

Making South Africa e-literate by 2030

Ikamva National e-Skills Institute

Towards a framework for e-skills research

This document considers a framework for e-skills research (knowledge for innovation), with evidence-based research supporting the national e-skills thematic areas. This is in order to achieve the objectives laid out in NeSPA and the NDP.

Towards a framework for e-skills research – *Version 1.1*

1. Introduction

The Institute is a national catalytic collaborator across government, business, education, civil society and organised labour stakeholder groups, mandated by Government and functioning within the ambit of the Department of Communications (DoC). Given the National e-Skills Plan of Action 2010, the Institute has made the choice for an operational architecture that fosters multi-stakeholder collaboration for national impact and that includes (i) CoLabs within a number of provinces (and eventually in all provinces) and (ii) the establishment of a Research Network for e-Skills (ResNeS).

Research has been identified right from the start as a core component of the activities of the National e-Skills Plan of Action 2010 and 2013, with evidence-based and multi-disciplinary research as being of key importance. One of the missions of the CoLabs relates to ensuring a relevant and cutting-edge knowledge base that supports its national thematic area, which can only be achieved through evidence-based research: linking into the best research, doing research, coordinating research and spreading the message of the importance of research in order to achieve the objectives of the national programme against the National e-Skills Plan of Action and the National Development Plan 2030

The various stakeholders and role-players have different challenges and needs regarding e-skills. In most cases, inputs of significance can only come from strong evidence-based research.

This framework for e-skills research sits at two levels: an overarching framework that speaks to stakeholders and role-players, and a deep-level framework that speaks to those responsible for research output.

The purpose of the *overarching framework* is to indicate –

- i) how a number of aspects relating to the architecture of the national programme form *an ideal ecology* to ensure that appropriate knowledge is gained, maintained and developed through evidence-based research; and
- ii) that this ecology forms *an ideal opportunity for stakeholders and role-players to become involved in evidence-based research* towards furthering the objectives of e-skills development and those investing.

The *deep-level framework* for e-skills research addresses the wide range of detailed issues that characterise the “world of e-skills development” and that could come into play in the research process. (Annexure C.)

The Value Proposition of The Institute (e-SI, 2012) indicates what The Institute has to offer in a range of areas relating to e-skills development, from policy to interventions and to the research underpinning these. This dual-level framework is positioned within the Value Proposition. The Institute has also developed a National Curriculum Competency Framework (NCCF) on which many of the aspects mentioned in this document will have a bearing.*

2. An ecology that is conducive to research on e-skills

Research is essential to understand the nature of the development and unfolding of the information society and knowledge economy, the requirements for e-skills to be developed in order to make use most effectively of the opportunities offered by these developments, and

the best way to develop these skills for people in various work settings or social contexts. Further, relevant evidence-based research covering *e-skills*, i.e. capacity to use modern ICT for personal, work, education and community benefit; *e-astuteness*, i.e. the capacity to appropriate continually emerging ICT for local benefit through networks, adaptation and developed intuition regardless of general literacy and formal education; and *e-readiness*, i.e. the 10 components identified by the WEF Global IT report (regulatory environment, business & innovation environment, infrastructure, affordability, skills, individual usage, business usage, government usage, economic impacts and social impacts) is essential to addressing the goals of the National Development Plan 2030 (NDP) for a more inclusive economy. The South African national e-skills programme offers an ecology that is conducive to such research.

2.1 An appropriate architecture for the national programme

The architecture of the national e-skills programme was designed to ensure both dynamic leadership at the central level and optimal implementation and interventions at a Provincial CoLab level; all of these underpinned by evidence-based and multi-disciplinary research.

a) *The national management and leadership of the programme:*

National leadership ensures

- i) the interpretation of the overall mandate of The Institute and of relevant national (including the NDP 2030) and provincial policy thrusts;
- ii) the way the national programme is embedded within national government and linked to national initiatives, the required advocacy for the programme and fact that the contribution of the programme is brought to the attention of and participation by relevant bodies and interest groups across government, business, education and civil society and global development partners;
- iii) the setting up, maintenance and further development of the architecture of the programme across government, business, education and civil society, and the necessary implementation steps to make it a reality; and
- iv) the fact that all stakeholder groups and participants in the programme are aligned to one another, not only for implementation, but also regarding the knowledge base to be developed through research.

b) *CoLabs:*

The CoLabs ensure

- i) interpretation of the provincial policy thrusts and of national ones as they relate to the province and the country at large – again, not only for implementation, but also towards the evidence-based research that needs to be done in a national thematic area and to advance South Africa's socio-economic interests for a more inclusive economy in an age increasingly dominated by modern ICT;
- ii) developing national leadership knowledge and expertise on assigned topics, which are then shared across the other CoLabs, to the benefit of the whole system;
- iii) a response to implementation and research challenges in their provinces, amongst others through network interactions across government, business, education and civil society and by undertaking regular environmental scans;
- iv) linking to established bases of knowledge and expertise in relevant academic departments of the host universities (and other universities in the region), government (including State Owned Companies and entities),

- business and civil society and global development partners, and involving these stakeholder environments in evidence-based research projects and capacity development for increasing relevant evidence-based research;
- v) involving stakeholders and role-players in the region and province – thereby forming an inclusive network for dialogue, advocating, supporting and doing evidence-based research;
 - vi) organising research meetings in order to bring together multiple parties having an interest in particular issues preferably supporting the national thematic areas of the CoLab, either to share research findings or to undertake research together; and
 - vii) developing and sharing appropriate methodologies to do mobile apps development – a new topic for many organisations and creating numerous opportunities for doing research for a growing and inclusive economy.
- c) *ResNeS*:
- ResNeS ensures
- i) that a relevant framework and taxonomy is developed and followed;
 - ii) that alignment takes place between national priorities and thrusts, business priorities and thrusts, and the capacity that is developed in the network;
 - iii) that a highly qualified international network of research leaders, funders and bodies is established, developed and engaged in the process of building local research capacity, longitudinal collaborative research projects and a programme of exchanges/sabbaticals;
 - iv) that results from international research is taken into account in order that local research will be moving at the cutting edge; this involves both data collection and dissemination;
 - v) that best practice from elsewhere informs the intensive policy engagement in which The Institute is currently involved and will increasingly be involved in a dynamically transforming society;
 - vi) that policies, strategies and action plans regarding active research are developed; and
 - vii) that an appropriate model for aggregation of relevant data (existing and ongoing) is developed and implemented aligned to a broad-based national approach within South Africa's developmental needs.
- d) *A range of international and national collaborating institutions*:
- The Institute has developed working relationships with a range of international and national institutions that have got expertise in the areas of development, e-skills development, societal transformation, etc. These institutions have already indicated their willingness to contribute their knowledge to the South African programme and to assist in developing a capable local evidence-based research base.

It is well known that the nature of the newly developing ICT enabled society and the need for appropriate skills development to function effectively in this society, differ largely in various segments of society, even at various levels of government and between the various provinces. A case in point is the understanding of the transformational changes that national broadband network can bring about, and the different understanding of this potential in various government departments, in the different provincial and local governments, across the higher education and training sectors and across the full spectrum of business (corporate, service providers and SMMEs). Thus the pace of change in the various programmes in which the CoLabs are involved cannot

be the same. However, like a clockwork or a complex machine in which the various cogs move at different speed, together they still contribute to the intended movement or objective.

2.2 An inclusive e-skills mandate and framework

The Institute has a very broad mandate regarding e-skills human capacity development. Many other bodies or organisations active in the area of e-skills development or human capacity development generally have a narrow mandate – or are only undertaking activities – for a particular sector of e-skills development (e.g. for the world of business). This evidently restricts their ability to undertake multi-disciplinary interventions; but it also restricts their ability to become involved in research activities that are essential in order to move forward or to identify best practice elsewhere in aspects that are essential for South Africa but outside of their immediate mandate. The importance of this cannot be over-estimated and despite the best efforts of many individual organisations, South Africa's global e-readiness ranking has dropped from 47th (2007) to 70th (2013) (WEF Global IT Report).

Accordingly, The Institute has developed an inclusive e-skills framework (including e-literacy in all its dimensions, including e-participation skills [as users, consumers, clients, family members and communities]), user skills for different sectors in the world of work and business development, ICT practitioner skills, and e-leadership skills (amongst others, to develop collaborative approaches within business, government, education, civil society and organised labour). (See Annexure C, par. B2.) The framework is explanatory for relationships within and outside of the framework. Although much work has to be done to develop the specifications for skills in different sectors, stakeholder groups and community settings, the framework as such provides a powerful and enabling basis for further work.

This broad mandate can ensure that evidence-based research to be undertaken takes into account the ubiquity of modern ICT devices in the digital society and that the established framework for e-skills human capacity development can ensure that all participants in evidence-based research have clarity on the domain within which the research takes place.

2.3 A pro-active approach to scanning the environment

The CoLabs follow a pro-active approach to environmental scanning regarding e-skills demand and supply (and related matters). In the area of e-skills development there are many entrenched beliefs and practices regarding the skills and competences that are required by individuals and in the workplace, education and life-long learning, community, family and social groups as deliverers, consumers, clients, learners and members of an inclusive economy. In the meantime, the rapid pace of ICT development (mobility, availability, capacity, affordability and applications expansion) has overtaken many of these beliefs. It is only through evidence-based and multi-disciplinary research that the requirements for training in the modern emerging environment which is increasingly dominated by modern ICT devices can be established, that impact can be achieved and that various approaches can be evaluated.

Similarly, ResNeS in collaboration with the provincial CoLabs follows a pro-active approach to scanning the environment of e-skills development (and the accompanying developments in the emerging society increasingly dominated by the socio-economic appropriation of modern ICT devices and applications), by feeding insights from this process into the management/ leadership context across the stakeholder groups i.e. national, provincial and local.

2.4 Working in a collaborative mode towards the new digital future

The Institute has developed competencies that are of key importance for understanding the world of a society increasingly awash with the adoption of modern ICT devices and applications that have multidimensional implications across organisational, social, economic and community based impacts. Specifically these developments have substantial implications for learning, teaching, innovation and knowledge development. How these will be affected by the rapidly developing technologies – not only the process of learning, but also the changing requirements for all members of society, including those for the world of work, business development and sustainability (including rapidly changing dynamics in economies of scale and loss leader time frames), service delivery and consumption patterns, social appropriation, culture and the socio-economic boundaries of nation states. In addition, The Institute has developed an approach to multi-stakeholder collaboration and interaction that is essential for taking the e-skills agenda forward in ways that directly impact national, provincial and local strategic plans, international socio-economic engagement, addressing equity and in developing a growing and more inclusive economy.**

Composition of this document package:

This document package consists of the following:

The main document, and

The following **annexures**:

Annexure A: The e-skills framework used by The Institute

Annexure B: A diagram of the ecology for research {to follow later}

Annexure C: A deep-level framework for doing e-skills research (incl. Bibliography)

Annexure C1: e-Skills Research Framework (diagram)

Annexure C2: Elaboration on education, training and learning

Annexure C3: Terminology used in Annexure C

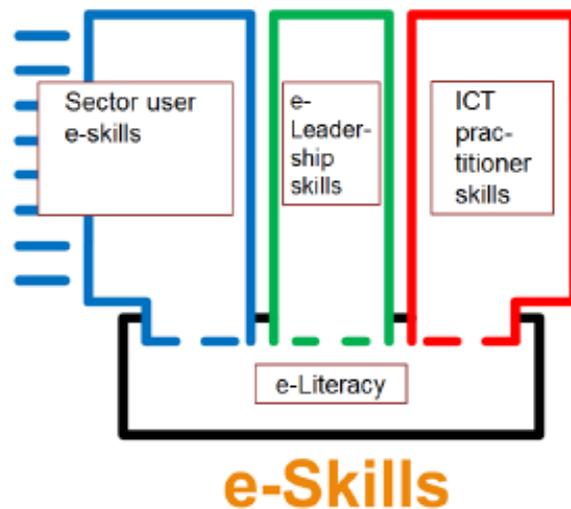
ResNeS
The Institute
30 September 2013

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* *Towards an e-Skills National Curriculum Competency Framework and Certification Guidelines* (NCCF). Pretoria. 2013.

** For the widespread recognition of the multi-stakeholder collaboration model for the effective development of e-skills, see N. Kurop, A. Joyce, C. Bergaud & C. Wood. *The e-Skills Manifesto*. Brussels. 2012.

Annexure A: e-Skills Framework and Taxonomy



e-Literacy:

The 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.

Sector user e-skills:

1. The e-skills for work in a specific sector or type of organisation.
2. These skills can be
 - a) of a general nature (e.g. a general e-skills set for business), or
 - b) a specific skills set applicable to that sector (e.g. the graphics industry, or health), or
 - c) a combination of both.
3. The skills sets must be worked out for each sector.

ICT practitioner skills:

The skills/capabilities required for

1. researching, developing and designing, managing,
2. the producing, consulting, marketing and selling,
3. the integrating, installing and administrating,
4. the maintaining, supporting and service of ICT systems.

e-Leadership skills:

A portfolio of skills, representing expertise in both using ICT systems and leading organizations (or divisions/functions in an organisation), as appropriate to the specific context.

These skills are often referred to as a T-shaped portfolio of skills.

e-Leadership is defined as “the accomplishment of a goal that relies on ICT through the direction of human resources and uses of ICT” (N. Fonstad, INSEAD).

Annexure B (Diagram)

Annexure C

A deep-level framework for doing e-skills research

A. Introduction

1. Background and general remarks

The e-skills agenda involves a very wide range of topics, involving skills, people development, capacity building, e-learning, society, access to information, technology, apps (that is, apps usage and the development of appropriate apps), etc. On the one hand, the agenda deals with issues relating to e-literacy (including e-skills, e-astuteness and e-readiness regardless of formal education, location, ethnicity, gender, age and disadvantage) and society and the requirements of business and other organisations for their employees. Whilst, on the other hand, issues regarding ICT practitioner skills, skills for consumers, clients and users to provide a base for business, government, education and civil society, skills to effectively harness social media for local socio-economic benefit, skills for increasingly self-reliance in appropriating emerging technologies (e-astuteness) and skills to establish networks to build social cohesion around improving health, safety, learning outcomes have to be addressed. Accordingly, the agenda for *research* on matters relating to e-skills will be just as wide, or perhaps even wider, given the variety of approaches and methodologies that could be applicable to each situation or to the various kinds of research.

Research on e-skills undertaken in South Africa will typically be of three kinds:

- a) Postgraduate research (for master's or doctoral degree purposes, and even research projects at the honours level);
- b) Research for non-degree purposes (by collaborators of the CoLabs or by others who are in some way related to the CoLabs, or not at all related);
- c) Research-/evidence-based policy documents/proposals, or well-informed comment and/or contributions in the context of policy engagement.

Accordingly, the performers of the research can be the following:

- a) Academics or thought leaders at universities (or researchers associated with academic departments or institutes);
- b) Postgraduate students;
- c) Researchers, thought leaders or policy makers involved in a sector of Government or in associated institutions, or in organised labour or civil society;
- d) Researchers, thought leaders or persons doing R&D involved in business/industry (incl. SMMEs), or persons acting in a consulting role to business/industry. Amongst these could be developers of learning materials or apps for which research is a prerequisite;
- e) Persons not involved formally in any of these categories, but just interested in the development of ICT enabled society, in people development or societal development, etc. and wishing to make a contribution through research.

The Institute follows a multi-stakeholder approach towards achieving national e-skills objectives – an approach that has proved itself to be the only viable one for handling an area in which there are so many parties that have different interests and fields in which they can and

do play a role.¹ Evidently, The Institute has no jurisdiction over these institutions and role-players, either in terms of implementation or regarding research undertaken. However, as catalytic collaborator across government, business, education, organised labour and civil society stakeholder groups The Institute does have a role to play regarding both implementation and research – a role of advice, guidance and support, as well as working towards aggregation to ensure that national objectives are indeed addressed across a wide spectrum of topics and of all segments of the population. In certain cases The Institute will be the guardian of research projects funded from outside and for which it takes contractual responsibility, in which case it will expect research proposals and reporting to meet the requirements it sets.

It is clear that The Institute (and the Research Network for e-Skills [ResNeS]) should have a clear and well-founded view of the research on e-skills matters. ResNeS serves the national e-skills programme, by ensuring that the “ResNeS agenda” is implemented. This involves the following, amongst others: supporting the CoLabs in their endeavours to do research and to follow evidence-based practice; striving to ensure that research is of high quality that direction is given regarding research, and that opportunities for research funding are opened up; ensuring that research on e-skills is recorded and publicised in such a way that is useful for other researchers and persons working on e-skills and that it can be used by policy-making and implementation bodies (at national, regional and local level), and building an international network of researchers to support local capacity development, to help align research in light of relevant global initiatives, to provide entry into international funding sources and to help establish longitudinal and comparative research agendas, etc.

2. The purpose of a framework for e-skills research

A framework is a way to organise knowledge and to understand – and express and make visible – complex domains and the underlying relationships and interactions. In the context of e-skills, the framework indicates how different sub-domains (or groups) of e-skills relate to each other to form the whole of the “world of e-skills”.² Used in this way, the words “framework” and “taxonomy” can in fact be used interchangeably.³ However, in certain contexts in which the national e-skills programme functions, the word “framework” is the more common one, whereas in others the word “taxonomy” would be the preferred one:

- * In the international discussions on e-skills frameworks, the word “framework” is widely used and understood by all informed people involved. (For example: in the Skills Framework for the Information Age (SFIA) or the European e-Competence Framework (e-CF).)⁴
- * In the world of information systems, the word “taxonomy” is commonly used as an indication of a structured domain of software applications.⁵

We can therefore speak of a “framework and taxonomy” for e-skills, as long as this use of the word “taxonomy” does not obviate the need also to have – at some stage – a taxonomy in the sense of a structured classification system or a “text-based taxonomy”. The latter is still

¹See (Korte, Braun, & Gareis, 2007) and (Kurop, Joyce, Bergaud, & Wood, 2012).

²The comprehensive e-skills framework that is proposed for The Institute, is outlined in a separate document and PowerPoint presentation.

³See (Nickerson, Varshney, & Muntermann, 2013, p. 338).

⁴See also the use of the word framework in (Janssen & Stoyanov, 2012), especially referring to “e-competence framework(s)”.

⁵See (Nickerson et al., 2013)

required to ensure coherence and consistency in the way terminology is used, to classify or “index” research and evidence relating to the national programme, to achieve retrieval of research and publications, etc. However, in view of the fact that the national programme involves a comprehensive approach to e-skills, also regarding the varied settings of life and work, each bringing its own terminology, the development of a “text-based taxonomy” is a larger process that will stretch over a longer period of time.

Similar to the case of an e-skills framework, we also require *a framework and taxonomy for e-skills research*, that will organise and make understandable – at a high and overview level – the components or meta-dimensions relating to *research on e-skills* and the very wide world of disciplines and settings in life (learning, consuming, participating, family and social cohesion, etc.) and work within which it functions. And since research is about *process*, the framework for e-skills research should also indicate the stages of activity and steps to be taken by the researcher in broad outline, whilst at the same time providing the evaluator of the research (evaluation for quality purposes or for implementation purposes) with an understanding of the way the researcher approached his/her research.

We will still need a structured, text-based taxonomy, but this cannot be developed at this early stage of the national programme. For that purpose, all key terminology has to be structured, choices have to be made about preferential use of terminology involving the real experts in the area, terminology from different disciplines has to be merged in a justifiable way, etc. This is, of course, done regularly in the development of taxonomies. However, in the case of research on e-skills the total area covered involves a wide range of disciplines and settings in life and work, and the research is multi-disciplinary. Terminology gets its meaning from its use in a particular context, in this case also in a particular discipline. To develop a taxonomy for all of this terminology in the area covered by the e-skills programme, will take time ... but it has to be done in the medium term.⁶

In the meantime, we can use the framework for e-skills research *as an interim, broad taxonomy for research on e-skills*. It is possible that, in time, further insights into e-skills and research on e-skills will lead to further refinement of this interim e-skills research framework. At this stage, however, we believe that the analysis behind the framework cuts to the core of the matter of e-skills research and provides a useful guide not only to the research process, but also to relevant content within each component. (See A3 below.)

3. Components of the e-skills research framework - Overview

Many (or most) of the components of the e-skills research framework listed and elaborated below, might be part of the standard research procedures in other areas as well. In view of the extensive nature of e-skills research (see par. A1 above), The Institute regards it as essential to be explicit about these components, not only by identifying and listing the *components*, but also by identifying *relevant content elements/dimensions/perspectives* for each of the components. This content is gained from recent and current research in the area of e-skills development (and related studies), obtained from numerous publications and reports. This content is not exhaustive, and in all cases where such content is identified, opportunity is given to identify other elements, eventually feeding those back for consideration for inclusion in future versions of the framework.

⁶ It is expected that the current interim taxonomy will be extended to a text-based taxonomy before the end of year two of the ResNeS activities.

For the researcher or supervisor, the components and elements indicate the range of issues that could also be addressed in the study, ensuring that no random choices are made and that the other alternatives are also identified and considered. This can be helpful in narrowing or broadening the scope of the study, as seems applicable.

The Institute expects all research undertaken in conjunction with it (incl. the CoLabs) to contain the *components* below, and would like to see that the elements within these components are considered, as appropriate to the specific study/research. The Institute believes that this process will enhance the level of research by ensuring that the research is framed within the context of national development programmes and thrusts, that there is clarity on the focus of the research, that the evidence-base is taken seriously and that feedback and learning loops are activated in order to ensure that the programme as a whole (both at the local and the national level) is characterised by systemic learning and that it can be even more effective in future.

The framework contains the following *components*:

- a) Identification of the *national considerations or thrusts* to which the study/research will relate or where it wishes to make a contribution.
- b) Pegging of the research on the accepted *e-skills framework* used by The Institute, by identifying the broader e-skills domain (or “group” of e-skills), or – if appropriate – the whole area of e-skills.
- c) Identification of the *area(s) of study/research* (that is, of research, R&D, evidence-based practice, M&E, etc.) within the e-skills domain.
- d) Identification of one or more *complementary dimensions* of the research programme, if applicable (which will mostly be the case). (For more detail on this concept, see 4 below.)
- e) Identification of, and motivation for, the choice for a particular *methodology* (or *methodologies*) to be followed.
- f) Identification of, and motivation for, the *evidence-based dimension* of the study/research.
- g) Doing the *study/research* and reaching ...
- h) *results/findings*, which – expectedly – will relate to the national dimensions [(a) above) and other components of the research framework].
- i) Identifying *further challenges and topics for research*.
- j) Activating *appropriate feedback and learning loops* in order to ensure that the programme (both at the local and the national level) reflects the characteristics of a learning organisation. (Some of these loops will be activated during the research process itself.)

For a graphic representation of these components, see Annexure C1. (It is recommended that the remainder of Annexure C is read with this graphic representation at the side.)

Evidently, the *other components* of a research proposal or a report (as applicable in each case, e.g. university requirements for master’s theses and doctoral dissertations) should still be present in research proposals or applications to those institutions (e.g. statement of the research problem, hypothesis, research design, methodology, ethical clearance process, budget, etc.). Similarly, for a research publication or a report on funded research there might be other requirements that have to be addressed.

4. Terminology

On the terminology used in this document: at the beginning of the chapter on each component, a definition or description of that component is given. For an overview and further definitions, see Annexure C3.

B. The components of the e-skills research framework

1. Considerations relating to the national level

The following considerations (objectives, plans/thrusts, activities) *relate to the national level*, as the broader national context within which the study/research takes place:

- 1.1 *National plans, priorities and thrusts* for the country at a broader level (e.g. the NDP and the way the e-skills agenda or a sector thereof fits into national development and developmental state thinking, functioning and planning).
- 1.2 The so-called “*triple challenge*” of unemployment, poverty and inequality in South Africa.
- 1.3 *Competitiveness* (of the country or a sector).
- 1.4 *Productivity* improvement.
- 1.5 *Growth* (and the resulting job creation and the creation of new businesses).
- 1.6 Preparing the country for the “*knowledge economy*” / “*digital economy*”.
- 1.7 *Education, training and learning*.⁷
- 1.8 *Capacity development* of people and organisations (government institutions, business, other organisations).
- 1.9 The optimal use of modern ICT (a wide range of devices) by *individuals* (in their private capacity or in small businesses) and by communities, thereby creating better life opportunities for all.
- 1.10 The optimal use of modern ICT (a wide range of devices) in and by *government* (at national, regional and local level).⁸
- 1.11 The optimal use of modern ICT (a wide range of devices) in the *world of work* in general.⁹
- 1.12 Promoting an *active citizenry*.
- 1.13 *Measuring/evaluating e-readiness* (and other indices to determine and track country performance on indicators related to ICT and the knowledge society / knowledge economies) (dimensions of it; ways to determine and evaluate it).
- 1.14 *Policy-making*.
- 1.15 *Other* (supply an appropriate descriptive term for a relevant national dimension that is not included in 1.1 to 1.14 above).

⁷The knowledge base regarding teaching and learning is, of course, constantly being developed on many fronts. The point “Education, training and learning” is singled out from the others in the component of “national considerations” in view of the exceptional importance of this matter in South Africa. For further aspects, challenges and opportunities regarding this point, see Annexure C2.

⁸These objectives can relate to the development of the capacity of the state, or can be part of the thinking from the point of view of a developmental state.

⁹This includes the “world of work” as we know it, as well as a prospective business environment in which small businesses are increasingly empowered to thrive and grow, and where they move beyond the supply of market products towards a creative phase characterised by local production and innovative service offerings.

These dimensions are purposely at different levels of granularity, in order to enable the user to make a choice between objectives/thrusts that are more over-arching or more specific.

The “question to be answered”, is: Which of these options describe(s) the intention/objective/thrust of my study/research best? (Of course, more than one option might be applicable.)

This selection will enable the person who undertakes the study/research to link it at an appropriate level to a set of national goals or a subset of the national goals. The Institute would like to see *all research making a contribution at this level*, either by developing alternatives for development, functioning and learning (etc.) or for generating insight and understanding. In addition, the practice of identifying a thrust and/or broader objective can form one point of a feedback loop stretching over the whole of the research process, up to the findings of the study and identifying challenges for further study/research.

All research related projects/programmes that are funded by The Institute (from its own funding or from funding under its control) *have to indicate specifically* (by number/page) the objectives of the NGP (New Growth Path), MTSF and/or the National Development Plan 2030 (NDP) to which it is targeted, as well as the NeSPA (e-SI, 2013) recommendation to which they relate.

2. Pegging of the study/research on the accepted e-skills framework

The appropriate e-skills domain (group) in the framework accepted by The Institute (see Annexure A of the overarching framework) has to be identified, namely one of the following five, and/or 2.6 as a further dimension of the framework:

- 2.1 e-Literacy (or “digital literacy”);¹⁰
 - 2.2 Sector (or sector-specific) user skills;
 - 2.3 ICT practitioner skills;
 - 2.4 e-Leadership¹¹;
 - 2.5 The whole spectrum of e-skills;
- and/or
- 2.6 Astuteness (e-astuteness and e-social astuteness) as a specific take on e-skills¹².

(To make this choice, a good understanding of the e-skills framework is required, as well as the ability to identify the essence of a particular group of e-skills or of a skills need.¹³)

¹⁰The Institute works with a very broad understanding of e-literacy, including the ability of persons to use the skills in life and work.

¹¹See (INSEAD, 2012), (Fonstad, 2013). See also (Oskam, 2009) and (Uhlenbrook & de Jong, 2012) for the so-called T-shaped professionals.

¹²The Institute regards e-astuteness as a very important objective of the national programme, as well as e-social astuteness, when applied to the community. See (Mitrovic, Taylor, Sharif, & Wesso, 2013) for an elaboration of these concepts. See also the internal document of The Institute “Statement on a vision for the e-astute citizen (e-astuteness)” (August 2013), in which extensive use is made of (NZ, 2012).

¹³This does not exclude questioning the e-skills framework or the e-skills research framework, even fundamentally; see 4.13 on “framework alternatives”.

3. Identification of the area(s) of study/research

(Under study/research we understand: research, R&D, evidence-based practice, M&E, etc.)

The identification of the area(s) of research is applicable to the domain selected in 2 above.

- 3.1 *Description* (qualitative and/or quantitative) of the e-skills in the specific domain, or for the whole spectrum of e-skills, both for supply and demand (a.o. “e-readiness” in a specific sector or group of the population).¹⁴
- 3.2 *Environmental scanning* relating to all (or selected) aspects and role-players involved in a specific e-skills domain, both for supply and demand.
- 3.3 *Needs analysis* in detail (the current and the prospective situation).
- 3.4 *Planning towards impact and aggregation* (and engaging with the dimensions of impact relating to the specific sector).
- 3.5 *Learning programme* and/or course conceptualisation, construction and delivery, and the use made of technology to present/mediate/support learning¹⁵.
- 3.6 *Other intervention programmes’* conceptualisation, construction and implementation/delivery¹⁶ (that is, programmes that are not in the first instance learning programmes, e.g. programmes for pioneering or sustainably doing ICT interventions in the community).
- 3.7 *Programme management/delivery* (including funding, reporting).
- 3.8 *Multi-stakeholder collaboration* (which has become the most widely accepted way of doing effective e-skills development) in relation to a specific domain.¹⁷
- 3.9 *Innovation* (as relating to the specific domain, but taken in the widest sense of the word, including product, process and service innovation, as well as social innovation).
- 3.10 *Programme monitoring and evaluation (M&E)* (including methodology and tools to evaluate outcomes and impact).¹⁸
- 3.11 *Cognitive and affective aspects* relating to the use of the new media (be they negative or positive) (incl. a range of aspects related or linked to the cognitive and affective).¹⁹

¹⁴Most aspects relating to the description or understanding of the “digital divide” or to levels of “digital inclusion” will also fit into this category. In order to prepare tailor-made learning materials for different groups of people with different levels of formal education and experience, it is increasingly important to have information about e-literacy in specific demographic categories. A good example of information that enables decision-making of this kind, is (NTIA, 2013). For a recent survey in Germany see <http://www.initiated21.de/portfolio/digitale-gesellschaft>.

¹⁵In the case of ICT practitioner skills, this heading also includes the following: re-skilling, and continuing education (and up-skilling), training for general purpose apps development (persons from non-ICT areas becoming involved in apps development in fact also become ICT practitioners in a wider sense of the word).

¹⁶See (Wessal, Treuth, & Wescott, 2013) on what is now called a “science of delivery” – an approach that goes further than knowledge transfer “...the “science of delivery” tailors project components based on local factors such as implementation capacity and political support. ... The “science of delivery” approach requires intensive field research, improved data collection at the project level through the use of good monitoring systems, and the diffusion of ideas to enable these changes in implementation and management.”

¹⁷ See (Kurop et al., 2012) and (Manning & Roessler, 2013).

¹⁸We recommend the approach indicated in (NEPF, 2011), concisely summarised in an animated build-up frame in (Goldman, 2012).

¹⁹For a long time, most publications about social media, for example, were characterised by enthusiasm about the new possibilities opened up by these media and networks. We are now entering a phase in which a broader spectrum of impacts and experiences of the new media is emerging, allowing for interesting and urgently

- 3.12 The development of the “*informational capabilities*” of the people at stake in the particular domain, as appropriate to the domain.²⁰
- 3.13 “*e-leadership*” that can be situated primarily in one of the e-skills domains (for leadership in general, see below 4.10).
- 3.14 *Applications development* relating to a broader implementation or roll-out of ICT, or to the development of ICT capacity (which, today, will in many cases be mobile apps development)²¹.
- 3.15 Unlocking and leveraging *the potential i.t.o. e-skills competence that is volunteered* by knowledge workers in the domain, sector and functional area in organisations in all four domains of the e-skills framework, that is, “I(C)T competence volunteering”²².
- 3.16 *Other* (supply an appropriate descriptive term for what is not included in 3.1 to 3.15 above).

4. Complementary dimensions

These dimensions bring a focus to the area of study/research, or provide an angle from which the area or object of study can be viewed. As such, they (can) bring a different perspective to the study, at another level than just methodology.²³ They will (or: might) influence the study/research: the approach, the skills sets required for the research, the sources of publications and reports, etc. Some of these dimensions might seemingly resemble the topics in component 3 (“areas of study”), but the scope of what is intended with the dimensions introduced below is different from a situation where a related concept is included in the component “areas of study/research” and where it closely links to one or more of the e-skills domains.

required research. See recently (Kross et al., 2013) for a significant recent study in this regard. The area of “subjective well-being” (SWB) is pertinent in this connection, being also a central concern of positive psychology, the approach founded by Seligman and Csikszentmihalyi. For an excellent recent study on the effects of emotions on IT use, see (Beaudry & Pinsonneault, 2010).

²⁰ Although “information literacy” has for a long time been part of the concept of e-literacy, the exponential increase in information today requires us to address the development of the capabilities of people to work with data/information more explicitly (that is, access, interpretation, evaluation, making it applicable to life and work). This would be applicable to all domains, as appropriate to that context. Based on work with rural communities, Gigler recently concluded “that enhancing peoples’ informational capabilities is the most critical factor determining the impact of ICTs on their well-being” (Gigler, 2011).

²¹ This element relates to both 3.4 and 3.6 (“other intervention programme...”), but, whereas the interventions there could still make use of standard devices or pre-packaged materials, the focus here is on developing applications for specific purposes, which can be for a specific community purpose, or the creation of an incubation environment in which startups can develop and sharpen their ICT and business skills in order to become stronger players in applications development. The “apps factories” / “apps labs” linked to the CoLabs of The Institute belong to this category, with the functions of creating capacity for apps development and doing apps development with the aim of using them for interventions in communities, for business, for individual use, etc.

²² For introducing this concept, see (Davis, 2013): “This research introduces the concept of IT competence volunteering, which is conceptualized as a form of organizational citizenship behaviour that is not explicitly contracted by the firm and may not be directly rewarded.” (p. 403), basing his work on “social exchange theory”. This study suggests that “... leveraging IT competence distributed beyond the IS department is largely a function of managing exchange relationships within the organization.” (p. 412). This kind of I(C)T support can, of course, also take place across the various domains in the e-skills framework we use.

²³ These dimensions are of such a nature that they do not belong within the e-skills framework itself. Superimposing them (or even some of them) on to the domains and/or the area(s) of study, would require a three-dimensional representation, which would make both the visual presentation and the numbering overly complex.

Designating these dimensions as “complementary”, can be debated, since each of these – or some together – might be seen as extensive “disciplines” in their own right, sometimes belonging at the core of more comprehensive disciplines. The reason they are regarded as “complementary” in this framework is because in relation to the theme of “research on e-skills (development)”, they are in fact complementary, bringing very important perspectives and insight, but not as such defining the area of “research on e-skills development”. The purpose of the framework and taxonomy developed here, is, after all, to be *a framework and taxonomy for research on or directly related to e-skills (development)*.

A study can, of course, focus entirely on one of these “complementary dimensions”. The study might then not necessarily be an “e-skills study”, but could still contribute extensively to the state of knowledge on e-skills and e-skills development.

The following *complementary dimensions* can be identified:

- 4.1 The provision of *infrastructure, bandwidth or services* (national, provincial or local) as relating to the proposed study as defined (incl. broadband).
- 4.2 *Strategic foresight* (incl. technology foresight) relating to the programme.²⁴
- 4.3 *Mobile devices and apps*, and the dynamics of, and possibilities created by, these.²⁵ (The focus is here on the implications of the modern wave of mobile devices. For apps development as it relates to the individual domains, see 3.14.)
- 4.4 The “new” *social dimension* in interpersonal interactions, in the workplace and in government-public interactions (incl. “social media”, “social business”, “collaborative economy”²⁶).
- 4.5 *Data analytics approaches* (“big data” and/or “data analytics”).²⁷
- 4.6 *Innovation* at a broader level in organisations and in society (in the widest sense of the word, including product, process and service innovation, as well as social innovation).
- 4.7 “*Development*”(often going with innovation in specific areas) (that is, work done in the context of broader ICT4D initiatives).
- 4.8 *Aggregation* towards national (or provincial or local) objectives, with a focus on *impact*.
- 4.9 *Cost dimensions* of various kinds (affordability; relative costs per country or per segment of the population; quantification of the value or cost of the availability or non-availability of appropriate e-skills; etc.).

²⁴ This involves more than technology *per se*, but also other dimensions of society or of the organisation at stake, e.g. the changing world of work (see (Maitland & Thomson, 2011) and (OECD, 2012)). For an excellent recent overview of how strategic foresight has evolved and how it is increasingly used in navigating public policy making, see (Kuosa, 2011).

²⁵ The incessant stream of new developments and new products in the mobile device space tends to obscure the fact that mobile should be seen as one component of a set of forces that *together* make a huge difference in the ICT world as a whole and can in fact be seen as a “platform”. Gartner refers to this set of forces as the “nexus of forces”, where each of the four forces of mobile, social, cloud and information is supported and amplified by the others (Gartner, 2012, 2013). This view also relates to dimensions 4.4 and 4.5.

²⁶ See D. Hinchcliffe (29 July 2013) http://www.zdnet.com/while-most-companies-werent-looking-social-business-remade-the-economy-7000018691/?s_cid=e539&ttag=e539.

²⁷ This approach is put in this category, instead of in the category “methodology”, since the data analytics approaches also relate to the approach of collecting extensive data, finding ways to access it, or building and exploiting large collections of data. The use of statistics in research will be in the component “Methodology”.

- 4.10 *e-Leadership* (which would typically be where e-leadership spans more than the three other e-skills domains).²⁸
- 4.11 The roles (current [both positive and negative or inhibiting], possible, ideal, and ways to get there) of one or more of any of the *partners in the multi-stakeholder networks* required to achieve e-skills development (e.g. the role of universities²⁹).
- 4.12 Broader *philosophical, sociological, economic, etc. positions* that assist in understanding aspects of and approaches to e-skills development (e.g. neoliberal approaches, *laissez faire* approaches to the market and to regulation).
- 4.13 *Framework alternatives*, that is, alternatives to the framework proposed by The Institute (both the e-skills frameworks and the framework for e-skills research),³⁰ be they overarching and comprehensive national frameworks, or domain- or sector-related frameworks.
- 4.14 *Other* (supply an appropriate descriptive term for what is not included in 4.1 to 4.13 above).

5. Methodology/ methodologies

The comprehensive nature of the national e-skills programme brings about that a wide range of research methods could be involved in research on and related to e-skills. It is not the purpose of this framework to set out the advantages and disadvantages of various methods; neither do we wish to be prescriptive regarding the methodologies chosen for the specific study/research project even if it is funded by or via The Institute. We believe that seasoned researchers will be able to make the best choices regarding the most appropriate methodology, and that the same will be the case for emergent researchers under the guidance of their supervisors.³¹

We are of the view that the *case study approach* can provide very valuable insights in the kind of interventions that are envisaged by The Institute, and that the resulting set of case studies can be used fruitfully to guide further interventions and research.³²

6. The evidence-based dimension

The Institute has made a choice for evidence-based research. Although the term “evidence-based research” might sound like a tautology for seasoned researchers, we have to keep in mind that the point with the focus on evidence is actually to address a number of *areas of practice* and to ensure that these areas of practice are “evidence-based”, hence “evidence-based practice” (EBP) (or, paraphrased here, “practice (etc.) that goes back to evidence that is based on research”). In common parlance, the phrase “evidence-based research” is often used, which might to some people’s liking not be the best choice of terminology, but which happens to be part of the terminology in the field, with which we have to make do.

It is especially in areas such as health sciences, social work, socio-economic interventions, education and the judicial system that the aspiration to move increasingly towards

²⁸See the note relating to 2.4 above.

²⁹ On the important role of universities, see now the excellent multi-authored volume (Benneworth, 2013a). In this volume, see especially (Benneworth, 2013b) and (Ward, Buglione, Giles, & Saltmarsh, 2013).

³⁰Frameworks are important ways of representing facts and relationships. The Institute should maintain an openness to motivated proposals for alternative frameworks, even though it moves ahead with the frameworks that seem best justified by the available evidence.

³¹See (Alasuutari, Bickman, & Brannen, 2008) for social research methods.

³²See (Ellet, 2007). See also (Pouloudi, Pouloumenakou, & Pramataris, 2012) on the prominence of the case study approach in research in “information systems” in the Mediterranean region.

“evidence-based” practice has become prevalent over the last two decades.³³ During the last decade, the importance of “evidence-based” policy-making has increasingly received attention.³⁴ Over the past few years, the call for “evidence-based” practice has also been made in the study of management. Recently, the OECD called upon countries to enhance the evidence base to help design effective skills policies, the latter being an area in particular need of such evidence.³⁵

6.1 The following dimensions (formulated as questions) regarding *evidence in general* are relevant:

- a) What is the evidence underlying a particular approach/model/programme?
- b) Have the interventions underlying the evidence base survived rigorous empirical testing?
- c) Is the evidence-base applicable to, or relevant to, the situation in South Africa in which the intervention is to be done?

6.2 The following dimensions regarding *the planned study/research* are relevant:

- a) Is the purpose of my study to engage with the evidence from other studies or to build up a new/further/amended evidence base?
- b) How can I ensure that the research, as well as the evidence I generate, will stand to rigorous empirical testing?
- c) Which research approach and methodology will ensure that I can generate the kind of evidence that will stand to rigorous empirical testing?

Evidently, the evidence base can also relate to projects done elsewhere in the world, as long as the different context is recognised and the insights are transferred appropriately.

7. Doing the research

This is a process step and does not as such form part of the interim taxonomy.

8. Findings/results

This component is linked to 7 and follows from 7.

9. Identification of further areas and challenges of research

Research typically identifies areas of study, approaches that can be explored, cases that can be investigated, etc. that might not be within the scope of the present study undertaken, but that present themselves most clearly to the able investigator pursuing a specific focus. These “moments of questions or insight” should be captured during the course of study/research and should be made known to the research community striving to develop an area through research insight. Especially when working in a multi-disciplinary field such as e-skills development (in the wide sense in which we define the field), these perspectives and challenges often only emerge on the border areas of disciplines, many of them serendipitously when researchers are actually pursuing other objectives of their own study.

³³See (Auslander, Fisher, Ollie, & Yu, 2012).

³⁴See (Goldman, 2012) and the numerous references to “evidence-based policy-making” in (CLEAR, 2012). See also (Hammersley, 2008, pp. 48-51) and (EC, 2008). The UK’s Department for International Development (DfID) uses the term “evidence-informed decision making” (for developing policies and programmes).

³⁵See (OECD, 2012, pp. 105ff.).

10. Activating the feedback and learning loops

Various “feedback loops” can originate in the process of following these steps. We would like to see the research results and the identification of further areas and challenges of research influencing the other components and steps, thereby creating a virtuous circle of the growth of insight, knowledge and intervention capability.³⁶

C. Further aspects

1. Prioritisation by The Institute

Where funding or the use of facilities or capacities of the national programme are concerned, The Institute can prioritise on any of components 1 to 5, depending on the needs and requirements of the national programme, or those of its South African funders and principals, or the needs, requirements and priorities of external funding bodies. The mix and weights of the various components and considerations can vary from case to case.

2. Priorities of other role-players

Some role-players are making use of commercial research agencies to do surveys relating to their needs and requirements, or to the areas of business or implementation they wish to enter. Often they are better suited to do the extensive surveys that are required. By involving The Institute (or its CoLabs), these role-players can ensure that all relevant aspects of research are catered for.

³⁶ See (Wessal et al., 2013, p. 2) on feedback loops in the case of implementation projects: “Key elements of the “science of delivery” are to ensure that projects or interventions have adequate monitoring and evaluation mechanisms built in to the project and to ensure these are linked to feedback loops to ensure continual learning, experimentation, results monitoring, and redesign based on experience.”

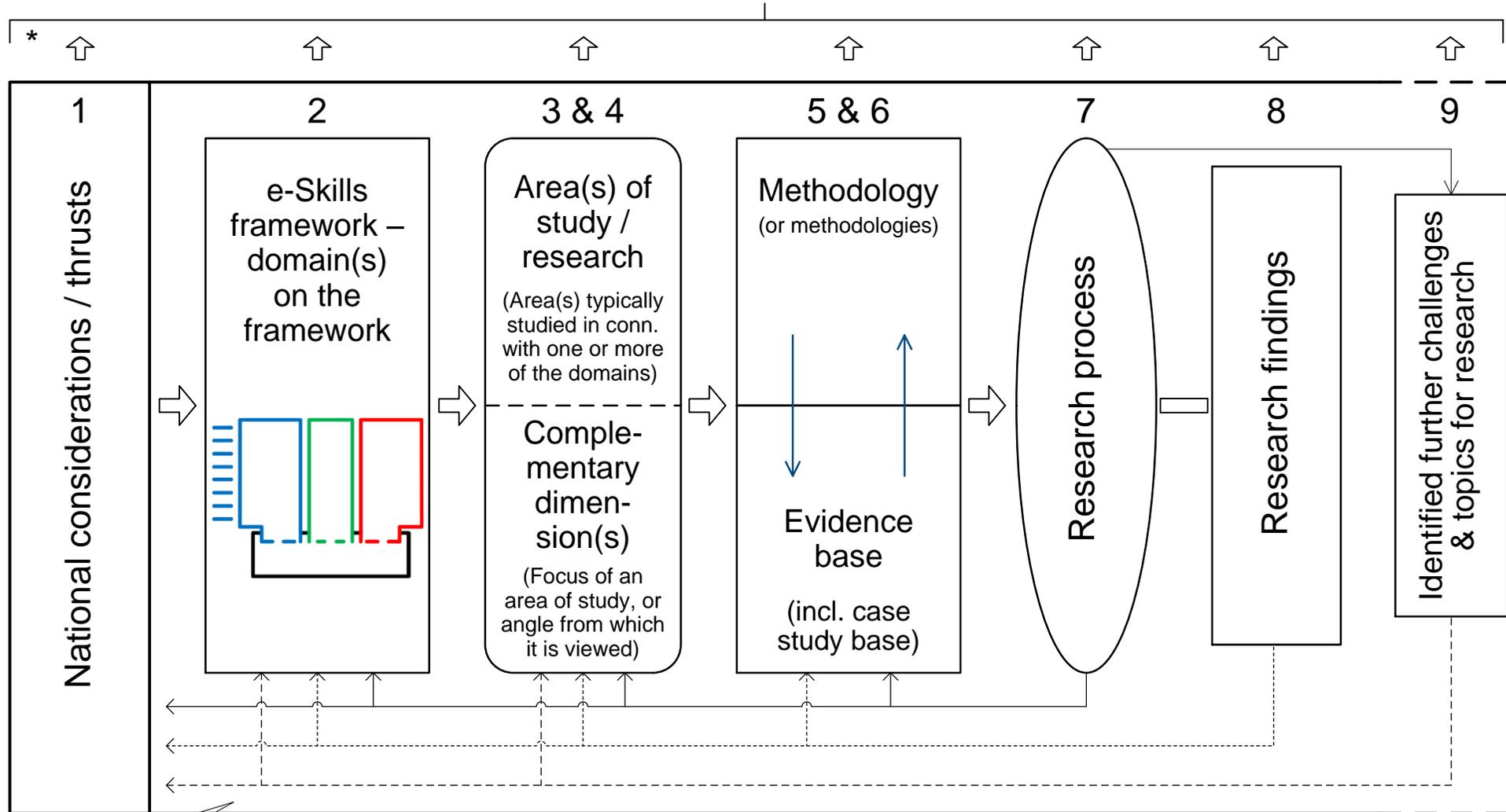
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Annexure C1: e-Skills Research Framework



10. Feedback & learning loops

*Feeding into the appropriate knowledge bases through dissertations / theses, publications, presentations, reports, case studies policy inputs, implementations, codified tacit knowledge, communities of practice, etc.

Annexure C2

“Point 1.7 Education, training and learning”

(in Memorandum, that is in Annexure C)

in

The “Component 1”: National considerations/thrusts

The element “Education, training and learning” is singled out from the others in the component of “national considerations/thrusts” in view of the exceptional importance for this matter in South Africa. The educational challenges are huge, amongst others due to decades of neglect and under-provisioning; the skills required for development of the country are not available in many areas; a very large number of the youth are “not in employment, education or training” (NEETs); the FET sector has to be built up from a very low base to be a core component of the national system of education; adult up-skilling and re-skilling has to take place over a wide front; and use has to be made of ICT to enable all of these, coupled with reliable M&E and credible research to support progress in all of these areas.

This is evidently a very wide area, that has been studied from all angles, from theory to practice, from learning at school to workplace learning (incl. up-skilling and re-skilling), from the use of technology in the classroom to self-paced learning through the use of mobile devices, from individual use to MOOCs – an endless range of perspectives, studies, innovations and experiences. And yet, the dynamics of the modern world of ubiquitous devices and omnipresent applications of ICT brings a respectable organisation such as the NMC (New Media Corporation) – with wide representation in its membership and meetings – to assert in the communiqué following their 2013 summit that we need “... a foundational shift in how we think about teaching, learning, and the work of knowledge creation” (NMC, 2013).

The NMC bases their assertion on the following five challenges (in two cases, supplied with quotations from their communiqué), these resulting from a process based on the notion of “wicked problems”:

- * **“Rethink what it means to teach, and reinvent everything about teaching.** All of our notions about teaching were developed for eras in which the oral tradition was the main way that knowledge was transmitted from one generation to the next. Libraries existed, but only the very lucky few had access to the kinds of resources that virtually all of us take for granted today. When most any practical question can be answered in microseconds via the network, and in most cases, with a variety of perspectives and viewpoints also included – what is the role of the venerated teacher? What are the defining attributes of the teachers ...?”
- * **“Reimagine online learning.** The demand for online learning is challenging us to rethink what learning via the network can and should deliver – whether the provider represents one of the world’s leading universities, a for-profit provider of skills or business training, or a school system trying to meet the needs of increasingly disengaged learners. Simply delivering content is no longer enough. Students expect learning that matters; learning connected in timely ways to the

real world; learning that engages their interests; and learning experiences that see them as entire persons, not just consumers of content.”

- * **“Allow failure to be as powerful a learning mode as success”;**
- * **“Make innovation part of the learning ethic”;**
- * **“Preserve the digital expressions of our culture and knowledge” (NMC, 2013).**

Annexure C3

Terminology used in Annexure C

- Area(s) of study/research:** This designation refers to the aspects of e-skills that are typically addressed in research on e-skills. The list of aspects is compiled from numerous publications and reports in the area of e-skills, with specific aspects encapsulated under broader headings. This list is not exhaustive and it will grow over time as further research is done. Under “study/research” we understand: research, R&D, evidence-based practice, M&E, etc. (See B 3 in the memorandum, Annexure C.)
- Complementary dimensions:** These dimensions bring a focus to the area of study/research, or provide an angle from which the area or object of study can be viewed. As such, they (can) bring a different perspective to the study and link it to other areas of study or even to autonomous disciplines in their own right. (See B4 in the memorandum, Annexure C.)
- Component:** The identifiable point, stage or process in the overall research process, all of these actually positioned in such a way that they relate to component 1 (National considerations/thrusts). (See A3 in the memorandum, Annexure C.)
- Domain:** The broader “group” of e-skills on the framework accepted by The Institute, exhibiting characteristics of similarity and coherence that allow the e-skills typical of that “group” to be defined as a “domain. The designation is wider than just a domain of work. (See B2 in the memorandum and the PowerPoint presentation “Towards a comprehensive e-skills framework and taxonomy”.)
- Elements:** The *content* dimensions or perspectives (as can be identified up to this stage) for each of the components 1 to 4(for their relationship to the components, see A3 in the memorandum, Annexure C). In the case of component 1, the elements are called “considerations”, in line with the name of the component; similarly, in the case of component 4 they are called “dimensions”.
- e-Literacy:** “The 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.” (See NCCF, 2013, Glossary.)
- Evidence:** In the most general sense of the word, evidence is anything presented in support of an assertion, an analysis or a constructed plan for implementation. In the case of science/scholarship, evidence consists of experimental results and observations that can be used to support, refute, or modify a scientific hypothesis or theory. Accordingly, in areas of implementation and practice, evidence is the basis for decision-making on the question as to which approaches have survived rigorous empirical testing, or – after implementation and appropriate monitoring and evaluation – whether an approach can be further supported, or whether (and how) it should be modified. (See B6 in the memorandum, Annexure C.)
- Feedback and learning loops:** The mechanisms and processes to ensure that insights/results from the study/research and experiences gained during the process are fed back into the appropriate components and stages in the research framework, thereby enabling the individual to learn and to re-adjust the process, and enabling the organisation or research corps in the national programme to benefit from the findings/results and experiences.(See B10 in the memorandum, Annexure C.)

Findings/results: The findings or results of the study undertaken, typically summarised at the end of the study/dissertation/thesis.(See B8 in the memorandum, Annexure C.)

Methodology: We use this word here as a broad and over-arching term for the range of scientific/scholarly methods, techniques and approaches that come into play in the course of the study/research, used for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. We realise that this is strictly speaking not the correct way of speaking about “methods” and “methodology”, the latter actually providing the theoretical underpinning for understanding which set of methods or so-called best practices should be applied in a specific case, thereby actually addressing the research design. In common parlance, both “methods” and “methodology” in this more precise meaning are included under the general designation “methodology” and the seasoned researcher or supervisor will ensure that both dimensions are addressed separately. (See B5 in the memorandum, Annexure C.)

National considerations/thrusts: The national objectives, plans, thrusts, activities to which the study/research relates or in regard to which it wishes to make a contribution. (See A1 in the memorandum, Annexure C.)

Sector: (as we use it here) A part or segment in the world of work that is characterised by common skills (in this case, e-skills), work conventions and the use of computer programmes or apps. Some sectors are transversal to other sectors, e.g. the typical “office management functions” (incl. word processing and developing presentations) or the group of people that makes extensive use of spread sheets. One of the domains on the e-skills framework acts as the space for sector-specific skills. The area of “ICT practitioner skills” can in fact also be regarded as a sector, but the dynamics of this group is so different that it is best to treat it as a separate domain (mainly, because the main task of persons in this domain is to design, develop, install, manage, maintain and support the ICT systems used by persons in the other domains). We use the word here in a narrower sense than it is used for in the classification of industry or economic sectors. (See A2 in the memorandum and Annexure A of the overarching document.)

e-skilling the nation

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