human development and the ability to create a better future society.

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Chapter 8

Embracing the Fourth Industrial Revolution: Adaptive changes for sustainable distance theological education

Marilyn Naidoo

1. Introduction

In this 21st century, the Fourth Industrial Revolution speaks of fundamental change and has brought radical and far-reaching transformation to the Higher Education landscape. Currently, there are millions of people connected by various devices "with unprecedented processing power, storage capacity, and access to knowledge" (Salmon 2019:96) which will be all-important for knowledge creation and learning. At the same time, digital concepts of networks, connectedness, collaboration and community are transforming our society. This rapid expansion is overwhelming as the changes needed seem beyond control. Within Higher Education itself, there are many challenges that involve student fees and access, institutional redress, funding, diversity and the like. To arise above this noise to consider the digital impacts on education requires energy, as what we are experiencing is so different in terms of the complexity of developments. Nevertheless, in this chapter, I reflect on the impact of the digital revolution on ministerial training and how it not only confronts theological education's fundamental approaches to learning but also raises issues of how we are becoming in the process. As Hefner states (2003:4), "[T]here is a tension between technology as the enemy of nature and technology as the pivotal point in the process of making ourselves into a new being." We are quietly but certainly being shaped by the technology, "so not only how we teach will change but the people preparing for religious leadership will be shaped by the technology itself" (Hess 2005:31).

We take note that while organisations in the broader society have embraced the new technological teaching tools, in our context, religious institutions have struggled to do the same. Theological institutions are not known to lead in terms of technology and are facing the promise and challenge of moving into the digital age. The challenge of the financial viability of theological education is a real one, and institutions react by quickly moving to distance education or adding online courses without considering the nature of learning (Naidoo 2012:4). This has resulted in the tendency to be like everyone. Some consideration will have to be made of the nature of this Fourth Industrial Revolution and the adaptive changes that are needed, exploring uncertainty with curiosity and challenging deeply held assumptions.

In this chapter, as a practical theologian, I pay close attention to the distinctive contextual and existential dimensions of experienced Christian faith. In attempting to describe and evaluate theological education there is a need to reflect theologically on the new, emerging phenomenon. This discussion has three parts: Firstly, it will make mention of the unique infrastructure challenges in our context. Secondly, considering the need for a holistic pedagogy when training ministers in a distance and online space, numerous reservations need to be reflected on, notwithstanding the formational impacts of technology on identity and relationships. Finally, to embrace the technology, critical adaptive changes are needed that require a shift to a constructivist pedagogy, while maximising on interpretative communities for integrated learning. To do this, educators will need capacity and professional development to enable leadership development. To engage this technological reality, some internal movement must be made to consider the benefits that technology can bring, while at the same time being critical of the discernible losses.

But firstly, to understand how to respond we need to locate ourselves in this epoch of cultural transformation and the developments of education in relation to the World Wide Web. We begin at the transmission stage where information was becoming available for consumption which then led to more students wanting to study and the rise of open universities through posted study material, radio and TV broadcasts and eventually video material. Twenty years later,

> Virtual Learning Environments/Learning Management Systems (VLE/LMS) came into being and educators started attempting to enhance

face-to-face learning with the Web. From around, 2005 web sites increasingly allowed and enabled people to interact and collaborate, also to create and contribute ideas and photos. It was called the "read-write" Web or Web 2.0 (Salmon 2019:98).

The significant shift from Web 1.0 to 2.0 was in the way technology was used and the start of the

> great democratization of the Web, reflecting the power to express opinion and to add to rather than just receive ... new platforms of all kinds emerged; blogs, wikis, sharing sites, music, images. Open Education Resources and crowd-contributed content-enabled different approaches to more accessible and/or free information and knowledge (Salmon 2019:99).

MOOCs (Massive Open Online Courseware) arrived and raised the potential of emerging online education. With these significant advances, issues of plagiarism and academic integrity arose from the volume of information in circulation. Developments then moved into semantics, the science of machine comprehension of text. The term "Semantic" or "Web 3.0" came into usage describing "applications which are capable of 'talking to' and exchanging data automatically between each other" (Berners-Lee, Hendler & Lassila 2001). This complex system of data that can be processed by machines gave way to "Web 4.0, known as the 'symbiotic web' which is a symbiosis between artificial and human intelligences and how they interact and gain experiences from each other" (Salmon 2019:100).

What the Fourth Industrial Revolution might mean for education, in general, has received less attention, although the implications are extensive and increase the demand for new skills and knowledge, including new ways of configuring education (Organisation for Economic Co-operation and Development [OECD] 2018). Butler-Adam (2018) states that the impact will be felt in terms of what universities can or should contribute to the advancement of artificial intelligence and its applications and how curricula and learning will need to change. Already we can note the complex idea of the Fourth Industrial Revolution with much long-term change predicted, which Higher Education will need to attend to and sustain.

Theological education will have to advance just as much in the use of technology and online teaching as in other academic disciplines. Stuart-Buttle (2013:65) submits that "the internet, used initially to augment distance learning, now belongs to the mainstream educational pedagogy, provision and practice". To resist or avoid because of fear of the unknown is counterproductive since we live in a media culture; it is the "water in which all of us swim" (Hess 2005:33). This time of technological change could be an opportune moment for deeper reflection on the enterprise of teaching and learning, instead of merely "adding on" to existing practice.

2. Contextual challenges in terms of the Fourth Industrial Revolution

Theological education has already seen significant changes locally and globally with the impact of globalisation, rationalisation and new accreditation standards. In the last decade with the recognition for the need for academic flexibility, there has been significant growth in distance theological education made possible by technology. Because social justice is a key motif in Higher Education, providing access to students to theological education is an important focus, thus creating widening and inclusive educational environments. Other institutions, more pragmatically, hope that offering distance theological education to an expanded market will boost their enrolment and stabilise their finances. At the same time, there are institutions that are unclear of a response; they recognise that the future lies in the digital world but because of the commitment and capacity, ignore it at their peril. Hulme and others insightfully remind us that some theological institutions are accountable to both Higher Education and the church, and hence to maintain a distinctive Christian mission while providing an educational experience is filled with tension and competing commitments (Hulme, Groom & Heltzel 2016:98).

Distance education in South Africa is offered in theological faculties at universities and Bible colleges and appears in the form of postal material, hybrid courses (blended learning) or fully online. For example, North-West University, a contact university, now has a Distance Learning Unit with considerable registrations and has recently improved teacher "presence" through its interactive whiteboard system. It provides distance theological

education to a large cohort of reformed students in a confessional mode. In terms of private providers,

> there are a growing number of smaller theological colleges, for example, the Baptist Theological College, with about 80 contact students, which previously did not offer distance education has now over 300 distance learning students (Naidoo 2019:3).

A leading actor in distance theological education is the University of South Africa (UNISA), categorised as a mega-university with its challenge of massification of education while also attending to the need to create customised learning environments. Theological education is offered as the academic study of theology. It takes place at the heart of Web 2.0 using the LMS called myUnisa based on software powered by SAKAI to host and manage online course delivery. Currently, myUnisa uses applications of email, Whatsapp messaging, podcasts, YouTube, Vodcasts (Skype) and cloud computing, together with e-portfolios and importantly asynchronous discussion forums which are an integrative focal point of each course. At the same time, UNISA is attempting to engage in the exploratory use of technologies of social software like Facebook and Twitter and the use of mobile learning. The first-year student experience is supported by MOOCs to transition into the UNISA study environment. UNISA has since 2014 developed an e-tutor model that provides online student support (Madiope & Govender 2015:48).

In our context, we have student populations whose inadequate access to technologies and infrastructure might appear to justify many institutions using "outdated and inadequate ontologies" (Coeckelbergh 2011:87). Part of the challenging in embracing technologies is the digital or knowledge divide, depending on the educational or the socio-economic level and the unequal access to and use of affordable high-speed internet connectivity and technology (Morgan-Klein & Osborne 2007). It also involves students not only having equal access to the learning space but shared power to shape its discourse and norms (Lester 2014:224). People who have the financial means already have access to technology and skills to use it, while the majority have no access and are therefore marginalised and unable to participate in an information-based economy. Concerns around digital inclusion, digital participation and digital literacy remain (Morgan-Klein & Osborne 2007),

with online and distance education having the potential to replicate existing inequalities unless measures are taken. Some students are from such homes that encounter a computer for the first time when they reach high school or even university (Makoe 2006:361). Others entering Higher Education are competent users of mobile phones and have excellent social networking skills acquired through experiential learning. In terms of the latter group, the irony is that the skills and capacities that students have are often not validated or in sync with institutional practices and policies, thus resulting in lost opportunities for engagement with students in learning with their own devices (Kilfoil 2015:2).

Using technology must acknowledge and "address different interlocking frameworks for change: infrastructure, attitude, staff development, support, sustainability and transferability" (Mabunda 2010:240). Infrastructure development of both hardware and software is also a costly requirement that local private theological institutions encounter as they do not receive government funding. However, resistance to embrace technology and change can be the greater obstacle. Many times, the challenge is focused "more on the people issues ... where the readiness of the organisation to accept change and the ability to create the necessary environment is lacking" (Stuart-Buttle 2013:70). Human issues have a much greater effect where educators feel overwhelmed with the pace of change and may not be able to adapt quickly to the required skills needed to use the technology. It is therefore understandable that there is a reluctance, while at the same time generational changes may distinguish the difference. Younger members of staff are what are known as "digital natives" who have grown up with technology and are comfortable with operating in a digital, mobile world. Older faculty may be "digital immigrants" (Prensky 2001) who learn to use and adapt to the new technologies, but they feel uneasy about the retooling required for teaching online. There are also the "digital aliens" who do not use the technology unless it is absolutely necessary (i.e. email for work) and believe that social media is divisive as it isolates and segregates people (O' Lynn 2018:81). These various positions of digital citizenship point to the user's understanding and use of the actual technology rather than how he or she behaves. Technological proficiency can be mastered but psychological factors, including the lack of familiarity, confidence or

interest will severely limit the genuine possibilities for online learning to occur (Stuart-Buttle 2013:47).

Considering how the World Wide Web had developed, the technology has moved from print material and videos to digital and mobile, and now moved to algorithms and artificial intelligence. In terms of the developments, we are very much located in the 2.0 Web and social media where students are no longer just "users", but can contribute to and draw upon knowledge, expertise and mentorship collectively. Traditionally distance education was merely about moving content online, very much in the transmission mode. We now understand distance education to mean using interactive pedagogy involving engaged learning and a collaborative community-learning approach. Hence using Web 2.0 for education means escorting students out of the relatively closed environments of the LMS into the open environment of the social web. The new culture of learning involves bringing together the massive information network while honouring and working within the structured environment with room for experimentation (Thomas & Brown 2011).

3. Ministerial training in the digital world

The changing landscape of theological education in recent years has caused church authorities to reconsider the product of theological education, that is quality leadership. Theological education should provide visionary leaders who can attend to the needs of the church and can deal with the social needs of our society.

Hence the growing emphasis on theological learning as ministerial formation, which involves a complex of attributes; a multi-faceted "activity involving critical thinking, the acquisition of knowledge, skills development, religious identity formation and the development of ministerial and spiritual maturity expected of church ministers" (Naidoo 2012:2). Here we find the ecclesiastical context alongside formal educational criteria, so that the "informative" can also become "deeply formative" (Groome 2002:588). Theological education is formative in that it engages and shapes people's lives, yet at the same time is sound in critical study and reflection. Critical to formation is the role of the educator as a mentor and facilitator, as opposed to being the academic

expert (Young & Lucas 1999:104). When a person participates in a formative community of learning, usually there is socialisation or transformation into the institution's worldview, values and norms. Since formation involves a process of becoming human (Smith 2009:70), "there is a fluidness in the goal of achieving maturity supported by theological anthropology and developmental theory" (Overend 2007:138).

The axiom "forms, informs and transforms" will be familiar to many Christian educators, yet how this is implemented in theological education is not always clear. Formation involves educating a minister in a holistic way, which is challenging enough in a contact setting, made more difficult by adding technology. How do we form ministers in the online environment with the social and intellectual isolation, the detachment that runs counter to Christian nurturing and formation? Some educators wonder if the online environment will not inevitably "depersonalize the learning process" (Kelsey 2002:3: Palka 2004); others are afraid it will "lead to a commodification of knowledge that can be shaped, manipulated, and programmed according to the taste of the individual" (Ravoi 2002:4). The concerns for educators vary from the practical ("I don't know how to do it") to the pedagogical ("How can I teach X to students who are not sitting in my classroom?") to personal ("I don't have time") to institutional ("We don't have the resources") to the social ("How can we form community if students aren't on campus?").

As Stuart-Buttle alerts us,

> in a digital culture of increasing individualism, free choice and self-determination, the reality is that distance and online theological education can be chosen and conducted in one's time, pace and place and obtained from a provider who is no longer a local institution but a distant or virtual service (Stuart-Buttle 2013:33).

The criticism has been that distance education is driven by pragmatics, using technology indiscriminately without considering the theological issues, like embodiment for example. Some scholars state that formation must "include bodily presence, rooted in the sacramental consciousness that appreciates the embodied nature of Christian life" (Kelsey 2002:6), consistent with theological anthropology where human beings are viewed "as personal bodies whose material body is affirmed by the creation and incarnation" (Stache 2014:285).

There have been issues around the challenge to provide a community of learning or the pedagogical argument "'this does not meet our standards for good or appropriate pedagogy', to the sociological argument 'there is a set of social dynamics that cannot be captured in this medium'" (Naidoo 2012:8).

Concerns about the legitimacy of the formational potential are valid, but the issues have moved on to "the quality of content rather than the quality of delivery" (Killacky 2011:167). Innovative approaches in the distance space "are linked with improved learner engagement and educational experience" (Stuart-Buttle 2013:62). "Multimedia content and e-learning design are said to create participative and collaborative opportunities as well as fostering personalised and self-directed learning" (Gin et al. 2019). Educators now indicated that "community can occur in an online context and that the social interaction of presence can replicate the face-to-face human interaction of traditional course offerings" (Delamarter 2014; Nysse 2011).

Because theological education includes both knowing and understanding Christian tradition, it speaks to personal and collective human experience within a critical search for meaning. Theological education, in this approach, takes up a more dialectical position engaging dialogue with the Christian tradition, past, present and future together with the community and wider world. As distance learning has become a part of the landscape of theological education and adapts to technological and social change, the focus, it is felt, should be reframed and considered from the view of the positive gains that are found in virtual interaction (Delemarter 2014:140). The issue at hand is more about the quality of theological distance education and how distance courses can promote and support opportunities for formation. Le Cornu (2003:18) suggests that "the distance learning mode of education naturally lends itself to the formational mandate on account of its learner-centred pedagogical approach." The constructivist learning paradigm and formation are inextricably linked as it involves constructing knowledge and meaning-making which involves transformation and becoming. The debate has "now moved on to explore how theological education might adapt to new teaching and learning environments and use new pedagogies and technologies to prepare students for ministry" (Naidoo 2019:4).

Even though formational education is becoming a reality online, there is still a need to be aware of the challenges that technology brings. For example,

digital technology makes it possible for people to sit at home and follow liturgical worship through web-based church services, without attending church services physically with others in the worshipping community. The self-sufficiency that technology fuels increases people's autonomy and removes the need for other people. This promotes an individualism where technology influences the sense of "spiritual" identity within the person. We also know that the "inexorable integration of technology in our lives" (Salmon 2019:98) has reduced our humanness; take for example our constant connection to our smartphones which has limited our ability for engaging conversation and impacts how we nurture relationships.

Being aware of how identity is being shaped in the online education space is important for formational education. Barbara Molony examines technology and identity, and she asks, "whether rapidly accelerating technology is eroding our sense of who we are" (Molony 2005). Since technology is about self and the world, we need to understand how we are becoming with technology (Hefner 2003). While the modern view is that "technology is radically separate from us, the post-modern and virtual episteme suggests that technology exists in a social space with us and that we co-create our lives with technology" (Pallof & Pratt 2007:38). Hess (2005:10) reminds us that "technology triggers new ways of doing things, which in turns triggers a new way of thinking about our world and our relationship to it". While technology is fuelling a sense of self-empowerment and self-reliance, it turns people towards technology. At the same time, we also see that technophobia may be turning people back to simple lifestyles bringing a confusion about personal identity (George 2006:32).

The communication of human identity and exchange is a highly complex process of interconnecting factors. In the context of cyberspace, old patterns of identity and presence are changing (Lyon 2000). High-paced interconnectivity is prized and information overload demands severe levels of energy, time and resources engaging a "person's identity, relationships and history" (Prokes 2004:6), and when this collapses in the virtual world, there is a loss of an anchor, a sense of belonging, which has implications for formation. Students also have the opportunity to present and re-present themselves or create entirely new personas in the online world. The internet offers "mecca of multi-personality possibilities" as well as identity experimentation

(Campbell 2005:115). This carries significance for formation where authentic relationships and mentoring is foundational.

The anonymity of communicating online and a growing cyber-culture with a lack of cyber-ethics can be viewed as threatening to stable and traditional social and moral structures. There is a strong temptation for encouraging dysfunction and destructive patterns of identity and behaviours, as well as causing recognised additions (Young & Klausing 2007). Concerns are voiced for safeguarding the dignity of persons, for the value of human relationships conducted online and for the psychological and sociological impact of immersion into cyberspace.

Students may want to "hide" in media, hence digital literacy is needed and

> essential guidelines for online interaction to promote genuine dialogue that challenges assumptions, affirms insights and asks clarifying questions under intentional direction from the teacher. It is essential that process factors such as safety, emotional accessibility between members of the learning community, integrity and authenticity be established as core values or the structural factors will be only minimally effective (Naidoo 2012:4).

In addition, in formation, there will be times of disequilibrium.

> At such times, when the learner's emotional state is unsettled, and particularly when dealing with matters of faith, it is incumbent on the faculty to serve as a monitor, guide and reassuring presence. Also understanding and appreciating the life circumstances of the learner is essential if distance programmes are to meet the formational needs of students (Naidoo 2012:4).

There are also issues of the appropriateness of material found on the internet. Educators need to assist students with the skills to correctly select and filter material. The openness of the internet and its content, with little control due to the democratisation of information, may also clash with traditional understandings of religious authority (Campbell 2010). This can be viewed as disruptive by introducing new information and questions that a socially constructed learning paradigm encourages, especially when this is done without connection to an established tradition. Campbell has examined what happens when "religious communities are forced to examine the influence of new media on their faith traditions and ways of life" (Campbell 2010:260).

Stuart-Buttle (2013:215) suggests that what is needed is a "negotiating process of culturing ... which can enable Christian educators to shape the adoption and localisation of online pedagogy for authentic education". Distance education can uphold the authority of religious teaching while adhering to new pedagogical methods like constructionism.

What emerges from the above is an understanding of the world of cyberspace that calls into question not just how technologies function but how we conceive of communication, identity and relationships. Interacting with technology is a complex process as it shows us who we are and points out our values and ambitions. A dialogical openness seeks to engage with technologies and seeks out what is sound, but a critical lens is also needed if they are to be employed for Christian pedagogy.

4. Moving forward with technology

When we consider how the digital environment has expanded in recent years, theological education needs to consider seriously how to maximise on the technological context underpinning education and take advantage of new technologies in training ministers. The reality is such that most students now own mobile devices, are socially connected and that digital content is freely available. It is hardly surprising that students assume that technology will be integrated into their educational experience. What pedagogical method do we use to engage the digital world that supports learning and what approach do we follow, considering the new media-focused generation, and what would that mean for educators?

This section briefly mentions three critical adaptations that are essential to moving forward in this digital age. This involves a learning-based theory focused on social interaction while at the same time learning within the broader culture even including social media and finally the required capacity from educators to deal with pedagogical changes.

4.1 Need for a constructivist pedagogy

From a deeper investigation into the local distance education scene, especially amongst private providers, many have moved to distance education to increase student enrolment in a competitive market. The pedagogy that is

currently used is a transference of classroom practice using the distance mode environment where content is simply moved online driven by the pragmatics of delivery. This type of distance education replicates traditional models of teachers and learners, reproducing existing practices or conveying educational information.

While teaching may be supplemented by videos, this still represents a passive, one-way instructional model of learning. Educators have jumped into technology without developing an appropriate pedagogy which should be the very foundation of a delivery system. Distance education is only viewed as doing more quickly, reliably and interactively what lecturers have always done. Technology in distance mode is in itself not enough to bring about pedagogic change, it is only a delivery system. Barbara Blodgett reminds us that "distance is a function of pedagogy, not geography" (Gin et al. 2019:81). Meyer (2010:35) suggests that any potential for truly innovative distance education is lost when pedagogy is unreflectively transferred from traditional teaching into distance education.

The old "teaching-based" approach assumes a stable base of information to be shared "about" the world. Previous methods were transmission based, teacher dominated, focused on factual or rote-learning, separated knowledge into different subjects and fostered limited learner interaction and participation (Goldberg 2007). Fortunately, an educational shift has been made from "teaching-based" to "learning-based" approaches. In the new "learning-based" approach, the focus is on learning "through" engagement with the world (Thomas & Brown 2011:37). It is about relational teaching and learning. In distance learning then, the focus should be on "learner-centeredness, removing barriers to access, the flexibility of learning provision, supporting students and constructing learning programmes with the expectation that students can succeed" (Naidoo 2012:4).

The Fourth Industrial Revolution provides enough motivation to re-conceptualise teaching and learning practice. This trend towards learner-centeredness is built on constructivist pedagogy based on an approach that understands learning as a social experience, identified with the cognitive theory of Lev Vygotsky (1962). Vygotsky furthered the theory that purposeful learning occurs best when done with other learners that is collaborative. Social constructivism views knowledge building as occurring not in the individual

constructions but rather in social contexts of shared learning with peers. Educators offer different theories of learning where learners are in control of their learning that reflects real-life contexts, with flexibility in using resources and with collaboration and openness in discussing issues, moving from the "sage on the stage" to "guide and facilitator" in knowledge construction (Salmon 2004:9). Influential educators like Dewey (1938), Freire (1973) and Knowles (1980) among others, draw upon constructivist discourse.

Hung & Chen (2001:69) offer four principals to underpin an online pedagogy based on social constructivism; these are commonality, situatedness, interdependency and infrastructure. Here knowledge is dynamic, relational, participatory and collaborative. It is focused on "tacit knowledge that builds from constantly changing experiences" (Brown & Thomas 2011:31). Students bring their tacit knowledge from implicit socialisation processes, into explicit reflection. There is significant content which needs to be engaged, and focused on, and thus expands students' repertoire of practices of attention and reflection, and dramatically contributes to student learning, while deeply engaging personhood in community.

The constructivist approach "holds that learners actively construct meaning by interacting with their environments and by incorporating new information into their existing knowledge and hence building on prior knowledge and skills" (Naidoo 2012:3). However, we must acknowledge that while an abundance of information is beneficial, learners cannot construct knowledge by themselves if presented with information particularly at the undergraduate level. They have "great need of ongoing support and guidance of expert teachers" (Njenga & Fourie 2010:200). Guri-Rosenblit (2005:470) advocates that educators ensure "that the learners develop the necessary skills to construct knowledge" so that knowledge is "adapted and contextualised to the learners' unique environments."

4.2 Awareness and use of interpretative communities

Educational systems are part of the larger social context within which students are shaped and developed. Because "students' memories and learning strategies are situated in social relationships, political orientations, cultural meanings, worldviews, and historical experiences", learning involves "a collectivity of significant 'others' or what is known as interpretative communities"

(Hess 2013:6). These communities are transformative when they "promote acceptance, trustworthiness and reciprocity" (Lester 2014:93). Learning is relational and interpretative communities can help students in making connections "between their prior and current knowledge by providing informal settings where students are not afraid to ask critical questions, to attempt solving different problems, and to occasionally fail" (Meyer 2010:1). In this model, the student is at the centre of learning with many resources or interpretative communities around which the theological institution integrates learning. For example, teachers and church communities are interpretative communities which Dan Aleshire refers to as the "ecology of faith in which different but complementary contexts shape students" (Lowe & Lowe 2010:100). Creating communities of practice "by leaving the student in their current place of ministry" supports contextual theological education. Delamarter (2014:138) suggests that "students move back and forth between learning and applying in ways that are immediate and seamless."

The Fourth Industrial Revolution also alerts us that we cannot conceive of digital technologies without seeing how we all are embedded in mass-mediated popular culture. Theological reflection lives and breathes amidst these interpretative communities of daily political sagas, movies, music, the interwoven webs of the internet and every form of media we now engage with. If we are to teach and learn in contemporary culture, we have to engage these communities, with "media being an entry point into popular culture" (Hess 2005:26). We need to notice the digitally mediated environments we inhabit and use to communicate (Hess 2005:25), in the same way, Christ used parables and stories of everyday life. Media is not only about meaning making from the producer of the message, but also the interaction between the message and those who engage it. Mary Hess (2005:36) states that "when integrating digital technologies into theological pedagogies, we have to think of our work as a process of cultural intervention".

These interpretative communities build on the socio-cultural ties and play an important role in the consumption and negotiation of knowledge inside and outside the classrooms and can help to obtain various kinds of knowledge. The importance of such an environment can be traced back to Vygotsky's theory (1962) that states that learning is situated and culturally mediated through

human relations. Learning occurs in the social realm before it is internalised and shows the interdependency of learning with the broader culture.

Because students belong simultaneously to several interpretive communities, educators must be increasingly attentive to the multiple webs of knowing that students are embedded in and also be alert to ways to make teaching and learning more collaborative and participatory. Thus, educators need to build bridges with parents and church communities, especially for formational education to supplement the formation that is already taking place in the church. Here all voices are heard; "it capitalizes on the personal and professional experiences that each bring to the conversation" (Delamarter 2014:139).

Theological education should begin to ponder how to teach with these interpretative communities as this highlights the importance of relational mapping of learning (Campbell 2016) over the information transfer model. Here Oliver is helpful towards educator interventions:

> (1) Connect the classroom to authentic ministry spaces; (2) account for the whole-person identities learners bring with them; (3) invite attention to how social practice shapes and is shaped by its context; and (4) prepare the students for the unique navigational challenges posed by digitally mediated space (Oliver 2019:6).

Connectivism is a process of building networks (Campbell 2015; Siemens 2004) of resources that are applied to real problems. Here knowledge continually grows and evolves; access to what is needed is more important than what the student possesses. Teaching through networks represents working with different interpretative communities, involving peer-to-peer support systems, where ideas are challenged and one-way mediation is out.

4.3 Professional development of educators

Educators learn how to teach by the way they were taught in Higher Education. Few educators have online experience either as student or teacher; "online teaching is a move into the unfamiliar, entailing risk-taking and challenges to their beliefs" (McQuiggan 2012:30). When knowledge is stable, teaching about the world might be functional and adequate, but in a digital age, knowing is changing all the time "and deeply embedded in personal agency

and experience" (Hess 2013:13). If educators in theological institutions have been trained in an age of stable knowledge and teaching based education, the new learning culture could seem too different and even impossible for them to facilitate.

Although many Higher Education institutions are addressing this issue through their own staff development programmes, according to Salmon (2013:99), "there is a tendency for professional development to teach about teaching theory and alienate large numbers of potential online teachers who want practical guides." There must be effective support when introducing technology into teaching and learning as well as the opportunity to experiment with different approaches so that learning is owned (Maddix & Estep 2010). Pallof & Pratt (2007:62) state that "because teaching is so inextricably bound with the identity of the person, any changes in teaching entail an element of risk-taking requiring changes in personal beliefs rather than simply the addition of new skills." Educators have most often been "constrained by time, motivation, and lack of cooperation during the establishment of e-learning, which, coupled with poor or lack of compensation, lead to the failure of e-learning establishments" (Mihhailova 2006:280). To overcome this "sufficient training, support and infrastructure, as well as proper compensation" must be in place.

5. Conclusion

"To thrive in this uncertain climate, institutions will need to reconsider basic assumptions, ask difficult questions, and reconsider the nature of the problems they are addressing" (Hulme et al. 2016:96). Technology has proved itself already as a means through which a sense of belonging and care can be created, despite geographical distances or time differences. The massive information network also provides almost unlimited access and resources to learn. It has great potential as online delivery systems, m-learning through smartphones, or radio technology, and can increase the ability to take theological training to remote places in Africa where it has historically been difficult for ministers to be adequately prepared for their professional roles in congregations and communities.

Because technology is here to stay, educators must start to integrate technology into pedagogy, while considering the learning patterns of students, to meet

the needs of sustainable theological education. Locally there has been a clear shift in Higher Education

> from relatively poor ICT infrastructure, where institutions were solely responsible for both infrastructure and education provision, to a more cloud-based ICT infrastructure with "unlimited" educational possibilities, and a higher reliance on low-cost, mobile, flexible, ubiquitous technology solutions (Kilfoil 2015:32).

As one earlier pioneer stated, "what is required now is to move beyond the claims and the rhetoric, to begin to establish a base of rich experiences with the new technologies within our leaning environments" (Zukowski 2000:17).

We need to work within an incredibly complex technological system to advance and secure the future of theological education.

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Chapter 9

Religious leadership and the Fourth Industrial Revolution: Towards a competency framework

Ian A. Nell

1. Introduction

Our civilisation finds itself at the threshold of what scholars describe as the Fourth Industrial Revolution. We find evidence of profound changes in our society in the reform of socio-economic systems, the development of new business models and even the disruption of several public sectors on an unprecedented scale. The latter are all features of the VUCA (volatile, uncertain, complex, ambiguous) world in which we find ourselves. Of course, these deep-seated changes confront the leadership in all sectors of society with unique challenges. Looking through the lens of leadership to the nature and extent of these changes and challenges one becomes aware that they can be observed on the macro, meso and micro levels of society (Lorenz, Rüssman, Strack, Lueth & Bolle 2015:3).

2. The challenges of the Fourth Industrial Revolution

One of the main features of the Fourth Industrial Revolution is technological advancements, and these developments are, according to Kurzweil (2005:22), increasingly changing the way we live, communicate, work, socialise and travel. These changes occur at such a rapid pace that the impact of digital technological progress is predicted to be so profound that it can change our lives irreversibly. According to Bostrom (2014:4), computers can become so powerful in the future that companies will not need certain categories of

employees. More and more, we see how machine algorithms are applied to intellectual tasks that have exclusively been done by humans in the past.

This dramatic increase in technological innovation and its impact on our lives can no longer be denied. Leadership is therefore placed in the centre of the paradox of both the benefits of transformation and the fundamental challenges it faces. We are all well acquainted with the great challenges of secularisation, individualisation and globalisation over the past decades and therefore I do not need to discuss them extensively. I would rather like to approach the challenges from a different angle and concentrate on the processes of deinstitutionalisation, diversification and digitalisation.

2.1 Deinstitutionalisation

One of the most important features of our post-modern world is that many institutions have lost their credibility. Institutions are usually the manifestation of habits, customs and laws that find expression over a long period. Within organisational structures, the latter is guaranteed in the context of a shared culture and values. As a result of the exponential increase in knowledge and growing diversity, institutions lose their influence under a major part of the population. In recent times, it has been particularly evident in the rise of populist parties that consciously respond to the growing distrust of the so-called elite and their institutions. The latter also applies to religion and the institutional church that lost credibility as a result of various scandals (Barentsen 2017:66–67).

When institutional structures fall away, leadership becomes personified. Although one might become a leader on the basis of appointment in a particular position, a leader obtains respect by acting transparently and authentically. As a result of secularisation, the institution has less influence and the leadership is founded on spiritual and personal inspiration, sometimes in strange and esoteric forms. For example, we see that there is more and more room for charismatic leaders without any connection to and supervision by institutional structures. This means that the leader in his/her own person embodies the model for the followers. Some are aware of these dangers and are deliberately moving in the opposite direction in the form of shared or team leadership, also known as distributed leadership. The latter is the result of the breakdown of traditional authority structures, and consequently, the

leader is under great pressure to prove him-/herself as leader and model and to act as such (Contractor, DeChurch, Carson, Carter & Keegan 2012).

2.2 Diversification

Societies, and in particular the South African society, are increasingly multicultural. With millions of immigrants flowing from Africa crossing our borders looking for jobs and better living conditions, diversification is an imperative. Foreign cultures do not simply assimilate by themselves and there are often misunderstandings among both the immigrants and the local population. The latter often leads to xenophobic violence, as we have experienced almost annually since 2008 (Nell 2019:3). Indeed, leaders find it harder to work with the point of departure of a common set of values and norms, as is evident in the political fragmentation we are experiencing today (Chin & Trimble 2015).

Also, on religious grounds, the diversity and variations of faith communities over the past few decades have grown. With 80 per cent of our population identifying themselves with the Christian faith, it is remarkable to observe the increase in African Independent Churches (AICs). The AICs, which are mainly made up of the Zionist and Ethiopian groupings, are by far the fastest-growing churches in South Africa, while there is also a significant growth in Evangelical and Pentecostal groups. According to the most recent statistics, followers of the Christian tradition are divided equally between the AICs and mainline Protestantism. It has been especially since 1994 that we had an influx of diverse church models, especially from the USA, into South Africa. In this context, it does not make much sense for the leaders of the mainline churches to compete with the other groups, as the religious demand and supply are so diverse (Hendriks 2004:15).

2.3 Digitalisation

Digitalisation not only refers to the increasing influence of information and communications technology in our lives, but also to the profound influence and impact it makes on who we are and what we do daily. The internet and smartphones took over our lives and we can no longer imagine a world without them. Not long ago we still thought about computers as tools to get our jobs done and to try to work smarter, and in the process, hopefully, have

more free time at our disposal. Meanwhile, they have taken over our lives (Cloete 2015:3).

Communication via digital channels such as email and social media (e.g. Facebook) is not only an alternative to the telephone and postal services of a previous era but is accepted as the standard form of communication today. Teamwork and negotiations also take place via digital channels. This significantly accelerates decision making and the accompanying response rate compared to older forms of communication. Digitalisation, therefore, contributes to the democratisation of information and it is not just scientists and leaders in important positions who have access to information, but everyone, via the internet. Many leaders who had exclusive access to information and information transfer lost their power, as the focus is now on information processing (Barentsen 2017:65).

Digitalisation has consequently become a channel of globalisation, where anyone with an internet connection can learn about all sorts of projects and organisations abroad. The net result is that one's own culture and favourite organisation are being relegated to just one of many possibilities. With so many possible choices in a networking society, it is no longer necessary for one to focus on local organisations alone. This means that leaders must constantly maintain and uphold the loyalty of their followers (Castells 2010). Now that we have addressed these three challenges, we can move on to the landscape on which the Fourth Industrial Revolution is playing out.

3. The Fourth Industrial Revolution landscape

Schwab (2016) believes that we find ourselves at the beginning of the Fourth Industrial Revolution and observes that the scale and complexity of this transformation cannot be compared to anything we have experienced before. The pace at which the Fourth Industrial Revolution is developing is not only changing the "what" and the "how" of how we do things, but also the "who", in other words, who we are and how we experience these transformations.

Brynjolfsson and McAfee refer to three broad conclusions concerning the Fourth Industrial Revolution, namely:

> (1) [F]inding ourselves in a time of profound digital technological progress, (2) the potential benefits to be brought about by digital

technology and (3) the potential thorny challenges brought about by digitisation, emphasising that it should not be surprising, as "even the most beneficial developments have unpleasant consequences that must be managed" (Brynjolfsson & McAfee 2014:9-11).

In a paper presented at the 28th Annual Conference of the Southern African Institute of Management Scientists in September 2017, Jacobus Oosthuizen writes:

> The World Economic Forum (2015:5) identified six software and services megatrends that are shaping society, namely (1) people and the internet; (2) computing, communications and storage everywhere; (3) the internet of things; (4) artificial intelligence and big data; (5) the sharing economy and distributed trust; and (6) the digitisation of matter. In terms of the world of work, Lorenz et al. (2015:5) list the top 10 effects of industry 4.0 on the workforce as being (1) big data-driven quality control, (2) robot-assisted production, (3) self-driving logistic vehicles, (4) production line simulation, (5) smart supply networks, (6) predictive maintenance, (7) machines as a service, (8) self-organising production, (9) additive manufacturing of complex parts and (10) augmented work, maintenance and service (Oosthuizen 2017:6).

The great danger of what is described here as the Fourth Industrial Revolution landscape is that it can easily happen that the remarkable technological advances can simply leave many people in our country behind. The reasons are, firstly, because computers, digital technologies and robots are not available to or used by a major part of our country's population. Secondly, even those for whom it is available and who can afford it expect to learn ordinary competencies and skills at an extraordinary pace. The impact of the latter on the future of different leadership practices cannot be overlooked and is also narrowly linked to how knowledge is constructed.

Bearing in mind that, according to Sharma and Jain (2013:310), leadership is connected to influencing others to achieve a common goal and to prepare for the realisation of cohesion and coherence in an organisation, the question arises: How should leadership be done to navigate the Fourth Industrial Revolution challenges? In this regard, leadership can be seen at least as one of the active agents in achieving the latter. Looking at the individual level, the

question is: What are the competencies that can be expected of leadership and in particular of religious leadership to face the complexity and uncertainty of the Fourth Industrial Revolution? The latter was the central research question of this study and therefore we will now look at leadership, and particularly at religious leadership.

4. Leadership

Before paying attention to religious leadership, just a comment or two on leadership in general. It is true that there is a rich variety of definitions and descriptions of leadership and that it is a subject that has fascinated people for centuries. That is why it is not so simple to define leadership; it remains an elusive topic which relates, among other things, to the fact that in leading people we find a complex interaction between the situation, the leader and the followers (Van Saane 2012:13).

As far as secular leadership is concerned, I find the comprehensive definition of leadership by Winston and Paterson (2006:8-30) very useful. I attempt to paraphrase a short version of their extensive definition: A leader is a person who influences one or more followers with different gifts and skills and who focuses the followers on the organisation's mission and purpose. The result is that the followers are enthusiastically prepared to use spiritual, emotional and physical energy to participate in a coordinated effort to achieve the goals and mission of the organisation. In his well-known book on leadership, Northouse provides a very short and concise definition of leadership when he writes: "Leadership is a process whereby an individual influences a group of individuals to achieve a common goal" (Northouse 2018:3).

5. Religious leadership

In reflecting on religious leadership, Michael Jinkins points to the contested nature of leadership language within the religious discourse. In a chapter titled "Religious leadership" in *The Wiley-Blackwell Companion to Practical Theology*, he writes: "Though leadership has been an essential aspect of religious life from antiquity, its precise role and significance remain contested to this day in the academy and the church" (Jinkins 2012:308). One of the main reasons, according to him, lies in the very definition of the term and

the fact that the ways in which the concepts are utilised in many churches "[bear] the marks of secular ages, especially derived from business, social sciences, and political studies" (Jinkins 2012:309). Jinkins reflects on the role of religious leadership and defines it when he writes:

> It remains an open question whether leadership as a field of study benefits from being understood as a discipline per se. At present it appears more likely that leadership should be viewed as a subject matter, an area of specialization, or a field of study within practical theology, though its disparate core concerns may make it more difficult to describe its disciplinary subject definitively than other specializations (such as homiletics, liturgics and pastoral counselling). However conceived, religious leadership tends to focus on concerns such as leadership proper, organizational behaviour, management, stewardship, finance, conflict, power, change, and professional ethics (Jinkins 2012:310).

Barentsen gives the following definition of religious leadership:

> [I]t is understood as leadership in religious contexts by people who identify themselves with that particular context. This may refer to church or denominational leaders in various Christian traditions, but also to leaders of other religious communities or non-profit organizations with an explicitly religious purpose (Barentsen 2016:26).

Reflecting on this definition of religious leadership, one also comes under the impression of the contested nature of the concept because of several factors that relate to aspects such as power, change, management and conflict, which all belong to leadership discourses. According to Barentsen (2016:262-263), due to the changing role and place of religion in late-modern societies (in other words in the face of the Fourth Industrial Revolution), religious leadership faces many challenges, inter alia the need for public accountability and transparency, pressure from diversity and autonomy and the need for religious leaders to become spiritual guides. With this in mind, we move on to define competencies.

6. Competencies defined

Competencies can be broadly defined as "a combination of cognitive, affective, motivational, volitional and social dispositions that form the basis for performance" (Shavelson 2010:42). Shavelson offers an approach to defining,

measuring and statistically modelling competency measurements by suggesting that competency is a complex ability construct closely related to real-life-situated performance. The intent is to make the construct "competence" amenable to measurement and therefore competencies can be understood as trait dispositions that are relatively stable across situations and over time, while changes can be induced by vibrant components (Shavelson 2010:42).

It is also important to make a distinction between learning outcomes and competencies. Learning outcomes are defined in terms of particular levels of knowledge, skills and abilities that a student has attained (Adam 2008:9). Competencies take this further by describing learning outcomes in terms that define not only what is to be learned, but also the specific levels of performance that students are expected to master (Mulder, Weigel & Collins 2007:67).

The purpose of theological training is to educate and equip prospective religious leaders with the necessary skills and competencies to empower other believers to participate in the mission of the church. In this study, the point of departure is that there is a close connection between the quality of theological training and the quality of the candidate arriving for ministry. Competency-based theological education takes this challenge seriously. According to Brown:

> Competency-based theological education represents a paradigm shift in theological education. It offers an innovative way for seminaries and learning networks to raise a new generation of proven leaders, trained in context, in the knowledge, in the skills, and in the character traits, they need to prosper in their callings (Brown 2016:2).

Brown goes on to define competency-based theological education as

> an educational model that emphasizes: (1) learning more than "seat time", (2) the mastery of professionally-oriented competencies, (3) well-planned learning activities or assessments (class-based or not, online or onsite) that students may complete at their own paces, and (4) a community of learning where regular and substantive interaction occurs between qualified faculty and students (Brown 2016:2).

From this, it is clear that competency-based theological education is an approach to developing academic programmes where the focus is on the

competencies rather than the time spent in classrooms. Students illustrate and demonstrate their skills and knowledge by participating in learning experiences, activities and exercises where there is an alignment with well-defined learning outcomes.

7. The Fourth Industrial Revolution and religious leadership competencies

To address the identified challenges posed by the Fourth Industrial Revolution, we need to develop a well-rounded set of competencies that include our thinking, feeling and volitional capacities. However, given the rich diversity of religious leadership contexts, we should recognise that different variables will impact the practice of religious leadership. Variables such as location, size, age, demography, personality, training, experience, culture, ethnicity and social context all play an important role. In developing the competency framework that I propose, I used different sources and frameworks, inter alia the work of Barentsen (2016, 2017), Oosthuizen (2017) and Press & Powell (2012).

As an organising principle, I took the three meta-categories from Barentsen (2016:272) and translated them to competencies. These are:

- core competencies that qualify leadership as religious;
- competencies that focus on relationships within the religious community; and
- competencies that focus on relationships with those outside the religious community.

Under each of these headings, I discuss three competencies (see Table 1).

Table 1: Meta-categories, competencies and descriptions

Meta-categories	Competencies	Description
Core competencies	Symbolic	Representing and mediating the Sacred to the followers and celebrating the community's culture and identity
	Spiritual	Living an authentic and transparent spiritual life by embodying the community's identity and empowering and inspiring followers to live similarly
	Hermeneutical	Interpreting the religious tradition to engage followers in experiencing its relevance in daily life
Competencies within	Pastoral	Caring for the spiritual needs of followers to foster belonging to the community and its traditions
	Visionary	Mobilising followers for a common goal and empowering them for a variety of inputs as part of a team
	Reconciling	Enabling the community to cope with conflict, tension and differences through meaning-making and managing
Competencies outside	Communicative	Speaking out publicly on behalf of the religious community and leading followers to do the same in their sphere of influence
	Innovative	Leading followers in innovative ways to engage in the social needs of the public and liberating people from oppressive social and political conditions
	Entrepreneurial	Developing a new sense of community that is both religiously and socially based by making place for a variety of spiritual experiences

7.1 Core competencies that qualify leadership as religious

The core competencies of religious leadership relate to tasks guaranteeing the core of this form of leadership and consequently concentrating on the religious identity of the community. The result is that identity leadership plays a major role here and the competencies discussed below can be distinguished.

7.1.1 Symbolic competency

The first competency relates to the minister, priest, pastor or mystic as representing and mediating the Sacred to the followers. As a symbolic leader, presider or liturgist, he/she strives to draw the community together in celebrating the community's culture through Word and sacrament. In this regard, the leadership participate in shaping the symbols and culture of their communities. Cormode (2006) points out that culture shapes our expectations and perceptions and that religious leaders are required to interpret new events and situations in such a way as to conform to the existing cultural repertoire. Religious leaders, according to him, not only interact with these cultural symbols but also actively shape these particular symbols, practices, beliefs and history of the local faith community. The shape and nature of these symbols, whether in the form of clothing, liturgical spaces, architecture, rituals or music, will, by their very nature, differ from community to community, meaning that a good understanding of and delicate approach to them are important.

7.1.2 Spiritual competency

Closely related to symbolic competency is spiritual competency, where the focus is on living an authentic and transparent spiritual life. The leadership embodies the community's identity and empowers and inspires followers to live a similar life. As a spiritual guide and role model, the leader acts as a spiritual director in an attempt to deepen the followers' relationship with the divine, but also to learn and grow in their personal spirituality. Normally, the person seeking spiritual direction shares his/her own stories of divine encounters, while the director listens and asks questions in order to assist the followers in their process of spiritual growth and reflection (Dutton 2010).

7.1.3 Hermeneutical competency

The third core competency is the hermeneutical competency, where the leader as theologian, interpreter, preacher and teacher interprets the Scriptures and tradition, not only to understand them in their original contexts, but also to engage the followers in experiencing their relevance in daily life. Without tradition, religious identity does not have any roots. In this regard, leaders are, in the words of Osmer (2008), interpretive guides, where the guide takes

people into new territory and helps them to interpret this territory. The religious leader is, according to Barentsen (2016:268), trying "to guide people in interpreting situations or life events in religious terms to appropriate a sense of divine involvement or closeness in the situation". The leader reframes certain events and situations so that they make sense within new contexts.

Looking at the Fourth Industrial Revolution intelligence framework that Oosthuizen (2017) developed, there are at least three types of intelligences that relate to the core competencies discussed in the previous section. They are contextual intelligence, Socratic intelligence and ethical intelligence. Each one of these can help to enhance the core competencies and a summary of each follows.

- **Contextual intelligence**, which has to do with the deliberate adaptation, selection and shaping of the environment relevant to a person's life. In other words, it is about the practical know-how that requires not only knowing what to do, but also how to get it done. Schwab writes: "[S]ense of context is defined as the ability and willingness to anticipate emerging trends and connect the dots. These have been common characteristics of effective leadership across generations and, in the Fourth Industrial Revolution, they are a prerequisite for adaptation and survival" (Schwab 2016:5).
- **Socratic intelligence**, which we find in the dialectic method of systematic inquiry, where Socrates would start with a general definition of an idea and then use the dialectical method to try to come to an understanding of the essential nature of the idea. According to Oosthuizen, "[t]he applicability to leadership in the Fourth Industrial Revolution finds expression in the UNESCO ... view that Socratic dialogue is a philosophical practice for everyone, in which a small group of people led by a rigorous facilitator (leader) engage in dialogue over many hours in order to get to the bottom of some fundamental question of general interest and find an answer" (Oosthuizen 2017:21).
- **Ethical intelligence**, which can be seen as the systematic way of distinguishing between right and wrong, good and bad, and acceptable and unacceptable behaviour, and therefore relates to the well-being of relationships between people in communities (Rich 2013:4). As leadership

and ethics are so important in the light of technological advances, diverse worldviews, socio-economic realities and global communication (characteristic of the Fourth Industrial Revolution), leaders are expected to address ethical issues in their everyday lives and in the organisations they lead. According to Seider, Davies and Gardner (2009:214), "individuals who demonstrate ethical intelligence recognize their role as members of a local, national and international community and consider the effects of their actions on these various communities".

7.2 Competencies that focus on relationships within the religious community

Where the previous competencies were concerned with the identity of religious leadership, the focus now shifts towards competencies related to the maintenance, preservation, and promotion of the religious community.

7.2.1 Pastoral competency

One of the most distinctive tasks of religious leadership is the pastorate, the shepherd who cares for his/her flock. Through personal visits, the pastor looks after the members and is personally involved in their lives. Here is also little talk of hierarchy and one finds care in the form of walking along with members in their quest for their own spiritual path in which spiritual experience and meaning are central. There is also democratisation of care in which believers also care for one another. Where congregations grow too big for personal pastorate, the pastor becomes a care manager who equips and sends out pastoral volunteers (Barentsen 2017:71).

7.2.2 Visionary competency

The challenges the Fourth Industrial Revolution pose to spiritual leadership call for religious leaders who can embrace the necessary changes, develop a vision and face a new era. When it comes to the prospering and growth of faith communities, research has shown that the ability of a community to set a clear vision, goals and directions is of great importance. It revolves around leading the community through mobilising followers for a common goal and empowering them for a variety of inputs as part of a team. The danger to many religious communities is to spend all their time and energy on survival

and maintenance, so much so that a vision for the needs of the world is lost. A strong commitment to the vision by the leadership through clear goals and directions also leads to greater commitment on the part of the members (Press & Powell 2012:36).

7.2.3 Reconciling competency

Crisis and conflict always form part of a community's existence. With greater diversity in terms of different spiritualities, crisis recognition and intervention are important competencies for religious leaders. The faith experiences and interests of groups of believers in the faith community can easily grow apart. Learning to negotiate with the various interest groups is, therefore, a crucial leadership task – "crucial" in the sense of being related to the "cross" because the ministry of reconciliation and peacekeeping is entrusted to all believers, but in particular to the leadership. Conflict management and linking subgroups are at the heart of organisational leadership. With growing ethnic diversity there is also a growing need for cross-cultural competency, which refers to the skills, knowledge and motivation that empower individuals to adjust effectively in cross-cultural surroundings (Barentsen 2017:72).

Once again looking at the Fourth Industrial Revolution intelligence framework of Oosthuizen (2017), three types of intelligences relate to the competencies inside the community. They are emotional intelligence, inspired intelligence and strategic intelligence, summarised below.

- **Emotional intelligence**: A high degree of emotional intelligence is a feature of effective leadership and Goleman (2004:82) regards it as a *sine qua non* of leadership. Salovey and Mayer (1990:189) define emotional intelligence as "the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions". According to Schwab (2016), the five components of emotional intelligence developed by Goleman (2004), namely self-awareness, self-regulation, motivation, empathy and social skills, are critical skills to succeed in the era of the Fourth Industrial Revolution.
- **Inspired intelligence**: Inspiration comes from the Latin word *spirare*, which means to breathe. Schwab (2016) speaks of inspired intelligence,

which he believes relates to the constant search for purpose and meaning and explains it as the "creative impulse and lifting of humanity to a new collective and moral consciousness based on a shared sense of destiny". Inspired intelligence supports the visionary competency of imagining and envisioning exciting possibilities for the future. An attractive vision influences the followers' confidence in the future and is usually not the actions of a single person but requires a team effort (Kouzes & Posner 2009:20).

- **Strategic intelligence**: Agha, Atwa and Kiwan (2015:65) believe that strategic intelligence consists of five interdependent competencies, namely visioning, foresight, systems thinking, motivating and partnering. According to them, strategic intelligence is important to maintain and enhance performance in the current information age. Leaders with strategic intelligence understand the context in which they should lead and move their followers to be willing co-workers for the common good. They do this through an ongoing process of collecting data, and processing and distributing intelligence of strategic value in feasible ways to support long-term decision making (Djekic 2014).

7.3 Competencies that focus on relationships with those outside the religious community

We have seen that a religious community is grounded in its religious identity (core competencies) and is complemented by the care and maintenance of that community (competencies within the community). However, faith communities are embedded in specific societies that influence and define them. The third group of competencies is therefore directed at the public dimension of society.

7.3.1 Communicative competency

Public communication can take on different forms, including traditional activities such as evangelism, the diaconate and the unmasking of social injustice. Leadership speaks out publicly on behalf of the religious community and leads followers to act in the same way in their sphere of influence. In this way, the pastor becomes a public theologian who represents the faith community in civic settings (Vanhoozer & Strachan 2015). In each of these

settings, the message of faith is communicated in a specific way, whether to move others towards faith for the purpose of caregiving or as advocating for the oppressed. In the meantime, many forms of communication have been digitalised, with the result that the leader is expected to know about social media and of religious communication via the internet and even through his/her own webpage. An apologetic approach is an important part of this form of communication to help the many outsiders understand the Christian faith better. The task of public proclamation has therefore changed from traditional faith language to articulation of the Christian faith for a diverse audience (Barentsen 2017:73).

7.3.2 Innovative competency

Research shows that leadership that is not open to innovation and willing to try new things stagnates very quickly. It can easily happen that leaders get out of touch with people beyond their borders or with a new generation of believers. Openness to change and a spirit of innovation are very much needed, and many leaders are experimenting with new approaches in terms of worship styles, different forms of group work and missional activities. An interesting development in the innovation of faith communities is the emergence of new forms of churches alongside more conventional forms. In the literature, we find terms such as "fresh expressions, mission-shaped church, emerging church and missional church", which appear as alternative communities of worship in the form of cell churches, café churches, church plants, network-focused churches and seeker churches (Press & Powell 2012:44).

7.3.3 Entrepreneurial competency

Closely related to the innovative competency is the entrepreneurial competency, where leaders often feel that the traditional tasks of liturgy, proclamation and pastoral care do not necessarily lead to revitalisation. In religious discourses, entrepreneurial leadership is often associated with missional leadership in the form of contributions to social justice and the civic community rather than just the building up of the faith community (Van Gelder 2009). This move represents a paradigm change that calls for new forms of leadership that are still undefined. The e-church in South Africa can be used as an example in terms of both the nature of the faith community and the form of leadership involved here (Nell 2016:1).

For a final round, we look at the Fourth Industrial Revolution intelligence framework of Oosthuizen (2017), finding three types of intelligences that relate to the competencies with people outside the community and they are: entrepreneurial intelligence, transdisciplinary intelligence and ecosystem intelligence. A summary once again follows.

- **Entrepreneurial intelligence** is defined by Timmons and Spinelli (2009:1) as "a way of thinking, reasoning, and acting that is opportunity obsessed, holistic in approach, and leadership balanced for the purpose of value creation and capture", and is, according to Oosthuizen, "the ability to recognize opportunity through synthesis of the whole and creatively combining resources that result in the creation of renewal of value that makes economic and/or social meaning. ... Entrepreneurial intelligent leaders can inject imagination, motivation, commitment, passion, tenacity, integrity, teamwork, and vision into the Fourth Industrial Revolution, and despite facing dilemmas, ambiguity and contradictions, identify opportunities, influence solutions and create value" (Oosthuizen 2017:17).
- **Transdisciplinary intelligence** overcomes the traditional approach of inquiring phenomena from the perspective of a single discipline, providing a partial view mistakenly perceived as the whole (Montuori 2013:46). Transdisciplinary intelligence is therefore inquiry-driven rather than discipline-driven, where the scope is defined by the subject matter and not guided by the boundaries of the discipline. The goal is therefore to understand the present world by looking for the unity of knowledge. Montuori (2013:47) furthers that "transdisciplinarity draws on systems and complexity theories to propose a way of thinking that is different from reductive/disjunctive disciplinary thought".
- **Ecosystem intelligence** developed from biologists who revealed the limits of studying living organisms in isolation and gained a much deeper understanding of organic life by reflecting on the complicated relationships between organisms and their environment. Oosthuizen states: "Drawing on the insights from ecology and using ecosystems framework could enhance leaders' understanding of the process and phenomena playing out in Fourth Industrial Revolution" (Oosthuizen 2007:19). According to Morin (2008:11), human societies are just as complex as ecosystems,

with many different types of players and environmental settings, and therefore ecosystem intelligence brings these constructs together.

8. Conclusion

I started this study by referring to the fact that our civilization finds itself at the threshold of what scholars describe as the Fourth Industrial Revolution. We have seen that it is all part of the VUCA (volatile, uncertain, complex, ambiguous) world in which we find ourselves and that these deep-seated changes confront the leadership in all sectors of society with unique challenges. Next, three of these challenges were addressed: deinstitutionalisation, diversification and digitalisation. The proposal was then made that by developing a number of competencies, leadership could be enabled to face the challenges of the Fourth Industrial Revolution. A competency framework was developed based on three meta-categories and brought in conversation with a Fourth Industrial Revolution intelligence framework.

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Chapter 10

The impact of emerging technologies on liturgical practices: A thanatechnological exploration

Nicolaas Matthee & Cas Wepener

1. Introduction

This chapter explores the future of liturgy and ritual in the light of emerging technologies. In order to venture into this future, thanatechnology is used to explore the landscape of offline and online liturgy. To look forward in a meaningful way, however, we also have to look back. To explain how the liturgical traditioning process functions, Geoffrey Wainwright (1997) uses the image of the sport of rowing in which a team races forward while looking back. The rowing team sits together facing the person who steers from the rear of the boat and who directs both the tempo and the direction of their rowing. Just like that boat, the liturgy is always moving forward and all liturgical celebrations are always new and different at different times and places, as one never steps into the same river twice. This ongoing and inevitable liturgical renewal happens, according to this image, with an eye focused on where one is coming from.

In this contribution, we want to connect to, but also expand, Wainwright's beautiful, calm, colonial metaphor. The image has a definite article (the river), and depicts the river as one singular stream, like a calm river flowing through Oxford or Cambridge. The image of rowing is an illuminating metaphor for our purposes, but in this chapter we see ourselves as liturgists studying ritual in late modern culture, and therefore rather more like river rafters rowing on a river with rapids and deltas, looking back, but also and importantly looking around us as well as ahead, in anticipation of upcoming rapids and the

network of side streams. On this river, the researchers often find themselves on a delta rather than a single main stream, not sure on which part of the network of the river they are currently rowing, which is typical of the context of practices in a network culture and era of globalisation (Barnard, Cilliers & Wepener 2014; Post & Van der Beek 2016:73-76). The analogy is also very different from Wainwright's image, which was still part of the waning ideals of the liturgical movement of the 19th and 20th centuries.

The Fourth Industrial Revolution is probably a series of rapids lying ahead of us in the rivers of tradition, or rather, they are rapids that we have already started to enter, even though their full force is probably still ahead of us. The Fourth Industrial Revolution is not the first turbulence that the liturgy has had to face. The preceding three industrial revolutions were driven by steam, electricity, and computing (see Daemmrich 2017:257-265), which all impacted on liturgy in their own ways, and to a certain extent, liturgy and ritual are still coming to grips with the impact of the Third Industrial Revolution. Very few scholars of the history of liturgy, if any, have used these epochs of the four industrial revolutions in their periodisation of the history of the liturgy (see Wainwright 1992a; Webber 1994; Wegman 1991; White 1993). Stringer uses the term "discourses" (following Foucault) to classify periods in his overview of the history of liturgy, in which he discusses some of the developments that interest us as part of a "discourse" ("period") he calls "The globalisation of Christian worship, 1800-2000" (Stringer 2008:209-239). In many of the histories of the liturgy, the historians end with a chapter on the future of the liturgy; however, there are no examples that we have come across that specifically include a consideration of the impact of the Fourth Industrial Revolution.

There is a new and nascent area in liturgy and ritual studies that addresses the challenges posed by the Fourth Industrial Revolution for ritual and liturgy and that we will explore in this chapter (see Berger 2018; Böntert 2012; Post & Van den Beek 2016). But to conduct this research and explore the theme in a meaningful way, it is necessary to sink Wainwrights' metaphorical rowing boat, which evokes a strong Christendom paradigm in which the church is in a central and powerful position and in control of its liturgies and sermons, and instead climb aboard the white water raft to explore the network and rapids of the river of liturgy and ritual in a network culture (see

Barnard et al. 2014). Strange as it may sound, the river we will be exploring is most probably more akin to the currents of the first centuries of the Christian liturgy than later centuries, even recent ones. The mistake is often made to refer to the early church in the singular, but recent liturgical research has shown that there were many congregations (churches) spread out around the Mediterranean with a great diversity of worship styles (Stringer 2008:237). There were table services performed in houses, preaching services, baptisms as initiation, ecstatic charismatic services in the Spirit, and more expressions of liturgy. Even though those decades are to some extent comparable to the diversity and flow we encounter today in worship and ritual, there was no ICT, no AI, no cyberspace, and no machine learning in the first centuries CE.

In what follows we will begin by tracing some recent developments in the fields of practical theology and liturgical studies in order to locate them meaningfully within advancements associated with the Fourth Industrial Revolution. We then explore the Fourth Industrial Revolution and religious practices, especially the ways that they impact on research methodology and ethics. The core concepts of the chapter will be unpacked, such as e-ritual, worship in the network culture and thanatechnology. This will be followed by an account of recent developments with regard to the liturgical and ritual landscape, with a specific emphasis on cyber-liturgy and e-ritual. As the whole scope of liturgy and ritual is very broad, we choose liturgy and rituals associated with death as a lens to explore these developments. The chapter concludes with a discussion of the impact of emerging technologies on liturgical practices.

2. Practical theology as the study of lived religion

Practical theology is increasingly being approached as the study of lived religion (see Ganzevoort & Roeland 2014; Gräb 2014; Weyel 2014). According to Gräb (2014:103-104), the purpose of practical theology is the conceptualisation of religious communication and the ideal conditions under which it will be successful. However, he also argues that there are nowadays a greater number of locations for this communication, and, consequently, "religious self-exploration" should be supported and "church needs to see itself as a service provider of religion for humanity" and presents itself in the public square. In this approach "the empirical reality

of lived religion in contemporary society" (Gräb 2014:109, 111) should be taken seriously, which includes engagement with emerging technologies (see Böntert 2012; Matthee 2016, 2019; Post & Van den Beek 2016). "Lived religion as the subject of practical theology aims simultaneously at religious practices within and outside of the church by analysing the manifold relations between church life and cultural life" (Weyel 2014:154).

Ganzevoort and Roeland, for example, explore gardening as an object of study for practical theology and state: "We ... champion a practical theology that includes activities like gardening precisely for the fact that for many participants, such activities are far from trivial, but rather highly meaningful ways of being in the world" (Ganzevoort & Roeland 2014:95).

These developments in the field are also part of practical theology in South Africa; so, for example, Van den Berg's (2019) inaugural lecture at the UFS was entitled "Tweeting God: Finding the Sacred in Everyday Life". A key issue in this development is a broad theory of religion (Ganzevoort & Roeland 2014:97) and also the need for religion to be identified as such (Weyel 2014:153). This broadening of the scope of research in practical theology so that it is more than just an applied science (see, for example, Dingemans 1996:15-16), and includes lived religion, can also be seen in recent developments in the discipline of liturgical studies.

3. Liturgy as the study of symbols and rituals

Marcel Barnard has described the study of liturgy as the study of Christian rituals and symbols (Barnard 2000), which was in line with the approach of other Dutch scholars (see Lukken 1999; Post, Rouwhorst, Scheer & van Tongeren 2001) and much broader than just the study of worship services. Along with this expanding of the scope of the field, new scientific alliances were forged, especially with the domain of ritual studies (see Grimes 1987, 1990, 1995, 2014). In the wake of these developments, theoretical concepts and methodologies were also broadened in order to signify the combination of theology and, for example, anthropology in research designs. Depending on the position of a researcher, a choice of approach was now opened up between, for example, a liturgical-ritual approach (with the emphasis on theology) in the research, or a ritual-liturgical approach (with the emphasis on anthropology/ritual).

This methodological development in the field coincided with research in which scholars showed that the study of liturgy had, by the beginning of the 21st century, moved beyond the liturgical movement of the 19th and 20th centuries. They made it clear that there are now liturgical movements (plural) and that the discipline should include more expressions of (liturgical) ritual as objects of research (see Barnard 2006; Barnard & Schuman 2002; Post & Van Tongeren 2011; Spinks 2010). These developments can also be seen in liturgical studies in South Africa (see Pieterse 2017:7) and research projects such as those by Flynn (2015) on sport, De Klerk (2016) on pilgrimage, Wepener (2017, 2019b) on literature, and more recently the work of Matthee (2019) and Labuschagne (2015) on cyber-liturgy.

In both practical theology and ritual-and liturgical studies, the groundwork has been done to expand the scope of study to lived religion in general, and religious ritual in particular, which is a necessary foundation for the study of cyber-liturgy and ritual in the context of the Fourth Industrial Revolution.

4. The Fourth Industrial Revolution and the study of religious practices

New and emerging technologies have enhanced the possibilities for the study of religious practices. These technologies not only provide more modalities for the study of human religious expression but also allow for the creation of completely new spaces of expression. Some of the core concepts are discussed briefly below.

4.1 Methodology: Netnography

In response to the context of the Fourth Industrial Revolution and the emergence of new technologies, the repertoire for human expression has also evolved. This evolution means that methodologies need to be adapted to be able to generate insights and to study all forms of human expression, including religious and ritual expressions. From a liturgical and ritual studies point of view, methodologies[1] such as netnography and network ethnography

1 See the work of Kozinets (2015) and Matthee (2019) for more on netnography and network ethnography.

have proven to be useful in providing frameworks within which these cyber expressions can be studied.

4.2 E-ritual

E-ritual refers to the migration of elements of empirically observable rituals into cyberspace. In many cases, this results in completely new and evolved ritual expressions unique to the context of cyberspace. This is an important development in terms of liturgical and ritual studies, which are fields that have been explored by academics such as Post (2015), Post and Van der Beek (2016), Berger (2018) and Böntert (2012).

4.3 Worship in the network culture

The network culture has proven to be a fundamental concept in understanding the nature of human expression and connection within the evolving context of ICT. The work of Barnard et al. (2014) has been important in opening up the field of liturgy and ritual to the realities of the network culture. They use the concept of liminality as a *Leitmotiv* to explain how flow has become a dominant paradigm in a network environment and in relativising core liturgical concepts such as embodiment, space and time.

4.4 Space, time and embodiment

Traditional notions of especially space, time and embodiment are fundamentally challenged in the context of new and emerging technologies. As seen with the thriving communities in the context of social technologies, such as Facebook and Instagram, these online spaces have in a certain sense moved from the periphery to the centre of lived reality. The work of Tinning (2014) is instrumental in understanding that the essence of space is revealed by the limits that define it. The limits that define the space of human expression have expanded and are expanding as a result of new and emerging technologies, and therefore the essence of online space warrants new exploration. The same holds true for the question of time, especially relating to ritual. Ritual and liturgical time exhibit new potential in the context of the Fourth Industrial Revolution. Finally, traditional notions of embodiment are being challenged. Ritual and liturgical practice have for millennia had the physical human body as an important and crucial feature for at least a segment of the specific

expression. This is fundamentally challenged in the current context as none of the e-rituals and other cyber expressions need to have a physical human body present. To some extent, the physical body is simulated when using technology such as virtual reality, but this is still only a representation or encoding of the physical body.

4.5 Thanatechnology

Thanatechnology is but one example of the categorisation of certain technologies to aid the study of accompanying expressions in the context of new and emerging technologies. Thanatechnology refers to those technologies enabling the observation of and the participation in expressions, rituals and liturgies within the context of death, grief and bereavement. Some popular thanatechnologies are, for example, Facebook and Instagram, and can even include smartphones, tablets, or other consoles.

5. Thanatological movements on the physical ritual-liturgical landscape

Death is ritualised in most, if not all, cultures. In this section, we will first provide a brief explorative description of the ritual landscape pertaining to death, showing how core church liturgies related to death, such as the funeral service, have expanded to include more spaces.

Numerous factors have an impact on the expression of death rituals. In a culturally diverse country such as South Africa, people celebrate death in varied ways and in different locations. A few decades ago, death was mostly celebrated in the Christian tradition in church buildings by means of a funeral liturgy followed by a burial ceremony in a cemetery. This is still the case for most of the South African population; however, in certain parts of society, cremation is becoming more popular. Simultaneously, space in graveyards is becoming limited, whilst graveyards are also increasingly crime-ridden spaces.

There are a variety of ways in which people conduct rituals with ashes after cremation, such as committal services at walls of remembrance or the scattering of the ashes in special locations. A fairly recent development regarding the ritualising of death is the marking of places where people died in vehicle accidents by constructing roadside shrines and conducting regular

rituals at the shrine (see Wepener 2011). Another development is conducting a ritual at the place where a death occurred, such as a pavement in a suburb where people form a circle, read a poem and perform symbolic actions (see Wepener 2019b).

In South Africa, the Freedom Park Memorial in Pretoria is also a space that includes a memorial wall of remembrance for people who died in wars in South Africa. A similar space has been created in the space around the nearby Voortrekker Monument, while close to Polokwane in Limpopo province there is a Boer Genocide Memorial (see Wepener 2011:265) consisting of thousands of white crosses planted in the landscape commemorating farm murders. These spaces are examples of how the ritualisation of death has moved beyond the space of core church liturgies to include a variety of other spaces in the ritual landscape. In recent decades and in the wake of the Fourth Industrial Revolution the ritualisation of death has also migrated into cyberspace (see Matthee 2019).

6. Thanatological movements on the ritual-liturgical landscape of cyberspace

During the last two decades, there has been a massive shift in human expression from empirical reality to cyberspace. Some of the first studies on this migration of human expression in the context of religion and theology were conducted from the perspective of computer games and other similar online spaces. What is evident from these studies is that, on the one hand, human expression evolved enormously during the Third Industrial Revolution to now include cyberspace. On the other hand, these studies indicate that the fields of liturgy and ritual are only now attempting to explore the reality of cyberspace as an authentic space of human expression.

Internet and communications technology (ICT) played a fundamental role in the creation of these spaces. Initially online spaces of human expression concerning liturgy and ritual were text-based. This was a result of the limitations of the technology at the time and as ICT evolved, so did these spaces. Relatively speaking, the evolution of the possibilities offered through ICT occurred quite rapidly. Twenty years ago, people could express themselves in online spaces through textual interactions; today people can express

themselves online through a multitude of modalities greatly surpassing what was possible even at the start of this century. These spaces include not only opportunities for liturgical and ritual expression, but also opportunities for liturgical and ritual engagement. In what follows, certain liturgical and ritual cyberspaces are discussed to illustrate the position of the raft in the rapids.

6.1 Grief and bereavement in cyberspace

One of the most prominent liturgical migrations into cyberspace has occurred in the rituals relating to death; the expressions of grief and bereavement are finding rich spaces in the context of cyberspace.

6.2 Cyber cemeteries

Cyber cemeteries are interpreted broadly in this chapter to refer not only to the instances where a website is dedicated to the virtual representation or reproduction of a physical cemetery, but also other unique expressions of grief and bereavement in online contexts. Some of these instances are discussed below.

6.2.1 Virtual cemetery

The first instance (and one of the oldest examples) of technology facilitating the migration of liturgy into new spaces is the creation of virtual cemeteries. In these instances' physical graveyards/cemeteries are reproduced in cyberspace, usually as a website. These websites enable participants to express their grief by participating in a way that closely resembles what one would find in empirical reality. This includes ritual liturgical interactions such as the lighting and placing of candles, writing a letter or note to the deceased, visiting the grave and placing flowers there. Some of these cyber-cemeteries, such as The World Wide Cemetery,[2] provide additional options for ritual liturgical interaction including:

- custom-made memorials with a visitors' page;
- a digital map directing participants to the physical location of the grave;
- a photo of the deceased as part of the visitors' page; and

2 The World Wide Cemetery can be accessed at https://cemetery.org/ and the publicly available memorials can be viewed there. Accessed 8 February 2020.

- a permanent QR code that can be displayed at the physical grave. When people visit the grave, the QR code can be scanned and the participant will be directed to the custom-made virtual cemetery.

Figure 1: An example of QR codes.
[Source: Image credit: https://cemetery.org/sample-qr-code/]

6.2.2 Memorial websites

Similar to virtual cemeteries, the internet is home to many memorial websites. While these do not reflect the physical reproduction of a graveyard or cemetery, the interactions found in this context are similar. With the evolution of internet technologies, it has become much easier for any person to create and host a website that not only looks professional but has all the functions the creator wants to add. Many congregations and church denominations have already embraced this technology (one of the few technologies embraced in this way) for their own general websites, but very few include memorial functionality and a context for the bereaved communities. One of the most famous and most active memorial websites is that of Chester Bennington, the former vocalist of the supergroup Linkin Park. Participants can use the hashtag #makechesterproud to post to the memorial from a wide variety of social media applications, including Instagram and Twitter. Upon visiting the memorial there are hundreds of thousands of posts where people share their narratives of grief and bereavement, and in many cases, they give expression to religious stories about the ascension to heaven of the iconic vocalist. Matthee (2019) uses this memorial as one of the field sites in his study of ritual liturgical expression in cyberspace and it is interesting to note that the

hashtag has changed from #ripchester to the current #makechesterproud, providing a glimpse into the dynamics of ritual in cyberspace.

6.3 Social media and digital gaming

Social media and digital gaming is a unique combination of established technologies such as Facebook and YouTube and other emerging technologies such as Snapchat, TikTok and digital gaming. In terms of studying liturgy and ritual in the context of emerging and established technologies, this instance has received the most attention in recent academic work. Social media and digital gaming have proven to be rich and vast spaces of human expression. These spaces have evolved (with the help of technology) to offer participants many different ways to interact with one another and, therefore, adapted and new ritual repertoires have emerged. Some relevant findings are briefly explored below.

6.3.1 Facebook

Facebook, both as an established technology and a leader (albeit contentious) in the context of emerging technologies, is frequently used as a space for ritual liturgical expression. Matthee (2019) studied four different profiles on Facebook (three profiles where the owner was deceased and one where the owner was alive, but mourning the death of his son) and it was found that Facebook constituted spaces of complex and personalised ritual and liturgical interaction, irrespective of guidance from religious institutions. In other words, people participated in authentic ritual and liturgical instances, constructing and bringing their own complex narratives of grief and mourning into these spaces. It is important to note that Facebook is a public space for the most part and therefore these narratives were part of newly formed bereaved communities, ritually and liturgically interacting with each other in cyberspace. Ritual and liturgical interaction as found in the context of Facebook are limited by technology; in other words, participants could only interact in ways the available technology made possible. These included the entire functionality of Facebook including the posting of photos, videos, links, text (comments and wall-posts) and GIFs.

Other studies are exploring the context of ritualised behaviour on Facebook such as that by Willis and Ferrucci (2017) discussing the motivation behind

interactions with the dead on Facebook, Lingel (2013) working on the policies of Facebook and how they influence practices of online grief, and Walter (2015) describing the difference between online and offline mourning.

6.3.2 Instagram

While being cutting-edge social technology, Instagram offers ritual and liturgical expression within a more restricted technological framework. Instagram (also owned by Facebook) has a much greater focus on the visual aspect of technology. This is evident in the function of the platform as an opportunity for photo sharing. Recent technological developments give users the ability to post what is known as "stories". It is reported that stories are extremely popular amongst the users, having a reported 500 million story users daily. Thimm and Nehls (2017) did a study on the sharing of grief and mourning on Instagram and found that this act of sharing in some cases developed into individual ritual behaviour. Their study focused on only posted photos and not stories. Studying the complete technological framework of Instagram is difficult because the stories are only available for 24 hours, and if they are not captured during this time they are no longer available. Stories are frequently used as a type of a pop-up memorial, remembering the dead or celebrating the living. Given the non-permanent nature of Instagram stories, they are used more frequently, hence keeping the memory of the deceased alive as part of the narrative of the user. Instagram uses the hashtag function prominently to allow users to tag their posts. This is usually done so that like-minded individuals can find the post and interact with it. A search for the #RIP[3] tag yielded 24,3 million posts. The posts are made up of a combination of mourning the deaths of celebrities (the most popular occurrence), the deaths of other individuals and the deaths of pets, amongst others.

6.3.3 Online gaming

One could argue that online gaming has had a significant influence on the nature of social media as we experience them today. One of the first massively successful multiplayer online roleplaying games (MMORPG), Ultima Online, was launched in 1997. Players could create their own digital avatars and

3 The #RIP page can be accessed at https://www.instagram.com/explore/tags/rip/. Accessed 8 February 2020.

meet others in the virtual world of Ultima, joining other groups of players to form guilds. The game quickly reached hundreds of thousands of players, providing a virtual platform where people could share their fictional and real-life narratives with others. Because of the social and expressive nature of online gaming, it has become a prominent area of inquiry for those seeking to study community formation, religion and ritual in cyberspace. Some of the most important work stems from the *Heidelberg Journal of Religions on the Internet*, where themes such as ontology (Bosman & Poorthuis 2015), agency (Knoll 2015), extra-textual production (Ohlendorf 2016) and Christian narrative (Saucerman & Ramirez 2016) are explored, while the work of Campbell and Grieve (2014) has also advanced this discussion. Other studies with a larger focus on ritual and death include that by Haverinen (2014), which explores death in the context of the online game Second Life, and Matthee (2016), which explores ritual production and formation in the context of the online game World of Warcraft.[4]

Figure 2: A memorial in World of Warcraft to remember the famous actor Robin Williams. The manifestation of the memorial refers to the genie in the *Aladdin* movie which Robin Williams voice-acted. [Source: Image credit: Blizzard Entertainment.]

4 The web page found at https://www.wowhead.com/a-guide-to-in-game-memorials offers a comprehensive list of the locations and descriptions of the memorial and sacred places to be found in the game world. Accessed 8 February 2020.

A final important contribution is that by Geraci (2014), who explores the authenticity and sacredness of online space through the lens of online gaming. It is evident that online gaming has proven to be an effective window into the ritual and liturgical aspects of cyberspace, and just as Ultima Online once provided us with a glimpse of what is to come in terms of the potential of ICT, so online and digital gaming are doing the same. Online and digital gaming function within the context of the newest and emergent technologies. Emerging technologies such as AI, machine learning, virtual reality and augmented reality are already commonplace in some gaming environments, helping us to imagine the potential future for worship, liturgy and ritual.

6.4 Other ICT

Still, within the context of a broad interpretation of cyber cemeteries, some other technologies will now be explored that do not, strictly speaking, fit into the context of social media and digital gaming.

6.4.1 The passion

A cultural phenomenon to be found in the Netherlands, where the narrative of Christ's final hours is dramatised in a different city each year with Dutch celebrities as actors, in a play called *The Passion* (see Klomp et al. 2018). It usually ends with a heavy cross being carried to a central area where a large stage is constructed, and crowds gather to watch. The cross is carried through the streets of the relevant city and people can walk with the cross as part of the procession. While certainly liturgical in nature, the physical drama is not the focus of this discussion. For those unable or unwilling to participate in this event physically, everything is both broadcast locally and streamed internationally through the official website of the event. While not necessarily a cemetery, the context of the phenomenon is the death of Christ and therefore it falls within the frame of online grief and bereavement. When one visits the website during the event, the option is available to virtually join the procession and as a participant to the ritual, one can write a short message to state the reason that one is joining the procession. This message is publicly available even to those who have not indicated that they will participate virtually in the procession. The contents of these messages are varied, although many of them refer to the participant's spiritual journey. Another consequence of the

virtual aspect of this event is the sharing of experiences from the physical to the virtual world. A photo was taken of a young man in tears and this led to the publication of an article[5] on the website of the event sharing the liturgical experience of this young man with the world.

6.4.2 Apps

One of the last (but not final) rapids in the liturgical river is that of applications (including mobile, web and desktop). As seen with the financial success of the Apple, Google and Microsoft app stores, apps are currently central to the lives of billions of people around the world. RipCemetery is one of the most prominent apps within the context of death, grief and bereavement. Apps such as RipCemetery are very similar to what one would find in a virtual cemetery, although it is created with mobile users as the primary group. A website is in most cases something that you visit, while an app is something you use rather than visit. The slogan of RipCemetery is "Always have your loved ones with you", therefore indicating the subtle nuances between the web and app approach to grief and bereavement. While there are not many theologians who have explored the context of death and bereavement through apps, there are important works where other instances of ritual and liturgy have been explored, for example, the work of Huotari and Ikonen (2017), Mann (2017), Scott (2016) and Berger (2018).

7. Conclusion

The fields of practical theology and liturgical studies have seen major developments over recent years. In a network culture, liturgical rituals resemble a network or delta of interactions. The latest development creating more streams and rapids has to do with the advent of the Fourth Industrial Revolution. In conclusion and in the light of our exploration of thanatechnology, we will now offer some answers regarding what we deem the impact of the Fourth Industrial Revolution could be on liturgy and ritual of the future, focusing specifically on narrative identity and ritual time and space.

5 The article can be accessed at https://www.thepassion.nl/artikel/2019/04/wie-was-de-ontroerde-jongen-bij-the-passion. Accessed 8 February 2020.

The work of Matthee (2019) found that the migration of ritual liturgical interaction into cyberspace through a variety of technologies resulted in what is understood as a narrative identity. This identity is the narrative (re-)construction of the person in ritual and liturgical spaces where the physical body cannot be present. It was observed that in spaces such as Facebook and Instagram people were present in the narratives that they posted by means of photos, videos, text and other methods of communication. The narrative identity and the physical person are elements of the same human being, influencing each other through their experiences. It was found that cyber experiences such as online comments, mentions, likes and other devices influenced the physical person, and experiences in empirical reality were reflected in the way the narrative identity evolved. The best example is the process of learning to live with the death of a loved one. As the person travelled on their road of grief and bereavement, the movements of the journey were reflected everywhere the person is embodied, physically observable in the empirical reality and narratively observable in cyberspace. The reality was a product of both the online and offline aspects of grief and bereavement.

A possible impact of the Fourth Industrial Revolution could be that cyber technologies keep developing and that more people choose to express themselves narratively instead of physically. A possible future scenario resulting from this could be that people choose to rather participate in liturgy through technology instead of by physically attending a liturgical ritual or church liturgy. Liturgy will increasingly need to be accessible to people wherever and however they choose to be present.

As is evident from the discussion, the Fourth Industrial Revolution and the technology that accompanies it have resulted – and will still result – in exciting and challenging new spaces for human expression. There are already new and unique ritual and liturgical repertoires that have evolved as a result of the desire of humans to express themselves in this way in the spaces that now exist due to technological evolution. As alluded to above, people now have the luxury of participating in liturgy not only outside of the traditional church building (Wepener 2011) but even outside of empirical reality.

To add to the panorama of the liturgy in the context of the Fourth Industrial Revolution, ritual and liturgical time have been expanded. A funeral liturgy will last for around an hour or two before it is concluded and after that

participants can engage in other ritual activities as they see fit. The online "funeral liturgy" of Chester Bennington has been going on for just over two years, with thousands of people participating daily. The evolution of liturgical space and time challenges traditional liturgical thought to truly consider the implications of the network society and its liminal nature.

This chapter merely touched the tip of the iceberg regarding the impact of emerging technologies on liturgy and ritual. More work is much needed, and this will be a fruitful domain for research in the near future.

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