



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Education Sector ICT Strategy

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Contents

| | |
|--|----|
| Contents | 3 |
| Acronyms and Abbreviations | 5 |
| A. Executive Summary | 7 |
| B. Details of the ICT Strategy | 17 |
| C. Summary of Recommendations and Critical Success Factors | 43 |
| D. Next Steps and Implementation Plan | 46 |
| Appendixes | 47 |
| Appendix A | 50 |
| Appendix B – Implementation Plan | 54 |

List of Figures

page number

| | |
|--|----|
| Figure 1: ICT Strategy Framework | 18 |
| Figure 2: Information Technology Infrastructure Library | 24 |
| Figure 3: Enterprise Architecture | 29 |
| Figure 4: Key Pillars of ICT Strategy | 32 |
| Figure 5: ICT management and governance forums | 35 |
| Figure 6: Relation between sector goals and functional programme | 36 |
| Figure 7: Data Warehouse design | 40 |
| Figure 8: ICT Strategic Implementation Framework | 65 |

List of Tables

page number

| | |
|---|----|
| Table 1: White Paper 7 - Definition and goals of e-Education | 11 |
| Table 2: Stakeholder engagements during the Discovery Phase | 14 |
| Table 3: Phases and key elements associated with the Fourth Industrial Revolution | 16 |
| Table 4: DBE Goals 14 - 27 | 20 |
| Table 5: Recommendations and actions required of the sector | 42 |

Acronyms and Abbreviations

| | |
|---------|---|
| BCX | Business Connexion Group (<i>company</i>) |
| BYO | Bring Your Own |
| CAPS | Curriculum Assessment Policy Statement |
| CEI | Centre of Excellence and Innovation |
| CEM | Council of Education Ministers |
| CGICT | Corporate Governance of Information Communication Technology |
| CGICTPF | Corporate Governance of Information Communication Technology Policy Framework |
| CIO | Chief Information Officer |
| COBIT | Control Objectives for Information and Related Technologies |
| DDD | Data Driven Districts |
| DBE | Department of Basic Education |
| DG | Director General |
| DOE | Department of Education |
| DPSA | Department of Public Service and Administration |
| DTPS | Department of Telecommunications and Post Services |
| ECD | Early Childhood Development |
| FET | Further Education and Training |
| GITO | Government Information Technology Officers (Council) |
| GTAC | Government Technical Advisory Centre |
| HEDCOM | Heads of Education Departments Committee |
| HOD | Head of Department |
| ICT | Information Communication Technology |
| IM | Information Management |
| IP | Internet Protocol |
| ITSM | Information Technology Service Management |
| ITIL | Information Technology Infrastructure Library |
| IoT | Internet of Things |
| LTSM | Learning and Teaching Support Materials |
| MIS | Management Information System |
| MNO | Mobile Network Operator |
| MOU | Memorandum of Understanding |
| MSA | Master Service Agreement |
| MST | Mathematics, Science and Technology |
| NECT | National Education Collaboration Trust |
| PED | Provincial Education Department |
| PM | Project Management |
| PMO | Project Management Office |
| SAPS | South African Police Service |
| SLA | Service Level Agreement |
| SDLC | Software Development Life Cycle |
| SteerCo | Steering Committee |
| SITA | State Information Technology Agency |
| USO | Universal Service Obligations |
| URL | Universal Resource Locator |
| VM | Virtual Machine |
| VPN | Virtual Private Network |
| WC | Western Cape |

Executive Summary

A. Executive Summary

Introduction

The National Education Collaboration Trust (NECT) and the Department of Basic Education (DBE) took the approach that sees strategy as a “systemic way of exposing reality and acting on it” rather than an extensive write-up of wishes.¹ The approach is based on a strong view that strategy differs from policy in that the latter expresses principles and statements of intention whilst the former is about a sound combination of capacity (people and capabilities) and a step-by-step plan to achieve the intended goals.

The publication “IT Governance and Strategy Development” by Applied Trust², describes the essence of a strategy as an enabler to achieving an organisation’s intended goals and is succinctly captured in the statement: “Strategy is only as good as its execution”.

The approach to this strategy is thus “Strategy in Execution”.

Exclusion: This strategy is for the use of ICT as an Enabler for teaching and learning and NOT ICT as a curriculum subject, or, how to define ICT-enabled teaching and learning. This strategy specifically investigates the matter of the extent to which ICTs (for teaching and learning) have been successfully rolled out, and, proposes crucial change levers necessary to ensure a more successful deployment.

Legislative Alignment

The National Development Plan (NDP) calls for the DBE to pay special attention to Information and Communication Technologies (ICT’s). This requirement is also identified in the DBE’s Action Plan to 2019 and the White Paper on e-Education of 2004.

“The National Development Plan is aligned with the Department of Basic Education’s Action Plan and Vision for Schooling in 2025 in both its diagnosis and proposed solutions. These plans are complementary, not competing. The National Development Plan makes new proposals in some areas and in others it merely outlines general points of departure to frame and guide reforms in education. Some of the areas that need attention can be grouped into the following categories:

- *The role of teachers, principals, other stakeholders, parents and districts.*
- *Infrastructure and information and communication technology (ICT).*
- *Curriculum, incentives, inclusivity and language issues.*
- *Sports, school health, arts and culture” - pg 302 NDP 2030: Our Future – Make it Work.*

It is within the following policy context, therefore, that use of ICT will provide an opportunity to enhance the quality of teaching and learning:

- **The 2015 Action Plan to 2019: Towards the Realisation of Schooling 2030.** This document focuses on the objectives and goals of the Education Sector. These goals are summarised into twenty-seven (27) specific goals, thirteen (13) of which are recognised as outcomes and the remainder, fourteen (14), as deliverables.
- **The 2004 White Paper 7.** This policy document comprehensively lays out the intention to use ICT in the Education sector, which objectives and intentions were targeted for achievement by

¹ Informed by Larry Bossidy, Ram Charan and Charles Burch (Execution – The Discipline of Getting Things Done)

² In the Enterprise Information Technology Body of Knowledge (EITBOK), Wikipedia

2013. Per this policy document... 'The following key elements underpin the use of ICTs in teaching and learning without constraining the teachers, learners and learning organizations in creativity, problem solving and innovation':

- **Equity;**³
- **Access to ICT infrastructure;**⁴
- **Capacity Building;**⁵
- **Norms and Standards**⁶;

Chapter 5 of the 2004 White Paper 7 also details the following as the Strategic Objectives.

- ICT professional development for management, teaching and learning (p25);
- Electronic content resource development and distribution (pg27);
- Access to ICT Infrastructure (pg29);
- Connectivity (pg31);
- Community and Engagement (p32);
- Research and Development (p33).

It is important at this juncture to re-emphasise that the purpose of this strategy is not the same as those articulated in the White Paper. That is, the strategic objectives of this strategy are *not* the same as the White Paper, rather, the strategic objectives of this strategy are aimed at *enabling* those of the White Paper. This is not to say that this strategy disagrees with the desirability of those strategic goals identified in the White Paper. Those goals are laudable. However, they have thus far failed to be achieved due to the absence of the achievement of the strategic goals identified by this strategy document.

The Functions / Services of the Department of Education

Within the context of this legislative framework, the National Development Plan⁷ notes that 'The key priorities in basic education are human capacity, school management, district support, infrastructure and results-oriented mutual accountability between schools and communities'. Read with the mandates of the department's branches / units, the services of the department can be summarised as follows:

- Build Schools;
- Enroll Learners and Teachers;
- Provide relevant Curriculum;
- Provide access to curriculum content to enable teaching and learning;
- Measurement and assessment of outputs;
- Schools Administration and Support; and
- Supporting the education sector officials to perform their tasks.

The aim of this strategy then is to support the delivery of ICTs in line with the White Paper, to ensure the realisation of the above goals of the department, through ICTs. However, in order to deliver ICTs, again, key enablers or "critical success factors" need to be present.

Sector Goals

³ White Paper, Pg. 20

⁴ White Paper, Pg. 20

⁵ White Paper, Pg. 20

⁶ White Paper, Pg. 21

⁷ National Development Plan, Chapter 9 p299.

As noted per the policy document 2015 Action Plan to 1029: Towards the Realisation of Schooling 2030, there are 27 Education Goals. Goals 1 to 13 are outcomes and 14 to 27 are deliverables. See Appendix A for the details. Read together, the Action Plan goals can be summarised as follows:

Goals 14,15,16 and 17 - These goals relate to the recruitment / enrolment, skilling and support for Teacher;

Goals 18,19, 20 and 26 - These goals relate to the Learner. Ensuring that a learner is enrolled, has access to curriculum (textbooks and workbooks) and has end user computing infrastructure ("wide range of media, including computers").

Goal 21 - This goal relates to Schools management and administration support.

Goals 22,23 and 24 - These goals relate to Support for the sector through provision of Tools ("improving access to important information via the e-Education strategy", namely, this document), creating an inspiring environment and engaging community participation.

Goal 25 - Specific support through access to social services, health and sport and culture needs of learners. This relates to the ability and services of the Education Enrichment Services directorates.

Goal 27 - This relates to measuring and support of the learning and teaching at schools.

These goals are delivered through the department's organisational / structural function known as Branches in line with the mandates summarised above.

The Current Reality - Challenges and Opportunities

Within this legislative context, progress to achieve the policy objectives is determined by both structural and behavioral factors. It is critical for the sector to adopt attitudes and behaviour that support the common purpose of achieving both the intent of *White Paper 7* and Education Sector Goals as elaborated in the *2015 Action Plan to 2019: Towards the Realisation of Schooling 2030*.

Below are the achievements and shortcomings in the sector in implementing ICT, noted from the Discovery Phase, of this strategy development process - Review of sector documents / policies and Stakeholder Engagements. The main inhibitor to achievement of policy goals is the significant disparities in the implementation, maturity and extent of ICT roll-out and usage across the provinces.

Opportunities

- A governance framework (e.g. Interprovincial ICT SteerCo, HEDCOM, CEM) exists across the Education sector, although probably with less consistent input than is envisaged by the *White Paper 7*. Guidance on national ICT activities can and should be facilitated through this governance framework. The key focus in forums and discussions should be on how ICT is used to enable strategies and progress towards achievement of the Sector Goals.
- Progress has been made through provincial initiatives and, particularly, through Operation Phakisa which has had broad support in the sector following its launch in 2015. Most stakeholders are significantly invested in the programme, which holds the potential for a national programme and approach to drive ICT in the sector.
- Pockets of ICT implementation and management excellence exist in the Education Sector, particularly in the provinces. Lessons have been learned, and these lessons and the successes can be adapted and leveraged for national roll-out and benefit.

Challenges

- National coordination of ICT activities, including the planning, delivery and governance of initiatives is inconsistent. The Education sector lacks a conscious operating framework for key national initiatives that provide a coherent set of activities designed and developed for

universal benefit of learners and teachers. A common and shared vision must be underpinned by a shared set of projects and programmes using a common language and measurement tools. A project like SA-SAMS, is a nationally driven initiative that could serve as a template to develop a consistent national ICT implementation framework.

- Consequently, sector ICT implementation is driven by a disparate set of initiatives and programmes, thus mostly duplicating effort in addressing similar issues. For example, provinces that have taken the lead in ICT implementation have different e-learning portals. Some provinces, where ICT services are well-resourced and better managed, are better equipped. However, universal national access to similar levels of education service is not achieved.
- Budgeting and funding management for the ICT initiatives: Lack of process to secure, source and 'ring-fence' budget for ICT initiatives. A functional and operating Project Management Office with processes that manage both the development / creation of business cases and budget approval and tracking would improve the funding certainty of initiatives. It is noted that National Treasury has proposed such a model, specifically for ICTs in education, however this process is still in its advocacy stage.
- Aspects needing attention from an improved ICT management capability include:
 - Roles and role clarity across the sector;
 - Structure and responsibilities;
 - Commonly accepted ICT management processes;
 - IT Architecture and delivery structure;
 - Introduction and management of change; and
 - A contracting model and system for management of suppliers and agencies.

The Recommendations: The ICT Strategic Objectives

Within this context of the Current Reality and the Legislative prescriptions, the ICT strategy recommendation is anchored on six (6) key ICT strategic objectives which differ from those advocated in the White Paper, as they are rather enablers.

Implementing these strategic objectives will ensure a conscious drive to support the achievement policy objectives through ICT enablement. This national approach through the ICT strategic objectives will lay the foundation for interactive ICT services that enables learning and teaching, and the management of the ICT environment to ensure usage, availability and 'business' continuity of the ICT services.

- **Objective 1:** Deploy, Refresh and Optimise Infrastructure. With special focus on
 - Connectivity; and
 - End User Computing, i.e. devices;
- **Objective 2:** Functional Applications and Content development and Digitisation;
- **Objective 3:** Application Standardisation and Rationalisation, e.g. single systems that are accessible nationally;
- **Objective 4:** Creation of Education Sector Cloud Computing services;
- **Objective 5:** Data and Information Management, i.e. a single MIS platform enabling 'single version of the truth';
- **Objective 6:** ICT Governance Optimisation, i.e. a management framework that ensures project delivery and ICT operations are available and kept current.

How the Recommended ICT objectives supports the Education Sector Goals and Business Functions

The essence of this ICT strategy is to enable the achievement of the policy goals and objectives. The Action Plan 2019 details 14 Goals as deliverables. It is the intent of this strategy, as detailed in this document, that each ICT strategic objective supports the education goals. Put differently the intention is that each education goal is supported by an ICT strategic goal. In this way, the ICT investment will be directed and channeled to ICT priorities that support the Education Goals of the sector. The table below details the alignment and enablement of the Goals by the ICT strategic objectives. The full table and list of goals is contained in Appendix A.

| Goals | Description | Relevant Strategic Objective | Responsible Branch | How ICT can enable the goal – Desirable Outcome |
|-------------------------------|---|--|--|---|
| Goals 14,15, 16 and 17 | Teacher - recruitment / enrolment, skilling and support | Objective 1. Infrastructure Schools: Connectivity, Devices. Objective 2. App / Content Dev and Digitisation Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access | Branch T - Teacher, HR and Institutional Development; Branch I - Infrastructure; Branch C - Curriculum Policy, Support and Monitoring. | Teachers are required to gain Continuing Professional Teacher Development (CPTD) points. Amongst these requirements are ICT skills. However, the purpose of gaining ICT skills is not just to gain CPTD points, but to gain useful skills to improve the quality of teaching and learning, by (a) integrating exciting ICT technologies into learning, such as interactive content, and (b) being able to use online and digital resources to shore up their own knowledge of their subject. |
| Goals 18,19, 20 and 26 | Learner - Ensuring that a learner is enrolled, has access to curriculum (textbooks and workbooks) and has end user computing infrastructure (wide range of media, including computers). | Objective 1. Infrastructure Schools: Connectivity, Devices. Objective 2. App / Content Dev and Digitisation Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access. Objective 5: Data and Information Management | Branch T - Teacher, HR and Institutional Development; Branch I - Infrastructure; Branch C - Curriculum Policy, Support and Monitoring. | Curriculum Coverage, Access to digital content and downloadable interactive services will ensure that Learner gain useful skills and employability post-school by (a) accessing exciting ICT technologies and learning how to use them, such as interactive online content, and (b) being able to use online and digital resources to shore up their own knowledge of their subjects at school, as well as their interests and hobbies. A key deliverable is thus a 21st-century skilled learner who is ready for the Fourth Industrial Revolution; a learner who is capable of Collaboration, Creativity, Critical thinking, and Communication. ICTs enable these skills. A learner who can emerge from the schooling system with computer expertise is more employable than one who is not. |
| Goal 21 | School Management and Administration support | Objective 2. App / Content Dev and Digitisation. Objective 5. Data and Information Management. Objective 3. Standardisation and Rationalisation | Branch C - Curriculum Policy, Support and Monitoring. Branch P – Planning, Information and Assessment | The DBE currently has the SA SAMS and LURITS databases however these are almost maintained manually. They also do not closely integrate with infrastructural and curriculum systems. Therefore, better monitoring of curriculum delivery, building maintenance and delivery of new buildings, as well as other management issues such as HR, personnel, leave, etc., would be possible with an integrated ICT system as is proposed in this strategy. |
| Goals 22,23 and 24 | Support for the sector through provision of Tools (improving access to important information via e-Education strategy), an inspiring environment and community participation. | Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access. Objective 2. App / Content Dev and Digitisation Objective 6. IT Governance, i.e. the Critical Success Factor – Capacity and Capabilities | Branch A - Administration Branch I - Infrastructure | Ensuring that ICT services are cost efficiently available and accessing also by parents and district officials. Managing the cost of implementing ICT services to schools and ensuring usage and that value is derived from the services. Professional tracking of projects, with proper accountability tracking and progress indicators, would be an output of a professional project management (PMO). The same applies to “dumping” of ICT equipment which becomes a white elephant or “expensive gift”. Lack of proper management of funds, donations and equipment can lead to unexpected future burdens, not just financially, but in terms of turning a school into a target for criminals. |

| | | | | |
|-----------------|---|---|---|---|
| Goal 25 | Specific support through access to social services, health and sport and culture needs of learners. This relates to the ability and services of the Education Enrichment Services branch. | Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access. Objective 2. App / Content Dev and Digitisation | Branch S - Educational Enrichment Services Branch A - Administration | Partnerships with Health and other departments may be feasible, particularly if facilitated by ICT solutions, such as providing apps that deliver GPS locations of clinics, counsellors, online psychosocial support. Through external interfaces exchange info and data between DBE / Schools and Other departments. Presently only one such initiative exists which tracks provision of meals to schools. |
| Goals 27 | Measuring (Assessment) and support of the learning and teaching at schools. | Objective 2. App / Content Dev and Digitisation. Objective 1. Infrastructure Schools: Connectivity, Devices. | Branch P - Planning, Information and Assessment | Professional tracking of delivery of curriculum and matric pass rates, with proper accountability tracking and progress indicators, would be an output of a professional project management and programme management protocol and digital solution. Such ICT solutions exist. This would be particularly true in the case of curriculum completion, principals' KPI measures, and other quality assurance measures, normally carried out by physical inspections. |

Similarly, it is critical to ensure that the ICT strategic objectives are aligned to the achievement of the White Paper 7 strategic objectives. Appendix A provides a view of this alignment. This alignment will also serve as guiding post in the planning and funding of ICT initiatives, of which the key question would be - "How does this initiative help the Sector achieve Sector Goals and the 2004 White Paper Strategic Objectives?"

The Critical Success Factors

The recommended ICT objectives should be driven together with, and supported by, the identified Critical Success Factors, as detailed below. The critical success factors to enable execution are, to a large extent, both behavioural and structural / functional. The achievement the ICT strategic objectives will require both a new organisational culture, new way of doing things and organizational design and capacity. These noted critical success factors derive from the summary of the 'current reality' as detailed above.

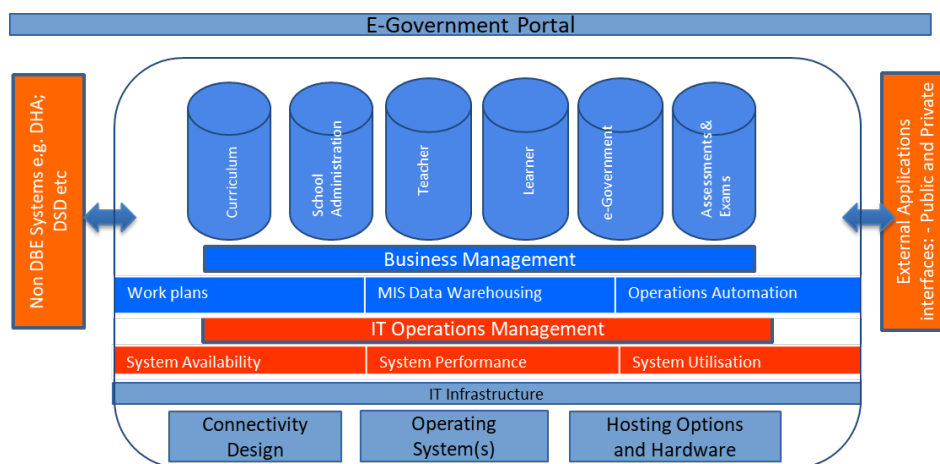
- **Leadership:** Leadership responsibilities do not reside in one person, but require a *cohesive* sector-wide leadership to support a national agenda (a common purpose)
- **Governance:** The applied, visible and active management oversight and support through the CEM and HEDCOM forums
- **Strengthened human capacity and capabilities:** The recommendation is to create a Chief Information Officer (CIO) office, to lead and manage the ICT management practices, i.e. Project Management Office (PMO), Information Technology Service Management (ITSM) and Contracts Management Unit (CMU).
- These capabilities can therefore be summarised as:
 - **Project Management (PMO)**
 - **IT Services Management (ITSM)**
 - **Contracts Management (CMU)**
 - **Change Management**
 - **Data Warehouse and Management (through a designated provider)**
 - **ICT Technical expertise – Custodianship of architectural standards and practices for a developer Hub.**

The Future ICT-enabled State of the Education Sector

The recommended Enterprise Architecture is a technical view of how the ICT services of the Sector will be designed / 'structured' and managed to create value and enable the education sector ICT objectives. Though technical to build and achieve, the intent of diagram below is to provide a

functional overview and benefits of this envisaged architecture for the education sector, i.e. the **user experience in an ICT enabled Learning, Teaching and Managed / Administered school environment** :

- A managed ICT environment within one private network. This means that **all Education sector applications are centralised for national use**. Currently, ICT services are fragmented across provinces with significant disparities and inequalities. One challenge that this represents is that national bodies such as the Department of Planning, Monitoring and Evaluation (DPME) is unable to obtain a clear, consistent picture of progress in the sector. Furthermore, a second challenge that this creates is the duplication of expense and investment in duplicating functionality, such as each PED paying for a website, administrative system, digital content repository, etc., which entails that costs are multiplied tenfold due to failure to centralise.
- A **Single Sign-On** onto a set of integrated systems with **appropriate** user access management and Security protocols. The purpose of such an architecture would be to ensure consistent, accurate data across silos and even between departments; furthermore, ensuring that users do not have to sign up every time on a new system and provide their demographics over and over.
- Nationally available to all learners – **universal franchise**, across all provinces and schools. This will be a critical management ‘tool’ to manage cost for schools and learner through e-rate and zero rating. In other words, since the architecture is centralised and has a single port of entry, it is easier to require of telecommunications providers (telcos) that they zero-rate the content from that particular site.
- The architecture mitigates connectivity problems that, to date, have inhibited the achievement of ICT goals. The Architecture is agnostic to type of device and network connection that a user, teacher or administrator uses.
- Provides flexibility to access other supplementary learning and teaching materials or services from internet education platforms, e.g. Google Classroom. In other words, through Application Programming Interfaces (APIs), it will be possible to send/receive data from other systems and provide a seamless experience with tracking of user activities, enabling "big data" and therefore analysis of educational usage, early warnings of problems in outputs, etc.
- Provides an MIS infrastructure that enables ‘Big Data’ and ‘Single Version of the Truth’.
- An infrastructure platform that provides for system availability management and life cycle management to ensure that IT systems are kept current and usable.



Enterprise Architecture (Figure 3)

The recommendation is that the key enabler and custodian for this enterprise architecture will be SITA as the sector's ICT development hub. Per government policy it is SITA's *raison d'être* to provide ICT

services to and on behalf of government in terms of the SITA Act of 2003 as amended. This enterprise architecture and design has, accordingly, been discussed with and is aligned with SITA's system delivery principles. However, SITA's performance issues to date, have been sharply raised. The final decision will therefore depend on SITA being able to prove to the Sector that SITA is able to and has capacity to architect this desired Future State. It is envisaged that the DBE will strike a new MOU/SLA with SITA to ensure delivery commitments.

Implementation

The **first** step in the process to implement the recommendations is to canvas for the Adoption of the Recommended ICT Strategy and principles. This includes the adoption of the key behavioral Critical Success Factors – A Leadership and Common Purpose.

The **second** area of focus will be to create and adopt a short and medium-term plan with specific set of activities to build Capacity and create an ICT Governance Framework (incl. Reporting and Monitoring). Section E, Next Steps, of the document provides details and an initial view to guide this plan. The key part of this area of focus are the Critical Success Factors. Without these elements being addressed the drive to implement the White Paper goals will be badly hampered.

The **third** element is detailed and initiative-specific. This is an Implementation Plan focusing on the achievement of the ICT Strategic Objectives and the Education Sector Goals as defined by the policy document, *2015 Action Plan to 2019: Towards the Realisation of Schooling 2030*. Section E of the document provides details.

The approach to the implementation should also allow and actively solicit Private Sector partnerships.

- Financial Resources to fund and co-fund the initiatives;
- Leverage Technology options that can be deployed to schools, e.g. in cloud computing services, applications development and 'sand pit' for interactive use; and
- Expertise to support management initiative and workstreams to deliver on the strategic objectives.

The objective of the implementation plan is to create a programme of approved and funded initiatives. This process will involve a review of possible and required Foundational / Infrastructural and Functional (Operational) initiatives for approval, scoping, funding and initiation. This review process should also include identification of initiatives currently running across the Sector which should be **stopped, merged or rationalised** to release capacity, funding and resources for the benefit of a nationally driven set of initiatives. In short, the sector is beset by a proliferation of many small projects, many of which are pilot projects or CSI initiatives, and these projects create small unsustainable deliveries at great cost of officials' time and effort. It is recommended, instead, that as per the Operation Phakisa lab outputs, namely, the Three-feet Plans, that those initiatives, and *only* those initiatives, are focused on and delivered on, and all other initiatives are suspended, rationalised, merged or halted, particularly those initiatives which duplicate or mirror initiatives elsewhere, e.g. national initiatives led by DBE. It is further recommended that the national projects be based on the 'best of breed' or 'best practices' as delivered in PEDs, meaning that each PED who has surpassed national standards, should by default have their initiative in any particular deliverable area, adopted as the national standard.

Each initiative will be prioritised and funded based on its alignment, as depicted by Figure 8 in Appendix B.

The Big Decisions:

- The Approval of this ICT strategy by the Sector should mean an equal commitment to execute and deliver on the recommended ICT strategic objectives. The specific actions and required behaviours are summarised under the section, *Critical Success Factors*.
- Sector commitment should translate into sector support to drive national initiatives. This means courage to deprioritize and 'subjugate' provincial initiatives to the national agenda. It also means courage to stop initiatives to release resources to focus on the key strategic and nationally beneficial ICT objectives.
- The alignment of Operation Phakisa initiatives ("Three Feet Plans") to this ICT strategy to create a funded, resources and planned set of initiatives. Some Operation Phakisa initiatives, Provincial Initiatives, etc., may have to be rescope or stopped.
- A commitment to a managed project delivery through SITA - as Legislated. This commitment should not be 'blind' but should be backed by SITA operational / delivery plan, resources and business processes aligned to the sector ICT strategy. Without these, the DBE reserves the right to seek alternatives. The engagement with SITA on this commitment is thus critical.

ICT Strategy: Detailed Recommendations

B. Details of the ICT Strategy

VISION: Across the Education Sector, ICT is used to support the delivery, assimilation and management of all aspects of education and learning in South Africa by 2030

Mission: "By 2030, every South African learner in the general and further education and training bands will be able to use ICT confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be a full participant in the global community." – 2004 White Paper 7 Policy Goal

1. Background and Context

The purpose of this document is to provide direction for the implementation of an Information and Communication Technologies (ICT) strategy for the Department of Basic Education (DBE) and the Education Sector. The Department of Education's *White Paper 7* of 2004, *Transforming Learning and Teaching through Information and Communication Technologies (ICT)*, is broadly acknowledged and commonly used by all stakeholders as the primary reference document. This White Paper, together with existing policies, guidelines and frameworks within the DBE and other departments, such as the Department of Telecommunication and Postal Services (DTPS) and Department of Public Service and Administration (DPSA), provides a good foundation and guidance for this Information and Communication Technologies strategy.

Table 1: White Paper 7 - Definition and goals of e-Education

| e-Education Defined |
|--|
| <p><i>"In the South African context, the concept of e-Education revolves around the use of ICTs to accelerate the achievement of national education goals. e-Education is about connecting learners and teachers to each other and to professional support services, and providing platforms for learning. e-Education will connect learners and teachers to better information, ideas and one another via effective combinations of pedagogy and technology in support of educational reform. It supports larger systematic, pedagogical, curricular and assessment reforms that will facilitate improved education and improved use of educational resources such as ICT."</i></p> |
| Goal of e-Education |
| <p><i>"Every South African learner in the general and further education and training bands will be ICT capable (that is, use ICTs confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community) by 2030."</i></p> |

The development of this sector strategy also reflects the work and discussions with key stakeholders between August 2017 and March 2018, a review of previous government initiatives including *Operation Phakisa – ICT in Education*, and everyday activities and engagements within the DBE and some Provincial Education Departments (PEDs).

The feedback and input from these various stakeholder engagements, as well as a review of former and current ICT initiatives conducted at national and provincial levels, guided the development of this ICT Strategy.

Documentation review

Since the publication of *White Paper 7* in 2004, there have been a number of other frameworks, draft policies and reports, both published and unpublished, relating to ICT in Education. The following key documents were taken into consideration:

- Department of Education (2004). *Transforming Learning and Teaching through Information and Communication Technologies (ICT) White Paper 7 of 2004*
- 2008.04.11 *e-Education Needs Analysis*
- Department of Public Service and Administration (November 2012). *Public Service Corporate Governance of Information and Communication Technology Policy Framework*
- Department of Telecommunications and Postal Services (October 2013). *South Africa's Broadband Policy Draft*
- Department of Basic Education (May 2014). *e-Education Plan, Internal Draft Document*.
- Department of Basic Education (November 2012). *Implementation Strategy for e-Education in South Africa: 2013 – 2015, Internal Draft*.
- Department of Telecommunications and Postal Services (2014), *National Integrated ICT Policy, Green Paper vol 583*
- Department of Basic Education (2015), *Action Plan to 2019 towards the Realisation of Schooling 2030*
- Department of Basic Education and Department of Planning, Monitoring and Evaluation (October 2015), *Operation Phakisa ICT in Education Final Report*
- *Draft Schools Broadband Guidelines*;

Stakeholder engagements

Engaging with stakeholders is best understood as a continuous process playing a fundamental role in leveraging sector-wide intellectual property as well as applying institutional memory for developing practical alternatives and options, with the aim of ensuring the execution and implementation of strategic programmes that will achieve sector goals.

Both internal (DBE, ICT Steering Committee and Interprovincial ICT Forum, now reformed as the HEDCOM ICT forum) as well as external (sister departments, ICT Advisory Committee, and Union) structures were consulted as part of the Discovery Phase. Provincial engagements were based on the DBE selection of provinces, as per the provinces' experience and / or progress in implementing ICT and IT services (that is, a selection of greater and lesser success in delivery, chosen at random).

A comprehensive summary report of the feedback and input obtained during the Discovery Phase is contained in a different document which is available on request.

The following table outlines the stakeholder type, group name and dates of consultations.

Table 2: Stakeholder engagements during the Discovery Phase

| Stakeholders | Group | Dates |
|--------------|--|---|
| Internal | Director-General and other Senior Managers | Multiple; various dates |
| | ICT Steering Committee | Continuous and multiple engagements |
| | ICT Interprovincial meeting | 4 July 2017 |
| | ECDoE | 26 August 2017 |
| | NWDoE | 28 September 2017 |
| | WCED | 2 October 2017 |
| | KZNDoe | 20 October 2017 |
| | GDE | 21 November 2017 |
| External | ICT Advisory Committee | 17 August 2017; 10 November 2017; 16 February 2018; 9 March 2018 |
| | SITA | 15 September 2017; 5 February 2018 20 February 2018; 6 March 2018; 19 March 2018 |
| | DTPS | 21 September 2017 11 October 2017 |

The process of developing this strategy has gone through three of four phases with the Implementation phase to follow the adoption of the strategy:

| | |
|------|--|
| I. | Discovery |
| II. | Analysis and Synthesis - Opportunities and Challenges |
| III. | Formulation of recommendations and evaluation of required capabilities |
| IV. | Implementation |

The approach to implementation is that during the relevant phases, capabilities and capacity will be built, and agreement on the set of national initiatives will continue to evolve. A successful ICT strategy is not one with a fixed destination and pre-defined process of implementation, but one which must have inherent flexibility to allow adaptation to emerging innovations and conditions as the implementation process unfolds.

It is critical to recognise that this strategy should enable and support the realisation of education goals which change over time and be adapted to meet new thinking and developments. An immediate example of change in education is the need to prepare schools to support learning and emergent thinking in the Fourth Industrial Revolution debates. The recommended set of ICT Strategic Objectives presented in this document will require continuous review.

2. The ICT Strategy Recommendations

“A plan of action designed to achieve a long-term or **overall** aim” [emphasis intended.]

Oxford Dictionary

2.1. Introduction and Synopsis on the 4th Industrial Revolution

The proposed ICT strategy is intended to drive a **national** schools ICT enablement agenda. The adopted principle is that government has a **unitary** set of objectives espoused by the 2004 *White Paper 7* and the 2015 *Action Plan to 2019: Towards the Realisation of Schooling 2030, as well as the Operation Phakisa Lab outputs*. The end goal of this ICT strategy is to ensure that learners and educators have access to technology services that enable them to assimilate and deliver quality education and its auxiliary functions irrespective of where in the country they reside. It is the intent and objective of this strategy to ensure that ICT services are **available universally** to all educators and learners **nationally**.

The DBE has made significant commitment to, and recognises of the challenge and future value of, the Fourth Industrial Revolution. This ICT strategy thus anticipates the creation and implementation of an ICT landscape that will serve as a foundation from which to pursue and prepare the sector to adopt features of the Fourth Industrial Revolution. The participation and use of ICT in daily experiences of educators and learners provides the springboard for the leap into this new way of working and interaction.

The three key elements to the creation of this platform and foundation need to be dealt with sequentially.

1. **Access:** Physical and convenient access to IT applications and information
2. **Confidence in use:** Use of the IT applications⁸ and external interfaces
3. **Application and content development:** availability of tools and “sand pits”⁹. This is when the users can interactively relate to the applications and develop their own system instructions to create and amend their own sections of work and applications.

Table 3: Phases and key elements associated with the Fourth Industrial Revolution

| Phase | I: Access | II: Confidence | III: Application development |
|------------------|--|---|--|
| Key Elements | 'Physical' access – Connectivity network and devices | Use of technology and applications, as well as ICT as a pedagogical ¹⁰ subject | Cooperation - ability to interact remotely with other learners and external parties defined by knowledge sharing |
| | 'Convenient' - availability of IT services when users require access | Use of external interfaces to enable access to supplementary and external information | Knowledge access via Open Source software and the ability to contribute to the knowledge base |
| Success Measures | Affordable Information Technology Service costs | Simplicity in design and visual presentation | Access to end-user computing capabilities; ability to fully utilise intelligent devices to create new material and knowledge |
| | Managed and supported applications - keep applications | | Availability and access to Internet of Things (IoT) ¹¹ |

⁸ An application is a computer programme designed to perform a group of coordinated functions, tasks or activities for the benefit of the user.

⁹ A “sand pit” is an IT environment created to enable users to create prototypes

¹⁰ Note: Pedagogy is not part of the scope of this initiative

| | | |
|--|--|---|
| | current and updated to emerging technologies and services – Availability of proprietary and public applications – Functional applications per 'line of business' | – DBE generated content and internet services accessed on demand (both public and private); and DBE users (officials and students) accessing other platforms (not curriculum specific) to supplement teaching and learning |
|--|--|---|

2.2. The Functions / Services of the Department of Education

The National Development Plan (NDP)¹² notes that 'The key priorities in basic education are human capacity, school management, district support, infrastructure and results -oriented mutual accountability between schools and communities'. Read with the mandates of the department's branches, the services of the department have been summarised as follows, as we saw in the Executive Summary:

- Build Schools;
- Enrol Learners and Teachers;
- Provide relevant Curriculum;
- Provide access to curriculum content to enable teaching and learning;
- Output measurement and assessment;
- Schools Administration and Support; and
- Support the education sector officials perform their tasks.
-

(These are supported by and aligned to White Paper Strategic Objectives)

2.3. The Recommended ICT Strategic Objectives

Given the above-mentioned functions and services, the recommendation for ICT support in achieving the department's mandate and goals, below are the recommended ICT strategic objectives which will provide an ICT platform and enabling capacities and capabilities that will also enable the achievement of the White Paper 7 objectives and the Education Sector goals.

As part of an implementation plan, these ICT strategic objectives will be translated into a specific set of initiatives mapped to both the Department's services and goals. See Appendix B

- Objective 1: Deploy, Refresh and Optimise Infrastructure. With special focus on
 - Connectivity; and
 - End User Computing, i.e. devices;
- Objective 2: Functional Applications development and Digitisation;
- Objective 3: Application Standardisation and Rationalisation, e.g. single curriculum system that is accessible nationally;
- Objective 4: Create Education Sector Cloud Computing services;
- Objective 5: Data and Information Management, i.e. a single MIS platform enabling 'single version of the truth'; and
- Objective 6: ICT Governance Optimisation, i.e. a management framework that ensures project delivery and ICT operations are available and kept current, including Change Management.

¹¹ IoT is defined by Wikipedia as a network of devices and objects which enables these objects to connect and exchange data. It is in this context of data exchange that learners and teachers will be able to connect to multiple and relevant devices and systems to access information and data that could be relevant to their research and field of study.

¹² National Development Plan, Chapter 9 p299.

2.4. The ICT Strategy Framework.

The ICT Strategy Framework (Figure 1) depicts the key elements of the proposed ICT strategy. The ICT strategy will be an **integrated**, living and evolving artefact that informs and is informed by all parts of the sector. Its integration model makes it an ecosystem of IT applications and infrastructure that serve the sector, including both internal (sector developed) and external (internet services) applications.

The diagram below¹³ summarises the model used to develop the ICT Strategy for the sector. Each element of this model is defined with specific relevance to the education sector.

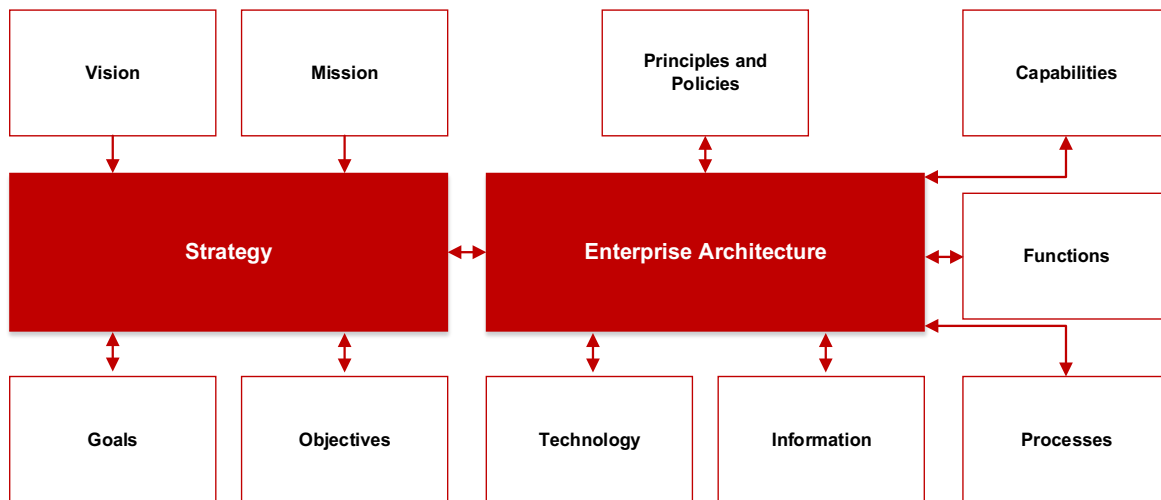


Figure 1: ICT Strategy Framework

The ICT strategy is an enabler to achieve DBE and sector objectives; that is, it does not seek to replace the objectives identified in, e.g. White Paper 7 and Operation Phakisa, instead, it seeks to enable the realisation of those thus-far elusive goals..

As a tool, this model for the strategy, as set out above, will support key areas including:

- **Optimisation of value and effectiveness** of the sector and its ICT investment by more closely aligning ICT initiatives with the sector goals. How this alignment will be achieved is described in the Project Management Office section below.
- **Identification of priority areas** for maximum impact to achieve objectives and goals. This is a critical role of the Project Management Office's portfolio management.
- **Identification of change levers** to support the delivery, usage and sustainability of strategic change initiatives. It is critical that anticipated changes in scope for each project are realised through their adoption by the intended user group; and
- **Definition of management processes** to ensure "business continuity"¹⁴ and operational risk management. Implemented systems should remain available and usable.

Key Elements of the ICT Strategy

The proposed ICT strategy embodies the following vision, mission, education goals and objectives:

¹³ Kim Parker April 2013. Knowledge Economy.

¹⁴ Business Continuity encompasses planning and preparation to ensure that an organization (government, in this case) can continue to operate in case of serious incidents and disasters and is able to recover to an operational state within a reasonably short time. (Wikipedia) It is not intended by "business" continuity to imply that education is a business engaged in profit-making.

2.4.1. Vision: Across the Education Sector, ICT is used to support the delivery, assimilation and management of all aspects of education and learning in South Africa by 2030

2.4.2. Mission: “By 2030, every South African learner in the general and further education and training bands will be able to use ICT confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be a full participant in the global community.” – 2004 White Paper 7 Policy Goal

The ICT services should thus be

- Digital and digitised;
- Web based;
- Real-time accessible;
- Interactive i.e. end-user applications functionality and capabilities; and
- Available (i.e. managed and supported)

2.4.3. Education Goals and Objectives:

ICT is an enabler to achieve organizational (government) goals. Therefore, as the education sector implements and invests in ICT, the reference point and measure of value of the investment, is the alignment to and extent to which such investment help the department achieve its service delivery goals as identified in the *Action Plan*.

Goals 14 to 27 of the Action Plan direct or set parameters and scope of the specific set of national foundational (infrastructural) and functional (delivery-oriented) initiatives and projects that will form part of the implementation roadmap. The scope of **each ICT initiative** must address the question, “**How does this initiative help us achieve the Education Sector Goals?**” Significantly, though, the sector should recognise and acknowledge that this model is an ever-evolving artefact that must accommodate and adapt to the maturity in thinking in the sector’s development and implementation of education goals. ***Precisely how the ICT strategic objectives will support the Action Plan Goals is demonstrated in Appendix A.***

2.4.5 Principles and policies

The strategy development process did not wish to create a new policy framework but relied on the review and referencing of the following policy documents and sector plans:

- Department of Education (2004). *Transforming Learning and Teaching through Information and Communication Technologies (ICT) White Paper 7 of 2004*
- Department of Public Service and Administration (November, 2012). *Public Service Corporate Governance of Information and Communication Technology Policy Framework*
- Department of Telecommunications and Postal Services (October, 2013). *South Africa’s Broadband Policy Draft*
- Department of Basic Education (May 2014). *e-Education Plan. Internal Draft Document*
- Department of Telecommunications and Postal Services (2014), *National Integrated ICT Policy, Green Paper vol 583*
- Department of Basic Education (2015), *Action Plan to 2019 towards the Realisation of Schooling 2030*

- Department of Basic Education and Department of Planning, Monitoring and Evaluation (October, 2015), *Operation Phakisa ICT in Education Final Report*
- *Draft Schools Broadband Guidelines*;

2.4.6 Capabilities

The approach that this strategy formulation has adopted is **Strategy in Execution...** “**strategy is only good as its execution.**” Thus, these are key enablers to ensure that Intent is translated into Actions to Achieve. Therefore, the need for a strong ICT centre, that supports and serves the national agenda. To this effect, the recommended strategy anticipates an adoption of ICT management capabilities, capacity and principles. Key amongst these capabilities, as we saw in the Executive Summary, are:

- Project Management Office (PMO);
- Change Management;
- Information Technology Services Management (ITSM);
- Contracts Management;
- Custodianship of architectural standards and practices, supported by a system development hub; and a
- Data warehouse and management (See Sec 2.6.1)

For the DBE to orchestrate a set of national projects, these capabilities must be established and / or be bolstered to transition the IT services to being of value and functional use to the end user, to manage these services and to ensure “business continuity”. In addition, it is critical to review the establishment and bolstering of capabilities alongside various existing pockets of excellence and lessons learned in the PEDs. Leveraging the PED experiences will also enrich and benefit national initiatives and the national ICT implementation program in general. This review process will be performed repeatedly and be informed by the focus of national priorities.

During the Discovery Phase of the drafting of this Strategy, various PEDs presented some initial perspectives on services that may require further evaluation for potential to leverage for national deployment. Below are some examples of these capabilities.

- Centre of Excellence and Innovation (CEI) in the WCED. This is an applications development hub with technical skills for application development and managing of outsourced IT services
- GDE learner registration and end-user computing service.

Project Management Office

The proposed PMO serves two primary roles:

1. Management and responsibility for delivery of projects or initiatives. For this role, the PMO function will be staffed with project managers. These project managers will ensure adherence to the adopted Software Development Lifecycle (SDLC) to deliver each initiative, especially projects such as the modernisation of SA SAMS and the Examinations systems. The volume of work that the sector initiates will determine the requisite number of project managers at national and provincial level. Each PED should have project managers responsible for the implementation and rollout of the nationally-agreed upon projects as defined in Operation Phakisa, that is, the “Three Feet Plans”.
2. Strategic functions must be created to support the achievement of sector goals by:

- Supporting all management forums through MIS and metrics to ensure that critical matters affecting execution are brought to bear in the forums, particularly the CEM and HEDCOM where ICT is an agenda item; Supporting all the ICT execution and governance forums with relevant reporting dashboards appropriate for each forum;
- Project portfolio management, including prioritisation. Ensuring that only projects that are aligned to the Sector Education Goals or the Three Feet Plans are approved for execution and funding;
- Project Risk reporting and ensuring that a 'single version of truth' on the status and progress of projects is presented to relevant governance forums using nationally deployed PMO tool(s).

For these roles, the DBE will need to employ a minimum of three (3) experienced project management practitioners.

In addition, the PMO will also provide functions and responsibilities as follows¹⁵:

3. Provide Support:

- Provide a standardised set of project management tools
- Provide (facilitate) training in appropriate use of the PM tools in the tracking of all projects and initiatives across DBE and PEDs. This will be targeted to the DBE and provincial PM role players to be facilitated by the supplier of the Tool. A potential service provider for this is the templates mandated by National Treasury through the office of the Government Technical Advisory Centre (GTAC)
- Develop an operating model and rhythm for all project managers, nationally, to follow the same software development life cycle (SDLC) management and reporting.

4. Tools:

- The primary tool will be a project tracking application, which will provide Business Intelligence functionality or dashboard functionality so that reports can be extracted by upper management, DPME, Strategic Planning, etc.
- The tool will be deployed and used (uniformly) nationally
- Sub-projects of national initiatives will be linked with roll-up capabilities to show a single national view of the project portfolio.

5. Processes:

- Agree and adopt a standard SDLC
- Adopt and follow similar structure for project initiation, scope, time and cost management, e.g. using the GTAC templates
- A reporting rhythm should be confirmed with the inter-provincial delegates, as these reports will provide a view of how the nationally driven initiatives are reported to the senior management forums
- Agree and adopt a few critical templates to capture reporting and feedback
- Adopt a "capture once" mindset to update and source metrics and reports. Most enterprise project management tools have these capabilities
- Agree the stage sign-off requirements. This will include requirements for project initiation and budget approval, as well as funding tranche release

¹⁵⁶ This section and its details are the scope of the Request for Information that GTAC has been asked to provide. If and when approved, the strategy document will be updated, for example with an annexure.

- “Clean-up” / Rationalise the project portfolio based on the above. Key drivers:
 - “Less is more”: Determine which projects will have impact and are aligned to the Education Goals and the Three Feet Plans.
 - Be wary of end user change fatigue, and of trying to do too much.

Change Management

Change Management is a broad topic and can relate to anything that the department does. In the context of these recommendations, the focus on training is to enable use of ICT to deliver basic education and ICT integration in teaching and learning, as well as proper ICT management and workflow in departments and sub-offices.

Training needs to recognise teachers’ time restrictions; in the afternoons after school, for three hours at most from 2pm-5pm. Some sessions should be held at the school, some at central areas, depending on how many teachers are being trained. It is important also to realise that teachers only have 80 hours of training time per teacher, and this limits how much training can be set aside specifically for ICT training.

Pedagogic integration and changing how you teach. Teachers should be exposed to the technology and new pedagogic styles first, followed by the learners. Training should lean towards the pedagogical aspect of ICTs in education, as opposed to the skills-button type of training on specific products. It is key in selecting the course content that it does not just address technical competencies, e.g. creating ‘Word’ documents, but that it addresses pedagogic skills.

Delivery of Training. The uptake of new technologies in schools is largely dependent on whether teachers are offered professional development activities to help them integrate new tools into their classroom practice. Capacity-building is a high priority and supplying equipment isn’t enough. Furthermore, teachers need clarity on the value of ICTs.

Assessment. This has to be a continuous process that includes baseline, improvement measures and support programmes, e.g. SACE/SAQA and CPTD points.

Information Technology Services Management (ITSM)

“Business continuity” and operations risk management is a key consideration in any organisational strategy. Because ICT services enable most business operations and processes for most large organisations, their availability is critical for the optimum functioning of these organisations. It is thus important that ICT services are **available**, **usable** and **functional** at expected acceptable levels. These elements are becoming increasingly critical for the Education Sector as the sector expands its adoption of the use of ICT services to digitise the delivery and assimilation of education by teachers and learners.

Information Technology Infrastructure Library (ITIL)¹⁶ is a framework that many organisations use to manage their ICT services. The diagram below succinctly summarises the intent of IT Service Management (ITSM). Failure to maintain and manage ICT services introduces significant risk to the operational and business continuity of an organisation. For the DBE, this is even more so, with significant risk due to the potential social impact and disruption such failure could have. Where ICT is a key part of delivering services, it is not always easy to revert to manual business continuity management. For example, there are significant risks involved in maintaining old, redundant or

¹⁶ ITIL is a set of detailed practices for IT service management (ITSM) that focuses on aligning IT services with the needs of the organisation.

obsolete software, which is beyond feasible upgrades. Also, in today's technologically enabled society, it is not feasible to run in manual mode for extended periods.

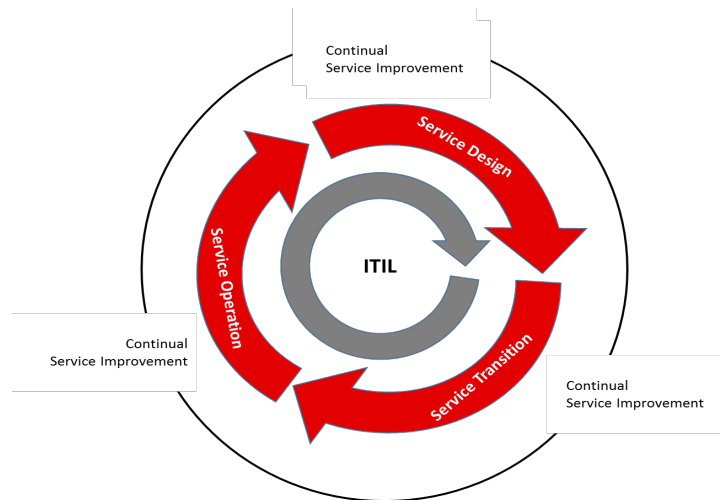


Figure 2: Information Technology Infrastructure Library

The risk management and ITSM design contains critical measures that include ability to detect and report problems, time taken to repair the problems, and others. These are standard elements of ITIL.

The four elements of this Information Technology Services Management (ITSM) model are:

1. **Service design.** This means that when an ICT system is designed and built, it must be “fit for purpose.” For example, a system that is intended to be accessed by one million learners, needs a different level of robustness than a system accessed by 10 000
2. **Service transition.** The process of operationalising a system should include user Service Level Agreements (SLAs) defining what the users expect from the system both in terms of functional (what the system should do) and nonfunctional (when should the system be available) aspects. The transition should include information for the users regarding who and how to contact the IT Support Desk, should the need arise. (It always does arise.)
3. **Service operation.** Service operation tools and protocols exist to help the technical function ensure that systems are available and functional, and provide early detection for emerging problems, which invariably arise. A simple example of this is reflected in the inability of the sector to tell *which* schools have connectivity and whether they are currently online. Compare this situation to the banking sector where banking head office IT departments *know* that an ATM is offline and remedy it within a day or two.
4. **Continual service improvement.** This a critical function and includes the capacity to rewrite and replace old systems when the need arises, to keep them current. In addition to the need for renewal and managing obsolescence, new technology sometimes provides opportunities to rationalise and simplify IT services for the benefit of both the organisation and the user community.

Within DBE, some level of ITSM exists but its function does not seem clearly defined or visible. The fact that some critical applications do not have adequate support and are running on old technology, with a limited product management road-map, poses substantial risk to the Education sector and the user community.

ITSM structure and operating model

As a starting point, the ITSM function for the sector should be structured at two levels, i.e. a two-tiered structure is proposed. Suitable Help Desk functions should be established in both the provinces and at the DBE.

- I. **System Management level:** This will mainly govern the relationships between the DBE and SITA to ensure that major sector-wide ICT services are managed and supported.

The focus areas of the DBE/ SITA based service management are:

- SLA management
- Incident management, including
 - Severity definition/ classification and “tiering”, i.e. classification of IT services and incidents in terms of level of criticality to users
 - Average time to repair per classification of an incident’s level of criticality
 - Incident-logging process and tool (an ITIL tool) for the IT Help Desk
 - The ability for the user to close an incident, not an IT person, as per the user’s satisfaction with the resolution of his/her problem.
- IT Operations Management, using ITSM data input (from the ITIL tool) should similarly report to the ICT steering and advisory committees. This should include:
 - System life cycle management, i.e. support and maintenance responsibilities
 - ‘Cost of ownership’ and ‘cost of use’.

- II. **Implementation and user level:** Provincial / District / School level IT services focusing on supporting schools.

The provincial / school level support should include the following:

- ‘First-line’ support and query resolution at school and district level by IT technicians and support staff.
- Incident logging, which should not be left to the schools, but undertaken by ICT support staff who should be based in the regions and provinces.
- ICT support staff must have access to ITIL tool to check and follow up incidents that may have been logged for someone else to resolve. The setup of ITIL tool should allow for a hierarchy – school, district, and province. This will help identify provinces or districts that require specific support and intervention
- Reporting lines for school ICT support staff / teams should be to the provincial ICT team. It is not reasonable to expect educators to manage an IT function, as is currently the case in at least one of the provinces visited.
- Local enablement to create capacity within communities to support schools and schools’ management. This enablement should be supported by provincial and national ITSM and technical functions. The Western Cape model of the Centre of Excellence and Innovation (CEI), if adopted and leveraged nationally can be good source of this technical support model.

The ITSM management processes should include the following:

- Monthly SLA meetings between provinces, DBE and SITA
- Monthly incident review meetings between DBE Service Managers and ‘lines of business’ i.e. Departmental Branches; then Provincial Service Managers and provincial lines of business.

Contract Management

This is a management, and not a legal, function. The legal team within the DBE will support the ITSM structure and management function by drafting and vetting contracts with external parties. The contracts anticipated in this function will have the sole purpose of ensuring that ICT serves the public through its service design / build and “business” continuity in meeting the objectives and goals of the Education Sector.

As noted above, service transition and service design / build are anchored on SLAs and contracts. The education sector seems to currently lack this capability. For example, some services are not sustainably managed or maintained in the schools in which they are introduced. Stakeholder engagement indicated that devices are frequently misused or not fully utilised. One of the Stakeholders referred to some of the laptop rollout initiatives as in most cases being ‘expensive gifts’. Furthermore, the fact that there are projects that include external service providers running for an inordinate amount of time is an indication of lack of good project and contract management capacity.

Generally, there are three types of IT contracts, two of which are specifically relevant to the management and mitigation of these weaknesses:

- Master Services contracts – out of the scope of this strategy. This an overarching ‘contract template’ for the government or department.
- Transaction contract – for a specific deliverable that has a start and end date:
 - It is project or initiative specific
 - Informs and is informed by the project plan
 - The contract cost / fee is linked to the delivery of the project plan
 - May include penalties if deliverables are not achieved per project plan
 - If not linked to or entered into under the umbrella of an MSA, it should include clauses that cover:
 - Intellectual Property (IP)
 - Warranty
 - Indemnity, e.g. use of another suppliers’ software.
- Maintenance and support contract – a long-term contract:
 - It is a contract that will be managed for the long-term
 - Supports business continuity programme and ITSM
 - Some management data / metrics / MIS may need to be included in the deliverables of the transaction document to manage this contract type
 - Supports the SLA, which in turn derives from the user requirements i.e. a SLA must be informed by what user requirements are
 - No vendor-developed system should be implemented without this type of contract unless the responsibility for system support is deliberately assumed by an in-house function, such as SITA, and with access to source code, and some assurance that the code is in a common language that is readily supportable (i.e. not COBOL, ADABAS etc).

2.4.7 Functions and Processes

The specific functions and processes will be developed in the next phase of the implementation of the ICT strategy. The principles and the recommendation will need to be adopted at the various governance forums before detailed work on the organisational design commences. The key objective

of this organisational design and the creation of business functions should be to enable creation of sector-wide capacity and expertise to manage an ICT environment. This will cover:

- ICT leadership - Creation of the role of and appointment a Chief Information Officer (CIO);
- Supported by ICT support functions such as PMO (GTAC process based), ITSM (bolstered team) and change management (normally this service is contracted per initiative).

For the creation of the PMO and its project management and governance processes, this will be determined by output from the work with GTAC. Similarly, ITSM processes will depend on the adoption of ITIL or Control Objective for Information and Related Technologies (Cobit)¹⁷. However, since Cobit is a more advanced process and suitable for ICT mature organisations, this strategy document / work recommends the adoption of ITIL or some key elements of ITIL, rather than Cobit. The project management model provided will cover:

- Project management process and tools;
- Project initiation processes focusing on project sponsorship (i.e. the owner of project in the sector, typically a senior manager), delivery and change management;
- Management process to deliver projects with value;
- Transition of projects from development to operations, maintenance and support, i.e. IT Service Management processes; and
- Where relevant, software development processes, i.e. sub-processes of the SDLC will be a domain of SITA and driven accordingly.

2.4.8 Enterprise Architecture and System Development Hub

The following enterprise architecture is recommended as a **National** system implementation. The key elements of this architecture are the following:

1. A 'private cloud': A set of integrated systems managed through a single virtual private network (VPN).
2. Access is managed through a single URL (universal resource locator). In simple terms, this is an address for the internet browser. This has multiple benefits both for the user and for the management of the systems, key to which are **security** and **single sign-on**¹⁸. SITA has a minimum Information Security Standards, which will serve as guidance in the implementation of the recommended architecture and initiatives. The guiding principle being to enable users and make user-facing systems simple to use, and easy for teachers and learners to access.
3. The system will be built and aligned to 'business' functions, i.e. departmental branches as product owners. The objective here is to ensure that the Branches take a lead in developing requirements, i.e. what the ICT (system) should enable. This approach will also ensure that **common (single) national** set of systems are developed to service the sector. For example, there should be only one repository for digitised curriculum, ensuring that, nationally, all teachers and learners, have access to the same digitised, approved curriculum - a single CAPS curriculum with national digital textbooks, workbooks, etc. Similarly, there will be one repository for learner information (e.g. LURITS). There is an opportunity to incorporate the best practices from the Gauteng Department of Education's online registration system, to become a national platform for managing both learner registration and identification using a

¹⁷ Cobit is defined by ISACA as, an IT governance framework and toolset that allows managers to bridge the gap between control requirements, technical issues and business risk.

¹⁸ (Single sign-on is an authentication process that allows a user to log / sign onto multiple applications or databases with a single set of credentials or password)

standardised national learner identification number protocol. Other national deliverables may be digital examinations, web-enabled SA-SAMS, and a digital teacher portal with professional development tools.

4. A single set of common systems allows for easy **integration** and *product positioning*, which means having each system in the architecture dedicated to one function. For example, learner information will be stored in the 'Learner System'. Thus, this system is the master against which all other systems are integrated in order to read, query or utilise information about a learner. This integrated design will apply to all systems based on Minimum Interoperability Standards (MIOS), also as defined by SITA. MIOS applies to both document exchange and data exchange between databases or silos. The true benefit of this design is that it provides a 'single version of the truth', i.e. a single source of information that is referenced by all systems and updated at predefined intervals. In this manner information integrity is ensured and will be a good basis for robust MIS, at low cost. As a simple example of this, Department of Home Affairs has mandate for issuance and verification of Identity Document (ID) numbers, and so, represents the SSOT (Single Source of Truth) regarding ID Numbers.
5. **Access to the applications:** The adoption and use of the E-Government portal URL will not only enable teachers and learners to access both Education Sector systems, e.g. Curriculum, but also access to externally available auxiliary or supplementary systems that offer additional education material and services. The advantages here are:
 - a) The Department would know which learners and teachers accessed the URL and moved from that system to another via an authentication API;
 - b) e-Rating or zero rating can be negotiated with network providers for access to systems that are hosted in this private network, thus enabling all learners and teachers to use the systems without charge or at an agreed e-rate;
 - c) Although the provision of end-user devices will in most cases still be the responsibility of the sector, this design will enable Bring Your Own Device (BYOD) usage;
 - d) Therefore, learners and teachers would be able to access the applications from anywhere (even home), and at any time, thus not be limited to use of the Education sector ICT services only when at school. This is critical for example when learners have homework or wish to engage their parents at home on digital learning materials, without having to impose cost on the family.
6. This Architecture will ensure that within the context of government's concurrent functions, where applicable and optimal, it will remove the **complexity of managing IT services**, SLAs and system availability from multiple role players and department functions to a single point of responsibility - a managed centre. The objective is to make IT services the responsibility of IT practitioners rather than educationalists, whilst still taking active and serious cognisance of the requirements of the education sector, and, through the SLA practice, delivering on those requirements specified by educationalists. It is the IT practitioners' responsibility to host the IT services, ensure services are managed and that business processes have access to these services are **simplified**.
7. The Management Information and Data Warehouse is one of the elements of the ICT strategy framework and is dealt with separately below.
8. Operations automation is the process of using information to improve and reduce administrative activities, and as such is an area of **opportunity**. For example, teachers may access application functionality that enables them to update lesson plans, reports about the teachers' work may then be derived from the information updated or not updated on the system, without requiring further manual reporting. Another example may be tracking of

projects in a digital system with a Business Intelligence dashboard. Instead of incessant requests to officials for progress, management can simply extract reports on-demand, at any time, without any need for formal reporting schedules. Event logging, particularly of system usage and user behaviour on systems, is more and more a good source of administration and management information, as it provides indications of the levels of engagement of officials, teachers, etc. in the system. As another example, if a particular learner does not engage with the system much, it may be possible to correlate their engagement levels with their marks/test scores. This opportunity may need to be the focus of the next phase of implementing this design.

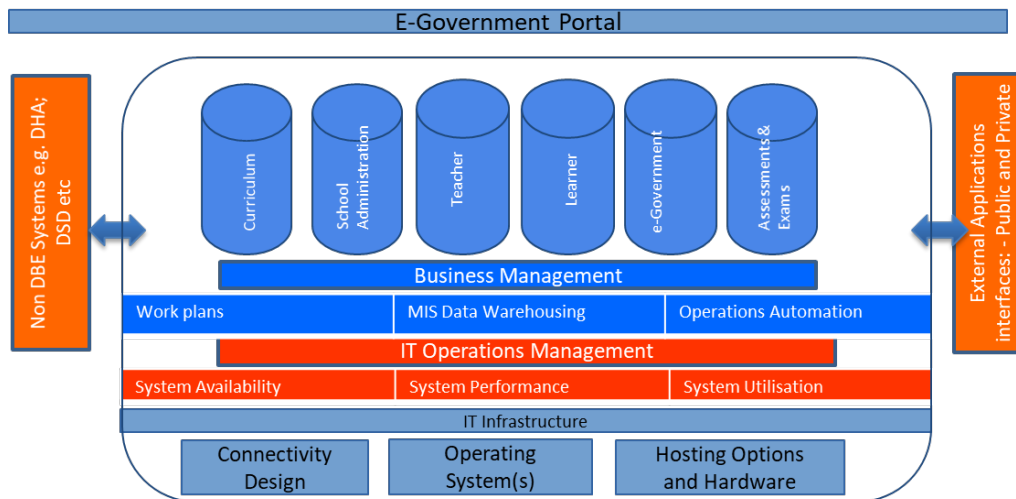


Figure 3: Enterprise Architecture

The role of the State Information Technology Agency

Key to the achievement of this design or enterprise architecture landscape is the need for a system development hub. It is widely acknowledged that, to date, SITA has not performed to expectations and its mandate. However, there are two key realities:

- SITA has the mandate and *raison d'être* to provide ICT services to government departments as per the SITA Act 2003 as amended.
- The alternative is to outsource the development and hosting of **all** services to **one** service provider. Fragmentation and multiple hosting and development services will fail to achieve the 2004 *White Paper 7* objectives as well as the overall objective of a functional ICT landscape that would support both the administration and delivery of education as the systems would likely be developed in such a way as to be incompatible. We already see this with the existing examinations mainframe, for example, which is not compatible, again as an example, with the curriculum delivery systems; meaning that a learner has to sign up separately for both, and their marks in the curriculum system cannot be sent to the examinations mainframe for recording or prediction of success/failure. This fragmented approach is not recommended because in addition to removing the Education sector ICT systems from the government ICT eco-system, it will make system interfaces difficult as explained above.
- There is a new management commitment to the SITA mandate and new business model, the realisation of which will be helped by the DBE's active drive to derive value from SITA. There are established bureaucratic and political forums to ensure that this commitment translates into action and reality. The challenge to date has been the extent of DBE ownership and leadership of these services, hence the recommendation for a strong ICT function supported by ICT management capabilities.

Below is the specific rationale for recommending SITA as the key service provider and custodian of the Education sector's enterprise architecture:

Strategic: SITA is a national agency, and management of government's ICT is their *raison d'être*.

Cost to government:

- ICT spent between within government departments (i.e. within the same organization) are generally referred to as 'Wooden dollars' – SITA services are already a cost to government unlike spend going to an external / private entity; the money spent remains within government.
- Theoretically, SITA should be more cost effective than the private sector, given government spend on IT services. The natural consequence of the large government spent on ICT using common infrastructure, application and interfaces should Economies of Scale. However, it is well known that this is not the case and this is one of the first matters to take up with SITA prior to signing of an SLA.

Accountability

- SITA is a legislated institution. It is reasonable to assume that mechanisms and processes to regulate its execution of its mandate and responsibilities are documented and should be used to ensure meeting of the Education Sector's requirements
- SITA reports through DTSP to Parliament on ICT management for all government institutions. This will 'shield' the education sector from accounting on services that are not core to its function of delivering education.

Operational: *Business continuity and risk management*

- Ability to implement common / standardised systems in compliance with national governmental standards.
- Avoiding multiple service providers with divergent services, products and development models/frameworks, which result in complex requirements to manage.
- Managed Virtual Private Network (VPN) that enables single sign-on and interoperability of systems. Where external service providers are used, their systems must be deployed within SITA's education sector VPN.
- Enablement and ease of downstream capabilities, e.g. data warehouse and analytics, because of the intention to deploy systems which are interoperable with enabled Interfaces within VPN and the external IT services accessed through the VPN.
- A common management of end-user computing requirements and incidents. This will include elements of usability and access enable through common user interface, single sign-on and security.

These recommendations recognise the limited Customer Relationship Management (CRM) framework from SITA that has, to date, been focused on serving and servicing the GITO Corporate Services and/or EMIS directorate. This, to date, has primarily been in exclusion of other IT services that help the sector deliver on its mandate to serve learners and teachers. It is the resolution of this proposed CRM framework that SITA should provide the best opportunity for the sector to drive the ICT implementation in a coherent customer-(education sector)-driven approach.

The alternative to using SITA will results in **complexity**, key of which is creating ICT service supplier management competency in the sector; which is a function that is not a natural core competence of

the department, or which would entail acquiring the necessary human resources and ICT infrastructure at the DBE, and hence significant additional costs.

2.5 Achieving the ICT Strategy: The Critical Success Factors

Successful achievement of the ICT strategy is dependent on the establishment of and the quality of the following key pillars:

- **Leadership.** Leadership responsibilities do not rest on one person but require a cohesive sector-wide leadership. Leadership responsibility for the education sector rests in two key national structures: CEM and HEDCOM¹⁹. To this end, ICT and its implementation should form a key part of these forums' agendas.
- **Strengthened human capacity and capabilities.** There is a need to create a strong **ICT management centre** to manage all the noted capabilities. This will provide a point of aggregation for technical oversight of the noted functions and capabilities, as envisaged in the role of a CIO and a PMU.
- **Governance.** Governance is the applied, visible and active management oversight and support through the leadership forums of CEM and HEDCOM. The objective of governance is to ensure the management and delivery according to plan of the agreed set of national initiatives. Universal practices to govern the delivery of projects focuses on these elements: time, cost, quality, and scope.

¹⁹ (See the following section on Leadership and Common Purpose)

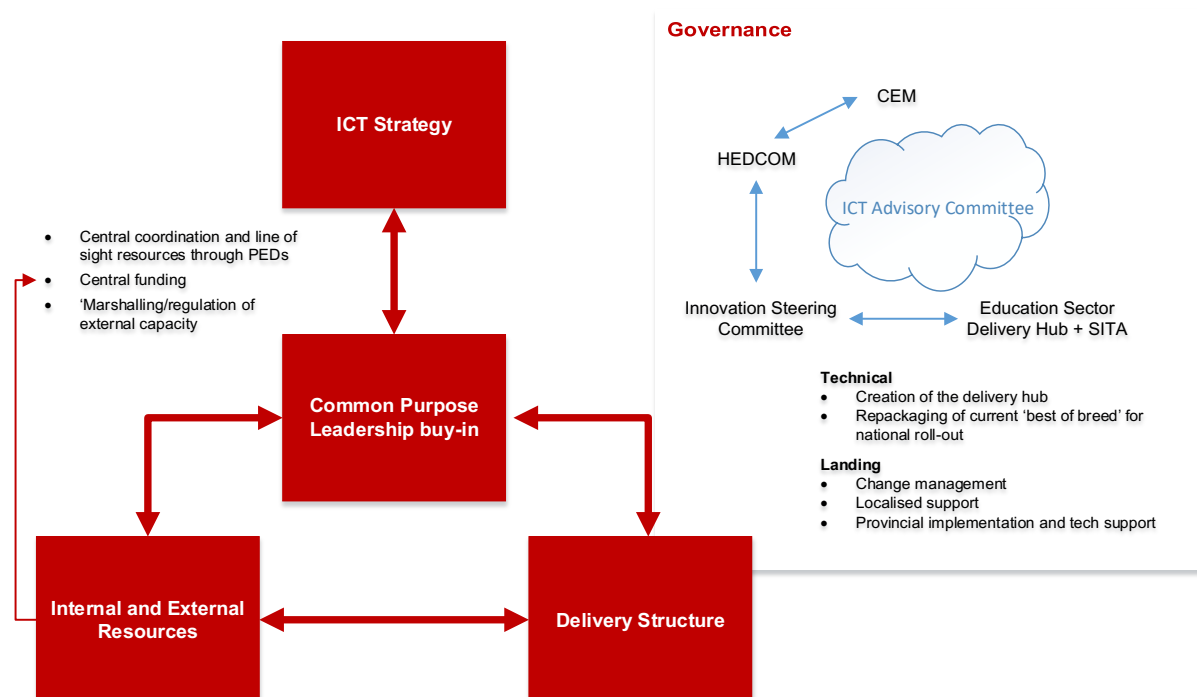


Figure 4: Key Pillars of ICT Strategy

2.5.1. Leadership and Common Purpose

All stakeholders need to work within the model of unitary effort or Common Purpose. The table below highlights key considerations that will support and enable this common purpose.

- Manage ICT under one umbrella, albeit with distributed ownership to leverage provincial capacity and local knowledge, to afford the sector with a common and consistent set of management practices, funding model and management of accountability.
- Through Operation Phakisa, most stakeholders have invested in an agreed set of initiatives. This agreement should be leveraged to gain further stakeholder 'buy-in' and engagement. It provides an already established starting point.
- Support provided by an existing governance framework with mandates and policies. See Section 2.5.3 Governance Forums.
- A "redefined" GITO role should be broadened to be the CIO function that delivers and manages education sector ICT services across the sector.
- Managing and extracting value from the Universal Services (and Access) Obligations (USAO/USO), which delivers connectivity and devices to schools through the licensing agreements between ICASA and telcos. Standards and common objectives for the USO services linked to the sector project list and initiatives need to be created. Currently these USO services are not clearly linked to an overall delivery plan and seem mainly to be driven directly by DTPS and ICASA, with poor ICT service transition processes. At most some IT services are directly delivered to schools with minimal involvement of the province, let alone the DBE or PEDs.
- Managing innovation across DBE and the Education sector and supporting the sector through a well-established sector-wide Project Management Office. .
- Creating and managing SLA contracts with SITA through Information Technology Services Management (ITSM).

- Policy framework to manage private sector donor services across the sector. A single point to ensure that donor funds are channeled to initiatives that make the most significant impact across the sector. This will include 'crowd sourcing' principles, meaning that more than one donor can support one initiative.
- Create sector-wide technical capabilities for both applications development and infrastructure. The options for the sector are either to create a stand-alone Innovation Hub (similar to that of the Western Cape) or to entrust the responsibility to SITA.

2.5.2. Strengthened Human Capacity and Capabilities - Creating the Central ICT Function

As noted already, there is no central coordination of ICT initiatives and services for the sector, nor any single point of coordination and responsibility in DBE, across the sector and even within some of the provinces.. The GITO function in DBE seems to be narrowly defined and purposed to provide 'corporate' services but not Education Sector ICT services. This is a major inhibitor that is not aligned to the 2012 Corporate Governance of ICT Policy Framework (CGICTPF).

The recommendation of the strategy in this respect then is to create and / or strengthen the DBE ICT Centre that will serve the whole Education sector.

Public Service Corporate Governance of Information and Communication Policy Framework (CGICTPF)

Below are some of the relevant sections from the CGICTPF document that demonstrate the value of GITO in supporting government departments provide service to the public.

Section 5.2: In 2000, Cabinet approved (Cabinet Memorandum 38a of 2000) that the GITO in each department should be responsible for aligning the respective department's ICT strategy with its strategic direction and management plans. Furthermore, the GITO should report to the HoD and be part of the Executive Management team.

Section 6.2: The purpose of ICT is to serve as an enabler of public service delivery through, inter alia, achieving stakeholder value and ICT key focus areas (ICT House of Value 4) that enable the Public Service to achieve these 12 strategic outcomes.

Section 7.2: **Outcome 1: Basic Education**

Primary Influencing Goal: Government; Architecture; Interoperability; Digital inclusion; Economies of scale; Reduced duplication.

Secondary Influencing Goal: Security.

Value(s): Lower cost; Citizen convenience; Increased productivity.

2.5.3. Governance and Monitoring

Below are the recommended governance forums to ensure sector achievement.

| PROJECT EXECUTION AND MANAGEMENT COMMITTEES | | MANAGEMENT AND GOVERNANCE COMMITTEES | |
|--|--|--|--|
| 1. Regular Project Management meetings | | 4. Inter-provincial HEDCOM Subcommittee meetings | |
| <ul style="list-style-type: none"> a. Weekly. b. Managed through a Gantt Chart to track progress. c. Attended by delivery teams. d. Chaired by the project managers/leads. e. Held at either PED or DBE level depending on where the project is initiated. | | <ul style="list-style-type: none"> a. Quarterly before HEDCOM. b. Status update input from #3 and PMO reporting dashboards. c. Attended by project sponsors. d. Chaired by a HEDCOM delegate – typically a DDG. | |
| 2. Project Steering Committee meetings | | 5. HEDCOM | |
| <ul style="list-style-type: none"> a. Monthly. b. Focus on managing project delivery risks and blockages. c. Attended by project lead and the delivery leads. d. Chaired by the project sponsor – typically the CD or DDG. e. Held at either PED or DBE level. | | <ul style="list-style-type: none"> a. As Is – Quarterly. b. Progress update towards achieving GOALS with ICT as an enabler. c. Oversight on IT spend. d. Oversight on adoption. e. Oversight on trends – ICT Advisory Committee input. f. Input and update from Chief Directors Forum. | |
| 3. Provincial / DBE ICT Projects Review meetings | | Other committees | |
| <ul style="list-style-type: none"> a. Monthly departmental meetings. b. Progress tracking relative to plan, cost and scope and quality. c. Attended by all the department's ICT projects' leads at both National and Provincial level. d. Provincial feedback is based on regional feedback and experiences. It should also be possible to learn regional and provincial project implementation best practices for replication across the sector. e. Includes benefit realisation. f. Chaired by provincial HOD or DBE DDG where applicable. | | <ul style="list-style-type: none"> a. ICT Advisory Committee. b. Other. | |

Figure 5: ICT management and governance forums

To support implementation in provinces and drive common practices nationally, provinces must create a **provincial** project implementation structure and teams. The functioning and effectiveness of this provincial structure should be visible and monitored at the Provincial / DBE ICT project review meetings.

2.6. The Delivery Roadmap

The execution of this strategy anticipates an agreed national approach to implementing ICT. As a recommendation and starting point, this document proposes two sets of initiatives.

1. **Foundation initiatives** - these are technical initiatives that are prerequisites to laying the platform for a good ICT landscape and user experience. These will provide enabling systems capability. A clear and obvious example of such is Connectivity.

2. **Functional initiatives** - these are projects initiated to meet specific user requirements. An example of this will be projects initiated to support Learning and Teaching Support Material.

The table 4 in the Implementation Plan provides a probable likely (to be confirmed as part of the Implementation Plan adoption) view of the alignment with Education Goals. This alignment will be achieved through the initiatives, informed by the ICT Strategic Objectives. Below are some of the recommended specific initiatives.

Specific Initiatives

The agenda for achieving sector specific objectives and goals will determine the definition of specific requirements and system functionality. Key to meeting the 2030 Education Goals will be to ensure their alignment with the applications that are built or changed and be directly linked to specific goals. It has to be acknowledged however, that not all of the goals are ICT dependent.

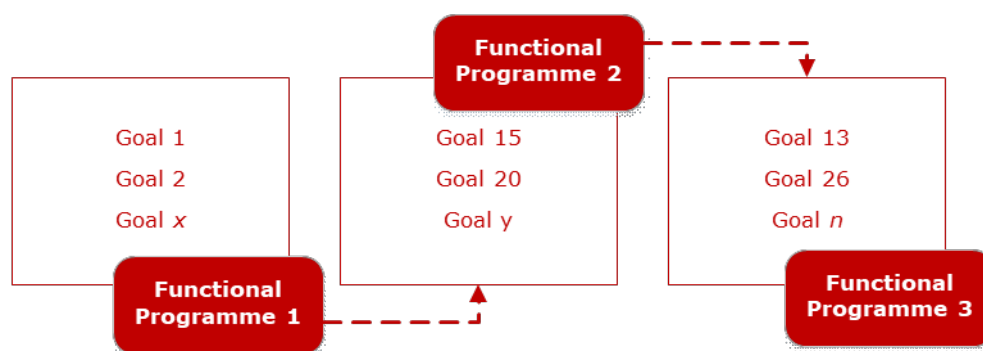


Figure 6: Relation between sector goals and functional programme

2.6.1. Recommended Foundation Initiatives

1. Access - Connectivity

Connectivity is a significant impediment to the achievement of ICT in Education goals. The responsibility for the roll out of network infrastructure rests with the Department of Telecommunication and Postal Services (DTPS). The lack of progress on this initiative has resulted in provinces adopting and implementing their own networks and thus creating inconsistencies in network infrastructure rollout across provinces. Many urban areas and better-resourced provinces have developed their own network infrastructure independent of the DTPS. The reality is that the DTPS broadband initiative is taking time with no clear delivery commitment / dates and the approach so far seems to be dependent on the readiness of other departments, specifically Health and SAPS.

However, to regard DTPS as redundant, as some provinces have done, has multiple obvious disadvantages for the development of this ICT service, including

- Loss of leverage on economies of scale
- Reduced flexibility for users, therefore there is no national access to systems that are deployed within specific provincial networks. For example, a Gauteng learner may be unable to access the Western Cape system, and thus unable to work collaboratively on the same piece of information or project with a Western Cape learner.
- Obstacles to advancing the national intent of connected schools, communities, businesses, and government.

To remedy this paralysis and leverage the potential value to be gained through the DTPS contribution, it is recommended that the CIO function, through the Education sector GITO, should play a strong

role as a 'customer' in the context of supplier relationship management, to hold the DTPS to the delivery of this service. This function should ensure that DBE sector-wide priorities are set, requirements defined, funding sourced, and progress managed.

Although the need for a national network is acknowledged, a parallel approach is recommended that through a DBE driven foundational initiative, the Education sector can achieve a level of flexibility on connectivity that is still managed within a single umbrella. Options for connectivity include:

- With Gauteng and Western Cape having progressed in developing regional networks, it is nevertheless still possible for a national network to be established according to the current policy framework, i.e. driven by DTPS and SITA.
- Use of Mobile Network. A second approach, which is immediately feasible and practical given the very high estimates of connectivity coverage by Mobile Network Operators (MNOs) in SA by ICASA, to resolving the connectivity issue is the use of Mobile Network.

2. Access – Devices

The ICT strategy recommendation through the enterprise architecture (Figure 3) is agnostic to the type of devices being used. It anticipates that learners and teachers will be able to use personal devices (laptops, smartphones and PCs) to access ICT services through the e-government portal.

Where the sector or department has responsibility to rollout devices, the *initial* view is that devices should be appropriate 'dumb' terminal. There are multiple levels of 'dumb', thus the main objective is to limit the computing capability of the end-user device. These devices will work when connected to the e-government portal to download and upload data and information.

Benefits of 'dumb' devices:

- Lower cost to procure.
- "Theft proof". Without or with lower computing capability, the value in misappropriating these for use outside of the education sector VPN is low unless used in other ICT environments with similar enterprise architecture. This is unlikely.
- Device management and refresh, using ITSM process and principles will be simplified.

3. Education Sector's managed private cloud

Cloud computing is a general term for the delivery of hosted services over the internet. Cloud computing enables users to consume a computing resource, such as a virtual machine (VM), storage or an application, as a utility - just like electricity - rather than having to build and maintain computing infrastructures in-house.

The private cloud initiative can add significant value to the Education sector. The mobile telephony equivalent is *pay as you go*, but more so the ability to have common access to services and products with all other users nationally in the cloud. As such, the concept of the private Education cloud is a bit of an oxymoron if it does not allow for access to multiple applications and ICT services. Based on the recommended Enterprise Architecture, the private cloud within the private network will not only enable access to multiple Education sector applications and systems, but also access to external applications that the private sector may provide, e.g. Google classroom and others.²⁰ This will benefit teachers and learners, by supplementing the ICT services and applications provided by the Education sector.

Through the Enterprise Architecture, the Private Cloud will host applications that cover:

²⁰ It is important to distinguish the word "private" in the phrases "private network" and "private cloud" from the word "private" in the phrase "private company"

- Curriculum
- Learning and Teaching Material
- Teacher Development
- Sector Administration
- School Administration
- The Enterprise Architecture is “...an ever-evolving artefact”, thus used to develop applications that meet the sector’s goals.

The second element of the private cloud is its management. It is imperative that these IT services are managed, to ensure that the services are both available and kept relevant and refreshed to serve the evolving needs of the sector.

4. Hosting options for the DBE cloud

The discussion above on the role of the SITA notes the recommendation and preference for this service to be performed by SITA. Given the historical role of SITA as the government agency responsible for hosting the government ICT service, the assumption is that technically SITA has key competencies in the function. However, in implementing and evaluating the hosting options, this initiative should address the following elements:

- Private and public security. This is normally controlled through user access management and role provisioning
- Role profiling and maintenance, e.g. data access requirements, standardising role definitions. Defining these roles minimises the effort and administrative tasks necessary to create and maintain the role profiles.
- Other internet services, i.e. accessing public cloud via the Education sector private network
- Product / applications licensing management – usage subscription and de-registration or unsubscribing, as well as intellectual property (IP) issues in content distribution.
- Licensing models, e.g. ‘buy once and use forever’ similar to a physical book vs access for as long as annual subscription fee is paid. The licensing and contracts option should be governed per the contracts management section noted earlier with key focus on IP, warranty and indemnity. It is anticipated that digital material will enable interactive use of content. In the case where private sector sourced content is enriched by teachers and learners, this IP should remain in the sector, or be accessible at no extra cost.

5. Information – Data Warehouse and Analytics

Generally, there are two types of Management Information System (MIS) reporting:

- 1) Standardised / Structured Reports: e.g. Data-driven Districts Dashboard²¹ within the Education Sector. These reports are based on a set of predefined rules and (programming) logic.
- 2) Unstructured/ Query: These report types put the onus for the logic, parameters and presentation format on the user or requester. The quality of the report and its usefulness is specific to the user.

System functionality and its management requirements drive each of these reporting types. For the Education sector, best practice would be to create standard sector-wide reports, and to limit the use

²¹ The Data-driven Districts Dashboard is a web application created for the DBE which gives a dashboard overview of performance in the districts. It draws data from SA-SAMS. The Michael and Susan Dell Foundation plays a role here through the DDD initiative.

and availability of unstructured data downloads. For systems that are likely to be accessed by millions of users, allowing for unstructured/ query reports presents significant business and IT operations risk.

Also, note that this Enterprise Architecture and Data Warehouse design will enable the “Big Data” as and when the sector’s MIS requirements mature to that level of complexity. The current starting point is to provide usable data that can be translated to MIS. A key enabler of “Big Data” is an ability to track each user’s “footprint” within an ecosystem of ICT services. Within this Enterprise Architecture and private network this can be easily achieved.

The recommended Enterprise Architecture and the Data Warehouse design below expand the scope of information to include more systems as sources of data.

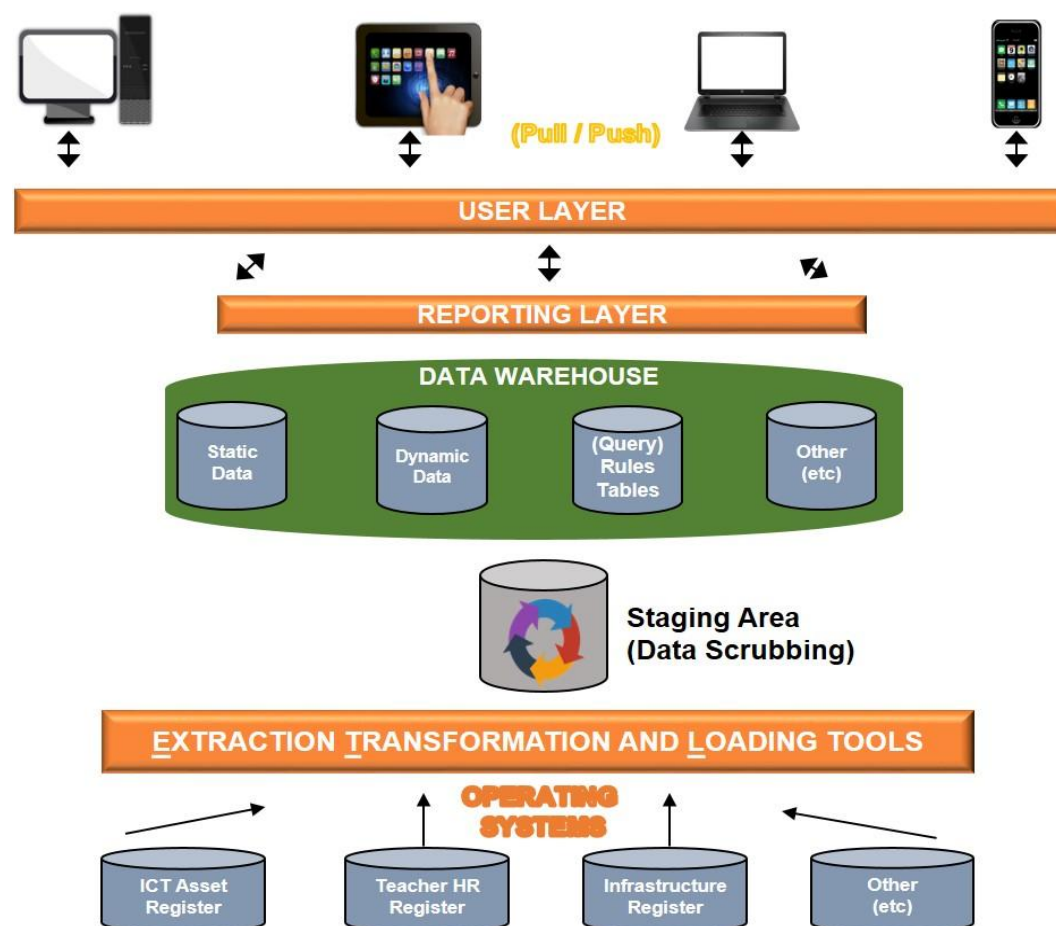


Figure 7: Data Warehouse design

2.6.2. Recommended Functional Initiatives

The key objective of functional initiatives will be to achieve Digitisation and Application Standardisation and Rationalisation. The below represent some suggested functional initiatives.

- e-Administration: There is a cluster of systems in this space, e.g. NEIMS, LURITS, SA-SAMS. The scope of this initiative should simply be about providing multiple views or report types from one data source, the SSOT.
- Digital content and curriculum: The functional scope should cover what and how educators and learners will use LTSM, i.e. management of distributed access to content. The content and access should be standardised, and Single Signon should apply.

- **Interfaces:** Interfaces (APIs) between school infrastructure (NEIMS), PERSAL, Home Affairs, and so on. Some data elements will be needed for operational purposes e.g. in registering a child at school, an interface to Home Affairs may be necessary to validate a child's details.
- **Automation of Operations:**
 - Corporate services. An example of this project is the already initiated process of automating "submissions". This system, if workflow enabled, can be expanded to automate other corporate services such as Invoice receipt to Payment. There are multiple opportunities and applications that such a system can be extended to cover, each project being developed with its business case, funding and execution plan.
 - Automation of administrative activities in delivery and managing the delivery of education. Examples of what is possible under this initiative include the automation of lesson plans; reporting of work done, or curriculum covered. This will be made possible by the teacher and learner login details to LTSM and Curriculum systems, when accordingly developed. This should be handled by the DBE Cloud / curriculum silo in the Enterprise Architecture.

The Project Management Office (PMO) will be critical in ensuring that these initiatives are managed to Time, Cost and Scope/ Quality measures. These measures and metrics will be presented and discussed at the oversight and governance forums. The key areas of the scope of this reporting will include:

- Project portfolio management - which projects should be initiated and funded based on 'business case' criteria that help the sector to achieve its Goals?
- Project tracking - Will the project meet the targets and scope agreed? Will the project team and management forums design and implement early intervention steps whenever required?
- Provincial rollout and access - measuring the value of the initiative and investment. The project is successful only if the intended user community can use it and derive value.

C. Summary of Recommendations and Critical Success Factors

The ICT strategy framework (Figure 1) provides for key elements that the recommended ICT strategy covers. These elements have been covered in detail in this document, however, the main thrust of this ICT strategy recommendation is execution: a strategy is only as good as its execution. The Critical Success Factors to **enable** the achievement of the ICT strategic framework as defined in the section C1 of this document and detailed in **Appendix B** are:

- Leadership and Common Purpose
- Capacity and Capability
- Project Management Office
- IT Services Management (ITSM)
- Contract Management

The table below summarises the specific set of recommendations defined through the document.

Table 5: Recommendations and actions required of the sector

| Title | Recommendation | Actions required |
|---|---|---|
| Central ICT function | <ul style="list-style-type: none"> • Create and/or strengthen the DBE ICT Centre that serves the entire education sector • Strengthen GITO function within the CGICTP Framework | <ul style="list-style-type: none"> • Review and confirm that the current policy framework is applicable to support the education sector as a whole • Appoint the identified role players |
| Role clarity | <ul style="list-style-type: none"> • Underpin common and shared vision by shared set of projects and programmes using common language and measurement tools • Define a common set of management processes and accountability for the ICT delivery for identified initiatives • Resolve current gaps in role clarity and responsibilities | <ul style="list-style-type: none"> • Develop management processes and assign roles and responsibilities to tasks in each process • Set-up provincial ICT structures that support implementation of nationally driven initiatives. This action does not suggest there will not be provincially driven initiatives; however, PED initiatives will have lower priority than national initiatives |
| Sector structure and responsibilities | <ul style="list-style-type: none"> • Develop COMMON PURPOSE framework • Agree on sector-wide set of initiatives that support a common set of goals guided and governed under the different forums (ICT Steering Committee, HEDCOM, CEM and ICT Advisory Committee) | <ul style="list-style-type: none"> • Agree on common goals for the Education sector • Develop initiatives that support the goals • Guide and govern initiatives under the different forums |
| Agencies and management structure for services | <ul style="list-style-type: none"> • Resolve current execution accountability and management issues of 'delivery agencies' e.g. SITA • Establish unit in DBE to manage this function | <ul style="list-style-type: none"> • Create a structure/ function within DBE that can manage and coordinate delivery Agencies' activities per contracts or SLA |
| IT delivery structure | <ul style="list-style-type: none"> • Leverage SITA's renewed 'energy' and focus on the 2002 service mandate. This should only be to the extent that SITA invests in supporting the Education Sector and delivers to target • Develop risk management processes to manage delivery | <ul style="list-style-type: none"> • Establish a governance framework with SITA • Establish a dedicated and visible delivery function • Establish an operating model that guides the architecture, application choices and hosting of services |
| Alignment and relevance | <ul style="list-style-type: none"> • Ensure the strategy execution framework closes the gap between the 2004 <i>White Paper 7</i> and the 2030 <i>Education Goals</i>. | <ul style="list-style-type: none"> • Review the strategy execution framework and ensure alignment with the goals |
| "Business" | <ul style="list-style-type: none"> • Address key question: How does the education | <ul style="list-style-type: none"> • Develop processes whereby |

| | | |
|--|--|--|
| continuity | <p>sector (and its ICT services suppliers) ensure that systems and technology deployed to the schools/ districts are or will be sustainable, managed and improved on?</p> <ul style="list-style-type: none"> • Adopt the ITSM principles as espoused by the ITIL framework. | <p>systems and technology deployed to schools are identified and accounted for in a Library of Systems</p> <ul style="list-style-type: none"> • Assign roles and responsibilities to the systems management process • Create a risk management system within the process to manage and mitigate possible risks |
| Transversal IT services | <ul style="list-style-type: none"> • Make decisions on end user application choices, i.e. desktop and laptop services; cloud services (FOSS / Office 365) and / or operating systems. These are contracts that exist across the sector and should either be leveraged nationally or rationalised. • Standardise applications and draw on economies of scale for further ICT project funding options. | <ul style="list-style-type: none"> • Agree on standard applications, desktop/ laptop services and operating systems for the sector • Negotiate with supplier bulk/ multiple licenses on software |
| “External” suppliers and contracting model | <ul style="list-style-type: none"> • Develop a common model for SITA and other ICT service suppliers to be governed by a standard contract type and service level agreements | <ul style="list-style-type: none"> • Agree on contract structures model that will work for the Education sector with the legal support team in the DBE |
| Disparities in ICT management practices between provinces | <ul style="list-style-type: none"> • Adopt the ITSM model that supports both management of ICT suppliers and systems availability to the users across the sector. | <ul style="list-style-type: none"> • Create the required technical capability and skills within each province and ensure the responsibility for this resides in an ITSM function and not with educators |
| Introduction and management of change | <ul style="list-style-type: none"> • Enforce the following management disciplines: <ul style="list-style-type: none"> ○ Technical change control management (Technical readiness) – this discipline includes processes that regulate the effectiveness of testing (specifically non-functional requirements); security and access management; infrastructure capacity and service support; ○ The other discipline is Change Management (User readiness) – this includes training and tracking of the use of the solutions (adoption). How does the system owner know which of this plethora of applications and solutions is/ are of value to the teachers and learners? | <ul style="list-style-type: none"> • Develop technical process and tools to test technical readiness • Develop change management process and tools to track and monitor functional/ user change and readiness |
| Managing provincial idiosyncrasies | <ul style="list-style-type: none"> • Recognition of individual provincial needs and peculiarities. However: • Through the PMO, coordinate and institute project tracking to ensure visibility of all initiatives in the sector | <ul style="list-style-type: none"> • Develop a portfolio management process that can enable transition of initiatives from province specific to sector-wide. |

Next Steps and the Implementation Plan

D. Next Steps and Implementation Plan

The focal point of this strategy is Execution. Execution requires a specific intent and a will to make decisions and take actions. To this end, the table below provides a set of the enabling decisions and actions required to take work output forward.

| | Short-Term (6 - 12 months) | Medium Term (1 - 3 years) |
|---------------------------------|---|--|
| Management | <ul style="list-style-type: none"> Review, amend and adopt the recommended ICT strategy at the senior sector forums forums, specifically the CEM and HEDCOM. As per Section 2.5 above the following decision points needs to be adopted: <ul style="list-style-type: none"> Common Leadership and purpose Governance model for a national implementation drive of ICT initiatives Creation of an ICT centre including the approval to create a sector-wide CIO office in the DBE Review and confirm SITA's role as the ICT delivery Hub for the Department: <ul style="list-style-type: none"> MOU A funded resource plan. | <ul style="list-style-type: none"> Confirm SITA's resource plan to support the Education sector; Agree a sector-wide project funding model - this may have to include Treasury, if deemed necessary, as some of the contracts and services may be transversal. |
| Operations | <ul style="list-style-type: none"> Review and confirm the required ICT management capacity and capabilities Agree the required HR and management structure to enable these capacities Review and increase capacity in the GITO function to support the sector and not the DBE only Review capabilities that exist in provinces - pockets of excellence that can be adopted and adapted for national benefit. | <ul style="list-style-type: none"> Continuous and long-term organisational design review to build ICT management capacity and capabilities. This should be driven by the CIO's office Continuous alignment of national and provincial ICT management function and practices. |
| Resourcing | <ul style="list-style-type: none"> DG to mobilise both public and private funding to build the required capacity and capabilities. (The NECT will continue to support DBE in sourcing private funding as the case with SA-SAMS) Issue requests for proposals to help the sector 'build' the required capabilities. This will include adopting provincial capabilities, skills and leadership for national benefit Fill the agreed roles for the PMO, ITSM and Contracts Management. | <ul style="list-style-type: none"> Through the CIO's office, resource the adopted initiative to ensure that projects are delivered to plan - Scope, Time and Cost Develop a contract model to supplement internal capacity - some of this capacity will be in the form of contract services. |
| Planning | <ul style="list-style-type: none"> Review and prioritise the recommended Foundational and Functional initiatives. Review the current list of initiatives. Stop those not aligned to the "Three Feet Plans" as agreed in the Operation Phakisa Lab, and align or merge provincial initiatives with the national initiatives where applicable. Examples are the different provincial curriculum portals that should be merged, national VPN, national Business Intelligence etc. | <ul style="list-style-type: none"> Develop a model for initiation of initiatives guided by the government budget cycle Develop a 'benefit realisation' model that demonstrates the 'value delivered' by the initiatives undertaken in each budget cycle. |
| Governance | <ul style="list-style-type: none"> Agree the project governance and management framework, Section C above references the recommended forums Agree meeting cadence for each of the forums Confirm attendee role players, e.g. mandatory attendees, quorum. | <ul style="list-style-type: none"> A continuous process to evaluate the value-add of each forum and amend where necessary. |
| Monitoring and Reporting | <ul style="list-style-type: none"> Adopt an SDLC (Software Development Life Cycle) that the sector will follow Agree templates and approval protocols for stage of the agreed SDLC | <ul style="list-style-type: none"> A continuous process to evaluate the value-add of each forum and amend where necessary. |

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| | <ul style="list-style-type: none"> ○ For project initiation, e.g. Project proposal/ concept document ○ For project funding approval, e.g. Business Case ● Adopt and deploy the project management and reporting tool, per the PMO design defined ● Confirm the format and reporting cycles. | |
|--|---|--|

The outcome of the above short-term decisions and actions will be an Implementation Plan (Appendix B) and Education Goals Alignment and Achievement Roadmap (Appendix A) with a set of specific initiatives. These initiatives should be prioritised based on their value in helping the sector achieve **national** objectives.

To ensure execution, each initiative should be structured and resourced as per the GTAC project management protocol (PPM):

- **Project sponsor** – should be Education sector leadership, preferably a HEDCOM member. This role should not be limited to DBE but can be assumed by Provincial representative of the HEDCOM
- **Project manager** - Experienced ICT project manager
- **Business case**, scope and requirement defined - these will be owned by 'subject matter experts' in the field that the ICT initiative is addressing, presented in a business case document
- Funding approval - "It is only a project if it is funded." The budget and human resource requirements are defined in the **Project Charter** and signoff of the charter constitutes the SLA and MOU around the project.
- **Continuous project monitoring**, and tranche release of funds only as milestones are achieved. Use of an issues log to track issues, resolutions, and lessons learnt.
- **Close-out report** once the project is completed which reports on delivery, failure, lessons learnt, and funding issues e.g. overspend.

Equally important is to review and stop all other projects that are not aligned to the Education sector's Three Feet Plans as defined in the Operation Phakisa Lab. The current estimate of the number of 'projects' that are run across the sector is in excess of 100. It is not feasible to provide effective and proper leadership, governance and manage guidance for this size of project portfolio. Many of these projects are a result of "free" CSI/CSR projects which were accepted on the grounds of being "free". However, most such projects do not hand over properly to their project owners, e.g. PEDs, resulting in the project fizzling out when it is completed. Moreover, PEDs often fail to budget for continuation or ownership of the project, sometimes because the matter would have to go to tender/supply chain. As such, delivery across the sector is incoherent. This is a matter that needs urgent remedy, and the remedy proposed is reduction of the number of projects to focus only on the "Three Feet" Plans as determined in the Operation Phakisa lab.

E. Tracking and Measurement

The specific actions identified in the implementation plan are intended to drive execution. At the detail of each level, each action will be tracked for progress. However, at senior management level a few metrics are required for consistent and continuous tracking and measurement. Measurement at this level focuses on tracking progress towards the

achievement of the strategic objectives. These metrics will be a summary and impacted by detailed actions and project progress measures.

| Strategic Objective | Top metrics |
|--|---|
| 1. Deploy, Refresh and Optimise Infrastructure, i.e. Connectivity and End User Computing | 1. Percentage of schools that have access to internet and access to the cloud services through: 1.1. Appropriate Connectivity; 1.2. Access to End User Computing Devices |
| 2. Functional Applications development and Digitisation e.g. e-learning system; | 2. Number of learners and educators using the focus digital technologies enabling: 2.1. Teachers Modules 2.2. Learner Modules 2.3. Curriculum 2.4. Another |
| 3. Application Standardisation and Rationalisation, e.g. single curriculum system accessible nationally. | 3. Number of duplicate functionalities eliminated among applications: 3.1. 'Single version of the truth'. |
| 4. Create an Education Sector Cloud Computing Services, i.e. a common IT platform for all education sector systems | 4. Number of cloud computing services available in the basic education enterprise cloud |
| 5. Data and Information Management i.e. a single MIS platform enabling 'single version of the truth' | 5. Number of individual application databases aligned to the enterprise-wide data architecture 5.1. The objective is to have a single Data Warehouse system and data governance processes that ensure data integrity. |
| 6. ICT Governance Optimisation, i.e. a management framework that ensure project delivery and ICT operations are available and kept current | 6. Number of enterprise-wide ICT Governance structure meetings that are functional and consistently forming a quorum per annum 6.1. ITSM: overall percentage performance against ICT service levels 6.2. PMO: Number of projects tracked or managed through PMO processes and tracking tools; 6.3. Contracts: Availability of standard Education Sector contracting 'Templates' – MSA, TD and M and S. |

Appendixes

1. Introduction

The objective of the implementation plan is to kick start the process of achieving the recommended ICT strategy.

2. The Implementation Approach

The details of the implementation plan actions are defined in:

Appendix A – Alignment of the ICT strategic objectives to the Education Goals and White paper.

Appendix B – Required Activities / Actions in the next 6 – 12 months: Critical Success Factors and Delivery of the ICT Strategy Objectives

Appendix A

Education Goals Alignment and Achievement Roadmap

2019 Action Plan and how it can be facilitated by ICTs

| Goals | Description | Relevant Strategic Objective | Responsible Branch | How ICT can enable the goal – Desirable Outcome |
|----------------|--|---|------------------------------|---|
| Goal 14 | Attract a new group of young, motivated and appropriately trained teachers to the teaching profession every year. | Objective 1. Infrastructure Schools: Connectivity, Devices. Objective 2. App / Content Development and Digitisation | Branch A All Branches | Younger persons are more familiar with ICTs and are more likely to want to work in an ICT-enabled environment that conforms to their way of being, which is, socialising and researching online. Younger teachers would expect to be able email other colleagues, interact with other colleagues in digital Communities of Practice, get digital contents online, etc. |
| Goal 15 | Ensure that the availability and utilisation of teachers are such that excessively large classes are avoided. | Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access. Objective 2. App / Content Development and Digitisation | Branch C | The DBE currently has a ratio of 31:1 learners to teachers. This is the national average. However, in more affluent schools the ratio is lower, and in rural schools the ratio is much higher. ICTs can help alleviate this problem by ensuring that overloaded teachers are able to give stronger learners self-study exercises, so that learners can self-support in class while the teacher focuses on weaker learners. Similarly, an overburdened teacher could show educational videos or give the class online assignments, again freeing her up to engage learners individually. Lastly, online assessments, and automation would reduce the workload of teachers in complying with Administration activities, so that they can focus on teaching rather than marking and completing forms for compliance. |
| Goal 16 | Improve the professionalism, teaching skills, subject knowledge and computer literacy of teachers throughout their entire careers. | Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access. Objective 2. App / Content Development and Digitisation | Branch C | Teachers are required to gain Continuing Professional Teacher Development (CPTD) points. Amongst these requirements are ICT skills. However, the purpose of gaining ICT skills is not just to gain CPTD points, but to gain useful skills to improve the quality of teaching and learning, by (a) integrating exciting ICT technologies into learning, such as interactive content, and (b) being able to use online and digital resources to shore up their own knowledge of their subject. |
| Goal 17 | Strive for a teacher workforce that is healthy and enjoys a sense of job satisfaction. | Objective 2. App / Content Development and Digitisation | Branch C | In the Operation Phakisa lab held in 2015, one of the issues identified was low teacher morale. This was spoken to in the lab by the suggestion that an HR app to support teachers would be a desirable initiative. This was supported by the lab generally and is one of the official OP initiatives. The app would assist teachers with HR challenges, such as punctual receipt of payslips, raising of grievances, seeking counselling, etc., through an app. |
| Goal 18 | Ensure that learners cover all the topics and skills areas that they should cover within | Objective 5. Data and Information Management | Branch P | Curriculum coverage is one of the mandates of the Branch C at DBE, and ensuring curriculum coverage is possible in |

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| | their current school year. | | | ICT solutions in two ways; firstly, automation, i.e. if a teacher on an e-Learning portal accesses content then the portal can track that access and demonstrate that the teacher covered the curriculum, e.g. by presenting a digital lesson. In addition, there should be functionality for digital forms to complete the curriculum checklist. Digital tracking also supports 'Rich Data' and MIS. |
| Goal 19 | Ensure that every learner has access to the minimum set of textbooks and workbooks required according to national policy. | Objective 1. Infrastructure Schools: Connectivity, Devices. Objective 4. Education Sector Cloud Computing Services, | Branch A Branch C | One of the goals of White Paper 7 is the delivery of digital content. A key initiative under way at DBE is to provide all the DBE content digitally. By making all the curriculum content digital and downloadable, no learner need ever be without a textbook again. Similarly, the DBE also has a DBE TV channel which contains video lessons, and this is also being delivered to schools. |
| Goal 20 | Increase access amongst learners to a wide range of media, including computers, which enrich their education. | Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access. Objective 2. App / Content Development and Digitisation | Branch C | Learners need to gain useful skills to improve their own skills and employability post-school, by (a) accessing exciting ICT technologies and learning how to use them, such as interactive online content, and (b) being able to use online and digital resources to shore up their own knowledge of their subjects at school, as well as their interests and hobbies, which will enable them to have employable skills. A key deliverable is thus a 21st-century skilled learner who is ready for the Fourth Industrial Revolution; a learner who is capable of Collaboration, Creativity, Critical thinking, and Communication. ICTs enable these skills. A learner who can emerge from the schooling system with computer expertise is more employable than one who is not. |
| Goal 21 | Ensure that the basic annual management processes take place across all schools in the country in a way that contributes towards a functional school environment. | Objective 2. App / Content Development and Digitisation. Objective 5. Data and Information Management. Objective 3. Standardisation and Rationalisation | Branch C Branch P | The DBE currently has the SA SAMS and LURITS databases however these are almost maintained manually. They also do not closely integrate with infrastructural and curriculum systems. Therefore, better monitoring of curriculum delivery, building maintenance and delivery of new buildings, as well as other management issues such as HR, personnel, leave, etc., would be possible with an integrated ICT system as is proposed in this strategy. |
| Goal 22 | Improve parent and community participation in the governance of schools, partly by improving access to important information via the e-Education strategy. | Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access. Objective 2. App / Content Development and Digitisation | Branch A Branch P | The DBE cloud also to need deliver facilities for parents, teachers, district officials, and the DBE, to communicate with each other and learn about current initiatives, challenges, obstacles and progress. For example, through an integrated architecture and automation a report card could be created for parents, who could then automatically post a query to the school, would be an example of the kind of system that is possible |
| Goal 23 | Ensure that all schools are funded at least at the minimum per learner levels determined nationally and that funds are utilised transparently and effectively. | Objective 6. IT Governance, i.e. the Critical Success Factor – Capacity and Capabilities | Branch A + ICT Governance Forums – CEM and HEDCOM. | Managing the cost of implementing ICT services to schools and ensuring usage and that value is derived from the services. Professional tracking of projects, with proper accountability tracking and progress indicators, would be an output of a professional project management (PMO). The same applies to "dumping" of ICT |

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| | | | | equipment which becomes a white elephant or “expensive gift”. Lack of proper management of funds, donations and equipment can lead to unexpected future burdens, not just financially, but in terms of turning a school into a target for criminals. |
| Goal 24 | Ensure that the physical infrastructure and environment of every school inspire learners to want to come to school and learn, and teachers to teach. | Objective 6. IT Governance, i.e. the Critical Success Factor – Capacity and Capabilities | Branch I | Professional tracking of projects, particularly around building of schools, with proper accountability tracking and progress indicators, would be an output of a professional project management and programme management protocol and digital solution. Such ICT solutions exist and are in use by ASIDI and other projects, however, they are not centrally maintained, managed, tracked, or integrated within an overall project management architecture. |
| Goal 25 | Use schools as vehicles for promoting access to a range of public services amongst learners in areas such as health, poverty alleviation, psychosocial support, sport and culture. | Objective 4. Education Sector Cloud Computing Services, also enabling external Internet services access. Objective 2. App / Content Development and Digitisation | Branch A Branch S | At present, Branch S provides such functionality, however, partnerships with Health and other departments may be feasible, particularly if facilitated by ICT solutions, such as providing apps that deliver GPS locations of clinics, counsellors, online psychosocial support. Through external interfaces exchange info and data between DBE / Schools and Other departments. Presently only one such initiative exists which tracks provision of meals to schools. |
| Goal 26 | Increase the number of schools that effectively implement the inclusive education policy and have access to centres that offer specialist services. | All ICT Objectives are relevant and applicable to Special Needs Schools. | All Branches | Inclusive Education makes heavy use of ICTs. A proper provisioning of ICTs to Special Schools is imperative. In this regard DBE has provided a draft revised guidelines document which caters for special needs equipment. However, such guidelines need to be broadly adhered to and such solutions rolled out in coherence with a broader ICT strategy, rather than ad hoc. |
| Goal 27 | Improve the frequency and quality of the monitoring and support services provided to schools by district offices, partly through better use of e-Education. | Objective 2. App / Content Development and Digitisation. Objective 5. Data and Information Management. Objective 1. Infrastructure Refresh and Optimisation. | Branch A + P + C | Professional tracking of delivery of curriculum and matric pass rates, with proper accountability tracking and progress indicators, would be an output of a professional project management and programme management protocol and digital solution. Such ICT solutions exist. This would be particularly true in the case of curriculum completion, principals' KPI measures, and other quality assurance measures, normally carried out by physical inspections. |

Alignment with White Paper

| White Paper Goal | How ICT Can enable the goal | ICT Strategic Objective 1-6 |
|---|--|---|
| Equity; Community-based SMMEs, Community engagement and capacity building. | By providing digital content and internet access to learners and the communities and in which they live, the inequalities between rural, urban, peri urban, suburban and township areas are expected | Objective 1. Infrastructure Schools: Connectivity, Devices. |

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| Access to ICT infrastructure, and Connectivity | <p>to be reduced:</p> <ul style="list-style-type: none"> • The quality of educational content will be more equal, • The presence of internet and ICTs will provide opportunities for the creation of SMMEs to sell goods online or to repair and service ICTs • Parents, teachers, learners and community members will gain ICT skills, access to online content and learning opportunities. | |
| Development of Norms and standards | <ul style="list-style-type: none"> • The Strategy aligns with this goal in that it provides direction regarding the norms and standards for ICTs in the sector, such as data standards, management standards, and interoperability standards. • DBE is presently defining guidelines, norms and standards on ICTs. | Objective 3. Standardisation and Rationalisation |
| ICT professional development for management, teaching and learning | <p>The strategy calls for a single vision of the ICT rollout and therefore it implies that:</p> <ul style="list-style-type: none"> • Teachers must be trained in ICT integration in pedagogy but • the courses must be consistent so as to ensure a consistent level of skills and competencies across the sector | Objective 3. Standardisation and Rationalisation |
| Electronic content resource development and distribution, through a national education department portal | <ul style="list-style-type: none"> • The Strategy calls for the deployment of a content repository within the unified enterprise architecture, offered at national level and delivering consistent content to all provinces. • The DBE has developed the DBE cloud, now it needs to be anchored in the SSOT and SSO solutions so that users from exams, SAMS, etc., can login to those systems as well as the DBE Cloud, without needing to maintain multiple accounts. | Objective 2. App / Content Development and Digitisation |
| Information management, Monitoring and evaluation, Research and development | <p>Through the centralised enterprise architecture, the system will be able to provide the DBE with "big data" – clear trends in ICT usage, access and behaviours of end-users such as learners and teachers. This will enable:</p> <ul style="list-style-type: none"> • Proper information management • Centralisation of data (single version of the truth / SSOT) • Accurate monitoring and evaluation and therefore • Accurate data that can inform research and development of DBE initiatives. | <p>Objective 5. Data and Information Management</p> <p>Objective 6. IT Governance, i.e. the Critical Success Factor – Capacity and Capabilities</p> |

Appendix B

Critical Success Factors

| | Overview | Benefits | Key Activities 6 – 12 Months |
|-------------------------------|--|---|---|
| Leadership and Common Purpose | <p>The custodianship of the ICT strategy implementation and the Governance Framework to ensure its realisation.</p> <p>Within the Education Sector operating model this responsibility rests at the CEM supported by the HEDCOM.</p> | Ensuring that the ICT policy framework (2004 White Paper 7) is realised and support the education sector goals (2015 Action Plan to 2019: Towards Realisation of Schooling 2030). | <ol style="list-style-type: none"> 1.Appoint a CIO for the sector to coordinate all sector ICT activities on behalf of the HEDCOM - An executive with day to day ICT responsibility; 2.Appoint Champions to drive the Strategic Objectives at CEM; 3.Confirm and allocate branch ownership of each Strategic Objective; 4.DBE Branches should set-up planning sessions to review their respective Strategic Objectives 5.Branches should allocate project sponsors for each initiative |
| Capacity and Capability | Ideally, the CIO should have a key role in establishing and resourcing the recommended functions. | These functions are intended to ensure that ICT management practices are followed to realise projects are implemented and applications are functional and available. | See each below |
| Project Management Office | Project governance and reporting | Ensure projects are approved, resourced and delivered per agreed Time Cost and Quality (Scope) | <ol style="list-style-type: none"> 1)Project portfolio management - Help the HEDCOM chose and prioritise; 2)Implement and project management methodology and Software Development Life Cycle – GTAC Model. 3)Adopt Tools 4)Appoint project managers to managed initiative across the Branches; 5)Provinces to appoint project managers; 6)Training for project managers on methodology and tools; 7)Agree reporting calendar and cadence |
| IT Services Management (ITSM) | <p>ICT operations management:</p> <p>Cost effective</p> <p>Functional</p> <p>Available</p> <p>Current technology</p> | Provide user support and ensure that users can access the ICT services | <ol style="list-style-type: none"> 1)Adopt an ICT services management framework. ITIL is recommended; 2)Resource this function for relevant roles at DBE, Provinces and Region, and SITA; 3)Adopt tools management services management, e.g. incident logging and management; Problem management; operational risk reporting |
| Contracts Management | <p>Creating a standard contracting regime that governance:</p> <p>IP, Indemnity and Warranty;</p> <p>Project commitments by and with ICT services suppliers;</p> <p>Management of operational maintenance and support services</p> | Operational Risk management, and ensuring that commitments are met and transitioned correctly to ITSM | <ol style="list-style-type: none"> 1)Review the current contracts function in relation to ICT Services; 2)Create standard contracts for supplier engagement 3)Allocate each contract type to the specific ITSM function per the adopted roles in the ITIL framework |

Delivery of the ICT Strategic Objectives

| ICT Strategic Objective | Overview | Benefits | Key Activities (Timeline will be scope dependent and Project Specific) |
|--|--|---|---|
| <p>1) Deploy, Refresh and Optimise the ICT Infrastructure - Connectivity</p> <p>Responsible: Branch A - Administration</p> | Using practical technology options, ensure that all schools in the country have quality access to Internet service | Learners and Teachers have access to internet based digital technologies, specifically the Education Sector Cloud as per Strategic Objective 4. | <p>1) Assess the state of internet connectivity of schools - create a database of the current status. How many have:</p> <ul style="list-style-type: none"> a) Wifi b) ADSL - To be migrated off ADSL c) Mobile <p>2) Develop an area map for the schools - GIS Map (Geographic Information System);</p> <p>3) Map schools to most appropriate technology per area;</p> <p>4) Develop a school's connectivity Business Case, i.e. Cost to Achieve;</p> <p>5) Get approval for Funding;</p> <p>6) Create a project with Project Manager, key role players;</p> <p>7) Issue a Request for Proposal</p> <p>8) Get approval for a Rollout Plan</p> |

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| <p>2) Deploy, Refresh and Optimise the ICT Infrastructure - Devices</p> <p>Responsible: Branch A - Administration</p> | <p>Ensure that all schools in the country have reasonable devices and support for them</p> | <p>Learners and Teachers have access to internet based digital technologies, specifically the Education Sector Cloud per Strategic Objective 4.</p> | <p>1) Agree End User computing policy, specifically to adopt the Bring Your Own Device (BYOD) policy;</p> <p>2) Review and agree minimum device specifications given then Strategic Objective 4 - Education Sector Cloud. DBE has a guidelines document on acceptable hardware devices.</p> <p>3) Confirm technical compatibility requirements with the Education Sector Cloud system;</p> <p>4) Review Market options i.e. device options. Target should be to get 'dumb terminals' or devices with low level capability:</p> <ol style="list-style-type: none"> Cost benefit "Theft proof" - not useful when not connected to the Cloud. <p>5) Confirm Funding Model - Per Province.</p> |
| <p>3) Application Development and Digitisation</p> <p>Responsible: All Branches</p> | <p>Transformation of Education services into Digital form and developing user Applications to access these</p> | <p>Nationally accessible to education services across the country enable by Connectivity, Devices and the Education Sector Cloud</p> | <p>1) Review the Sectors' services per Value Chain to confirm services that can and should be digitised;</p> <p>2) Confirm the list of Functional initiatives that will form the scope of this workstream;</p> <p>3) Map and confirm the value of the scope of each initiative is aligned to or helps to the Sector Goals per the 2015 Action Plan: Towards the Realisation of Schooling 2030;</p> <p>4) Review the Operation Phakisa Three Feet Plans and align;</p> <p>5) Develop a Business Case for each project;</p> <p>6) Get approval for Funding;</p> <p>7) Resource Allocation for each project.</p> |
| <p>4) Application Standardisation and Rationalisation</p> <p>Responsible: Branch C - Curriculum, Policy, Support and Monitoring</p> | <p>The intent is to consolidate and create single version of Applications and systems that are accessible and usable Nationally.</p> | <p>A simplified ICT landscape - Reduced complexity in maintenance and management;</p> <p>Cost-effective ICT environment.</p> | <p>1) Review the application landscape nationally per province -number per the value chain service</p> <p>2) Confirm each Application for:</p> <ol style="list-style-type: none"> Functionality and value; Life span; Cost to manage and own; <p>3) Determine potential for national rollout, e.g. GDE's Learner Registration system</p> <p>4) Identify and confirm candidates for decommissioning;</p> <p>5) Confirm the functionality in candidate applications will be or is catered for in the applications in Objective 2 and the Enterprise Architecture.</p> <p>6) Confirm decommission status / label for candidate applications</p> <p>7) Develop a decommissioning plan aligned to Objective 2.</p> <p>8) An example would be decommissioning Thutong in favour of DBE Cloud as they have identical purpose and function.</p> |
| <p>5) Education Sector Cloud Computing Services</p> <p>Responsible: Branch C - Curriculum, Policy, Support and Monitoring</p> <p>Branch A - Administration</p> | <p>Setup a common platform for managing and accessing Education Sector Applications by all Education Sector stakeholders - Learners, Teachers, Administrators and Communities.</p> | <p>National universal access to education and learning material.</p> <p>A 'single' manageable environment - lower cost relative to fragmented systems;</p> <p>High probability of data integrity and enablement of Data Warehouse services as seen in Objective 5.</p> | <p>1) Identify and review all Cloud and Internet services options:</p> <ol style="list-style-type: none"> SITA Hosting; or Based and managed in provinces; or Other private sector options; <p>2) Decide on the best options guided by policy intent - deviation from SITA mandate has to be motivated for approval.</p> <p>3) Confirm Cloud services. Preferably all key education delivery services will be hosted. Not all DBE or Provincial specific services have to be hosted.</p> <p>4) Confirm the network design and single URL to access the cloud;</p> <p>5) Build / Acquire the cloud services guided by requirements in Objective 2 and 5.</p> <p>6) Build and deploy the ICT services as per a project list and Sector Goals i.e. Objective 2.</p> |

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| <p>6) Data and Information Management</p> <p>Responsible: Branch P – Planning, Information and Assessment</p> | <p>Build a data and information capability that ensures data integrity, confidentiality, accuracy and availability. It includes the development of a presentation layer that allows for users to access the data in relevant formats.</p> | <p>“Single version of the truth” that ensure quality MIS for decision-making.</p> | <p>1) Confirm the owner of Data and: a) Develop Data Policy; b) Data Architecture; c) Management policy and lifespan of different data sets.</p> <p>2) Agree the scope of the Data Warehouse development project;</p> <p>3) Review and choose Data Warehouse products and Tools;</p> <p>4) Confirm data warehouse design;</p> <p>5) Implement Data Warehouse / management system within the cloud environment;</p> <p>6) Create functional projects, i.e. sources of data and presentation, e.g. DDD.</p> |
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| <p>7) ICT Governance Optimisation</p> <p>Responsible: Branch A - Administration</p> | <p>Build ICT management capability and capacity to execute, monitor and measure the Education Sector ICT services.</p> | <p>A managed ICT environment that ensures:</p> <ul style="list-style-type: none"> a) that projects and initiatives are execution according to scope, plan and cost; b) that the ICT systems are available and kept current, through operational risk management c) that ICT service suppliers and contract are managed; d) that, ICT applications designs, and technology is relevant and enabling for users. <p><i>Note that each of the above is further developed in the Critical Success Factors Section.</i></p> | <ul style="list-style-type: none"> 1) Confirm the recommended capability and capacity - PMO, ITSM etc. 2) PMO and the Projects and Management Governance Forums; 3) Develop an operating model for each; 4) Resource its capability as per the operating model of each; 5) Develop operating processes; 6) Evaluate Tools to support the operating processes; 7) Develop training programmes for the stakeholders; 8) Confirm reporting and monitoring requirements; 9) Implement relevant MIS per the requirements; and 10) Confirm the reporting calendar and Cadence. |
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The Diagram below – *Education ICT Strategic Implementation Framework*, provides an overview of the steps in the implementation process for the ICT Strategic Objectives.

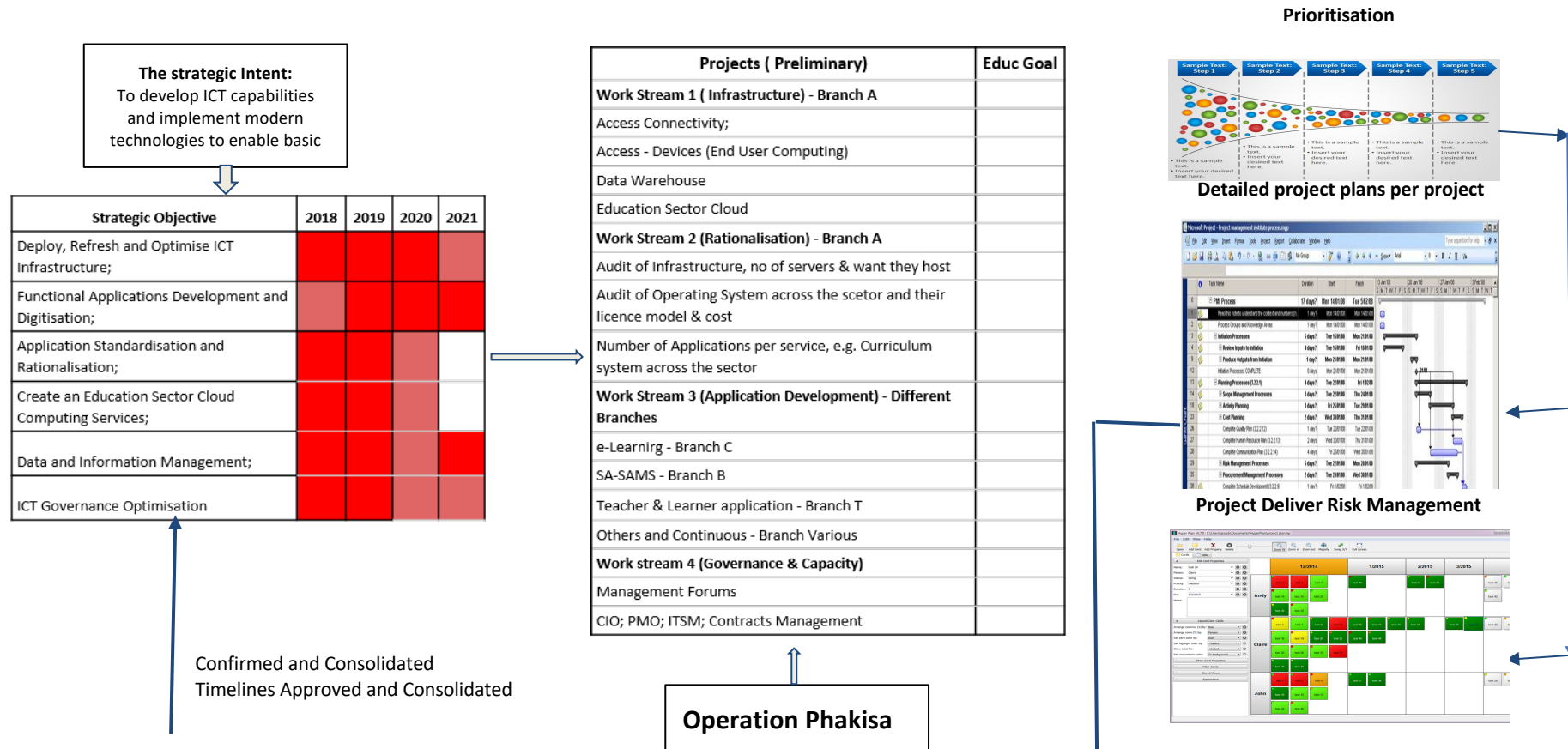


Figure 8: ICT Strategic Implementation Framework

