# IMPLEMENTATION PROGRAMME GUIDE

## FOR THE NATIONAL DIGITAL AND FUTURE SKILLS STRATEGY OF SOUTH AFRICA

### 2021 - 2025

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## Acronyms

| | |
|---|---|
| APIs | Application Programming Interfaces |
| BBI | Broadband Infraco |
| BPS | Basic Package of Support |
| CAT | Computer Applications Technology |
| CDW | Community Development Workers |
| CfE | Care for Education |
| CHE | Council for Higher Education |
| CHW | Community Health Workers |
| CIDA | Community Individual Development Association |
| COGTA | Department of Cooperative Governance and Traditional Affairs |
| CPSI | Centre for Public Service Innovation |
| CWD | Children with Disabilities |
| CWP | Community Works Programme |
| DBE | Department of Basic Education |
| DCDT | Department of Communications and Digital Technologies |
| DDF | Digital Development Fund |
| DEL | Department of Employment and Labour |
| DHA | Department of Home Affairs |
| DHET | Department of Higher Education and Training |
| DHP | Digital Hubs Programme |
| DISA | Disability info South Africa |
| DoH | Department of Health |
| DPSA | Department of Public Service and Administration |
| DRLR | Department of Rural Development and Land Reform |
| DSAC | Department of Sports, Arts and Culture |
| DSBD | Department of Small Business Development |
| DSC | Digital Skills Centre |
| DSD | Department of Social Development (DSD) |
| DSF | Digital Skills Forum |
| DSI | Department of Science and Innovation |
| DTIC | Department of Trade, Industry and Competition |
| DWYPD | Department of Women, Youth and Persons with Disabilities |
| ECD | Early Childhood Development |
| EIG | Education Infrastructure Grant |
| EMIS | Education Management Information System |
| EPWP | Expanded Public Works Programme |
| ETDP-SETA | Education and Training Sector Education and Training Authority |
| GCIS | Government Communication and Information Services |
| GDP | Gross Domestic Product |
| GITOC | Government Information Technology Officers Council |
| GTAC | Government Technical Advisory Centre |
| HEIs | Higher Education Institutions |
| HEMIS | Higher Education Management Information System |
| HWSETA | Health and Welfare Sector Education and Training Authority |
| ICASA | Independent Communications Authority of South Africa |
| IEG | Infrastructure and Efficiency Grant |

| | |
|---|---|
| IRSA | Information Regulator South Africa |
| IT | Information Technology |
| LAP | Labour Activation Programme |
| LGSETA | Local Government Sector Education and Training Authority |
| LIASA | Library and Information Association of South Africa |
| LMIP | Labour Market Intelligence Programme |
| LURITS | Learner Unit Record Information and Tracking System |
| MICT-SETA | Media, Information and Communication Technologies Sector Education and Training Authority |
| MLO | Mzansi Libraries On-Line Project |
| MOOCs | Massive Open Online Courses |
| NARYSEC | National Rural Youth Service Corps |
| NATED | National Accredited Technical Education Diploma |
| NCC | National Consumer Commission |
| NCPD | National Council of and for Persons with Disabilities |
| NCV | National Certificate Vocational |
| NECT | National Education Collaboration Trust |
| NEET | Not-in-Employment-Education-or-Training |
| NEMISA | National Electronic Media Institute of South Africa |
| NLF | New Leaders Foundation |
| NLSA | National Library South Africa |
| NOLS | National Open Learning System |
| NPMN | National Pathway Management Network |
| NRF | National Research Foundation |
| NSA | National Skills Authority |
| NSF | National Skills Fund |
| NSG | National School of Government |
| NT | National Treasury |
| NQF | National Qualifications Framework |
| NYDA | National Youth Development Agency |
| NYS | National Youth Service |
| PC4IR | Presidential Commission on the Fourth Industrial Revolution |
| PDFDL | Professional Development Framework for Digital Learning |
| PSET | Post-School Education and Training |
| PSETA | Public Service Sector Education and Training Authority |
| PWD | Persons with Disabilities |
| PYEI | Presidential Youth Employment Intervention |
| QCTO | Quality Council for Trades and Occupations |
| SACE | South African Council for Educators |
| SALDRU | Southern Africa Labour and Development Research Unit |
| SALGA | South African Local Government Association |
| SA-SAMS | South African School Administration and Management System |
| SAQA | South African Qualifications Authority |
| SASSA | South African Social Security Agency |
| SAYC | South African Youth Council |
| SEDA | Small Enterprise Development Agency |
| SITA | State Information Technology Agency |

| | |
|---|---|
| STEAMIE | Science, Technology, Engineering, Arts, Mathematics, Innovation and Entrepreneurship |
| SWOT | Strengths, Weakness, Opportunities and Threats |
| TVET | Technical and Vocational Education and Training |
| TUT | Tshwane University of Technology |
| UIF | Unemployment Insurance Fund |
| UNISA | University of South Africa |
| USAF | Universal Access and Service Fund |
| USAO | Universal Service and Access Obligations |
| YES | Youth Employment Service |

## Mini-Glossary

**Case management**
(search for case management images)

The practice and processes of managing the needs and requirements of people on a case-by-case basis. Case management usually includes screening, assessing needs, creating a plan, supporting, communicating, following-up and evaluating the success of the engagement with the person.

**Digital badging**
(search for digital badges images)

Evidence or a testimonial confirming that the holder has a specific skills set, where the skills can be acquired offline or online, and where the evidence or testimonial can be accessed online

**Digital skills ecosystem**

The full set of factors, actors and institutions that makes the acquisition of digital skills possible and within which digital skills is usable

**Distributed ledger technologies**
(search for distributed ledger technologies images)

Technological infrastructure and applications that enable shared access, validation and data updating across multiple sites, persons, institutions, and even countries, through an immutable ledger that maximises data security.

**Eduplaytion**

A convergence of education and play enhanced by digital applications, in particular using digital games in education

**Implementation measure**

The specific implementation actions required to make the particular strategy effective

**Micro-credentialing**

A credential for a skill acquired through writing specific tests, or compiling a portfolio of evidence demonstrating that a particular skill has been mastered, typically shorter than a more formal qualification, available as a digital certificate on completion (related to digital badging)

**Platform of platforms**

A digital platform that integrates other lower level data platforms and provides a high level of data integration on a particular theme eg digital skills matching

## 1. Introduction: Purpose of Digital and Future Skills Building

This implementation programme guide is the overarching document for the implementation of the National and Future Digital Skills Strategy of South Africa, adopted by the Cabinet of the Republic of South Africa in August 2020. The implementation programme sets out the measures, lead institutions and stakeholders, as well as the required inputs and major activities, and the expected outputs, outcomes and impact. For effective implementation, this document should be read together with the strategy itself, the background research paper on digital skills gaps, and the research framework for digital skills, available as a package of documents from the Department of Communications and Digital Technologies (DCDT). The guide should be seen as the foundation for the continuously evolving efforts to create a strong digital skills building ecosystem.

A special focus for the implementation programme guide is on digital skills for decent jobs for youth, noting that young people between the ages of 18 and 35 are the generation that will empower the South African economy and society with digital skills, noting too that more than 8 million young people are not-in-employment-education-or-training (NEET). This special focus is related to the South African government's engagement with the global campaign for decent jobs, in concert with local stakeholders and global partners. Equally important is the focus on gender balance, and the focus on persons with disabilities, as gender and disability balance must be prioritised, must receive as much attention and funding as possible, in order to ensure skills equity in 21$^{st}$ century South Africa.

Digital and future skills are a vital component of South Africa's human resource capacity growth path, without which it cannot renew its economic sectors, government and social sectors. Economic competitiveness needs digital and future skills, digital government needs digital and future skills, South Africans need digital and future skills, relevant to the particular objectives of each. The implementation ideas have been thoroughly canvassed in five consultative workshops, with engagement with the DCDT, the Department of Basic Education (DBE), the Department of Higher Education and Training (DHET), the Department of Public Service and Administration (DPSA), with many other national and provincial departments, with participants from local government, with participants from youth-based organisations, from the persons with disabilities community, and with participants from GITOC. Participants in these workshops contributed their insights and experience to the design of this implementation programme for digital and future skills. Noting that consultative engagements will continue and be deepened in the course of implementation, the consensus in the workshops is that building digital skills requires urgency, creativity, and making the many breakthroughs that will foster an agile rather than a bureaucratic approach to fostering skills in this dynamic field.

## 2. Context for the Implementation Programme

Research confirms that ***digital skills must be complemented by 21$^{st}$ century skills*** in order to effectively address the many levels of the digital divide. In its Professional Development Framework for Digital Learning, the Department of Basic Education, in particular, recognises the importance of complementary skills, such as creativity and problem-solving ability. This perspective on complementary digital and 21$^{st}$ century skills needs to become an open consensus between government and the broad range of digital

skills stakeholders, so that South Africa collectively engages in digital and future skills development, based on a common understanding.

The **socio-economic context** within which the development occurs presents significant challenges, noting the slow GDP growth and recessionary conditions experienced in 2020. The labour market is experiencing stronger demand for future skills each year, with skills markets specifically focused on digital and other 21st century skills. The implementation programme is informed by a brief **SWOT analysis** that recognises that are many, serious constraints to achievability. Some insights from the SWOT analysis are embedded in the sections below.

The implementation programme takes a **digital skills ecosystem perspective to creating South Africa's digital innovator capability**, meaning that implementation must take place within a context where (i) access to infrastructure is advancing, (ii) skills development is focused on building actual digital solutions in industry, commerce, government and society, (iii) skilled digital bilinguals create applications (apps) for economy and society and (iv) leadership of the digital skills strategy is powerful, collaborative and effective (Figure 1).

**Figure 1: Overarching perspective on digital skills**
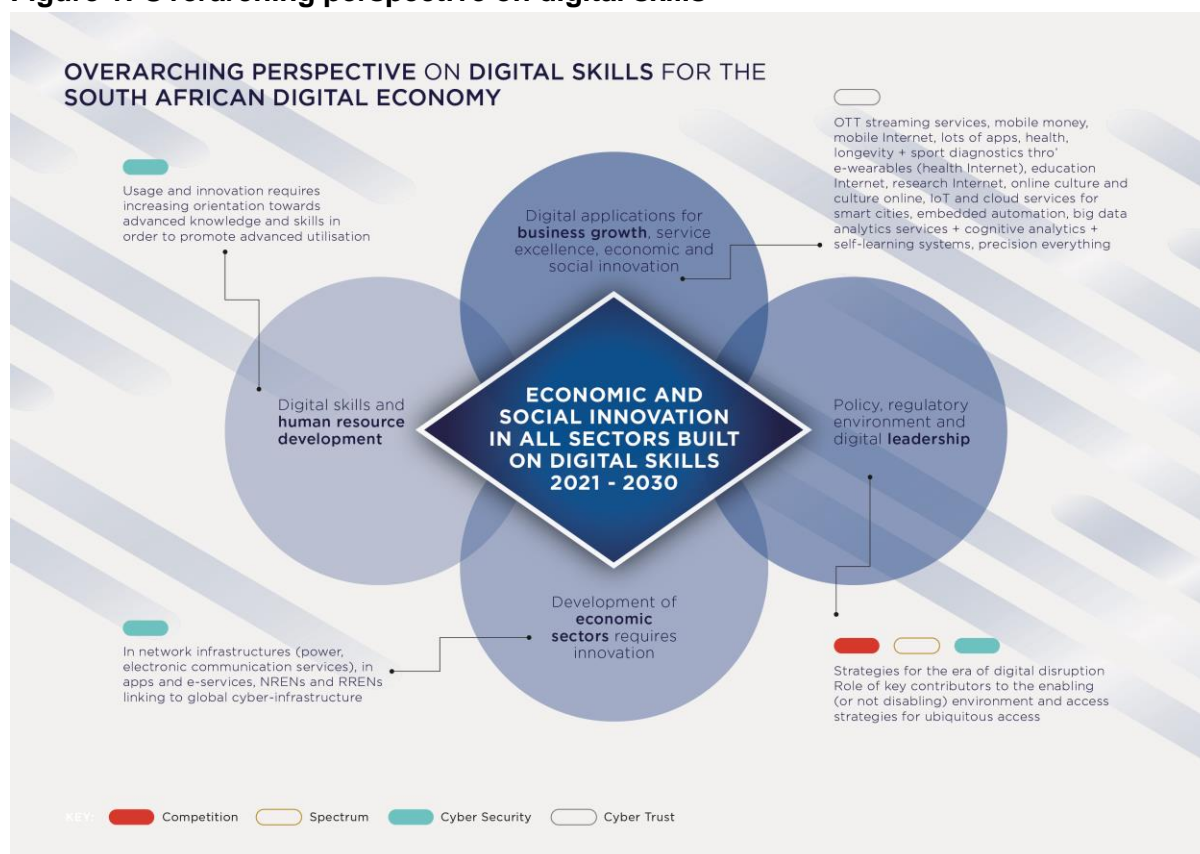


Source: Abrahams, 2021

In creating the more in-depth processes for implementation of digital skills development, organisations must step forward to produce the many highly specific implementation planning documents that are needed, at sectoral level, and at organisational level, to supplement this document and provide greater detail to this complex endeavour.

## 3. Programme Theory of Change: STEAMIE, Gender Balance, Persons with Disabilities and YNEET

A key word in the digital era is "disrupt", including **disruption in how** people function, in how institutions function, in how government functions, in how the economy functions and in how society functions, not only in technology terms. The associations between humans and technology, the **techno-human interaction**, gives rise to new modalities of behaviour, **new ways of being human**. To fully experience these new lives and lifestyles, the institutions that enable economy and society must themselves be disrupted. In particular, *government bureaucracies must become* **agile** *and enabling*, and must **accelerate and deepen** their current programmes in fostering digital skills. With respect to the new dimensions of digital and future skills development, government and its many stakeholders and partners must **institutionalise and embed** new skills programmes, in ways that encourage **breakthroughs** and **shape shifting**.

With respect to the details of this implementation programme, three major breakthroughs are needed (i) **investing time, human effort and funding in producing strong science, technology, engineering, arts, mathematics, innovation and entrepreneurship (STEAMIE) foundations** for digital and future skills at the basic education and post-school education phases; (ii) **investing time, human effort and funding** in shifting the inertia that pertains in the South African economy **with respect to young people not-in-employment-education-or-training** (YNEET); and (iii) ensuring that there is **equitable access to foundational STEAMIE skills** by women and girls, by persons with disabilities, and by YNEET. The principles and intent of **universal access design**, must underlie implementation. While all aspects of implementation are important, these three focus areas could enable South Africa to **shape shift**, from a declining economy with marginalisation of a large proportion of its population, to an economy becoming increasingly more empowered and becoming more socially and economically inclusive, see STEAMIE diagram Figure 2.

**Figure 2: STEAMIE skills sets (science, technology, engineering, arts, mathematics, innovation and entrepreneurship)**
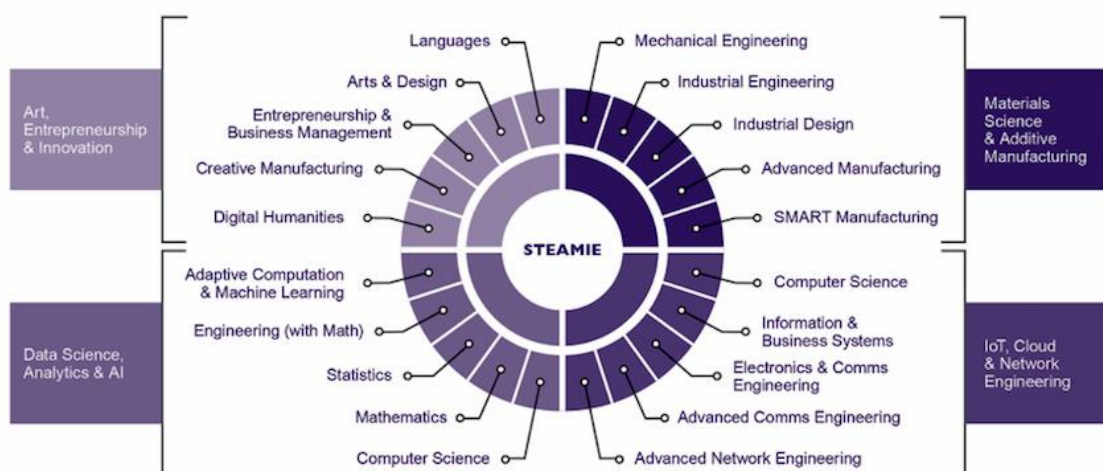


Source: Burke & Abrahams, 2021

**STEAMIE (science, technology, engineering, arts, mathematics, innovation and entrepreneurship): From STEM to STEAMIE**

Moving from the more traditional focus on the importance of science, technology, engineering and mathematics (STEM) skills, South Africa's industry, governmental, non-governmental and education and training sectors need to focus on building our human capacities for enabling the arts and creative industries to mainstream the use of digital applications and visualisations, and for building the kinds of digital skills that are useful for continuous innovation and even more dynamic entrepreneurship, shifting to ***STEAMIE***. A review of other national level digital skills programmes (India, Canada, amongst others), and a review of certificate and degree programmes at technical training institutions and universities across the globe, reveals that arts, innovation and entrepreneurship are key features of contemporary education and training, in addition to STEM. Much greater attention must be paid to building creative digital skills, digital innovation skills, and digitally-enabled entrepreneurship amongst women and girls, persons with disabilities, and YNEET, in order to promote digital skills equity. This approach to change is embedded in the implementation programme elements and interventions.

**Implementation Programme Elements and Interventions**

For each strategy element, the programme sets out the challenge and status for that particular element, as well as the change and measures required. Relevant implementation measures are then offered. Finally, in section 13 below, a simple implementation matrix sets out the inputs, major activities, desired outputs, as well as the expected outcomes and impact for each strategy element. Each of the major sections includes a visualisation responding to the question: What measures must we implement? Each visualisation points to measures, activities and outputs, as well as to the relevant stakeholders who should focus on those measures. Carry these visualisations with you, as you adjust and adapt existing activities, and introduce the new measures and activities, required for growing South Africa's digital and future skills. Introduce further innovation and new ideas, over and above the measures set out here.

**Implementation Programme Change Management**

Active change management must be applied, with respect to translating this theory of change into the South African reality of change. Such change management techniques must include (i) foresight exercises to diagnose implementation challenges and design responses and (ii) continuous collaboration between government and key stakeholders in digital skills building, as well as collaboration across the broad community of stakeholders, with digital leadership being exercised by government, industry, the non-governmental sector and the skills building sector.

## 4. Strategy Element 1: Digital and Future Skills Foundations

**Digital Foundations: Challenge and Status**

Science, technology, engineering, arts, mathematics, innovation and entrepreneurship (STEAMIE) serve as the foundations for meaningful participation and productivity in the 21st century economy. In addition, 21st century (future) skills are required in combination with STEAMIE, including *learning skills* (creativity and innovation; critical thinking and problem

solving; communication and collaboration), *literacy skills* (information literacy; media literacy; ICT literacy), and *life skills* (flexibility and adaptability; initiative and self-direction; social and cross-cultural skills; productivity and accountability; leadership and responsibility).

Foundational reading and numerical skills are critical for any future learning and knowledge construction since these enable higher cognitive reasoning and problem-solving, and skills acquisition in this regard cannot be leapfrogged (Reddy et al., 2019). These foundations need to be laid where the most significant impact can be made from early learning in the early childhood development (ECD) sector through to the senior phase of schooling.

The schooling system, faces many challenges, for example, while average mathematics achievement did improve between 1995 and 2015, there are significant inequalities: noting that 3% of high schools (200) produce more mathematics distinctions than the remaining 97% (6, 600) (Spaull, 2019). While there has been improvement in reading outcomes, 78% of Grade 4 children cannot read for meaning in any language. Outcomes are marked by income disparities, as a child in the wealthiest 10% of schools is five times more likely to learn to read at a basic level by Grade 4 than a child in the poorest 50% of schools.

Performance in mathematics achievement and reading outcomes should be addressed in the light of access to critical resources, including access to the Internet. According to the School Monitoring Survey, in 2017, access to the Internet by secondary school principals, teachers and learners was 68%, 59% and 21% respectively (DBE, 2020a). The survey indicates that 64% of Grade 12 learners in public schools have computer laboratories. The percentage of Grade 12 learners who take one of the two computer subjects, Computer Applications Technology (CAT) and Information Technology (IT), has remained around 6% for many years (20% in Quintile 5 against 2% in Quintile 1) (DBE, 2020a).

**Digital Foundations: Measures, Activities, Outputs**

Achieving success on **Strategy Element 1: Digital Foundations** in the next five years (2021 – 2025) requires designing local applications and content, using freely available applications, and continuously revising curricula, using digital content to adapt quickly and continuously to changing knowledge needs; building capacity to ensure all educators are empowered with digital skills and that these skills remain current; and providing access to broadband connectivity and other supporting infrastructure that enables digital skills.

The recommendations by the Presidential Commission on the Fourth Industrial Revolution (PC4IR) implores South Africa to build digital and 21st century skills, and calls for the initiation of changes that are catalytic by investing in STEAMIE education and in doing so, identifying the "pivot point" to bring about the desired change (Republic of South Africa, 2020). Changes must be introduced in ways that ensure sufficient "curriculum stability to ensure that the recent trajectory of improvements in key subjects such as languages and Mathematics continue" (DBE, 2020: 17). In other words, changes must be introduced in a manner that improves the cognitive capabilities of learners to support the improvement in mathematics and reading outcomes, including digitally supported teaching and learning. Each implementation measure discussed below incorporates inputs and major activities, acknowledging major activities currently in process, and adding further value-added activities.

# DIGITAL AND FUTURE SKILLS FOUNDATIONS
## What measures must we implement?

**YOUNG PEOPLE HAVE THE SKILLS TO FUNCTION EFFECTIVELY IN ANY PART OF THE 21st CENTURY ECONOMY AND SOCIETY**

### 1
**CURRICULUM INNOVATIONS**

### 2
**DIGITAL PEDAGOGICAL KNOWLEDGE OF TEACHERS**

### 3
**INFRASTRUCTURE AND CONNECTIVITY IN SCHOOLS**



**Column 1 — Curriculum Innovations**
- Digital curriculum in ECD, foundation to senior phases
- Unlock entrepreneurial mindsets
- Educational digital application

**Column 2 — Digital Pedagogical Knowledge of Teachers**
- Training on Professional Development Framework for Digital Learning
- Training teachers on digital pedagogy
- Teacher development across subjects
- Communities of Practice on digital pedagogy and mathematics

**15 000** teachers trained

**2 000** math teachers trained on dynamic software

**1 000** subject advisors participating
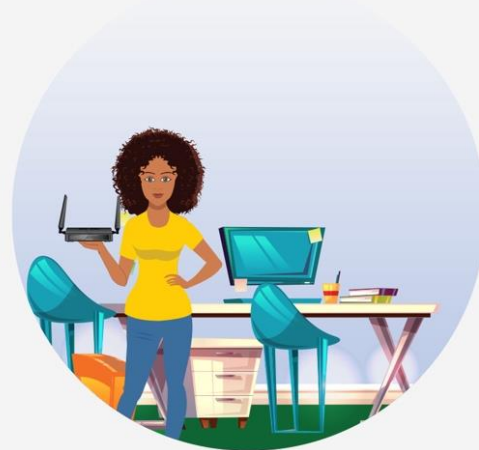
**Column 3 — Infrastructure and Connectivity in Schools**
- Digital learning support materials

**60%** of learners have access to the internet in schools

- DBE cloud
- Zero-rating data
- Full digital school ecosystem
- Universal service and access obligations

## ACTIVITIES AND OUTPUTS

## STAKEHOLDERS INVOLVED IN THE MEASURE:

- DBE
- DSD
- DHET
- SACE
- HEIs

***Girls, boys, and learners with disabilities must be encouraged to participate*** in digital skills development and, conversely, curriculum innovation and training in digital pedagogy must provide for greater accessibility to digital skills foundations, in a well-integrated loop. Open source software design can promote accessibility, while eduplaytion applications can enhance learning amongst all learners with varying cognitive development needs.

**Digital Foundations Implementation Measure 1: Curriculum Innovation**

The Department of Basic Education (DBE) is piloting coding and robotics in Grade 1 to 3 in 2020/21, and is developing the curricula for the General Education and Training (GET). The University of South Africa (UNISA) has made available 24 ICT laboratories for training 72,000 teachers, with plans in place to train at least 3 teachers in each of the 16 000 primary schools to teach coding (DBE, undated). The rollout will be supported through the introduction of an AI-based educational platform, Ms Zora, which is anticipated to reach 70% of the 24 000 schools in the country by 2023 (Malinga, 2020).

The ***rollout of digital literacy, coding and robotics in the curriculum*** from foundation to the senior phase is a cornerstone in the implementation programme and needs to be supported by all stakeholders. The curriculum focuses on several critical variables, including application skills; Internet and e-communication skills; data and information management skills; and computational thinking skills and coding. It includes the integration of 21$^{st}$ century skills such as creativity, collaboration, and problem solving. The DBE has established a team of experts in the fields of CAT and IT to prepare the digital skills curriculum from Grade R to Grade 9, with piloting commencing in 2020 for Grade R, Grades 4 – 6 during 2021 and Grades 7 – 9 during 2022 (DBE, 2019). As part of this process, the development of the necessary learning and teaching material and the training of teachers have been prioritised. The DBE must continue to drive this process, in collaboration with strategic partners such as the Provincial Departments of Education, and South African Council of Educators (SACE).

The DBE is also piloting the E$^3$ (Entrepreneurship, Employability and Education) initiative to ***unlock an entrepreneurial mindset*** among learners as part of developing 21$^{st}$ century skills. This initiative is geared towards project-based learning and gamification of learning, with respect to the existing CAPS curriculum, to better prepare learners for the digital economy. The pilot phase to 2021 is testing the E$^3$ approach and core interventions, including its learning methodologies such as project-based learning (PBL) in a sample of schools, teacher training and teacher support (DBE, 2019). The full-scale rollout of this approach in all schools following the pilot phase is another cornerstone towards the foundations necessary to develop not only digital skills but also 21$^{st}$ century skills. The initiative is delivered in partnership with Care for Education (CfE), Community Individual Development Association (CIDA), the National Education Collaboration Trust (NECT) and New Leaders Foundation (NLF).

***These initiatives must be complemented by the introduction of educational digital applications*** in all subjects, through all the phases of learning, to enhance understanding and capability with respect to subject matter knowledge, as well ***cyber secure conduct in schools***. These applications introduce benefits into the teaching and learning process and experience, as extensive information can be sourced, stored, organised, and manipulated to make it easier to absorb, a major advance over the traditional text-book. Benefits flowing

from the use of these applications include improved comprehension of structure and connections, exploration of concepts, re-description of concepts, concretising theory through practice, and enhanced knowledge construction (Ndlovu, 2015). As a first step, a review and critical evaluation must be undertaken to assess the most appropriate digital technologies for specific subjects in the curriculum. Thereafter consideration must be given to how these technologies can be introduced into the curriculum, taking into consideration access to the Internet, and the availability of devices and applications in schools.

With respect to promoting a reasonable degree of equity for persons with disabilities, building STEAMIE skills in education must apply to children with disabilities (in ECD), and to learners with disabilities (in school). Learning-friendly applications and open online courses can be designed to take care of the needs of specific types of disability, noting that digital applications are highly amenable to adaptation. ***Functional computer access is a key required investment in special needs schools***; and technologies in the reality-virtuality (RV) continuum, which include augmented reality and virtual reality, should be adopted as valuable aids for teaching digital and future skills in special needs schools.

Teachers will be the facilitators and thus, require extensive training in the use of identified educational digital applications. The DBE, once again, is a lead agent in this change process, together with the DHET, and university schools and faculties of education.

The development and implementation of a ***digital literacy curriculum for early learning***, targeting the Early Childhood Development (ECD) sector, is required to support the various initiatives aimed at strengthening this sector. This must be integrated into the ongoing efforts to provide early learning services in the ECD sector. Key areas of learning supported by digital technology include communication and collaboration, cognitive development, creativity, socio-dramatic play, and learning to learn (UNESCO, 2012). Despite this potential, available data suggest that just over 21% of children aged birth to two years are enrolled in a group programme for learning, with another 9% in the care of a day mother, child-minder or gogo, and the remaining 70% likely to be cared for by their mothers or family members. Nearly 1.1 million children aged three to five years are without access to any form of early leaning programme (Hall et al., 2019). Stakeholders in the ECD sector will need 100 000 new early learning practitioners and assistants, and more than 40 000 new venues to close this gap (SmartStart, 2020). Many new digital applications will be needed for the ECD sector, note for example the recent integration of messaging promoting early learning into the department's mobile messaging platform, MomConnect.

Efforts to ensure that an adequate number of appropriately qualified human resources are available are guided by the Human Resources Development Strategy for Early Childhood Development (DBE, 2018). The development of a digital literacy curriculum that can support a range of technological artefacts in low resource environments and support innovative teaching and learning practices for early learning is required. This can potentially be integrated into the existing curriculum components of the Occupational Certificate: Early Childhood Development Practitioner, but should also be flexible enough to be incorporated in a range of less structured training for practitioners (many of whom may be excluded from accessing a qualification at NQF Level 4 owing to their own exclusion from the formal education system). Micro-courses and micro-credentialing is an approach that is suitable here. Furthermore, this must be accompanied by the development and rollout of learning resources appropriate for both centre-based and non-centre-based early learning. The DBE,

in collaboration with the Department of Social Development (DSD) and the Department of Health (DoH), as well as Community Health Workers supporting early childhood development, and in partnership with the Education and Training Sector Education and Training Authority (ETDP-SETA) and other social partners such as StartSmart, are key stakeholders in this regard.

**Digital Foundations Implementation Measure 2: Building Digital Pedagogical Knowledge of Teachers**

The successful rollout of curriculum innovations that use digital tech to improve the quality of learning and learning outcomes is dependent on teachers having the relevant digital skills and pedagogical knowledge.

For this reason, a large-scale ***training programme on the Professional Development Framework for Digital Learning*** *(PDFDL)* is required to strengthen the digital pedagogical capabilities of teachers (DBE, 2018). A key aim of this Framework is ensuring professional development in the use of digital technologies that enhances teaching and learning, as well as enabling the process for doing so by leaders and support staff. The Framework is targeted at teacher trainers, school leaders and teachers, e-learning specialists, and curriculum subject specialists. The DBE has, in support of rolling out the Framework, developed teacher, provincial and district toolkits aimed at empowering all levels of the sector in supporting the implementation of the Framework in their respective provinces. The full-scale rollout of the Framework across all education districts must be put on fast-forward over the next five years, to ensure the development of digital pedagogical competencies in schools. The DBE must continue to lead this process in collaboration with SACE and DHET, while higher education institutions' (HEIs) faculties and schools of education must build the competencies of digital pedagogy amongst future teachers. The ***establishment of provincial and district level communities of practice (CoPs) for building digital pedagogy***, targeting school subject advisors, will make an important contribution to supporting the development of digital pedagogical competence across the country.

In order to deepen these capabilities, ***digital pedagogy integration into the curricula for teacher education*** in higher education institutions is required. The DHET should lead a process to determine the scope and quality of digital pedagogy coverage in undergraduate and postgraduate teacher education qualifications in South Africa higher education institutions (HEIs). A first step in this process is the convening of a conference on digital pedagogy in teacher education to which all the faculties, schools and departments of education in HEIs should be invited, with the objective to critically review the scope and quality thereof. This should become an annual conference, geared to the formulation and continuous review of a roadmap for strengthening the scope and quality of digital pedagogy in the teacher education and development curriculum.

The design of ***teacher professional development training programmes in many subjects*** for Grade 8 to Grade 12, must aim to enable the use of powerful language learning software (using applications for first and second language education, like the free Duolingo software for early language learning, very relevant for learning a second language), as well as applications in dynamic software for mathematics learning (like GeoGebra and The Geometer's Sketchpad), geography apps and websites (like the free app Planet Geo, or the

freely accessible National Geographic Education, or Google Earth VR) and other apps and content across the full school curriculum. To support ongoing teacher professional development, in particular in mathematics, it will be of great value to establish ***communities of practice (CoP) for maths teachers at secondary school level***, as these can provide opportunities for the applied use of digital technology in teaching practice. The many freely available applications that can support mathematics teaching and learning include GeoGebra, Math Mechanixs, Calc 3D Pro, LiveMath Viewer, Mathematica Player and GraphSketch, among others. The design and offering of training programmes for using maths apps must be available to secondary schools in all provinces. The establishment of maths teachers' communities of practice are a critical endeavour to support social learning, collaboration and peer support among teachers.

**Digital Foundations Implementation Measure 3: Ensuring Broadband Connectivity and Quality of Service for Using Digital Applications in Schools**

Curriculum innovation and building digital competencies requires broadband connectivity, with quality of service, and availability of devices for teachers and learners. Curriculum innovation requires schools to effectively use digital applications to augment, modify and transform the teaching and learning experience, in order to increase the success rate of learners in all subjects. A schools broadband partnership, with participation from industry and government, should invest in deployment of broadband connectivity to promote effective use of digital Learning and Teaching Support Materials (LTSM) and increased usage of DBE Cloud (https://dbecloud.org.za/login/welcome.php). School connectivity should enable the use of powerful and dynamic software, as well as access to learning apps and websites. Over and above these resources, is access to local school content initiatives such as the Digital Classroom (www.digitalclassroom.co.za/) offered by Vodacom and the educational platform Sentech Learn, Connecting our Youth in a Digital Age https://sentech.tv/.

While nearly 18 000 schools have been connected to the Internet, only 8% have access to high speed connectivity. The digital technology rollout plan of the DBE is set to connect 26 703 schools by 2024 (DBE, 2020), noting that the full digital school ecosystem needs to be designed, established, maintained and advanced, over and above connectivity. Negotiating formal agreements for zero-rating access to a relevant list of educational content and services, such as those mentioned above, is essential. The design of Universal Service and Access Obligations (USAO) by the regulator ICASA, in consultation with the DBE, and creative broadband access to schools' initiatives by telecommunications network operators, also in consultation with the DBE, in ways that address the multiple levels of the digital divide, must be facilitated. In parallel, education districts and school principals must play an even greater role then before, in promoting digital connectivity in schools, including as part of school-fundraising activities.

**Table 1: Digital Foundations: Measures, Outputs and Outcomes**

| Strategy Goal | Outcomes |
|---|---|
| • To expand the digital competencies in schools for improving the cognitive abilities of learners | • Enhanced cognitive capabilities of learners in basic education, with particular attention to gender equality |
| **Measures** | **Outputs** |

| | |
|---|---|
| • Enable curriculum innovation focusing on digital literacy, coding and robotics, and 21st century skills in basic education | • Integrated digital literacy, coding and robotics from Grade 1 – Grade 9 in all public schools<br>• 21st century skills (E³) integrated into the CAPS curriculum<br>• Educational digital applications integrated into six (6) school subjects in secondary school<br>• Developed a digital literacy curriculum framework for the ECD sector<br>• Communities of practice for maths teachers established in each schools circuit, of each education district, in each province<br>• Increased the number of Grade 12 learners taking one of the computer subjects (CAT or IT) at public school<br>• Introduce augmented and virtual reality applications for special needs schools for learners with disabilities |
| • Strengthen the digital pedagogical capabilities of teachers | • A minimum of 15 000 teachers trained in terms of the PDFDL<br>• Digital pedagogy integrated as a subject into the teacher education curricula at HEIs<br>• A minimum of 2 000 mathematics teachers trained in the application of dynamic software<br>• A minimum of 1 000 subject advisors participating in communities of practice on digital pedagogy<br>• University consortium established specializing in digital pedagogy innovations for teacher and subject advisor development |
| • Promote access to Internet connectivity digital infrastructure, facilities and educational resources | • 60% of learners have access to the Internet in schools<br>• Increased access to e-LTSM |

## 5. Strategy Element 1 & 2: Intermediate and Advanced Digital and Future Skills

**Intermediate and Advanced: Challenge and Status**

The Post-School Education and Training Sector (PSET) and wider innovation ecosystem provide the crucial skills development infrastructure for developing intermediate and advanced digital skills. The *National Digital and Future Skills Strategy* identifies the need for clarifying the roles, inputs and outputs of the Post-School Education and Training Sector (PSET) and wider innovation ecosystem. In particular, it is widely recognised that digital technologies open new opportunities for the Technical and Vocational Education and Training (TVET) sector, and it is crucial that these institutions embrace such technologies and regard the production of digital skills as one of their contributions to enhancing the individual and collective capacities of current and future labour markets (ILO, 2020). In this context, the PC4IR calls for rethinking the role of TVET colleges as micro-learning institutions, providing 21st century relevant competencies, in ways that contribute to the development of the required occupational skills for the future workplace (RSA, 2020a).

Universities are expected to make a significant contribution to the development of advanced digital skills. The *National Digital and Future Skills Strategy* implores universities to accelerate their contribution to advanced digital skills, through creating digital bilinguals in every degree programme and short course. Unfortunately, the number of students attaining qualifications in the relevant disciplines and fields remain small compared to the demand in industry, contributing to the digital skills gap. In the TVET subsystem, for instance, only 20% of students graduate with a National Accredited Technical Education Diploma (NATED) and National Certificate Vocational (NCV) in engineering programmes (National Planning Commission, 2020). In 2018, the total students registered for an *Engineering and Related Design* qualification were only 9 050 (L2 – L4), of which 1 133 (46.3% completion rate) registered, wrote and completed; *Information Technology and Computer Science* students

were 7 119 (L2 – L4) of which 415 (40.1% completion rate) registered, wrote and completed; and *Mechatronics* students were 840 (L2 – L4) of which 84 (61.3% completion rate) registered, wrote and completed (DHET, 2020a). These low success rates must change.

In the university subsector, 1,085,568 students enrolled in public higher education institutions (including 400,499 distance students) of which 320,671 (29,5%) were enrolled in Science, Engineering and Technology (SET) in 2018. SET graduates in 2018 were 17,418 at undergraduate level, 5,015 post-graduate below Master's level, 3,333 at Master's level, and only 713 graduated with Doctoral degrees. There are emergent pockets of HEI academic and research capabilities in digital arts, entrepreneurship and innovation; data science, analytics, and machine learning; IoT, cloud and network engineering; and materials science and additive manufacturing, dispersed across university system and science and innovation institutional infrastructure. For example, Sol Plaatje University offers an undergraduate programme in data science, while the Department of Science and Innovation and the National Research Fund (DSI-NRF) Centre of Excellence in Mathematical and Statistical Sciences (CoE-Mass) was established in 2014. The CoE-Mass, among other focus areas, includes Machine Intelligence and Learning from Experience (MILE) directed at theoretical and practical principles of artificial intelligence and their applications to real-world problems. A number of NRF South African Research Chairs Initiative (SARChI) also support the growth of these fields. Now, a growing number of universities are offering data science degrees at postgraduate level.

South Africa has a growing network of innovation spaces, including digital hubs, tech-hubs, co-labs, maker spaces, and innovation hubs that support digital entrepreneurship. These innovation spaces are an important node in the ecosystem for advancing digital entrepreneurship. They represent interconnected entrepreneurial actors, organisations, institutions, and entrepreneurial processes, which formally and informally connect, mediate and govern the local entrepreneurial environment (OC&C Strategy Consultants, 2018). They facilitate the evolution of real digital entrepreneurship through acquiring digital and 21st century skills (DCDT, 2020). A common feature is that they are collaborative working spaces and competence building centres, where participants use digital technology to create business start-ups, and improve and grow existing businesses (Kedama & Abrahams, 2017).

**Intermediate and Advanced: Measures, Activities and Outputs**

Strategy element two of the *Digital and Future Skills Strategy of South Africa* is focused on strengthening the post-school knowledge system and ecosystem of innovation spaces to facilitate digital entrepreneurship. Furthermore, the PC4IR (RSA, 2020) entreats us to take a comprehensive view of the entire human capital system, in which leverage points must be identified to accelerate 21st century capability building. The need to inject greater relevance into the TVET system must be addressed, towards such capability building, ***particularly for young women, young persons with disabilities and YNEET***. The focus must be on delivery of digitally-oriented programmes and qualifications, the development of institutional specialisations, while at the same time scaling access to these programmes. This must be accompanied by improved coordination, alignment and concentration of resources in ways that unleash this capacity for the benefit of society and enable digital transformation of PSET institutions themselves.

# INTERMEDIATE AND ADVANCED DIGITAL AND FUTURE SKILLS
## What measures must we implement?

**GRADUATES (PARTICULARLY WOMEN AND GIRLS) HAVE DIGITAL SKILLS-ORIENTATED QUALIFICATIONS AND DIGITAL BUSINESSES SHOW INCREASED START-UP AND GROWTH**

## 1
### FUTURE-ORIENTATED SYSTEM
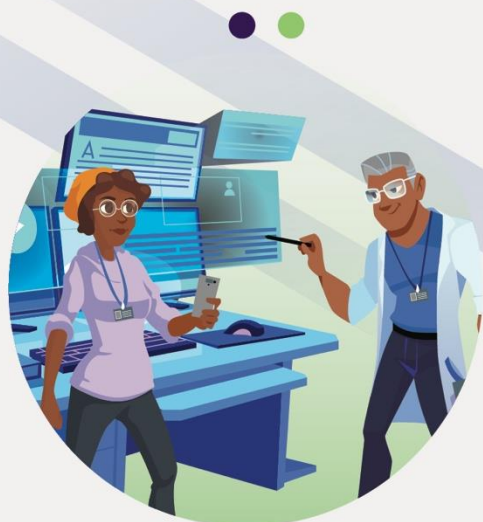
## 2
### HEIs USE A PLATFORMS FOR ADVANCED DIGITAL SKILLS DEVELOPMENT
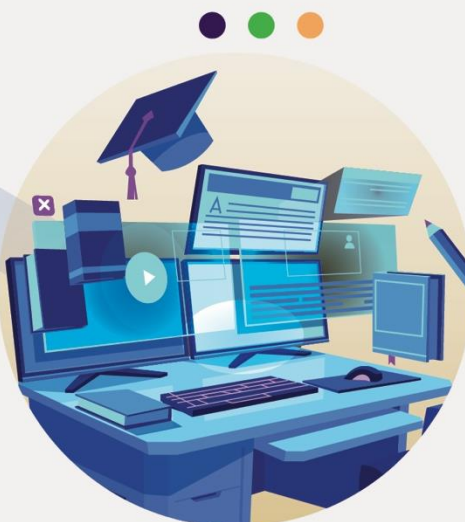
## 3
### VIBRANT ECOSYSTEM FOR DIGITAL ENTREPRENEURSHIP
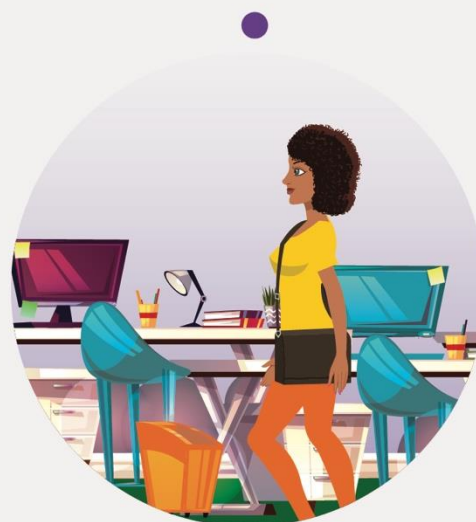
### Measure 1
- Implement NCV-IT and CS curriculum
- Build qualifications and institutionalisation specialization
- Improved TVET lecturer qualifications
- Recruit more students into STEM/STEAMIE qualifications

**10** TVET colleges specialising in offering digital qualifications

**2 000** TVET lecturers trained in digital pedagogy

**30%** increase in NCV-IT, Engineering, and Mechatronics enrolment and completion

### Measure 2
- Establish a platform to offer MOOCs in STEAMIE graduate programmes
- Establish university consortia in ICT and data science fields
- NRF privately funded chairs in in university

**20%** increase in STEM graduate and postgraduate enrolment and success rate

**4** university-TVET-industry consortia established

**5** research chairs established in 4IR niches

### Measure 3
- Digital hubs programme
- Stakeholder's ecosystem platform
- Business development services and finance

**20** digital hubs

**10 000** potential and existing entrepreneurs trained

## ACTIVITIES AND OUTPUTS

## STAKEHOLDERS INVOLVED IN THE MEASURE:

- DHET
- DTIC
- TVETs
- NRF
- HEIs

**Intermediate and Advanced Digital Skills Implementation Measure 1: Building a future-oriented TVET subsystem**

A series of interventions is required to build the future-readiness of the TVET subsystem.

Firstly, the ***implementation of the revised National Certificate (Vocational) Information Technology and Computer Science (NCV-IT&CS) curriculum*** must be undertaken as a matter of priority. The review of the curriculum has been completed and will be implemented through a phase-in and phase-out process. This follows the prioritisation of this qualification for review in 2018 and the establishment of Curriculum Support Teams comprising of subject experts and industry stakeholders. The DHET also worked with the Tshwane University of Technology (TUT) IT Faculty to develop a Robotics specialisation in the NCV-IT&CS. Implementation of the revised curriculum also requires commissioning and evaluation of textbooks and training of lecturers. The implementation of the revised curriculum is scheduled for 2021. The DHET has further partnered with the Cisco Networking Academy to update the Life Orientation component of the qualification to ensure that it covers, among others, the latest ICT developments in areas such as Introduction to Internet of Things, and Introduction to Cybersecurity. TVET colleges are currently registering as Cisco Network Academy Centres for the purpose of lecturer training and the implementation of the programme.

Secondly, the DHET needs to leverage the experience, networks and knowledge gained in the revision of the NCV-IT&CS and the development of the Robotics specialisation, together with the insights gained from the establishment of 26 Centres of Specialisation (CoS) at 19 TVET colleges, to ***build further specialisations in the qualification, as well as institutional specialisation*** respectively. Additional specialisations to be considered should include data analytics, network engineering, and design for additive manufacturing. Although the Centres of Specialisation programme for TVETs is dedicated to developing skills for specific artisan trades, consideration should be given to leveraging the approach adopted to develop TVET specialisations for digital skills. This will require the development of qualifications for digital technology-oriented occupations under the guidance of the Quality Council for Trades and Occupations (QCTO). Moreover, such an approach must contribute to differentiation based on digital programme offerings within the TVET subsystem.

Thirdly, the quality of the programmes is dependent on ensuring that appropriately qualified lecturers are available to teach. This will require a significant investment in ***upgrading and enhancing the qualifications of TVET lecturers***, not only in the specific digitally-oriented programmes, but also in strengthening their digital pedagogical competency. The professional and post-professional qualifications for TVET lecturers must integrate a focus on digital pedagogy, in line with efforts to introduce a minimum set of requirements for TVET lecturers (DHET, 2013) and the strategy for TVET lecturer development currently under preparation (ETDP-SETA, 2019).

Finally, the focus on enhancing the relevance of the NCV-IT&CS, and strengthening specialisations in the TVET subsystem, must be accompanied by a ***targeted campaign to recruit more students*** into the *Information Technology* and *Computer Science* fields*, Mechatronics*, and *Engineering and Related Design* qualifications. This targeted campaign promoting awareness of the significance of these programmes, as well as focused

recruitment drives among **young women, young persons with disabilities and YNEET as potential students**, and making available funding to support greater numbers of young people accessing these programmes, both at institutions and online.

**Intermediate and Advanced Implementation Measure 2: Strengthening Higher Education as a Platform for Advanced Digital Skills Development**

One of the most important initiatives for the evolution of a secure digital economy in South Africa is the **intermediate and advanced education and training in cybersecurity**, with work on OFO (Organising Framework for Occupations) codes for specific occupations in the field of cybersecurity currently in design; and initial work on the design of a junior qualification by the MICTSETA. Universities must work on the design of degree programmes, or the adaptation of existing degree programmes in the computing, software engineering, information systems, and management sciences, to **prioritise undergraduate and postgraduate education and postgraduate research in the field of cybersecurity**, understanding that effective cybersecurity education requires both a technology perspective and a management perspective. Furthermore, the basics of cybersecurity should be included, where relevant, in degree programmes in the education sciences, in the health sciences, and in other disciplines at risk for cyber vulnerability.

The interventions to strengthen higher education as a platform for the development of advanced digital skills include the use of Massive Open Online Courses (MOOCs) and content streaming for STEAMIE disciplines; growing postgraduate niches in digital arts, entrepreneurship and innovation; data science, analytics, and machine learning; IoT, cloud and network engineering; and materials science and additive manufacturing; and targeting funding to NRF and privately-funded chairs focusing on these fields, in universities.

The DHET launched its National Open Learning System (NOLS) in 2019 to make available self-directed learning materials and self-evaluation tools in order to increase access to learning opportunities. Furthermore, the DCDT through its implementing agency, the National Electronic Media Institute of South Africa (NEMISA), partnered with Coursera, an international MOOC provider established by Stanford University, to offer free courses to young people in the fields of data science, coding, applications development and artificial intelligence. These initiatives need to be harnessed to **establish a platform to offer MOOCs targeting graduate programmes in STEAMIE disciplines**. A university consortium must be established to convert the top graduate programmes in science, engineering and mathematics offered at South African universities and to offer these as freely accessible open online courses. These programmes will provide an opportunity to concentrate scarce academic resources for the purposes of supporting student access and success in these disciplines. The platform should not only provide the digital infrastructure for hosting the online courses, but also support the consortium in designing and producing the courses for online delivery, with continuous upgrades.

There are pockets of niche capabilities for digital skills, emerging in the higher education, science and innovation institutional landscape. A good example of this is the capability that has emerged in respect of additive manufacturing in the form of a Centre of Competence in Additive Manufacturing. This competence is spread across a number of higher education institutions and science councils focusing on process and product development; design

simulation and modelling; materials development and characterisation; and human capacity development. These specialist capabilities are applied in different industries, including advanced tooling, medical implants and devices and aero-structures (du Preez & de Beer, 2015). Drawing on this approach, there is a need to **develop postgraduate university niches through the establishment of university consortia in digital arts, entrepreneurship and innovation; data science, analytics, and machine learning; IoT, cloud and network engineering**. University and science council consortia should be invited to submit proposals for the establishment of these niche centres of competence.

A further measure to harness and strengthen existing capabilities are the **establishment of targeted NRF and privately-funded chairs in universities focusing on specific fields** in (1) digital arts, entrepreneurship and innovation (2) data science, analytics, and machine learning; (3) IoT, cloud and network engineering; and (4) materials science and additive manufacturing, across the university system and science and innovation institutions, and advancing the much-needed research capability at the tertiary level. These are strategic interventions that attract and retain research excellence and innovation at public universities, science councils and national research facilities. Bursaries should be provided to encourage postgraduate students, **particularly young women, young persons with disabilities and YNEET**, to undertake their studies in these fields in terms of the NRF Postgraduate Student Policy.

**Intermediate and Advanced Implementation Measure 3: Promoting a Vibrant Ecosystem for Digital Entrepreneurship**

The promotion of a vibrant ecosystem for digital entrepreneurship will be centred on the rollout of the Digital Hubs Programme implemented by the DTIC and its implementing agent, the Small Enterprise Development Agency (SEDA); knitting together the various networks in the digital entrepreneurship ecosystem to provide seamless support; and the delivery of digital entrepreneurship and business development services to promote successful business start-up and acceleration.

The Digital Hubs Programme (DHP) seeks to create a central meeting point for technology, innovation and creative businesses. These hubs serve as training centres for community members, provide access to facilities, and incubation for mainly young entrepreneurs operating in the digital economy. The hubs will be located inside the state-owned industrial parks that are currently supported by the DTIC under the revitalisation programme, and consist of a cluster of technology, digital media and Internet companies. The **rollout and scaling up of the digital hubs programme** forms an important part of the support that brings together digital skills and entrepreneurship development, technology and innovation.

The digital hub is only one form of innovation space. There are many others in the form of tech hubs, co-labs, makerspaces, fab labs and others that aim to bring together digital technologies, entrepreneurship and innovation. There are well-developed ecosystems in the Gauteng and the Western Cape Provinces, some independent operations and some with contributing funding from government. These ecosystems consist of a network of innovation-focused hubs, incubators, accelerators, universities and research and development centres (OC&C Strategy Consultants, 2018). The **development of an ecosystem that brings together all the relevant stakeholders** in a way that enables the seamless provision of

services to entrepreneurs in the digital economy, and advocating for their interests, is critical. The establishment of an ecosystem platform is an important step in this direction.

The quality of available digital entrepreneurship training in the public and private sectors, and the scale at which this can be accessed needs to be enhanced, in order to provide more entrepreneurs with the opportunities to enter and grow their digital businesses. This means *providing targeted business development services and finance* to a large number of potential and existing entrepreneurs in the digital economy.

**Table 2: Intermediate and Advanced Digital Skills Development: Measures, Outputs and Outcomes**

| Strategy Goal | Outcomes |
|---|---|
| • To develop intermediate and advanced digital skills through the post-school education and training and innovation ecosystems | • Increased the number of graduates completing digital skills-oriented qualifications in the PSET system, with particular attention to women and girls<br>• Increased digital business start-up and growth, emphasising inclusion of women and girls, young persons with disabilities and YNEET |
| **Measures** | **Outputs** |
| • Enhance the relevance of the TVET subsystem to the needs of the digital economy and society | • Implemented the re-curriculated NCV-IT offered across TVET system<br>• Developed robotics, data analytics and coding as specialisations in the NCV-IT<br>• 30% increase in NCV-IT, Engineering, and Mechatronics enrolment and completion<br>• 2 000 TVET lecturers trained in digital pedagogy<br>• 10 TVET college specializing in offering digital qualifications |
| • Strengthen higher education capabilities in STEAMIE disciplines | • Cybersecurity education and training prioritised through specialist degree programmes (computer science, engineering, information systems, management degrees) and integration of cyber awareness in a wide range of degree programmes and short courses<br>• 20% increase in STEAMIE graduate and postgraduate enrolment and success rate<br>• 4 university-TVET-industry consortia established (digital arts, entrepreneurship and innovation; data science, analytics, and machine learning; IoT, cloud and network engineering; and materials science and additive manufacturing)<br>• 5 Research Chairs established in digital innovation niche areas |
| • Increase access to digital entrepreneurship services to potential and existing entrepreneurs for the digital economy | • Supported digital innovation for government applications at 20 Digital Hubs<br>• Established an innovation system coordination platform<br>• Innovation spaces offering digital entrepreneurship skills development programmes<br>• 10 000 potential and existing entrepreneurs trained in digital entrepreneurship |

## 6. Strategy Element 3: Digital and Future Skills for Workplace 4.0 (Digital Industry and Digital Government)

**Workplace 4.0: Challenge and Status**

South Africa is grappling with its capability to effect the changes associated with the emerging techno-scientific revolution, most notably around the relevant skills needs across a range of digital technologies and their applications in industry, business, government and the non-governmental workplace. South African organisations must establish a pathway that steers away from pitting people against robots, automated systems and machines that learn,

towards a pathway in which people collaborate with new technologies (NEDLAC, 2019). In the case of robotics, this is referred to as collaborative robotics, or co-botics. The relevant skills are required to address some of the key changes in production systems in manufacturing, which include the digitalisation and integration of supply chains; design, rapid prototyping and customisation; additive and advanced manufacturing and automation; and e-commerce and digital economy platforms (CCRED, 2019).

The digitalisation of manufacturing takes place at a time when South Africa is struggling to maintain its competitiveness in key sectors, following two decades of deindustrialisation, seen in the decline in the contribution of manufacturing to Gross Domestic Product (GDP) from 21% in 1994 to 13,3% in 2016 (CCRED, 2018). Capturing the opportunities of digital technologies fully is necessary to regain competitiveness, including through (CCRED, 2019):

- improving products and their digital content, changing product system functionalities, to move towards higher value product segments;
- diversifying products and activities by deploying digital industrial technologies transversally across sectoral value chains;
- increasing productivity via process upgrading along the value chain and the local production system;
- linking up with domestic and international firms, and diversifying market access; and
- developing industrial competitiveness in new global sectors by leveraging South African resources.

Bringing about these changes in the industrial production process and service sectors, including the financial services and logistics that support South African industry, will require a significant upscaling in the delivery of the required digital skills at foundation, intermediate and advanced levels. Estimates suggest that the forecast demand for people in digital and ICT roles in the short term is as many as 66,000 of which 45,000 are at entry-level jobs, noting that about 28,000 jobs are outsourced to other countries (Harambee, 2020). Many recent studies, including SETA sector skills plans, highlight skills in demand for roles in the following clusters (Harambee Youth Employment Accelerator, 2020; JCSE and IITPSA, 2019; WC DEDAT, 2019):

- data analytics (data analyst, data manager, database designer and administrator, business analyst, data centre operations specialist);
- software development (software developer, software development engineer, integrated systems developer, lead solutions architect);
- network engineering (computer network technician, systems analyst, computer network and systems engineer; network analysts, telecommunications network engineer, cloud specialist, integrated systems developer, network controller);
- cybersecurity (ICT security specialist, information security specialist); and
- visualisation and creative design.

**Workplace 4.0 (Digital Industry and Digital Government): Measures, Activities and Outputs**

The need to ***scale up*** digital skills development to meet industry needs points to the urgency of improving collaboration between industry and skills development institutions for more responsive digital skills development. Expanding workplace-based digital skills learning opportunities for young people is crucial in this regard, given the importance of work experience in the form of a portfolio of previous work, when moving to a new prospective employer (WC DEDAT, 2019). Digital skills development niches must be developed across the skills development ecosystem through the utilisation of the existing skills funding mechanisms. Identification of ***opportunity zones*** is necessary, since growth through digitalisation holds significant potential for job creation, such as in the globally traded services sector, in which there is the potential to create 100,000 new jobs by 2023 and 500,000 by 2030, all requiring foundational to intermediate digital skills (SADA, 2020).

The digital skills gap impacts the workplace in the private sector and in government. Inordinately slow progress towards digital government is compounded by the difficulties associated with retaining digital skills in the public sector, due to outdated systems and technologies and the inability to compete with the private sector for remuneration (PSETA, 2020). The public sector has progressively moved towards digital technologies across its systems and processes, but this has not been matched with the development of the skills to optimise the role of these technologies in the public service and to deliver digitally mediated public services (PSETA, 2020).

In the workplace context, the digital skills gap impacts women, persons with disabilities and YNEET in particular. ***Women and persons with disabilities must be prioritised*** in terms of equitable participation in workplace digital skills programmes. Young people not-in-employment-education-or-training should be offered digital and future skills learning opportunities in ***"opportunity zones"*** created in the private sector and in government, for a few hours per month, within what is allowed by the applicable labour law. Opportunity zones can present opportunities for digital and future skills relevant both to employment, and to entrepreneurship. The best workplaces for the establishment of opportunity zones are those workplaces that are undergoing digital transitions. A key section of this implementation programme is dedicated to YNEET, see section 8 below.

Similarly, within this broader initiative, ***specialised opportunity zones should be designed, in collaboration with the many national and sectoral organisations for persons with disabilities*** (such as National Council for and of Persons with Disabilities), to cater for their special needs in terms of skills development. The major challenges here will be online access and physical access. Hence, the specialist opportunity zones and digital skills centres should ***use universal access principles in their design***, using accessible platforms and technologies, and employing the services of specialist facilitators. Digital and future skills, capacities and orientations can create opportunities for greater inclusion and greater participation in the workplace, supporting both independent and assisted living, and reducing economic vulnerability.

# WORKPLACE 4.0 - DIGITAL INDUSTRY AND DIGITAL GOVERNMENT

## What measures must we implement?

**WORKPLACE 4.0: TRANSITION FROM WORKPLACE 1.0 (MECHANISATION) TO WORKPLACE 4.0 (EXTENSIVE DIGITISATION) AND BEYOND: MORE EMPLOYEES HAVE WORKPLACE-FOCUSED DIGITAL SKILLS**

### 1 OPPORTUNITY ZONES AND DIGITAL SKILLS CENTRES

### 2 IMPLEMENTATION OF DIGITAL SKILLS DEVELOPMENT

### 3 WORKPLACE-BASED LEARNING

### 4 OPTIMISE VALUE OF DIGITAL SKILLS IN GOVERNMENT



**ACTIVITIES AND OUTPUTS**

**1**
- Digital skills development niches
- Partnerships with industry associations and professional bodies
- New and re-aligned qualifications

**3** multi-stakeholder centres

**2**
- NSF to invest in digital skills development opportunities
- Start-up of TVET teaching chair programme

**30%** increase in certification in digital skills development opportunities

**5** TVET Teaching Chairs

**3**
- Expand workplace-based learning
- Incentive schemes in workplace-based learning

**4**
- Government (PSET, NSG, DPSA) implement specialist digital skills programmes
- Digital literacy for frontline public servants
- Digital government programme for leaders and managers

**3** specialist digital skills development programmes

**STAKEHOLDERS INVOLVED IN THE MEASURE:**

- DSI
- TVETs
- PSETA
- Public sector
- Private sector

## Workplace 4.0 Implementation Measure 1: Establishing Industry-Led Digital Skills Opportunity Zones and Digital Skills Centres

Strong industry leadership is required to drive the establishment of a network of Digital Skills Centres, in collaboration with universities, TVETs, SETAs and skills development providers. These centres should not be considered as singular organisations, but rather as a network of distributed competence and specialisation. While initially established by the Department of Science and Innovation (DSI), to close the gaps along the innovation and technology development value chain, and to provide support for technology development and systems integration, the model of Digital Skills Centres (DSC) can be adapted to focus on digital skills development across the wide range of requirements for future productive human capacity. DSCs are conceptualised here as collaborative entities, led by industry, in association with stakeholders from the PSET system and science performing institutions. The DSC approach should be applied to the **development of digital skills development niches in (1) digital arts, entrepreneurship and innovation; (2) data science, analytics, and machine learning; (3) IoT, cloud and network engineering; and (4) materials science and additive manufacturing**. Much progress has been made in the establishment of an additive manufacturing DSC, to the extent that key proposals for the design, development and implementation of curricula have already emerged (Alabi et al., 2019).

The establishment of Digital Skills Centres will require **establishment of a range of partnerships**, led by industry associations and professional bodies. These partnerships must ensure the provision of physical and virtual platforms for collaboration and skills development in these identified skills niches. Opportunities for participation by vendors who offer vendor-accredited programmes, together with digital skills providers and PSET institutions in the skills ecosystem, should be emphasised, considering the growing importance of vendor-certified professionals. Moreover, the participation of science performing institutions must strengthen the research and innovation dimensions to skills development.

There is a need for the **development of new and re-alignment of existing qualifications** in a range of fields to ensure responsiveness to demands in the digital economy. This process has commenced under the leadership of the MICT-SETA, with a focus on selected qualifications or part-qualifications.

## Workplace 4.0 Implementation Measure 2: Steering Investment and Opportunities Towards Digital Skills Development

The funding instruments of the National Skills Fund (NSF), including the skills levy, must be used strategically to **steer investment towards digital skills development opportunities** in digital arts, entrepreneurship and innovation; data science, analytics, AI and machine learning; IoT, cloud and network engineering; and materials science and additive manufacturing. The range of instruments include bursaries, learnerships, internships and skills programmes. The National Skills Authority (NSA) should develop guidelines on the mechanisms for prioritising digital skills in skills planning, and deployment of skills funding to SETAs for the purpose of building digital skills.

NSF funding should be invested in the **start-up of a TVET Teaching Chair programme** as a catalytic programme and part of the broader revitalisation of the TVET sector. Establishing

teaching chairs in TVETs is aimed at attracting highly qualified and well-recognised academics in their field to selected colleges, to build new or strengthen existing teaching and pedagogical competencies in the delivery of digital skills-oriented qualifications. Teaching Chairs will be expected to build digital skills competencies and specialisations in selected TVET colleges, by drawing on their networks in academia and industry, to promote cooperation and networking that can enhance the institutional capacity of the college. Furthermore, the Teaching Chairs will serve as a critical interface between the academic and professional environments; training and research for sustained research-informed training; and where appropriate, build international links to attract expertise and other resources.

## Workplace 4.0 Implementation Measure 3: Expanding Workplace-Based Learning Opportunities and Cyber Awareness

Workplace-based learning is particularly important in a society with a labour market characterised by mismatches between market demand and supply, often attributed to a lack of work experience, and in which a large proportion of young people are unemployed with less than matric. The opportunities for workplace-based learning have grown in volume and are contributing significantly to greater levels of access to post-school qualifications for black South Africans, but with significant room for improvement in terms of gender representation (Wildschut & Kruss, 2019). The high workplace absorption and retention rates, with respect to those who complete learnerships and apprenticeships, makes a strong case for the *expansion of workplace-based learning opportunities*.

The *design and implementation of an incentive scheme to support workplace-based learning* for digital skills development is required. Such a scheme should focus on minimising the costs of integration and socialisation of the learner into the workplace, and on building the capacity of the firm, or government body, to participate in the process, so that effective support can be provided to the learner. In particular, workplace digital skills initiatives, both in industry and government, must provide the *foundations of cyber awareness, necessary to all those engaged in the world of work*. Cyber awareness training should be an obligatory orientation programme for all current and new employees.

## Workplace 4.0 Implementation Measure 4: Optimising the Value of Digital Skills in Government

A combination of initiatives to optimise the value of digital government is proposed, focusing on (1) building the technical skills required to operate, manage and sustain the digitally mediated processes of government and the underlying technological systems and databases; (2) the growth in digital literacy with a particular focus on data management and analytics for frontline service staff; and (3) the advancement of digital leadership skills among public service leaders and managers.

The Public Service Sector Education and Training Authority (PSETA), in collaboration with the National School of Government (NSG) and the Department of Public Service and Administration (DPSA), must initiate and implement a *specialist digital skills programme targeting the building of the technical skills* required to develop trained professionals to manage and operate the digital infrastructure, systems and databases, as well as to effectively manage the cybersecurity, underpinning public service digitalisation. The range of professional skills and positions targeted should include (but is not limited to) enterprise

architects, solutions architects, business systems specialists, systems integration specialists, network analysts and engineers, cybersecurity analysts and specialists, data analysts and managers, data centre operations managers, software applications developers, and device support engineers. PSET institutions that provide qualifications and skills programmes for the development of these skills, together with vendors with accredited programmes, should be enlisted as partners in the implementation of this intervention.

The design and implementation of a ***digital literacy programme for frontline public servants, with emphasis on data management and basic data analytics for everyday use***, at sites providing social security (for example, SASSA service and pay points), policing, transport (for example, drivers' licence and testing centres), municipal, health (for example, primary health care facilities), education, and civic services (for example, Home Affairs offices) is required. The NSG, in collaboration with the PSETA, must take a lead role in the design, development and implementation of such a programme. The programme should incorporate general modules on public service digitalisation; digital service delivery; the citizen as user of digital public services; cyber risks including privacy, data protection and cybersecurity; and specialisations focusing on data analytics and management.

The NSG should lead the ***development and implementation of a digital government programme*** for leaders and managers in government to enhance the capabilities of this cohort to steer the transition to digital government. Such a programme should cover a broad range of knowledge components cutting across the macro-, meso- and micro- levels, including building their understanding of the underlying disruptions and changes shaping the emergence of digital society, economy and government; the role of public institutions and strategies to inform digital transformation; and approaches and methods for enabling public service transformation through digital means.

**Table 3: Industry 4.0 and Government 4.0 Measures, Outputs and Outcomes**

| Strategy Goal | Outcomes |
|---|---|
| • To grow the supply of workplace-focused digital skills | • Narrowed digital skills gap in the labour market, particularly for women and persons with disabilities |
| **Measures** | **Outputs** |
| • Develop industry-led digital skills niches and competence | • 3 multi-stakeholder Digital Skills Centres of competence operationalised<br>• Increased the number of workplace graduates from skills programmes in digital skills niche areas |
| • Steer increased investment and opportunities towards digital skills development | • Increased registration in digital skills-oriented learning programmes<br>• Certification in digital skills development opportunities increased by 30%<br>• 5 or more TVET Teaching Chairs established |
| • Expand workplace-based learning opportunities in digital skills development | • Incentive scheme to incentivise workplace-based learning opportunities in digital skills building established<br>• Increased number of firms participating in incentive scheme<br>• Number of workplace-based opportunities (learnerships, apprenticeships and internships) for digital skills development accessed<br>• Introduce wide-scale cyber awareness orientation and training to maximise knowledge of cyber vulnerabilities |
| • Optimise the value of digital skills in government | • 3 specialist digital skills development programmes implemented (data centres operations, analytics and management; network engineering including IoT and |

| | |
|---|---|
| | cloud; software development, engineering, and system solutions architecture)<br>• Frontline service delivery data analytics skills development programme implemented<br>• Digital government programme implemented for government leaders and managers |

## 7. Strategy Element 4: Digital Skills for Society 4.0

**Society 4.0 Challenge and Status**

The PC4IR entreats the country to adopt an approach to the development of a digital society as a citizens' initiative that is rooted in communication among sectors of society that enables wide-spread awareness and participation (RSA, 2020a). However, South Africa performs poorly by most international benchmarks that measure digital development, especially on the demand-side indices that measure Internet usage, skills and digital awareness (NPC, 2020). There is a need to close the digital divide between those who passively consume a limited number of basic communication and media services and the limited number able to put digital technology to productive use (NPC, 2020). This needs to be done in a context in which the proportion of households with access to an Internet connection has increased from 23,9% in 2009 to 62,2% in 2017, marked by significant inequality in access (StatsSA, 2019), reflecting the structural inequalities related to income, gender, and geography (NPC, 2020).

One of the underlying factors contributing to the limited access and use of the Internet in South Africa is the high cost of data (Competition Commission, 2019). It is widely recognised that a lack of digital literacy, that is the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship (UNESCO-UIS, 2018), combined with access and affordability contributes to digital exclusion. The lack of digital literacy and access to infrastructure undermines the potential for digital citizenship, that is the regular and flexible access to the Internet, the skills to apply this technology, and regular use of the Internet for participation and functioning in all spheres of the society (Oyedemi, 2018). Furthermore, responsible digital citizenship cannot be exercised outside of safe cyber environments and the skills necessary to secure citizen personal data and privacy.

The *Digital and Future Skills Strategy for South Africa* recognises the challenge of the digital skills divide with many disadvantaged by race, gender, geographic location, income, or disability, or a combination of these, highlighting the need to equip individuals and communities with digital skills, to empower them as citizens for effective participation in the 21st century society. This implementation programme must foster broad-based digital literacy, empowering citizens to effectively participate in digital society, while limiting risk, privacy intrusions and cyber-crime.

**Society 4.0: Measures, Activities and Outputs**

There must be ***strong emphasis on building digital literacy, digital citizenship and digital health literacy among women and girls, among persons with disabilities, and among other marginalised groups in society***, as necessary to address this particular aspect of the digital divide, with funding identified and made available for this purpose. A few countries are moving to society 5.0, focused on human-centred digital innovation. This is the appropriate route for South Africa to follow, to address its disparities and inequalities. Cyber awareness training and knowledge building must be a major content area in programmes for digital literacy, programmes to advance digital citizenship, and programmes promoting digital health literacy.

# DIGITAL SKILLS FOR SOCIETY 4.0
## What measures must we implement?

SOCIETY 4.0: TRANSITION FROMSOCIETY 2.0 (MOBILE VOICE COMMUNICATION) TO SOCIETY 4.0(SOCIAL MEDIA + APPS + OTHER) AND LAYING THE FOUNDATIONS FOR SOCIETY 5.0 (HUMAN-CENTRED CONVERGENCE OF CYBERSPACE AND PHYSICAL SPACE TO ADVANCE HEALTH, EDUCATION AND SOCIAL WELL-BEING)

### 1 DIGITAL LITERACY FOR CITIZENS

### 2 DIGITAL CITIZENSHIP

### 3 DIGITAL HEALTH LITERACY OF CITIZENS
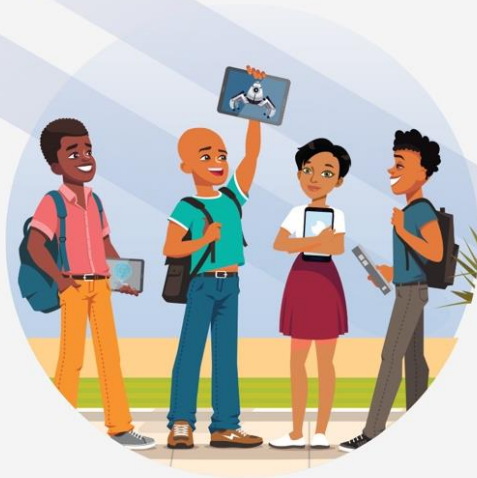


**1** — Citizens digital literacy programme

**20 000** trainers trained

**2 million** citizens trained in digital literacy
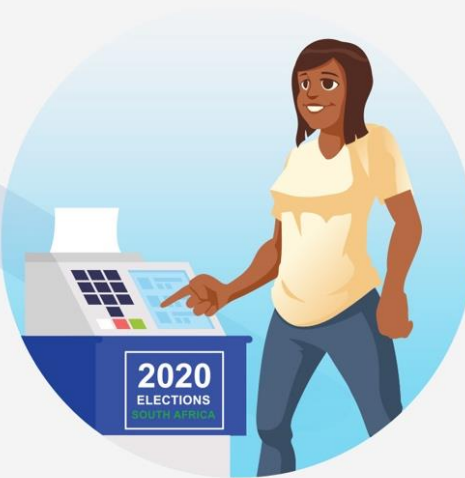
**2** — Mass-based digital citizenship programme

Community development worker training of trainers

**1 000 000** citizens trained in digital citizenship

**10 000** Community Development Workers trained
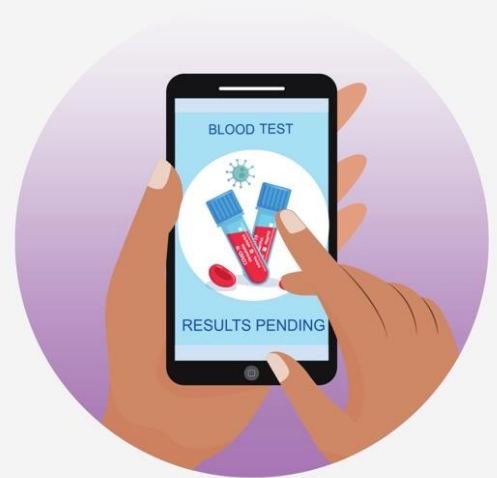
**3** — Awareness and training programme

Community health work training of trainers

**5 000** Community Health Workers trained

**500 000** citizens trained in digital health literacy

## ACTIVITIES AND OUTPUTS

## STAKEHOLDERS INVOLVED IN THE MEASURE:

- DSAC
- DCDT
- DPSA
- DoH

**Society 4.0 Implementation Measure 1: Building Digital Literacy for Citizens**

Access to the Internet and digital technologies alone do not guarantee productive use of these technologies by citizens, although it is a precondition for such use. Citizens must have the ability access, manage, integrate, communicate, evaluate and create information safely and appropriately for productive ends (UNESCO-UIS, 2018).

Developing the digital literacy of citizens must incorporate ***the rollout of a large-scale digital literacy programme including content on cyber awareness and cyber secure conduct***, targeting several million citizens in communities where they live, with customised content to ensure that it appropriately targets different citizen segments, including children, young people and the elderly. The focus of the programme has to be on building digital competence in information, media and data literacy, communication and collaboration, digital content creation, safety, devices and software operations, problem solving, and career/work/entrepreneurship-related information and knowledge. Public libraries, together with other social and community infrastructure, should be at the centre of such a programme, given its importance as a civic space to provide information and knowledge and promote civic participation. The National Library South Africa (NLSA) is in the process of transitioning the Mzansi Libraries On-Line Project (MLO) into the NLSA's Programme offerings, with a special emphasis on rural communities bridging the digital divide (NLSA, 2020). A recent study estimated that 97% of the 1,612 (updated statistics indicate there are now 1,879) public libraries have access to the Internet, but bandwidth limitations remain a challenge (Ledwaba et al., 2020). Public libraries and universities should offer ***digital skills courses to support independent living for persons with disabilities***, including device and software use, special cybersecurity needs, accessible banking for financial independence, courses which can lead to micro-credentialling.

The Department of Communications and Digital Technologies (DCDT) leads the digital literacy for citizens' component of the implementation programme, in close collaboration with the frontline service delivery departments, the Local Government Sector Education and Training Authority (LGSETA) and civil society organisations. The rollout of the digital literacy programme targeting citizens must have, as an integral component, a ***train-the-trainers programme*** in which librarians, para-professionals and community members are trained, in order to build the local capabilities to deliver digital literacy in communities, at this scale. The MLO project has already provided librarians with core ICT competency training, including the use of computing and mobile devices, email, social networking technologies, Internet, digital wellness, and public access to technology. The train-the-trainers programme should be led by the NLSA under the stewardship of the Department of Sports, Arts and Culture (DSAC) and the Provincial Departments of Arts and Culture, in collaboration with provincial departments and the Library and Information Association of South Africa (LIASA).

**Society 4.0 Implementation Measure 2: Enabling Digital Citizenship**

Digital technologies increasingly mediate the ability of citizens to participate in society. Digital citizenship, that is the ability to enact your role as citizen in society and observe the attendant rights and responsibilities, requires the necessary skills to source social, political, cultural and economic information, and to create different forms of content using multimedia formats.

Developing these skills requires the ***rollout of a mass-based digital citizenship programme*** across the country. The programme curriculum should focus on the development of a range of skills that enable citizens to effectively and productively participate in society: including in media and information literacy and production, in exercising civic rights and responsibilities, in personal and family health literacy, and in balanced use, privacy and security, and consumer awareness. The implementation approach should ***incorporate a train-the-trainer programme targeting Community Development Workers (CDW)*** who should play a pivotal role in rolling out the programme.

The Department of Public Service and Administration (DPSA) should lead the initiative in collaboration with DCDT, the Department of Home Affairs (DHA), Department of Cooperative Governance and Traditional Affairs (COGTA), the Information Regulator South Africa (IRSA) and the National Consumer Commission (NCC).

**Society 4.0 Implementation Measure 3: Develop the Digital Health Literacy of Citizens**

One of the underlying aims of the *The National Digital Health Strategy for South Africa 2019 – 2024* (DoH, 2019) is to empower all citizens to better navigate their personal health journeys, using digital technologies. This involves the development of digital health literacy of the South African citizenry. Digital health literacy is premised on the ability of citizens to search, acquire, understand, evaluate, communicate and apply health information, and knowledge gained from digital sources, towards citizen health and wellbeing.

A ***national digital health literacy awareness and training programme*** must promote the digital health literacy of the South African citizenry. The programme should be aimed at building the necessary skills among the various demographic segments of South African society, enabling citizens to navigate their own personal health journeys, to access, understand, appraise and apply health information and knowledge gathered electronically. A ***train-the-trainer programme targeting Community Healthcare Workers (CHW)*** must form a pivotal component of the implementation of the programme. This initiative should be led by the Department of Health (DoH) in collaboration with Provincial Health Departments and the Health and Welfare Sector Education and Training Authority (HWSETA).

**Table 4: Society 4.0 Measures, Outputs and Outcomes**

| Strategy Goal | Outcomes |
|---|---|
| • To development the digital literacy of the South African citizenry for enhanced citizen participation and health | • Increased productive use of digital technologies by citizens, with significant attention to women and girls, and persons with disabilities |
| **Measures** | **Outputs** |
| • Promote digital literacy among South African citizens | • Digital literacy programme for citizens, with attention to cyber awareness and cyber security, implemented<br>• 20 000 trainers trained in train-the-trainer programme<br>• 2 million citizens trained in digital literacy |
| • Strengthen digital citizenship of the South African citizenry | • Digital citizenship programme for citizens implemented<br>• 10 000 Community Development Workers trained in train-the-trainer programme<br>• 1 million citizens trained in digital citizenship |
| • Enhance the digital health literacy of South African citizens | • Digital health literacy programme for citizens implemented<br>• 5 000 Community Health Workers trained in train-the-trainer programme<br>• 500 000 citizens trained in digital health literacy |

## 8. Strategy Element 4: Society 4.0: Special Focus on Young People Not-in-Employment-Education-or-Training

**Young People NEET: Challenge and Status**

The lives of young people in South Africa are impacted by multidimensional forms of deprivation, including income poverty, low educational outcomes, poor physical and mental health, and a lack of access to diverse and productive social networks (Graham et al., 2019). Furthermore, young people experience long periods of unemployment that have profound negative impact on their physical and mental well-being (De Lannoy et al., 2018). According to Statistics South Africa (2020) there were 20,4 million young people aged 15-34 years, with about 8,5 million (41,7%) not-in-employment-education-or-training (NEET). Youth unemployment is considered a national crisis that demands urgent, innovative and coordinated solutions (Dicks, 2020). Young people unable to find labour market or further education and training opportunities become invisible to the existing administrative systems (Graham et al., 2019). As such, NEETs fall outside the institutional environments and networks that can be used as points of entry into the labour market.

Important efforts to address the youth unemployment crisis include the establishment of a National Pathway Management Network (NPMN), with the aim to grow a national network reaching three million young people through multiple channels, as part of the Presidential Youth Employment Intervention (PYEI). There are also ongoing efforts to mobilise a basic package of support (BPS) to young people, driven by a range of stakeholders, including the Southern Africa Labour and Development Research Unit (SALDRU) at the University of Cape Town, the Centre for Social Development in Africa at the University of Johannesburg, the DG Murray Trust, and The Jobs Fund, with funding and technical support from the Capacity Building Programme for Employment Promotion, funded by the European Union, and based in the Government Technical Advisory Centre. The rapid rollout of digital platforms such as the Youth Employment Service (YES, www.yes4youth.co.za) and Harambee Youth Employment Accelerator (https://sayouth.datafree.co) are important resources for linking young people and employment opportunities.

**Young People NEET: Measures, Activities and Outputs**

Addressing the youth unemployment crisis must involve providing meaningful support to young people at risk of becoming stuck along the transition to the labour market, unable to access decent work opportunities, including self-employment opportunities (National Planning Commission, 2019). The International Labour Organisation (ILO, 1999) and its campaign partner organisations, the International Telecommunication Union (ITU) and the United Nations Development Programme (UNDP), consider decent work to encompass opportunities for work that is productive and delivers a fair income, in conditions of freedom, equity, security and human dignity. Addressing youth unemployment must incorporate a process of unlocking learning and digital skills building opportunities, and engaging young people in addressing pressing societal problems. The ITU digital skills toolkit (ITU, 2018) is relevant to these measures, activities and outputs.

# SOCIETY 4.0: SPECIAL FOCUS ON YOUNG NEETS
## What measures must we implement?

**YOUNG PEOPLE NOT IN EMPLOYMENT, EDUCATION AND TRAINING ACCESS DIGITAL SKILLS DEVELOPMENT AND LABOUR MARKET OPPORTUNITIES**

**1**
UNLOCKING LEARNING AND DIGITAL SKILLS BUILDING

**2**
ADDRESSING SOCIETAL CHALLENGES

YNEET TECH HUB

**ACTIVITIES AND OUTPUTS**
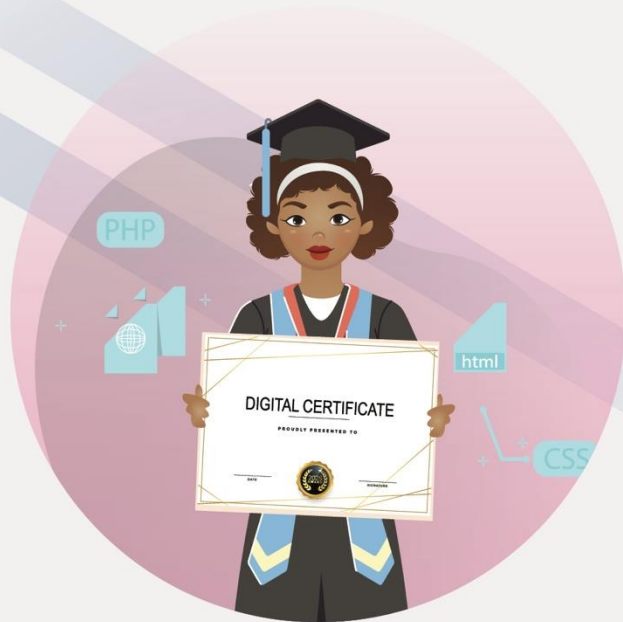
Digital literacy programme linked to learning and employment

Entry level digital skills programme

Young people training of trainers strategy

Public infrastructure for delivery

Micro-credentialing and digital badging

**5 000**
young people trained through train-the-trainer programme

**2,5 million**
young people trained in digital literacy programme

**4**
pre-entry levels digital skills development programmes

**80 000**
young people trained in entry level digital skills development

**1 000**
public and community-based facilities accessed to deliver skills development programmes

Digital literacy in public employment and youth services programmes

Digital rewards programme

**500 000**
young people participating in public employment and youth service programmes

**1 000**
corporates participating in digital rewards programme for public and community service

**R100 million**
mobilised in sponsorship for digital rewards programme

**R1 million**
young NEETs registered for participation in the digital rewards programme

**500 000**
young people established a digital skills and asset portfolio

**STAKEHOLDERS INVOLVED IN THE MEASURE:**

● DWYPD   ● NYDA   ● PSETA   ● Public sector

**Young People NEET Implementation Measure 1: Unlocking Learning and Digital Skills Building Opportunities**

This measure involves the ***design, development and implementation of a digital literacy programme specifically focusing on sourcing and taking advantage of learning and employment opportunities*** by digital means. The programme should be focused on developing the skills necessary to identify, evaluate and exploit further education and training opportunities across the entire spectrum of the PSET system, such as skills programmes, vendor-specific courses, and practice-oriented short courses; bursaries and funding opportunities; career guidance and leadership development opportunities; and general skills for conducting web research, online communication and collaboration. Furthermore, it should develop the abilities of young people to conduct online market research, undertake strategic planning and business analysis, access and use of financing and crowdfunding platforms, online marketing and networking, and basic business management. The network of co-labs and other digital innovation spaces should form an integral part of the delivery infrastructure for rolling out the digital literacy programme. The digital literacy programme should be complemented by the implementation of an ***entry level digital skills programme for developing data analytics, network engineering and digital design for additive manufacturing skills***. Mixed, augmented and extended reality approaches would be ideal for creating the "virtual experience" as a substitute for the "real experience".

This foundational digital skills programme should provide a pathway towards intermediate and advanced digital skills in these respective domains. The implementation approach to these programmes must incorporate a ***large-scale train-the-trainer strategy in which young people are recruited and accredited*** to deliver the training programmes. It is also important for the training to be delivered in local communities. ***Public infrastructure in metros, districts and local municipalities must be identified for use in the delivery of the training programmes***, including public libraries, Thusong Service Centres, municipal facilities, and schools, must be identified so that training can take place as close as possible to local communities.

The Department of Women, Youth and Persons with disabilities (DWYPD) and the National Youth Development Agency (NYDA) must lead the implementation of the digital literacy and skills programmes, in collaboration with the Presidency, DCDT, Department of Employment and Labour (DEL), Department of Higher Education and Training (DHET), National Electronic Media Institute of South Africa (NEMISA), and the South African Youth Council (SAYC).

A system of ***micro-credentialing and digital badging must be developed that enables certification of short courses***. Certification remains an important source of reliable information to employers, about the training young people have received. A system of micro-credentialing and digital badging facilitates the identification and tracking of the skills, knowledge and competence acquired by young people and enables them to build digital learning portfolios. Digital badging has the potential to provide visible recognition of a learner's achievement (Ellis et al., 2016). Such a system should not be too onerous or bureaucratic. Rather, it should be flexible enough to allow for innovation and adaptation of training courses to be responsive to continuously changing needs in the labour market. It

should, however, be rigorous enough to protect young people from exploitation by unscrupulous training providers (De Lannoy, 2018). The South African Qualifications Authority (SAQA), in collaboration with the Council of the Quality Council for Trades and Occupations (QCTO) and the National Skills Authority (NSA), should lead the design and development of the system of micro-credentialing and digital badging.

**Young People NEET Implementation Measure 2: Building Digital Skills Through Addressing Societal Challenges**

Local communities in South Africa face a broad range of challenges ranging from delivery of social services such as early childhood development, home-based care, distribution of food parcels and nutritional resources, crime prevention, health and wellbeing support, to environmental services such as waste management, land-based livelihoods support, and parks and beautification services. Young people can contribute to the delivery of these social and environmental services in their local communities, in support of existing and new government and civil society programmes. Existing public employment such as the Expanded Public Works Programme (EPWP) and the Community Works Programme (CWP) and youth service programmes such as the National Youth Service (NYS) and the National Rural Youth Service Corps (NARYSEC) are geared towards addressing these challenges.

Public employment and youth service programmes have a skills development component as part of their design. The *integration of digital literacy into the skills development components of public employment and youth service programmes* is required to equip young people with the necessary digital skills to mobilise and enhance their meaningful participation in South Africa. These programmes reach in excess of 1 million people on an annual basis, of which the youth constitute the majority of programme participants, (NPC, 2017). The skills development component of these programmes should be revised with a view to incorporating digital literacy in the curricula of these programmes. The Department of Public Works, in collaboration with the Department of Rural Development and Land Reform (DRLR), the National Youth Development Agency (NYDA) and the Sector Education and Training Authorities (SETAs) should play a leading role in integrating digital literacy into the curricula of public employment and youth service programmes.

*Coding camps for blind persons and persons with other disabilities* can be organised by government (Department of Social Development) in collaboration with the private sector and the national and sectoral organisations for persons with disabilities.

The *design and development of a digital rewards programme recognising the skills building*, underpinning the completion of selected public and community service activities by young people, is required to incentivise their participation in these activities. The digital rewards should incorporate both (1) recognition of skills developed resulting from the public and community service activities that contribute to the development of a young person's digital skills portfolio, as well as (2) sponsorship in the form of digital vouchers that enable young people to build up a digital skills and asset portfolio, that can be converted into cash, or tendered for purchasing of selected products and services offered by participating corporates in South Africa. This intervention will need to enlist the participation and sponsorship by corporate South Africa and operate on a digital platform.

**Table 5: Digital Skills Development for Young People NEET: Measures, Outputs and Outcomes**

| Strategy Goal | Outcomes |
|---|---|
| • To facilitate digital skills development training and labour market opportunities for young people not in employment, education and training | • Increased access to education, training and labour market opportunities by young people NEET, with particular focus on young women and young persons with disabilities |
| **Measures** | **Outputs** |
| • Unlock digital learning and skills building opportunities | • Digital literacy programme focused on learning and employment opportunities (including self-employment) implemented<br>• 5 000 young people trained through train-the-trainer programme to deliver digital literacy programme<br>• 2,5 million young people trained in digital literacy programme focused on learning and employment opportunities<br>• 3 pre-entry levels digital skills development programmes developed<br>• 5 000 young people trained through train-the-trainer to delivery entry level digital skills programmes<br>• 80 000 young people trained in entry level digital skills development programme<br>• 1 000 public and community-based facilities accessed to deliver skills development programmes<br>• National framework for recognition of micro-credentialing and digital badging implemented |
| • Facilitate access to digital skills building opportunities in public employment programmes, and youth and community service | • Digital literacy integrated into the training component of public employment and youth service programmes<br>• 500 000 young people participating in public employment and youth service programmes completed training with a digital literacy component<br>• 1 000 corporates participating in digital rewards programme for public and community service by young people not in employment, education and training<br>• R100 million mobilised in sponsorship for digital rewards programme<br>• 1 million young people not-in-employment-education-or-training registered for participation in the digital rewards programme<br>• 500 000 young people established a digital skills and asset portfolio |

## 9. Cross-cutting Strategy Elements 5 through 8: Leadership, Knowledge and Resourcing

This section combines the four cross-cutting strategy elements.

**Leadership, Knowledge and Resourcing: Challenge and Status**

The *National Digital and Future Skills Strategy* for South Africa recognises the importance of leadership and governance to ensure successful digital skills generation and development over the next five years, to ensure future impact. It should further be noted that the implementation of this programme will take place in an environment of extreme uncertainty, with an economy that was expected to contract by 7,8% in 2020, thus, requiring a fiscal consolidation pathway over the next five years (National Treasury, 2020). The diagnostic report of the PC4IR acknowledges that the skills development ecosystem is characterised by a silo mentality and expresses concerns about the speed at which entities are able to adapt

and change curricula, understand the needs of the workplace and provide accredited solutions to meet these needs (RSA, 2020a). Implementation is often hindered by coordination failures resulting from split accountability and overlapping mandates (National Planning Commission, 2011).

**Leadership, Knowledge and Resourcing: Measures, Activities, Outputs**

A radical shift in the human resource ecosystem, including a re-think of the architecture of the skills ecosystem, acceleration of the upskilling of young people, and the re-skilling of the existing workforce is required, given the above-mentioned conditions facing the country. The digital skills development programme should be regarded as a set of initiatives led and regulated by the state that introduces changes that are catalytic, to ensure flexibility, integration of learning streams, mobility of learners, and the use of technology to ensure the efficiency of the skills delivery system. The implementation programme therefore incorporates a set of interventions to enable distributed leadership and governance of the programme, build our knowledge of the digital ecosystem, and effectively resource the implementation of the programme under adverse fiscal conditions, as set out below.

**Figure 3: Digital leadership**



Source: Abrahams, 2021

The implementation challenges, which include the need to constantly adapt to a changing digital environment and a changing economic environment, means that strategic leadership is synonymous with adaptive digital leadership. The measures, activities and outputs set out in the various sections of this document need to be interpreted in the real-world context of South Africa, with leaders and their organisations finding creative ways to make digital skills building a priority, as this is the foundation of the future economy. Collaborative digital leadership is the key to success, with attention to the challenges of the digital divide, for young people, for women and girls and for persons with disabilities.

**Leadership, Knowledge and Resourcing Implementation Measure 1: Institutionalising Distributed Programme Implementation Leadership and Governance**

The complexity of the skills development ecosystem calls for an implementation approach that goes beyond the limitations of bureaucratic forms of organisation, still the dominant mode of organisation in the public sector. Whereas bureaucratic forms of organisation emphasise centralisation, authority and control, the network mode of organisation places emphasis on a plurality of actors, interdependence, and incentives for collective action (Kickert et al., 1999). Distributed leadership and governance structures, premised on the recognition that no one actor or entity has all the knowledge, expertise and resources to enable digital skills development for the country, are ***characteristics of the network mode of organisation, more suited to addressing the complex challenges of the ecosystem***.

The proposed institutional arrangements to give effect to distributed leadership and governance further draw on the underlying features of ***contemporary platform modes of social and economic organisation***. In a platform environment, the platform architecture establishes the design and development rules, provides for shared governance through decision-rights partitioning, and assures the autonomy of organisations, within the constraints of the platform rule. Structurally, the platform can accommodate large numbers of partners and collaborators, with the locus of control distributed among collaborating organisations. The style of management in platform environments is oriented towards innovation, and takes place by orchestration, rather than by giving and carrying out instructions. Managerial responsibility involves a careful balancing act between the ecosystem collaborators' autonomy and ecosystem-wide integration. Coordination mechanisms include norms and values (relational), rewards and sanctions (metrics), prescribed methods and procedures (process), and criteria for participation (authorising) (Tiwana, 2014).

The institutional arrangements proposed in this implementation programme draw on the ethos of network and platform modes of organisation. In this context, a Digital Skills Forum (DSF) must be established to lead, oversee and coordinate the implementation of the national digital skills programme. The gender equity, persons with disabilities and YNEET sectors should be well represented in this forum. A critical function of the DSF is to provide strategic direction to the implementation of the programme, prioritise and coordinate areas of focus, mobilise resources in the form of expertise, funding and institutional support, and monitor performance. The DSF will also advise on the re-conceptualisation and structuring of the skills development ecosystem, in support of digital skills building. The DSF should link into the Human Resource Development Council (HRDC) as a chamber, given its advisory role on human resource development of the country, so that the necessary alignments between digital skills building and the broader skills environment can be facilitated.

In utilising existing structures as far as possible, the 4IR Project Management Office in the DCDT will perform a pivotal management and coordination role. This role will include leading, planning, organising, communication and advocacy, as well as resource mobilisation, performance monitoring and reporting functions, supported by the relevant directorates in the DCDT. This will involve the setting up of the necessary management and administrative processes and systems to manage the collaborative implementation of the programme, coordinate the work of partners and collaborators, identify and mitigate risks,

build networks and disseminate information about the activities being implemented as part of the programme.

The **_cluster of interventions aimed at strengthening digital foundations_** will be led by the Department of Basic Education (DBE) in close collaboration with the Provincial Departments of Education, the South African Council for Educators (SACE), the National Education Collaboration Trust (NECT), and education labour unions. In this cluster, the DHET will play an important role in regard to actions and investments aimed at building the digital competence of educators, together with HEI faculties and schools of education, the ETDPSETA, DBE circuit managers, subject advisors and related school ICT structures.

A few key institutional innovations are proposed to drive and embed digital pedagogical capabilities, in strengthening the foundations for digital skills. A university consortium must be established, specializing in digital pedagogy innovations for teacher and subject advisor development. Furthermore, innovation in the design of schools and classrooms as centres of both face-to-face and virtual learning, fostering collaboration with public community centres, libraries and Thusong Service Centres, is required. Furthermore, collaborative public-private and public-public business models such as the DBE Cloud, the Sentech Learn educational content streaming platform, and Vodacom Schools must be encouraged and strengthened.

In the case of the **_cluster of activities aimed at developing intermediate and advanced digital skills_**, the DHET will take the overall lead and also lead the implementation of activities related to building a future-ready TVET subsystem, and developing the higher education system as a platform for advanced digital skills, in collaboration with the DBE, Universities South Africa (USAf), the Association of College Principles, HEI Faculties and Schools of Education, ETDPSETA and other SETAs, the Department of Science and Innovation (DSI), Department of Trade, Industry and Competition (DTIC), NEMISA, the National Research Foundation (NRF), science councils, and the Council for Higher Education (CHE). In the case of building a vibrant ecosystem for digital entrepreneurship, the DTIC will play a leading role, together with the Department of Small Business Development (DSBD), the Small Enterprise Development Agency (SEDA), DSI (Technology Transfer Station Programme), and NEMISA.

The institutional innovations to support intermediate and advanced digital skills development must focus on rethinking, reshaping, and redesigning TVETs, as is being done in all major innovation-focused countries. Furthermore, measures must be put in place to strengthen collaboration between universities, TVETs and science performing agencies.

The DTIC and the DPSA will provide overall leadership for the **_cluster of activities related to, workplace readiness in the private sector and government_**. Activities directed at building digital skills for the private sector will be undertaken in collaboration with the DHET, through the National Skills Authority (NSA) Secretariat, SETAs, science councils and innovation spaces, universities and TVETs. Activities targeting the optimisation of skills for digital government will be led by the DPSA, through the National School of Government (NSG), in collaboration with the Government Information Technology Officers Council (GITOC), the State Information Technology Agency (SITA), Broadband Infraco (BBI), Sentech, the South African Local Government Association (SALGA), the Public Services Sector Education and Training Authority (PSETA), and frontline public service departments.

The institutional innovations should be directed at ensuring that the NEDLAC, NSF and SETA agendas, together with the relevant government entities and workplace forums, focus more strongly on digital skills development. It is also necessary to strengthen the helix of university-TVET-industry linkages and relations. A digital innovation expert centre, established as a capability to advise public sector institutions with a range of digital transformation initiatives, must be considered as an important institutional innovation to support the evolution of digital government in South Africa.

The overall leadership for the *cluster of activities enabling digital skills development for Society 4.0* will be provided by the Department of Social Development (DSD), in close collaboration with Department of Home Affairs (DoHA), Department of Cooperative Governance and Traditional Affairs (COGTA), Department of Sports, Arts and Culture (DSAC), Department of Health (DoH), and other front line service delivery departments, LGSETA, the Services SETA, HWSETA, the Centre for Public Service Innovation (CPSI), National Library South Africa (NLSA), and the Information Regulator South Africa (IRSA) and the National Consumer Commission (NCC).

The Department of Women, Youth and Persons with disabilities (DWYPD), through the National Youth Development Agency (NYDA), should lead the implementation of the *cluster of activities targeting young people not-in-employment-education-or-training* (NEET). A broad range of collaborators are required for the effective implementation of this cluster of interventions, including the Project Management Office in the Presidency, the Government Technical Advisory Centre (GTAC), DHET, the Department of Employment and Labour (DEL, Employment Services of South Africa), the NSA, SETAs, NEMISA, and programmes such as the Youth Employment Service (YES) and the Harambee Youth Employment Accelerator. Stakeholders involved in mobilising support for the Basic Package of Support for young people are also critical.

A key institutional innovation targeting NEETs is *the establishment of a data-driven 'platform of platforms'*, see Figure 4 below, that links and enables data-sharing across a number of existing databases and information systems within the skills development ecosystem, that are crucial for defining and profiling the needs of young people and making the rollout of the National Pathway Management Network (NPMN) a reality.

**Figure 4: Institutional Design of the Digital Skills Development Programme Implementation Platform**
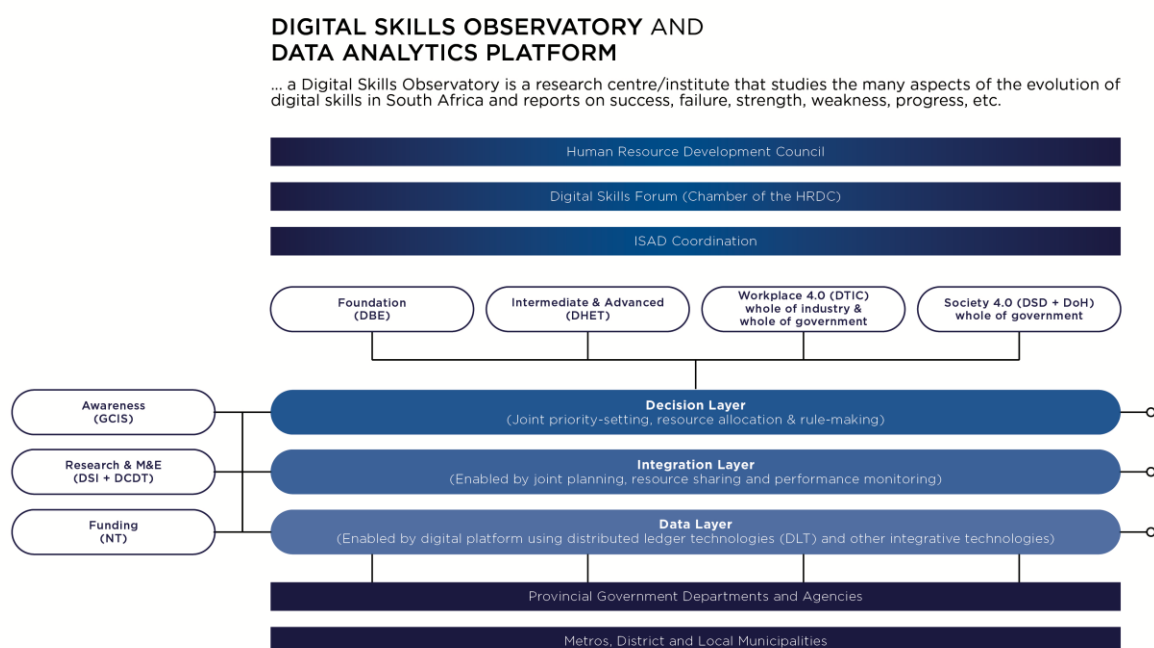


Source: Burke, 2021

There are clusters of activities that are cross-cutting and are required to support the implementation programme. The interventions to *create awareness* will be led by the Government Communication and Information Services (GCIS), while *research, performance monitoring and evaluation* will be led by the DCDT, and the *resource mobilisation and funding* will be led by the National Treasury (NT). The leadership and management architecture must effectively incorporate provincial and local government stakeholders, given their role in the programme's implementation locally.

The platform design provides for three layers, that is the data, integration and decision layers. The *data layer* is critical to the success of the implementation programme, given the critical role information will play in mapping digital skills demand and supply, and in facilitating access to services and support in the rollout of these services. A number of disparate databases and management information systems exist that do not have standardised frameworks for interoperability and sharing of data. For example, keeping track of developments and dynamics in the basic education sector requires data from various sources, such as the Education Management Information System (EMIS), the Learner Unit Record Information and Tracking System (LURITS), the South African School Administration and Management System (SA-SAMS), Provincial Data Warehouses, information systems

developed for the Data-Driven Districts Initiative, and the National Senior Certificate Database. In the PSET environment, databases and information systems include the Higher Education Management Information System (HEMIS), TVET MIS, Sector Education and Training (SET) MIS, NSFAS Database, the National Artisan Development (NAD) database management system, and the individual management information systems of 21 SETAs. Furthermore, datasets from the National Youth Service platform and the Youth.mobi platform are important building blocks to create a more comprehensive profile of the skills needs, developments and transitions into the labour market. Automated data-sharing across these databases and information systems is critical to the success of the national digital and future skills implementation programme, using technologies such as distributed ledger technology (DLT), or application programming interfaces (APIs), that enable access to relevant data, in order to build profiles, identify skills development needs, and link people to income opportunities through digital case management.

The *integration layer* is geared towards ensuring an integrated approach to planning, resource sharing and performance monitoring. This will involve joint planning on an annual basis, analysis of resource requirements, ensuring joint resource mobilisation, and integrated performance monitoring. The *decision layer* involves joint priority setting and resource allocation among stakeholders, led by the respective departments responsible for each cluster of interventions as set out above. Furthermore, stakeholders will establish the rules by which the different work-streams will be governed and managed.

Awareness of the digital transitions and their effects in economy and society remains limited in South Africa. A survey by Kagiso Trust (2019) suggest that only 1% of 1 123 respondents surveyed in 20 districts in all provinces regard themselves as highly knowledgeable about the "4IR", while half of those surveyed believe that the 4IR should not be taken seriously. There is an urgent need to launch a *mass awareness campaign* on the critical importance of digital skills, in preparing citizens to effectively participate in the opportunities and in mitigating the risks associated with this major economic transition. Such a campaign should harness youth leadership and civic participation to promote the development of digital skills through a multi-media campaign combining face-to-face, community outreach, social media platforms, and public broadcasting media including radio and television. Recruitment of volunteers trained in communicating key messages through various channels, including schools, sports clubs and activities, and other community outlets, must form a cornerstone of the campaign.

**Leadership, Knowledge and Resourcing Implementation Measure 2: Establishing a Digital Skills Observatory**

Collecting data and conducting analysis necessary for constructing knowledge about the complexities and dynamics of growing skills for the digital economy remain critical constraints to taking advantage of opportunities for evolution of the South African economy. The development of a more comprehensive account and explanation of transitions and dynamics in the process of digital skills demand and supply necessitates the construction of a knowledge base that integrates perspectives from diverse disciplinary domains and provides a synthesis of the multiple causes and outcomes of digital skills investments. The *establishment of a Digital Skills Observatory* is proposed, to address this gap in knowledge. The proposed research observatory must institutionalise observation capacity

that is able to monitor and study digital skills demand and supply over a sustained period of time, synthesising research outcomes across disciplinary boundaries, drawing on a diverse range of research infrastructures, and actively engaging policy-makers and actors in the skills development ecosystem on the basis of this research and scientific enquiry. The focus of the Digital Skills Observatory must be on bringing together existing data sets and presenting them in accessible, attractive ways to a variety of audiences; facilitating the use of data by agencies and actors whose activities impact the developments in the specific disciplines, sectors or communities; and facilitating co-operation between various local actors and researchers, policy makers, practitioners and community members. An initial *digital skills research framework* is attached as ***Annexure A***. The design and operation of the data-driven platform-of-platforms will be one of the main initiatives of the observatory, hence an initial expression of the design of the platform-of-platforms is included in Annexure A.

The conceptual approach underlying the establishment of the Digital Skills Observatory stresses the importance of shifting away from a situation that is characterised by isolated and disparate patches of research and institutional infrastructure, to an environment in which the research community, research infrastructures and collaborations are knit together to form a coherent and integrative system. Building on the experience of the Labour Market Intelligence Programme (LMIP), the Digital Skills Observatory must serve as a centralised repository for databases and other information resources on digital skills demand and supply in order to monitor and measure trends, evaluate programmatic outcomes, disseminate research outcomes and undertake networking initiatives, as the foundation for consultation, design and implementation.

The annual publication of a ***State of Digital and Future Skills report*** should be a pivotal output of the observatory. Different types of research products, including issues papers (investigating specific issues in detail), concept papers (examining and investigating specific trends and developments), policy briefs (noting the policy implications of specific developments and dynamics), and trends reports (observing and analysing emerging trends), should be produced. The tools, methodologies, networks and expertise established through the LMIP must be taken forward through the Digital Skills Observatory.

**Leadership, Knowledge and Resourcing Implementation Measure 3: Resourcing the Digital and Future Skills Implementation Programme**

The Government of South Africa has embarked on a fiscal consolidation pathway for the next several years, given the contraction of the economy and the high levels of uncertainty prevailing due to COVID-19 (National Treasury, 2020). The country faces adverse fiscal conditions, driven also by unsustainably high levels of debt. In this context, with many competing social, infrastructure and economic priorities, it is important to recognise that resource mobilisation for digital skills is an integral part of preparing the country for productive participation in the 21$^{st}$ century regional and global economy, rather than an unaffordable indulgence. The approach to mobilising the necessary financial resources to implement the national digital and future skills programme, therefore, consists of a combination of four funding mechanisms and approaches.

Firstly, it is necessary to mobilise new funding for supporting the rollout of the national digital and future skills implementation programme. Doing so requires the ***establishment of the Digital Development Fund (DDF)***, dedicated to mobilising and deploying funding to enable the evolution of digital and future skills. The DCDT is in the process of preparing legislation to dissolve the Universal Access and Service Fund (USAF) and to replace it with the DDF. A process to design, develop, structure and implement the DDF, under the leadership of the National Treasury, must be undertaken in close collaboration with the DCDT. Although this fund will have a broader remit than digital and future skills, the design of the DDF must ensure that a specialised funding instrument within the DDF must be targeted at skills development.

Secondly, a ***focus on digital and future skills development must be integrated and institutionalised more deliberately in existing funding platforms*** such as the National Skills Fund (through the SETAs), the Jobs Fund (through the funding window targeting support for work seekers), and the Labour Activation Programmes (LAP) funded via the Unemployment Insurance Fund (UIF). Resources channelled through these funds should target digital skills development that is oriented towards meeting labour market demands and linking young people to decent jobs.

Thirdly, the ***skills component for infrastructure earmarked grants*** where physical infrastructure includes Internet connectivity and network infrastructure must integrate digital skills development related to the delivery of these projects. This will apply to earmarked grants such as the Education Infrastructure Grant (EIG) for DBE and the Infrastructure and Efficiency Grant (IEG) for the DHET. Fourthly, interventions will be ***funded through the parliamentary budget vote process***, as part of the execution of the mandate of departments, agencies and entities.

Finally, ***funding must be mobilised through international development cooperation and the private sector***. A targeted drive to mobilise funding from the international community, through South Africa's traditional and new partnerships with multilateral agencies and bilateral relations, must be initiated with a view to raising development funding for the digital and future skills priorities outlined in the implementation programme. Furthermore, a funds mobilisation campaign must be initiated to raise private sector funding for this purpose.

**Table 6: Leadership, Knowledge and Resourcing: Measures, Outputs and Outcomes**

| Strategy Goal | Outcomes |
|---|---|
| • To effectively mobilise leadership, institutional and funding resources for the implementation of the digital and future skills programme | • Institutionalised the provision of digital skills in the education, training and skills development ecosystem |

| Measures | Outputs |
|---|---|
| • Build a digital and future skills implementation platform | • Established governance and management structures<br>• Enabled secure data-sharing across multiple databases and management information systems (platform of platforms)<br>• Implemented a performance dashboard to track programme implementation<br>• Multimedia digital skills awareness campaign implemented |
| • Build a knowledge base on digital skills demand and supply | • Digital Skills Observatory established and maintained<br>• Annual State of Digital and Future Skills Report produced<br>• Various knowledge resources and products produced and packaged<br>• Digital skills research community of practice established and maintained |
| • Mobilise funding to support digital skills development | • Digital Development Fund established<br>• R1 billion mobilised for digital skills development in the DDF<br>• R500 million mobilised through the NSF for digital skills development<br>• R500 million mobilised through the LAP-UIF<br>• R250 million mobilised through the Jobs Fund with an additional R500 million in co-funding<br>• R500 million mobilised through international development and corporate funding |

## 10. Digital Skills Convergence Journey: Implementation Approach for Digital Skills Benefits Realisation

The implementation approach must adopt the principles relevant to benefits realisation (New South Wales Government, 2018), adapted to the South African digital skills context, as follows:

1. A benefit derived from the implementation of the National Digital and Future Skills Strategy is a measurable improvement in digital and 21st century skills which is perceived as an advantage by many South African stakeholders.

2. Benefits must be aligned to the goals of the National Digital and Future Skills Strategy to achieve a digitally-enabled economy and society.

3. Benefits of digital and future skills investment and development need to be first understood as outcomes. Benefits are the reason an investment is made.

4. Benefits of investment in and development of digital and future skills must be measurable and evidence-based in order to demonstrate that an investment provides value.

5. Benefits of digital and future skills can only be realised through continuous change and adaptation, and such change can only be sustained by realising reciprocal benefits.

6. Benefits of digital and future skills advances need to be owned by appropriate sponsors, leaders and managers in government, industry and society.

7. Intermediate benefits are needed to realise end benefits, meaning that milestones are important for achieving successful outcomes from the investment in digital and future skills.

8. Since benefits are dynamic, the specific benefits of investment in and development of digital and future skills need to be regularly reviewed and updated, and the results of the reviews must be made public.

9. Government should keep the number of benefits monitored and reported to a sensible, manageable number, noting that the selected benefits should advance over a multi-year period.

10. Benefits management for digital and future skills should be integrated with other processes relevant to evolution of the digital economy and society.

Outcomes from such a digital benefits realisation process are presented in the digital skills journey diagram below, which represents the convergence of the multiple strategy elements.

**Figure 10: Digital skills convergence journey**
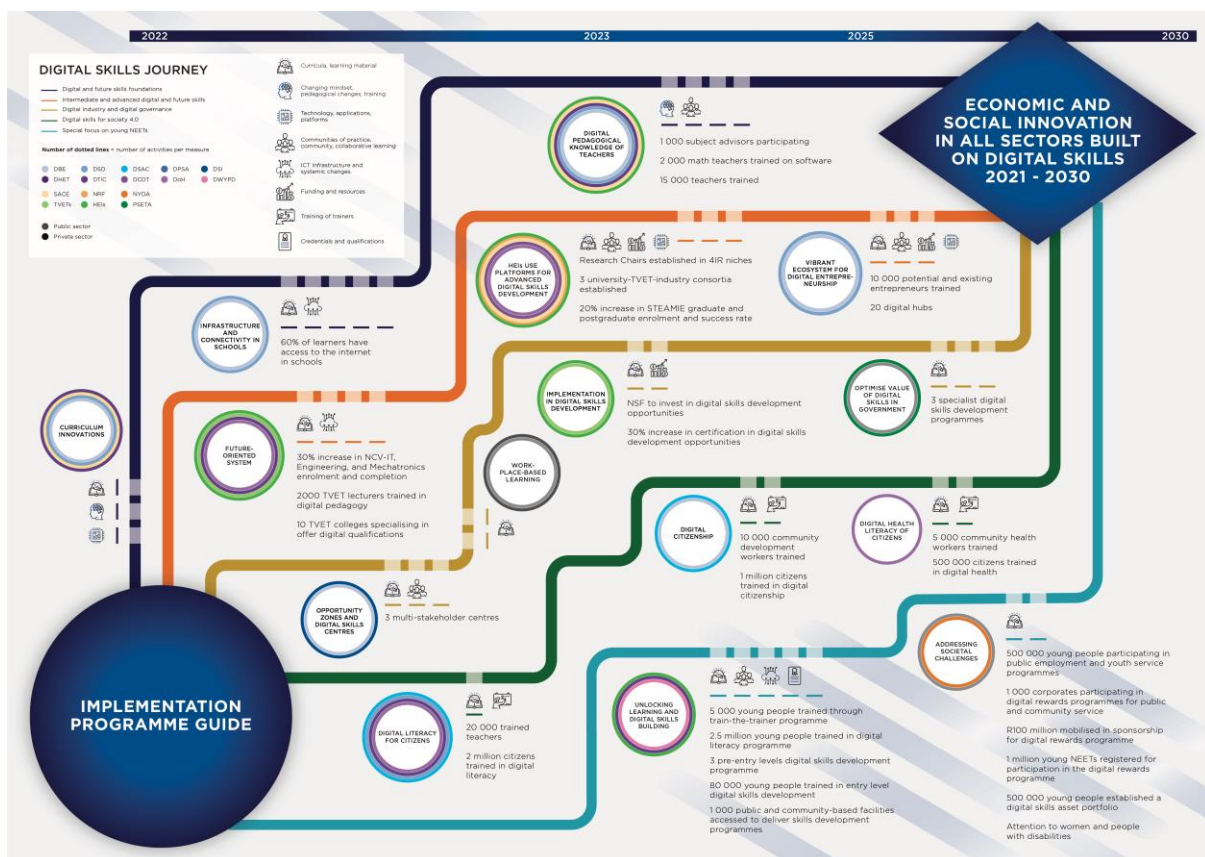


Source: Abrahams, Burke & The Data Innovator, 2020

## 11. Risks

The table below outlines the key risks to the effective implementation of the programme and appropriate risk mitigation measures.

**Table 7: Leadership, Knowledge and Resourcing Goals and Objectives**

| Outcome | Key Risk | Risk Mitigation | Responsible |
|---|---|---|---|
| **Digital Foundations** | | | |
| • Enhanced the cognitive capabilities of learners in basic education | • Curriculum changes introduced disrupt performance | • Effective change management underpins the interventions introduced | • DBE |
| • Improved the 21st century skills of learners | • Resistance by educators to implement $E^3$ methodologies | • Implement awareness programme to obtain educator buy-in | • DBE |
| • Improved the digital competence of learners completing matric | • Inadequate Internet connectivity facilities and learning resource materials | • Mobilise partnerships to ensure adequate support for the rollout of the relevant curricula and subjects | • DBE |
| **Intermediate and Advanced** | | | |
| • Increased the number of STEAMIE graduates pursuing advanced digital skills in 21st century niche areas | • Limited funding available to support postgraduate training in advanced digital skills | • Target postgraduate training in advanced digital skills through the NRF postgraduate funding policy | • DHET/ DSI |
| • Increased the number of graduates completing digital skills-oriented qualifications in the TVET system | • Unable to expand the enrolments in digital skills-oriented qualifications due to a shortage of appropriately qualified lecturers | • Implement lecturer training programme to develop teaching capacity in digital skills-oriented qualifications | • DHET/ HEIs |
| • Increased digital business start-up and growth | • Poor quality business development services provided | • Implement programme to strengthen the BDS offerings provided in innovation spaces | • DTIC |
| **Workplace 4.0** | | | |
| • Decreased digital skills gap in in the labour market | • Poor information and knowledge on digital skills needs in the labour market | • Establish a Digital Skills Observatory to study and track the demand and supply of digital skills to the labour market | • DCDT/ DHET |
| **Young People NEET** | | | |
| • Increased access to education, training and labour market opportunities by Young People NEET | • Poor linkages between the needs of young people and the opportunities available | • Implement digital skills case management that matches the profiles and needs of young people with digital skills training opportunities available | • DWYPD |
| **Society 4.0** | | | |
| • Improved productive used of digital technologies by citizens | • Unequal access to digital technologies | • Engagements with telcos to improve the scope and quality of coverage and bring down data costs | • DCDT/ DTIC |
| **Leadership, Knowledge and Resourcing** | | | |
| • Institutionalised the provision of digital skills in the education, training and skills development ecosystem | • Poor buy-in from stakeholders in government and the private sector | • Active Presidential and Ministerial support for the implementation of the digital and future skills building programme | • Presidency |

## 12. Performance Monitoring and Evaluation

The implementation plan sets out clear outputs and deliverables to measure programme implementation performance.

A six-monthly report on progress should be produced by the programme implementation coordination team, analysing performance against the plan. These six-monthly reports should feed into annual reviews. An annual review of performance should be conducted that interrogates whether there are any significant changes in the external and internal environment, and whether and how any of the major assumptions underpinning the programme implementation plan have changed. The annual report should provide a more detailed analysis that reflects on the performance over the year and incorporates a review of the targets achieved.

A mid-term review should be undertaken at the end of the first three-year cycle. This review is an important opportunity to determine which aspects of the planning and design related to the implementation programme require significant changes, and what those changes should be. An in-depth evaluation should be undertaken towards the end of the five-year planning cycle. The evaluation should consider the relevance, effectiveness and efficiency, impact and influence on the sustainability of the digital and future skills implementation programme.

**Table 8: Performance Monitoring and Evaluation Cycle**

| Year / Month | 2020/21 | 2021/22 | 2022/23 | 2023/24 | 2024/25 |
|---|---|---|---|---|---|
| April | • Implementation plan approved | • Annual work plan approved | • Annual work plan approved | • Revise and approve business plan report | • Annual work plan approved |
| September | • Prepare mid-year review report | • Prepare mid-year review report | • Prepare mid-year review report | • Prepare mid-year review report | • Conduct independent evaluation |
| March | • Prepare annual review report | • Prepare annual review report | • Prepare mid-term review report | • Prepare annual review report | • Independent evaluation report |

## 13. Implementation Programme Matrix

| Goal | Outcomes | Objectives | Outputs | Baseline | 5-Year Target | Annual Target | | | | | Key Stakeholders | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Lead | Support |
| **Digital Foundations** | | | | | | | | | | | | |
| To expand the development of digital competencies in schools for improving the cognitive abilities of learners | Enhanced the cognitive capabilities of learners in basic education | To enable curriculum innovation focusing on digital literacy, coding and robotics, and 21st century skills in basic education | Integrated digital literacy, coding and robotics from Grade 1 – Grade 9 in all public schools | Gr 1 – 3 pilot | Gr 1 – 9 | Gr 1 - 3 | Gr4 - 6 | Gr 7 - 9 | All | All | DBE | PDEs, SACE, UNISA |
| | | | 21st century skills (E3) integrated into the CAPS curriculum | Pilot | 9 Provinces | 3 | 6 | 9 | 9 | 9 | DBE | CfE, CIDA, NECT, NLF |
| | | | | 73 Schools | 73 Schools | 120 | 180 | 240 | 300 | 360 | DBE | CfE, CIDA, NECT, NLF |
| | | | Educational digital applications integrated into 6 school subjects in secondary school | - | 6 Subjects | Pilot | Pilot | 2 Subjects | 4 Subjects | 6 Subjects | DBE | |
| | | | Developed a digital literacy curriculum framework for the ECD sector | - | 3 000 ECD Centres | Developed | Piloted | 200 ECDs | 1 000 ECDs | 3 000 ECDs | DBE | DSD, DoH |
| | | | Digital pedagogy communities of practice established | - | 9 Provinces | 3 | 6 | 9 | 9 | 9 | DBE | PDEs, SACE |
| | | | Increased the number of Grade 12 learners taking one of the computer subjects (CAT or IT) at public school | 6% of students enrolled in Matric | 15% | 6% | 8% | 10% | 12% | 15% | DBE | PDEs |
| | | To strengthen the digital pedagogical capabilities of teachers | Teachers trained in terms of the PDFDL | TBC | 15 000 | 1 500 | 1 500 | 3 000 | 3 000 | 6 000 | DBE | PDEs, SACE |
| | | | Digital pedagogy integrated as a subject into the teacher education curricula at HEIs | TBC | 26 Universities | 5 | 10 | 15 | 20 | 26 | DHET | USAf |
| | | | Mathematics teachers trained in the application of dynamic software | - | 2 000 | 300 | 300 | 300 | 500 | 600 | DBE | DHET |
| | | | Subject advisors participating in community of practice on digital pedagogy | - | 1 000 Active Subject Advisors | 100 | 300 | 600 | 900 | 1 000 | DBE | PDEs, SACE |
| | | | University consortium established specializing in digital pedagogy innovations for teacher and subject advisor development | - | 1 | Inception | Operation | Operation | Operation | Operation | DHET | USAf |
| | | To promote access to Internet connectivity digital infrastructure, facilities and educational resources | Increased learner access to the Internet in schools | 21% | 60% | 25% | 40% | 50% | 55% | 60% | DBE | BBI/ Telecos |
| | | | Increased the access be learners to e-LTSM | - | 60% | 25% | 40% | 50% | 55% | 60% | DBE | |
| **Intermediate and Advanced Digital Skills** | | | | | | | | | | | | |
| To develop intermediate and advanced digital skills through the post-school education and training and innovation ecosystems | Increased the number of graduates completing digital skills-oriented qualifications in the PSET system | To enhance the relevance of the TVET subsystem to the needs of the digital economy and society | Implemented the re-curriculated NCV-IT offered across TVET system | - | Full Implementation | Pilot | Implement | Implement | Implement | Implement | DHET | Association of TVET College Principals, ETDPSETA, HEI Faculties of Education |
| | | | Developed robotics, data analytics and coding as specialisations in the NCV-IT | - | Robotics, Data Analytics & Coding Specialisations Implemented | Robotics Implemented | Data Analytics Developed | Data Analytics Implemented | Coding Developed | Coding Implemented | DHET | Association of TVET College Principals, ETDPSETA, HEIs |
| | | | Increased the number of students completing NVC (L2 – 4) Engineering and Related Design | 1 200 | 1 800 per annum | 1 320 | 1 380 | 1 500 | 1 560 | 1 800 | DHET | Association of TVET College Principals, ETDPSETA, HEIs |
| | | | Increased the number of students completing NVC (L2 – 4) IT&CS | 450 | 675 per annum | 540 | 584 | 630 | 653 | 675 | DHET | Association of TVET College Principals, ETDPSETA, HEIs |
| | | | Increased the number of students completing NVC (L2 – 4) Mechatronics | 90 | 160 per annum | 108 | 117 | 126 | 135 | 170 | DHET | Association of TVET College |

| | | | | | | | | | | | Principals, ETDPSETA, HEIs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TVET lecturers trained in digital pedagogy | - | 2 000 | 100 | 250 | 400 | 500 | 750 | DHET | Association of TVET College Principals, ETDPSETA, HEIs |
| | | Increased the number of TVET colleges differentiated by digital qualification specialisations | - | 10 | 2 | 4 | 6 | 8 | 10 | DHET | Association of TVET College Principals, ETDPSETA |
| | | Increased the number of STEAMIE graduates in higher education (Masters and PhD) | 4 500 | 5 500 per annum | 4 635 | 4 820 | 5 060 | 5 314 | 5 580 | DHET | DSI |
| | | 4 university-TVET-industry consortia established | - | Data science, Analytics, and Machine Learning Consortium Operational | Inception | Operational | Operational | Operational | Operational | TVETs | Industry Associations & Professional Bodies |
| | | | - | IoT, Cloud and Network Engineering Consortium Operational | Inception | Operational | Operational | Operational | Operational | TVETs | Industry Associations & Professional Bodies |
| | | | - | Materials Science and Additive Manufacturing | Inception | Operational | Operational | Operational | Operational | TVETs | Industry Associations & Professional Bodies |
| | | NRF and Industry Research Chairs established in 21st century digital innovation niche areas | - | 5 | 1 | 1 | 1 | 1 | 1 | DHET | DSI, NRF, USAf |
| Increased digital business start-up and growth | To increase access to digital entrepreneurship services to potential and existing entrepreneurs for the digital economy | Supported the rollout of 20 Digital Hubs | TBC | 20 | 2 | 2 | 5 | 5 | 6 | DTIC | SEDA, DSI |
| | | Established an innovation system coordination platform | - | 1 Coordination Platform | Inception | Established | Operational | Operational | Operational | DTIC | SEDA, DSI |
| | | Innovation spaces offering digital entrepreneurship skills development programmes | - | 50 | 20 | 30 | 40 | 45 | 50 | DTIC | SEDA, DSI |
| | | Potential and existing entrepreneurs trained in digital entrepreneurship | - | 10 000 | 500 | 1 000 | 3 000 | 3 000 | 2 500 | DTIC | SEDA, DSI |
| **Workplace 4.0** | | | | | | | | | | | |
| Narrowed digital skills gap in in the labour market | To develop industry-led digital skills niches and competence | 3 multi-stakeholder Centres of Competence operationalised | - | Data science, Analytics, and Machine Learning CoC operationalised | Inception | Operational | Operational | Operational | Operational | Relevant Industry Associations | Relevant Professional Bodies, SETAs, Universities, TVETs |
| | | | - | IoT, Cloud and Network Engineering CoC Operationalised | Inception | Operational | Operational | Operational | Operational | Relevant Industry Associations | Relevant Professional Bodies, SETAs, Universities, TVETs |
| | | | - | Materials Science and Additive Manufacturing CoC Strengthened | Operational | Operational | Operational | Operational | Operational | Relevant Industry Associations | Relevant Professional Bodies, SETAs, Universities, TVETs |
| | | Increased the number of graduates from digital skills programmes in digital skills niches | TBC | 30% | 10% | 15% | 20% | 25% | 30% | NSA | SETAs, Industry Associations, professional Bodies |

To grow the supply of workplace-focused digital skills

| | | Objective | Indicator | Baseline | Target | | | | | | Lead | Partners |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | To steer increased investment and opportunities towards digital skills development | Increased registration in digital skills-oriented skills programmes | TBC | 40% | 10% | 15% | 20% | 30% | 40% | NSA | SETAs, Industry Associations, professional Bodies |
| | | | Increased number of learners completing digital skills-oriented skills programmes | TBC | 40% | 10% | 15% | 20% | 30% | 40% | NSA | SETAs, Industry Associations, professional Bodies |
| | | | TVET Teaching Chairs established | - | 5 | 1 | 1 | 1 | 1 | 1 | DHET | TVETs |
| | | To expand workplace-based learning opportunities in digital skills development | Incentive scheme to incentivise workplace-based learning opportunities in digital skills development established | - | Incentive Scheme Operationalised | Design & Feasibility | Business Plan | Inception | Operational | Operational | NSF | SETAs |
| | | | Increased number of firms participating in incentive scheme | - | 9 000 | - | - | 6 000 | 7 500 | 9 000 | NSF | SETAs |
| | | | Increased the number of workplace-based opportunities (learnerships, apprenticeships and internships) for digital skills development accessed | - | 15 000 | - | - | 9 000 | 11 250 | 13 500 | NSF | SETAs |
| | | To optimise the value of digital skills in government | Specialist digital skills development programmes implemented | - | 3 250 Graduates in Data Centres Operations, Analytics and Management Programme | Curriculum Developed | 250 Graduates | 500 Graduates | 1 000 Graduates | 1 500 Graduates | NSG | Universities & Training Providers |
| | | | | - | 3 250 Graduates in Network Engineering including IoT and Cloud Programme | Curriculum Developed | 250 Graduates | 500 Graduates | 1 000 Graduates | 1 500 Graduates | NSG | Universities & Training Providers |
| | | | | - | 3 250 Graduates in Software Development, Engineering, and System Solutions Architecture Programme | Curriculum Developed | 250 Graduates | 500 Graduates | 1 000 Graduates | 1 500 Graduates | NSG | Universities & Training Providers |
| | | | Frontline service delivery data analytics skills development programme implemented | - | 10 000 Graduates | Curriculum Developed | 1 000 | 1 500 | 3 000 | 4 500 | NSG | Universities & Training Providers |
| | | | Digital government programme implemented for government leaders and managers | - | 1 000 Graduates | Curriculum Developed | 50 | 250 | 300 | 400 | NSG | Universities & Training Providers |
| | | | Digital Innovation Expert (DIE) Centre Established | | DIE Centre Operational | Design & Feasibility | Business Plan | Inception | Operational | Operational | DSI | CPSI, DPSA |
| **Society 4.0** | | | | | | | | | | | | |
| To development the digital literacy of the South African citizenry for enhanced citizen participation and health • | Increased productive use of digital technologies by citizens | To promote digital literacy among South African citizens | Digital literacy programme for citizens implemented | - | 2 million Citizens Trained | Curriculum Developed | 500 000 | 500 000 | 500 000 | 500 000 | DCDT | COGTA, LGSETA, SALGA SANGONeT CPSI, DACS |
| | | | | - | 20 000 Train-the-Trainer Trained | Curriculum Developed | 5 000 | 5 000 | 5 000 | 5 000 | DCDT | COGTA, LGSETA, SALGA, SANGONeT CPSI, DACS |
| | | To strengthen digital citizenship of the South African citizenry | Digital citizenship programme for citizens implemented | - | 1 million Citizens Trained | Curriculum Developed | 250 000 | 250 000 | 250 000 | 250 000 | DPSA, DCDT | DHA, DJ&CD, COGTA, Information |

| | | | | | | | | | | | Regulator, Services SETA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | - | 10 000 Com Dev Workers Trained in Train-the-Trainer | Curriculum Developed | 2 500 | 2 500 | 2 500 | 2 500 | DPSA, DCDT | NSG, DHA, DJ&CD, COGTA, Information Regulator, Services SETA |
| | To enhance the digital health literacy of South African citizens | Digital health literacy programme for citizens implemented | - | 500 000 Citizens Trained | Curriculum Developed | 125 000 | 125 000 | 125 000 | 125 000 | DoH | NSG, DPSA, DCDT, HWSETA |
| | | | - | 5 000 Com Health Workers trained in Train-the-Trainer | Curriculum Developed | 1 250 | 1 250 | 1 250 | 1 250 | DoH | NSG, DPSA, DCDT, HWSETA |
| **NEET** | | | | | | | | | | | |
| Increased access to education, training and labour market opportunities by NEETs | To unlock digital learning and skills building opportunities | Digital literacy programme focused on learning and employment opportunities (including self-employment) implemented | - | Digital Literacy Programme Implemented | Curriculum Developed | Piloted | Implemented | Implemented | Revised | DWYDP/ NYDA | DHET, DEL, NSA, Presidency, GTAC, SAYC, NEMISA, DPSA |
| | | Young people trained through train-the-trainer programme to deliver digital literacy programme | - | 5 000 young People Trained | - | 1 000 | 3 000 | 4 000 | 5 000 | DWYDP/ NYDA | DHET, DEL, NSA, Presidency, GTAC, SAYC, NEMISA, DPSA |
| | | | - | 2,5 million Young People Trained | | 500 000 | 1 500 000 | 2 000 000 | 2 500 000 | DWYDP/ NYDA | DHET, DEL, NSA, Presidency, GTAC, SAYC, NEMISA, DPSA |
| | | Pre-entry level digital skills development programmes developed | - | 1 Pre-entry Level Digital Skills Development in Data science, Analytics, and Machine Learning | Curriculum Developed | Piloted | Implemented | Implemented | Revised | DWYDP/ NYDA | DHET, DEL, NSA, Presidency, GTAC, SAYC, NEMISA, DPSA |
| | | | - | 1 Pre-entry Level Digital Skills Development in Network Engineering including IoT and Cloud | Curriculum Developed | Piloted | Implemented | Implemented | Revised | DWYDP/ NYDA | DHET, DEL, NSA, Presidency, GTAC, SAYC, NEMISA, DPSA |
| | | | - | 1 Pre-entry Level Digital Skills Development in Materials Science and Additive Manufacturing | Curriculum Developed | Piloted | Implemented | Implemented | Revised | DWYDP/ NYDA | DHET, DEL, NSA, Presidency, GTAC, SAYC, NEMISA, DPSA |
| | | | - | 80 000 NEETS trained in Pre-entry Level Digital Skills | - | 9 000 | 18 0000 | 25 000 | 30 0000 | DWYDP/ NYDA | DHET, DEL, NSA, Presidency, GTAC, SAYC, NEMISA, |

Left vertical label: To facilitate digital skills development training and labour market opportunities for young people not in employment, education and training

| | | | | | | | | | | | DPSA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Development Programmes | | | | | | | | |
| | | Public and community-based facilities accessed to deliver skills development programmes | - | 1 000 Facilities Accessed | - | 100 | 250 | 250 | 400 | DWYDP/ NYDA | DSAC, COGTA, SALGA |
| | | National framework for recognition of micro-credentialing and digital badging implemented | - | Framework Implemented | Research Undertaken | Concept Paper | Stakeholder Consultation | Regulations Issues | Implemented | SAQA, QCTO | DHET, DEL, DTIC, NSA |
| | To facilitate access to digital skills building opportunities in public employment programmes, and youth and community service | Digital literacy integrated into the training component of public employment and youth service programmes | - | Digital Literacy Integrated in EPWP Skills Component | Curriculum Review | Digital Literacy Curriculum Developed | Digital Literacy Curriculum Integrated | Digital Literacy Curriculum Implemented | Digital Literacy Curriculum Implemented | DWYDP, NYDA | EPWP, DPWI |
| | | | - | Digital Literacy Integrated in National Youth Service Skills Component | Curriculum Review | Digital Literacy Curriculum Developed | Digital Literacy Curriculum Integrated | Digital Literacy Curriculum Implemented | Digital Literacy Curriculum Implemented | DWYDP, NYDA | EPWP, DPWI |
| | | | - | Digital Literacy Integrated in Community Works Programme Skills Component | Curriculum Review | Digital Literacy Curriculum Developed | Digital Literacy Curriculum Integrated | Digital Literacy Curriculum Implemented | Digital Literacy Curriculum Implemented | DWYDP, NYDA | COGTA, DPWI |
| | | | - | Digital Literacy Integrated in National Rural Youth Service Corps Programme Skills Component | Curriculum Review | Digital Literacy Curriculum Developed | Digital Literacy Curriculum Integrated | Digital Literacy Curriculum Implemented | Digital Literacy Curriculum Implemented | DWYDP, NYDA | DRLR |
| | | | - | 500 000 Young People Completed Skills Component in Public Employment and Youth Service Programmes | - | - | 100 000 | 200 000 | 200 000 | DWYDP, NYDA | EPWP, DPWI COGTA, DRLR |
| | | Corporates participating in digital rewards programme for public and community service by NEETs | - | 1 000 Corporates | Programme Design | 100 | 250 | 250 | 400 | DWYDP, NYDA | EPWP, DPWI COGTA, DRLR, DSD, DEFF, DoH, BUSA |
| | | | - | R100 million Mobilized | Programme Design | R10m | R20m | R30m | R40m | DWYDP, NYDA | EPWP, DPWI COGTA, DRLR, DSD, DEFF, DoH, BUSA |
| | | NEETs registered for participation in the digital rewards programme for public and community service | - | 1 million Parting NEETs | Programme Design | 50 000 | 200 000 | 350 000 | 400 000 | DWYDP, NYDA | EPWP, DPWI COGTA, DRLR, DSD, DEFF, DoH, BUSA |
| | | NEETs established a digital skills and asset portfolio | - | 500 000 NEETs | Programme Design | 25 000 | 100 000 | 175 000 | 200 00 | DWYDP, NYDA | YES, Harambe, EPWP, DPWI COGTA, DRLR, DSD, DEFF, DoH, BUSA |
| **Leadership, Knowledge and Resourcing** | | | | | | | | | | | |

To effectively mobilise leadership, institutional and funding resources for the implementation of the digital and future skills programme

| Outcome | Objective | Indicator | Baseline | Target | | | | | | Lead | Partners |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Institutionalised the provision of digital skills in the education, training and skills development ecosystem | To build a digital and future skills implementation platform | Established governance and management structures | - | Governance & Management Structures Operationalised | Governance & Management Structures Operationalised | Governance & Management Structures Operationalised | Governance & Management Structures Operationalised | Governance & Management Structures Operationalised | Governance & Management Structures Operationalised | DCDT | Relevant Departments & Agencies |
| | | Enabled secure data-sharing across multiple databases and management information systems | - | Data-sharing Platform Established | Design | Business Plan | Implemented | Implemented | Implemented | DCDT | Relevant Departments & Agencies |
| | | Performance dashboard implemented to track performance | - | Dashboard Implemented | Design | Implemented | Implemented | Implemented | Implemented | DCDT | Relevant Departments & Agencies |
| | | Digital Skills Awareness Campaign Implemented | - | Digital Skills Awareness Campaign Implemented | Design | Implemented | Implemented | Implemented | Implemented | GCIS, DCDT | Relevant Departments & Agencies |
| | To build a knowledge base on digital skills demand and supply | Digital Skills Observatory established and maintained | - | Digital Skills Observatory Operationalised | Design | Business Plan | Implemented | Implemented | Implemented | DCDT/ DHET | Relevant Departments & Agencies |
| | | Annual State of Digital Skills Report produced | - | 4 State of Digital Skills Reports Produced | Design | 1 | 1 | 1 | 1 | DCDT/ DHET | Relevant Departments & Agencies |
| | | Various knowledge resources and products produced and packaged | - | 8 Issues Papers | 1 | 1 | 2 | 2 | 4 | DCDT/ DHET | Relevant Departments & Agencies |
| | | | - | 18 Policy Briefs | 2 | 4 | 4 | 4 | 4 | DCDT/ DHET | Relevant Departments & Agencies |
| | | | - | 4 Trend Analysis Reports | - | 1 | 1 | 1 | 1 | DCDT/ DHET | Relevant Departments & Agencies |
| | | Digital skills development research community of practice established | - | Community of Practice Established | Inception | Operational | Operational | Operational | Operational | DCDT/ DHET | Relevant Departments & Agencies |
| | To mobilise funding to support digital skills development | Digital Development Fund (DDF) Established | - | Digital Development Fund Established | Design | Piloted | Operationalised | Operational | Operational | NT, DCDT | |
| | | DDF funding mobilised | - | R1 billion Mobilised | - | R250m | R250m | R250m | R250m | NT, DCDT | |
| | | NSF funding mobilised for digital skills development | - | R500m Mobilised | - | R125m | R125m | R125m | R125m | NT, DCDT | NSF, SETAs |
| | | LAP-UIF funding mobilised for digital skills development | - | R500m Mobilised | - | R125m | R125m | R125m | R125m | NT, DCDT | DEL, LAP |
| | | Jobs Fund funding mobilised for digital skills development | - | R250m Jobs Fund | - | R75m | R75m | R75m | R75 | NT, DCDT | Jobs Fund |
| | | | - | R250m Jobs Fund Co-funding Mobilised | - | R75m | R75m | R75m | R75 | NT, DCDT | Jobs Fund |
| | | International development cooperation funding mobilised | - | R500m Mobilised | - | R125m | R125m | R125m | R125m | NT, DCDT | DIRCO |

## List of Resources

**Note:** This list of resources is compiled for implementers to read and digest, to consult, in order to gain deeper insight into the nature of digital skills building and to encounter ideas about building future skills.

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