

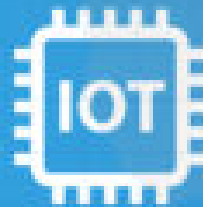


SABPP™
SA BOARD FOR
PEOPLE PRACTICES
Setting HR standards

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FACT SHEET

INDUSTRY
4.0



HR'S PLACE IN THE
FOURTH INDUSTRIAL
REVOLUTION



HOW TO READ AND INTERACT WITH THIS FACT SHEET

This Fact Sheet is designed to reflect the inter-connectivity and layered paths of the fourth industrial revolution by the hyperlinks to multimedia resources and networks of information, juxtaposed textboxes and lines of thinking, and multimodal engagement of the reader.

It is meant to be a medium for the reader to navigate and journey in-between the many resources available.



INFORMATION

This icon represents a small piece of extra information that can add to the context of a certain section, paragraph or point being made.



EXTERNAL RESOURCES

External resources for the added benefit of the reader. This icon will be used in the format of a button and will direct the reader through a link to a website with the relevant information.



INSIGHT

A small insight into the section, paragraph or point being made. The icon is used in the format of an indication and reference to a block with the relevant insight.



CLICK HERE

This icon gives the reader an opportunity to click on a button and has the reader taken to a space that the author would want to direct the readers attention.



VIDEO

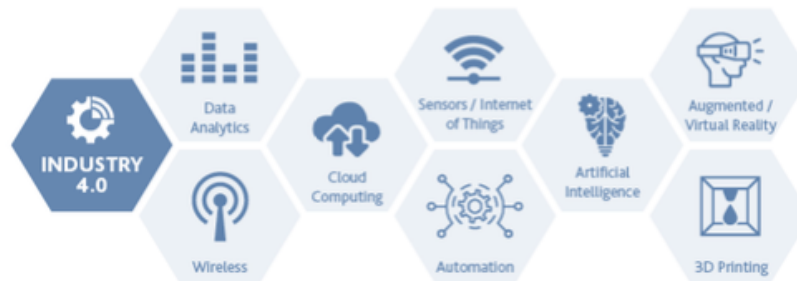
A video can be a great way to bring across an important point to the reader. This icon will be in the format of a button that will transport the reader to a video through a web link.

PLEASE NOTE: Any text that has been **bolded**, *italicised* and in a unique colour to the usual body text is also a link to more resources and is simply used by clicking on the text. You will be directed to the resources that the author has provided externally.

PAGE LAYOUT POSSIBILITIES

INTRODUCTION

The fourth industrial revolution (4IR) or industry 4.0 has become an urgent and critical priority for countries corporates and other organisations in relation to their strategy, sustainability and HR agenda. However, as illustrated in the adjacent figures, it presents a bewildering array of disparate technologies to contend with; conjures up images of autonomous robots and other technologies taking over and making humans redundant; and also promises a technology-augmented and 'personalised' productivity and consumption in our work/life.



This can lead to a sense of paralysis and reactive responses towards 4IR as well as a sense of wonderment and disorientation with the technologies' technical capabilities; which could impede a more proactive and strategic response.

This Fact Sheet builds on the discussion in the November 2019 Fact Sheet on Facing 4IR: What are South Africa's Constraints. It briefly explores further how the fourth industrial revolution is defined and then outlines three themes to help develop a systematic understanding of it. The themes are:

- techno fusion and utopianism;
- techno diffusion and realism; and
- technology as a social artefact.

These themes provide an organising framework for exploring the place of HR and the possible strategic HR choices and approaches available. This can assist with articulating what Strategic Human Resource Management (SHRM) means in 4IR; and what specific proactive and adaptive responses are required.

The SABPP National Human Resource Management Standards serves as an important guide in articulating what SHRM means. In particular, the SABPP Leadership Standard, the HRM Standard Element 1 Strategic HR Management, the Professional Practice Standard on Change Management, and HR Competency Model for example. These are illustrated below as a reference of the value, role and responsibilities of the HR practitioner as the discussion ventures into the complexities, contestations and paradoxes of 4IR.

The Leadership Standard is aimed at addressing the leadership crisis in South Africa, which is exacerbated by the fourth industrial revolution. It provides a framework that “creates a structure that defines, creates vision and the road map to drive leadership” (SABPP, 2017, p7; see the SABPP Leadership Standard Fact Sheet December 2017). The Standard comprises the following that speaks to the ‘doing’ and ‘being’ of leadership:

- Instilling a vision
- Delivering results which create value
- Living the values
- Influencing people

HRM Standard, Element 1:

Strategic HR Management is a systematic approach to developing and implementing HRM Strategies, policies and plans aligned to the strategy of the organisation that enable the organisation to achieve its objectives.

1.2.1 To ensure the HR Strategy is derived from and aligned to the organisation’s objectives in consultation with key organisational stakeholders.

1.2.2 To analyse the internal and external socio-economic, political and technological environment and provide proactive people-related business solutions

1.2.3 To provide strategic direction and measurements for strategic innovation and sustainable people practices.

Professional Practice Standard:

Change management is a purposeful, systematic approach to supporting individuals/teams/ organisations to arrive at a define desired future state which involves changes to the work environment or to the work itself

HR Competency Model:

Citizenship for the future: innovation, technology and sustainability

THE MEANING OF 4IR

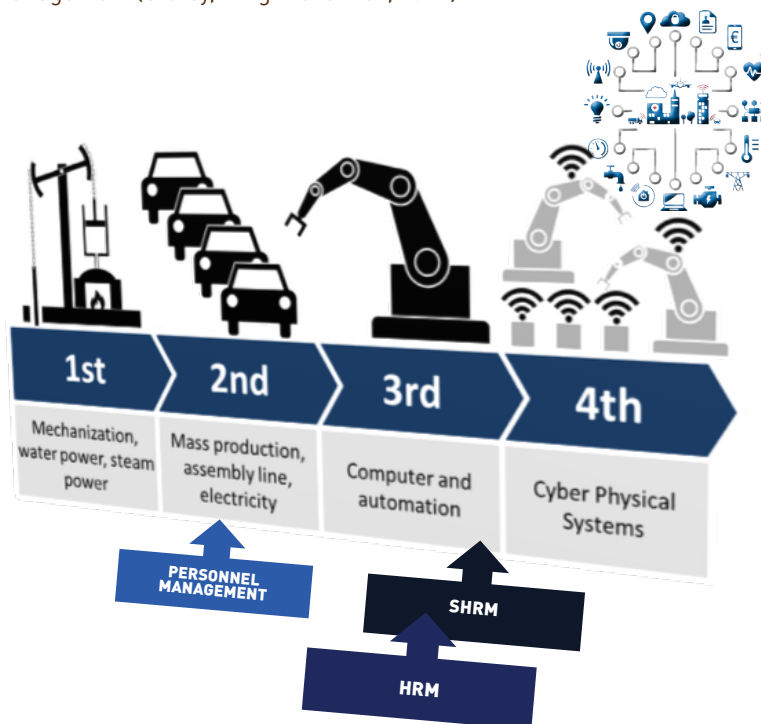
DEFINING 4IR

Klaus Schwab, the Founder and Executive Chairman of the World Economic Forum (WEF), is one of the prominent proponents of the argument that we are in a fourth industrial **revolution**. By **revolution** he means “*when new technologies and novel ways of perceiving the world trigger a profound change in economic systems and social structures*” (italics added, 2017, p6). The defining feature of the industrial revolutions for Schwab is technologies and the related new ways of making sense of, and acting on, our world. Schwab asserts that we are now in a fourth technological revolution that is leading to system-wide transformation and fusion of the physical, digital, and biological spheres, which will “fundamentally alter the way we live, work, and relate to one another” (Schwab, 2016). Thus, he asks for urgent leadership and collaboration on managing the unfolding fourth revolution across firms, industries, national economies and continents.

The November 2019 Fact Sheet described the four phases of industrialisation. It should be noted that there are various definitions of the industrial revolutions and ways of understanding them, which Schwab does acknowledge. There are also interchangeable use of terms such as digitisation, digitalisation and digital transformation in the various discussions on the third and fourth revolutions *(see Bloomberg (2018) for example: <https://bit.ly/2LXkSfR>)*. This adds to the complexity of, and confusion within, the many debates on the fourth revolution.

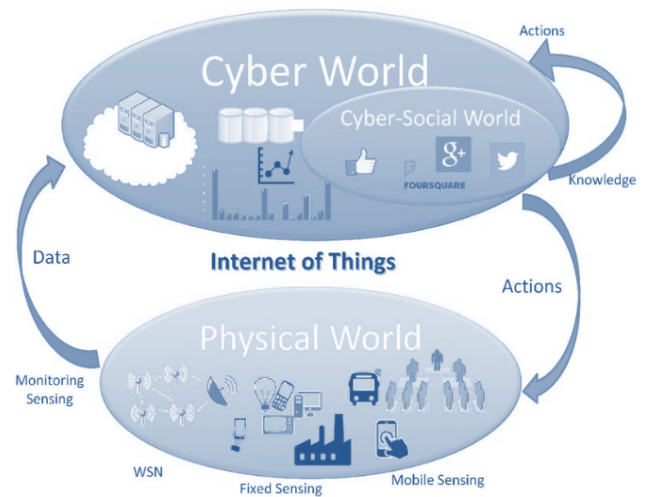
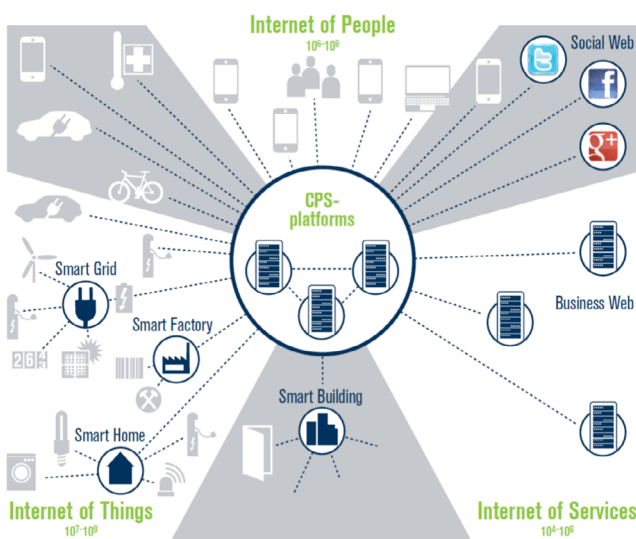
The four industrial revolutions can be illustrated in the figure below, which can also serve to roughly locate and contextualise the formalisation of what we know today as Human Resource Management (HRM) and Strategic Human Resource Management (SHRM) from the earlier Personnel Management (Storey, Wright & Ulrich, 2019).

View these additional resources by following the web links (by clicking on the buttons below):



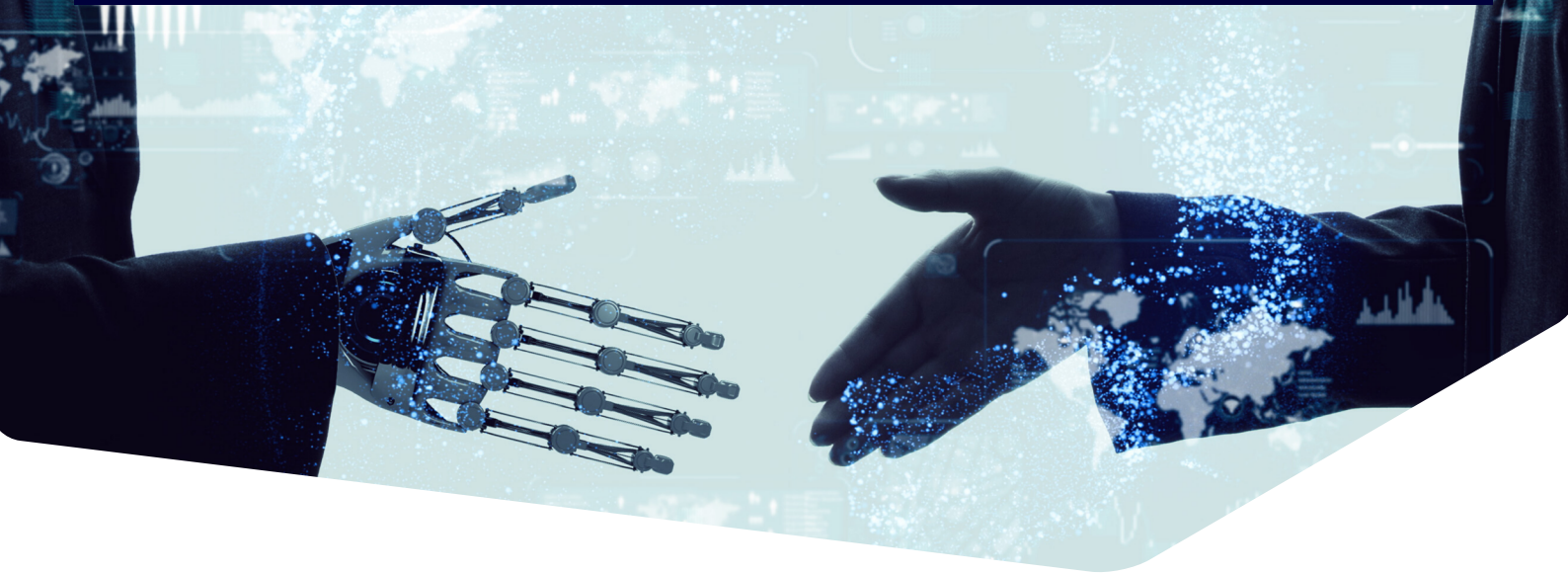
Cyber-physical systems mean the integration of computing, networking, connectivity, and various physical and biological processes across different parts of economies and geographies. This happens through the evolving development and adoption of a range of sensors, actuators, embedded physical and digital systems and other technologies. These include a mammoth list: cloud computing; advanced wireless connectivity; internet of things; augmented and virtual reality; distributed ledger technology; advanced automation and robotics; additive manufacturing; 3D printing; artificial intelligence; data analytics; geotechnology; nanotechnology; biotechnology; and neurotechnology (see SABPP Factsheet November 2019 and WEF (2018)).

Schwab (2017) argues that this integration is causing “unprecedented paradigm shifts in the economy, business, society” (p3), and our individual lives. Below are illustrative examples of cyber-physical systems, comprising the internet of things, services, energy and people. Note the reference to cyber-physical-social systems in the second illustration.



To recap, Schwab (2016) argues that the fourth industrial revolution is not simply the “prolongation of the third”. The fourth is different given the exponential *speed* and *scope* of transformations in technologies and the fusion of, the physical, digital and biological spheres; with the *system-wide* impacts on production, management and governance.





COUNTERPOINT

Rifkin (2016), for example, criticises Schwab's argument for a fourth industrial revolution. He presents an alternative interpretation that what we are observing is the continuing evolution of the digitalisation of the third industrial revolution; and that the fusion of spheres is an effect of the continuing digitalisation rather than a fundamental shift in it. He further argues that the characteristics of speed, scope and system-wide impacts that Schwab identifies with the fourth revolution can also be identified in the first three revolutions and, thus, are not unique to digitalisation. It depends on one's frame of reference.

“Both Professor Schwab and I agree that the introduction of digital technology across society over the past half-century has spawned vast, interconnected networks, fundamentally changing the way we organize our economic, political, and social life. We both would also agree that digitalization is the hallmark and defining technology in what has become known as the Third Industrial Revolution. I would argue, however, that the evolution of digitalization has barely begun to run its course and that its new configuration in the form of the Internet of Things represents the next stage of its development.”

Schwab acknowledges that “some academics and professionals consider the developments I am looking at as simply a part of the third industrial revolution” (2017, p2). He contends that the scope, speed and system-wide impact is qualitatively different to warrant the identification of a fourth industrial revolution.

Consider though other critiques that Schwab and the WEF focuses too narrowly on technologies and industries even though referring to system-wide transformations; and that their focus restricts technologies to tools, products and services (hardware and software) (see Unwin (2019), Hadebe (2018), and TIPS (2018a, b)). For example, technology and the convergence of technologies involve different concepts, knowledge domains and organisations, ecosystems, forms of adoption, and capital and resourcing. This means technology transfer and adoption is more complex and dynamic. One needs to take cognisance of global and local socio-economic histories and structures of inequality especially when considering ‘developing economies’; and consider the “complex reciprocal interactions between scientific, technological, economic, social and cultural change” (TIPS, 2018a, p18; Tshabalala (2017)). Here, one could reflect on the South African context.

THEMES OF 4IR

As can be seen in the above discussion in the counterpoint box there are contrasting perspectives on the fourth industrial revolution. These include debates on whether or not the evolving technologies are the defining characteristic of this revolution and its key driver; and, more broadly, deliberations on the nature of industrialisation, modernisation and development.

To help navigate these various debates and deliberations we can identify and explore the following themes for practical purposes: (1) Techno fusion and utopianism; (2) Techno diffusion and realism; and (3) Tech as a social artefact. As illustrated in the table below, the discussion of these themes focuses on how technology and its agency and impact are framed, the attendant policy and strategic choices that follow from this, and how HR is framed and located. This provides an organising framework for exploring possible strategic HR choices and approaches; and, thereby, proactive and adaptive responses.



FRAMING OF TECHNOLOGY	Convergence	Incubation, transfer and diffusion	Tech as socially constructed and embedded
AGENCY OF TECHNOLOGY	Exponential universalism, utopianism and frontiers	Context-bound and contingent	Mutual influence and institutional-boundedness
IMPACT	Tech-based disruption	Disruption and integration	Value creation
POLICY FOCUS AND STRATEGIC CHOICES	New economies	Evolving hybrid economies	Patterns of infrastructure, structure, discourses and practices
HR'S PLACE AND STRATEGIC CHOICES	HR disrupted	HR fit for the digital age	HR value creation and citizenry for future

- unbundling of HR function, practices and processes
- from lean, agile organisations to commons and decentralised, autonomous, protocol-based organisations
- universalistic and best practice approaches

- reinventing work, workforce, workplace and organisations
- building and developing firm-level ecosystems and value chains
- contingency, contextualised and configuration approaches; best (internal and external) fit approaches; fit and flexibility/agility; outside in HR; strategic agility

- reinventing industries, economies, institutions and macro-level ecosystems and value chains
- mission-orientated projects within public and value chain investments
- people custodian, ethically-centred governance, sustainability and citizenship for the future

The themes are not meant to be comprehensive or exhaustive in scope; nor a categorisation of clear-cut theoretical or strategic positions given the varied and vast literature available. For example, Schwab (2017) seems to hold an eclectic position that draws on various aspects of the above themes, which he describes as “pragmatic optimist” (p29). That is, between tech optimism/utopianism and pessimism/dystopianism.

THEMES OF 4IR: TECHNO FUSION AND UTOPIANISM

Convergence

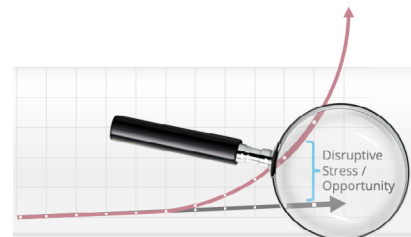
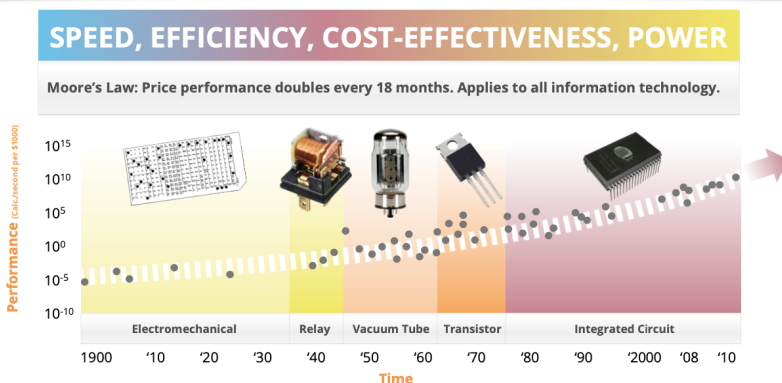
As discussed in the above section on the definition of 4IR, Schwab (2017) argues that there is a convergence of technologies and the previously separate physical, biological and digital worlds. For example, he cites how advanced robotics, 3D and distributed manufacturing, neurotechnology, gene editing, synthetic biology, internet of things and global platforms can result in the creation of new physical materials, autonomous production and transportation, personalised medical care and bio printing, human-machine interfaces, biofuels, and genetically modified plants and animals. Schwab also notes the convergence of industries where global platforms blur or dismantle the traditional boundaries between industries as well as firms¹. This means the unbundling, disaggregating and reconfiguring of industries and firms.

Exponential universalism, utopianism and frontiers

Singularity University is a consultancy and incubator which also argues for the convergence, pointing out that these technologies and its capabilities are growing at an exponential rate. Here, **Moore's law** of exponential increase in computing power over time is often cited and used as an illustration of exponential growth².



COMPUTING IS ACCELERATING TECHNOLOGY



Supporters of this approach appear to view technology as an abstract, rational force with its own exponential momentum and direction that can be harnessed by companies at the frontiers of innovation (such as those in Silicon Valley) to realise a future "utopia of abundance". They could be seen as an example of techno determinism and progressivism³; and of the argument for the point of technological singularity⁴. For more insight explore these links for their **beginnings** and **concepts**.



Singularity University provide a useful framework and concepts to understand how technology development is evolving exponentially. The 6Ds framework outlines the journey of digital technology as can be seen in the table below, from digitisation to dematerialisation and demonetisation. However, note Schwab's (2017) caution that "technology is not an exogenous force over which we have no control" and his argument against framing tech and the future as a "binary choice" (p4) between living with or without tech and development.

1. Consider the arguments for economic convergence of earlier modernisation theories: <https://www.weforum.org/agenda/2018/02/the-future-of-economic-convergence/>
2. https://en.wikipedia.org/wiki/Accelerating_change
3. https://en.wikipedia.org/wiki/Technological_determinism
4. https://en.wikipedia.org/wiki/Technological_singularity

DIGITISED	Once a technology is digitized it becomes an information science, and so we can use computers to manage it.
DECEPTIVE	Exponential growth is hard to spot. At the beginning of most exponentially advancing environments, the early stages of development are almost imperceptible.
DISRUPTIVE	After the initial deceptive growth, the development of an exponentially advancing technology can make the previous paradigm effectively obsolete, out-performing it in both effectiveness and cost.
DEMATERIALIZED	Items that were once large and unwieldy can now fit easily into our pockets. The miniaturization of sensors paired with digitization allows for the elimination of dedicated single-use physical devices. For example, cameras on smart phones.
DEMONETISED	GPS systems and high-resolution video cameras were prohibitively expensive in the past, but almost anyone can access them now that they are applications and sensors included on and in your phone. The cost of producing and replicating software is dramatically cheaper than creating the physical version of it, and the economies of scale associated with the sensors allow them to become eminently affordable.
DEMOCRATISED	Products, services, and information that were once only available to wealthy nations, research labs, or companies, are now becoming accessible by an ever-increasing percentage of the global population. If you can buy a cheap phone with an internet connection, you have the same communications capabilities and access to the same exact platforms as a billionaire.

DEMATERIALIZIZE

Physical products **disappear and consolidate**



DEMONETIZE

The cost of products and services **decrease significantly**



Singularity University (2020)



Tech-based disruption

As noted in the table above, the converging and exponential technologies will lead to tech-based disruption of traditional industries as well as legacy, incumbent firms. So there will be disruption to how we produce, transport and consume as well as the structural barriers inherent in them. Thus, being at the frontier means not being bound by the present and the 'stickiness' of existing structures. This allows for the reframing of problems and the consideration of various forms of automation, artificial and data intelligence, and augmented realities along with additive and 3D manufacturing, autonomous vehicles, robotics, sensors, nanotechnology, biotech and renewable energy as solutions.

New economies

Innovating at the frontier through exponential technologies and growth and not being bound by the present means the focus is on the creation of new economies and firms. However, there are different visions that are emerging. One vision is that of a **circular economy** that aims to be regenerative and eliminate waste⁵. Other examples are that of the sharing (or rather access economy), digital commons and relatedly that of Decentralised Autonomous Organisations (DAOs). Uber and Airbnb are examples of the **access economy**, which is mediated by these for-profit companies⁶. **Digital commons** is where there is collective creation and ownership of information and knowledge⁷. For example, Wikipedia and open software are digital commons. **DAOs**, in contrast, are designed to be automated and decentralised, which means there is no need for intermediation by for-profit and other organisations. DAOs work by designing crypto economic systems and protocols that utilise blockchains or other distributed ledger technologies with distributed or decentralised computing, game theory, and smart contracts (or digital, self-executing and enforcing contracts)⁸. There is also the idea of the commons-based economies, for example, the **Common Stack**⁹. Consider how DAOs and the Common Stack differ from the idea of **exponential organisations**¹⁰ by following the link to watch **Salim Ismail**, who is part of the Singularity University and explains the concepts of exponential organisations. He cites Google, Apple, Amazon, Ted Talk, Facebook and Uber as examples of some of the eleven attributes of exponential organisations.



The above different visions arise from different social, economic and political philosophies. Consider Taplin's (2017) argument on the influence of right-leaning libertarianism and evolving cyber-libertarianism in present-day Silicon Valley and technology companies; and the contrasts with tech's earlier counter-culture and cypherpunk (sic) hacker roots. It poses the question of how libertarian ideas, such as minimal taxes and government, minimal welfare, political decentralisation, and deregulated free markets, are shaping the new economies, platforms, and forms of engagement and employment? To provide context here is a nuanced take on the **evolving politics of Silicon Valley**.



5. <https://reports.weforum.org/toward-the-circular-economy-accelerating-the-scale-up-across-global-supply-chains/from-linear-to-circular-accelerating-a-proven-concept/>
6. <https://hbr.org/2015/01/the-sharing-economy-isnt-about-sharing-at-all>
7. https://en.wikipedia.org/wiki/Commons#Digital_commons
8. https://en.wikipedia.org/wiki/Decentralized_autonomous_organization
9. <https://commonsstack.org/>
10. <https://www.exo.works/insights/how-successful-companies-can-excel-at-disruptive-innovation>

HR disrupted

There is double sense of disruption of HR. There are many descriptions and scenarios of tech-based disruption of HR. A cursory search on “HR technology” and “HR Disruption” presents a bewildering set of results on how HR is being ‘rewired’, automated, and moulded for algorithm-based systems by the proliferating HR technology platforms, systems and applications.

However, there is a deeper disruption. The disruption of industries and firms is impacting the *very reason for the existence of an integrated HR function*. Existing workplaces, employment categories, employee/talent life cycle and related jobs, competencies, learning, and psychological contract are themselves being disrupted and made defunct. This means the disruption of the central defining feature of HR as it evolved from personnel management to HRM and SHRM, that is, employees and their lifecycle and productivity within firms. Storey et al (2019) see this as a challenge to the human capital investment and “high commitment agenda” (p5) of Strategic HRM that has evolved over time. It leaves open the question of what the development and deployment of a “highly committed and capable workforce” (ibid) and the future of work means now.

Presently we find the unbundling, disaggregation and reconfiguration of HR functions, practices and processes within firms as new forms of work, employment, organisation, management and economies evolve. For example, this includes suggestions on the use of talent or gig work platforms, lean start-up methodologies, lean organisational structures, and nudge or behavioural economics. We introduced Salim Ismail earlier in the Fact Sheet (page 10) and now consider his EXO formula comprising the eleven attributes of exponential organisations, in particular the Staff on Demand, Algorithms, Crowd and Autonomy attributes. He argues that in “any information-enabled business a large internal staff seems increasingly unnecessary, counterproductive and expensive”; and adds that “outsourcing [and crowdsourcing] whenever you can, makes your company agile, flexible, fast-moving, and cost-effective”¹¹. This on-demand sourcing can help tap into high-demand, specialist skills when required. These, together with algorithm-based decision-making, dashboards and automation, arguably make the discretion, decision-making, advice and action of HR professionals and managers (including other functional professionals and managers) redundant.

In a similar vein, other consultants, practitioners and researchers have described and/or prescribed the attributes and best practices of Silicon Valley and other frontier companies for adoption by traditional firms. These appear to present a universalistic and best practices approach to HR; that is, the identification of a set of best HR practices or practices of high performing firms¹² to learn from and replicate. The assumption of a universalistic approach is that the HR practices and their impact on performance are generalisable beyond the sample of firms and staff studied; and that the impact of these various HR practices is additive rather than multiplicative or synergistic (Martí n-Alca ´zar, Romero-Ferna ´ndez & Sa ´nchez-Gardey, 2005).



To gain some context and locate the proliferation of HR technologies and related disruption, the adjacent figure from Bersin (2019) is helpful. It displays the shift away from designing around integrated HR processes towards work and its experience and management in individuals and teams. Bersin (2018) also provides a helpful categorisation of the evolution of HR systems in the figure below, tracing the evolution from human capital management, talent management to HR in the flow of work¹³. Relatedly, in the next theme the reinvention of work is discussed.

	The 2000s	Today
Focus	Talent Management	Work Experience
Goal	Integrated HR transactions	Improved employee experience
Systems	Single platform	Ecosystem of apps
Platforms	ATS, LMS, TMS	Team and work management
Work Model	Job models, competencies	People, projects, goals, feedback
Technology	Integrated data models	Microservices, chatbot, AI
Design	Processes	Experiences (interactions)

- 11. <https://blog.growthinstitute.com/exo/11-attributes>
- 12. For example, consider **re:work**, Google’s “collection of practices, research, and ideas”.
- 13. Bersin elsewhere provides a summary of his overview of the current state of HR technologies. He previously highlighted ten disruptions for HR; and also the challenges of implementing HR technologies.

From HCM to Talent Management to *HR In The Flow of Work*



COUNTER EXAMPLES



There are interesting contrasts when comparing, for example, Bersin’s descriptions of how HR and the workplace are evolving, Mercer’s (2019) research on the building of *innovation-driven tech workplace* which is comprised of ‘digital natives’, and Ronnie’s (2018) reflections on *workplace disruption* for South Africa. Ronnie’s reflections in particular points to the importance of considering context as discussed below.



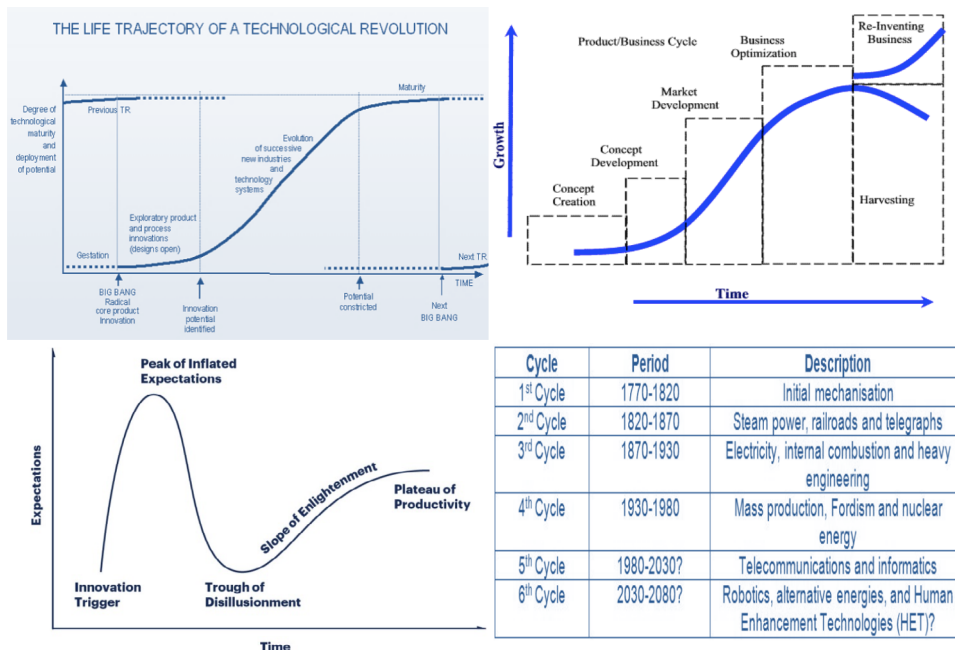
THEMES OF 4IR: TECHNO DIFFUSION AND REALISM

Incubation, transfer and diffusion

As can be seen in *Ismail's* explanation of exponential organisations and Singularity University's ecosystem of programmes, labs and expertise, there is an acknowledgment that innovative ideas, technologies and entrepreneurial teams do not arise in a vacuum. They require space, infrastructure, talent and incubation; and emerge from within the ecosystem of science, research and technology parks. Three important processes to consider in these ecosystems are innovation and technology transfer, diffusion and adoption. That is, how innovations and technologies are commercialised, spread and adopted in national economies¹⁴. Here is a [link](#) to how the Human Sciences Research Council (HSRC), for example, is building South Africa's technology transfer capability¹⁵.

Context-bound and contingent

As technologies do not arise in a vacuum so they do not take root, subsist and lead to developments in a vacuum. Technology is context-bound, and its development and use cycle, including disruptive potential, is contingent on factors within the particular context such as market receptiveness, sentiment and dynamics as well as social influence, social networks, talent base and incubation ecosystem. Schwab (2017) for example points to regions and cities as hubs of innovation development, absorption and deployment. This broadens the unit and scope of analysis from the narrow focus on exponential and frontier companies as in we saw in the last section on techno utopianism. Taking a step further, a macro level analysis could be undertaken. Here we could consider technology's S curves, adoption and hype lifecycle along with product, business and economic lifecycles such as the Kondratieff waves (as illustrated below)¹⁶. These have important implications for HR such as the alignment of workforce planning and broader talent management.

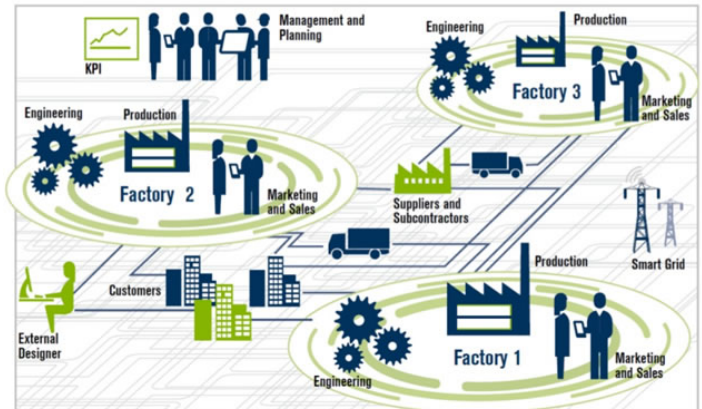


- 14. https://en.wikipedia.org/wiki/Diffusion_of_innovations
- 15. <http://www.hsrc.ac.za/en/review/hsrc-review-june-2017/technology-transfer-in-sa>
- 16. https://en.wikipedia.org/wiki/Business_cycle and <https://knowledge.insead.edu/strategy/the-next-cycle-of-capitalism-5226>

Disruption and integration

It follows from the discussion above that we should be cautious of conflating particular sets of technologies and the various modes of disruption of industries and firm’s business models (Armstrong, 2018; Kavadias, Ladas and Loch, 2016). For example, Armstrong (2018) points out that artificial intelligence “may enable automation, but it is the automation [as a mode of disruption] that has the potential to disrupt an industry or a business” (italics added, p13). Understanding the specific modes of disruption and potential business models provides a basis for firm’s strategic choices and responses. See Armstrong’s illustrated example of tech-enabled disruption in the adjacent figure.

Similarly, understanding how technologies enable integration of value chains also provides a basis for firm’s strategic choices and responses. For example, production platforms enable cross-firm collaboration and collaborative supply chain, production, logistics, sales, marketing, and management processes. This means shifting boundaries between industries as well as firms. As can be seen in the adjacent figure, the platform allows for the reconfiguration of the firm’s value chain, where the design, production, logistics, marketing and sales can be split-off and re-distributed across firms. With the evolution of cyber-bio-physical-social systems, the platforms will develop further capabilities. However, these discussions do not consider the ‘soft’ capabilities of teams, such as emotional intelligence and conflict management, that are required for collaborating and working across boundaries and teams.



The firm’s **business model** sets out its articulated assumptions, projections and intentions for how it creates or captures value and delivers it. The operational model then defines the capabilities, roles and responsibilities required for this; and how these should be configured. For HR, the challenge and opportunity is to consider how a firm’s capabilities needs to be bundled, unbundled and reconfigured given the value chain, business model, shifting boundaries, and attendant horizontal and vertical integration.



Evolving hybrid economies

Armstrong (2018) further observes that “not all [industries] are equally exposed to technological disruption” (*italics added*, p10). He argues that the unit of analysis should be the particular sectors and segments of the economy, which allows for a more granular, relevant and contextualised understanding of disruption and integration within national economies. This allows for a more nuanced and grounded understanding of how economies, industries, firms and business models are evolving. Consider also the tech, product and business cycles referred to above. Together these provide substantive insights on how traditional and disruptive (including access and sharing) economies are evolving together; and can supplement the digital maturity models of markets and firms that Armstrong provides an overview of.

Rifkin, in his *interview* discussion of Germany’s economy, offers provocative questions and thoughts on policy options for to how evolve national economies (remember Rifkin’s disagreement with Schwab on the third and fourth industrial revolution)¹⁷. It is at the level of national economies that Rifkin, Schwab and others point to the productivity paradox, that is, “the perceived failure of technological innovation to result in higher levels of productivity” (Schwab, 2017, p32). One possible explanation Schwab points out is that “innovations in information and disruptive technologies tend to raise productivity by replacing existing workers, rather than creating new products needing more labour to produce them” (p38). This is the dynamic between the innovation, disruption and automation-led destruction effects and the construction effects of the increase in “demand for new goods and services [which] leads to the creation of new occupations, businesses and even industries” (p36).

Chart 1

Easing off

Productivity growth has slowed dramatically around the world in recent years, especially since the global financial crisis.

(five-year average productivity growth rate, percent)



Sources: Penn World Tables 9.0; IMF, *World Economic Outlook*; and IMF staff calculations.
Note: Group averages are weighted using gross domestic product (purchasing power parity).

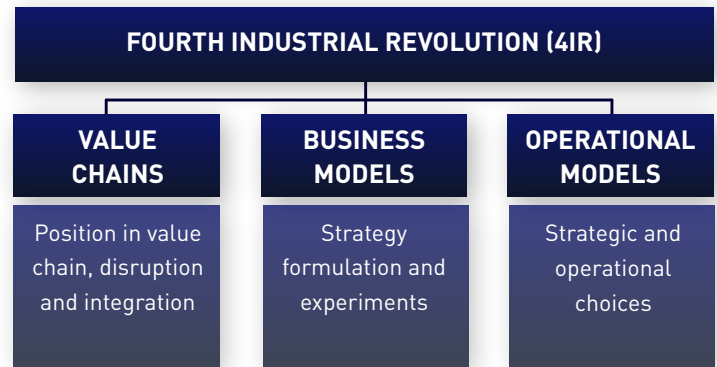
¹⁷ <https://yhoo.it/36ANJck>

HR fit for the digital age

The above discussion on the contexts, contingencies and economies of innovation, disruption and technology provides a more realist and pragmatic basis for positioning HR in, and making HR fit for, the digital age. It affords a more nuanced and grounded understanding of 4IR. More importantly, it opens up the space for a more deliberate, reflective and systematic response to 4IR in terms of how value chains, business models and operational models are evolving and how these can be shaped (as illustrated below). That is, it emphasises the need for Strategic HRM and proactive strategic choices.

A more deliberate, reflective and systematic response to 4IR will enhance the value, role and responsibilities of HR practitioners as articulated in the SABPP Leadership Standard, the HRM Standard Element 1 Strategic HR Management, the Professional Practice Standard on Change Management, and HR Competency Model for example. There are varied Strategic HRM approaches to meet the SABPP Standards, which are informed by a more realistic, grounded and pragmatic understanding of 4IR.

These Strategic HRM approaches include the contextual, contingency and configurational approaches (Martín-Alcazar et al, 2005; Storey et al, 2019). These variously consider the contexts, best internal fit of HR practices, best external fit of HR practices with the business strategy, and configurations of best internal and external fits. Storey et al suggest that both fit and flexibility/agility of HR systems are important within the current business and competitive landscape. This follows from their observation that “firms must be *efficient* [...] in their current operations, while also being able to their products, operations, and workforce to meet new competitive challenges as they arrive” (p71). This is similar to the concept of organisational ambidexterity.



Flexibility and agility may be approached from Ulrich’s description of ‘HR outside in’, where the business strategy is used as a frame or window to understand the external environment and stakeholder expectations. This understanding of the ‘outside’ informs what is ‘inside’ the firm¹⁸. This means reinventing the inside from the outside. Reinventing is a theme that continues in Yeung and Ulrich’s (2019) latest work and that of Bourdreau, Jesuthasan and Creelman (2015). These authors variously advise on the reinvention of work, workforce, workplace and the firm. Work, for example, is not necessarily seen and organised as jobs, which was previously illustrated in Bersin’s figure on the shift in HR technologies from integrated HR processes to work and its experience and management.

Bourdreau et al (2015) argue for the need to “deconstruct work” (p53), that is, disaggregate or unbundle tasks and work and distribute it across internal talent and external talent platforms. This can address skills shifts and gaps when required, but the authors also acknowledge that it could lead to the casualisation of work and workers. As discussed previously, though, the authors also point out that HR is embedded and “steeped in the language of employment” (p178) and the internalised employee lifecycle. Thus, the transition from leading employees to leading work will be a challenging one for HR and firms.

The key concept that emerges from the discussions on reinvention is that of a firm’s ecosystem and the need to reconfigure how the firm relates with the other parts of its system. This theme will be further explored in future SABPP publications.

HR remains with the paradox of a dual labour system and another form of digital divide; that is, on the one hand there is the in-demand, highly skilled and mobile talent geared for 4IR and who can reap the benefits of full-time employment and flexible work arrangements; and on the other hand those with skills that are or potentially redundant that face precarious employment and forms of work (Storey et al, 2019). This includes the following HR dilemmas: the process of job simplification into “discrete, well-defined tasks” (Schwab, 2017, p40) for monitoring, outsourcing and offshoring; development of self-organising, interdisciplinary and autonomous teams; management of the firm’s employment brand, motivation, performance, incentives and other behavioural economics-based interventions; and the management of gig platforms, workers and contracts.

¹⁸ Ulrich describes the outside in approach in this brief interview: <https://www.forbes.com/sites/danschawbel/2012/07/18/dave-ulrich-on-the-future-of-human-resources/#a8314c726647>

THEMES OF 4IR: TECH AS A SOCIAL ARTEFACT

Tech as socially constructed and embedded

There is an emerging line of argument through the discussions on technology incubation, transfer and diffusion that technologies are not an abstract, independent rational force subsisting outside of social contexts. This argument can be taken a step further by the understanding that technology is in essence a social artefact, meaning it is socially constructed and embedded. It does not have an independent, external essence or meaning, which should not to say it does not have physicality and agency.



Johnson (2019) provides an introduction to the **Social Construction of Technology** theoretical perspective and shares the bicycle case study ¹⁹. A broader, accessible introduction can be found on **Wikipedia** where critical perspectives and histories are also discussed ²⁰. These perspectives and histories question the status quo and ask how power relations and dominant discourses shaped and formed what we take for granted as given and as our present and evolving future. Consider the debates on the critical and contested histories of science, technology, industrialisation, modernisation and post-colonialism. See for example Raj's (2013) article on "Beyond Postcolonialism and Postpositivism" and Law and Wen-yuan Lin's (2015) article on "Provincialising STS [Science, Technology and Society]".

In this perspective, technology appears to be defined more broadly. It is not just a standalone technical object, instrument or tool such as a machine, robot or digital platform; but rather the interconnected processes, methods, skills, understandings and networks it is implicated within and which gives it its meaning, use and value.

Mutual influence and institutional-boundedness

It is clear from the above that there is a mutual influence between technology (or rather the technical world) and the social world. It is not unidirectional as argued by those in the school of technological determinism, where technology shapes and influences the social world. Certain authors may argue further that there is no separation between technical and social worlds; and that technology, in the broader sense, is institutionally-bounded not just context-bounded. This means the technical world (including innovation, disruption and exponential concepts) is essentially social, and is defined and made meaningful and useful from within social, economic and political institutions. Technology's agency, thus, emerges from these institutions and the rules, norms, routines, practices, power relations and discourses therein.



A deeper insight can be gained on institutional-boundedness through an exploration of, for example, paradigms, socio-technical systems (STS), general purpose technology, political economy, neoinstitutionalism, and circulation dynamics (as discussed in Raj's (2013) article).

¹⁹ <https://bit.ly/2N0CPVC>

²⁰ https://en.wikipedia.org/wiki/Theories_of_technology

Value creation

Given the social nature of technology and the view that it develops within institutions, the level of analysis is the macro patterns of how value is created within economies. In this perspective innovation, disruption and exponential growth are in essence contestations on who creates and captures the benefits of value.



Mariana Mazzucato, who serves on President Ramaphosa’s Economic Advisory Council, explores what is economic value and who creates it in her **Ted Talk**²¹. Consider her argument on the myths of the individual, entrepreneur-based innovation and of Silicon Valley; and how it is public investment that provides the ‘ground’ for **value creation** and therefore the benefits should be widely shared. See the example of **DARPA** and its role in the development of the internet²².

“If it was the state, not the private sector, which had traditionally assumed the risks of uncertain technological enterprises that led to the development of aviation, nuclear energy, computers, nanotechnology, biotechnology and the internet, how were we going to find the next wave of technologies to tackle urgent challenges such as catastrophic climate change, the epidemic of antibiotic resistance, the rise of dementia?” (Medeiros, 2019)

TED TALK

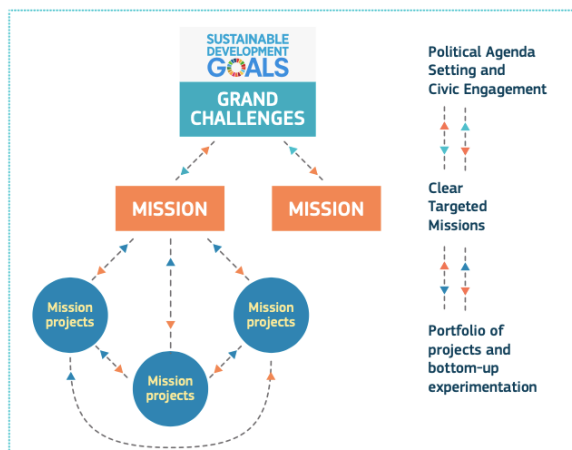
Value Creation

DARPA

Patterns of infrastructure, structure, discourses and practices

It follows from the above discussions that the policy focus and strategic choices under this theme are much broader than in the previous themes on techno utopianism and realism. For example, Mazzucato clearly articulates the need for state or public investment in infrastructure and structures of research, development, innovation and value creation. This means analysing the existing patterns of infrastructure and structures and addressing the investment required in these. Mazzucato states, “[h]istory tells us that innovation is an outcome of a massive collective effort – not just from a narrow group of young white men in California” (quoted in Medeiros, 2019). We should note that, for Mazzucato, the state means a “decentralised network of different state agencies [that are] mission-oriented to solve problems and structured to take risks, [and in this way] they can be an engine of innovation” (ibid). This is illustrated in Mazzucato’s figure to the right.

“Economics is full of stories [...] Words like ‘enabling’, ‘facilitating’, ‘spending’, ‘regulating’ – they create a story of the state as boring and inertial. It becomes a self-fulfilling prophecy. We need a *new narrative* to guide better policies.” (italics added, ibid)



²¹ <https://bit.ly/2ZXKtVW>

²² <https://en.wikipedia.org/wiki/DARPA>

“Mission-oriented policies can be defined as systemic public policies that draw on frontier knowledge to attain specific goals [...] Missions are also a new way to think about the dynamic interactions between enabling *horizontal* policies (framework policies around e.g. education, skills, training, research and innovation) and more directed *vertical* policies (e.g. health, environment, energy). Instead of using vertical policies to ‘pick’ sectors or technologies, the vertical aspect of missions picks the problem. The solution is then reached by stimulating multiple sectors and multiple forms of *cross-actor collaborations* to work to address those problems using the *entire research and innovation value chain*, from fundamental research to applied research and cutting-edge innovation” (italics added, Mazzacuto, 2018).

Mazzacuto and the social constructionist and other critical perspectives open up the space to ask questions about how value, ownership, access, voice, participation, labour, employment and the psychological contract, employment categories, and worker identities are shaped and defined. This includes how democratic participation, deliberative democracy, governance and human rights are shaped and enacted within the digital, socio-material, cultural, economic and political spaces.



Key themes to consider are that of the digital divide, deindustrialisation in developing economies, just transition and surveillance capitalism.

HR value and citizenry

HR practitioners and stakeholders have a key role to play in understanding, building and shaping infrastructure, institutions and value creation at the national, industry and firm level; and thereby shape 4IR and the responses to it.

This includes ensuring ethically-centred governance, human or people-centred policies, and sustainability. There are many levers for HR to realise its value and citizenry at different levels. For example, at the national level this could be through an engagement with the national skills system through the Sector Education and Training Authorities (SETAs) and other stakeholders. This engagement could collaboratively address South Africa’s value chain integration and investment, national readiness, skills development and skills gaps for 4IR; along with the casualisation of workers, job losses and youth unemployment²³ (Abbott, 2019; Hamann, 2018; Hadebe, 2018). Another example is the use of various national forums and bodies such as the SABPP.

The SABPP People Factor Strategy #202030 provides an example of a comprehensive framework for positioning HR in the digital age and realising HR value and citizenry: “HR practitioners must assist their organisations to harness the digital technologies to find new markets, new products and services and new operational processes. They must be able to foresee what new skills their organisations will need to enable man and machine to achieve the best balance. They must be able to find innovative ways to reskill and reassign people so that social injustice through displacement does not endanger society.”

In a similar vein the WEF suggests a **HR 4.0** framework comprising the following six imperatives:

1. developing new leadership capabilities for the 4IR;
2. managing the integration of technology in the workplace;
3. enhancing the employee experience;
4. building an agile and personalized learning culture;
5. establishing metrics for valuing human capital; and
6. embedding diversity and inclusion²⁴.



²⁴ See Abbott’s (2019) article and the SABPP Fact Sheet on the Future of Youth in SA (October 2018).

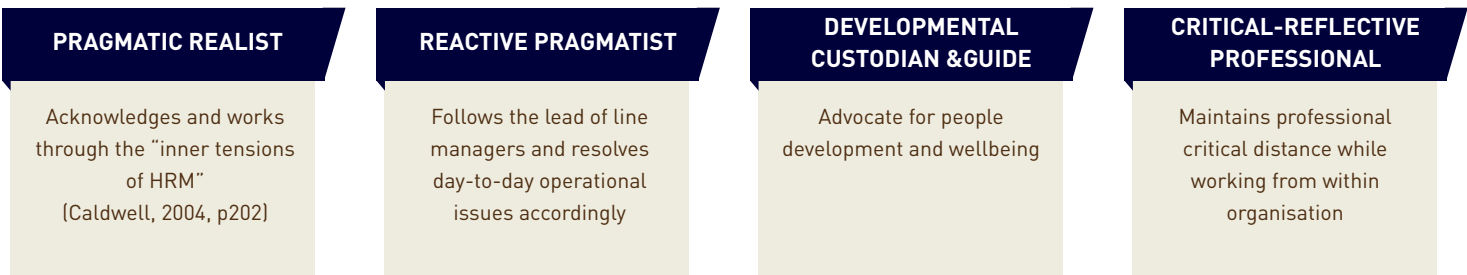
²⁵ <https://www.weforum.org/reports/hr4-0-shaping-people-strategies-in-the-fourth-industrial-revolution>

HR 4IR READINESS



A critical question we need to ask of ourselves is our own readiness for 4IR and its implications. The November 2019 Fact Sheet presented some information on the state of readiness of South Africa as a whole, for example, human capital shortages, internet penetration and the adoption of smart technologies. We must now look at the readiness of the HR profession in South Africa. SABPP’s HR Management System Standards Model and People Factor Strategy 2020-2030 provide a vision and guideline to assess our capabilities and readiness. HR needs to develop competence in hindsight, insight, foresight, oversight as well as in leading society more broadly. More importantly, as the Chair and CEO of SABPP ask, is it time to reinvent ourselves and create new models of people empowerment and productivity.

To reinvent ourselves we need to understand the identity-work required, how this is shaped by the positions we take up in our respective organisations, and our defensive reactions (of fight, flight and freeze) that may be activated. The diagram below draws on research to identify the range of positions HR practitioners take up within traditional HRM (Caldwell, 2004; Jivan, 2017). Relatedly, as previously noted, Schwab (2017) describes himself as a pragmatic optimist.



Reinventing ourselves means taking up new roles and positions and working through how we construct our identities as HR practitioners in these new positions. Reinventing ourselves and helping others in our respective organisations to do the same is hard work. It leads to and is influenced by our emotional reactions. In particular, our defensive reaction as our comfort zones, familiar ways of doing things, titles, statuses, job profiles, and career ladders are disrupted. In this defensive state we view change as danger, which impedes us from engaging in more creative and adaptive problem-solving and responses.

IN PLACE OF A CONCLUSION

As one follows the different threads of the discussions on the fourth industrial revolution and the identified themes, it is clear that it is not about a final point or destination. Rather we seem to be in transition to something unknown. The challenge is how we envision, lead, empower and collaborate to define the futures we seek to find. The plural is deliberate as there is the potential for a plurality and diversity of futures as well as entrenchment or amelioration of the divide of 'have' and 'have nots' in South Africa, Africa and globally.

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