

# **SAQA and the NQF in the context of the 4th Industrial Revolution: Realities and Implications**

## **Research Paper**

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## **1. INTRODUCTION AND CONTEXT**

### ***Some Global and national insights***

The term 'Fourth Industrial Revolution', hereafter referred to as 4IR, was first introduced by Klaus Schwab, the founder and executive chairman of the World Economic Forum (WEF), to describe what he refers to as the "digital revolution" that has been underway since the middle of the last century. The 4IR is characterised by the merging of technologies, that are "blurring the lines between the physical, digital and biological spheres" at an unprecedented speed, requiring an "integrated and comprehensive response" by all global stakeholders (Schwab, 2016, p.2). There are endless possibilities with regards to scores of people being connected by mobile devices with substantial processing power, storage capacity and access to knowledge, and such possibilities will grow through new technological breakthroughs in fields including artificial intelligence, robotics, the Internet of Things (IoT), autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing (Ibid). The 4IR represents the inevitable shift from simple digitisation (the Third Industrial Revolution) to innovation based on combinations of technologies (the 4IR) (Ibid). Machine learning and genomics are also included (Gray, 2016).

The 4IR will require a re-imagining of ideas of what it means to be human and how we interact with different sectors and industries. The possibilities of new technologies include creating and implementing effective and efficient change (Wils, 2019). The 4IR has the potential to elevate global income levels and improve the quality of living for global populations (Schwab, 2016). Those who have benefitted from the 4IR thus far have been able to afford and access the digital world. New products and services have improved the efficiency and standard of living of our personal lives (Ibid). On the other hand, the 4IR brings with it various challenges, including the potential to "disrupt" labour markets, leading to greater inequality (Brynjolfsson and McAfee, as cited in Schwab, 2016). Machines will replace workers, and this displacement might worsen the gap between

“returns to capital and returns to labour”, while on the other hand, it is also possible that technology will lead to safe and satisfying jobs (Schwab, 2016, p.3). The fear of job losses is seen as ‘misplaced’ by some. At a Future of Work Forum at the Stanford Graduate School of Business, various scholars and Artificial Intelligence (AI) experts were of the view that while rapid advances in technology will have a significant effect on many areas of the economy, fears of unemployment were exaggerated. Instead, AI will shift work and not replace it (Snyder, 2019). While uncertainty exists, a jobless future is not the outcome, although we should be prepared for “deep structural changes” (OECD, 2019, p.13). The OECD estimates that 14% of jobs are at high-risk of automation, significantly fewer than some researchers have argued (Ibid). Nonetheless, it was also acknowledged that concerns about increasing inequality and limited opportunities for many in the workforce were real and well-founded, and needed to be addressed (Snyder, 2016). Priscearu (2016) also points to the challenge of inequality that will be brought upon by the 4IR, and argues that digitilisation will “enhance the great inequality existing now in a world where many states and areas have not even passed through the second and third industrial revolution” (p.60). He further argues that robotics and artificial intelligence may lead to the dehumanisation of people’s lives, “affecting unique values as empathy, sensitivity, creativity and inspiration” and could also pose moral and ethical challenges (p.60). While rapid progress in technological advancements cannot be avoided, the negative and unintended outcomes need to be addressed (Ibid). Schwab (2016, p.3) argues that a critical factor of production in the future will be talent, more than capital, resulting in a job market divided into “low-skill/low-pay” and “high-skill/high-pay” parts – the latter leading to increased social tensions. The 4IR also poses a high level of difficulty for policy makers and regulators in trying to “keep up the rapid pace of change” (Benioff, 2017, p.2). The nature of the change will depend on the industry itself (Gray, 2016).

A WEF report highlighting the eight futures of work, identified a non-exhaustive list of actions that governments, businesses and other actors could take to prepare people for meaningful, fulfilling and safe work. These actions include: workforce reskilling; educational systems reform; enhanced digital access; agile safety nets for income security; job protection incentives; smart job creation incentives; supporting mass entrepreneurship; governance of online platform work (where skills are offered through online platforms); mobility management (e.g. improving accreditation and recognition of skills within countries to support people in navigating the future of work, and with regards to mobility, having common credentials for recognising skills and standardised qualifications for all levels of education across different systems); and last but not least, participation incentives (e.g. greater flexibility to vary working hours)(WEF report, 2018).

Within the South African context, the 4IR has become topical across all sectors. President Cyril Ramaphosa’s address at the first South African Digital Economy Summit on 5 July 2019, foregrounded the importance of “harnessing” the opportunities offered by the digital revolution to: enhance economic transformation and job creation; improve our education outcomes and skills revolution and ensure a healthy nation; consolidate the social wage through reliable and quality basic services; enhance spatial integration, human

settlements and local government; advance social cohesion and safe communities; create a capable, ethical and developmental state; and work for a better Africa and the World. The criticality of the 4IR to South Africa is evident through the establishment of a Presidential Commission on the 4IR. The commission will be led by Professor Tshilidzi Marwala, an internationally acclaimed researcher in the discipline of AI, and the current Vice-Chancellor of the University of Johannesburg. Another development is that Minister Naledi Pandor has established a task team to advise the Minister of Higher Education, Science and Technology on how to manage the threats and opportunities posed by the 4IR (Kahn, 2019).

South African citizens are among those around the world that will need to understand and adapt to the 4IR. Their self-assessment knowledge of the 4IR was a key feature of in-depth research commissioned by Kagiso Trust to provide insights into the potential, the challenges and the landscape of 4IR in South Africa (Oxford, 2019). This research was discussed at a Critical Thinking Forum hosted on 2 July 2019, by Kagiso Trust in collaboration with the Mail and Guardian. The research yielded more than 1000 responses across 20 South African districts and all nine provinces, and found amongst other things, that those who felt they had an average-to-above-average understanding of the 4IR, represented the population with a middle to high socioeconomic status (they had a higher education, an income of more than R6500 per person per month and had access to data). A lack of knowledge on the 4IR was evident, particularly amongst entrepreneurs and the unemployed (Ibid). The research raised three critical issues. The first was the lack of knowledge on the 4IR, with just a quarter (25%) of the pool surveyed having an acceptable level of understanding. This finding highlighted the inequality between the “haves and the have-nots” as “those with a lower socio-economic status or without access to data were those who did not have access to information, news and insights specifically around 4IR” (Oxford, 2019, p.32). The second issue pertained to the importance of developing entrepreneurship programmes that use 4IR and ‘upscaling’ education to enable a deeper understanding of technology. The third issue pertained to the perceived threat of the 4IR, particularly with regard to humans competing with machines for jobs and the related resistance to change. The findings also allowed for some reflection on the opportunities presented by the 4IR. According to Oxford (p.32), the 4IR could be the key that “unlocks a future that can harness vast natural resources, re-industrialise in alignment with global ideals, and allow for socio-economic growth of a young and vibrant population”. The 4IR was also seen as a ‘driver’ of the future of the African continent, in that it could also potentially “drive Africa forward, enabling innovation and new business models, and the opportunity to leapfrog legacy challenges into a bolder and brighter future” (Ibid, p.32). The forum also highlighted the need for the adequate upskilling of people, legal issues around accessing and handling personal information and privacy laws, and the fact that as much as data is the new ‘currency’ in the 4IR, it was important for the data to reflect social histories and backgrounds (Wils, 2019). In a Sunday Times opinion piece, Hodge (2019) expressed the view that while the technological revolution poses threats to South Africa, for example the threat to jobs from robotics, AI and digitilisation or the threat of global monopolies such as the FAAGs (Facebook, Amazon,

Apple, Google), it also presented many opportunities for new industries, jobs and more competitive and inclusive markets. With regard to jobs, various digital businesses may lead to the highly skilled data analyst positions, but also to the less skilled warehouse, delivery and driver jobs. As FAAGs continue to boost online presence, the demand for content will grow, and AI applications will need processed data, video and images typically and frequently compiled by a human workforce. Data portability and interoperability can open markets to new and innovative businesses, and one can still ensure privacy and the security of personal data (Ibid).

Gillward (2019) points to the lack of critical engagement with the concept of the 4IR within South Africa – intellectually, politically and especially from a policy perspective. She argues that what is required is a cross-cutting strategy and adaptive governance framework that is able to “engage the entire digital ecosystem in all its complexity; in its local and global manifestations” (p1). She furthermore cautions that one should not assume that the current digital development (which is regarded as an intensification of the third industrial revolution) will necessarily translate into wage or productivity growth – not unless South Africa develops ‘complementary’ policies for both government and business. Gillward (2019) calls for “targeted, evidence-based policy-interventions” that will do something differently from that done in the past, or the implementation of policies we have failed to – otherwise introducing more advanced technologies could ‘amplify’ current inequalities (p.2).

Turning the focus to education and skills specifically, Gray (2016) highlights the ten skills needed to thrive in the 4IR, amongst other things. The ten skills include: complex problem solving; critical thinking; creativity; people management; coordinating with others; emotional intelligence; judgement and decision-making; service orientation, negotiation; and cognitive flexibility. Not surprisingly, and in relation to ‘hard’ skills, there is an emerging demand for Data Science skills across industries (Ibid). Data is increasingly seen as an asset and an enabler of innovation in fields such as AI. The increasing demand for data science skills has led to a shortfall in the supply of such skills and strong competition between industry, academia and the public sector for such skills (Ibid). The WEF’s Future of Jobs survey pointed to the relevance of data science jobs and skills. User Entity and Big Data Analytics technologies were the most prioritised across all industries surveyed, and business leaders planned to match the investment in such technologies with the creation of new data science-related positions (WEF Report, 2018). Chung and Gill (2017) highlight shortfalls in learning standards pertaining to web literacy skills. They point, for example, to the need for web literacy skills such as coding, revision and remixing of digital content, as well as skills such as navigating the web and learning ‘open practice’ – the latter involving using and contributing resources to the web to keep the web transparent (Ibid).

Considering the implications of the 4IR for higher education, Xing and Marwala (2017) state that higher education in the fourth industrial revolution (HE 4.0) is a “complex, dialectical and exciting opportunity which can potentially transform society for the better”

(p1). They point to the interdisciplinary nature of higher education functions in the future and argue that the convergence between humans and machines will reduce the subject distance between the humanities, social sciences, science and technology, and necessitate significantly more interdisciplinary teaching, research and innovation (Ibid, p.1). AbuMezied (2019) argues that a fundamental question should be asked regarding how higher education institutes would be affected by the 4IR and how the delivery of education will be transformed. She points to the blurring of boundaries between the internet, the physical world and humans, and states that the need for education in general, and higher education in particular, to be 'place-based', is declining. Physical boundaries no longer pose a barrier to education. Higher education has seen an exponential increase in the offering of Massive Open Online Courses (MOOCs), which are a disruptive innovation, and which are increasing the accessibility of education to learners (Ibid).

Chao (2017) argues that in order to educate for the fourth and future industrial revolutions, there will be a need to 'embrace' the technologies that accompany them. He points to the need for flexible education systems, programmes and curricula that allow for students' interests and needs, and cater for unforeseen work and social issues. Qualifications need to be assessed and awarded for learning across formal, non-formal and informal avenues (Ibid). Louw (2018) states that traditional and 'antiquated' learning methods still persist despite thorough discussions about student-centred learning, appropriate learning outcomes, lifelong learning and the use of technology. Higher education institutions need a new understanding of the context within which they function to ensure their relevance, value and sustainability (Ibid) – "while access to higher education has always been considered a human right, the changes in the nature, characteristics and drivers of the global system demand new practices to enable broader participation in different types of learning that achieve entirely new types of learning outcomes" (Ibid, p.4).

Keevy (2019), explores the role of quality assurance in higher education in the digital era. Quality assurance will be more about a digital credential<sup>1</sup> and less about a qualification. Research has pointed to the need for credentials that are granular, stackable, evidentiary, personalised and machine readable (Oliver, as cited in Keevy, 2019). It will furthermore become commonplace to have new quality dimensions that distinguish between presage, process and product (Commonwealth of Learning, as cited in Keevy, 2019). Keevy and Chakroun (2018) explore how to represent learning outcomes beyond a qualification and offer an outline of the 'ecosystem' of digital credentials. Keevy et al (2019) state that various technological and digitisation trends are providing innovative ways of making credentials more transparent, portable and stackable. Barabas and Schmidt (2016) favour decentralised digital credentialing systems, and put forward two recommendations to enable this – firstly, the development of a flexible standard for digital credentials, and secondly, using blockchain solutions to issue credentials and record data about how they are used. Jackson (2017) references an initiative of IBM to substantially invest in ongoing skills-based learning programmes for employees (e.g. Big Data 101 or Machine Learning

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<sup>1</sup> A credential is an electronic or paper-based representation of the different types of learning acquired by an individual. A paper-based representation is most commonly referred to as a transcript (Keevy and Chakroun, 2018).

101) and certify these skills with the fairly new concept of ‘digital badges’<sup>2</sup> – the latter seen as valuable digital transcripts. Badges can, for example, be promoted on résumés and on LinkedIn profiles for employees to see (Ibid).

Tyatya (2019) points out that many of the jobs for which Technical and Vocational Education and Training (TVET) students are being prepared, will no longer exist in 50 years. He cites statistics reported by the then Minister of Higher Education and Training, Nalendi Pandor, that only 11 out of 26 South African universities offer course modules in 4IR and related fields of AI and robotics, and that none of the existing 50 public TVET colleges offer any courses related to AI and robotics. He points out that TVET lecturers and students need to be prepared for the 4IR. The aspects that need to be addressed include revisiting pre-service training and industry experience for TVET lecturers; updating and aligning TVET curricula to industry needs in consultation with students, lecturers and industry; and incorporating 21<sup>st</sup> century skills into curricula, including skills such as critical thinking, people management, emotional intelligence, judgement, negotiation and cognitive flexibility (Ibid).

Within the basic education sector in South Africa, 4IR is seen to be a challenge. The Department of Basic Education is currently training thousands of teachers in coding. Coding as a subject is due to be piloted in a thousand schools across 5 provinces (Kekana, 2019). Kekana (2019) reported various views that identified various challenges with this initiative, including the rolling out of technology in rural schools (i.e. using technology in teaching and learning and training teachers to use technology), and the view that the implementation of advanced technology will be a burden on already over-worked teachers. However, it was also felt that 4IR will be possible in schools with government commitment (Ibid).

### ***SAQA and the 4IR***

Closer to home, SAQA, in its verification and evaluation of foreign qualifications, has embraced the 4IR by providing qualification holders with ‘digital seals’ and electronic SAQA Certificates of Evaluation (e-SCoE). In 2018, SAQA publically launched the e-SAQA certificate pilot project. Through this project, SAQA is arguably making strides in progressive technological developments that embrace features of the 4th Industrial Revolution. The digital seal can potentially contribute to lowering the incidence of qualifications fraud, and furthermore, holders of a digital seal may make it available to potential employers as part of securing employment. Digital seals could also assist the mobility of the skilled workforce across Africa and the rest of the world.

SAQA has also participated in key events and processes towards shaping how digitisation is used in the education and training sector. In this regard, SAQA participated in a United Nations Educational, Scientific and Cultural Organisation (UNESCO) briefing on the

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<sup>2</sup> A digital badge is a clickable graphic that contains an online record of 1) an achievement, 2) the work required for the achievement, 3) evidence of such work, and 4) information about the organisation, individual or entity that issued the badge (Lemoine and Richardon, as cited in Keevy and Chakroun, 2018)

World Reference Levels pilot project, on 26 June 2019. This event was one in a series of events held to celebrate 21 years of the National Qualifications Framework (NQF). UNESCO has developed an online tool that can be used in the recognition and registration of qualifications as well in the evaluation of foreign qualifications. South Africa, through SAQA, has been asked to pilot the online tool along with three other countries. UNESCO aims to make the tool available worldwide (Samuels, 2019).

Digitisation also featured in discussions at other events hosted by SAQA to commemorate 21 years of the NQF, and was a cross-cutting issue. One such event was the *International Seminar on Recognition of Prior Learning (RPL) for Professional Qualifications and Professional Designations*, held on 21 June 2019. In painting a picture of the way forward, the keynote address at this event, drew attention to the digital economy and related skills, amongst others things. Some of the highlighted issues were:

- digitisation in the labour market – ‘digital economy’;
- the polarisation of the labour market in OECD<sup>3</sup> countries (very high level skills and occupations and very low level skills and occupations, without a sufficient ‘middle’;
- a focus on a wider set of skills which are job-specific and transversal and include sustainability and digital skills;
- digital credentials;
- individual pathways supported by artificial intelligence;
- digital Learners’ records;
- privacy and security, the ownership of learners’ records and inclusivity; and
- the right to career guidance and counselling.

(Chakroun, 2019)

Another event was that of the *International Policy Learning Forum on the Conceptualisation and the Use of Learning Outcomes in South Africa*, held on 24 and 25 June 2019. Within the context of future trends, the future of qualifications was discussed, and the 4IR was one of the key trends discussed, amongst others. The future scenarios included, for example, digital badges, digital learning records, online apprenticeships, and blockchain (from the registration of qualifications, to accreditation, to resulting and certification). A key notion was to move beyond credentials towards having a continually changing profile of a person’s learning to support their transitions in work and life (Chakroun, 2019).

Apart from the aforementioned activities, SAQA is also one of the first signatories to the Groningen Declaration Network (GDN). The GDN is a global network of like-minded organisations that aims to establish digital student mobility. Underpinning the work of the GDN network is a shared view that individuals should own their own data (e.g. qualifications, professional designations, etc.) and be able to share these digitally, with anyone at any time. SAQA actively participates in GDN meetings, most recently

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<sup>3</sup> Organisation for Economic Cooperation and Development

participating in its 8<sup>th</sup> meeting in Mexico. The theme of the 8<sup>th</sup> meeting was “*Creating a new world for academic and professional mobility*” and a key focus was on encouraging transparency (EMM discussions, 10 July 2019).

SAQA embraces the 4IR and will continue to engage in dialogues and events on how digitisation is used in the education and training sector. SAQA has opened up a dialogue within SAQA on the 4IR - and undertaking research within SAQA is one such example of this. This paper describes a small focused study undertaken amongst a sample of management staff at SAQA.

## **2. RESEARCH OBJECTIVE**

In seeking to engage with the discourse on the 4IR, specifically within the education and training sector, SAQA initiated focused exploratory research to consider how SAQA and the NQF will be positioned within the context of the 4IR, with a particular lens on the implications of the 4IR for the roles and responsibilities of SAQA, both from a broad organisational perspective as well as in terms of specific functional areas.

### **2.1 Research Design, Sample, Themes and Questions**

#### ***Design***

This paper is based on a small exploratory qualitative research study undertaken amongst a sample of management staff at SAQA. It provides a bird’s eye view of some of the key issues SAQA will need to consider as part of big-picture thinking and envisioning the future within the context of the 4IR.

#### ***Sample and responses***

Participants were purposively selected and represented directorates involved in various functions. A sample of 15 staff members was selected from a management staff complement of 37<sup>4</sup> and invited to participate in the short study. Twelve (12) completed questionnaires were received.

#### ***Themes***

In envisioning how SAQA and the NQF should be positioned within the context of the 4IR, the research sought to determine **a)** the key considerations, **b)** what would enable success, **c)** the potential barriers and how these could be addressed, and **d)** the implications of the 4IR on the roles and responsibilities of SAQA (and particular functions). The aforementioned areas constituted the key themes of the research and informed the questions posed.

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<sup>4</sup> The management staff complement was 37 at the time of the survey send-out and reminders (May-June 2019)



## **Questions**

The questionnaire comprised open-ended questions to elicit the views and perspectives of management. This approach allowed for a deeper engagement by staff with the aspects being researched. The questions were as follows:

1. In envisioning how SAQA and the NQF should be positioned within the context of the Fourth Industrial Revolution:
  - a. What would you say are the key considerations?
  - b. What would enable success?
  - c. What are the potential barriers and how can these be addressed?
  
2. In your view, what are the implications of the Fourth Industrial Revolution for the roles and responsibilities of SAQA [Directorates to respond in relation to their particular roles and functions]

The findings, discussed next, are set out in relation to the research themes and include some verbatim responses from participants. It is important to note that the findings provide preliminary insights into future-oriented thinking, which will guide deeper discussions at SAQA on the 4IR.

## **3. FINDINGS AND DISCUSSION**

### **3.1 Key considerations**

The main issues that emerged from responses pertained to the automation of SAQA's work and the role of SAQA in relation to ensuring the relevance of qualifications. The specific findings are detailed next.

#### ***Automation***

The **automation** of SAQA's work was raised as a key consideration by most respondents (9). It was reported that manual systems and processes should be replaced with automated systems and processes, to enable a more 'streamlined' way of doing business at SAQA. It was reported that technology should form the 'backbone' of SAQA and the NQF, that processes should be automated, and that there is a "seamless transfer of information between SAQA and the Quality Councils (QCs)". In relation to the latter, it was reported that policy decisions need to be based on accurate and current information drawn from 'robust systems'. Automation, it was reported, would improve service delivery, increase service quality and enable the containment of costs. SAQA would need to 'catch up' with the third industrial revolution, explore the development of digital systems and "take advantage of rapid advances in computing power to enable new ways of generating,

processing and sharing information”. Furthermore, with advances in technology, it was felt that the focus should not just be on technology, but improved communications and connectivity. It was suggested that SAQA could be at the forefront with ‘one consolidated learner database’ in ‘one ‘integrated processing system’; that APPs/automated systems could give access to learner records for learners and employers; and that automated information systems could be used to upload achievement data.

It was reported that a key consideration is the automation of internal processes for the registration of qualifications and recognition of professional bodies, for example the submission of qualifications from the Quality Councils as well as the evaluation of qualifications. The latter is currently done manually, leading to longer turnaround times for registering qualifications.

The automation of submission and evaluation will assist in the tracking and evaluation of submitted qualifications as well as qualifications that were sent back for amendments to the QCs [Response 2]

Block chain technology was mentioned in relation to the issuing of Records of Learning (RoL) and Certificates of Evaluation for foreign qualifications, as a way of potentially streamlining processes for learners.

...we should also consider block chain to enable the Learner to move anywhere without having to print or take their original certificate with. The era of losing opportunities because a learner has lost a certificate or forgot their certificates has passed [Response 7]

One respondent pointed out that it was important to firstly understand the various dimensions of the 4IR, including digitisation, robotics, artificial intelligence, the Internet of Things (IoT), nanotechnology, quantum computing and biotechnology – and to thereafter engage with how SAQA’s work might be influenced by these aspects.

A definite key consideration is first to understand the total concept (of the 4IR), and then only one can explore how your work might be influenced by it [Response 5]

Another respondent explained that some of SAQA’s digital interventions can be described as part of SAQA’s 4IR contributions, for example, the electronic SAQA Certificate of Evaluation which was first piloted and then implemented from the 2018/19 financial year, and initial investigations into the use of blockchain technology to issue Records of Learning (RoLs).

According to one respondent, SAQA would need to consider its role if there is less emphasis on paper credentials and if there is a proliferation of online courses.

### ***Relevant qualifications and skills***

Another consideration, raised by six respondents, was the **relevance of qualifications and skills**, the latter mainly about SAQA’s role in this regard. It was reported that qualifications in 4IR areas would need to be registered and re-designed. Qualifications would need to accommodate both 4IR skills and ‘soft’ skills. A stark reality is that many

jobs globally will be automated and new jobs will be introduced, pointing to possible upskilling or acquiring new qualifications.

Facilitate the registration of, and curriculum redesign for qualifications in the areas of 4IR. Areas include robotics, artificial intelligence, big data, etc [Response 3]

Qualifications registered on the NQF must be relevant to growing our economy and meeting the demands of the 4th IR [Response 10]

To work towards ensuring that qualifications registered on the NQF allow students to balance technical skills that are at risk of being replaced by automation, with timeless 'soft' skills [Response 12]

To be mindful of the fact that a number of jobs worldwide will be replaced by automation. Millions of new jobs will be added to the global economy. Those who lose current jobs will, possibly, not have the necessary qualifications to fill the new positions [Response 12]

It was reported that SAQA should undertake focused research on the profile of people who are currently in 4IR fields/areas in the country and recognise professional bodies that support these areas.

SAQA must furthermore ensure that education and training that meets the demands of the 4IR takes place in our schools and HEI's, and in this regard, a coordination role would be crucial.

SAQA's coordination role will be of utmost importance in this case, because SAQA, the QC's and the entire NQF family will need to work together to ensure seamless processes [Response 7]

SAQA's coordination role would be particularly important should legislation and related policies need to be amended.

Other respondents raised questions about the implications of the 4IR for stakeholders in education and training, career readiness and understanding the required skills. Part of this would mean being innovative in preparing learners for skills and careers which do not yet exist or which have not yet been conceptualised.

What are the implications for schools, HE, educators and other stakeholders and key constituents? How do we redefine career readiness and better prepare learners for an uncertain future? What skills will be needed to enter this period of time and of deep change? [Response 6]

Thinking out of the box so that we equip people with skills they will need to use technology that might have not been conceptualised yet. Also be forward-looking, and think about what should we be teaching if what is taught becomes outdated within a short space of time. Finding ways for occupations to be reconceptualised if some occupations will change significantly by the time students graduate? [Response 12]

One respondent emphasised the relevance of the qualifications SAQA has registered and is going to be registering on the NQF across the three sub-frameworks, to future careers and active and involved citizenship. "The former must deal with appropriate knowledge and skills that are being taught while the latter must deal with relationship and interpersonal skills, ethics and values, and environmental issues, amongst others". In this

regard, a proposal was made for research to be conducted on the relevance of NQF qualifications in preparing learners for a 'digital state'.

I would propose that SAQA conduct research to re-visit the relevance of the NQF qualifications and part-qualifications in terms of curriculum, flexible provisioning and whether the learner is being appropriately trained for living and working in a "future digital state" [Response 9]

In relation to the above proposal, it was reported that questions have already been raised about the NQF having outdated qualifications registered on the NQF and the Quality Councils not being 'proactive' enough in aligning qualifications to a "changed and changing digital and social/economic context". It was suggested that SAQA could be guided by the nature of international qualifications that it evaluates, and can keep abreast of debates and research on 4IR as it relates to the African continent and the world at large. Issues of decolonisation and africanisation of curricula would need to feed into discussions and it would be important to collaborate with professional bodies and "bring them on board".

Research and development and the cross-border sharing of knowledge and skills, were regarded as important for the alignment process.

Research and development and working with other countries to share knowledge and skills, will be very critical for SAQA to be able to align itself with the broader societal and technological shifts triggered by 4IR [Response 7].

On a cautionary note, it was felt that the 'contextual realities' facing South Africa need to be considered when engaging with the 4IR.

Also, we must not lose sight of the contextual realities that we face as a country and continent by blindly pursuing 4th IR needs at the cost of our current realities which are different from 1st world realities and contexts [Response 9]

### **3.2 Enablers of success**

The main enablers of success were collaboration; being open to change; funding; ensuring relevant qualifications and skills; and ensuring an appropriate IT infrastructure and updated skills. The findings for each of the aforementioned enablers, amongst others, are discussed in more detail next.

#### ***Collaboration***

Collaboration was cited by nine respondents in different ways. Respondents referred to collaboration mainly in terms of the NQF family and relevant stakeholders working together to address the implications of the 4IR. For example, SAQA and the QCs would need to work together to discuss the automation of processes related to accrediting and registering qualifications, deal with issues around duplication, and share resources, amongst other things. Having a common vision and goal would be important.

SAQA and the QCs need to discuss and agree on an automation process to assist in the accreditation and registration of qualifications. It needs to be linked to the NLRD [Response 2]

Removal of all forms of duplication by the different role-players in the education environment; sharing of systems and data bases [Response 8]

Sharing a common vision for the NQF among NQF family members will go a long way towards enabling success [Response 10]

A common goal and a clear understanding of what is needed towards getting there. Own interests, turfs and agendas should not underpin this [Response 11]

Collaboration would also be particularly important to ensure the relevance of qualifications and skills for the 4IR.

SAQA and its key partners to work as a collective to agree to the objectives and outputs required to address the goals of the 4th (already here) and future IR [Response 9]

Working with the QCs and providers to identify 4IR skills and registering qualifications that meet this demand [Response 10]

In terms of the SAQA context, one respondent mentioned the need for collaboration and communication around using existing technologies and exploring new technologies, while another identified a need for 'partnerships'. One respondent specifically referred to working with the private sector "to share knowledge and skills".

### ***Openness to change***

Five respondents gave expression to the change that would be brought upon by the 4IR. The 4IR would require a) a change in mindset with regard to how teaching, training and qualifications are conceptualised, b) a re-think of the organisational structure to shift SAQA from being 'process-driven' to 'outcomes-driven', c) an understanding and learning about the 4IR, and d) an openness to change.

Re-thinking organisational structures to move SAQA from being process driven to outcomes driven [Response 10]

Change in the mindset regarding how teaching, training and qualifications are conceptualised [Response 12]

Everyone needs to understand and embrace the Fourth Industrial Revolution [Response 4]

...learning and understanding before taking a leap in the dark. How do we know what is possible if we do not fully grasp what we are dealing with and what opportunities it may present? [Response 5]

Flexibility and openness to change [Response 6]

### ***Funding***

Four respondents cited funding as a key enabler, one specifying that funding would be required for the purposes of using existing technologies and exploring new technologies,

and another seeing grants and funds as an incentive to be used by employers to train workers for the 4IR. Others mentioned funding more generally.

Additional funding would also be required to ensure that we are able to use the existing technologies, and explore new alternatives [Response 4]

Grants and public funding must be provided to incentivise employers to support the kind of training that is crucial to preparing the workforce for 2020 and beyond [Response 12]

Resources [Response 6]

Financial resources; redistribution of existing and new financial resources [Response 8]

### ***Relevant qualifications and skills***

The relevance of qualifications and skills was identified as a key consideration, as reported in an earlier section of the report, and this aspect was also reported as an enabler of success by three respondents.

These respondents were of the view that having qualifications that are relevant to the 4IR would enable success in positioning the NQF and SAQA within the context of the 4IR. This will require the benchmarking of qualifications internationally, considering the skills needs of the country and global economy, and preparing learners to work in cross-functional teams as job descriptions may not be ‘fixed’ in the future.

Having qualifications that meet the needs of the 4IR to better prepare our learners for 4IR. To achieve this, we need to look at international degrees and how overseas institutions have developed degrees better suited to meeting the demands of 4IR and the changing world of work [Response 7]

In my view, SAQA’s success in addressing this issue will be to ensure that the qualifications and part-qualifications that it has registered and will be registering are linked to relevant learning programmes and provisioning that address the current and future knowledge, skills and behavioral needs of the country, and the global economy [Response 9]

Encourage qualifications that prepare people for work – not for jobs; equipping learners to work in cross-functional teams because it means fixed job descriptions will be obsolete [Response 12]

### ***Appropriate IT infrastructure and updated skills***

For SAQA to fully embrace the 4IR, it would require a robust underpinning IT infrastructure and appropriately trained staff. Two respondents referred specifically to the updating of SAQA’s IT systems, and related to this, one respondent called for an “investment in technology”. Three respondents pointed to a need to re-train and upskill staff (capacity) to adapt to a dynamic environment.

A total re-vamp of IT systems and re-training of staff to function in this new environment [Response 10]

Updated (computer) systems [Response 3]

Investment in technology [Response 12]

Capacity in the IT Directorate to develop an online system for the registration of qualifications and recognition of professional bodies [Response 1]

Upskilled staff who keep pace with technological changes; [Response 3]

### ***Other responses***

Two respondents reported that it was important to take into account the contextual realities of the country, suggesting that doing this would enable success. For example, it would be important to retain and upskill people, create jobs and ‘prepare’ the context to deal with the changes brought on by technology. The latter would involve, for example, enabling access to data that is affordable, and finding solutions to broader societal problems such as poverty and unemployment, amongst other things.

Finding balance by ensuring that robots don’t replace people especially with the high unemployment rate in South Africa. We must make sure that we implement the 4IR based on our country’s socio-economic context by retaining and upskilling our people, and also create jobs [Response 7]

...more broadly the context has to be prepared to address digital and technological changes i.e. the country has to provide nationwide and affordable access to data, online learning etc. as well as address the pressing problems of poverty and unemployment [Response 9]

### **3.3 Barriers to success and solutions**

Some of the reported barriers were the corollary of what were reported as enablers. According to respondents, the main barriers would be a lack of funding and a resistance to change, amongst other things.

#### ***Lack of funding***

Six respondents reported the lack of funding to support 4IR initiatives as a barrier. Some respondents elaborated on their responses by pointing to solutions, while others reported a lack of funding more generally.

According to one respondent, a solution towards obtaining funding would involve foregrounding the importance of SAQA and the NQF in South Africa.

The availability (or un-availability) of funding probably presents the biggest barrier – especially for an organisation such as SAQA. This can be addressed by emphasising the importance of SAQA and the NQF in South Africa, and thereby securing funding towards embracing the Fourth Industrial Revolution [Response 4]

Another respondent pointed to the need for ‘new’ funding. Reference was made to the budgeting process, and it was argued that the allocation of financial resources by using

previous allocations as guideline, is a huge barrier. (i.e. 5 % increase on last year's allocation).

You cannot guide the future from a historic budget allocation, you need new funding [Response 8]

It was also reported that a system overhaul would not be possible without funding.

The greatest barrier is funding. Without adequate resources, the system re-vamp would not be possible [Response 10]

Linked to the above, it was reported that if the state could not fund 4IR initiatives, then an alternative would be to initiate high-level discussions and negotiations with the South African government and international partners to determine who would be willing to fund such initiatives. In this regard, it was felt that it was not the responsibility of SAQA and the QCs to raise funds given that these organisations needed to discharge a public service role.

It is not the responsibility of SAQA and the QCs to raise funds. We are providing a public service and should be provided with adequate resources to do our work [Response 10]

One respondent placed the responsibility on government to budget sufficiently and to secure funding.

...government budgeting adequately and sourcing other funding [Response 12]

### ***Resistance to change***

Four respondents reported that resistance to the change brought on by the 4IR would be a barrier. This resistance could be experienced by various decision-makers, role players and stakeholders. Responses were general and, with the exception of one, did not specifically indicate how these barriers could be addressed.

Political will continues to be an obstacle because of the resistance to changing needs [Response 6]

Non-cooperation from the different role players who want to guard their space because "we always did it this way" [Response 8]

Own interests, turfs and individual agendas [Response 11]

One respondent argued that resistance to change by some decision-makers could be addressed through establishing a common understanding and acknowledgement of what needs to be accomplished.

The way in which this should be addressed is through establishing a common understanding and acceptance of what we want to achieve. If we can agree on the big picture, then we can deal with the resistance to change [Response 10]



## **Other responses**

Two respondents pointed to the lack of a common vision as a barrier. Working in ‘silos’ would be problematic. The focus should be on collaboration, sharing skills and establishing a common vision and buy-in.

Working in silos – working together and sharing of skills is very crucial [Response 7]

One of the key challenges would be the lack of a common vision and buy-in by the entities involved [Response 9]

Other reported barriers could be the lack of expert IT and HR resources; the change in certain job roles and responsibilities; continuing and increasing inequalities (those who have the resources to change and those who do not); not fully grasping the changes that will be brought by the 4IR (with the solution being to learn from other countries and to document and highlight ‘emerging good stories’); not having workforce strategies that are aligned to the changes that are required by the 4IR (with the solution being to align strategies and include an innovation component); outsourcing rather than upskilling; and having a misinformed or ‘shallow’ understanding of the 4IR.

## **3.4 Implications of the 4IR for the roles and responsibilities of specific functions within SAQA, and SAQA more generally**

Sampled respondents representing specific directorates within SAQA were asked about the implications of the 4IR for the roles and responsibilities of their directorates. Some issues were specific to directorates, while others were cross-cutting. Some of the key insights, amongst others, pertained to:

- automating systems and streamlining processes (e.g. automation of records of learning, automation of access to learner data on the NLRD to employers to speed-up employment, timeous and real-time loading of learner data on the NLRD from all service providers, automation of a fraud register and collaboration between the Department of Justice, SAPS and SAQA, and developing an online system for the registration of qualifications and the recognition of professional bodies);
- Defining and reporting on misrepresented qualifications in a consolidated manner;
- harnessing the power of big data;
- re-envisioning the role of the NLRD;
- employing digital technology and continuous 4IR system development;
- linking systems across the NQF landscape nationally, regionally and internationally;
- providing information to help learners make informed decisions about career choices in 4IR areas;
- focusing on assessing credentials rather than qualifications, which would include qualifications/skills/short courses/part-qualifications and other learning;

- building capacity for high-level work and complexity;
- new policy and procedure developments to accommodate 4IR developments;
- adjustment of Human Resource requirements to accommodate 4IR skills;
- fostering an organisational culture where change is embraced rather than resisted, and where employees share a flexible and agile mindset and can respond and adapt to evolving and emerging technologies;
- keeping abreast of trends and developments in 4IR; and
- refocusing current ways of thinking about, for example, education, qualifications, qualifications frameworks, learning outcomes and skills.

In terms of the implications for SAQA more generally, the following aspects were highlighted by respondents:

- SAQA will need to show visionary and bold leadership to drive the process. It will not be a 'quick fix'.
- SAQA would need the support and collaboration of various stakeholders, and in particular the political authorities.
- This work cannot be an unfunded mandate and will require the necessary resources and capacity to lead and implement a short, medium and long-term strategy.
- SAQA's role as an advisor and the provider of information that supports decision making, becomes more critical. SAQA's role as the custodian of the information about the NQF takes on greater significance. SAQA will gain much more respect as the authority on NQF information if it has the proper systems in place to support this.
- Creating new knowledge based on SAQA's information also takes on a different meaning if SAQA has all of the records of the NQF in its possession.

## 4. CONCLUSION AND WAY FORWARD

SAQA initiated a small exploratory study to consider how SAQA and the NQF will be positioned within the context of the 4IR. A particular focus, amongst other things, pertained to the implications of the 4IR for the roles and responsibilities of SAQA, both from a broad organisational perspective and in terms of specific functional areas. The study provides insights into the issues SAQA will need to engage with, and provides an initial basis from which further dialogue and engagement can take place. As discussed earlier, and reiterated here, the findings provide preliminary insights into 'big-picture' thinking to guide deeper discussions at SAQA on the 4IR. The NQF Amendment Act 2019 and the requirements thereof, such as having separate registers for misrepresented and fraudulent qualifications and part qualifications and professional designations, amongst other things, will require SAQA to seek technological solutions where necessary, to enhance efficiencies.

SAQA will continue to deepen and enrich its understanding of the implications of the 4IR on its roles and responsibilities, by participating in both external and internal discussions and debates, keeping abreast of developments internationally, and conducting further research as necessary.

In conclusion, it is evident that technological advancements are transforming the global economy and are, no doubt, inevitable. Hanna (2017) offers the perspective that digital transformation is a social learning process, and not a “technological fix, a blueprint scan, a one-off event, or a one-size-fits-all strategy” (p.2). The process is a marathon and not a sprint, and furthermore, digital transformation involves varied stakeholders and is a process that is sustained over time (Ibid) – which within SAQA’s context, is food for thought.

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