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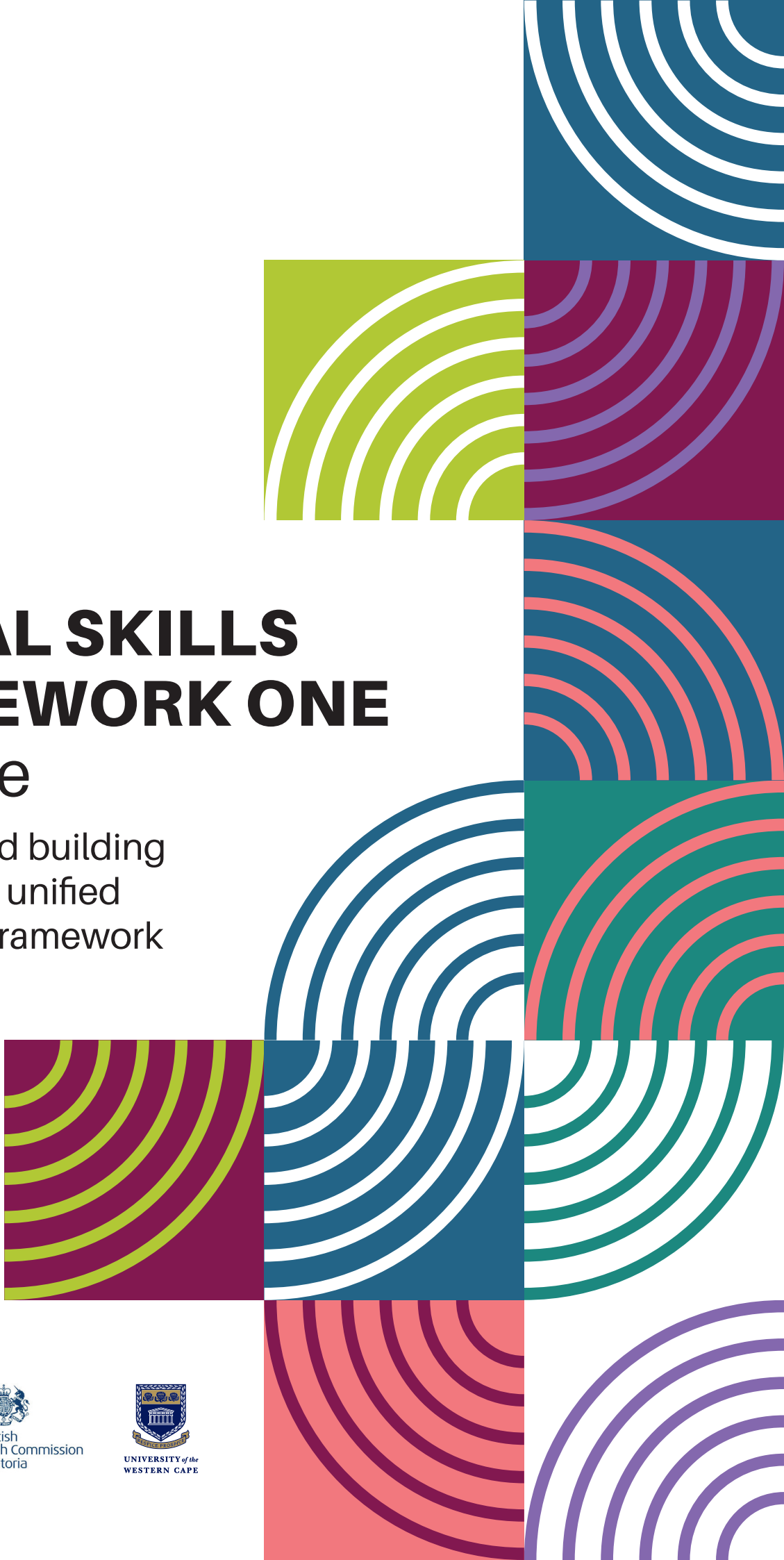
DIGITAL SKILLS FRAMEWORK ONE

DSFOne

Concepts and building blocks of the unified digital skills framework



NEMISA NPC
National Electronic Media Institute of South Africa

British High Commission Pretoria

UNIVERSITY of the WESTERN CAPE

The consultative research project for the development of a shared understanding of the concept of *digital skills* is a collaborative initiative between the National Electronic Media Institute of South Africa (NEMISA) and the University of the Western Cape (WC CoLab), and was funded by the British High Commission

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CHAPTER 1

Introduction and context

The *National Digital and Future Skills Strategy* (NDFSS) (2020) presents a vision for the future of South Africa that is inclusive of all citizens and all sectors of society, and in which the digital capabilities of all citizens are developed by embracing current and emerging technologies. The strategy identifies eight interconnected strategy elements that, in turn, define the space within which Government and other stakeholders can take part in the discourse on digital and other skills, and can design their own specific action plans.

'Digital skills' form the thread linking all the strategy elements. They manifest in different ways and contexts: from the skills required by all citizens to those required in the rapidly changing world of work, from the skills currently required to those yet to take shape as emerging technologies mature.

The strategy encourages the broad spectrum of stakeholders to participate in the national digital skills agenda by shaping initiatives and in monitoring progress, amongst others through collaborative action and research.

The National Electronic Media Institute of South Africa (NEMISA), as one of the key implementers of this strategy, in collaboration with the University of the Western Cape (WC CoLab), is responding to this invitation by means of a research project focused on the development of a shared understanding of a national *digital skills framework*.

With the financial support of the British High Commission, a participatory and consultative research process was undertaken for this purpose in April 2022. The project consists of two parallel but interdependent processes, namely

- A research process for the refinement of a unified digital skills framework, that is locally relevant but also aligned with international developments in this respect, and
- Stakeholder consultations for input on the framework refinement, and implementation process.

This document presents the intent, logic and key building blocks of a unified digital skills framework (DSFOne). The purpose of this publication is to provide a high-level overview of the framework and broad guidelines for practical application in various ecosystems. It is less focused on the theoretical discourse that underlies digital skills frameworks. However, footnotes for further reading are provided for those who are interested in the theoretical aspects of this field.

Digital skills have become a necessity in the digital economy and digital society. Businesses are increasingly dependent on digital technology, from production to distribution, and in the service sector. Supply chains have become well integrated, with digital technologies bringing about efficiencies, higher productivity and increasing customer satisfaction. Governments (national and local) are putting in place policies relating to digital skills and are increasingly using digital technologies to provide services to citizens, who need to have the appropriate digital skills to get access to these services.

Digital skills will enable citizens to participate in the digital economy and will help to drive innovation and economic growth.

The advice from a 2019 OECD report is even more applicable today: "Empower people with the skills needed to succeed in a digital economy and society. Get ready for a massive training challenge, fundamentally rethink education systems, foster foundational skills and life-long learning, address concerns around emerging forms of work, and improve social protection to ensure that no one is left behind".[1]

1 OECD Report (2019). *Going digital: Shaping policies, improving lives – Summary*. Paris: OECD. www.oecd.org/going-digital/going-digital-synthesis-summary.pdf

CHAPTER 2

The role and function of skills frameworks and of a digital skills framework

The NDFSS is supported by the Digital and Future Skills Implementation Plan (2020), which provides direction in terms of the implementation of measures, the identification and description of the potential roles of lead institutions and stakeholders in terms of digital and future skills development, and by highlighting the required inputs and major activities, with a clear focus on the ultimate outcome and influence of the collective effort.

The NDFSS (p.11) explicitly indicates that it "... consciously avoids setting out specific digital skills, as such an approach would risk excluding continuously emerging new areas of skills development and new areas of technology application."

The NDFSS also does not make explicit reference to a digital or future skills framework. The strategy document contextualises digital skills as a multi-stakeholder and multi-institutional responsibility, reflects on the diversity and multi-dimensionality of digital skills, and identifies the broad spectrum of responsibilities of all role players and implementing agencies.

However, at the practical level of the planning and execution of digital skills development programmes, the multiplicity of role players does need to be explicit and unambiguous, focusing on (sector) specific digital skills, and on learning pathways for the development of the required expertise. Planners and implementers necessarily have to operate according to a framework(s) that can provide structure to the wide range of digital skills and can assist in navigating the terrain.

Generally speaking, a *framework* is a way to organise and represent knowledge and to give expression to the understanding of complex domains. A framework is useful, even necessary, to create a shared understanding of digital skills, to give direction to learning interventions, to clarify the various nuances and to aggregate efforts. In essence, a common and shared framework can coordinate and align NDFSS implementation efforts across multiple stakeholder groupings. It can contribute towards a more integrated and unified implementation approach.

2.1 Advantages of applying a digital skills framework

A digital skills framework can be regarded as a 'navigation tool' to guide people through the complexities of skills required for the rapidly changing digital landscape.[2] It provides a means to categorise and organise the spectrum of digital skills sets, guide defined pathways and domain or sector requirements, provide a way of identifying relevant and in-demand skills, facilitate informed decision-making related to skills for employment, upskilling and reskilling initiatives, and can be used to guide workforce training strategies.

A framework can offer resilience and can grow alongside the changing digital landscape, reflecting the competencies related to technological advances.[3]

A digital framework provides the foundations that can be used to adapt or inspire further framework developments that are more specific to the country or to a specific sectoral context.[4]

2 Schueler, J. (2021). *Digital pathways identification project*. National Centre for Vocational Education Research on behalf of Digital Skills Organisation, Australia. p. 4.

3 Kluzer S., & Pujol Priego L. (2018). *DigComp into action - Get inspired, make it happen*. In S. Carretero, Y. Punie, R. Vuorikari, M. Cabrera, & W. O'Keefe (Eds.), JRC Science for Policy Report, EUR 29115 EN. Publications Office of the European Union. https://doi.org 10.2760/112945

4 Ibid.

A framework thus provides a common language or a shared understanding within the particular ecosystem and can play a unifying role.

In addition, a framework can facilitate country participation at a regional or multi-country level, laying the foundations for the development of a 'digital single market' in a region and enable trade in digital goods and services and the flow of appropriately skilled human talent across borders and sectors of the economy.

2.2 Advantages to the whole digital skills ecosystem

A digital skills framework can be of benefit to the multiple stakeholders and institutions involved in the overall or broad digital skills ecosystem. A shared framework can enhance the capability and capacity of the total ecosystem to facilitate lifelong learning.[5] A digital ecosystem typically consists of individuals, employers, training providers, institutions of learning, and government agencies responsible for the promotion of digital skills development, as illustrated in Figure 1.

Some of the benefits for ecosystem role players are listed in Table 1 below.

5 Schueler, J. (2021). *Digital pathways identification project*. National Centre for Vocational Education Research on behalf of Digital Skills Organisation, Australia. p. 4. 5

Figure 1: Role players within the digital skills ecosystem

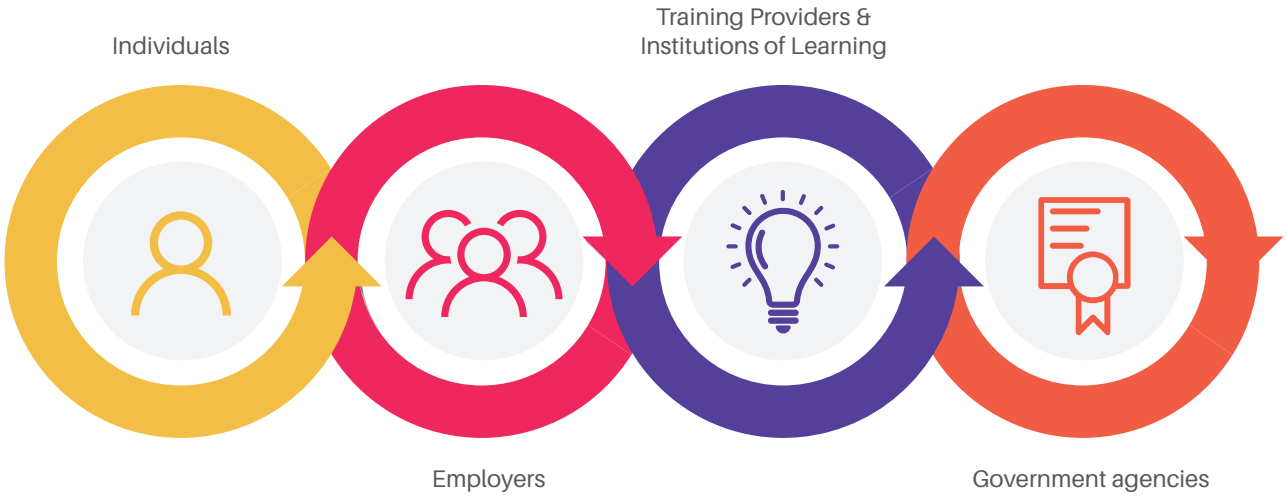


Table 1: Ecosystem benefits

Ecosystem Role-Players	Typical benefits
Benefits for individuals	• Use the framework (and related tools) for self-evaluation of digital competencies for personal improvement. • Raise awareness and visibility of in-demand digital skills. • Appropriate digital skills pathways can guide individuals in terms of their personal skills development journey. • Specification of digital skills requirements for job roles can guide aspiring individuals' digital skills investment choices. • Use the framework to assess and identify appropriate training programmes.

Ecosystem Role-Players	Typical benefits
Benefits for employers 	• Use the digital skills framework to articulate digital skills requirements for all the job categories within the organisation. • Such an approach can guide the identification of skills gaps within the workforce and guide the reskilling and upskilling of current employees to remain relevant and competitive within an increasingly digital context. • Use framework to establish appropriate digital skills levels for appointments and promotion in organisations. • Articulated job requirements (inclusive of the digital skills requirements) can guide self-expression, promotion and the recruitment of appropriate fresh or mid-career professionals. • Use framework to guide decision-making regarding strategic skills interventions to develop specific competencies as part of the digital transformation agenda of institutions (e.g. data literacy for all managers to use for decision-making).
Benefits for training providers 	• Develop curricula and learning materials that make provision for digital skills at all levels of learning. • Apply the framework to gain insight in terms of sector trends and in-demand existing and emerging skills. • Identification and structuring of in-demand industry-specific digital skills programmes as standalone initiatives and/or by integrating digital skills training into existing programmes (e.g. new undergraduate and postgraduate programmes in data science; advanced data literacy modules as part of a management qualification). • Identification and structuring of sector, job or competence-specific short courses to facilitate upskilling and/or reskilling of people who are already in employment (e.g. social media marketing for businesspeople). • Ensuring relevant and up-to-date curriculum content.
Benefits for government agencies 	• Government and regulatory bodies can apply a digital skills framework for the establishment of a shared understanding of and a common language guiding initiatives across different departments, agencies and bodies. • Use the framework to align multiple and diverse digital skills development initiatives across stakeholder groupings. • Align standards, policies and strategies for digital skills across all levels of government, both national and provincial. • Identify gaps in digital skills levels (personal, organisational and country) and put strategies and interventions in place for the appropriate upskilling. • A shared understanding and common language can assist in the development of measurement instruments to determine the state of digital skills in the country (for populations and groups at a sub-country level), to assess progress and to identify priority areas for intervention.

In addition to the benefits of the internal ecosystem, a skills framework can also facilitate country participation at a regional or multi-country level, laying the foundations for the development of a 'digital single market' in a region, amongst others by enabling regional harmonisation of policies and regulations.[6]

6 Refer to The Digital Transformation Strategy for Africa (2020-2023, p.3) which refers to digital skills requirements and digital skills framework. https://au.int/sites/default/files/documents/38507-doc-dts-english.pdf

CHAPTER 3

Introducing the unified digital skills framework: DSFOne

This section provides a short overview of the origin of the DSFOne, its overarching logic, key components and distinctive qualities as a unified digital skills framework.

3.1 Background and positioning

Entities responsible for initial strategy for and implementation of ICT skills, and later for digital skills acknowledged quite early the need to develop a guiding 'digital skills framework'. The e-Skills Institute (in the early years) - NEMISA since 2015 - created a context for the emergence of the Digital Skills Framework One (DSFOne) as a localised construct for a structured approach to digital skills development. This national discourse developed in parallel with international developments in this respect, acknowledging prominent and co-designed initiatives/outcomes of the wider international peer group.

The development of a local framework, responding to the realities of the digital skills scene in South Africa, started at the University of the Western Cape and the Western Cape CoLab in 2013. Concepts relating to the relationship between the different categories of digital skills were tested and graphical models were developed. An extensive study was done of the ways in which digital devices (including mobile devices) are used to fulfil user needs in everyday life and in work, leading to six 'areas of competence'.

In 2017, NEMISA and two of the CoLabs facilitated initiatives to test and validate these competencies, involving users from a wide range of application areas, sectors and training institutions within the Western Cape and Gauteng provinces. Since these early validation processes, further refinement of the DSFOne continued through engagement with the international peer group and the local digital skills ecosystem.

3.2 The distinctive building blocks of the DSFOne

'Digital skills' is a comprehensive term for a wide range of digital skills, from digital skills required in everyday life, to those advanced skills required for the appropriate and effective use of digital devices and the internet in particular work contexts or sectors.

The DSFOne was developed to facilitate a local, shared understanding of these fields and to assist stakeholders in navigating the landscape.

The distinctive characteristics of the DSFOne, that qualify it as a unifying framework, relates to two key components:

- Acknowledging **six particular digital competences** as the basic building blocks of the spectrum of digital skills.
- Identifying **four broad, definable digital skills ecosystems** relating to people's use of technology that differentiate these distinct nuances, yet integrate them into one unifying framework.

a) Six digital competences

Due to the similarity between the locally developed areas of competence and those of DigComp,[7] with its extensive ecosystem of digital skills product applications, a decision was taken in 2019 to largely follow the DigComp model, with its five areas of competence, and to add a sixth one, namely 'Transacting', due to the widespread use of digital devices for transactions in everyday life.[8]

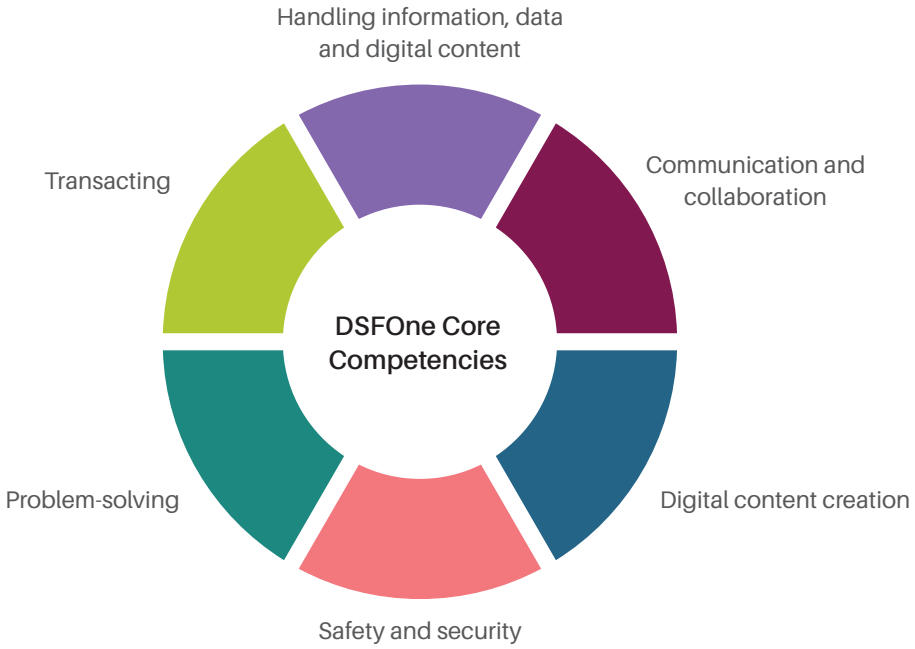
The framework was structured to be locally relevant, and to accommodate both a developer and a user perspective, while also allowing for stratification and development pathways – from basic or elementary skills to advanced skills sets.

7 Refer to Annexure A for a historical overview of digital skills frameworks within the global context.

8 The UK framework Essential Digital Skills (EDS) also gives prominence to 'transacting' as a distinct competence area (refer to Annexure A).

In addition, the framework acknowledges the growing international prominence of digital leadership and innovation skills.

Figure 2: Core competence in DSFOne

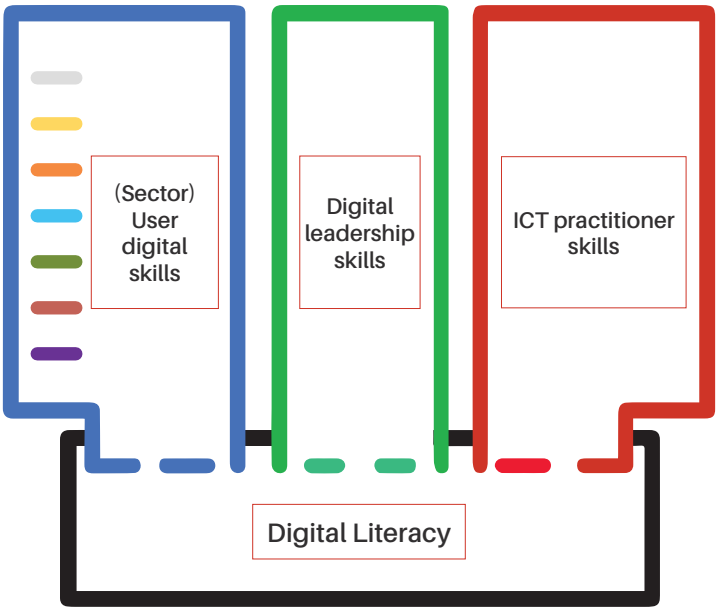


b) Four broad segments or ecosystems

It is useful to think of *different ecosystems* to differentiate between the particular digital skills and proficiency levels that persons require to function effectively as citizens or within a particular work context or sector. An ecosystem, in this context, can be described as being constituted by:

- a group of persons that can be identified
- the setting in life and work within which they operate
- the purpose for which they use digital devices and require digital skills, and
- the set of digital skills they require.

Figure 3: Graphical representation of DSFOne



The DSFOne differentiates between four ecosystems,

- Citizens (black frame)
- Users in the context of work - where the different colours represent different industry sectors (blue frame),
- ICT practitioners or professionals (red frame), and
- Leaders or digital leaders (green frame).

Digital leaders are highlighted as a separate ecosystem, as these people need to play a decisive role in terms of the digital transformation of institutions (both business and public service) and society. One key dimension of the digital transformation of an institution is the focus on the acquiring of relevant advanced technological skills and the upskilling and reskilling of the workforce. Digital leaders can be understood as leaders in and for the digital economy, and the term should be regarded as encompassing people in leadership positions.

The various ecosystems can overlap, or can feed into each other. The six digital competences underlie each of the segments or ecosystems, but manifests differently in each of the segments.

Within each ecosystem, users can grow from basic use of the relevant digital skills to a more advanced or even sophisticated use of the various skills, or using those skills in combinations that enable them to solve complicated challenges. Apart from being able to use the digital skills, users also need to understand how digital devices function, the role played by data, and the 'tracks' left by users in their interaction with digital devices and the internet, how advanced technologies (such as 'artificial intelligence' [AI]) can influence their actions and results, etc.

c) Advantage of differentiating between segments

Differentiating between the four ecosystems or segments is a strategy to create understanding of the unique nuances and requirements of each of the particular ecosystems, reflecting on the particular role players within the ecosystem, as well as developing appropriate approaches, learning pathways and interventions (to name but a few). It is also aimed at focusing attention on each of the segments, thereby facilitating investments and interventions in all these ecosystems.

DSFOne was developed as a *unified* framework of digital skills to eliminate confusion between the various types and levels of digital skills, while at the same time bearing the 'whole picture' in mind. Most digital skills frameworks address only one component of this multifaceted and multi-coloured world of digital skills and leave it to the readers and planners to link the various frameworks.

CHAPTER 4

Defining the concept of digital competence

DSFOne defines digital competence, taken here as an underlying competence that relates to all users of digital devices - be it ordinary citizens or ICT practitioners - as comprising of:

- 6 areas of competence,
- 24 competencies, and
- eight proficiency levels.

Building on these underlying competences, different further sets of digital competencies can be developed. In the case of ICT practitioners, this leads to a closely-knit and well-structured set of digital competences (see 5.3). In other areas of work, these further sets of competencies might differ in detail, but the underlying six areas of competence will always be relevant and recognisable (see 5.2).

4.1 Introduction

It was only during the last part of the 1980s and 1990s of the previous century that computers came to be used widely by *individuals* to shape and manage activities in their daily lives. In the preceding years, however, there also were a number of office applications that were also used for the activities of individuals in their daily lives, for example word processing and spreadsheets.

During the 1990s and into the first decade of the new century, various proposals were made on the competencies required for individuals in order to make effective use of the affordances of digital devices. This was stimulated by the development of handheld devices since the early 1990s, and especially by the introduction of the first iPhone in 2007.

In the case of the use of digital devices for business and administrative applications, user skills were determined largely by processes to be enacted (performed) by computers, such as preparing and printing a report and doing a transaction. However, user skills relating to *everyday life* could involve a broader and more open range of user actions and applications. Developing a framework to accommodate the digital skills involved in such a diversity of actions was quite a challenge.

Over time, the user digital skills became clearer and elementary frameworks emerged. At the same time, educational institutions and authorities (such as national departments of education, or regional bodies driving a regional educational agenda, such as the European Commission for the EU[9]) started to pay attention to which of these digital skills should be incorporated into school curricula, evidently also requiring teachers to develop these skills. This gave rise to a number of frameworks for digital skills in education.[10]

4.2 Digital competence defined

In line with international developments in the European Union (EU) and the United Kingdom (UK), the DSFOne draws on the collective international wisdom and local realities for the definition and compilation of the concept of digital competence. This is described below.

a) Six core areas of competence:

DSFOne follows DigComp in the first five areas of competence, but adds **Transacting** due to the importance of digital transactions in the everyday lives of citizens over the past number of years.[11]

9 In Europe these national and regional authorities received the support of European Schoolnet (EUN), a network of 34 European Ministries of Education, based in Brussels. As a not-for-profit organisation, it aimed to bring innovation in teaching and learning to its key stakeholders.

10 For example the UNESCO ICT Competency Framework for Teachers (UNESCO, 2008; https://www.oercommons.org/hubs/unesco), followed by version 2 in 2011.

11 It was already foreseen in the first version of DigComp (2013) that provision would be made at some time for a future dimension of competence being applied to different purposes, one of which would be 'Buying and Selling'. The rapid increase in transactional uses of mobile devices over the past few years, across various areas of the use of digital devices, makes it necessary to already include Transaction as a separate competence. The Austrian version of DigComp includes 'Carrying out purchases and sales' as a competence under 'Communication and collaboration' as early as in 2021.

In South Africa, this area of competence will also resonate with the realities of many users in their daily use of digital devices (especially smartphones).

The following six areas of competence thus constitute digital competence and form the basis of the DSFOne:

1. Handling information, data and digital content (incl. search, evaluation, storing)
2. Communication and collaboration
3. Digital content creation
4. Safety, security
5. Problem-solving
6. Transacting

The areas of competence are applicable to the use of digital devices of all kinds, including mobile devices (e.g. smartphones). So-called feature phones will enable some of these areas of competence and the underlying competencies.

The definitions of the areas of the six core competences of the DSFOne are provided in Table 2.

Table 2: Definitions of the six areas of competence[12]

Competence	Definition
Handling information, data and digital content (incl. search, evaluation, storing)	• To identify, • to locate, • to retrieve, • to store, • to organise • and to analyse digital information, and • to judge its relevance and purpose.
Communication and collaboration	• To communicate in digital environments, • to share resources through online tools, • to link with others, • to collaborate through digital tools, • to interact with, and • participate in communities and networks, and to develop • cross-cultural awareness.
Digital content creation	• To create and edit new content (from word processing to images and video), • to integrate and re-elaborate previous knowledge and content, • to produce creative expressions, media outputs and programming, • to deal with and apply intellectual property rights and licences.
Safety, security	• Personal protection, • data protection, • digital identity protection, • security measures, and • safe and sustainable use.
Problem-solving	• To identify digital needs and resources • to make informed decisions on most appropriate digital tools according to the purpose or need, • to solve conceptual problems through digital means, • to use technologies creatively, • to solve technical problems, and • to update own and other's competence.
Transacting	• To do transactions in digital environments, be they buying and selling, or acquiring or providing services, • to do online payments and receive money transfers (or transfers of other benefits, both doing transfers or receiving them), • to manage money and banking services online.

12 See A. Ferrari (2013), *DIGCOMP: A Framework for developing and understanding digital competence in Europe* (JRC Report 83167), Luxembourg: Publications Office of the EU. The definitions of the first five areas of competence originate from DigComp, where it has turned out that these definitions were sufficient for further development work done on digital skills for a decade. The definition of the area of competence 'Transacting', was developed as part of the development of DSFOne in the CoLab.

At a level below the competence areas, provision is made for a segment for the very basic skills required for using digital devices, e.g. switching devices on and off, connecting to Wi-Fi, and loading data on devices.

b) 24 Competencies

Within the six competence areas, 24 competencies are identified. The bottom three competencies (setting up online accounts, managing money and transactions online and ordering items online) result from the inclusion of the area of competence of *Transacting* to give recognition to the mobile-first context of South Africa. Table 3 shows the list of competencies and Annexure B provides a detailed discussion of the 24 competencies.

Table 3: 24 Competencies

1. Handling information, data and digital content
1.1 Browsing, searching, filtering data, inf. and digital content
1.2 Evaluating data, information and digital content
1.3 Managing data, information and digital content
2. Communication and collaboration
2.1 Interacting through digital technologies
2.2 Sharing through digital technologies
2.3 Engaging in citizenship through digital technologies
2.4 Collaborating through digital technologies
2.5 Netiquette
2.6 Managing digital identity
3. Digital content creation
3.1 Developing digital content
3.2 Integrating & re-elaborating digital content
3.3 Copyright and licences
3.4 "Programming" [for some: coding]
4. Safety, security
4.1 Protecting devices
4.2 Protecting personal data and privacy
4.3 Protecting health and well-being
4.4 Protecting the environment
5. Problem-solving
5.1 Solving technical problems
5.2 Identifying needs and technological responses
5.3 Creatively using digital technologies
5.4 Identifying digital competence needs
6. Transacting
6.1 Setting up online accounts (public or private services)
6.2 Managing money and transactions online
6.3 Ordering items or services online and making payments

In practice, many user activities will, of course, often include actions from more than one of the above, for example:

> The user will search for information on the internet; she/he will ask for that information to be shaped in a given format; during the process, the user will ensure that confidential information is not compromised.

The user actions can be **separate** and **sequential**, or can be ***integrated*** as a function of the application (possibly by choice of the individual). Advanced levels of artificial intelligence (AI) might be involved in the background (e.g. in the case of recommendation systems on commercial databases, or in the case of navigation systems) without the ordinary citizen being aware of these.

In the case of user interaction with 'generative AI' systems (such as ChatGPT and the many comparable applications that will appear in 2023 and beyond), the system response might appear nearly 'magical'. However, the different actions executed by the system are so well *integrated* and the sequential execution is so fast that the user does not recognise the various separate actions performed by the AI application in the background. In reality, most of the six core competences of user interaction with digital systems will still be distinctly recognisable.

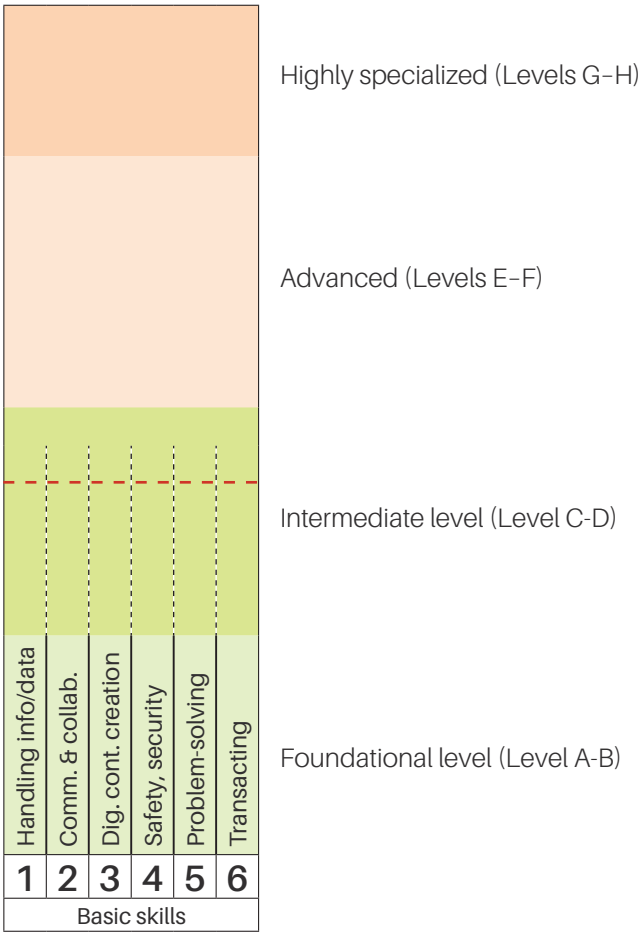
Generative AI systems will (at least for the foreseeable future) be based on a text corpus (as opposed to a verified knowledge base) representing information that is both good and bad, correct and incorrect, appropriate and inappropriate. Users will therefore have to engage thoughtfully and critically with the system outputs, and this will still have to be done through the competences and sub-competencies above (or at least a subset of those).

c) Eight levels of proficiency

DSFOne follows DigComp in distinguishing eight levels of proficiency that can be expressed in four designations, namely:

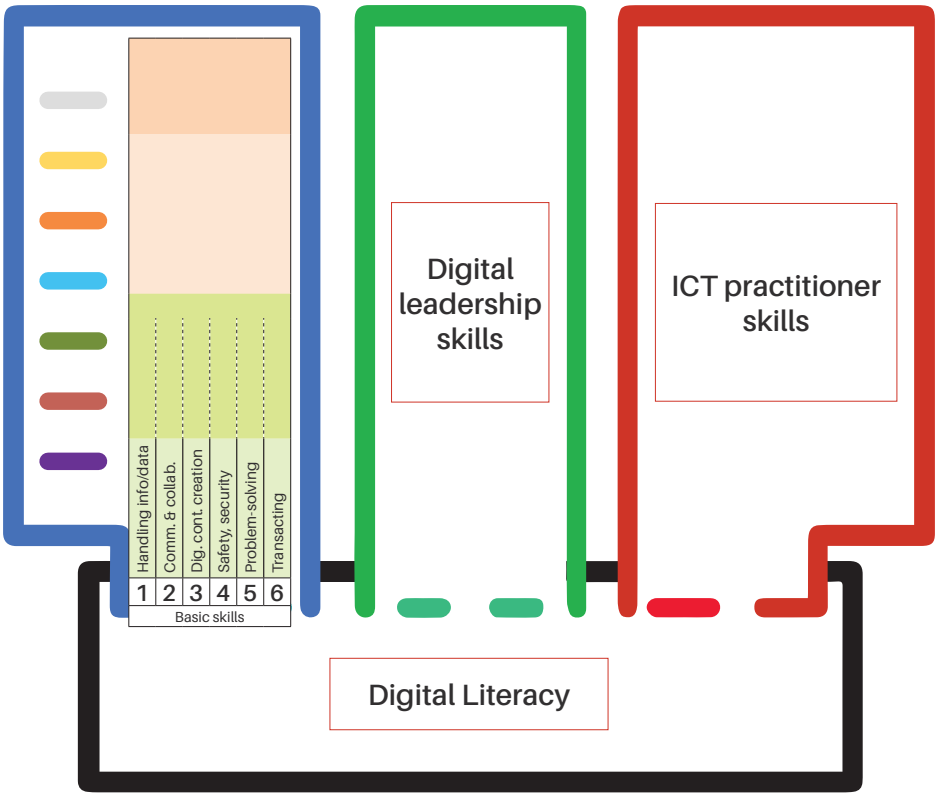
Figure 4: Levels of proficiency

- Foundational level (Level A-B)
- Intermediate level (Level C-D)
- Advanced level (Level E-), and
- Highly specialised (Level G-H)



These proficiency levels are indicated vertically by way of colour segments in the graphical model of DSFOne – from 'foundational' at the bottom of the list to more advanced levels at the top. Figure 5 provides a representation of how the six areas of competence and the levels of proficiencies can be interpreted as integral part of the DSFOne.

Figure 5: Digital skills within DSFOne



d) A few anchor points relating to the model

- The red dotted line distinguishes between the foundational digital skills that all citizens require to function within a digital society, and those more advanced digital skills required to function effectively within the formal world of work.
- Below the red dotted line (in Figures 4 and 5) can be described as 'general digital literacy for all citizens' (proficiency levels A to C).
- Proficiency level C can also be regarded as the ***work readiness*** threshold.
- It is important to note that the concept 'Advanced' is not only applicable to programming/coding skills or to emerging technologies, but is also applicable to user digital skills, both generic skills and/or how they are intertwined with sector skills.[13]

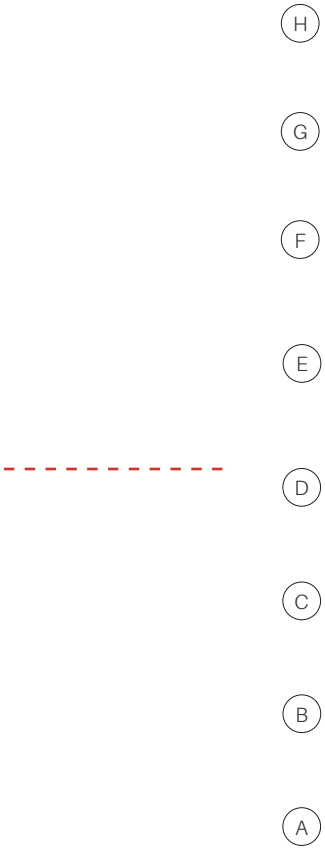
In this respect the DSFOne aligns largely with the DigComp. Linking up with international developments, it has the distinct advantage that we can learn from these developments and also utilise material that is made available to the broader community. There is thus no need to reinvent the wheel.[13]

For illustration purposes, Figure 6 below provides an example of the proficiency levels of ***one*** of the 24 competencies, namely competence 1.1: *Browsing, searching, filtering data, information and digital content*. Competence 1.1 forms part of the first competence area, namely *Handling information, data and digital content*.

13 As indicated earlier (Section 3.3.2), the approach to distinguishing different levels followed by DigComp is well-founded. The description of the various levels is broadly correlated with the levels of Bloom's Taxonomy.

Figure 6: Illustration of levels of proficiency within the DSFOne

8 levels of digital skills - Illustrated for one of the 24 competencies (read from bottom):-
Under competence area 1 "Handling information, data and digital content":-
Competence 1.1: "Browsing, searching and filtering data, information and digital content" [here abbreviated as DIDC]



CHAPTER 5

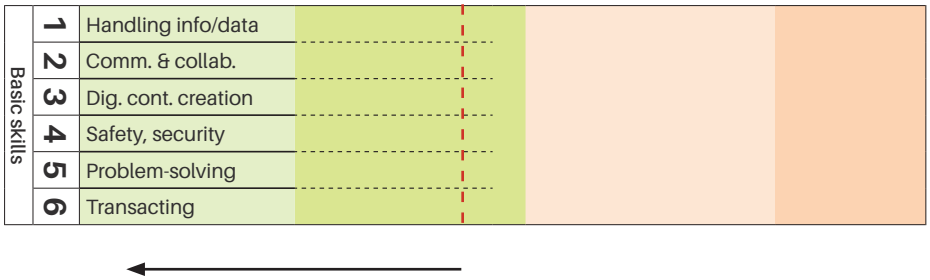
Digital skills for citizens (digital literacy)

As indicated in section 3, the concept of ecosystems proves to be a useful one to identify and delineate the various groups of people (ecosystems) and the context of activity within which they require particular digital skills.

This section provides more detail on the particular characteristics of the four identified segments or ecosystems.

5.1 Digital skills for citizens

Figure 7: Basic Foundational skills for Citizens



Digital literacy forms the basis of digital skills and the path to access the other components of the framework. Digital literacy comprises user digital skills (or as in some terminology, 'end-user skills'), specifically in six areas of competence – the same competence areas that can also be performed at higher and more advanced levels (see Figure 6).[14]

Digital literacy can be defined as ***"[t]he ability of individuals to use digital tools and facilities to perform tasks, to solve problems, to communicate, to manage information, to collaborate, to create and share content and to build knowledge, in all areas of everyday life and for work".***[15]

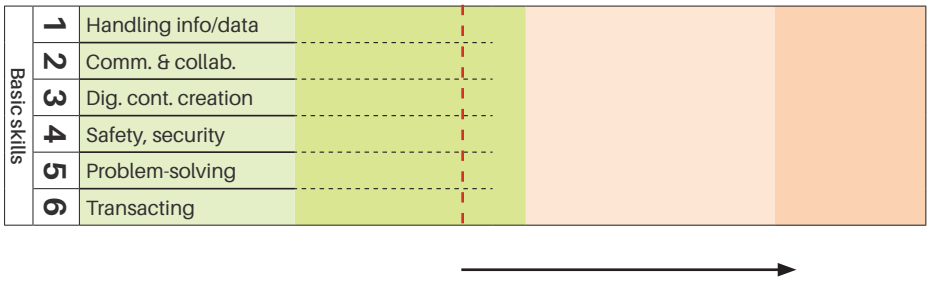
Digital literacy is what is typically required of the average citizen.

A few pointers:

- All citizens require some level of digital skills to function in a digital society, regardless of whether they are in employment or not.
- These skills are required to function in everyday life situations, in which citizens, for example, have to:
  - communicate (voice and messaging),
  - find information and evaluate its relevance for them,
  - create digital content (e.g. producing documents or forms), and
  - transact (online purchases, banking).
- In all of these activities, they also have to ensure the safety and security of their assets and personal information.

14 Definition of 'digital literacy' used in the DSFOne framework. https://www.wcapecolab.org/single-post/digital-skills-framework-one-dsfone
15 Ibid.

Figure 8: Foundational to advanced and highly specialised skills in terms of user digital skills



A few pointers:

- People in work contexts evidently need the digital skills required for all citizens (that is, digital literacy). In most cases, they will need more than basic levels of the core competences. In many of these cases, the skills will be shaped by the requirements of the specific sector of work, or additional skills relating to the sector will be added to the core competences. We therefore can speak of 'sector user digital skills'.
- Most of the skills in 'sector user digital skills' do not require coding, but advanced levels of skills for a better understanding of how computers work or how to adapt settings and systems for enhanced system or device performance.
- Sector users might not necessarily be expected to know how to develop the algorithms or construct the various machine learning approaches for predictive analytics. However, they should be able to understand what the benefits of predictive analytics are and how to apply it within their particular work context. Users of predictive analytics should also have the ability to reflect on, for example, potential ethical implications and unintended consequences.

5.2 User digital skills

The six areas of competence constituting digital literacy, at the more advanced levels, form the user digital skills that are used in work contexts. User digital skills therefore refer to the particular digital skills that people (or employees) need to fulfil their work responsibilities within a particular role within a particular sector.

a) Specification of digital skills for sector-specific application

User digital skills can be thought of as generic when they are described in a general way. Once user skills are applied in the world of work, sector user skills sets come into being, in which the generic user skills are combined with insights from, and the requirements of, the specific sector. The skills sets for a specific sector have to be defined by making use of well-informed and forward-looking insights from experts in the field.

Sector user skills sets require the 'specification' of the foundational digital competences to be applicable to a particular target audience (e.g. teachers) or sectors (e.g. the business process outsourcing sector, manufacturing). *Specification* involves the identification and selection of digital competences that are relevant for a particular context. This selection obviously depends on the technologies that are at play within that particular sector. Specification might also mean putting less emphasis on some digital competences as well as determining the proficiency levels of specified digital competences.

Specification thus refers to the process of making choices about the relative importance of digital competences and the proficiency levels required for a particular target audience.[16]

There are various international sector-specific user competency profiles that can guide our thinking and practice in this regard.

16 Kluzer, S. & Rissola, G. (Eds). (2015). *Guidelines for the adoption of DigComp*, 2015. This guideline document provides a more detailed description of the specification process.
17 https://digital-strategy.ec.europa.eu/en/node/7919/printable/pdf

See, for example, the project CarerPlus (Carer+), which focuses on the development of the digital skills of care workers to enhance the quality of life of older people.[17]
This initiative **specifies** those digital competences that are and would be relevant for care workers to provide the necessary support (using technology) to older adults, followed by the development of training material to enhance these specified digital skills.

See Annexure D for a graphical view of the process to specify digital skills sets for a particular sector or job role.

b) Integrating specified digital skills into sector or job competency profiles

A typical approach for the application of digital skills in various sectors is to integrate the ***specified digital skills*** (as discussed in a) into the professional competency profiles of particular jobs, roles or sectors. The combination of professional competencies and specified digital competencies are often referred to as ***hybrid*** competencies or skills.

Figure 9: Hybrid Skills

Professional Competences + **Advanced Digital Competences** = **Hybrid Competences**

5.3 ICT practitioner skills

Ever since the time when computers came to be used for business purposes, skills sets for programmers, system developers and persons involved in the operation and maintenance of systems were defined, and training based on these skills sets took place. Over time, and as applications became more complex, the skills sets became formalised.

The mostly widely used framework for ICT practitioner skills is the Skills Framework for the Information Age (SFIA), which was developed under the auspices of the British Computer Society. The first version of SFIA appeared in the year 2000. Revisions appeared regularly; the most recent version is SFIA 8, which was released in 2021.

In the most recent version, SFIA identifies itself as the framework for **"... the skills and competencies required by professionals who design, develop, implement, manage and protect the data and technology that power the digital world"**.[18]

SFIA is organised along two axes, namely 'Categories of activity' and 'Levels of responsibility', which form a matrix covering the wide range of practitioner skills (see Table 4). Jobs and digital skills are then defined within this matrix.

SFIA is widely used internationally. The Institute of IT Professionals South Africa (IITPSA) also makes use of SFIA in its categorisation of ICT practitioners.

It should be noted that SFIA covers more than strictly ICT digital skills. SFIA positions itself as the framework for the ICT functionality or environment of an organisation. It therefore includes, for example, skills relating to the management of people and the administration of processes for the development of their digital skills.

Table 4: SFIA matrix

	SFIA 8 *(Skills Framework for the Information Age)* (Categories, and levels of responsibility)	1. Follow	2. Assist	3. Apply	4. Enable	5. Ensure, advise	6. Initiate, influence	7. Set strategy, inspire, mobilise
A	Strategy and architecture							
B	Change and transformation							
C	Development and implementation							
D	Relationships and engagement							
E	Delivery and operation							
F	People and skills							

18 SFIA Foundation. (2021). *About SFIA*. https://sfia-online.org/en/about-sfia/about-sfia.

Another framework for ICT practitioners was developed in the EU during the first decade of the 21st century, namely the e-Competence Framework (eCF).[19] Following the second version of this framework, it was adopted as the European Standard in 2016. The logic of the eCF is different from that of the SFIA, and all the digital skills included in this framework can be regarded as ICT practitioner skills.

The eCF does not seem to be used widely outside of the EU, and SFIA is used in many countries and organisations within the EU.

DSFOne takes the view that SFIA (see 3.2 above) can be used for the ICT practitioner skills framework. SFIA is widely accepted and used.

5.4 Digital leadership skills

The significance and particular contribution of leaders in the digital transformation process of institutions and the society at large necessitated the identification of digital leadership as a separate ecosystem on the DSFOne.

There currently are different conceptualisations of 'digital leadership skills'. Some of these focus on the achievement of the objectives of a business or other kind of organisation, either internally or within the context in which it operates; others focus on the broader society and the way digital means are used by an organisation or by society to achieve transformation or to align with societal or global objectives.

For a society-wide approach, to which DSFOne aspires to be, it is advisable to include both of these dimensions of 'leadership skills'.

a) Defining digital leadership skills

Until a widely accepted definition emerges, it might be useful to work with the following interim definition:

Digital leadership skills are **"[t]he capabilities needed to exploit opportunities provided by ICT, notably the Internet, digital devices and the new media,**

- **to ensure more efficient and effective performance of different types of organisations,**
- **to explore possibilities for new ways of conducting business and organisational processes,**
- **to establish new businesses, organisations, platforms, applications and interventions,**
- **to accomplish goals that rely on ICT through the direction of human resources and uses of ICT, and to effect innovation (incl. social innovation) through digital means."**[20]

b) Digital leadership skills are different from 'ICT practitioner skills'

Digital leadership skills do not necessarily imply advanced ICT practitioner skills. Generally speaking, these skills can rather be considered as the ability to understand the disruptive nature and opportunities of digital technologies and their implications for the particular sector and the particular business. It is the responsibility of leaders to ensure the sustainability of their businesses or institutions within a changing digital context.

It is argued in the academic and business literature that leaders in and for the digital economy should have the leadership and the technology (digital) capabilities (where applicable) to take the responsibility within their own institutions to:

- Build the relationship between the ICT function and experts (practitioners) and 'business' people to ensure an integrated approach towards digital transformation (weaving the technology and business skills for maximum benefit of the institution);
- Prioritise the digital skills development of staff; and
- Facilitate new ways of working within the institution for improved efficiency and innovation.[21]

c) On ethics

Leadership faces major ethical challenges within the increasingly digital context, and these are typically related to or associated with:

- **socio-economic** challenges, such as fragmented social cohesion, ethical considerations related to AI systems, protection of privacy and personal data (to name a few),
- **political challenges**, which can include, for example, challenges to ethical organisation systems design, and

19 European Commission. 2014. *European e-Competence Framework*. Version 3.0. https://esco.ec.europa.eu/en/escopedia/european-e-competence-framework-e-cf

20 Western Cape CoLab. (2022). *Digital Skills Framework One (DSFOne) – Overview*. https://www.wcapecolab.org/single-post/digital-skills-framework-one-dsfone (In this definition, use is made of T. Hüsing et al. (2013). *e-Leadership: e-Skills for competitiveness and innovation. Vision, roadmap and foresight scenarios*. Final report. empirika.) Changes were made for DSFOne purposes.

21 Westerman, G., Bonnet, D. & McAfee, A (2014). *Leading digital: Turning technology into business transformation*. Harvard Business Press.

- **environmental challenges**, which can include, amongst others, lack of transparency and accountability in terms of digital design.[22]

The lag (sometimes described as a vacuum) in regulatory and policy development related to accelerating digital technological development,[23] poses challenges. Leaders carry a huge responsibility in navigating this complex field.

Business schools, leadership scholars and various international institutions, such as the Institute for Digital Transformation[24] are actively involved in research and practice to define and refine the 'new' or hybrid (digital) leadership competencies for people to lead effectively in the digital economy.

22 Bhatta, N. (2021). Emerging ethical challenges of leadership in the digital era: A multi-vocal literature review. *Electronic Journal of Business Ethics and Organization Studies*, 26(1), 30-46.

23 Kane, G.C., Phillips, A. N., Copulsky, J.R. & Andrus, G.R. (2019). *The technology fallacy: How people are the real key to digital transformation*. MIT Press.

24 https://www.institutefordigitaltransformation.org/digital-dialogue-digital-leaders-require-a-cognitive-shift/

CHAPTER 6

What about advanced (4IR) digital skills?

Over the past six years, the imagination of countries, businesses and individuals have come to be captured by the concept of the 'fourth industrial revolution' (4IR). The increased importance of digital technologies and their implementation, and the widespread presence of digital devices in both work and in society, have led to a realisation of change so significant that it could be described as a revolutionary shift from an earlier industrial society to a 'new' society. In this new context, industrial production and the distribution of goods and services would be dominated by the digital dimension, workers would need new skills, and the way in which ordinary citizens would live their lives and engage with their governments would change. Apart from the changes in technology, changes in the skills of all citizens would be paramount. Current specialist and general skills would become more digital, and new digital skills would be required for all persons in order to participate in the economy and in society, and at the individual and personal level.

Some skills associated with this spectacular development and the convergence of technologies have come to be known as '4IR skills'. In some circles, the concept 'advanced digital skills' has come to be used for these skills. These skills are particularly important for ICT practitioners, of whom it was soon expected that they should expand their digital toolsets to include the new technologies.

However, the so-called 'advanced digital skills' (or '4IR skills') do not stand on their own, but link to the advanced levels of digital skills in the three top components of DSFOne.

The digital skills framework (DSFOne) is a unified framework for digital skills, comprising a wide spectrum of these skills. Skills - from basic to advanced - are included in this framework, across the three areas of user digital skills, ICT practitioner skills and digital leadership skills.

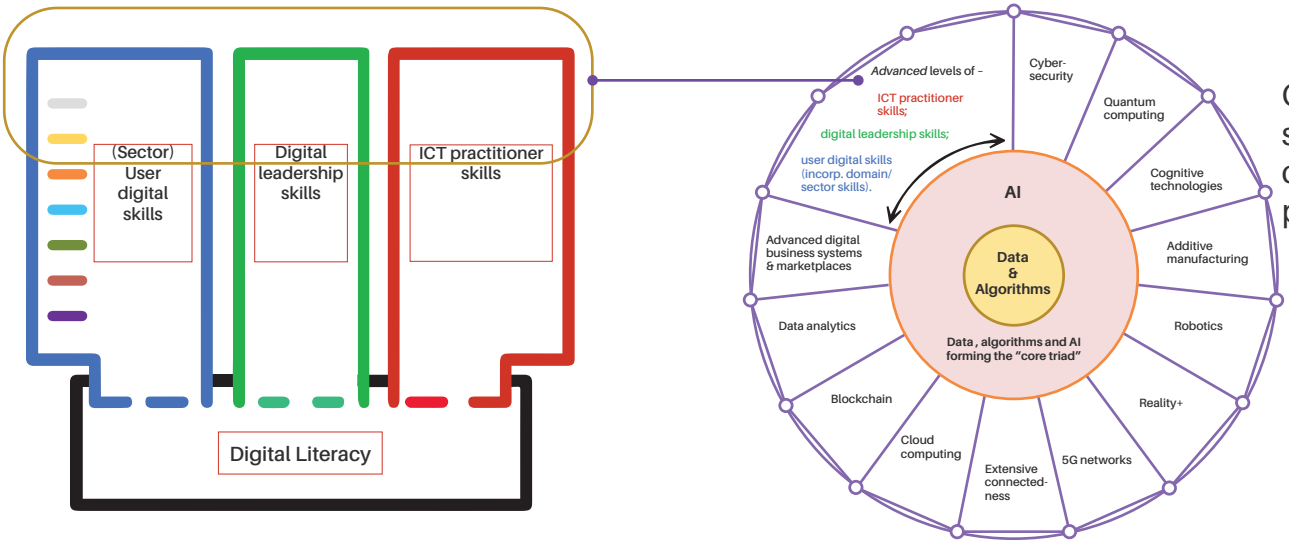
Over the past fifteen years, a number of developments in the digital technology space have led to the emergence of new technologies. At the same time, the widespread connectivity in society has led to a massive increase in the volume of data generated by users, sensors and applications. In most of the emerging technologies, this data, in turn, enables and powers existing and new applications – in conjunction with powerful algorithms and the use of AI. Together, data, algorithms and AI form what one can call the 'core triad' enabling and powering most applications today.[25]

From the position of a developer of applications, the 'core triad' can be leveraged to develop innovative applications that can accomplish what users might have thought to be impossible two decades ago. From the position of informed users, an *awareness* is increasingly required that behind the new-use functionalities there lies this 'core triad' and a range of technologies that play a role in many different ways, potentially either positively or negatively.

The digital emerging technologies can be captured in an *emergent sub-framework for advanced digital skills*, DSFA ('A' for advanced). The skills related to these emerging technologies are actually further components of the toolsets used by ICT practitioners when they develop applications for users, either for citizens in general, or for sector users. DSFA does not identify the skills by their name, but rather identifies the *emergent digital technologies by name*, since these technologies come into play in many of the skills that ICT practitioners use. DSFA is called an emergent sub-framework, since new technologies can emerge over time, or new combinations of technologies can be configured to provide new

25 Neeley, T. & Leonardi, P. (2022). Developing a digital mindset. How to lead your organization into the age of data, algorithms and AI. Harvard Business Review. May-June, 50-55. Leonardi, P. & Neeley, T. (2022). *The digital mindset. What it really takes to thrive in the age of data, algorithms, and AI.* Harvard Business Press.

Figure 10: Advanced digital skills



Digital Skills Framework One (DSFOne)

Digital Skills Framework Advanced (DSFA)

functionalities hitherto unthinkable or unforeseen for the near future. For a populated view of DSFA, see Annexure C.

The advanced skills levels of the DSFOne framework feed into the application, use and maintenance of the digital emerging technologies:

- ICT practitioner skills are required for developing the applications;
- Digital leadership and innovation skills are required for conceptualising and shaping applications, as well as ensuring organisational or societal uptake;
- Sector user digital skills are required in order to translate needs and user scenarios into the way applications are shaped, and adapted and implemented.

In turn, the nature of the activity across all components of DSFOne is affected by the power of some of the emerging technologies.

For example,

- basic search operations by users are mostly (or can be) affected by the use of AI at the back-end of the search application (such as Google), and users have to be aware of the implications of the use of such technologies;
- users increasingly have to be aware of the cybercrime threats that can affect them and the cybersecurity measures that can be taken to stay safe and secure.

In the DSFOne, the organising principle is the concept of four ecosystems, as set out in Section 3.2. People engaged in *any* of these four ecosystems need an understanding of the powerful forces that are provided by the data-algorithms-AI triad and that – in some way or another – influence or even determine the activities of users, the developers of applications, and the way leadership can shape new business futures. This triad can influence even the most simple activities of users, e.g. a search, or engaging with a chatbot (such as ChatGPT).

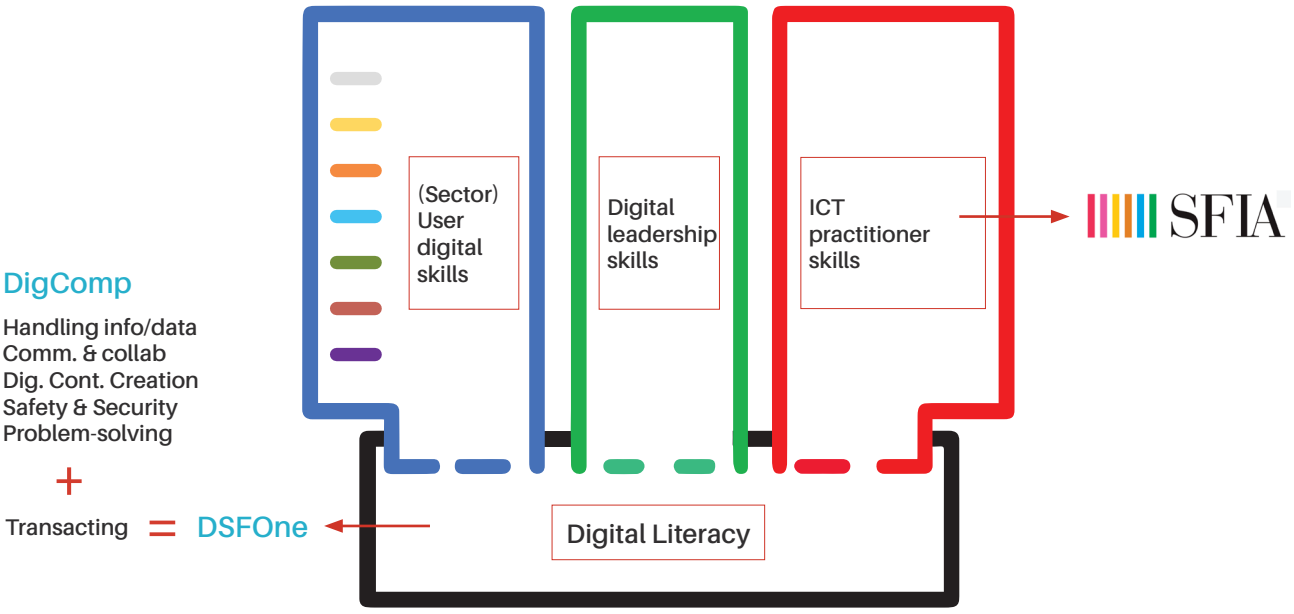
CHAPTER 7

Benefits of using the DSFOne Framework

In the development of the DSFOne, it was deemed appropriate to capitalise on the momentum within the international discourse regarding digital skills frameworks, and their implementations. The development of skills frameworks typically comprises resource- and time-intensive processes, and much could be gained from the collective experiences and expertise.

Frameworks that proved to garner large acceptance in their relevant sectors and countries are: DigComp(EU), SFIA (UK), and Essential Digital Skills (EDS, UK). The DSFOne benefited from and built on some of these frameworks to arrive at a unified digital skills framework. (See Annexure A for more details on international developments.)

Figure 11: DSFOne alignment with international thinking



The unified DSFOne integrates the various digital skills sets (citizens, sector user skills, ICT practitioner skills and digital leadership skills) into one coherent framework and provides alignment with the international discourse for future developments and transferability.

There are distinct benefits to using the digital literacy component of DSFOne as a basis for digital literacy for citizens, and in using the DSFOne framework as a whole for digital skills in general.

7.1 Benefits of participating in the international discourse

Many advantages are to be gained from interaction and alignment with the broader international digital skills framework discourse. Some of these are:

- Sharing in the insights and accomplishments of more than a decade of research and implementation of digital skills across a diverse range of countries and populations.

- Linking to the extensive ecosystem of products and services based on, or aligning with, the DigComp, EDS and SFIA competence frameworks.
- DigComp manifests itself, in particular, in:
  - products and services from countries that accepted DigComp as their national framework, as it is, or with small adaptations;
  - products and services from organisations beyond the EU that align their understanding of digital skills (especially digital literacy) with DigComp due to the wide international acceptance of DigComp;
  - commercial organisations that align with DigComp as a basis for their products and services (e.g. ICDL);
  - a very active and internationally representative community of practice (CoP) regarding DigComp, which shares experiences and challenges regarding digital skills and the implementation of DigComp;
  - providing a rich set of examples relating to all aspects of the five digital competence areas, at multiple levels and in relation to the three dimensions of knowledge, skills and attitudes. The latest version of DigComp also includes more than 250 examples that highlight new and emerging themes, such as the way citizens interact with AI systems, the important and relevant topic of information disorder, and the datafication of internet services and apps.
- EDS was initially developed by an NGO and over time developed into an initiative that is characterised by a strong alignment and collaboration between government and business (public-private partnership) for implementation.
- SFIA is widely accepted and aligns business, government and organisations in terms of ICT practitioners. Given the wide acceptance and collaboration, the framework is updated regularly and therefore retains its relevance for all of these constituencies.

7.2 Benefits of applying DSFOne as digital skills framework

Apart from the benefits brought by its alignment with other frameworks, the following benefits of DSFOne can be singled out:

- As a unified framework, it enables a broader view of digital skills than merely user digital skills on their own, by also including:
  - Digital skills for citizens
  - ICT practitioner skills, and
  - digital leadership skills.
- DSFOne clearly differentiates between skills required for the *development and management* of ICTs (**ICT practitioner skills**) and digital skills required for the effective *use* of ICTs (*non-ICT practitioner skills*, i.e., digital skills for citizens, user digital skills and digital leadership skills).
- Through its graphical structure, it indicates how the stack of user digital skills from basic to advanced relates to –
  - the concept of 'digital literacy', and
  - the alignment of the full stack with sectors and professions.
- It adds one area of competence ('Transacting') that resonates with the way most citizens make use of their digital devices for transacting. This is particularly relevant in a country such as South Africa, where citizens use their mobile phones to 'transact' in many ways. (This addition to the five areas of competence of DigComp is done in such a way that the numbering alignment of DSFOne with DigComp is not affected, paving the way for continued engagement with the rich ecosystem of DigComp.)
- The focus on citizens (digital literacy) emphasises the requirement of having basic digital skills to live and function in a digital economy. It highlights the importance of providing appropriate non-formal and informal skills development initiatives to ensure that citizens acquire the necessary skills to participate in the digital economy.
- The basic digital skills form the basis of the development of higher levels of proficiency that are typically required for most jobs in the formal sector.[26]
- As discussed in Section 4.2 (d), 'work readiness' can be related explicitly to an intermediate proficiency level of digital skills, thereby aligning with international thinking.
- The application and use of emerging or 4IR technologies, for example data analytics, AI, robotic process automation and machine learning, are increasingly indispensable for non-ICT professionals and workers in the formal world of work. DSFOne accommodates the digital skills required for these emerging technologies (see Section 6 and Annexure C).

26 The World Bank report on digital skills highlights that the requirement for digital skills to function within the informal sector is likely to become ubiquitous (Bashir, S., & Kogi, M. (2020). *Digital skills: Frameworks and programs*. World Bank).

- The framework provides a structure for decision makers in organisations and in education/training to take decisions on which segment of the unified framework is at stake in a given case of planning for digital skills development.

7.3 Digital skills proficiency levels and the formal educational system

A framework with clearly defined competences, proficiency levels and ecosystems, facilitates and enables a clearer alignment between the digital skills proficiency levels and the focus of digital skills development within the formal educational system.

The adapted World Bank diagram below portrays the digital skills proficiency levels that the various education institutions should ideally be focused on.

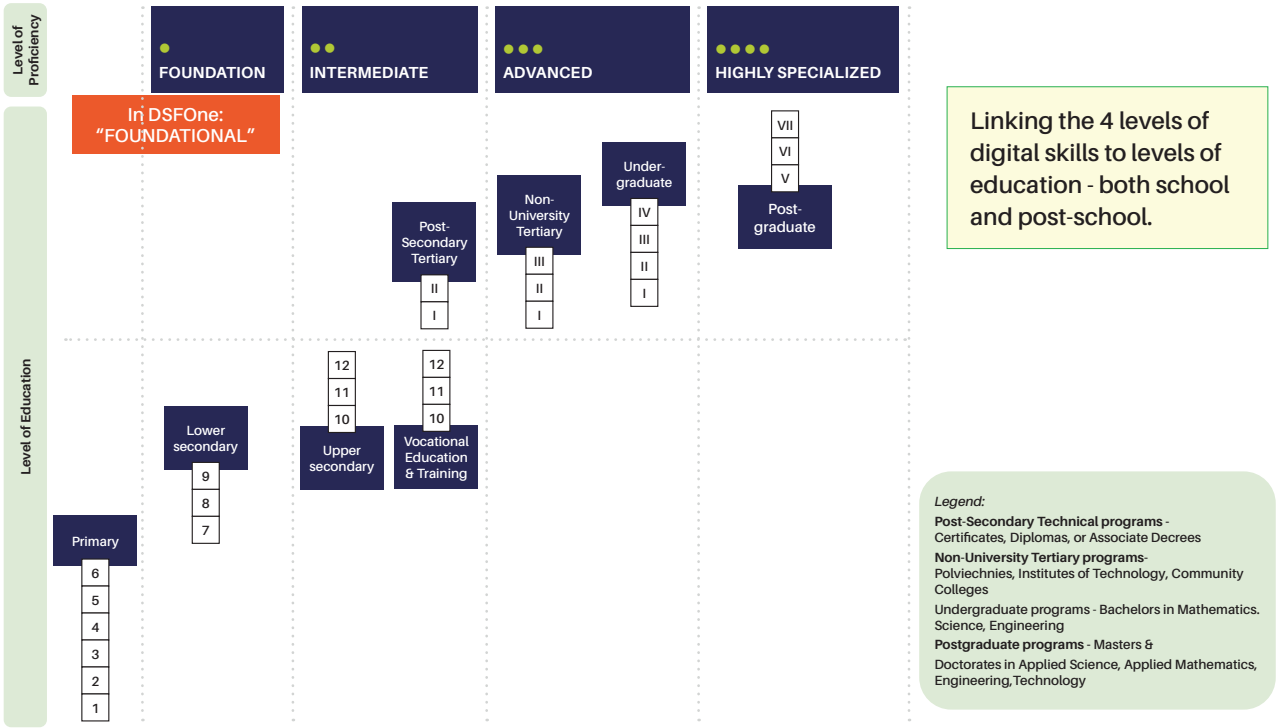
- **The diagram implies that the basic education sector should concentrate on the development of digital skills up to an intermediate level for all learners.**
- **The digital skills proficiency level for access to the world of work (work readiness) implies the development of intermediate digital skills by learners in the upper secondary school and students in technical-vocational and undergraduate non-ICT programmes.**[27]
- **The development of advanced and highly specialised skills typically relates to non-university tertiary education and undergraduate and postgraduate tertiary education.**

General comment applicable to all ecosystems

Although the DSFOne is anchored in a set of six digital competences that form the basis of all digital activity within the specified ecosystems, differentiation is required during implementation. The specification of appropriate skills for a particular target group or sector, should recognise the particular requirements or cultural differences and preferences, as well as the socio-economic realities of the respective target audiences.

27 Bashir, S., & Kogi, M. (2020). Digital skills: *Frameworks and programs. World Bank*, p. 5.

Figure 12: Digital skills proficiency levels aligned with formal education institutions



[World Bank, Digital Skills: Frameworks and Programs. *Washington 2020. p. 19]*

CHAPTER 8

Outcome of the consultation process

As stated in the introduction of this document, the project consists of two parallel but interdependent processes, namely

- **A research process for the refinement of a unified digital skills framework, that is locally relevant but also aligned with international developments in this respect, and**
- **Stakeholder consultations for input on the framework refinement, and implementation process.**

The previous sections (2 to 7) provide an overview of the concepts and building blocks of the framework. Section 9 will cover the key learnings and feedback points resulting from the consultation process.

8.1 Stakeholder consultation

The acceptance, validation and use (adoption) of a digital skills framework requires the participation and input of the total spectrum of stakeholders.

Although DSFOne was introduced to various stakeholders and practitioners over time, it still needed to be shared with the broad digital skills stakeholder community. Such a broad consultation process should ideally be aimed at obtaining input from multiple stakeholder groupings to ensure the inclusivity of the framework, to work towards its refinement, and to move towards the general acceptance and adoption of the framework.

Funding from the British High Commission during the 2022/2023 financial year enabled the DSFOne project team to initiate such a consultative process. Through the process of stakeholder mapping, networking with role players within the wider digital skills ecosystem, and the support of the Interdepartmental Coordinating Committee (IDCC) for Digital Skills,[28] the research team managed to consult with key stakeholder groups to raise awareness of the DSFOne, and to obtain their input in terms of the value and applicability of the framework as well as their suggestions for the implementation thereof. This was done in the period from July 2022 to March 2023. In addition to selected specialists, the team consulted with representatives of the following stakeholder groups:

28 The Interdepartmental Coordinating Committee for Digital Skills is facilitated by Ms. Lerato Shai, Director: Project Management Office (PMO) in the Private Office of the President.

- Western Cape Skills Forum
- Digital Skills Accelerator and TechXit, now operating as the Collective X
- Department of Basic Education (DBE)
- Department of Higher Education and Training (DHET)
- Quality Council for Trades and Occupations (QCTO)
- Global Business Services (BPeSA and CapeBPO)
- Support organisations for SMEs (through Viridian)
- Department of Trade, Industry and Competition (DTIC)
- SETA Forum
- IDCC participants.

In some instances, the consultation involved several discussions, while for other stakeholders follow-up sessions are still required. A summary of the key discussion points and outcomes per stakeholder grouping is provided in Addendum F. These discussion points form the basis of the recommendations for implementation.

It transpired from all the consultation sessions that the DSFOne has clear face validity and could greatly assist in contributing towards:

- Demystifying the concept of 'digital skills'
- Creating a shared understanding of this concept
- Differentiating between digital skills for ICT practitioners and digital skills for non-ICT practitioners
- A better understanding of the digital skills that are relevant for the various ecosystems
- A better understanding of sector-specific skills requirements and the need to specify those digital skills that are relevant for particular sectors
- A more equal distribution of effort to address the total digital skills ecosystem
- Coordination of digital skills efforts in the total ecosystem.

In general, it can be stated that the DSFOne demonstrates value and high levels of acceptance within the stakeholder groups. The DSFOne is a tool that can assist in the implementation of the NDFSS, by highlighting those digital skills and proficiency levels on which they should be focusing, as well as the further developments to specify sector-specific digital skills.

Some industry bodies recognised the practical value of the DSFOne and are already moving ahead with the implementation process (refer to global business services (GBS) and the industry-led Collective X initiative).

Stakeholders underscored the potential value and benefits of the DSFOne, as discussed in Section 2 of this report. In almost all respects, consultations typically progressed quickly from understanding what the DSFOne is about, towards the process of implementation.

8.2 Towards implementation

At its most basic level, the adoption and implementation of DSFOne would imply the following:

- Acceptance of the six core digital areas of competence as the definition and foundation of digital skills within all of the South African digital skills ecosystems. These core areas of competence are the basic starting point.
- The progression from basic digital literacy (focusing on the six core areas of competence) - from basic to intermediate proficiency levels - for work readiness (Section 5.1).
- Development of ICT-specific digital skills competences, working from the foundational six basic areas of competence into the 'specialised' skills under the guidance of the SFIA framework (Section 5.3).
- The selection or specification of those digital competencies for which advanced and highly specialised proficiency levels are required to function effectively within a particular sector (sector user digital skills – Section 5.2; refer to the GBS process).
- Recognising digital leadership as a separate ecosystem that requires sector-specific development.

8.2.1 The role of formal education

Although digital skills are ubiquitous, the formal education sector represented by the Department of Basic Education (DBE), Department of Higher Education and Training (DHET), the Quality Council for Trade and Occupations (QCTO) and the network of Technical Vocational Education and Training (TVET) colleges, in collaboration with the Department of Communication and Digital Technologies (DCDT), as the owner or sponsor of the NDFSS, can be regarded as the primary role players in guiding the implementation of the DSFOne for a consistent and shared understanding of digital skills (six areas of competence) as the basis for the diversification or specification of digital skills across all sectors.

Figure 12 provides the key for the alignment of the digital competence proficiency levels with various sectors within the formal educational system.

a) Department of Basic Education

At a basic level, basic education should ideally focus on ensuring that all learners, at a minimum, should have acquired an intermediate level of proficiency in all six areas of digital competence by the end of their secondary schooling. An intermediate proficiency level is typically regarded as the appropriate standard or level for work readiness.

The implication for learning facilitators (or teachers) is that an intermediate level of proficiency in all six digital competence areas is required, along with the development of advanced and highly specialised proficiency levels for those areas of competence that are specifically relevant for the teaching profession (e.g. managing LMS, online-learning, pedagogy).

As indicated during the consultation sessions, implementation can follow the following pathway:

The DBE representatives provided input and guidance on how such a process could be introduced within the existing structures and initiatives (refer to Addendum F).

b) Quality Council for Trade and Occupations and TVET colleges

Following the line of thinking applied in the basic education sector, the Quality Council for Trade and

As indicated during the consultation sessions, implementation can follow the following pathway:

- Integrate the DSFOne into the DBE Professional Development Framework, as the DSFOne provides the definition of what digital skills (IT skills) are through the specification of the six areas of competence.
- Use the DBE Professional Development Framework (PDF) as a good example of a teachers-specific digital skills framework (user group on the DSFOne). Integration with the DSFOne will ensure the progression from an intermediate level of proficiency in all six areas of competence to advanced and highly specialised digital skills in selected areas of competence that are relevant for the education sector (and as specified in the PDF).
- Integrate the DSFOne with the PDF to facilitate a better understanding of the digital competences and proficiency levels that learners need to develop over the course of their primary and secondary schooling years.
- Upskill the current teacher workforce to an intermediate level of proficiency in the six areas of competence and advance to higher proficiency levels for education-specific requirements (e.g., online learning, robotics, coding).
- The above will enable the basic education sector to facilitate digital competence development (in all six areas of competence) from very basic and foundational levels in primary schools to the achievement of intermediate proficiency levels in all six areas of competence at the grade 12 level.
- School leavers (at the end of grade 10 or 12) therefore should have foundational to intermediate proficiency levels in all six digital competence areas as a minimum, in addition to the specific skills related to robotics and coding (especially for those students who would want to explore careers in the ICT sector).
- The integration of the DSFOne into the PDF should be regarded as a change process in itself and will require communication, as well as training, in the DSFOne and PDF, guided by the DBE leadership and supported with the necessary material (brochures, communication plans etc.) to raise awareness and understanding to facilitate implementation.

Occupations (QCTO) and the network of TVET colleges should ideally focus on ensuring that all TVET college learners acquire an intermediate level of proficiency in all six basic competence areas as a minimum. At the end of their learning journey at TVET colleges, learners should therefore be regarded as sufficiently digitally literate to enter the world of work. More specifically, learners should also acquire digital competence at the intermediate and even advanced levels to be sufficiently digitally competent for a particular sector, trade or occupation (where applicable).

A use case to guide the thinking

The tourism sector is one of the first sectors to be fundamentally transformed by advanced technologies. A Cape Town-based TVET college, specialising in training students for the tourism sector, integrated digital skills into all the training content. Apart from ensuring a foundational to intermediate level of digital literacy, specific attention is given to the development of more advanced proficiency levels for those competences that are specific to the tourism sector, such as digital fluidity in navigation across various digital platforms, social media marketing skills, search engine optimisation techniques and tools, and augmented and virtual reality (AR&VR) for content development and the creation of customer experiences.

The QCTO can facilitate the implementation of the DSFOne by means of the following mechanisms:

- Specify the six digital areas of competence and required proficiency levels as a 'standard' for all training material. This implies that service providers need to integrate the development of digital competence development into the training content.
- Ensure that the 'standards' include sector-, trade- and occupation-specific digital competence areas that require more advanced levels of proficiency.
- Integrate digital skills training at the required level of proficiency into all the existing curricula.

TVET colleges can implement the DSFOne by means of the following mechanisms:

As with basic education, TVET colleges should ideally focus on ensuring that all learners, at a minimum, acquire a foundational to intermediate level of proficiency in all six areas of digital competence by the end of their study period.

This implies that TVET lecturers (learning facilitators) need to demonstrate an intermediate[29] level of proficiency in all six digital areas of competence as a very basic or minimum requirement. As with teachers in basic education, educational-specific digital competence areas require advanced to highly specialised levels of proficiency. It might be useful to refer to the Professional Development Framework to work towards a hybrid[30] competence profile for TVET lecturers (refer to Section 5.3). However, an additional requirement for TVET lecturers is the specific focus on those digital competences that are required for particular sectors, trades and occupations (where applicable).

Implementation could potentially consist of the following steps:

- Use the DSFOne to assess entry-level learners' basic digital competences and to develop targeted digital skills interventions to address digital skills gaps. The objective is to ensure that all first-year TVET students should at least have digital skills at a foundational level.
- Integrate the six digital competences into the professional competence profile of TVET lecturers, at the required proficiency level (intermediate as a minimum).
- Initiate a process to (i) assess the digital competence levels of lecturers and tailor digital skills interventions to (ii) upskill lecturers to the required level of proficiency.
- Identify or specify occupation- or trade-specific digital competences for inclusion in course

29 An intermediate level of proficiency is typically regarded as the appropriate level of digital literacy to function within the world of work.

30 A hybrid skills refer to the integration of the relevant digital skills into the professional competence profile of a particular role or job. Refer to Section 5.3.

material and the upskilling of lecturers (where applicable). Collaboration with the related sectors or industries to this end is advisable. (This could potentially include the total redesign of curricula – these requirements are discussed in the NDFSS.)

- A digitally literate lecturer corps and learning material inclusive of the required digital competence learning components, should enable TVET colleges, over time, to supply students who have the required digital literacy to function effectively in the world of work (work readiness).
- Fast-track new courses/ programmes to build the pipeline for new jobs (this falls outside the scope of the DSFOne implementation – see NDFSS for detailed discussions).

c) Tertiary educational sector

As depicted in Figure 12, the tertiary educational sector ideally should focus on the development of advanced to highly specialised sector-specific digital skills. The assumption is that basic education should ideally deliver/supply the tertiary educational sector with students who are sufficiently digitally literate to function at an intermediate level of proficiency.

In many cases, the transformational impact of advanced technologies necessitates the reconceptualisation and redesign of courses and programmes. (This dimension is addressed within the NDFSS and falls outside the scope of this DSFOne project.)

The tertiary sector can use the DSFOne for digital skills development, in the following manner:

- To assess the digital proficiency level of first-year students in terms of the six areas of digital competence and, where necessary, to provide targeted digital skills interventions to address digital skills gaps. The main objective of such interventions should be to ensure that all first-year students are sufficiently digitally literate (intermediate level of proficiency) to successfully engage with their learning material and facilitators in a hybrid and online context, and to create content using appropriate digital tools. (This is already the practice at several higher education institutions, although not necessarily aligned with the DSFOne.)
- Include digital competence development (at the required proficiency level) as a standard for new course and curriculum development.
- Specify the digital competences and proficiency levels that are required for particular subject areas, professions and roles, and integrate these competences into the curricula. This would require regular interaction and alignment with the relevant industry sector (or world of work).

8.2.2 The role of the world of work, SETAs and professional bodies

The world of work acutely experiences the reality of digital skills shortages. This can be attributed to a combination of factors such as (1) low levels of digital literacies (given the historical lack of digital competence development in schools internationally, (2) technological advances requiring new skills and even new roles and jobs, and (3) an insufficient supply of skills to name but a few. In a sense, the world of work has to play 'catch-up'[31] by ensuring that the total staff component is digitally work ready (i.e., by achieving digital skills competence to the intermediate level), as well as investing in the development of advanced and highly specialised digital skills as are relevant for the particular sector.

31 The concept of 'catching-up' is used given the fact that many people come through a schooling system in which digital skills are not integrated into the curriculum. It is also still a reality that many people (non-ICT practitioners) typically acquire digital skills in an informal manner.

These advanced and highly specialised digital skills are applicable to ICT professionals and non-ICT practitioners (the business users as discussed in Section 5.3 and Section 6).

Using the six competence areas and proficiency levels as specified in the DSFOne, the world of work, professional bodies and SETAs can collaborate to **specify** those digital competences that are relevant and need to be developed to advanced and highly specialised competences (refer to Section 5.2 for sector user skills and hybrid skills). It would be advisable to follow a collaborative, co-design process within a particular ecosystem (such as health, tourism, manufacturing etc.), which will contribute greatly to the identification of pathways for progression within the sector. (International examples of sector-specific frameworks and pathways exists and can be quite useful in fast-tracking South African efforts.)

The PDF for teachers (developed in the basic education sector) is a good example of a sector-specific framework. The Global Business Services sector has initiated a similar process. The six digital competences, as defined in the DSFOne, are to be used as the basis to specify and scaffold sector-specific digital competence profiles.

In this context, the DSFOne can be used by all these stakeholders to facilitate and coordinate digital skills development in the following manner:

- Use the DSFOne to assess the digital skills levels of new job entrants and of the existing workforce.[32] Develop targeted digital skills interventions to address gaps to ensure that all employees are competent to function at an intermediate proficiency level in all six competences.[33]
- Use the six digital competence areas and proficiency levels as defined in the DSFOne to **specify** those digital competences that are relevant for the particular sector and that require advanced to highly specialised proficiency levels. Align with international professional standards in order to ensure international mobility.
- Invest in targeted stand-alone or acceleration programmes to upskill (reskill) employees to develop these advanced and highly specialised digital skills.
- Collaborate with the relevant training institutions for the integration of digital skills and sector- or job-specific digital skills into existing curricula.

A typical example would be the development of data-analytics courses for managers aimed at developing their ability to understand and use data for decision-making, or a course about what AI is and how it can be applied in the business context for a competitive advantage. This implies very different skills from those of the ICT practitioners or specialists who are responsible for the development of the technology or algorithms, etc. Non-ICT professionals need to have an advanced to highly specialised understanding of these new technologies in view of applying them successfully within their particular work contexts.

8.2.3 The role of multi-stakeholders in the upskilling of citizens[32] [33]

Citizens outside the formal education sector and formal employment, are often left to their own devices to obtain the necessary skills required to take advance of the affordances of digital devices and developments. In this respect government, civil society organisations, foundations etc. fulfil a critical role in contributing towards the digital skills development of a large majority of the population.

In this respect, NEMISA (for example) is specifically tasked by government to implement digital skills development initiatives to reach citizens that otherwise would have been excluded.

Stakeholders focusing on the digital skills development of citizens, can use the DSFOne in the following manner:

- Assess the digital skills proficiency levels of citizens for the identification of digital skills gaps for interventions.
- Use the six areas of digital competence to develop appropriate and targeted digital skills interventions for particular user groups.
- Benchmark service providers' digital skills material or training programmes against the six areas of digital competence and levels of proficiency to determine appropriateness and suitability for a particular target audience.

32 Work readiness requires digital competence at an intermediate proficiency level. Refer to section 5 for a detailed discussion of this aspect.
33 It is also the situation that digital skills are mostly learned in an informal manner.

8.3 Where to start

As stated elsewhere in the document, it transpired from the consultation processes that the DSFOne demonstrates face validity and is considered as a useful tool to refine and define digital skills development across sectors.

Some industry bodies such as Collective X and the GBS sector are already implementing the DSFOne given its value in terms of providing the architecture and structure for digital skills and digital skills development initiatives (refer to the input of Collective X on the benefits of the DSFOne – Annexure E).

However, given the role of different government departments in the implementation of the digital skills initiative, the sentiment is towards some form of national endorsement or ratification of the DSFOne to enable the various government departments to initiate the process of implementation within their respective ecosystems.

The following principles can guide the implementation process:

- Given the sponsorship and ownership role of the Department of Communications and Digital Technologies (DCDT) in terms of the NDFSS, it is recommended that the process of endorsement or ratification be led by DCDT with the support of NEMISA (and the project team).
- DCDT, with the support of NEMISA (and the project team), can facilitate such an endorsement discussion with those government departments focused on the education sector, namely the Department of Basic Education (DBE) and the Department of Higher Education and Training (DHET).
- It is stated clearly in the DSFOne discussion document, that it is a framework under development and requires the input and collaboration from various stakeholders. In that sense, the process of endorsement could be seen as initiating the co-design process, using the DSFOne as the basic building block.
- The exact nature of the endorsement or ratification, should be decided on and co-designed by the DCDT and NEMISA, with input from the DHET. The participation of organised labour and the Department of Employment and Labour (DoEL) needs to be explored.
- The implementation process can typically be conceptualised as a hub-and-spoke model. The core coordination and communication mechanism can potentially be located at the DCDT, DHET and NEMISA, while the sector-specific developments can be located at the various SETAs, professional bodies (the Collective X and GBS sector are good examples), and with the research support of specialists at universities. A communities of practice approach (CoP) has proved to be successful in the implementation of digital skills frameworks in many countries.
- The core principles of the DSFOne, namely the six areas of digital competence and the 4 ecosystems with sector-specific frameworks related to the six areas of competence, form the basis of the skills framework and need to be kept intact to ensure alignment across all sectors.
- Changes to these principles are possible, but would require deliberations across all sectors with due recognition of the international discourse to ensure and maintain alignment for mobility.
- The development of and changes to sector-specific frameworks need to be coordinated and calibrated within the particular sectors, with the necessary alignment with international professional bodies.
- The DSFOne has been developed to align with international thinking, but also to be locally relevant. The principle of cross-sectoral and international alignment and mobility needs to remain as a critical guiding principle in further developments in future.
- Applying the DSFOne as navigation tool for digital skills development can assist in the aggregation of digital skills efforts across sectors. Given the specification of various ecosystems, and the differentiation between ICT practitioners and non-ICT practitioners, all digital skills interventions can be mapped onto the framework, thus indicating in which sectors interventions are happening, as well as the focus of these skills interventions or programmes.
- The hub-and-spoke set-up will allow the sectors to take shared ownership of the implementation process, but will also facilitate cross-sector communication and alignment.
- The implementation process will not happen on its own. It is important to set up the core structure to facilitate implementation towards reaching the 'tipping point' after which sustainability will be more likely. The change process should ideally focus on information sharing, upskilling where necessary and the provisioning of supporting material to guide stakeholders.

- As a typical large-scale change process, the implementation of the DSFOne will transpire across multiple years. However, to maintain focus on this implementation and the necessary sense of urgency, it is recommended to implement communication, information sharing and measurement mechanisms to determine and demonstrate progress in the respective areas. It could be considered to introduce a dedicated 'stream' on digital skills development and frameworks at sector-specific and national digital skills conferences.
- Consider, for example, the implementation mechanisms applied for digital skills frameworks in other regions such as the DigComp (EU) and the EDS (UK):

> **DigComp:** The development of DigComp was and still is an EU-wide collaborative process, with the core development of the framework delegated to a task team situated within the Joint Research Centre of the EU. Various iterations have transpired, with each phase involving consultation with the broader EU community. All EU countries adopted the framework and, in some instances, countries made slight adaptations to accommodate country-specific realities and priorities. Implementation typically follows country-specific strategies and requirements.

> **The Essential Digital Skills (EDS):** This framework originated in an NGO context and was further developed by the UK Department for Education (DfE) in collaboration with a range of stakeholders, including employers, digital skills experts and other government departments. It enjoys wide acceptance within all jurisdictions of the UK and its implementation is integrated within all education-related sectors, as well as business and government departments.

- For more detail on the DigComp and EDS processes, refer to Annexure A.

A few key points

- The above discussion provides broad brush-strokes on how the DSFOne can be implemented. In some respect the recommendations are premature, as discussion with critical role-players (e.g. organised labour, NEDLAC and DoEL) must still happen while the consultation process with the SETAs is still under way.
- However, as reflected in the outcome of the completed consultation sessions (see summaries provided in Addendum F), there is a fair amount of convergence of ideas in terms of implementation.
- Implementation within the particular stakeholder networks should ideally be co-designed, as these role players understand their contexts and can advise in terms of available structures and mechanisms to facilitate the process. The approaches proposed by the Department of Basic Education and the QCTO are typical examples of how the DSFOne can be implemented within the different contexts.
- DSFOne implementation should ideally be integrated into existing digital skills initiatives, structures and processes.
- It is necessary to focus on the implementation of quick wins and to share the message with the broader stakeholder groupings to assist them in their implementation process.

CHAPTER 9

Concluding remarks

The National Digital and Future Skills Strategy clearly stipulates the vision for the digital capability development of all citizens in view of embracing and benefiting from current and emerging technologies. One of the eight strategic pillars points to the importance of research on monitoring of digital skills to support the Digital and Future Skills Strategy. It highlights the importance of broad stakeholder collaboration and participation for the provision of data, and practical research on issues such as digital skills needs assessments, benefits realisation assessments and the generation of strategic intelligence from data to guide future initiatives.

This consultative research project is such a collaborative research initiative aimed at the facilitation of a shared understanding of digital skills across the multitude of stakeholders and sectors. Given the multi-faceted and ubiquitous nature of digital skills, participation is required from a wide range of stakeholders in the formal education sector (e.g. the DHET, DBE, QCTO), government, organised labour and the world of work, to name but a few. Pillar seven of the NDFSS inevitably refers to the need for coordination across these stakeholder groupings, but in such a way as to "... advance the digital skilling agenda, while limiting interference in and independence of initiatives" (p. 22).

The proposed unified digital skills framework (DSFOne) is a useful and practical 'navigation tool' to help facilitate coordination of and collaboration on the digital skilling agenda. The core digital competences provide a common, foundational building block that can be used by the respective ecosystems or multitude of stakeholder groupings to co-create the required sectoral perspectives of digital skills. The framework allows for a shared understanding, and a common or shared starting point for scaffolding advanced and specialised digital skills to incorporate the diverse and specified sectoral digital skills requirements. Its unified, yet 'open', approach allows for expansion to grow with technological advances. Allowing for flexibility and a diversity of perspectives within one shared, unified framework can help ensure a coordinated society-wide perspective and approach towards digital skilling.

Although the DSFOne has been in the making for many years, it is by no means complete. Many researchers and practitioners were consulted during the design process, but much more participation is required to develop the sectoral perspectives for local use. This publication is a step towards the creation of a shared understanding (coordination), but should also be seen as a bold step in terms of inviting participation from the broad spectrum of stakeholders.

Annexures

Annexure A: On digital literacy

Applying a digital skills framework can provide a shared understanding of the 'meaning' of digital literacy by articulating those digital competencies that will facilitate individuals' meaningful inclusion and participation in an increasingly digital society.

A shared digital skills framework can facilitate an agreement in terms of the specific level of digital literacy proficiency (foundational or intermediate) that would suffice for workplace readiness. A particular level of digital literacy competence can be regarded as the entry point to more advanced levels of competencies required within the formal world of work.

Stability in terms of an understanding of digital literacy is a necessary (foundational) building block for the development of the ecosystem of products and services that support digital skills development:

- products, e.g. learning/training materials;
- services, e.g. assessment and self-assessment tools, certification.

The term 'digital skills' can easily lead to a lack of clarity or confusion: skills that are required for ICT practitioners (e.g. programming skills, skills for building apps, or for operationalising and maintaining apps) can easily be regarded as the requirement for all users who simply wish to use the apps as tools. In contrast, skills in the use of computers and digital apps can be regarded by some as sufficient to build and maintain computer systems or to take apps to a further level of development.

At the same time, it is clear that there are various levels of skills use: from the basic or elementary use of digital devices and apps, through more advanced levels to highly specialised levels (e.g. in doing basic searches on an event or a service provider, or performing sophisticated search operations by purposely including some words and excluding others; actions in using digital devices can be either unconnected or highly integrated). It therefore is necessary to distinguish a number of levels of user digital skills. Similarly, the tasks of ICT practitioners can be at a routine level, or can be very complex, as is required for the development of well-functioning and sophisticated forward-facing systems.

Historical development of digital skills framework

Over the past decade, digital devices (primarily mobile phones) have penetrated all areas of society, and digital skills have become essential skills for all citizens. Not everyone needs all user skills at a high level, but some digital skills are required for all citizens. These essential digital skills are regarded as 'digital literacy'.

Two lines of development of digital skills frameworks dominated the international scene over the past decade, namely the Essential Digital Skills Framework (EDS) and DigComp.

The Essential Digital Skills Framework (EDS)

The Basic Digital Skills Framework (BDSF) was created by Go ON UK in 2015, a not-for-profit organisation in the UK. From 2016, the framework was hosted by *doteveryone* (a think tank). Following a few other changes, it became known as the Essential Digital Skills Framework (EDS) in 2018. It is currently hosted on the UK Government Department for Education (DfE) website.[34]

There are five categories of essential digital skills for life and work (see Figure 1):

- Communicating
- Handling information and content
- Transacting
- Problem-solving
- Being safe and legal online

In addition, there is a category of digital foundation skills that underpin the five essential digital skills.

34 UK Department for Education. (2019). *Guidance: Essential digital skills for framework*. https://www.gov.uk/government/publications/essential-digital-skills-framework/essential-digital-skills-framework#introduction

For each of these categories, a distinction is made between life skills and work skills.

The EDS forms the *basis* of the *Essential Digital Skills Report* (sponsored by Lloyds Bank) that has appeared since 2019, with the most recent report covering 2022. The report is based on self-assessment by a representative sample of users in the UK of their ability to perform a range of digital tasks in life situations and in work contexts. In this way, a benchmark of the essential digital skills is developed of the population of the UK above 18 years of age, both for the UK as a whole, and for the various regions.

The EDS also *informs the UK Consumer Digital Index* (also sponsored by Lloyds), the most recent report covering 2022. The Index combines datasets from the Essential Digital Skills Report with consumer data provided by various financial agencies to provide a view of consumer behaviour in the digital age.

DigComp

In 2006, the European Parliament and the Council of the European Commission made recommendations on key competencies required for lifelong learning,[35] and updated these in 2018.[36] The table below provides a comparison of the 2006 and 2018 versions. Note the reference to digital competence as a stable requirement over 12 years; today it is more important than ever.

Figure 1: Five categories of essential digital skills

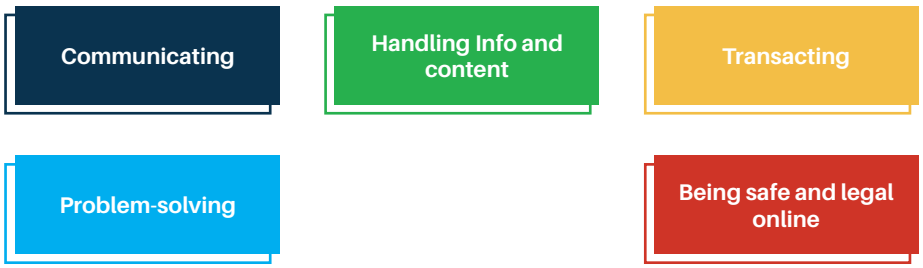


Figure 2: Key competencies for lifelong learning

Key competencies for lifelong learning - 2006 perspective	Key competencies for lifelong learning - updated in 2018
• Communication in the mother tongue	• Literacy competence
• Communication in foreign languages	• Multilingual competence
• Mathematical competence and basic competence in science and technology	• Mathematical competence and competence in science, technology and engineering
• Digital competence	• Digital competence
• Learning to learn	• Personal, social and learning to learn competence
• Social and civic competence	• Citizenship competence
• Sense of initiative and entrepreneurship	• Entrepreneurship competence
• Cultural awareness and expression[37]	• Cultural awareness and expression competence[38]

35 European Union. (2006). *Recommendations of the European Parliament and of the Council of 18 December 2006* on key competences for lifelong learning. https://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF

36 European Union. (2019). *Key competences for lifelong learning.* EU.

37 European Union. (2006). *Recommendations of the European Parliament and of the Council of 18 December 2006* on key competences for lifelong learning. http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF

38 European Union. (2019). *Key competences for lifelong learning.* EU.

Given the technological advances and their consequent influence on society, the focus on digital competencies was intensified. The Joint Research Centre (a research organisation of the EU) initiated work in 2011 towards the development of a digital competence framework, leading to the publication of the first version of DigComp in 2013.[39] This framework consisted of the following:

- Five (5) areas of competence: information, communication, content-creation, safety and problem-solving.
- Twenty-one (21) competencies.
- Three (3) proficiency levels for each competence (foundational, intermediate, advanced).

This study incorporated the insights and outcomes of more than a decade of research. The initial three proficiency levels of skills were broadly aligned with the *Revised Bloom's Taxonomy*, which is widely used in educational circles around the world to indicate the nature of the cognitive activity in the processes of learning, and expressed in a carefully selected choice of verbs, e.g. 'remembering', 'understanding'.

In DigComp 2.1 (published in 2017[40]), the proficiency levels of the DigComp framework were elaborated further, adding a fourth proficiency level, namely 'highly specialised', with further distinctions within each level. This resulted in eight proficiency levels. In accordance with the Revised Bloom's Taxonomy, the proficiency levels were aligned as follows:

- Levels 1 to 4: remembering and understanding;
- Levels 5 and 6: applying and evaluating respectively;
- Levels 7 and 8: creating.

DigComp 2.1 continued using the refined competence areas introduced in DigComp 2.0, based on important developments in the digital scene during the previous years (see Figure 3), namely:

- Information and data literacy
- Communication and collaboration
- Digital content creation
- Safety, and
- Problem-solving.

39 Ferrari, A. (2013) *DIGCOMP: A framework for developing and understanding digital competence in Europe.* JRC Scientific and Policy Reports No. JRC83167. European Commission.

40 Carretero, S., Vuorikari, R., & Punie, Y.(2017) *DigComp 2.1: The digital competence framework for citizens with eight proficiency levels and examples of use.* European Commission.

Figure 3: DigComp areas of competence [41] ***(replicated from report)***

Apart from the clear distinctions regarding the areas of competence and competencies, the distinctions of proficiency levels proved to be one of the major contributions of DigComp, making it clear that the designations 'advanced' and 'highly specialised' are appropriate for higher levels of digital skills. This contribution helped to clarify misconceptions on what is understood by advanced in the overall constellation of digital skills.[42]

In DigComp 2.2, which appeared in early 2022, the fourth dimension of DigComp was elaborated, namely the knowledge, skills and attitudes applicable to the 21 competencies of DigComp. This was done by providing 10 to 15 examples of each competence that highlight contemporary themes. Some of these examples relate to themes such as the way citizens interact with AI, or the awareness of the factors determining the veracity of information found on the internet.

41 Kluzer, S. & Pujol Priego, L. (2018). *DigComp into action – Get inspired, make it happen.* In S. Carretero, Y. Punie, R. Vuorikari, M. Cabrera, & W. O'Keefe, W. (Eds.), JRC Science for Policy Report, EUR 29115 EN. Publications Office of the European Union.

42 Very often, the word advanced' is used only with reference to ICT practitioner skills or to the development of products and services involving the 'emerging technologies'. Reference is often made to an ITU publication (*ITU Digital Skills Toolbox,* 2018), in which the word 'advanced' is used to denote a number of areas relating largely to the "emerging technologies". Other areas are designated as 'basic' and 'intermediate' respectively. The distinction between the three categories seems to be based on perceptions of the complexity of different areas of digital skills, and not on the level of cognitive demand required within the various areas. The distinctions in the ITU document were not in line with the prevalent thinking on levels of learning.

DQ (Digital Quotient)

The DQ framework encompasses much more than the digital skills that are included in the two digital skills frameworks outlined above. It focuses on eight 'critical areas of digital life', each of which can be developed in three dimensions – citizenship, creativity and competitiveness. This results in 24 digital competencies.[43]

By incorporating such a wide variety of areas of digital life, the framework loses many of the finer distinctions that are important for developing digital skills training and assessment. The DQ framework is therefore less useful for the purposes of developing digital skills.

43 DQ Institute. (2021). *What is the DQ framework? Global standards for digital literacy, skills, and readiness.* https://www.dqinstitute.org/global-standards/#contentblock1

Annexure B: DSFOne – 24 Competencies

1. Handling information, data and digital content

1.1 Browsing, searching, filtering data, information and digital content

To articulate information needs, to search for data, information and content in digital environments, to access them and to navigate between them.

To create and update personal search strategies.

1.2 Evaluating data, information and digital content

To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content.

To analyse, interpret and critically evaluate the data, information and digital content.

1.3 Managing data, information and digital content

To organise, store and retrieve data, information and content in digital environments.

To organise and process them in a structured environment.

2. Communication and collaboration

2.1 Interacting through digital technologies

To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.

2.2 Sharing through digital technologies

To share data, information and digital content with others through appropriate digital technologies.

To act as an intermediary, to know about referencing and attribution practices.

2.3 Engaging in citizenship through digital technologies

To participate in society through the use of public and private digital services.

To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.

2.4 Collaborating through digital technologies

To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of data, resources and knowledge.

2.5 Netiquette

To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments.

To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.

2.6 Managing digital identity

To create and manage one or multiple digital identities, to be able to protect one's own reputation, and to deal with the data that one produces through several digital tools, environments and services.

3. Digital content creation

3.1 Developing digital content

To create and edit digital content in different formats, to express oneself through digital means.

3.2 Integrating and re-elaborating digital content

To modify, refine and integrate new information and content into an existing body of knowledge and resources to create new, original and relevant content and knowledge.

3.3 Copyright and licences

To understand how copyright and licences apply to digital information and content.

3.4 'Programming' [for some: coding]

To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or to perform a specific task.

4. Safety, security

4.1 Protecting devices

To protect devices and digital content, and to understand risks and threats in digital environments.

To know about safety and security measures and to have due regard for reliability and privacy.

4.2 Protecting personal data and privacy

To protect personal data and privacy in digital environments.

To understand how to use and share personally identifiable information while being able to protect oneself and others from damages.

To understand that digital services use a 'privacy policy' to inform how personal data is used.

4.3 Protecting health and well-being

To be able to avoid health risks and threats to physical and psychological well-being while using digital technologies.

To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber-bullying).

To be aware of digital technologies for social well-being and social inclusion.

4.4 Protecting the environment

To be aware of the environmental impact of digital technologies and their use.

5. Problem-solving

5.1 Solving technical problems

To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).

5.2 Identifying needs and technological responses

To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve them.

To adjust and customise digital environments to personal needs (e.g. accessibility).

5.3 Creatively using digital technologies

To use digital tools and technologies to create knowledge and to innovate processes and products.

To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.

5.4 Identifying digital competence needs

To understand where one's own digital competence needs to be improved or updated.

To be able to support others with the development of their digital competence development.

To seek opportunities for self-development and to keep up to date with the digital evolution.

6. Transacting

6.1 Setting up online accounts (public or private services)

To set up accounts at financial institutions (physical presence in bank sometimes required), or in order to get access to public services, or to private services of various kinds (e.g. access to a news site that requires payment, to music streaming services, to social media services). [See also 6.2 and 6.3.]

6.2 Managing money and transactions online

To manage an account at a financial institution online (for making payments [see 6.3]); to transfer money between accounts; to check activity on accounts; to identify dangers relating to bank accounts and digital money transfers, and to take appropriate action or knowing when to seek advice).

To do online transactions of various kinds (commercial transactions [see 6.3]; payment for public or private services).

6.3 Ordering items or services online and making payments

To order items from online traders, or to get access to online services, sometimes requiring you to set up an online account first [see 6.1].

To understand which modes of online payments are most appropriate and safe for your context (work or business), and to be able to make payments in such a way that security of personal information and banking information is not compromised [see 4.1].

(For competence areas 1 to 5, the descriptors of the competences in the most recent version of DigComp were used. See Vuorikari, R., Kluzer, S. & Punie, Y. (2022). *DigComp 2.2: The Digital Competence Framework for Citizens*, EUR 31006 EN. Publications Office of the European Union. ISBN 978-92-76-48882-8, doi:10.2760/115376, JRC128415.

For competence area 6, descriptors were developed for the DSFOne, taking into account the 'mobile first' and 'mobile only' context of South Africa.)

Annexure C: DSFOne sub-framework on emerging technologies (DSFA)

The sub-framework for the emerging technologies (DSFA) was introduced in Chapter 6. These link to the advanced digital skills levels across all three top stacks (or ecosystems) of the unified digital skills framework, DSFOne.

As indicated, instead of identifying the digital skills involved by name, most discussions on the emerging technologies simply list the emerging technologies. The unspoken understanding therefore often is, that the skills involved in developing applications that make use of the emerging technologies are advanced levels of skills that are found only in the ICT practitioner skills space. The emerging technologies indeed bring new possibilities to developers, and they should have a good understanding of the positive potential of these technologies, but also of their potential negative effects, or even dangers.

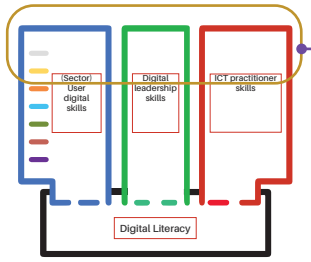
Often, the emerging technologies are simply listed, with the result that the reader/user can easily lose the sense of how some of these 'technologies' actually belong together in groups that often share the same core or underlying digital technologies and configurations (e.g. the various artificial intelligence bases underlying so many applications today), yet leading to applications in different areas.

The advantages of the DSFA sub-framework are, amongst others, that it–

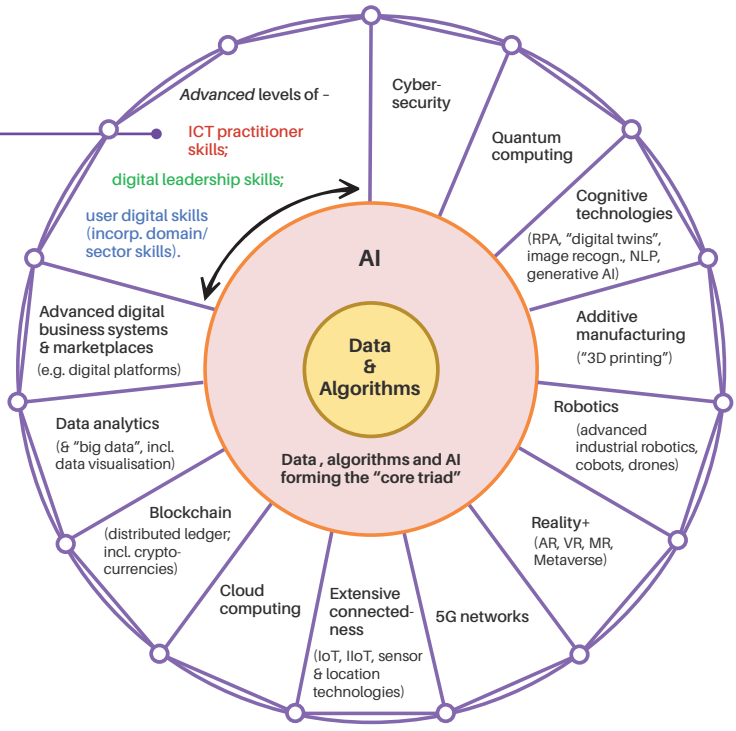
- indicates the *groups* of emerging technologies by a single word or combination of words (e.g. robotics, different from cyber-security, and different from blockchain); and
- indicates the essential *linking* of the emerging technologies on the side of the ICT practitioners to the advanced levels of user skills (also as they relate to different sectors) and ICT leadership skills.

The *populated version* of the DSFA *sub-framework* provides sufficient graphical space to list most of the emerging technologies under each of the words or designations in the top line, while at the same time indicating that some of the emerging technologies are separate strands in the emerging technology space and cannot be subsumed under other top-line headings. However, in most applications these emerging technologies are used *in combination* with others, and by *linking* them with user skills and digital leadership skills. In this way, sophisticated, powerful and cutting-edge digital environments are created that are in line with the needs and implementation scope of users/businesses, and that are accepted and embraced in business and society through the practise of digital leadership skills.

The populated version of the DSFA sub-framework of DSFOne is shown below.



Digital Skills Framework One (DSFOne)



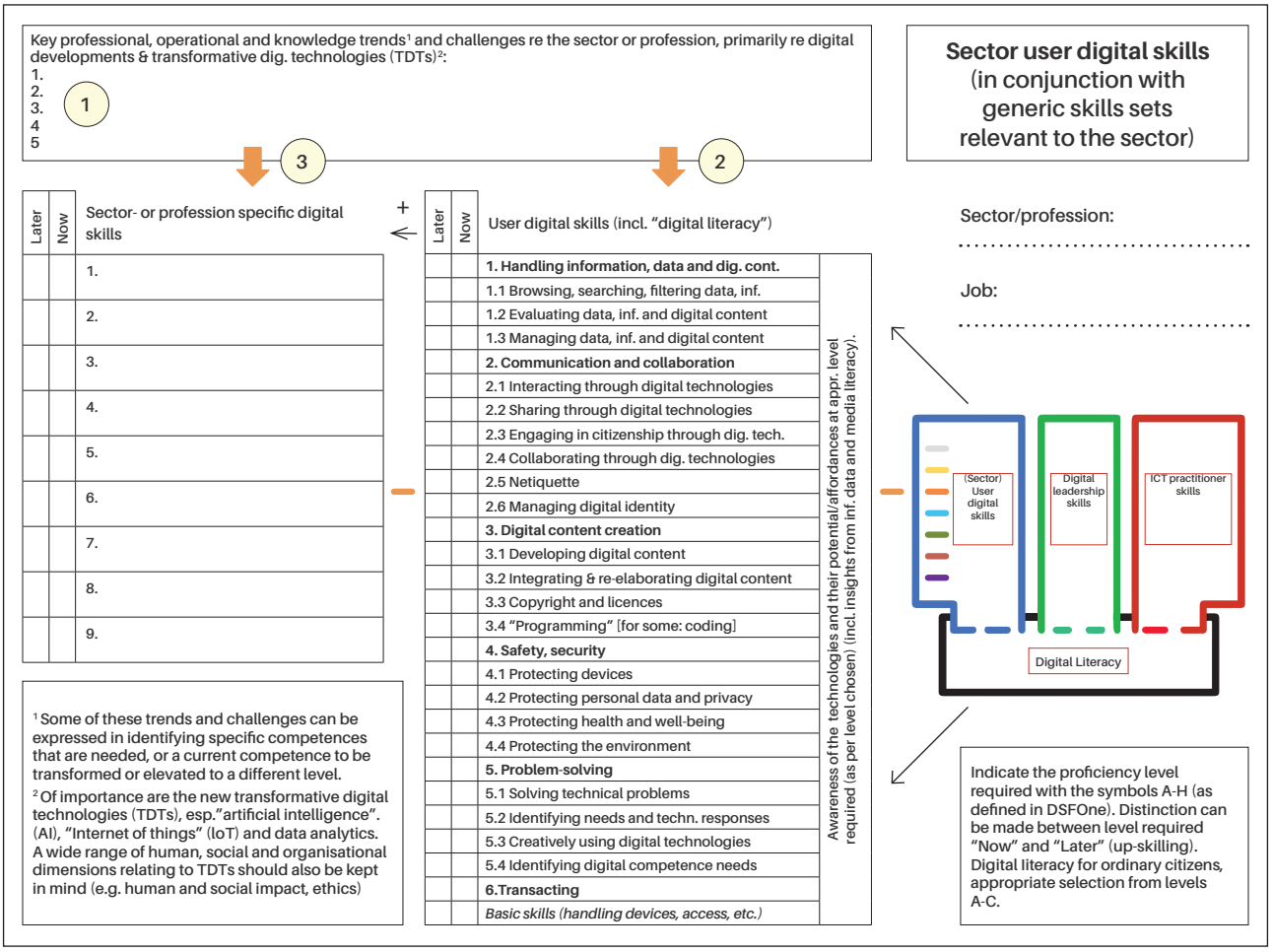
DFSA: Advanced, emergent sub-framework of DSFOne ("A" for "Advanced")

Annexure D: Process for determining the skills sets for a sector or job

DSFOne, with its structured layout and a stack of proficiency levels - from digital literacy at the bottom to highly advanced digital skills - can be used to determine the skills sets required for a profession, a sector or a job in a particular sector.

In the largely self-explanatory diagram below, note should be taken of the following:

- The orange bar that appears within the DSFOne diagram and repeats to the left, can be regarded as a specific sector (e.g. agriculture, education).
- The general understanding is that all citizens should have the skills listed in the six areas of competence and the 24 competencies. (In the diagram below, competence area 6 ['Transacting'] is represented on one line.)
- The skills levels on the six competences for all citizens should ideally be at proficiency level C, but in some cases citizens might only have those competences at level A or B. (There are eight levels of competence, from level A at the bottom to level H at the top.)
- For the specific sector (or job or profession), higher levels than level C might be required, e.g. at the 'advanced' level F.
- Next to the list of competencies are two columns that users can designate as best suiting their exercise of determining digital skills sets, e.g.
  - At which digital skills level should training be taking place now? And what can be trained later? (Indicate the levels by A to H.)
  - At which level are the current staff members proficient? And where do you want them to be two years from now?
- The process should only start once the top part of the diagram (yellow circle 1) has been concluded, based ideally based on insights from people who are well-informed on skills in the particular domain ***and*** on digital skills, and who have forward-looking views on the position of the sector/profession in the digital economy. Insight into the key professional, operational and knowledge trends in the sector, and phrasing those in the context of the specific sector/ business, are crucial for moving on to the other segments on the diagram.



    - Design-thinking approaches could be a good way to generate insights and to unlock enthusiasm.
- Once the top part is completed, move to the next segment (yellow circle 2), as set out above. An understanding of the key trends will help to identify the proficiency levels required in the 24 digital competencies. Most of these competencies are at a generic level. They might acquire much more of sector/business flavour and the domain might become more visible at the higher proficiency levels.
- Then the digital skills planner can move to the final segment (yellow circle 3), where the sector- or domain-specific skills can be identified (or specified) by name, feeding on the trends identified in the top part of the diagram.
- Ideally, the digital skills planner should follow an iterative process, moving between the table with the 24 competencies and the segment in which the sector- or profession-specific skills are indicated, until a list of digital skills is developed that fits the need of a sector, profession or job.

Annexure E: Digital skills competency mapping in the Global Business Services sector

BPESA is the recognised trade association and industry body for Global Business Services (GBS) in South Africa. BPESA's mandate is to market South Africa as a top offshore location for outsourced services, stimulate local job creation and economic growth, and to support the sector with skills development for a suitable talent pipeline.

Why is digital skills competence mapping a priority for the GBS sector?

Digital transformation has affected almost all sectors and industries across the South African economy. Digital skills are a critical success factor for the sector's ability to transform, scale and remain competitive, particularly across international markets. According to Harambee Youth Employment Accelerator, we lose about R8.5 billion in export revenue due to a lack of suitably skilled talent to service the local demand for Digital and ICT jobs. This places considerable focus on the development of the local digital talent stack, as there is a big opportunity to reshore digital jobs to South Africa, over and above the broader focus on supporting the digital transformation of the sector.

The challenge for South Africa, and specifically the GBS sector, is that our targeted local talent pool is predominantly comprised of disadvantaged and marginalised South Africans with poor educational backgrounds and lower levels of highest educational attainment (HEA). This creates an impact on traditional sourcing and recruitment methods that rely on traditional indicators for aptitude, potential and role fit, which does not support inclusive hiring methods – which are at the heart of the sector's growth strategy.

Compounding this challenge is the fast pace at which the digital economy has shaped skills development and credentialling, thereby influencing businesses' articulation of digital skills requirements and consequently market signals for talent.

By aligning with an adopted competence framework for digital skills for digital jobs and digitally enabled jobs, we will create a common language, supporting a greater synchronisation between demand and supply in our sector.

What is the future vision for BPESA and the Future Skills platform?

BPESA mobilised a Learning Experience Platform powered by EdCast Cornerstone in May 2022. The platform is a shared sector resource and a key supply-side enabler with a focus on digital skills for entry-level talent through to senior and executive talent. At the heart of its value proposition is a rich and quality content marketplace supported by bespoke expert-curated content and machine-curated content to support demand-driven learning experiences for a plethora of learning requirements.

The vision for Future Skills is to support the sector's growth targets for 2030 by enabling half a million South Africans with access to online skilling to support their careers. Considerable focus is being placed on creating sector-endorsed and recognised training for in-demand roles in which competence is demonstrable and there is a strong fit between skills and job opportunities. Future Skills will aim to align sector-identified priority digital roles (digital and digitally enabled jobs) with the DSFOne to enhance the credibility of Future Skills-acquired credentials that will drive relevance for the incumbent workforce and employability for disadvantaged South Africans.

How will Future Skills get started with the incorporation of the Digital Skills One Framework?

In 2023, the Future Skills team will be developing a sector-focused digital work readiness programme with the intention to accredit it and offer it as a formal qualification to all job seekers using Future Skills to support their journeys to employment. The work readiness programme is not only being developed to align with the DSFOne framework, but to put a focus on fundamental digital skills that are required for the increasingly digitalised economy and that are transferable to support fluidity in the rapidly changing job market.

Digital skilling is pervasive in the sector and recognised as a building block and foundation for all roles within the rapidly growing and transforming sector.

Practical examples of current programmes

- Digital Work Readiness Programme
- Digital Future of Work Ambassadors

- Digital Skills Development across organisational levels in the sector
- 4IR skills embedded in financial services skills programmes in the outsourcing or captive customer service centres or divisions
- Digital leadership and transformation learning journeys

The BPO sector hence includes the DSFOne-style competence level development across roles - from pre-entry work readiness candidates and throughout the organisation.

Sector collaboration for digital transformation and related skills development.

The GBS/ BPO sector has a highly collaborative nature when it comes to skilling the current and future talent pipeline. Representative sector bodies, like BPESA, Cape BPO and related advisory bodies, are led by sector thought leaders. They have worked extensively on the digital future of the sector and the skills necessary to support its ongoing growth.

Current sector digital transformation research is under way and aligned with the research, and traditional role profiles are being reviewed for new skills needed to perform in a range of roles - from agent to executive - in the sector or related sectors.

There is recognition that digital skills are transferable skills, yet they often take on a unique application in the GBS/BPO environment.

Future Skills development is being geared to meet these role competencies. The sector recognises the importance of embedding a strong foundation of digital skills from a schooling level and are engaging heavily with education and economic development department stakeholders to embed digital job readiness at various stages within the education process. In addition, Impact Sourcing, a well-applied strategy in this sector, and Work Readiness programmes, are, as above, being aligned with the Digital Skills Frameworks, both our own DSFOne and broader global frameworks where relevant.

Globally recognised micro-certification, high-impact learning content and tool partnerships, and access to aligned digital skills are key pillars in the sector transformation strategy.

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Annexure F: DSFOne Input and implementation recommendations

Stakeholder	Discussion points and feedback
Western Cape Skills Forum	• The Skills Forum has been involved in the co-design and validation of the initial development of the DSFOne (prior to the BHC-funded project). The ***Skills Boost*** research project (2018/2019), aimed at (1) determining digital skills requirements for six sectors in view of a (2) shared agenda for digital skills development, utilised the DSFOne as foundational building block. • Refer to the summary report: https://www.westerncape.gov.za/sites/www.westerncape.gov.za/files/skills_boost_western_cape_-_summary_report.pdf • However, the recommendations focus mostly on the ICT practitioner space, and recommendations for sector-specific action require further development.
Collective X	Collective X incorporates the Digital Work Accelerator and TechXit. • This industry-led initiative recognises the ability of the DSFOne to assist in facilitating collaboration within the ICT ecosystem and to provide the basic architecture for digital competence identification and digital skills development processes within the sector. • The intention of Collective X is to use the DSFOne as the architecture for the digital skills platform. • Collective X focuses on the ICT practitioner ecosystem. Working from the core foundational digital competencies, as discussed in the DSFOne, the initiative identified pathways from digital literacy towards ICT practitioner skills for specialisation in high-demand roles, applying the principles of the SFIA framework.
BPO sector (BPeSA & Cape BPO)	• The project team engaged in several discussions with the national and WC provincial association of the BPO sector, namely BPeSA and CapeBPO. • Very positive response: moving towards the application of the DSFOne to guide the Human Capital team in the specification of advanced sector-specific digital skills for the various roles within the sector. • See Annexure E for the principles and approach applied within the sector in terms of the application of the DSFOne. • The project team was requested to participate in the sector-specific framework design and share lessons learned and successful approaches with the broader ecosystem.
DHET: Social Inclusion and Quality & Open Learning	In discussion with the Social Inclusion and Equity and Open Learning units within the DHET, the Chief Director and Director expressed their support for the framework. The following points were highlighted as key contributions of the DSFOne: • Differentiation between four ecosystems and the focus on digital leadership in particular • Differentiation between eight proficiency levels • Technology agnostic • Fairly easily integrable into existing competence framework of career development practitioners • It caters for organic growth and flexibility • The focus on digital leadership skills as a separate ecosystem is regarded as a key contribution In terms of the implementation process, the following points were highlighted: • The need for a change management process to guide the implementation process, inclusive of material (e.g. brochures) to market the framework. • The need to include SETAs in the discussion and implementation process. (Please refer to the minutes for a more nuanced perspective.)

Stakeholder	Discussion points and feedback
Support organisations for small and medium-size companies	A morning workshop was conducted by Viridian with SOs (support organisations) for small and medium-size businesses. (Refer to the detailed report.) Following a user-design process, SOs listed the typical digital skills requirements to be successful as SMEs. This demonstrated significant alignment with the DSFOne. Interestingly enough, the workshop process ventured into a discussion of the need to develop an SME-specific digital skills framework. Under the leadership of Viridian, this group has scheduled a follow-up workshop to initiate such a collective initiative. The project team requested to support and participate in the process.
Department of Basic Education	The project team engaged in a face-to-face workshop with six representatives of the Directorate for Curriculum Research and Development. The following key points arose from the discussion: • The DBE Professional Development Framework should be regarded as a typical sector-specific digital skills framework. • Adapting/integrating the DSFOne into the DBE Professional Development Framework is fairly easy, as the DSFOne will mostly be used as a guide for the DBE framework. In terms of the implementation process, the following comments were made: • DSFOne provides a clear way forward for refining teacher-specific digital skills. • Competence areas in the DBE framework should be identified that may align with the DSFOne. If no areas are aligned, it will be necessary to determine which areas of the DSFOne can be adapted in the DBE Framework. • Communication will be important to drive awareness of the DSFOne and teacher-related digital skills. • Investment in a change management programme is essential to support the integration of the DBE and DSFOne frameworks within the education sector. It is important to change the mindsets of people. • On completion of the consultation and validation process, the DBE must post on the Continuing Professional Teacher Development (CPTD) platform to inform teachers of the DSFOne and its alignment with the DBE framework. • Digital integration across the curriculum must be discussed, along with a guideline to assist teachers with integration. It will also be necessary to identify what other subjects need to be introduced into the curriculum (over and above coding and robotics). • Guidelines need to be developed to assist teachers in terms of 'how to teach using digital tools'. • The project team (NEMISA and UWC) to design pamphlets and/or posters to create awareness; these can be shared/communicated by the DBE. The Directorate expressed its support for the adoption and integration of the DSFOne into the sector-specific profile. However, it is clear that some form of national endorsement or ratification is required to allow them to kick-start the process within the DBE. Please refer to the minutes of the meeting for a more nuanced perspective.

Stakeholder	Discussion points and feedback
QCTO	The project team had an online meeting with the Director in the Office of the CEO, followed by a workshop with representatives of the QCTO, inclusive of the CEO. The following points were discussed: • Generally speaking, the QCTO expressed interest in the DSFOne and commented on the relevance of the framework for its work, as well as that of all TVET colleges. • The alignment between digital competence proficiency levels and educational levels helps clarify the focus of QCTO and TVET colleges regarding their role in terms of digital skills development. In terms of the implementation process, the following comments were made: • Digital competencies as defined in the DSFOne (digital literacy) can potentially be integrated into all new training programmes and can be specified as a standard to guide all new course development. The DSFOne clarifies what 'digital skills' are, as well as the necessary proficiency levels relevant for the sector. • Digital competencies should typically be integrated within the education of all training facilitators in TVET colleges. This will facilitate the adoption and scaling of digital skills. • QCTO adoption and public support of the DSFOne are, however, dependent on some form of national endorsement or ratification that includes the SETAs. The QCTO collaborates closely with the SETAs (MICTSETA in particular), and their buy-in and support are essential.
IDCC workshop	The DSFOne project has been adopted as one of the IDCC initiatives. This means that the team reports to this meeting on its progress on a monthly basis. The IDCC provides access to its network and assists in raising awareness of the framework for buy-in towards implementation. The IDCC scheduled a special consultation workshop with its members to obtain input on the DSFOne framework and process. This workshop focused on the six core competences (digital skills), clarification of the four ecosystems, the relationship between the SFIA framework and the DSFOne, as well as the digital skills 'specification' role that is required within sectors to develop sector-specific digital skills frameworks or profiles. The following points transpired in the discussion: • The digital skills framework is one of the dimensions of the much broader context of digital society or digital life. The DSFOne is concerned predominantly with digital skills and does not aim to address the digital society. • The DSFOne process should consider the importance of ethics, critical thinking, privacy and power relations, and how these elements will be addressed within the framework. • Acceptance of the framework does not necessarily mean 'uncritical' adoption. It is stated clearly that further development is needed that will require the collaboration and participation of multiple stakeholders. • DSFOne can assist SETAs in defining digital skills for their sectors. According to the W&R SETA, this is a typical difficulty currently experienced. • The BPO sector application of the DSFOne is a good 'use case' that can guide profile development in other sectors. • IDCC participants requested the continuation of the DSFOne consultation process, as well as assistance in terms of its application in the various sectors. Please refer to the minutes of the session for a more nuanced perspective.

Stakeholder	Discussion points and feedback
NEMISA Round table discussion	At the NEMISA Colloquium of February 2023, a round table conversation was hosted to obtain stakeholders' perspectives on the potential value of the DSFOne for their particular contexts, and suggestions to guide the process of implementation. Participants included Mr. M. Mashologu (DDG:DCDT), Mr. J. April (QCTO), Mr. A. Searle (Director: Paladin Consulting; Collective X stakeholder) and Prof. D. Collier (Dept. of Mercantile and Labour Law, UWC). The session was facilitated by Mr. T. Rammitlwa (NEMISA). Interesting perspectives that were raised during this discussion, included the following: • The NDFSS provides empowerment for effective participation of stakeholders for digital and future skills development and provides a roadmap for priority digital skills action points and stakeholder collaboration. • The NDFSS (goals and outcomes) supports the development and implementation of reskilling plans. • The DSFOne provides a systematised and structured approach for digital skills development and can be used as a planning tool in multiple contexts. It is a useful tool to enable the implementation of the NDFSS. • In the world of work the DSFOne can be used to scaffold skills development and reskilling conversations on national, sectoral and enterprise or organisational level. • Technological disruptions lead to negotiation (social dialogue) processes between employers and employees (national, sectoral and enterprise level) and require a plan for reskilling based on a sectoral digital skills framework in the context of restructuring, retrenchments and just transitions. The DSFOne provides a definition of digital skills (clarifies what it is) and guides sectoral digital skills frameworks. • See below the detailed input of the Collective X on the value of the DSFOne, its benefits and application within the sector and recommendations for implementation. • The perspectives of the QCTO are captured elsewhere in this table.
SETA Forum	The IDCC facilitated the participation of the project team in the SETA forum of 7 March 2023. The forum was hosted by the DG of the Department of Higher Education, Science and Innovation and attended by almost all of the DDGs, CEOs (or representatives) of the SETAs, QCTO, National Skills Authority and the National Skills Fund. There was limited time for engagement after the formal presentation, but two important points were raised, namely: • The need for the SETAs and the National Skills Authority to participate in the process going forward, and • The need for engagement in a more formal manner with the DG of the Department of Higher Education, Science and Innovation.

Contribution of the Collective X in terms of the application of the DSFOne

Scaling Digital Skills for Multidisciplinary Impact

NEMISA 2023 – Digital Skills Colloquium

Why do we need a digital skills framework?

- The demand for digital skills starts in the schooling environment and continues throughout a person's life stages
- This demand includes the basic skills to enable people to use the digital tools required for everyday life and work; and extends to the skills required by ICT practitioners, including the skills needed to innovate, develop and support transforming technologies (4IR tech); they are driven by the multiple sectors in the economy in which we work and the extent to which that work requires digital enablement
- In the context of the Collective X (which is the consolidation of the Digital Work Accelerator (DWA) and TechXit Collective initiatives – a public-private partnership driven by industry to unlock earning opportunities at scale in the digital economy), the objective of our collective action is to scale the throughput of the digital skills supply chain by 10X – at the right quality and cost (to address current shortfalls, to enable work to be repatriated, and ultimately to export digital and ICT services)
- This collaboration involves many role players in the ecosystem, including schools, private sector training service providers, corporate training departments and academies, TVET colleges, universities, non-profit skills academies, and others, who must all produce skills that meet the requirements of the jobs in demand (in the public or private sector) – with multiple handovers taking place along this learning journey

To ensure that the outputs of this skills supply chain meet the ever-evolving needs of the working world, it is crucial that:

- We have a common language for understanding the skills requirements of the different roles and competence levels
- We can design learning pathways and journeys to meet these requirements – linking up the competence levels seamlessly – across stages in the skills value chain
- We can develop work readiness programmes to include digital literacy and digital user skills as a core component to equip all work seekers to function in a digitally enabled world of work
- We have the means to assess people's competencies using a standard and proven framework throughout the skills development process – with a high level of assurance for employers regarding the quality of the assessment outcome
- We can identify what skills a person has, using a generally accepted naming convention, viz. 'tagging'; we should be able to call the same skill by the same name
- We can create content architectures in companies/entities and on learning platforms that are aligned with a single, generally accepted skills framework
- We therefore take a framework approach that caters for the spectrum of digital skills and digital initiatives in the DCDT Digital and Future Skills Strategy – so that each stakeholder group can then focus on specific aspects within that framework that are most relevant to it, while remaining 'connected' and 'aligned' with what others are doing
- We can build greater insights into digital skills in the country by drawing on inputs from multiple sectors and entity types – but we need a single, accepted framework for this to work
- We align with a framework that has international relevance and credibility, that is supported locally, that allows for flexibility and adaption – people move from job to job, country to country, and the skills tags and quality should be generally recognised and accepted
- We are all aligned (business, government, social partners, citizens)

The Digital Skills Framework One offers this, as it expands on the DigComp framework for user digital skills by adding transact competencies and incorporating the SFIA (Skills Framework for the Information Age), as introduced by the Collective X.

How would you implement this framework?

- Engage with IDCC – including the DHET (QCTO), DCDT, DTIC and DoEL to support it – as it is supportive of the Digital and Future Skills Strategy and could enable the country to align multiple approaches to skills development with one digital skills framework

- Build awareness of the DSFOne framework and the benefits of using it – working through intermediaries and other suitable channels
- The BPESA FS platform must be aligned with the Competence Framework
- Introduce its use in third party-funded skills programmes
- Encourage those already using it to advocate its benefits across the skills supply chain
- Use it to build insights into what the current digital skills inventory is and to encourage those not using it to align with it
- Recognise skills badging linked to competencies of the framework and incentivise its adoption
- Eventually incorporate the framework on a country level to drive the digital skills strategy

Annexure G: ICT practitioner digital skills framework

Competency Framework for Digital / ICT Skills

The Collective X

THE COLLECTIVE

The Collective X is a national initiative developed to enable the South African digital skills supply chain to deliver the right digital skills (competency level & quality) at the right time (demand informed & work ready), at the right price (economically sustainable & globally competitive) through a coordinated ecosystem approach.

In order to coordinate and enable effective implementation, The Collective X has established a Not-for-Profit legal entity to support successful implementation. This private sector-led initiative will activate and coordinate the digital skills ecosystem and influence the systemic solutions required to achieve national digital skills development goals

Vision

To unlock the digital potential of South Africa's youth and to thereby create economic opportunities for all.

Mission

To harness the power of Collective action and resources to accelerate and scale up a pipeline of relevant digital skills in South Africa.

The Collective X Value Proposition

Ecosystem Approach

- A single national initiative
- Ecosystem collaboration & collective action
- Cross-sectoral participation
- Both public and private sector enabling successful delivery

Life Cycle Approach

- Orchestrate across supply and demand value chains
- Build a sustainable skills pipeline across all layers of the value chain, from school, through the Post School Education and Training (PSET) system, successfully transitioning into income earning opportunities / gainful, sustained employment

Acceleration and Scale

- Coordinated and concentrated effort to drive acceleration and scale of ICT / digital skills delivery
- Unblock systemic barriers and bottlenecks in the ecosystem
- Scale delivery for the good of the economy and not simply to meet individual demand
- Ecosystem commit to 10X goal – 10X current efforts over 10 years

Priority Skills

- Focused effort on most in demand ICT / digital skills

World Class Quality Standards (SFIA Competency Framework)

- National competency framework for most in demand digital roles
- National assessments aligned to the competency framework for most in demand digital skills

Work Ready Talent Pipeline

- Build consistent and sustainable pipeline from level 1 to level 3
- Scale Apprenticeship models

Efficient Funding Mechanisms

- Reduce costs of developing ICT / digital skills
- Reduce costs and increase speed of hiring
- Create economies of scale
- Re-direct ICT / digital skills spend into most in demand digital roles
- Additional funding for innovative solutioning
- Identify incentives to shift status quo and drive accelerated transformation

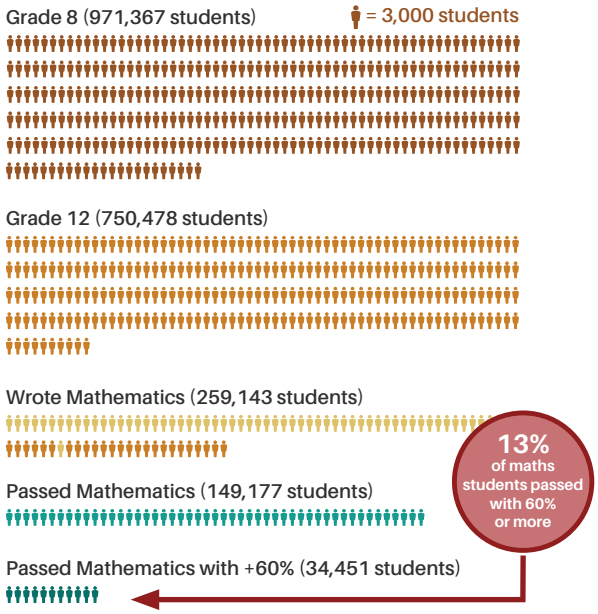
The South African Landscape

South Africa's educational system is not producing the number of STEM skills at the level, quantity and proficiency required to meet the increasing demand for engineering, computer science and other tertiary education graduates.

In 2021, 750,478 learners enrolled in matric, but only 35% of them wrote the final maths exam. 20% of the grade 12s passed, but only 5% passed with 60% or more. That means 5 out of every 100 Grade 12s obtained a "good enough" maths mark to do a Bachelor of Science degree at university. Gatticchi, G., (2021) "More students need to do maths and science if SA wants to be part of the fourth industrial revolution", *The Outlier*. (https://www.theoutlier.co.za/education/2021-07-20/81049-/more-students-need-to-do-maths-and-science-if-we-want-to-be-part-of-the-fourth-industrial-revolution)

Figure 1: Visual Representation - Maths

3.5% of students in grade 8 in 2017 passed matric maths with 60% or above in 2021



Source: The Outlier. 2021

Without the appropriate pipeline of digital skills and competencies, starting at a school level, new ICT/digital skills entrant numbers will remain low and South Africa will not be able to meet current and future demand. This will result in unrealised youth employment opportunities and accelerated offshoring of work, contributing to a bleak economic future for South Africa and its people.

The need for a consistent, reliable competency framework

The large-scale adoption of new technologies during past 'Industrial Revolutions' has always reflected changes in labour market demand and have required a significant realignment of South Africa's skills base. This time however it is different. Digital transformation has permeated every aspect of society and has impacted most jobs in virtually every workplace. Not only has it been all-pervasive but the rate of change has been different with a velocity and breadth never before experienced.

The first step in establishing an equilibrium between the supply and demand for digital / STEM skills is to create some form of consistency of understanding to underpin exactly which skills are in demand and what competency should underpin the application of a skill. Doing so provides a common language and consistent framework for educators, trainers, employees and employers to base their decisions and actions. This consistency is ensured by the establishment of competency standards. Competency standards describe the skills required to do a job effectively.

On the demand side, competency standards assist hiring managers to develop effective job descriptions as they provide an accurate picture of what is required to perform a job at a granular level. Competency models are critical elements within talent management frameworks and are used by employers and their human resource practitioners in areas such as recruitment, training / skills development, career development as well as succession planning.

On the supply side, competency frameworks provide direction to educators with regard to the development of their curricula. Once skills requirements are clear and there is consensus on them at an industry or employer level, educators can focus on developing creative pedagogical approaches and methodologies to develop these skills.

Whilst a competency framework provides a comprehensive, consistent language or framework for the acquisition of skills, it must be remembered that the combination of the changing nature of jobs in today's world, the evolving skills landscape, and the focus on building 'composite' capabilities have all resulted in the transformation of career pathways in the digital age.

A **competency framework** therefore needs to be flexible and pragmatic enough to accommodate a conceptual transition in the description of career progressions from 'career ladders' to a **'career lattice'** of multiple entry points, career paths, progressive competencies and multiple end points in terms of potential positions that may be attained. A ***career lattice*** acknowledges that there are multiple paths to advance a learner's career. It provides the opportunity and flexibility to switch job roles entirely and make cross-functional movements to different roles that are not necessarily at a level higher or even in the same domain. The use of a 'career lattice' acknowledges the reality of non-linear non-traditional career movements.

The DFSOne & ICT Practitioner Skills (SFIA Competency Framework)

Digital skills competency levels may be divided into four distinct groups;

1. Digital literacy as a basic life skill. These are skills required by the majority of citizens to navigate the requirements of their digitally-enriched lives. At an employment level it talks to all employees,

irrespective of their level within an organization, and is critical to operating an organisation's basic systems and applications. This requirement has created a new form of literacy called digital literacy. Digital literacy may be defined as 'the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process.' These are the foundational skills that all children should learn and all adults should be able to acquire through primary and tertiary education. (Digital Work Research, 2018)

2. Digital practitioner skills. These are the skills required for researching, designing, managing, producing, consulting marketing, selling, integrating, installing, administering, maintaining and supporting ICT / digital systems. These are functional skills which would normally require both tertiary and higher education level focus through universities of technology. They may also be provided by other education providers or technology certification providers (MCSE) or acquired at the workplace through company specific skills training based on the employer's own systems or technologies employed, such as robotic and automation programming.
3. Digital related skills for specific sectors. These are both the specific and generic skills required to work in a particular industry such as financial services, health, education, security etc. These are usually developed by industry specific service providers and institutions.
4. Digital leadership skills. These are the skills required to exploit the opportunities offered by the digital world which may include optimizing efficiency and effectiveness, disrupting business models or establishing new business organisations such as platforms. These skills are usually developed at higher education institutions such as colleges, universities and business schools.

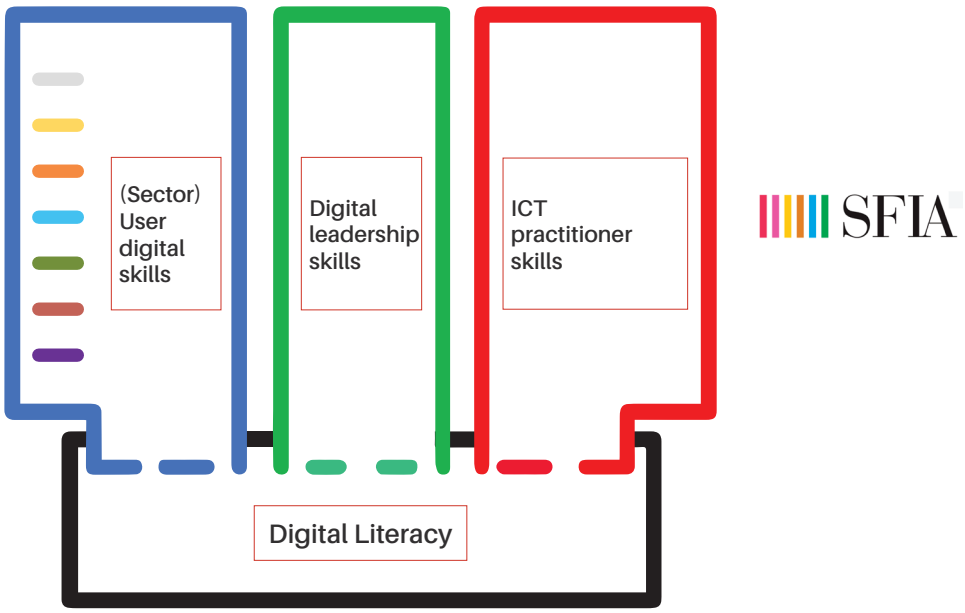
The DFSOne digital skills framework has been developed to facilitate a shared understanding of these groups.

Within each group, users can grow from basic use of the relevant digital skills to a more advanced or even sophisticated use of the various skills, for example ICT practitioner skills.

The SFIA Competency Framework (ICT practitioner skills)

The SFIA Foundation is a global, not-for-profit organisation which oversees the development and use of the SFIA Competency Framework. SFIA was first published in 2000, created by a consortium of many organizations, spearheaded by the British

Figure 2: Digital skills within DSFOne



Source: DSFOne

Computer Society (BCS). Since its first publication, the SFIA Competency Framework has been regularly refreshed and updated every 3 years to reflect the evolving needs of international industry and business.

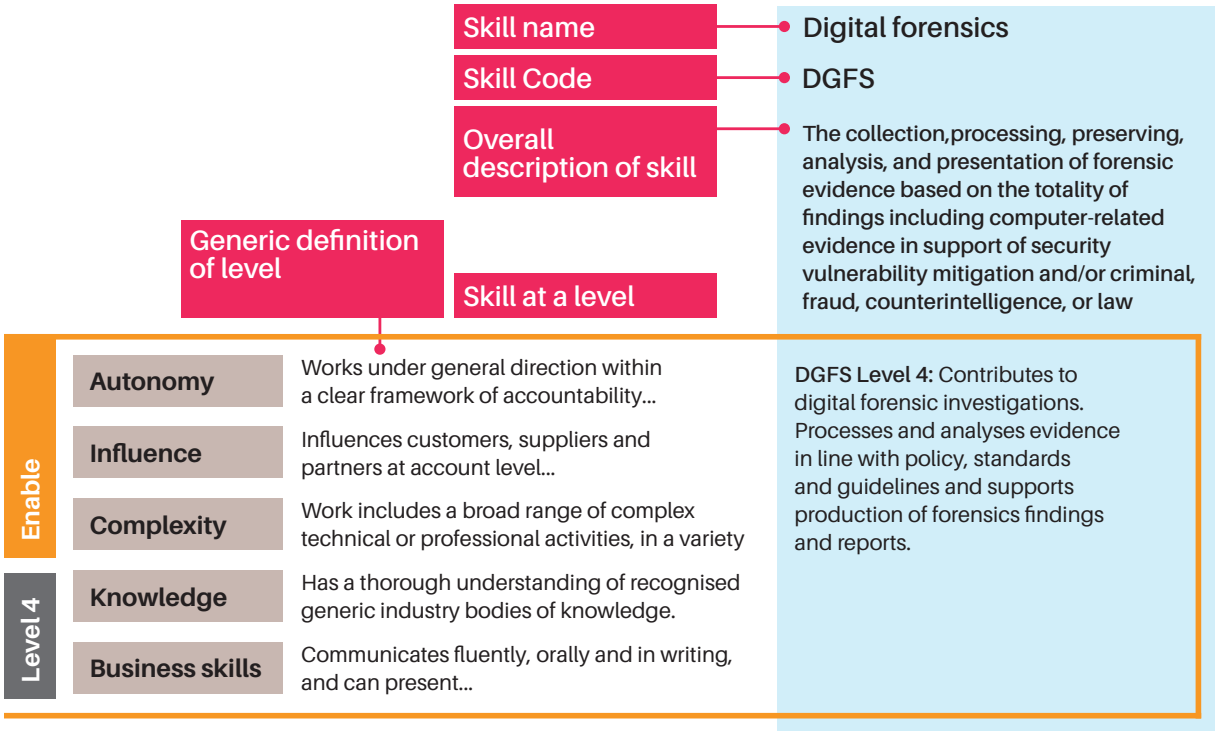
The SFIA Competency Framework is a world-wide industry standard for defining the skills of ICT professionals. The wide acceptance of the framework makes it ideal for assessment purposes due to the consistent definition of the skills in whichever country, region, or organisation within which it is deployed.

The SFIA Competency Framework provides detailed descriptions for more than 102 professional skills. Each professional skill comes with a description and guidance notes reflecting the skill at each relevant level of responsibility. The consistency of the levels of responsibility carries forward into the progression of the skills. The generic responsibilities describe **five important attributes of responsibility - autonomy, influence, complexity, knowledge and business skills.**

Figure 3: Visual representation – Skills, levels of responsibility and attributes

Source: SFIA

Figure 4: Visual representation: Digital Forensics - Skill, level of responsibility and attributes



Source: SFIA

The SFIA Competency Framework **doesn't define roles or jobs** – it has always provided a framework of flexible 'building blocks' of skill descriptions at various levels of competency. SFIA skills that used to be found in people who would identify themselves as 'ICT professionals' are now more distributed throughout organisations. Organisations are supplementing traditional formal structures with flexible pools of resources that can be included in short-term and agile teams for specific projects or activities.

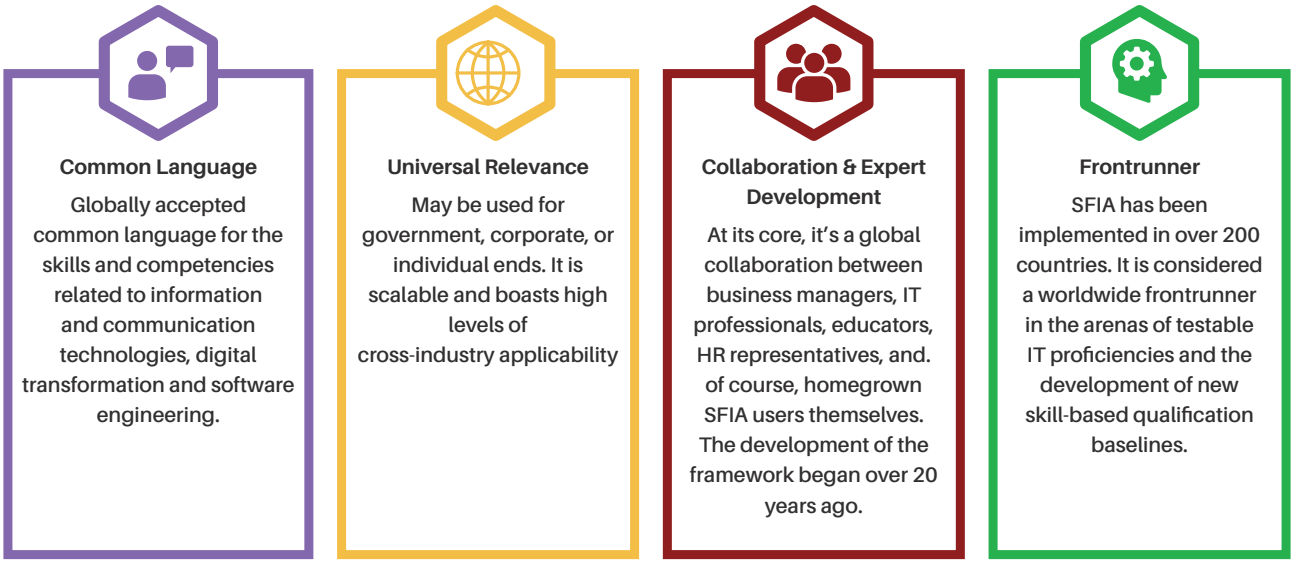
The use of the SFIA Competency Framework to assess the skills required helps to provide a clear picture that answers the often otherwise unanswered question of 'what skills do you have?' By using the SFIA Competency Framework to answer the next question, 'what skills do you need?' it provides the two essential elements needed to create a plan for closing any identified skills gaps.

The Collective X SFIA Competency Framework

The Collective X SFIA Competence Framework is an adaption of the SFIA Competency Framework and introduces an additional level to describe a basic digital literacy competency expected to be achieved within the School Phase. A gap in competency frameworks usually exists in describing the skills developed to equip school leavers. The proficiency level 3 (intermediate skills) within the DSFOne Competency Framework, aligns directly with competency level 0 within The Collective X SFIA Competency Framework. It creates a seamless progression from the DFSOne Competency Framework to the competencies described in the SFIA Competency framework.

The benefits of The Collective X utilising an adapted version of the SFIA Competency Framework are:

Figure 5: SFIA Competency Framework (adapted)



Source: The Collective X

The Collective X's unified digital / ICT competency framework

The impact of adopting The Collective X's unified digital / ICT Competency Framework is:

- A consistent view on the level of digital / ICT skills competency;
- A standardised view of the quality of skills, given that job titles & descriptions are not universally standardised;
- A common, trusted system for the accreditation of service providers;
- A common framework to underpin highly-proficient digital skills training, trainers and training institutions;
- A common framework to support employers and employment-related decisions;
- A thorough, robust, well described portfolio of current and future in demand job families;
- Guidance for a smooth digital skills journey and the transition from school to post school digital learning;
- The adoption of an open set of interoperable standards will ultimately allow all stakeholders

in the ecosystem to speak a common skills language.

By driving the adoption of an open set of interconnected digital credential and learner pathway ecosystem, The Collective X enables any stakeholder to "plug-in" to a non-competitive set of standards that better serve the ambition of upskilling tech talent to meet demand side opportunities.

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