



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

Private Bag X894, Pretoria, 0001

Tel.: +27 (0)12 843 6300

Fax: +27 (0)12 349 1030

www.dst.gov.za

## **Background Note for Consultation on South Africa hosting an Affiliate Centre of the World Economic Forum's Centre for the Fourth Industrial Revolution**

*"The Fourth Industrial Revolution represents a fundamental change in the way we live, work and relate to one another. It is a new chapter in human development, enabled by extraordinary technology advances commensurate with those of the first, second and third industrial revolutions. These advances are merging the physical, digital and biological worlds in ways that create both huge promise and potential peril ... The real opportunity is to look beyond technology, and find ways to give the greatest number of people the ability to positively impact their families, organisations and communities." - (World Economic Forum, 2018).*

South Africa's adoption of transformative technologies should be in the form of a unique model, strategy and objectives, informed by South Africa's socio-economic imperatives and shaped by South Africa's unique contexts and circumstances as a developing economy. Due to the globalised nature of the economy and the digital transformation, South Africa and Africa as a whole will need to actively collaborate both internally and externally in order to remain competitive. To this end, the Department of Science and Technology is leading the effort to establish in South Africa an Affiliate Centre of the World Economic Forum's (WEF) Fourth Industrial Revolution Network (C4IR Global Network).

Headquartered in San Francisco, the Centre for the Fourth Industrial Revolution Network launched new hubs in China, India and Japan in 2018. In addition to these Forum-led centres, the network is establishing affiliate centres around the world that are managed and operated locally by governments and/or invited academic institutions.

The Centre for the Fourth Industrial Revolution Network's vision is to help shape the development and application of emerging technologies for the benefit of humanity. The network's mission is to co-design, test and refine governance protocols and policy frameworks to maximize the benefits and minimize the risks of advanced science and technology. To accelerate impact and drive change, the network brings together governments, business organizations, dynamic start-ups, civil society, academia and international organizations from around the world to work together across nine emerging technology areas:

### **1. Internet of Things (IoT), Robotics and Smart Cities**

As IoT technologies continue to spread to all aspects of day-to-day life, questions about data ownership, accuracy and privacy protection take on greater importance. Similarly, in an interconnected world where electric grids, public infrastructure, vehicles, homes and workplaces are capable of being accessed and controlled remotely, the vulnerability to cyber-attacks and the potential for these security breaches to cause serious harm are unprecedented.

Possible projects within the Internet of Things, Robotics and Smart Cities portfolio include:

- A multi-city approach to smart cities which enables transparency standardization and data sharing across municipalities
- A policy framework for ensuring an inclusive roll out of 5G in low income communities
- Accelerating the digital transformation of utilities like water and electricity

## **2. Precision Medicine**

Fourth Industrial Revolution technological advances – such as increased computational capacity, sophisticated digital information platforms and large amounts of genetic and biological data – are changing the players involved and the way in which health and healthcare systems function. A more tailored approach to screening, diagnostics, treatment and cure can improve outcomes and potentially lower costs. Government, industry, academics, civil society and patient groups need to collaborate to ensure that the whole of society is able to benefit from rapid advances in technology and precision medicine.

A possible Precision Medicine portfolio for a South Africa Affiliate includes the following projects:

- Breaking barriers to health data
- Leapfrogging with precision medicine
- Re-visioning clinical trials (African cohorts)
- Enabling access through innovation in pricing and reimbursement improved diagnostics and therapeutics

## **3. Blockchain and distributed ledger technologies**

Blockchain, an early-stage technology that enables the decentralized and secure storage and transfer of information, has the potential to be a powerful tool for tracking and transactions that can minimize friction, reduce corruption, increase trust and empower users. Cryptocurrencies built on distributed ledger technologies (DLT), despite still being in their infancy, have emerged as potential gateways to new wealth creation and disrupters across financial markets. Other revolutionary use cases are being explored in almost every sector, ranging from energy to shipping to media.

By taking a systemic and inclusive approach to this technology, it is possible to ensure that everyone—from the most marginalized members of society to the most powerful— benefits from its transformative potential.

Possible projects include:

- Interoperability, integrity, and inclusion: Blockchain for supply chains
- Central banks in the age of Blockchain
- Unlocking transparency
- Re-imagining data ownership and economic models in the token economy
- Digital identity and certification

## **4. Artificial Intelligence & Machine Learning**

Artificial intelligence (AI) is the software engine that drives the Fourth Industrial Revolution. Its impact can already be seen in homes, businesses and political processes. It holds the promise of solving some of the most pressing issues facing society, but also presents challenges such as inscrutable “black box” algorithms, unethical use of data and potential job displacement. As rapid advances in machine learning (ML) increase the scope and scale of AI’s deployment across all aspects of daily life, and as the technology itself can learn and change on its own, multi-stakeholder collaboration is required to optimize accountability, transparency, privacy and impartiality to create trust.

The Artificial Intelligence and Machine Learning (AI/ML) portfolio aims to support the development of policy frameworks and governance protocols to accelerate the societal benefits and mitigate the risks of AI and ML. Projects could include:

- Empowering AI leadership
- Unlocking public-sector AI
- Generation AI: Standards for protecting children
- Re-imagining the regulator
- Data marketplace for AI
- Teaching responsible AI
- The ethics switch

## **5. Autonomous and Urban Mobility**

Autonomous vehicles (AV) have the potential to improve road safety, decrease pollution levels, reduce congestion and transform the design of cities. With the proper parameters in place, AVs can be safer, more efficient and more economical than vehicles today. However, transitioning to autonomous vehicles involves a disruptive shift that is bound to reshape public and private transportation systems, leaving many players behind if they fail to keep pace with emerging technologies. Collaboration among business and government leaders is needed to jointly identify the best strategies for accelerating the adoption of autonomous mobility in a safe, clean and inclusive manner.

Possible projects will focus on areas including safety regulations; societal benefits, equality and access; infrastructure readiness; shaping urban mobility choices; and data governance and security.

## **6. Data Policy**

As data is increasingly generated and collected globally, businesses require clearer and more practical data policies, while policy-makers need better tools to develop future-oriented and agile frameworks for data regulation that will allow for innovation but protect individual privacy. The Data Policy portfolio focuses on maximizing the humanitarian and beneficial uses of data while seeking to develop practical solutions using a multi-stakeholder approach to policy-making.

Projects include:

- Data policy toolkit
- General Data Protection Regulation (GDPR) for the Fourth Industrial Revolution
- Chief data officer community
- Trustworthy data for the common good

## **7. Digital Trade**

The Fourth Industrial Revolution has already had a profound impact on global trade, economic growth and social progress. The ability of data to move across borders underpins new business models, boosting global GDP by 10% in the last decade alone. However, digital trade barriers including outdated regulations, fragmented governance and strict data localization policies could potentially hamper these gains. At the same time, policy-makers must balance societal concerns in the digital commercial space while stakeholders need to navigate divergent national responses.

The Digital Trade portfolio contains projects that fall under one of three overarching themes: Enabling e-Commerce, TradeTech, and cross-border data flows. Projects include:

- Paying without cash: Accelerating the digital payment transformation
- Trade single window with Blockchain application
- 3D printing
- Cross-border data flows: Global approach with a regional focus

## **8. Drones and tomorrow's airspace**

Although drones have the potential to transform business models and tackle societal challenges around the globe, governments are struggling to find ways to encourage innovation while maintaining public safety and confidence. Large companies, as well as a growing start-up ecosystem, are hindered in their ability to invest and expand. Enabling millions of manned and unmanned aircraft to fly concurrently will also require new types of airspace management, physical infrastructure, and privacy and data ownership policies. Laying the right policy foundation and platforms for industry cooperation today, both through smart government regulation and industry-driven standards, will accelerate the adoption of new use cases and business models once the enabling technology and infrastructure are mature.

Projects that fall under the Drones and Tomorrow's Airspace portfolio include:

- New paradigms for Drone regulation
- Drone Innovators Network
- Drones for Government services
- Re-imagining aircraft certification  
Medicine from the sky

## **9. Fourth Industrial Revolution for the Earth**

The technologies of the Fourth Industrial Revolution offer new tools for enabling better stewardship of the Earth. Among these are innovative data collection and analysis tools such as small satellites; robotic platforms for air, land and water; novel sensors; AI; and genetic sequencing. In combination,



these offer potentially transformative opportunities for managing our environmental future.

The Fourth Industrial Revolution for the Earth's portfolio of projects includes:

- Scaling up renewable energy with Blockchain
- Ocean innovations for healthy oceans
- Environmental data from Fourth Industrial Revolution technology

**The South African Affiliate Centre will have access to the C4IR Global Network. The benefits of joining the network include:**

- Working with experts in the network to develop custom governance tools and frameworks to address specific challenges related to Fourth Industrial Revolution technologies that address national priorities, created and piloted with the network's user-centred design methodology.
- Gaining unique insights in new forms of governance and new technology applications, allowing policymakers and thought leaders to stay ahead of the curve.
- Being visible as a global leader committed to innovation and implementation of new technologies that matter to society.
- Connected with cutting-edge technology innovators as well as specialists, developing new governance models for the Fourth Industrial Revolution.
- Development of individuals as fellows in-residence at the Centres in the C4IR Network, and develop a community of peers and pioneers across business, academia and civil society.

*Enquiries:*

*Daan du Toit*

*Deputy Director-General: International Cooperation and Resources*

*Department of Science and Technology*

*Tel : +2712 843 6323*

*Website: [www.dst.gov.za](http://www.dst.gov.za)*

*E-mail : [Daan.duToit@dst.gov.za](mailto:Daan.duToit@dst.gov.za)*