Republic of Mauritius

NATIONAL ICT STRATEGIC PLAN

2007-2011

...now Scaling Up

Foreword

Foreword

Executive Summary

MAURITIUS, a small island nation in the Indian Ocean off the coast of Africa has few natural resources and is a long way from the main markets and sources of growth in the world economy. Having successfully undergone the transition from a low-income mono-crop economy, with a narrow production base at the time of its independence in 1968, to a middle-income country with a more diversified structure, the country, today, is largely reliant on four economic pillars of manufacturing, sugar, tourism and financial services. Of late, though, Mauritius is faced with constraints that hinder further growth of its economy primarily precipitated by an erosion of its preferences in the international community in sugar and textile sectors, general dismantling of subsidies worldwide and the rapid emergence of low-cost competitor nations across the world.

The Government of Mauritius (GoM) recognised early that its Information and Communication Technology (ICT) sector is important to future development of the country. GoM sees ICT as a tool to support business processes and information flow within and across economic activities, leading to increase in value added at the national level.

The Government's Vision is to make ICT the fifth pillar of the economy and transform Mauritius into a Regional ICT Hub.

This document sets out a strategy to realise GoM's Vision.

ICT as the Fifth Pillar

Elevating ICT to take the dimensions of a "pillar" of the economy would require interventions in the twin tracks of Information Economy and Information Society. While the former calls for measures which, significantly (a) enable the ICT sector to contribute into the GDP[1] of Mauritius, (b) lead to the ICT sector employing more Mauritians, (c) make for a sustained availability of skilled manpower to power the sector, and (d) facilitate contribution from the ICT sector into the Mauritian export basket, initiatives to create an information society revolve around the instilling of a "technology temper" in Mauritians to bring about increased adoption and usage of ICT, ICT-enabled knowledge networking among citizens, and generally accepting ICT as a stream of professional persuasion at par with others.

Mauritius as a Regional Hub

Mauritius must follow a two-fold strategy to transform itself into a Regional ICT Hub. It must emerge as a leader in some identified select areas[2] of ICT where expertise does not substantially exist in the region and, more generally, it must increasingly be seen as a preferred centre of ICT skills, expertise and employment in the region. The latter requires Mauritius to cooperate with other countries of the region to boost its availability of skilled ICT manpower. In fact, Mauritius' partnership with the other countries in the region must transcend the mere fulfilment of its manpower requirement to a larger geo-political win-win exercise that, even as it aims at bolstering Mauritius's own ICT manpower availability, also makes for the cooperating countries' economic progress. Partnering countries stand to benefit, for instance, by remittances of income acquired by their peoples trained and employed in Mauritius, return of trained manpower to their respective countries to be absorbed gainfully there, and by the spillover of investment from Mauritius into those countries.

Getting increasingly discussed in various forums is the potential of Africa to emerge as a prominent epicentre of economic activity, including ICT, in the years to come. Mauritius stands to gain enormously from its sustained kinship

[1] Gross Domestic Product
[2] Comprehensive planning is recommended precedent to the establishment of a Centre of Excellence that would make for the identification and development of niche areas. To start with, though, networking, mobile technologies and information security are suggested to be pursued with regional leadership in mind. Technology Test Beds for trying out innovative applications of ICT are also indicated for deployment at the regional level.

with countries of the East, particularly India and China, through serving as a geo-cultural bridge between these countries and nation-states of Africa. Mauritius can serve as a springboard for countries desirous of investment into the region, a "Gateway" as it were.

Early Successes for Mauritius

Today, there is practically no domain of socio-economic activity in Mauritius that is completely bereft of ICT. Equally importantly, there are few realms within ICT itself in which Mauritius is uninitiated. Regular hosting of ICT events at the regional level has also engendered a perception of Mauritius being significantly active in the ICT arena.

However, initiatives taken up so far have been largely isolated ones and not an outcome of any collaborative and coordinated all-round planning. Encouraging achievements, though, have been made in many areas, including (a) in IT Enabled Services and IT services catering to offshoring nations of the world, (b) substantial levels of uptake in sectors of economic activity, including in banking and financial services where it is comparable to global standards, (c) significant degree of ICT penetration in society, (d) reasonable levels of skills being imparted in the educational institutions, (e) successes emerging in the sphere of eGovernance with participation from the domestic ICT industry, and (f) a growing rate of penetration of ICT, including the Internet, in the society.

Integrally associated with Mauritius, are its inherent strengths (favourable geo-climatic positioning, sustained kinship with countries of Europe and nation-states in Asia, a population that enjoys equal felicity in both French and English, and an enduring state of polity), its acquired competencies (a robust telecommunication infrastructure, a society that values education, reasonable placement in terms of socio-economic parameters, early successes in ICT uptake in diverse domains of activity and a government strongly motivated to furthering interests of the ICT sector) and its emerging potential (promising gains made in ICT services exports, presence of domain skills in a few functional areas of activity and early signs of an ICT workforce buildup).

The Way Forward: Targets to be Achieved

For the Vision to be realised, Mauritius needs to SCALE up: to take its activities to the next level that not just makes ICT truly a sector to reckon with, but also makes ICT a ubiquitous and affordable tool that profitably shapes the lives of citizens. Interventions, though, need to be holistic in scope and collaborative in approach, towards building up an Information Economy and creating an Information Society.

Identified with the Vision, the primary targets to be met over a period of five years are the following.

<u>Information Economy</u>

- a 7% contribution into Mauritius GDP from offshore ICT export services
- employment to at least 29,000 qualified individuals in the ICT sector
- employment in the ICT sector to at least 90% of those who graduate in ICT
- doubling the number of foreign investors[3] into the ICT sector in Mauritius
- Memoranda of Understanding for collaborative ventures in the field of ICT with countries of the region

<u>Information Society</u>

- Increased preference for ICT with at least 50% acceptance for services available online
- Increase in PC ownership by at least 20,000 households and 12,000 PCs in primary schools

[3] Identified areas for foreign investment in which Mauritius stands to do well include French Call Centres, Translation, IT Helpdesk, Enterprise Resource Planning, Transcription, English Call Centres, Software Development and Testing, Clinical Data Entry, Finance and Accounting (French), Telemarketing (French), Telemarketing (English), Finance and Account (English), Basic Data Entry, Payroll Processing, Payment Processing, Legal Processing, Civil Architecture, Multimedia, Data Mining, Equity Research, Logistic Support and Supply Chain Management

- 150 PIAP[4]s across the island
- Internet Connectivity and Networking of all primary, secondary schools
- At least 100% increase in the enrolment at the tertiary level in ICT courses over a period of five years
- Increase in Broadband Penetration by at least 250,000

Strategy to Realise the Vision

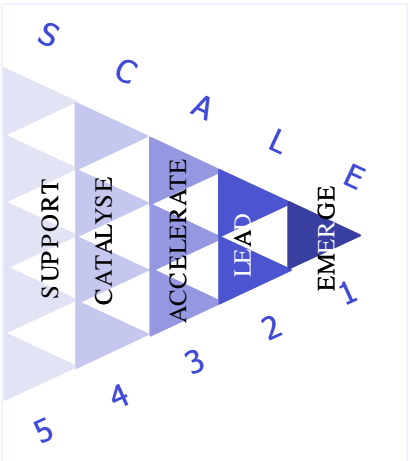
Holistic interventions are required to achieve the targets associated with the Vision. Essentially, five Strategic Thrust Areas, with their associated goals, are identified.

- undertaking SUPPORT measures by initiating appropriate legal, institutional and infrastructural changes, investing in long-term educational fulfilment, fostering a culture of security and trust in ICT and following these up with effective monitoring and evaluation mechanisms.
- CATALYSING economic activity in critical sectors of the economy by promoting eBusiness adoption within and across different sectors of socio-economic activity.
- ACCELERATING ICT adoption in society by embracing electronic means of governance and by taking measures towards democratising ICT in society.
- taking up LEADERSHIP roles in the region through transforming itself into an ICT skills and expertise hub in this part of the world, while at the same time identifying a few areas in which to become a regional leader.
- EMERGING as a global point of reference for offshored services both in the ITS and in the ITeS domains using, among other things, advantages of bilinguality and becoming an investment nucleus for ICT and a Gateway to markets of Africa.

Constituent Strategies

Each of these thrust areas identified for Mauritius to SCALE[5] up have been associated with their respective strategies as follows.

1. SUPPORT has <u>five</u> constituent strategies for (a) maintaining of a consistent policy, legal and regulatory framework aligned to needs of the ICT industry and promoting uptake of ICT in economy and society through high levels of trust and confidence, (b) fostering a culture of information security in businesses, government and society through a judicious mix of proactive and reactive interventions, (c) facilitating sustained superior quality of talent pool in Mauritius through interventions at the foundational levels of educational system aimed at instilling a spirit of lifelong learning, (d) enabling the creation of a reliable, robust, affordable and scalable ICT infrastructure that aims at effectively harnessing emerging technological developments for the collective benefit of all and (e) establishing an effective, objective, continual and transparent monitoring and evaluation framework.
2. CATALYSE is enabled through <u>four</u> strategies of (a) promoting the adoption of ICTs in Small and Medium Enterprises through awareness campaigns, capacity building, awards and incentives and provision of relevant value-adding products and services, (b) enhancing existing levels of ICT use in the Health sector through planning and collaborative working, knowledge sharing and harnessing appropriate technologies for the collective benefit of health workers and patients, (c) adopting coordinated



[4] Public Internet Access Points
[5] SCALE here is also an anagram for the five Strategic Thrust Areas of Support, Catalyse, Accelerate, Lead and Emerge.

planning, design and implementation of ICT solutions in Agriculture sector to bring about optimum utilisation of resources and high-level decision making, and (d) promoting collaboration among various stakeholders in Tourism sector to bring about an ICT offering that enhances tourist convenience and facilitates an inclusive growth of the sector.

3. ACCELERATE is attained through three strategies of (a) Collaborating widely to design and implement eGovernment systems that aim at enhancing citizen convenience and improving internal efficiencies and effectiveness in the government, (b) undertaking key investments that make for a higher visibility of eGovernment in the daily lives of citizens, and (c) accelerating the uptake of ICT in society by making it accessible, available, applicable and affordable to everyone.
4. LEAD is facilitated through two strategies of (a) undertaking win-win collaborative exercises involving stakeholders in industry, academia and governments of the region to establish Mauritius as a hub of ICT expertise and employment in sub-Saharan Africa, and (b) identifying and building expertise in certain niche areas of ICT.
5. EMERGE is brought about by undertaking comprehensive, planned and focused publicity among target countries of Mauritius' inherent and emerging strengths and its offerings, including in the field of ICT.

NICTSP- A Synthesis of Strategies

NICTSP, then, is an amalgam of 15 strategies to implement on a concurrent basis. Programmes have been identified as the main vehicles to implement the strategies, with each programme implementing a strategy on a one-to-one basis, including within them projects that have been associated with outcomes and take place within pre-defined timeframes. Whereas programmes run parallel and enjoy equal priority, projects within a programme have a priority associated with them determined by the twin factors of "criticality" of the project to attaining the objectives associated with the programmes and "feasibility" of its implementation.

Implementation and Institutional Framework

The institutional structure has been addressed on two counts: one required to operationalise the initiatives under the NICTSP (the "Implementation Framework"), and the other, on a more permanent footing, is for the ICT sector, keeping in mind a few Critical Success Factors that need to be met (the "Institutional Framework"). These two have been kept as loosely coupled as possible in order to ensure that succeeding in one does not depend on success in the other.

The Implementation Framework to execute, supervise and monitor the initiatives under the NICTSP follows a three-tier model of (bottom-upwards) execution of projects, supervision of programmes and, at the apex level, monitoring the NICTSP. The last mentioned would be done through a High-Level Inter-Ministerial Committee (IMC) for the Implementation and Monitoring of the NICTSP, with a multi-stakeholder constitution comprising representatives from the government, the private sector, academia and civil society. Given that the Committee would comprise members at key positions in diverse socio-economic pursuits who would periodically meet to, among other things, lend strategic directions to NICTSP measures, a Secretariat to the Committee has been recommended to be set up. The Secretariat would be in a position to follow up more closely on initiatives under the NICTSP and serve as an available bridge between the programme implementation committees and taskforces and the IMC. Detailed Terms of Reference have been outlined for bodies at each of the three tiers.

Following a scope review, a revision of the Institutional Framework to one that gives clear and unambiguous responsibilities and reporting structures, has also been recommended. In consonance with evolving global trends in institutional leadership in ICT, a National ICT Authority of Mauritius (NICTAM), a unified body representing the ICT sector, that has in its management a multi-stakeholder representation and performs policy making, strategic thinking,

advisory, ICT promotion within the nation and country promotion to the world, and other related functions has been recommended. From a change management perspective, a gradiented approach is suggested wherein an interim arrangement can be adopted first, before moving on to the single-body authority at the national level. The unification approach will enhance collaboration among hitherto disparate units, make available advantages of synergy and reduce, if not eliminate, duplication of efforts. Among the agencies that would stand significantly impacted by this restructuring are the National Computer Board, the Central Informatics Bureau and the Central Information Systems Division. The ICT Authority, following requirements of effectiveness, has been recommended to assume a role outside NICTAM.

Constructive Collaboration

Lastly, Initiatives under the NICTSP carry an all-round focus and must necessarily be backed by a collaborative approach. Members from the private sector, as also the civil society, must come together in their allocated roles and responsibilities, and must join forces to make this a success. The NICTSP is not, and must not be seen as, a government-only effort.

"...let us resolve to bridge the Digital Divide between countries, between rural and urban areas, between educated and illiterate populations, and between men and women. And let us act urgently so that all the world's people can benefit from the potential of the ICT revolution..."

UN Secretary General Kofi Annan on the 2002 "World Telecommunication Day"

Structure of the Report

The report is contained in three parts.

The first part describes the approach taken towards evolving the strategy for the NICTSP, including an assessment of the current state, brief coverage of the recommendations made and how they fit into the Strategic Model of SCALE recommended for the NICTSP.

The second part covers the individual programmes and includes their description, their project composition, entities recommended to take up their implementation and measurement parameters on which to assess their progress.

The programmes have been described to constitute (a) their context, including recommendations made in the “Analysis” phase, which they address, (b) the projects that make up the programme, (c) the priority with which they would be taken up, (d) the “owner” organisations entrusted to implement the projects, (e) the main milestones and indicators that define the projects and help monitor their implementation.

The third and the final part is contained in two sub-parts, with the first part detailing the Implementation Framework required for the NICTSP, while the second sub-part describes the recommendation for an Institutional Framework required for the ICT sector following a scope review earlier done in the “Analysis” phase.

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PART ONE

Structure of Part One

This part outlines the components of the GoM's ICT Vision and conceptualises the Vision along the two principal dimensions of Information Economy and Information Society, in the process giving targets to be achieved for each of them. It also describes the approach taken towards evolving the strategy for the NICTSP and the Strategic Model of SCALE adopted for the same. Concisely it also covers the assessment of the current state, a brief overview of the recommendations made and how they fit into SCALE model.

The part concludes with a summary of the set of strategies recommended for the NICTSP.

Part One Table of Contents

1. Mauritius ICT Vision

MAURITIUS, today, faces challenging economic realities precipitated by the withdrawal of earlier quotas, drying up of subsidies and the emergence of low cost competitor nations in sectors where it enjoyed an edge. Of late, though, Mauritius has had promising success in ICT industry enabled predominantly by advantages of a bilingual workforce, congenial time-zone positioning, presence of reliable basic telecommunication infrastructure and sustained kinship with some outsourcing countries of Europe.

There are encouraging signals for the Government in a healthy ICT uptake in the domestic sectors, promising functional expertise, beginnings of an ICT workforce buildup and inroads into the global offshoring markets.

Facets that have drawn the GoM's attention include the following.

- A firm beginning has been made in the uptake of ICT in sectors of economic activity, including in banking and financial services, where it is comparable to global standards.
- There exists a significant degree of ICT penetration in society, both in terms of personal computers and the Internet.
- Quality skills are being imparted in the educational institutions of Mauritius with courses exclusively for ICTs seeing, of late, an increasing enrolment into them; these are early signs of an ICT workforce buildup.
- There is also a growing ICT domestic sector that has to a large extent been able to meet Mauritius's own requirements of ICT applications, including in the sphere of eGovernment.
- Mauritius also has substantial functional expertise in diverse functional areas that it could capitalise on, particularly as an IT-enabled service.
- The socio-political environment is stable and makes for a secure business investment.
- The overall socio-economic goals (for example, the MDGs[6]) today appear comfortably realisable, thus enabling GoM to concentrate on the ICT industry.

A few other factors that encourage the Government to play a leadership role in the region in ICT include the following.

- For countries of the East, Mauritius stands at the threshold of Africa, a largely unexplored market, and widely considered to be an emerging epicentre of economic activity- this positioning is unique to make it a geo-cultural bridge between those countries and nation-states in Africa.
- In sub-Saharan Africa, Mauritius has had good business and political relationship with other countries; in particular, Mauritius has taken many leadership initiatives among its regional brethren in ICT.

The Government takes due cognisance of these and wants to take ICT to the next level where ICT truly becomes one of the pillars of the economy, the fifth one after Tourism, Agriculture, Offshore Finance and Manufacturing. One of the ways, the government envisages to realise this vision is to position Mauritius as a Regional ICT Hub.

The Government's ICT Vision for Mauritius is "to make ICT the fifth pillar of the Mauritian economy and transform Mauritius into a Regional ICT Hub".

[6] United Nations Millennium Development Goals

2. Realising the Vision

Holistic measures are required rather than isolated initiatives dictated by narrow considerations.

Holistic measures are required rather than isolated initiatives dictated by narrow considerations of, say, generating a targeted number of ICT manpower, for following reasons.

- The government's mandate is to bring about the attainment of larger socio-economic development goals and ICT is identified as a means for that, though a very key one. Limiting the interventions to some areas while ignoring others would amount to underutilisation of ICT's potential and an under-achievement of socio-economic development itself.
- There is a considerable amount of interplay between different socio-economic spheres of activity contributing to an overall development of the country. Effecting interventions in some areas to the exclusion of others would not adequately account for these inter-disciplinary dependencies and may result in a sub-optimal buy-in from stakeholders in the process. This could jeopardise the realisation of the Vision.

For the Vision to be realised, it is important that interventions are done towards building up an Information Economy and the creation of an Information Society.

There must be adequate and appropriate ICT uptake in different sectors of economic activity for a vibrant ICT domestic sector that exchanges resources and competencies with the ICT exports sector.

Information Economy measures must be such as to ensure that

- The business community leverages ICT for higher levels of efficiencies and effectiveness.
- There results adequate levels of ICT uptake in different sectors of economic activity leading to a vibrant ICT domestic sector that can exchange resources and competencies with the ICT exports sector thus bringing about optimum levels of resource utilisation.
- The educational institutions generate outputs that are as closely aligned to the ICT industry requirements as possible, in both quality and quantity terms.
- The government facilitates the above by pronouncing appropriate policies, setting up appropriate legal infrastructure, adopting ICT in its own house for higher levels of citizen-convenience and improvements in efficiency and effectiveness, facilitating installation of a commensurate technology infrastructure, and generally encouraging ICT uptake.
- Mauritius is seen to be a Regional ICT Hub in Sub-Saharan Africa through taking up win-win collaborative measures that helps Mauritius' ICT industry and brings about the cooperating countries' economic progress.

In quantity terms, following targets are associated with the ICT-linked economy by 2011.

Attributes	Targets by 2011
ICT export services in Mauritius GDP	• 7% of GDP from export services through offshoring
Professionals in ICT employment	• Over 29,000 individuals employed in ICT sector • At least 16,000 Mauritian nationals employed in ICT sector • At least 90% ICT graduates absorbed in ICT industry
Transformation of Mauritius into a Regional ICT Hub	• MoUs with countries of the region • 13,000 people from outside Mauritius to be employed in ICT sector • At least double the number of foreign investors for investment into ICT sector • A Regional Centre of Excellence for niche technology areas • A Technology Test Bed for trials on emergent technologies

Table 1 Information Economy Vision Targets for 2011

Information Society measures need to ensure that

- There emerges gradually a widespread societal perception of ICT, not just as an important tool with which to better their lives but also as a reliable career choice for higher levels of individual fulfilment and collective prosperity.
- Society realises that in today's knowledge world increasingly getting shaped by the twin forces of globalisation and technological advancement, education is key to development and lifelong learning a basic pre-requisite for success.
- That society increasingly takes to ICT as a way of life in its day-to-day affairs, including participating in online networks and transactions.
- That ICT becomes a ubiquitous and affordable tool for everyone regardless of age, location, gender, financial strength or any other socio-economic disability.

ICT must become a ubiquitous and affordable tool for everyone regardless of age, location, gender, financial strength or any other socio-economic disability.

In quantity terms, Table 2 brings out the targets associated with the information society to be achieved by 2011.

Attributes	Targets by 2011
Inculcation of a "Technology Temper"	• At least 50% applications for services available online are done online • Quantitative targets for the following indicators ○ Increased percentage of Monthly income for Internet usage ○ Government's increased prioritisation of ICT ○ Increased Government procurement of ICT ○ Increased number of Households online ○ Reduction in Brain Drain ○ Increase Broadband Penetration by 250,000
Increased Adoption and Usage of ICT	• PC Penetration increased by 20,000 households and 12,000 PCs in primary schools • 150 PIAP[7]s across the island • ALL primary, secondary schools networked
Knowledge Networking among Citizens	• Triple the number of Internet hosts under ".mu"
Increased acceptance of ICT as a preferred career choice	• 100% increase in the enrolment at the tertiary level in ICT courses • At least 20% year on year increase in enrolment at the tertiary levels

Table 2 Information Society Vision Targets for 2011

Forthcoming sections bring out the strategic approach that has been adopted to realise the GoM's ICT Vision.

[7] Public Internet Access Points

3. Strategic Approach

Figure 1 summarises graphically the approach that has been adopted towards formulating strategies to realise the Mauritius ICT Vision. The approach for evolving the strategy took the following stages.

Stage 1: Assessment

A. The current state was assessed in 10 Building Blocks of ICT belonging to (a) the ICT Sector, (b) Domains where ICT is exploited, and (c) components that were a part of the Enabling Environment, technical, institutional or legal. The ten Building Blocks are as follows.

a. ICT Sector, comprising
   - ICT Domestic Sector, and
   - ICT Exports Sector.

b. Domains of ICT Exploitation, including
   - ICT for Social Development,
   - ICT for Sectoral Exploitation, and
   - eGovernance.

c. The Enabling Environment, constituted by
   - ICT Manpower Planning and Development,
   - ICT Policy, Legal and Institutional Framework,
   - Information Security,
   - Emerging Technologies, Applications and Standards, and
   - Infrastructure and Electronic Communications.

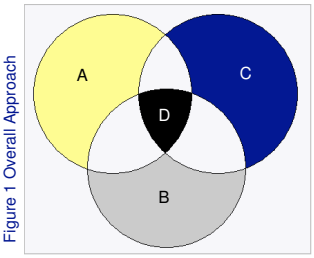


Figure 1 Overall Approach

Lessons have been drawn from our collective experience as well as learnings revealed by multi-lateral networks like the World Bank, UN, OECD, individual country experiences, research firms' literature etc.

Every Building Block was further associated with conceptual domains of activity or "themes" within which interventions would be made. In arriving at the above themes recourse was taken to (a) the understanding of the current state as revealed by the respective Working Group assigned (Figure1, Region "A"), (b) experience and expertise available with the consultants through undertaking assignments of similar nature (Region "B"), and (c) experiences and lessons available from other countries though not with consultants' participation, and to literature available from multi-lateral sources including the World Bank and its associated entities, the UN network, lessons from advances made in developed countries, research organisations like Forrester etc (Region "C").

Recommendations essentially lie at the confluence of the three regions, Region "D" in Figure 1.

B. Realisation of the Mauritius ICT Vision was conceptualised in terms of measures required to build up both an Information Society and an Information Economy, as explained in the section on Vision.

The interventions listed in "A" above were further tempered by what Mauritius ICT Vision would require.

Stage 2: Identifying the Thrust Areas

From the slew of broad intervention areas that emerged, 5 Strategic Thrust Areas were identified[8]. Each of these strategic thrusts was identified with a goal that had to be attained if the thrusts were to be effectively imparted. Further, each of these thrusts was associated with strategies that would help achieve the goal associated with the thrusts. Since the strategies identified with the thrust areas finally make up the NICTSP itself, the NICTSP could also be considered as a synthesis of these constituent strategies.

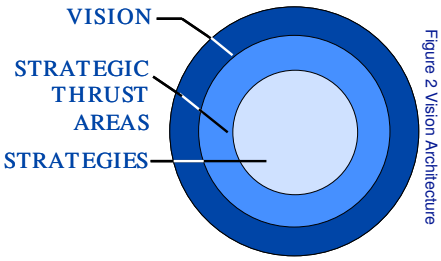


Figure 2 Vision Architecture

The NICTSP is a synthesis of its constituent strategies and programmes are vehicles to implement the strategies.

Stage 3: Programmes

Programmes have been identified as the vehicles with which to implement the strategies referred in Stage 2, and have a one-to-one relationship with them. A programme is a group of projects. Most projects are one-time activity that are implemented in a definite time-frame and result in an identified set of outputs; some of the projects, though, are also recurring in nature, being taken up every year along similar dimensions and resulting in similar set of results.

A key point here is the difference between a project and a programme: whereas a project has definite and shorter timelines to it, a programme encompasses several projects which fall under the same strategy and call for similar set of competencies required to run them, and has a much longer time-frame associated with it.

A programme is implemented through one or more projects.

Programmes, being vehicles with which to implement strategies, are also identified with a set of strategic objectives they are intended to achieve. Given that a programme also includes activities that are recurring, there actually is no logical time-frame associated with it since the recurring activities will continue to be run year after year. Nevertheless, a programme and its dimensions could be revisited periodically and lessons emerging from the learning could be incorporated into a re-fashioned programme.

[8] It may be noted here that the "Building Block" of Stage 1 was more of assessment area and included within itself issues whose understanding called for similar competencies. However, once the assessments were done and interventions identified, the Building Block lost its identity as such. Strategic Thrust Areas emerge from the recommendations earlier made aligned to the Building Blocks and any Strategic Thrust Area typically encompasses interventions that could be grouped together at a higher level and typically covers more than one Building Block.

Twin considerations of criticality and feasibility help prioritise projects within a programme. All programmes have equal priority.

Stage 4: Prioritising and resourcing the interventions

Since all strategies are of equal importance, their associated programmes too enjoy equal priority, however, projects within a programme need to be prioritised. Priority accorded to a project is determined by the twin factors of criticality (essentially how integrally linked the project is with attaining the strategic objectives associated with the programme) and feasibility (the extent of ease with which a project could be implemented). Prioritising a project or a recurring activity helps determine how soon within the overall currency of NICTSP is the initiative going to begin. Respectively, High, Medium and Low priority indicate that the projects would begin in the first, second and the third year of implementation of the NICTSP.

Monitoring is continual and on the basis of objectively-verifiable indicators.

Projects also need to be resourced with people who would (a) run them, and (b) monitor and evaluate on a continual basis their progress on the basis of some objectively-verifiable indicators. Resourcing also includes monetary requirement for the programme. Funds to execute programmes could either be sourced from within the government budgets or be taken from bodies outside the government.

Further sections of the report lay out the components of the strategic framework model which identifies the particular thrust areas, the strategies, and the programmes to implement the strategies.

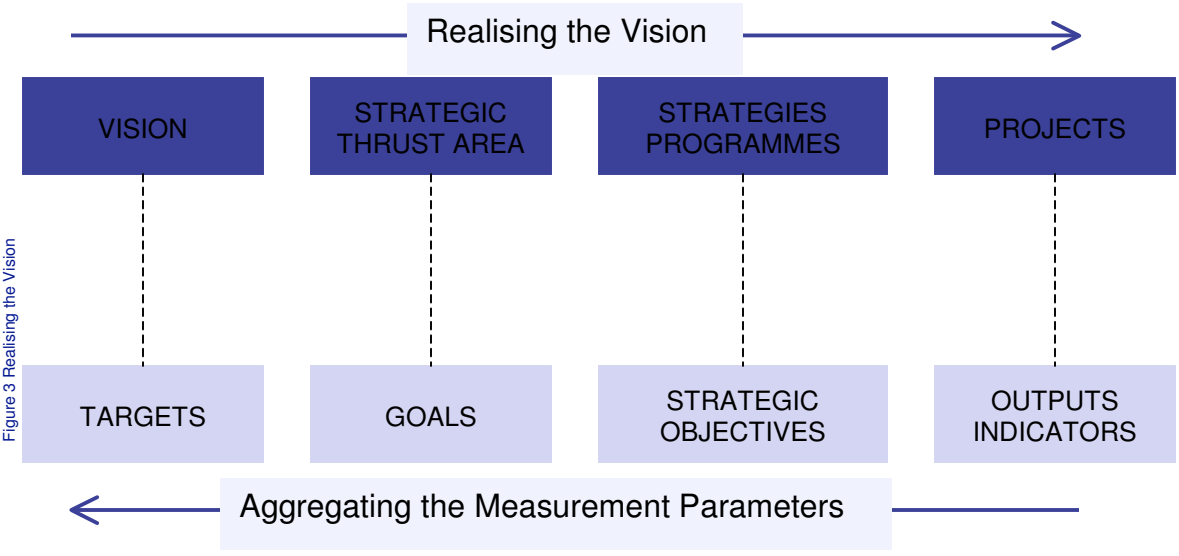


Figure 3 Realising the Vision

NICTSP
2007-2011

NICTSP STRATEGIC APPROACH

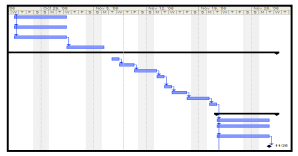
	DOMAINS OF ASSESSMENT	BROAD INTERVENTIONS	IDENTIFIED THRUST AREAS	CONTOURS OF INTERVENTIONS	DETAILS OF INTERVENTIONS
Mauritius ICT Current State	ICT Domestic ICT Exports ICT Manpower Development eGovernance ICT for Sectoral Exploitation ICT for Social Development Information Security Infrastructure and Electronic Communications Emerging Technologies and Standards Institutional, Policy & Legal Framework		STRATEGIC THRUST AREA 1 STRATEGIC THRUST AREA 2 STRATEGIC THRUST AREA 3 STRATEGIC THRUST AREA 4 STRATEGIC THRUST AREA 5	STRATEGY/PROGRAM 1 STRATEGY/PROGRAM 2 STRATEGY/PROGRAM 3 STRATEGY/PROGRAM 4 STRATEGY/PROGRAM 5 STRATEGY/PROGRAM 6 STRATEGY/PROGRAM 7 STRATEGY/PROGRAM 8 STRATEGY/PROGRAM 9 STRATEGY/PROGRAM 10 STRATEGY/PROGRAM 11 STRATEGY/PROGRAM 12 STRATEGY/PROGRAM 13 STRATEGY/PROGRAM 14 STRATEGY/PROGRAM 15	 Programme and Project Outcomes Project Priorities Programme Ownership and Responsibilities Programme Monitoring and Evaluation Indicators Programme Costs
Mauritius ICT Vision	The Government of Mauritius Vision for making ICT into the fifth pillar of the economy and transforming Mauritius into a Regional ICT Hub.				
Guidelines and Approach	Mauritius ICT Current State Assessment The current state was assessed in 10 domains of assessment belonging to (a) the ICT Sector, (b) areas where ICT is exploited, and (c) components that must form a part of the enabling environment, technical or legal. Fulfilment of the Mauritius ICT Vision was conceptualised in terms of realisation of measures required to build up both an Information Society and an Information Economy.	Based on the current state, PwC's similar experience and other global developments, for every domain, themes and broad thematic intervention areas were outlined.	From the realities of current state, the requirements for the realisation of the vision and the slew of broad intervention areas outlined, 5 strategic thrust areas were identified that would lead to orienting activities for realisation of GoM Vision.	Each of the thrust area would have strategies and programme that would lead to fulfilment of thrust area goals. Programmes would consist in a set of projects and activities. They would be prioritised based on factors of Criticality and Feasibility.	• Quick Wins for Economic development, long term focus on holistic Socio-Economic Development • Clear Ownership Structures • Outcome based M&E Framework • Evolutionary Approach

Figure 4 Strategic Approach

4. Strategic Framework Model

The strategy for Mauritius is to SCALE up to create a vibrant information economy and a supportive knowledge society.

The strategy for Mauritius now is to SCALE up to the next level of activity in various domains of involvement in ICT, including measures aimed at realising an Information Economy and creating an Information Society.

From the recommendations earlier made in our Analysis Report, the holistic approach to realise the GoM's ICT vision is by undertaking measures in five broad areas of involvement, the **Strategic Thrust Areas**.

- undertaking SUPPORT measures by initiating appropriate legal, institutional and infrastructural changes, investing in long-term educational fulfilment, fostering a culture of security and trust in ICT and following these up with effective monitoring and evaluation mechanisms.
- CATALYSING economic activity in critical sectors of the economy by promoting eBusiness adoption within and across different sectors of socio-economic activity.
- ACCELERATING ICT adoption in society by embracing electronic means of governance and by taking measures towards democratising ICT in society.
- taking up LEADERSHIP roles in the region through transforming itself into an ICT skills and expertise hub in this part of the world, while at the same time identifying a few areas in which it can become a regional leader.
- EMERGING as a global point of reference for offshored services both in the ITS and in the ITeS domains using, among other things, advantages of bilinguality, and becoming an investment nucleus for ICT and a Gateway to markets of Africa.

Each the five Strategic Thrust Areas have their own strategies that would together make up the overall strategy as follows.

Support	Set up a robust, transparent, equitable and progressive support structure for ICT.	5 Strategies 5 Programmes 50 Projects
Catalyse	Catalyse economic activity in critical sectors through increased adoption and usage of ICT.	4 Strategies 4 Programmes 15 Projects
Accelerate	Accelerate uptake of ICT in society by provision and adoption of ICT services/facilities of use to citizens.	3 Strategies 3 Programmes 35 Projects
Lead	Aim for regional leadership by becoming a hub of ICT activity and a regional leader in niche areas.	2 Strategies 2 Programmes 17 Projects
Emerge	Emerge as a global point of reference for offshore services and a Gateway to Africa.	1 Strategy 1 Programme 7 Projects

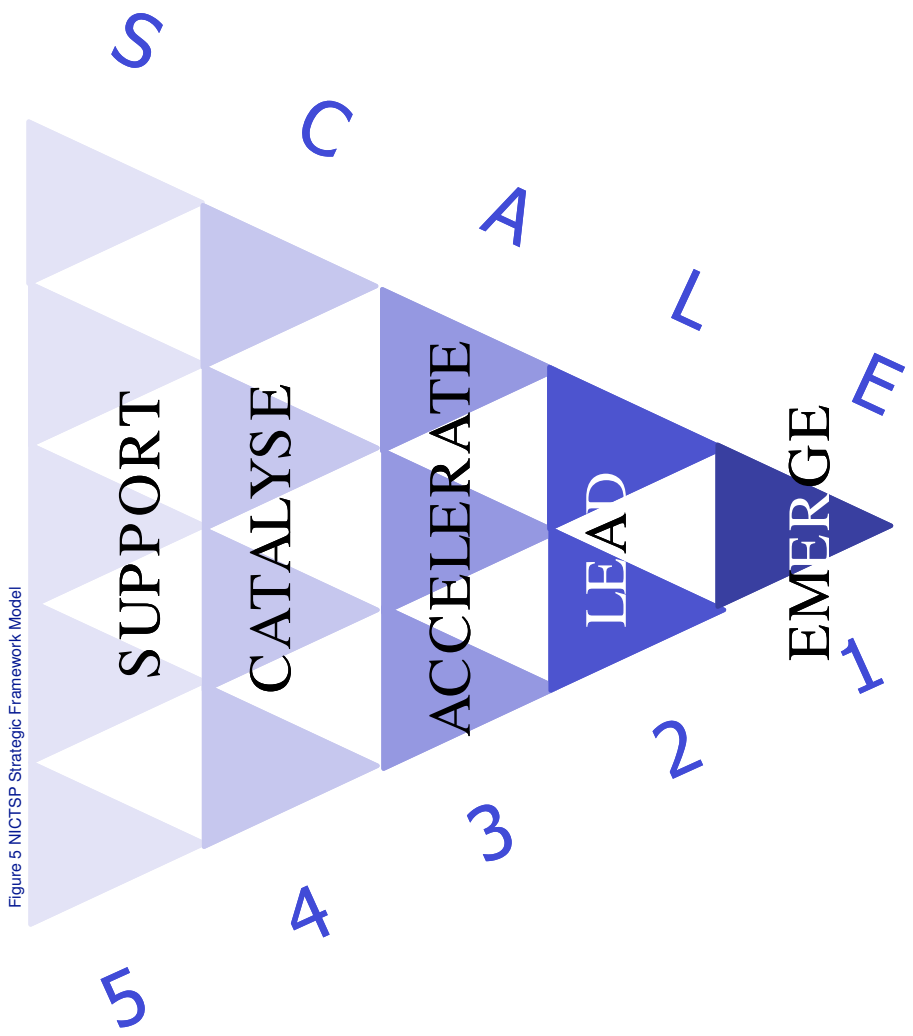
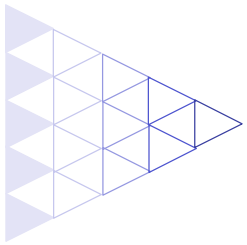


Figure 5 NICTSP Strategic Framework Model

The five Strategic Thrust Areas of SUPPORT, CATALYSE, ACCELERATE, LEAD and EMERGE respectively have 5, 4, 3, 2 and 1 strategies associated with them. Every strategy is implemented through a programme.

5. Strategic Thrust Areas

SUPPORT



5.1 SET UP A ROBUST, TRANSPARENT, EQUITABLE AND PROGRESSIVE SUPPORT STRUCTURE FOR ICT MEASURES TO SUCCEED

For initiatives under NICTSP to succeed, necessary support structures comprising elements of technology infrastructure, the politico-legal backbone, a supportive society that reposes trust in ICT as a way of life and invests in appropriate education, and an institutional framework that continually takes stock of emerging realities of the world and applies course correctives, is a fundamental requirement.

The following elements constitute the support structure.

A National ICT Policy conveys consistent and undiminished political commitment and continuity.

Policy, Legal and Regulatory Structure

The policy, legal and the regulatory structure makes up the foundation required to ensure that initiatives continue to enjoy consistent and undiminished support throughout the currency of the plan. A policy superstructure would convey not just political conviction and commitment for the initiatives but also, to a fair measure, guarantee continuity across political tenures. A comprehensive National ICT Policy encompassing different domains of involvement would be a necessary first step to impart direction as well as serve as a guiding document for stakeholders.

Legal or regulatory interventions must not stifle creativity or impede free flow of information but necessary checks and balances must still exist. Legal provisions must be harmonised with needs of the information economy and with international norms. Regulatory regime must be equitable, transparent, progressive and customer-centric.

For the identified activities to take place smoothly, it is also necessary that the legal framework is harmonised with requirements of the information economy and international norms, and is braced up into one in which participants have trust and confidence. While on the one hand it is necessary that legal or regulatory interventions do not stifle creativity or impede the free flow of information, it is also imperative that adequate checks and balances exist for systems to be restored whenever breaches occur. Following this, for example, interventions have been proposed in the sphere of data protection and privacy that are a mix of industry self-regulation and amendments to the law itself. Whereas amendments would make for a Data Protection Commissioner that is perceptibly more independent not just in spirit but also in letter, industry self-regulation and codes of governance would ensure that until Mauritius becomes an “adequate country”, ICT business does not suffer.

The ICT regulator not only needs to be effective, it must also be, and must be seen as, independent. Legal provisions and regulatory practices need to be seen in this light. Add to it the complexities thrown in by the challenges originating from convergence that have made erstwhile boundaries of regulation quite irrelevant today. Any shortfall in meeting regulatory requirements as mentioned above would not make for a regulatory regime that is equitable, transparent, progressive and customer-centric. Recommendations, therefore, have been made towards enhancing technical and institutional capabilities of the regulator.

Sustained Availability of Quality Manpower

ICT is a knowledge-intensive industry and hence is one which is driven essentially by skilled manpower. Both measures count here, quantity and quality. If interventions at the tertiary level make for immediate results in terms of making available outputs that are compatible with industry requirements, what is necessary, and is perhaps more fundamental, is that measures must be initiated at the foundational levels of education itself. A thriving ICT industry whose manpower requirements are substantially met from within the country requires more than twice the number of students coming up the secondary education ladder in streams related to ICT than is the current trend.

Reducing the high levels of school dropouts would require students to see education as a necessity not just for employment but to handle life itself. They must imbibe in themselves a spirit of lifelong learning, which discards all perceptions of education being a once-and-for-all effort. Parental involvement in this process as a key participant will also go a long way towards influencing the academic trajectory of children.

Education must be such as to inculcate in students an acumen of tackling the untoward and staying prepared for challenges in an increasingly professional and knowledge-driven world. ICT must be used as a key enabler in this endeavour, and education must make the transition from “Education about ICTs” to “Education through ICTs” in a larger effort to make education more creative and less pedagogical and subject to rote. ICT would be a key enabler to effect this transformation.

Course Curricula refinements with changes in the dimensions of content (project-oriented), structure (flexi-core courses) and delivery (with ICTs, group assignments, real-life problem simulations) with long-range impact have been recommended that would prepare the students of today to successfully take on the challenges of tomorrow. All-round stakeholder participation and involvement in the education process also needs to be enabled through the platform of a portal for education.

Culture of Information Security

In an increasingly knowledge-driven and networked world where a considerable degree of anonymity is associated with activities, and systems are prone to external interceptions that are in breach of lawful online conduct, all of which could lead to an erosion of trust and confidence, it is important that, on one hand, measures are undertaken towards creating an awareness of what is desirable and building capacities for the same, and on the other following it up with an enforcement and compliance regime. An environment of trust and confidence in ICT, particularly the Internet, is an essential pre-requisite for uptake levels to rise.

A larger National Information Security Strategy for Mauritius (Annexure I) has been formulated which is a synthesis of reactive and proactive measures towards building

Reducing high levels of dropouts is a prime requirement. So is parental involvement as a means to influencing the academic trajectory of children in Mauritius.

Education must imbibe in students a spirit of lifelong learning and must enable an acumen of tackling the untoward. ICTs are a key enabler in this endeavour. Course-curricula refinements at foundational levels need to be investigated. A unified education portal is also a requirement.

A National Information Security Strategy is formulated that is a blend of reactive and proactive measures. Reactive systems like the CERT-MU need to be backed with an assurance framework that promotes trust and confidence through adherence to standards and guidelines in at least the Critical Information Infrastructure areas.

an information-secure society. The strategy builds on the existing national information security incentives, policies, legislation and standards in the area of security, and focuses on the key areas of Information Security co-operation (national as well as international), Information Security Awareness and Education, promoting Trust and Confidentiality, Information Security Risk Management, Security Issues of Internet Governance and Information Assurance. Among the principal recommendations is a National Computer Emergency Response Team (CERT-MU) to respond to information security incidents and breaches. Besides, a National Information Assurance Framework will be implemented and adherence to information security standards will be promoted in order to build confidence and trust in the information economy through mandatory compliance audits for operators of Critical Information Infrastructure.

With “Everything Over IP” becoming a profitable alternative a National IP Policy to govern and guide activities over IP networks becomes a requirement. Otherwise, for the still evolving IP-based networks, a judicious mix of decentralised self-regulation and a centralised intervention from the regulator has been recommended.

Harnessing Technologies and rolling out an Appropriate ICT Infrastructure

ICT infrastructure forms the essential bedrock on which initiatives under the NICTSP would succeed. Establishment and sharing of a functioning electronic communications infrastructure, proper service management principles governing operations of this infrastructure and necessary policy and regulatory support must make for a regime that is equitable, transparent, progressive and customer-centric in orientation. This becomes particularly true in the case of resources that are finite and scarce, for example spectrum and numbered resources, and for infrastructure investment that has already been made by the incumbent.

Accordingly, recommendations have been made for a review of the telecommunication licensing regime and influencing its movement towards one that is more unified/converged and encourages more and more vendors providing service in a competitive market. Similarly, a telephone numbering plan migration to an eight-digit structure which is free from anomalies has also been recommended, as also a transition plan that causes least disruption to the users and effects the change in a user-centric way. Another competitiveness imperative, unbundling, both at the first and the last mile, has been addressed through a recommendation for a feasibility exercise that accounts for the dimensions of efficiency, user-centricity, cost-effectiveness and regulatory structure.

Broadband, increasingly becoming an instrument of national development, must have a policy too. Fixed and wireless access modes as also over powerline and fibre need to be explored.

With "Everything Over IP" becoming a profitable alternative which different countries of the world have embraced to varying degrees, a National IP Policy to govern and guide activities over IP networks, as also of making the transition to the IPv6 regime, has been recommended. In general, the approach for response to the evolving opportunities engendered by convergence has two aspects to it: (a) a judicious mix of decentralised self-regulatory codes and standards to be arrived at through consultation, and a centralised approach which concentrates this at the hands of the regulator, for example, the recommendations made for VoIP[9] adoption, and (b) guarded but collaborative response when it is perceived that Mauritius needs to wait a little more for clear trends to emerge.

[9] Voice Over Internet Protocol

The latter approach has been taken for Next Generation Network (NGN) for which discussion and deliberation has been recommended for an exercise that would arrive at an overall approach towards NGN.

Broadband, increasingly becoming an instrument to achieve national development goals, must have a policy too. Implementation of broadband must have within its planning horizon both fixed and wireless access possibilities as also other options like transmission of data at broadband capacities over powerlines and over fibre, be it to homes or to premises.

It is important, too, at the same time that emerging technologies are identified, adapted, adopted and harnessed through standards and regulatory frameworks that help internalise them smoothly into the existing systems without upsetting existing synergies. A key recommendation in this regard is the rollout of technology test beds for trying out emerging technologies before they are deployed in the real world. In fact, it is proposed, this could even be taken up as an initiative in which Mauritius could take a regional leadership role with the test bed and associated competencies being shared with other countries of the region.

The case for adoption and induction of emerging technologies needs to be furthered through a two-pronged approach of promotion and regulation. This has been recommended, respectively, through a Centre for Advancement in Computer Software and Engineering and through a Software Testing and Quality Assurance framework. In particular recommendations have been made towards effectively adopting Smart-card based electronic identification systems, open source particularly for usage in eGovernment applications and inducting Radio Frequency Identification Devices (RFID) in a streamlined way.

Given that a growing ICT sector would need fresh investments to be made towards building appropriate infrastructure for housing organisations that set up shop in Mauritius and that occupancy in the Ebene Cyber City is reaching saturation levels, a feasibility study has been recommended for new technology parks to bring about, among other things, increased infrastructure sharing and regional dispersion of investments.

Timely Monitoring and Evaluation Framework

In order that interventions taken up deliver the intended benefits, a timely and objective monitoring and evaluation framework is also an essential pre-requisite, as also is the requirement of a dedicated team entrusted to monitor and evaluate on a continual basis. The criteria that must form the basis for such evaluation also needs to be objectively laid down before implementation begins, in the form of performance-linked indicators on which to evaluate the progress of programmes.

Emerging technologies need to be identified, adapted, and adopted through standards and regulatory frameworks that help internalise them into existing systems without upsetting existing synergies.

A Technology Test Bed for trying out technologies before they hit the real world has been proposed. Mauritius could leverage this for regional leadership too.

Infrastructure sharing and regional dispersion of investments can result through new technology parks. A Feasibility Study is recommended.

Definitions for the ICT sector and ICT services are a prime requirement to quantify the contribution of the ICT sector into Mauritius GDP and track the growth of the sector.

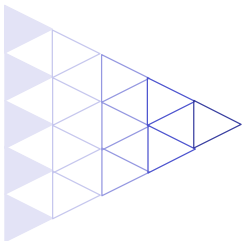
Since indicators form the very basis on which achievements in ICT could be qualified, a key recommendation is that of first arriving at definitions for the ICT sector and ICT service. Much has been happening at the international level in this area and while at the global level broad agreements exist on what must constitute the sector, finer granularities still vary from one country to another. Recommendations have been made towards arriving at a definition for the ICT sector as also of ICT service, that is aligned to current practice, in an effort to not just benchmark, but to also be in a position to calculate the contribution of the ICT sector to the Mauritius GDP.

Given that harmonisation of ICT statistical data collection is an important global exercise, a set of Core ICT Indicators has also been suggested as a starting point from which to expand. Indicators' data must not only be collected, they need also to be analysed to identify the problems alongwith recommendations that would help address them.

NICTERNs need to be tasked with analysing collected data, undertaking research and producing the Mauritius State of the ICT Report on a biennial basis. The report will evolve into a single-point reference for all ICT-related developments in Mauritius.

This work is expected to be heavy and would call for single-minded dedicated effort. Accordingly recommendations have been made for the deployment of a National Information and Communication Technology Evaluation and Research Network (NICTERN) comprising people tasked with responsibilities of analysing collected data, undertaking research on various aspects of the NICTSP and produce, on a biennial basis, a Mauritius State of the ICT Report which would be an integrated document that would cover not just progress made on the different dimensions of interventions, but also recommend further course of action. Whereas the National Computer Board will house the NICTERN, the National ICT Indicator Taskforce, the multi-stakeholder body entrusted with assuming overall responsibility of monitoring NICTSP initiatives on ICT indicators, will also review NICTERN's outputs in the sphere of indicators.

The Mauritius State of the ICT Report is an unprecedented exercise and the extent of coverage as also its depth will grow with time. A complete State of the ICT Report would be a document that would come to be a single-point reference for the latest ICT developments in Mauritius, with indicators being a part, though an important one, of it. The NICTERN will also be tasked with turning out this document in its entirety, replete with all the involved analysis and research.



Following the discussion above, Figure 6 brings out the GOAL associated with the Strategic Thrust Area of "SUPPORT", and the five associated STRATEGIES to help attain this goal.

GOAL

To operationalise a robust, transparent, equitable and progressive political, legal, technological and institutional support structure that is in harmony with the needs of an emerging information economy and that fosters an information society that believes in and invests in ICT.

STRATEGIES

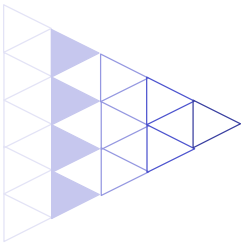
FIVE strategies have been identified.

Strategy S1	Maintain a consistent policy, legal and regulatory framework that is aligned with the needs of the ICT industry and promotes increasing uptake of ICT in economy and society through high levels of trust and confidence.
Strategy S2	Establish a culture of information security in businesses, government and society through sustained proactive interventions of awareness and capacity building and reactive emergency response systems.
Strategy S3	Facilitate the creation of a reliable, robust, affordable and scalable ICT infrastructure that aims at effectively harnessing emerging technological developments for the collective benefit of society.
Strategy S4	Facilitate sustained superior quality of talent pool in the country through interventions at the foundational levels of educational system using ICT as a tool and aimed at instilling a spirit of lifelong learning among students.
Strategy S5	Establish an effective, objective and transparent monitoring and evaluation framework that would serve as the basis on which to continually assess the progress of initiatives under the NICTSP.

Figure 6 Goal and Associated Strategies for SUPPORT

FIVE strategies are identified under the Strategic Thrust Area of “Support”.

CATALYSE



ICT must not just enable value-added service provision to the tourist but must also facilitate a more equitable sharing of the proceeds from the tourism industry.

A comprehensive eTourism initiative including a country portal for tourism, end-to-end service for the tourist and cost-effective provision of ICT to operators are envisaged.

Enhancing tourist convenience through a single-window interaction, provision of m-services for the tourist supported by agreements with other operators will help tourist convenience.

5.2 CATALYSE ECONOMIC ACTIVITY IN CRITICAL SECTORS THROUGH AN INCREASED ADOPTION AND USAGE OF ICT AS AN ENABLER

Significant levels of ICT uptake already exist in sectors like banking. However, in other critical sectors of economic importance and/or social relevance, there is room where ICTs need to be used as a catalyst to bring about better sector management and sector development, and to facilitate collaborative working not just between stakeholders within a sector but also across sectors. Besides making for growth in the sectors themselves, this would trigger increased ICT activity in the domestic sector and irrevocably establish its relevance for Mauritius.

The following critical sectors are identified for Mauritius.

Tourism

Tourism is a key defining characteristic for Mauritius in the international arena. Drawing on a wide range of skills and involving players from both public and the private sectors, tourism, though, is a heterogeneous and fragmented industry that can benefit immensely from collaboration enabled by ICT which would result not just in offering value-added services to the tourist but would also result in benefits percolating more equitably to stakeholders. ICT intervention efforts must, therefore, lead to enhanced tourist convenience and to a more equitable sharing of industry proceeds.

However, ICT penetration rates including that of the Internet are low and restricted to larger operators. The concept of an all encompassing portal offering end-to-end multi-channel ICT-enabled service to the tourist and single-point reference for tourism in Mauritius has still to be realised. Similarly, multi-channel location-based services do not exist. Interventions in the sector must necessarily lead to not just offering value-added services conveniently obtained through a single point of reference by the tourist, before, during and after her trip to Mauritius, but must lead to a more geographically and economically diverse tourist profile, facilitating overall tourism growth.

Presenting a value-for-money proposition to the tourist would also imply that all stakeholders, big and small, are brought on board, in an overall effort to make tourism a growing, vibrant and inclusive sector of economic activity. Cost-effective mechanisms of participation and partaking of the benefits of ICT must be conceived to facilitate this. The recommendation is for a comprehensive eTourism initiative including that of a portal representative of tourism in Mauritius, applications and data hosting on a shared infrastructure to give opportunity to the SMEs and end-to-end integrated service provision to the tourist.

The recommendation is for an integrated eTourism initiative that helps the tourist plan her trip through a multi-dimensional decision-making tool on the portal that takes into account budgetary restrictions, locational requirements, need for amenities like rented

car, a local mobile phone during her stay in Mauritius, interfacing arrangements with tour operators and other associated amenities. Options would need to be explored for enhancing tourist convenience through a single-window interaction for the tourist supported by agreements with other operators, as also of providing convenient service over ICT devices like a mobile phone. Inclusiveness of the eTourism platform would ensure that all operators of the tourism sector, particularly the SMME segment get a digital window to the world.

Health

Provided free of charge at the point of use, healthcare in Mauritius is characterised by a network of primary, secondary and tertiary level institutions. However, ICTs have a long way to go for it to be optimally utilised for the collective benefit of health workers and patients. Uptake of ICT in the sector has been disparate and not the result of any integrated plan for the sector as a whole. Largely restricted to the use of mailing and information systems in isolated departments, the health sector has a lot to gain through ICTs in terms of ushering internal efficiency and effectiveness and generally enabling collaborative working among its stakeholders.

Interventions in the health sector must necessarily lead to addressing the multi-faceted problems faced by stakeholders in the sector through a more holistic exploitation of both information and communication technologies available towards bringing about better provision of healthcare, remote or otherwise, better information sharing among its participants and better analytical and decision-making capabilities by policy planners in the sector.

Accordingly, recommendations include arriving at a comprehensive eHealth plan for the sector that would lay out the initiatives required to be taken and associate them with entities entrusted to take them up. In particular, telemedicine possibilities need to be explored not just for extending healthcare to outlying areas of the country but also as a means with which expertise could be shared with other countries of the region. Similarly, recommendations also include identification and deployment of systems that would free doctors from repetitive work associated with ICT and afford them more time on their core competencies.

The Pan-African eNetwork programme that plans to connect a university and a hospital from each of the 53 nations of the African Union by satellite and fibre-optic network in a bid to enable them all to receive, among other things, tele-education and tele-medicine services from 12 hospitals in India, will also be rolled out.

Agriculture

On a downward trend owing to a reduction in the proportional land ownership and a reducing contribution into the GDP, compounded by withdrawal of preferences available earlier and emergence of many low-cost competitors, agriculture and allied activities nevertheless continue to be important even as the sector prepares itself for

Recommendations include a comprehensive eHealth plan that would lay out the roadmap for ICT adoption. Feasibility of telemedicine as an instrument of extending healthcare to other countries of the region, as also to outlying areas of Mauritius also needs to be explored.

For Agriculture, Business Process Re-engineering, an integrated portal linked with geo-database as a visualising and decision-making tool must take place. Appropriate institutional mechanisms with which to implement and monitor implementation must exist.

challenges of the future. The sector is also distinguished by a plethora of institutions involved, each with its own ownership structure and mandate. Like in the other sectors, here too, the initiatives have been largely piecemeal and not the result of any integrated ICT adoption plan. ICT adoption in the sector is also distinguished by inadequate utilisation of the Internet as a sector development and a sector management platform.

Interventions in the agriculture sector, alongwith the necessary business process re-engineering, an integrated portal and efficient use of geo-database as a visualising, analytical and decision-making tool, must also include coming out with appropriate institutional mechanisms with which to implement and monitor the implementation of solutions in the sector, ensuring smooth functioning of infrastructure on which to run ICT solutions, undertaking capacity building measures and awareness initiatives towards promoting ICT uptake. Recommendations, therefore, include a comprehensive eAgriculture plan for the sector that would lay out the initiatives required to be taken and associate them with entities entrusted to take them up.

The larger effort is towards a comprehensive agro-climatic Mauritius Agriculture Resource Information System as a planning tool for stakeholders in the sector.

An all-encompassing portal for the sector as an information repository and a collaborative platform, including discussion forums and advisory and advocacy networks, needs to come up as also, in the long-term its evolution into the Mauritius Agriculture Resource Information System (MAGRIS), an extensive and structured repository of an agro-climatic data that could be used for planning by the stakeholders from the farmer to the topmost officials of the sector

Small and Medium Enterprises (SMEs)

Representing about 14% of the GDP but employing nearly 36% of the workforce[10], SMEs play a very crucial role in the Mauritian economy. SMEs, though, in Mauritius are crippled by problems related mostly to size and isolation: if isolation prevents them from taking advantages of benefits that could accrue out of networking, their small size handicaps them in terms of the financial bandwidth they have towards making investments into areas where gains are not immediate.

Rewards and incentives must punctuate the uptake of ICTs by the SMEs. Awareness campaigns and capacity building must make for higher ICT adoption towards facilitating fruitful clustering and networking

ICTs are seen as a key enabler in making SMEs utilise gains of efficiency and effectiveness in their internal working and as a facilitator towards helping them cluster and network with other participants in the sector to achieve better integration in their offerings to the market and attaining economies of scale through a shared investment into infrastructure. However, faced with an inward looking mindset, interventions, besides those related to technology, must necessarily involve taking up appropriate capacity building and awareness initiatives towards adopting and using ICTs in a more comprehensive way.

[10] Small Islands, New Technologies and Globalisation- A Case of ICT adoption by SMEs in Mauritius, United Nations University, Working Paper Series, 2006

Cost-effective solutions on low-cost platforms must be explored and operationalised as a tool to bring about better advertisement of the SME's products, facilitate beneficial clustering and networking opportunities, and as a general efficiency-enhancing tool has been recommended. Appropriate rewards and incentives for those who effectively deploy ICT in their organisations must also give a push to sagging ICT uptake rates.

Following the discussion above, Figure 7 brings out the GOAL associated with the Strategic Thrust Area of "CATALYSE", and the four associated STRATEGIES to help attain this goal.

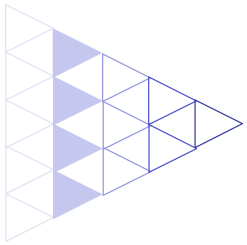
GOAL

To significantly enhance the uptake of ICT in critical sectors of economic activity as a tool to bring about higher levels of productivity, as a collaborative platform of working among stakeholders within and across sectors and as a channel through which to reach out to new avenues of growth.

FOUR strategies have been identified to attain this goal.

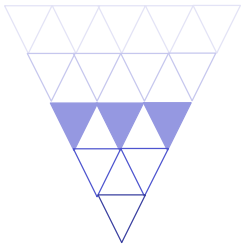
Strategy C1	Promote the adoption of ICTs in SMEs through awareness campaigns, capacity building, awards and incentives and support it with easy provision of relevant value-adding products and services.
Strategy C2	Enhance existing levels of ICT use in the Health sector through coordinated planning that promotes collaborative working, knowledge sharing and harnesses appropriate technologies for the collective benefit of health workers and patients.
Strategy C3	Adopt coordinated planning, design and implementation of ICT solutions in the Agriculture sector to bring about optimum utilisation of agricultural resources and help policy planners and farmers take informed decisions.
Strategy C4	Collaborate among various stakeholders in the Tourism sector and bring about an ICT offering that significantly enhances tourist convenience and facilitates a higher and inclusive growth of the sector.

Figure 7 Goal and Associated Strategies for CATALYSE



FOUR strategies are identified under the Strategic Thrust Area of "Catalyse".

ACCELERATE



5.3 ACCELERATE UPTAKE OF ICT IN SOCIETY THROUGH PROVISION AND ADOPTION OF CONVENIENT ICT SERVICES AND FACILITIES OF PRACTICAL USE TO CITIZENS

ICT stands considerably harnessed in governance and a significant beginning has been made in the provision of electronic services to citizens too. It is time now to accelerate eGovernance through enhancement, consolidation and collaborative working. eGovernance must be seen not just as a tool for citizen convenience but also as a spur to the domestic ICT industry in Mauritius and a compelling reason for communities to adopt ICT in their daily lives. Concurrently, initiatives need to be accelerated in making available to communities the wherewithal, in both infrastructure and capability terms, required to gainfully make use of ICT in their lives, in an overall effort to democratise the Internet in society.

The following have been identified as the mechanism through which ICT uptake in society will be accelerated.

Accelerated Excellence through eGovernance

Substantial investments and achievements have happened in the sphere of eGovernance in Mauritius, including the setting up and operationalising of the Government Online portal and launching of a few eServices on it. Interventions, now, are required in the twin areas of (a) enhancement of the existing initiatives in order to bring about higher levels of internal efficiencies and effectiveness within the government and facilitating citizen convenience in their dealings with the government, and (b) taking up additional interventions on board to address those areas where gaps have been identified to exist.

Services must make the transition from a single-service single-stage to a multi-service, multi-stage delivery framework. Citizen convenience is paramount and this must ride on high levels of internal efficiencies and effectiveness.

Initiatives taken so far towards electronic governance are largely limited to particular departments with a minimal amount of cross-departmental working behind the systems. Services need to undergo a transition from a single-service, single-stage to a multi-service, multi-stage delivery framework to make governance an efficient, citizen-friendly, transparent and participative process. A successful transition to this to be undertaken in an accelerated way would require interventions in the three principal dimensions of people, process and technology in a framework that encourages and requires collaborative working. More importantly, there would also be required a central plan within which all departments must work, according priorities not just between departments but also to services that need to be launched within the individual departments.

An eGovernance Cell to plan, monitor, advise and coordinate initiatives being taken up in Mauritius must exist. Government Process Re-engineering needs a re-look.

Recommendations made include the setting up of an eGovernance Cell to plan, monitor, advise and closely coordinate the eGovernance initiatives being taken up in Mauritius, on the basis of plans collaboratively prepared and agreed upon by departments. Process reform, on a recast process template that unmistakably associates process components with individuals in their roles and thus facilitates easy tracking of documents in a workflow system has been recommended. This needs to be followed by the implementation of IT solutions with user-convenience the uppermost priority, using a multi-channel delivery framework, is planned. So also are communication drives to ensure that users, both

external and internal are communicated of advances being made in eGovernance. A larger eGovernance branding is envisaged in the long-run, with both print and electronic media being profitably used for the purpose.

Undertake Flagship Investments

To accelerate a more rapid uptake of ICT among citizens and businesses, it is imperative that the government is seen to be driven in its commitment towards providing electronically-enabled services. Flagship investments achieve the twin purposes of (a) conveying unequivocally the message that government is seriously pursuing eGovernance through the provision of services that directly touch the day-to-day lives of citizens, and (b) undertaking some key investments that would serve as nuclei around which other eServices would grow and build.

Flagship services are key investments that become the nuclei around which other services would grow and develop. A smart-card based electronic identification system for citizens implemented in a phased manner is a key recommendation. So is a VoIP-based Government Call Centre.

These investments would get shared across multiple departments and achieve not just cost-reductions but also a substantial extent of technology interoperability between systems deployed in different wings of the government. Investments envisaged include a consultancy followed by an implementation of a smart-card based electronic identity system for citizens, an e-procurement system, document management system in the ministries, and a global positioning system for the Mauritius Police and the like. Other measures aimed at bringing about cost-reduction include adopting open source systems, exploring, among others, public private partnership options in an effort to identify alternative sources of funding for eGovernment projects.

Public Private Partnerships would marry public sector sensitivities and private sector competencies in a bid to reduce costs and share risks and responsibilities.

As a further measure towards building flagship investments, though not directly linked to the provision of services, is the step towards facilitating collaborative working and knowledge networking between departments. These initiatives would trigger the process of collaboration and knowledge sharing in such a way that when the actual cross-departmental services themselves are rolled out, stakeholders are found primed to fruitfully contribute to the processes that run behind the services. Operationalisation of knowledge databases and project management solutions would fall in this category and have been recommended. Also recommended, though on a longer-term perspective is the development of competencies in eGovernance among the civil service so as to act as constructive agents of change.

Accelerated Community Empowerment through ICT

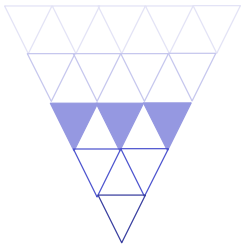
Measures to facilitate uptake of ICT in society have been largely those relating to the provision of PCs to households and primary schools coupled with computer learning for everyday use to citizens. Although these have pushed up the PC penetration rates, the Internet penetration rates have not gone beyond a point. Essentially initiatives taken up have been primarily top-down in nature with their effect not lasting beyond the timeframes in which they have taken place. Moreover, even at subsidised rates PCs would be purchased by households only if additional value is perceived. Lack of locally relevant content has not encouraged higher PC purchase rates significantly.

Lack of adequate locally generated and relevant content have not significantly pushed up PC penetration rates.

Widely available and affordable Public Internet Access Points would be vehicles to deliver ICT to people. A multi-purpose PIAP would ensure more footfalls into the centre.

Enhancement of the existing Gateway portal prototype will trigger local content generation while a system of rewards will motivate content augmentation.

Growth with equity must be the mantra and the Universal Access Fund the principal enabler.



THREE strategies are identified under the Strategic Thrust Area of "Accelerate".

Interventions, then, need to take place in the multiple areas of (a) giving community access to PCs to those Mauritians who would not otherwise be available to afford or willing to buy PCs, (b) triggering local content generation even as communities get prepared to use ICT through a continuation of computer learning programmes and (c) letting initiatives be run by communities themselves, though following some centrally-determined guidelines. Essentially, the Community Empowerment Programme needs to be broadened in scope.

A Public Internet access Point (PIAP) is the major vehicle through which initiatives could be run and the concept of multi-purpose PIAP is one which would increase chances of more and more individuals visiting the PIAPs and hence must be adopted and actively encouraged. Recommendations, accordingly, include a planning exercise to determine the locations of the PIAPs as well as their operational models. Self-generating sources of revenue with active people's participation is one way PIAPs would run on their own steam and not depend on budgetary allocations. Local content could be triggered through enhancement of the Mauritius Development Gateway portal prototype by students of the Universities as part of a larger project that also earns them academic credits. To lend further impetus, it is proposed to acknowledge the contribution of PIAPs and local web content through a system of annual rewards.

Subsidised PC purchase schemes for low-income groups of society, arrived at after tripartite consultation between the GoM, Original Equipment Manufacturers and the Development Bank of Mauritius, and the launching of a Universal Service/ Access Fund are also envisaged to be measures aimed at ushering growth with equity.

As a direct fallout of these interventions, Mauritius would also witness an improvement in its ranking in ITU's Digital Opportunity Index, a global standard now in evaluating a country's standing in ICT among nations of the world.

Following the discussion above, Figure 8 brings out the GOAL associated with the Strategic Thrust Area of "ACCELERATE", and the three associated STRATEGIES to help attain this goal.

GOAL

To significantly enhance the quality of life of citizens through extension of integrated services from government over preferred electronic channels of delivery and widespread provision of ICT as a tool of choice for enrichment and empowerment.

Accordingly, THREE strategies have been identified to attain this goal.

Strategy A1 Consult and collaborate widely to design and implement eGovernment systems that aim at enhancing citizen convenience and improving internal efficiencies and effectiveness in the government.

Strategy A2 Deploy electronic systems and undertake key investments that make for a higher visibility of eGovernment in the daily lives of citizens.

Strategy A3 Accelerate the uptake of ICT in the society by making it accessible, available, applicable and affordable to everyone.

Figure 8 Goal and Associated Strategies for ACCELERATE

5.4 AIM FOR REGIONAL LEADERSHIP THROUGH BECOMING A HUB OF ICT ACTIVITY AND A PREFERRED POINT OF REFERENCE IN THE REGION IN IDENTIFIED NICHE AREAS

A highly literate bilingual population, favourable geo-climatic positioning, sustained kinship with other countries and initial successes in offshoring qualify Mauritius to mark its presence in the ICT map of the world. However, symbiotic partnerships must be put in place with other countries of the region, that, help build Mauritius' own ICT industry and further growth of ICT enterprise in collaborating nations. A few niche areas of leadership in Sub-Saharan Africa must also be identified.

Regional Hub of ICT Expertise

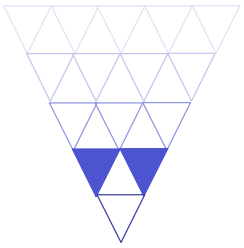
"Competing for Resources and not for Clients" has been a prevailing sentiment unique to Mauritius ICT industry. On an immediate basis, therefore, Mauritius needs to have adequate numbers of quality resources both in the Information Technology and the Information Technology enabled services domains. An overall target of 7% of GDP directly attributable to ICT services exports implies a manpower requirement of a little over 29,000 qualified individuals.

Current enrolment trends in Mauritius indicate that the cumulative indigenous supply of professionals over five years who would qualify for employment in ICT sector make for a resource base of a little over 16,000 qualified individuals. Within the currency of this plan, this deficit (about 13,000 qualified individuals) could be marginally bridged by (a) collaborative working between academia and industry leading to expansion in domestic enrolment for courses on the one hand and an increase in the absorption rate in employment on the other, and (b) rigorous awareness and sensitisation campaigns by the ICT industry that publicises its successes.

This, though, would still leave Mauritius with a substantial deficit to bridge; it is proposed that this shortfall be made up through win-win partnerships with other countries of the region that aim at boosting the ICT manpower requirements of Mauritius even as it facilitates economic progress for cooperating countries. This, it is proposed, could happen through attracting students from collaborating nations in the region into ICT education in Mauritius and, upon completion of their education, helping them contribute to the sector here, with the ones returning getting gainfully employed in their respective countries' ICT sectors. However, this would require (a) offering high quality ICT education in Mauritius, (b) expansion of intake into courses that make for employment in ICT sector, and (c) achieving a high rate of absorption into employment of students in ICT sector.

Larger country-to-country Memoranda of Understanding (MoUs) are required for the above arrangement to work sustainably and successfully. MoUs, to begin with, are suggested with partnering nations, with whom plans for similar cooperation are already under discussion in the industry. Later, as clearer manpower trends emerge

LEAD



Competing for resources and not for clients is the prevailing sentiment unique to the Mauritian ICT industry.

A GDP target of 7% requires employment of over 29,000 qualified individuals. Current trends indicate an indigenous accumulated supply of only a little over 16,000 of them.

Win-win symbiotic partnerships must materialise between Mauritius and other countries of the region, if the required numbers are to be met. More importantly, enrolment levels in the educational institutions must go up.

Bilateral Memorandum of Understanding is suggested to be initiated with countries of the region to augment ICT manpower availability. More MoUs may need to get crafted later.

and lessons from the MoU experience itself sink in, other countries could be considered for crafting more MoUs, Such measures need to take place not only at the government level, but also at the level of the private sectors of the cooperating countries with government facilitating the process[11].

Biennial (once in 2 years) collaborative exercises are recommended between the academia and as broad a spectrum of the ICT industry as could be brought on board that would, on a two-year horizon, dovetail the industry requirements with academic outputs from the educational institutions in Mauritius. These exercises must not only take place but they must be seen to be happening too, with successes emerging being publicised widely with the idea of pushing up enrolment and induction rates into ICT on the one hand, and spurring investors from other countries to choose to invest into the ICT sector into Mauritius.

Evolving and adhering to biennial plans between the academia and the industry as the basis on which to dovetail industry requirements with academic outputs is critical to realising the ICT Vision.

Among the issues that must necessarily be covered are a re-adjustment of intake into tertiary levels and re-alignment of the course structure to meet ICT industry requirements on a 2-year horizon basis. The biennial exercise must yield definitive outputs in manpower requirements, expected technology profile, research requirements by industry to be conducted in Universities, and other cooperative ventures like Executive Development Programmes and internships. To start with, a BPO training centre has been recommended to be established with students' training getting facilitated through a Government scheme and an assured employment in the industry.

On an annual basis, ICT Industry-Academia conference must be hosted that would publicise successes achieved over the last year and the next activities to be taken up. Invitations for the event would be sent to ICT firms outside Mauritius too and, it is expected, that this would set in motion a virtuous cycle between publicity and success in ICT.

The Annual ICT Industry-Academia conference would set in motion a virtuous cycle between publicity and success.

Research activities in the field of ICT not from a theoretical standpoint but dictated by practical relevance and encouraged by the ICT industry. Rewards and incentives must also be a key intervention that will impart impetus to research being taken up.

Leadership in Identified Niche Areas

Whereas the above strategy would lead to substantial skill development both in the ITS and the ITeS domains, such skills would continue to be flexibly deployable in many technology streams. Additionally, Mauritius could build advanced expertise in certain identified focus areas in which skills are not readily available in other countries of the region; such initiatives would hasten the leadership status for Mauritius in the region. Centres of Excellence that house specialised expertise to conduct research in niche technology areas in consonance with industry requirements are among select measures that could be taken up. Although a comprehensive planning and design exercise must precede the

[11] In fact, other countries Mauritius will increasingly have to contend with are categorised as “Collaborators”, “Competitors” and “Target Countries”. Countries of the region with which Mauritius would be working in an effort to build up the ICT pool of expertise can be called “Collaborators” in this venture. Target countries are the main offshoring markets of the world which the ICT exports industry in Mauritius would address, while competitor nations include those countries that are active in the identified “targets”. Figure 6 brings this out.

establishment of the Centre of Excellence and would have the identification of niche areas built into it, at this stage, networking, mobile technologies and information security are identified to be pursued with regional leadership in mind.

Two other related initiatives are Technology Test Beds and Career Counselling Networks. Whereas technology test beds would make for nurturing expertise in order to coordinate and monitor trials that take place on emerging technologies before they are deployed in the real world, a burgeoning ICT industry would need functioning career counselling networks to exist that continually show the path to professionals in the ICT industry, particularly those in the BPO industry. Expertise and infrastructure garnered in both of these areas would also enable Mauritius to take up a leadership role in the region.

Operationalising Centres of Excellence that house specialised research expertise in niche technology areas in consonance with industry requirements could enable Mauritius take up a leadership role in the region.

Initiatives could also be taken towards horizontally transferring home-grown ICT solutions and their associated expertise to other countries of the region, given that governance systems in both Francophone and Anglophone African countries are likely to be somewhat similar to that in Mauritius, with the latter having had experience in both of these.

ICT business incubation is another area suggested for Mauritius to take up a regional leadership role. Substantial expertise has been built over a period of time by NCB and it is now felt that NCB must take incubation to the next level of involvement (such as virtual and semi-virtual incubators and marketing initiatives) and expansion (like “incubating incubators” in other countries) to emerge as a true incubation “think tank” of the region.

Horizontal transfer of home-grown ICT solutions into other countries and playing a prominent role in ICT event hosting are other key initiatives that would help Mauritius climb the ICT leadership ladder in the region.

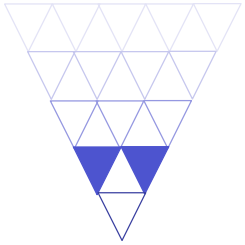
Following the discussion above, Figure 9 brings out the GOAL associated with the Strategic Thrust Area of “LEAD”, and the two associated STRATEGIES to help attain this goal.

GOAL

To attain a position of leadership in sub-Saharan Africa in certain identified niche areas of ICT in particular and emerge as a hub of ICT expertise in general.

Accordingly, and in line with the discussions above, TWO strategies have been identified to attain this goal.

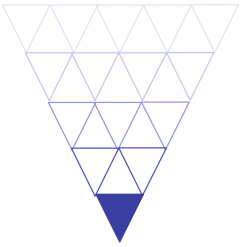
Strategy L1	Undertake win-win collaborative exercises involving stakeholders in industry, academia and governments of the region to establish Mauritius as a hub of ICT expertise and employment in sub-Saharan Africa.
Strategy L2	Identify and build expertise in certain niche areas of ICT.



TWO strategies are identified under the Strategic Thrust Area of “Lead”.

Figure 9 Goal and Associated Strategies for LEAD

EMERGE



An exclusive ICT Export promotion agency for attracting business and investments must rigorously pursue market intelligence-based targets in the offshoring world.

More jobs, higher export revenues and greater technology transfers must define an upward ICT export spiral punctuated by larger geographical penetration and newer service lines.

Country Branding exercises on multiple platforms for a global audience must be taken up to publicise Mauritius' emergence as a preferred centre for offshoring in the world.

5.5 EMERGE AS A GLOBAL POINT OF REFERENCE FOR OFFSHORING AND A GATEWAY TO AFRICA

Known opportunities, even if not always the best, are better than unknown possibilities. It is this straitjacket of thought that may influence decision-makers in offshoring nations. Confronted with a choice between Mauritius and another country while choosing to offshore their operations, many may fall for past performance rather than promised potential. Mauritius needs to allay such perceptions through a mix of measures that must include campaigns that advertise inherent, acquired and emergent strengths of the country in its total offering to the world, in the process heralding its arrival as an emerging offshore location of the world.

History, multi-ethnicity and geographical location together endow it with advantages of a bilingual population and sustained kinship not just with offshoring countries in Europe and nations in the African mainland but also with countries of the east like India and China, with both of whom it enjoys long-standing relationship. The two countries are also keen to invest to get a share of the Francophone offshoring pie and to do business with Africa. Mauritius, in this regard, is in an excellent position to serve as a geo-cultural bridge between these economies and countries in the African continent too.

Key measures recommended include the establishment of an exclusive ICT Export promotion agency, aiming at attracting business and investments for the export sector. The agency would have two functional wings concentrating separately on IT services and IT enabled services. Together they must empower the agency with market intelligence-based information for initiatives that target both quantity and quality of business and investment attracted. Collaboratively arrived export promotion plans on an annual basis must fully exploit market intelligence findings, and dovetail them with promotional efforts. More jobs, higher export revenues and greater technology transfers must define an upward ICT export spiral, punctuated by larger geographical penetration and newer service lines.

Investment for the ICT export services sector must be attracted both from within and beyond the country. Supporting measures like investor facilitation and servicing that assist an investor in analysing investment decisions and sustaining a business are recommended. Single window "one-stop shop" service aimed at expediting approval process, and other related help in obtaining sites, utilities, and the like also need to be pursued vigorously. An Export Development Fund could be launched with the planning exercise providing recommendations on sources of contribution into it and its effective utilisation. Policy measures like fiscal incentives and tax rebates need also to be taken up to attract more investment.

Towards meeting these objectives country-branding exercises need to take place to publicise Mauritius' emergence as a preferred centre for offshoring through an appropriate

mix of events, road shows, and advertisements to a global audience. Mauritius needs to make a better value proposition to the offshoring countries of the world identified as “Target Countries” than do its “Competitors”.

Also recommended are advertisements on both electronic and print media of global viewership of the advances being made in Mauritius in the field of ICT, including the inherent qualities of offshore attractiveness, a population almost equally comfortable in French and English, favourable geo-climatic positioning, political order and the like. Sustained campaigns are foreseen which would irrevocably associate the offshoring attribute with Mauritius.

On its ties with countries like India and China, while Mauritius would bring in the geographical proximity and cultural knowledge of Africa, and help dissolve language barriers with Francophone countries, the two Asian giants would bring in the resources to make a combined offer. Memoranda of Understanding between Mauritius and countries of the region with projects to follow are envisaged to be taken up. Extra-governmental collaborative ventures between private industries and academic institutes could also be explored.

Following the discussion above, Figure 10 brings out the GOAL associated with the Strategic Thrust Area of “EMERGE”, and the associated STRATEGY to help attain this goal.

GOAL

To firmly establish Mauritius as an offshoring centre of choice among the main offshoring countries of the world and a gateway for investors in Africa.

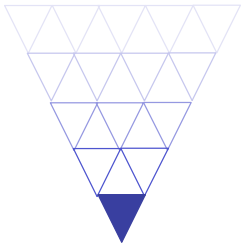
ONE strategy has been identified to attain this goal.

Strategy E1	Rigorously pursue planned and focused market-intelligence informed targets in the offshoring world by attracting business and investments.

Figure 10 Goal and Associated Strategies for EMERGE

Memoranda of Understanding with partnering countries of the region are planned. So are extra-governmental collaborative ventures between industries and academic institutes.

ONE strategy is identified under the Strategic Thrust Area of “Emerge”.



6. Summarising NICTSP Strategies

6.1 The Strategic Architecture

Figure 11 reproduces the strategic architecture discussed in the earlier sections of the report. The following constitute the key points.

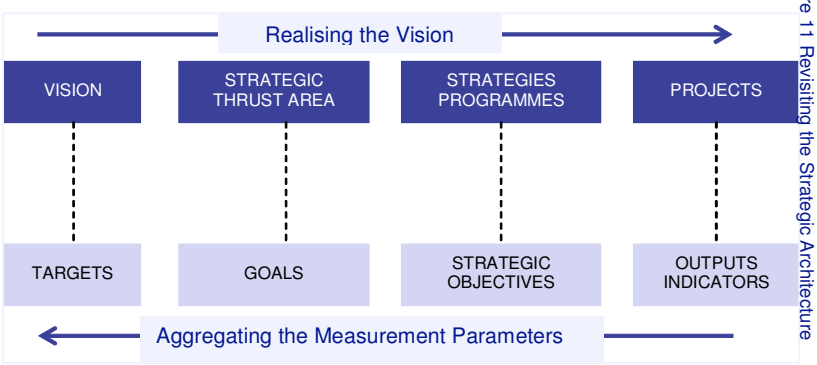


Figure 11 Revisiting the Strategic Architecture

- To realise the twin targets associated with the Vision of making ICT the fifth pillar of Mauritian economy and Mauritius a Regional ICT Hub, five Strategic Thrust Areas have been identified, with each area being associated with a Goal.
- Broadly, the five thrust areas are those of (a) setting up a robust, transparent, equitable and progressive support structure, (b) catalysing economic activity in critical sectors through ICT, (c) accelerating uptake of ICT in society through provision and adoption of convenient ICT services and facilities, (d) aiming for regional leadership through becoming a hub of ICT resources and a leader in identified areas, and (e) emerging as a global point of reference for offshoring and a Gateway to Africa.
- To attain the goals associated with the thrust areas strategies have been identified under each of them in a 5, 4, 3, 2, 1 sequence respectively with each of the areas, making it a total of 15 strategies to implement.
- Programmes have been identified as the vehicles to implement the strategies in a one-to-one relationship with strategies, with each of them meeting identified strategic objectives.
- A programme is actually a clutch of projects to execute with each such project structured to result in identified outputs and be amenable to tracking through measurement of indicators associated with them.

NICTSP then is a synthesis of 15[12] strategies to implement through programmes and projects described later in this report. Figure 12 summarises the fifteen strategies that constitute the NICTSP.

6.2 Mauritius in relationship with some other countries prominent in ICT operations

Since much of ICT services is either language dependent or is one in which appropriate linguistic use would make a substantive difference, nations have been grouped into two broad classes,

- Francophone, or countries where French is spoken substantially, and
- Anglophone, or states where English is a preferred language in businesses.

Within each of the language-determined categories above, countries above have been further categorised as

- Target Countries, or those nations that are known to offshore their services substantially to other countries;
- Collaborators, or countries whose partnership would be elicited towards meeting the goals and objectives described earlier; and
- Competitors, or nation-states that cater to the same offshore services markets as is planned for Mauritius and hence constitute the competition.

Collaborative relationship between Mauritius and other countries are envisaged on primarily three aspects,

a. Cooperation towards attracting investments that would help the ICT sector meet business objectives from the identified “target” countries;

[12] 5+4+3+2+1=15

b. Cooperation on building up an ICT manpower resource base that would help meet businesses obtained from the "target" countries; and
c. Cooperation that would help exploit Mauritius' potential of acting as a bridge between countries looking towards Africa for business and nation-states in Africa (in other words, positioning Mauritius as a "Gateway" to Africa).

Figure 13 positions Mauritius in this envisaged scenario. Table 3 associates select potential countries with the above description.

Francophone Countries			Anglophone Countries		
Targets	Collaborators	Competitors	Targets	Collaborators	Competitors
• France • Belgium • Netherlands • Luxemburg • Canada • Other African countries of high ICT expenditure[13]	• Madagascar • Mauritania • Ivory Coast • Mali • Chad • Algeria • Congo • Niger • Reunion • India • China	• Morocco • Tunisia • Senegal • Romania • Vietnam	• UK • US • Ireland • Norway • Sweden • Denmark • Finland • Canada • Other African countries of high ICT expenditure	• Namibia • Zimbabwe • Zambia • Tanzania • Kenya • Nigeria • Sierra Leone	• South Africa • India • China • Egypt • Botswana • Philippines • Malaysia • Thailand • East Europe Countries

Table 3 Targets, Collaborators and Competitors

[13] High ICT expenditure could be taken on an objective basis to include those countries with a contribution exceeding 5% into the GDP from their ICT sectors.

S1 Maintain consistent policy, legal and regulatory framework aligned with needs of ICT industry and promotes increasing uptake of ICT in economy and society through high levels of trust and confidence

S2 Establish a culture of information security in businesses, government and society through sustained proactive interventions of awareness and capacity building and reactive emergency response systems

S3 Facilitate the creation of a reliable, robust, affordable and scalable ICT infrastructure that aims at effectively harnessing emerging technological developments for the collective benefit of society

S4 Facilitate sustained superior quality of talent pool through interventions at the foundational levels of educational system using ICT as a tool and aimed at instilling a spirit of lifelong learning among students

S5 Establish an effective, objective and transparent monitoring and evaluation framework that would serve as the basis on which to continually assess the progress of initiatives under the NICTSP

C1 Promote the adoption of ICTs in SMEs through awareness campaigns, capacity building, awards and incentives and support it with easy provision of relevant value-adding products and services

C2 Enhance existing levels of ICT use in the Health sector through coordinated planning that promotes collaborative working, knowledge sharing and harnesses appropriate technologies for the collective benefit of health workers and patients

C3 Adopt coordinated planning, design and implementation of ICT solutions in the Agriculture sector to bring about optimum utilisation of agricultural resources and help policy planners and farmers take informed decisions

C4 Collaborate among various stakeholders in the Tourism sector and bring about an ICT offering that significantly enhances tourist convenience and facilitates a higher and inclusive growth of the sector

A1 Consult and collaborate widely to design and implement eGovernment systems that aim at enhancing citizen convenience and improving internal efficiencies and effectiveness in the government

A2 Deploy electronic systems and undertake key investments that make for a higher visibility of eGovernment in the daily lives of citizens

A3 Accelerate the uptake of ICT in the society by making it accessible, available, applicable and affordable to everyone

L1 Undertake win-win collaborative exercises involving stakeholders in industry, academia and governments of the region to establish Mauritius as a hub of ICT expertise and employment in sub-Saharan Africa

L2 Identify and build expertise in certain niche areas of ICT

E1 Rigorously pursue planned and focused market-intelligence informed targets in the offshoring world by attracting business and investments.

SUPPORT (5 STRATEGIES)

CATALYSE (4 STRATEGIES)

ACCELERATE (3 STRATEGIES)

LEAD (2 STRATEGIES)

EMERGE (1 STRATEGY)

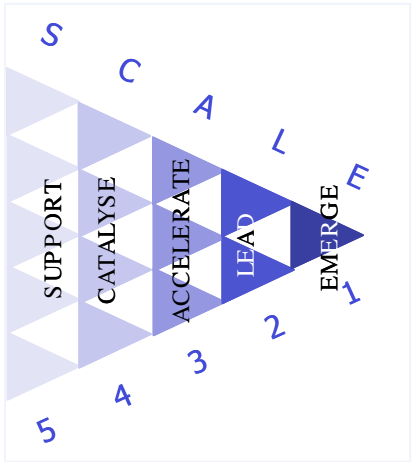
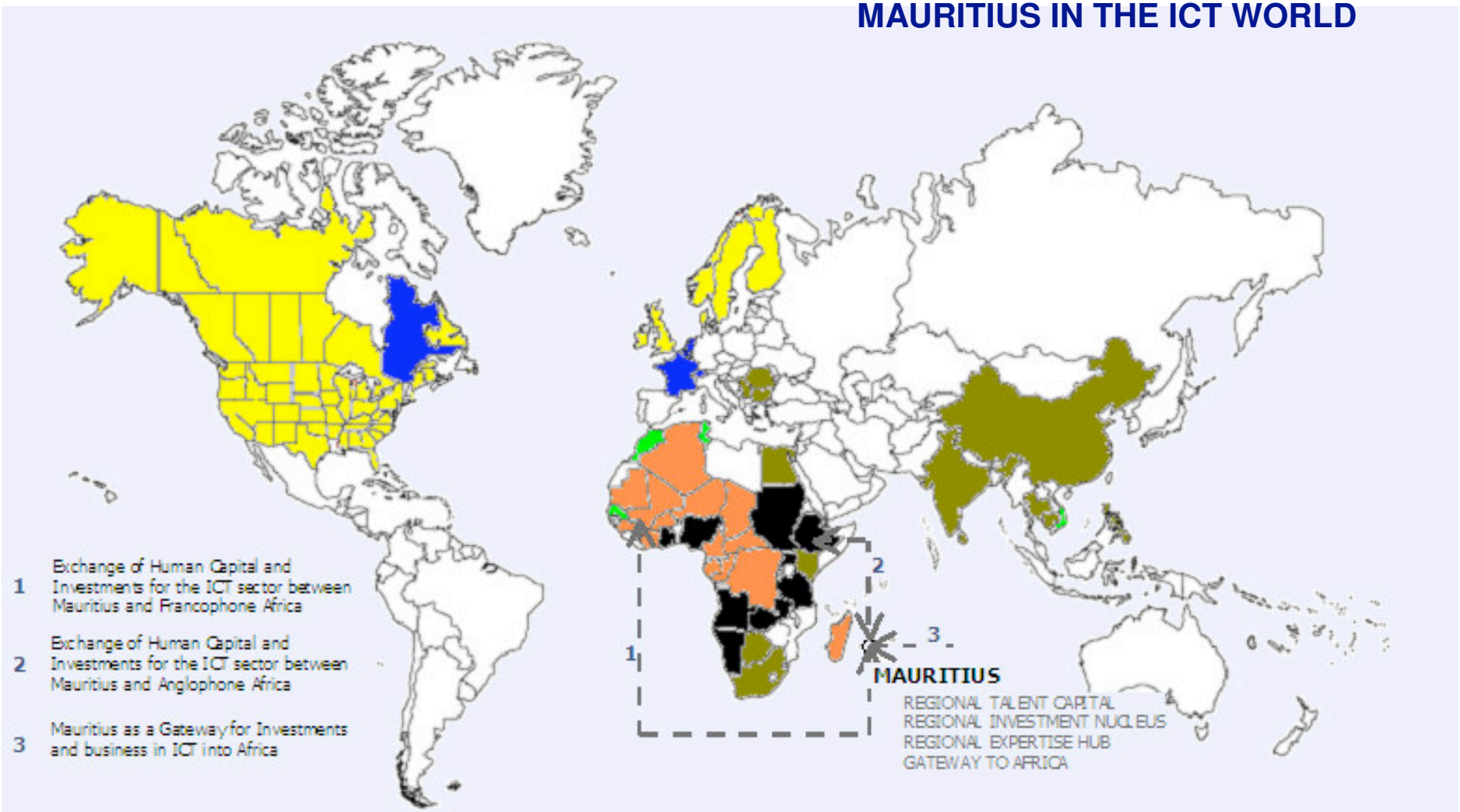


Figure 12 Constituent Strategies of SCALE

CONSTITUENT STRATEGIES OF NICTSP 2007-2011

ENVISAGED SCENARIO- MAURITIUS IN THE ICT WORLD



ANGLOPHONE		FRANCOPHONE	
Markets	UK, US, Ireland, Norway, Sweden, Denmark, Finland, Canada, African nations with ICT spending	Markets	France, Belgium, Netherlands, Luxemburg, Canada, Francophone African countries with high ICT spending
Collaborators	Namibia, Zimbabwe, Zambia, Tanzania, Kenya, Nigeria, Sierra Leone	Collaborators	Madagascar, Mauritania, Ivory Coast, Mali, Chad, Algeria, Congo, Niger, Reunion, India, **China**
Competitors	South Africa, India, China, Egypt, Botswana, Philippines, Malaysia, Thailand, East Europe	Competitors	Morocco, Tunisia, Senegal, Romania, Vietnam

Figure 13 Mauritius International Positioning

PART TWO

Structure of Part Two

As discussed above, programmes, constituted by projects, are the main vehicles to implement the 15 strategies earlier detailed. Programmes are associated with the "Strategic Objectives" that are to be met through their implementation.

In this section, 15 programmes, corresponding to their respective strategies are detailed. The description of the programmes are on the following lines.

- Context of the Programme, including recommendations made in the "Analysis" phase, which they address;
- Projects that make up the programme;
- Priority associated with the projects which determines the order in which they would be taken up;
- "Owner" organisations entrusted to implement the projects; and
- Main milestones and indicators that define the projects and help monitor their implementation.

Part Two Table of Contents

7. NICTSP Programmes

The following is the list of Programmes.

Strategic Thrust Area: **SUPPORT**

S1 REVIEWING THE ICT POLICY, EFFECTING LEGAL AND REGULATORY CHANGES
S2 INFORMATION SECURITY CULTURE AND EMERGENCY RESPONSE SYSTEMS
S3 HARNESSING EMERGING TECHNOLOGIES AND ENHANCING INFRASTRUCTURE CAPABILITY
S4 EDUCATION THROUGH ICT
S5 ICT MEASUREMENT AND EVALUATION TERM REVIEW (ICT METER)

Strategic Thrust Area: **CATALYSE**

C1 ENHANCE ICT UPTAKE AMONG SMEs TO PROMOTE MARKET EXPANSION AND PRODUCTIVITY
C2 PROMOTING INTEGRATED ADOPTION OF ICTs TO DELIVER BETTER HEALTHCARE
C3 PROMOTING INTEGRATED ADOPTION OF ICTs THROUGH COLLABORATIVE WORKING
C4 ENABLING INCLUSIVE GROWTH OF TOURISM INDUSTRY THROUGH ICT

Strategic Thrust Area: **ACCELERATE**

A1 ACCELERATED E-GOVERNANCE THROUGH PROCESS RE-ENGINEERING AND COORDINATED PLANNING
A2 UPSCALING E-GOVERNMENT THROUGH FLAGSHIP APPLICATIONS
A3 ENHANCING CONNECTIVITY AND CONTENT FOR COMMUNITY EMPOWERMENT

Strategic Thrust Area: **LEAD**

L1 COLLABORATIVE PLANNING FOR MANPOWER DEVELOPMENT IN IT AND ITES/BPO SECTOR
L2 BUILDING LEADERSHIP COMPETENCIES IN ICT

Strategic Thrust Area: **EMERGE**

E1 A PREFERRED OFFSHORE DESTINATION FOR IT AND ITES-BPO SERVICES

7.1 PROGRAMME S1: REVIEWING THE ICT POLICY, EFFECTING LEGAL AND REGULATORY CHANGES

Programme Context and Overview

Interventions as part of NICTSP are recommended in a range of areas including technology infrastructure, eBusiness adoption in critical sectors of economic activity, ICT adoption in government and uptake of ICT in society at large. However, for these activities to take place successfully, an essential pre-requisite is a politico-legal superstructure that is (a) aligned with needs of the information economy, (b) is harmonised with international norms, (c) takes into account emerging developments in technology, including that of convergence, and (d) promotes increasing uptake of ICT in economy and society through high levels of trust and confidence.

Key interventions suggested include

Collaborative and Convergent Institutional Arrangement
An exercise is suggested that threshes out the issue of collaborative working and leads to either (a) the two bodies of ICTA and IBA[14] merging into a revised Organisation design, or (b) though the two bodies must stay separate, comprehensive guidelines are worked out for joint efforts towards regulating the ICT sector, particularly in light of convergence.

Comprehensive Regulatory and Competency Review of ICTA
A comprehensive regulatory and competency review of ICTA is suggested that must cover issues including those related to functional competence including professional experience and educational requirements, consultative approach in decision-making, continuity in tenure at higher levels and other connected issues.

Review of the Electronic Transactions Act (ETA)
Having adopted the UNCITRAL[15] Model law for eCommerce in 2000, there are a few areas of variance that lie between the ETA and the later UNCITRAL convention of 2005 which now need to be closed.

Beefing up the Data Protection Regime
A two-pronged strategy is recommended to (a) effect requisite changes in legislative and institutional domains with an objective to eventually bring about an official recognition for Mauritius in the European Community as a “third country” whose data protection provisions are “adequate”, and (b) concurrently, evolve industry or sector-based codes of conduct that would merit recognition from respective countries on a case-to-case or a sector-to-sector basis.

Harmonising the Copyright Act, 1997
The Copyright Act needs to be harmonised with practices contained in Internet Treaties (the "World Copyright Treaty" and the "World Photograph and Phonogram Treaty") and/or with the norms being followed in other countries with which substantial business in ICT is envisaged.

Regulation of Working hours in ICT Industry
With ICT becoming a focus sector of the information economy, a law to regulate working hours in the ICT industry, particularly the BPO segment, needs to be enacted and proclaimed.

National Broadband Policy
Following the feasibility study to be undertaken for broadband rollout in Mauritius (described under programme “Harnessing Emerging Technologies and Enhancing Infrastructure Availability”), a National Broadband Policy needs to be formulated that would pronounce the government's intention towards promoting broadband in a reliable, cost-effective and progressive manner.

Other recommendations include the

- Review of the National ICT Policy for Mauritius in the light of emerging realties during the course of NICTSP implementation
- Enactment and proclamation of an Anti-Spam law
- Enactment and Proclamation of Child Online Protection Act

[14] ICTA: Information and Communication Technologies Authority, IBA: Independent Broadcasting Authority
[15] UNCITRAL: United Nations Convention on International Trade and Law

- Coming out with a comprehensive Organisation Design and Job Description for the National Information and Communication Technology Authority of Mauritius, the unified body recommended later in the section for activities pertaining to the ICT sector.

Programme Strategic Objectives

- to review the National ICT Policy in light of developments during the NICTSP implementation towards achieving national development goals, and generally serve as a guiding document for stakeholders.
- to ensure an enabling legal framework that is aligned with Mauritian constitutional provisions, the legislative and regulatory environment, is tuned to ICT industry requirements, and is consistent with international best practices.
- to ensure harmonisation of laws and rules that prevent unauthorised alteration and access, unlawful use, unauthorised interception and other such wrongful acts generically described as cyber crime, with international norms.
- to undertake appropriate legal initiatives to ensure harmonisation with international practice, ICT laws that provide for legal recognition, force and validity to electronic data messages, electronic records, electronic transactions and electronic signatures.
- to implement an enactment that provides for use of personal information in a manner that creates a trusted framework for collection, exchange and use of personal data in commercial and governmental contexts while recognising the right of privacy of individuals to personal information.
- to provide for varying degrees of enforcement, including industry self-regulation, industry codes and legal recourse in an effort to bring about a smooth transition to a stage when Mauritius is recognised as a third country whose data protection laws are “adequate” in accordance with EU[16] directives.
- to ensure that legal provisions for copyright are harmonised with international practices so as to bring about a freer flow of information.
- to undertake collaborative, multi-disciplinary measures that promote and enforce online child safety through effecting interventions in legal and institutional domains.
- to bring about appropriate changes towards effective regulation of ICT activities that take into account requirements and benefits from convergence and makes for a fair, trusted and transparent regulatory regime.
- to provide for a National Broadband Policy that clearly signals the Government’s intention of promoting broadband as an instrument of development, through a mix of interventions that would accelerate uptake of broadband in Mauritius among businesses and citizen communities in an equitable, transparent and customer-centric way.
- to undertake appropriate legal interventions to proclaim and enact an anti-spam legislation.

Projects and Outcomes

Table 4 S1- Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
S1P1	Effecting appropriate changes for technical and institutional capabilities in the emerging “converged” environment	• Exercise on changes required in legislation for ICTA • Arrange for a regulatory and competency review of ICTA's technical and institutional capabilities • Competency review of the ICT Advisory Council, ICT Appeal Tribunal, IT Unit of the Mauritius Police and any other institution with regulatory powers for ICT • Introduce necessary changes in the ICT Act to reflect areas and procedures of public consultation in decision-making process • Exercise on a staggered tenure for the management	• Consolidated Restructuring Report on ICT Regulation in Mauritius • Amended ICT Act

[16] European Union

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
		board of ICTA • Exercise to recommend effective ways to create a converged environment or to recommend effective ways of collaborative working between ICTA and IBA	
S1P2	Comprehensive Review of ICT policy to lend strategic directions to activities in ICT and other sectors	• Study of the Programme Objectives under the SCALE framework • Reviewing the National ICT Policy	• Revisions to the National ICT Policy of Mauritius
S1P3	Data Protection and Privacy	• Effecting requisite changes in the legislative and institutional domains LEGISLATIVE ○ amendments to the law to reflect independence from data controllers ○ amendments to the law, if applicable, to reflect changed requirements for the appeal process ○ amendments to the law to reflect lifelong compliance to secrecy ○ amendments to the law to reflect an inclusive coverage of technology INSTITUTIONAL ○ Facilitating finalisation of the Code of Conduct and Code of Practice in collaboration with the private sector	• Amended Data Protection Act, 2004 • Sector-based Codes of Conduct and Code of Practice • Full proclamation of the Act • Data Protection Act being given due recognition at level of EU.
S1P4	Effect changes in Copyright Act, 1997	• Constitution of the Committee for reviewing the Copyright Act, 1997 • Consideration of the relevant issues of the Copyright Act, 1997 • Proposal for Amendments • Enactment and Proclamation of the Amendments	• Amendments to the Copyright Act, 1997
S1P5	Effect changes in Cyber Crime and Computer Misuse Act, 2003	• Constitution of the Committee for reviewing the Cyber Crime and Computer Misuse Act, 2003 • Consideration of the relevant issues of the Cyber Crime and Computer Misuse Act, 2003 • Proposal for Amendments • Enactment and Proclamation of Amendments	• Amendments to the Cyber Crime and Computer Misuse Act, 2003
S1P6	Harmonise ETA[17] with UNCITRAL 2005 convention	• Exercise on changes required in the legislation on the following three aspects ○ Time and Date of Despatch ○ Time and Date of Receipt ○ Electronic Signatures • Recommendations for Amendments to the Law, including for those pertaining to consumer protection issues in the online context • Enactment and Proclamation of the amended ETA	• Amendments to the Electronic Transactions Act, 2002
S1P7	Enact and proclaim Anti-Spam Law	• Constitution of a Team to draft the legislation • Consultative Process • Enactment and Proclamation	• Spam Act

[17] Electronic Transactions Act, 2002

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
S1P8	Formulate and enact amendments to Child Protection Act to cater for safety of children online	• Constitution of a Team to draft the legislation • Consultative Process • Enactment and Proclamation	• Amendments to Child Protection Act
S1P9	Formulate a Broadband Policy	• Study of the Broadband Recommendations in the Final Analysis Report, NICTSP • Study of the Feasibility Report for Broadband in Mauritius ("Harnessing Emerging Technologies and Enhancing Infrastructure Availability") • Drafting the National Broadband Policy	• National Broadband Policy for Mauritius
S1P10	Enact and proclaim Labour Laws for the ICT Sector	• Constitution of the team appointed to draft the law • Draft the Law • Public Consultation • Enactment and Proclamation	• Labour Laws for the ICT Sector
S1P11	Organisation Design and Job Description for the National Information and Communication Technology Authority of Mauritius (NICTAM)	• Study of the Organisation Chart for the NICTAM[18] • Study of the ToR[19] in the source organisations suggested in the report • Draft the combined ToR for NICTAM • Draft the Mission, Objectives for NICTAM • Populate the conceptual entities in the organisation chart with resources from the source organisations • Draft Job Descriptions in the new set up	• NICTAM Organisation Design • Act for the NICTAM • Greater economies of scale and greater collaboration in the ICT sector

Programme Governance Framework

A National Taskforce on Revamping the ICT Legal and Regulatory Framework needs to be constituted, chaired by the MITT, including representatives from ICTA, State Law Office, HRDC, National Computer Board and ICT Industry Association. The taskforce will be monitoring the progress of the programme closely.

Projects, Ownership and Priorities

Table 5 S1- Project Priorities

Project Code	PROJECTS	Owner	HIGH	MEDIUM	LOW
S1P1	Effecting appropriate changes for an effective regulator in the "converged" environment	MITT[20]	✔		
S1P2	Reviewing the ICT policy to lend strategic directions to activities in ICT and other sectors	MITT			✔
S1P3	Data Protection and Privacy	PMO[21]	✔		
S1P4	Effect changes in the Copyright Act, 1997	MoAC[22]			✔

[18] National Information and Communication Technology Authority of Mauritius
[19] Terms of Reference
[20] Ministry of Information Technology and Telecommunications
[21] Prime Minister's Office

Project Code	PROJECTS	Owner	HIGH	MEDIUM	LOW
S1P5	Computer Misuse and Cyber Crime Laws	MITT		✔	
S1P6	Harmonise ETA with UNCITRAL 2005 convention	MITT	✔		
S1P7	Enact and proclaim Anti-Spam Law	MITT		✔	
S1P8	Formulate and enact amendments to Child Protection Act to cater for safety of children online	MoWRCDC P[23]		✔	
S1P9	Formulate a Broadband Policy	MITT	✔		
S1P10	Enact and Proclaim Labour Laws for the ICT sector	MoLIRE[24]	✔		
S1P11	Organisation Design and Job Description for the NICTAM	MITT			✔

Programme Monitoring Milestone(s)/Indicators

Table 6 S1- Project Milestones and Indicators

No	Parameter	Milestone(s)/ Indicator(s)
S1P1	Effecting changes in the ICT Act, 2001	• Completion of exercise on changes required in legislation for ICTA • Completion of a regulatory and competency review of ICTA's technical and institutional capabilities • Incorporation of amendments in the ICT Act 2001 to reflect areas and procedures of public consultation in decision-making process
	Effecting changes in the institutional arrangements	• Recommendations made for a staggered tenure for the management board of ICTA • Recommendations made following review of technical and institutional capability • Arrangements made to reflect procedures of public consultation in decision-making process • Recommendations made for effective ways to create a collaborative working between ICTA and IBA[25]
S1P2	Review and pronouncement of Revised ICT Policy	• Existing ICT Policy timely reviewed • Revisions agreed upon and announced
S1P3	Effecting changes in the Data Protection Act, 2004	• Incorporation of recommendations to adequately cover "independence" issues • Incorporation of provisions to cover generically the whole of ICTs in the legislation • Incorporation of changes required for secrecy provisions in the Data Protection Act, 2004
	Effecting changes in the institutional arrangements	• Institutionalisation of Office of Data Protection Commissioner (DPC) • Finalisation of knowledge sharing arrangements between the data processors and the DPC's office • Agreement among the industry bodies on the self-regulatory measures and other codes of conduct that need to be followed
S1P4	Effecting changes in the Copyright Act, 1997	• Amendments to cover temporary copies made • Amendments to cover exhaustion principle made • Amendments to cover anti-circumvention principle made • Amendments to cover the rights' management information

[22] Ministry of Arts and Culture
[23] Ministry of Women's Rights Child Development and Consumer Protection
[24] Ministry of Labour, Industrial Relations and Employment
[25] Independent Broadcasting Authority

No	Parameter	Milestone(s)/ Indicator(s)
		• Amendments to cover liabilities of intermediaries made • Above amendments enacted and proclaimed
S1P5	Effecting changes in the Cyber Crime and Computer Misuse Act, 2003	• Amendments to effect harmonisation with EU[26] provisions in terms of offences against confidentiality, integrity, availability of data and systems like illegal access, illegal interception, data or system interference and illegal devices • Amendments to effect harmonisation with EU provisions in terms of computer-related forgery and computer-related fraud • Above amendments enacted and proclaimed
S1P6	Harmonise ETA with UNCITRAL 2005 convention	• Amendments to cover temporary "Time and Date of Despatch" made • Amendments to cover "Time and date of Receipt" made • Amendments to cover electronic signatures made
S1P7	Enactment of an Anti-Spam Law	• Drafting of the enactment done timely • Proclamation of the Act done timely
	Installation of Institutional Arrangements	• ISPs adopt a common anti-spam policy • Other operational institutional arrangement adopted and finalised by ISPs[27]
S1P8	Formulate and enact amendments to Child Protection Act to cater for safety of children online	• Drafting of the enactment on incorporating online child safety done timely • Drafting of the enactment on incorporating enforcement and regulatory provisions • Proclamation of the Act done timely
	Installation of Institutional Arrangements	• Designation of a Watchdog body • Finalisation of institutional principles
S1P9	Formulate a Broadband Policy	• Drafting of the Broadband Policy done timely • Broadband Policy announcement takes place timely
S1P10	Enact and Proclaim Labour Laws for the ICT sector	• Inclusion of flexible working hours and working conditions • Drafting of the enactment done timely • Proclamation of the Act done timely
S1P11	Organisation Design and Job Descriptions for the NICTAM	• Source Organisations finalised • Terms of Reference, Mission, Objectives for the NICTAM finalised • Terms of Reference for the SBUs finalised • Terms of Reference for the SBU Units finalised • Unit Organisation Designs finalised • Organisation design for the NICTAM finalised, including constitution of the management board • Job Description for officials in the NICTAM units finalised • NICTAM Act is drafted • Enactment and Proclamation of the NICTAM takes place • NICTAM is operationalised • Extent of Synergies generated

[26] European Union
[27] Internet Service Providers

7.2 PROGRAMME S2: INFORMATION SECURITY CULTURE AND EMERGENCY RESPONSE SYSTEMS

Programme Context and Overview

Mauritius is today on the brink of the next wave of ICT adoption, implying ever greater use of e-information, its processing, sharing and transmission in a networked environment.

Interventions ranging from creating awareness, imparting relevant education to build domain skills in manpower, establishing legal steps and enforcement mechanisms, having a functional risk management framework and establishing an emergency and crisis management team, would provide adequate trust and security so as to make the adoption of ICT all pervasive and secure.

The following recommendations are advanced as part of a larger National Information Security Strategy (Annexure I) which aims at establishing a culture of information security through a two-fold approach of reactive and proactive interventions. The implementation structure to operationalise the recommendations proposed require NCB to assume most responsibilities of undertaking advisory and awareness related measures on information security, while the Computer Emergency Response Team (CERT-MU) for Mauritius, also proposed to be housed in the NCB would be responsible for co-ordinating and handling information security incidents at national level. A National Information Security Forum comprising representatives from the Critical Information Infrastructure areas would help stakeholders air their views on information security in their respective areas of operation.

Education and Awareness

Proper education and training are required to appreciate issues on information security, to gain awareness, develop skill and build sufficient skilled manpower to mitigate security risks.

Recommendations include

- Organising national awareness campaigns for Internet users and the population at large to raise awareness on various issues.
- Imparting information security education for students at the tertiary level.
- Raising awareness on information security issues for employees and top management in public and private sectors.
- Special short duration bridge courses on information security.
- Setting up local chapters of international bodies associated with information security and encourage certification on information security through them.
- Extend regional and international co-operation for knowledge sharing.

Trust and Confidence

Fundamental tenets of information security, e.g., availability, integrity, authentication & non-repudiation must be established before online transactions happen and people begin to take part in them. The following measures are suggested.

- Initiate the process for proclamation of the provision for CCA[28] establishment under ICT Act.
- Establish a consultative process towards building a national cryptography policy.
- Implement a Mauritian PKI[29] for creation of local Certifying Authorities.
- Implement a Government PKI exclusively for G2B, G2G and G2C[30] transactions.
- Encourage e-commerce sites to procure site seals / SSL certificates to ensure trusted interaction.

Critical information infrastructure

Information has become one of the most important assets of an Organisation. Increasing dependence on ICT is fast making existing infrastructure critical as there are associated risks too. It is essential that there is a formal information security risk assessment framework and mitigation processes are in place on a continual basis.

The following need to be taken up.

- Setting up of the Mauritian Computer Emergency Response Team.
- Implementation of Information Security standards in critical sectors.

[28] Controller of Certification Authorities
[29] Public Key Infrastructure
[30] Representing respectively Government-to-Business, Government-to-Government, and Government-to-Citizen

- Agreements with international Organisations or other regulatory institutions in other countries to engage in co-operation on information security incidents and protecting the security of our Internet infrastructure.
- Organise Information Security risk management programmes for participants from industries.
- Implement programmes for capacity building on cyber crimes for law enforcement and investigation authorities.
- Implement appropriate infrastructure to facilitate the investigation authorities on cyber crime investigations.
- Create a baseline security standard framework to be adopted by different sectors and specify Information Security requirements.
- Audit compliance to information security controls in the identified key sectors to be carried out on a regular pre-defined periodicity basis.
- Create tailored Information Security standards and publish guidelines for adoption of information security best practices at SMEs.

Internet Governance

Internet has now become a convenient and preferred channel to do business. However, illegal and fraudulent acts pose serious security threats to doing business. The following need to be done

- Implement the anti-spam committee recommendations.
- Implement on-line safety measures.
- Implement a code of good practices for ISPs as first line of defence from hazards of using Internet.
- Institute a framework to monitor Internet traffic which might be harmful to the nation and society.

Programme Strategic Objectives

- to implement the National Information Security Strategy that encompasses elements of information security awareness and education, promotion of trust and confidence in ICT, risk management frameworks particularly those in sectors deemed critical, establishment of governance mechanisms that accord due consideration to requirements of information security and provides for security standards to be adhered to by stakeholders of ICT in Mauritius.
- to enable Government, in cooperation with the private sector, to prevent, detect and respond to cyber-crime and misuse of ICTs by developing guidelines, enacting legislation that allows for effective investigation and prosecution of misuse, promoting effective mutual assistance efforts and strengthening institutional support at the international level for preventing, detecting and recovering from such incidents.
- to enable stakeholders to act in a timely and cooperative manner to prevent, detect and respond to security incidents.
- to help participants in the information society share information, as appropriate, about threats and vulnerabilities and implement procedures for rapid and effective cooperation to prevent, detect and respond to security incidents.
- to ensure that measures to usher information security are implemented in a manner consistent with the values recognised by democratic societies, including the freedom to exchange thoughts and ideas, the free flow of information, the confidentiality of information and communication, the appropriate protection of personal information, openness and transparency.
- to help participants conduct periodic risk assessments that identify threats and vulnerabilities, occasioned by technology, physical and human factors,
- to help stakeholders determine the acceptable level of risk and help them in the selection of appropriate controls to manage the risk of potential harm to information systems and networks in the light of the nature and importance of the information to be protected.
- to enable stakeholders review and reassess the security of information systems and networks and make appropriate modifications to security policies, practices, measures and procedures that include addressing new and changing threats and vulnerabilities.

- to facilitate measures that make stakeholders aware and responsible for the security of information systems and networks in which they operate in a manner appropriate to their individual roles.
- to establish formal incident handling and response frameworks.

Projects and Outcomes

Table 7 S2- Projects and Outcomes

	PROJECTS	ACTIVITIES	OUTCOMES
S2P1	Establish a PKI infrastructure	• Establish the set of policies, processes, hardware & software used for the purpose of issuing and managing certificates and keys. • Establish a consultative process towards building a national cryptography policy • Implement a Mauritian PKI for creation of local Certifying Authorities • Implement a Government PKI exclusively for G2B, G2G and G2C transactions • Encourage e-commerce sites to procure site seals / SSL certificates to ensure trusted interaction • Implement information security best practices to counter emerging threats like Phishing	• Mauritius Public Key infrastructure • PKI exclusively for the government • Cryptography Policy
S2P2	Setting Up of Mauritian CERT	• Constitution of the Mauritian CERT • Undertake changes relevant legislations to improve compliance to CERT requirements • Incident Management Services • Threat and Vulnerability Monitoring, Evaluation and Advice • Research • Publications • Training and Education • Execute agreements with other countries on cooperation in emergency response systems	• Mauritius Computer Emergency and Response Team • Research and Other Publications • Training and education • International country-to-country arrangements • Amendments to appropriate legislations
S2P3	Implement a code of good practices for ISPs as a first line of defence from hazards of using Internet	• Draft and agree a code of good practices for ISP • Agree on the code of good practices • Roll out the code of good practices for adoption among ISPs	• Code of Good Practices for adoption by the ISPs
S2P4	Institute a framework to monitor Internet traffic which might be harmful to the nation and society	• Discussion on the framework • Adoption of the framework • Necessary regulations and amendments to existing legislations like the NCB Act, 1988 and the ICT Act, 2001	• Internet Traffic Monitoring Framework • Regulations and Amendments
S2P5	Create a baseline security standard framework to be adopted by SMEs	• Discussion and adoption of the standards • Adoption of the standards	• Mauritius Baseline Security Standard Framework

	PROJECTS	ACTIVITIES	OUTCOMES
S2P6	Promote the setting up local chapters of international professional information security associations	• Discussion with international bodies and agreement on the setting up of local chapters • Setting up local chapters	• Local Chapters of International Bodies
S2P7	Setting up and institutionalising an Information Security Assurance Framework	• Draft Guidelines and processes to be followed by the industry for adherence to Information Security requirements • Agreement on and dissemination of the same • Setting up audit compliance processes to be followed	• Information Security Assurance Framework
S2P8	Include Information about information security threats, safety measures in the curriculum at lower secondary level	• Design information security course curricula • Agree on the course curricula with the universities • Roll out the curricula	• Raised competencies among students
S2P9	National Information Security Awareness Programme	• Conduct Information Security Awareness campaigns with government and the private sector • Promote information security skill enhancement through awareness sessions • Promote awareness measures to facilitate suppliers of IT systems to practise transparency in informing customers with the level of security that their product can guarantee.	• Raised awareness among practitioners • Raised adherence to Information Security standards
S2P10	Critical Information Infrastructure Protection and performing information security risk profiling	• Develop criteria to facilitate identification of Critical Information Infrastructure and systems • Devise method for risk and vulnerability assessment • Promote development of security models, tools and mechanisms for risk analysis • Develop parameters for risk profiling • Risk profile Operators • Regulations for CII and requisite changes in the NCB Act, 1988[31]	• Criteria for identification of CII[32] • Method for risk and Vulnerability Assessment • Security models and tools for risk analysis • Risk Profile for CII operators • Regulations for CII and amendments to the NCB Act, 1988
S2P11	Promote the adoption of	• Evolve Standards • Consultative process to agree on standards to	• National Information

[31] Since NCB identified as the "owner" for this project.
[32] Critical Information Infrastructure

	PROJECTS	ACTIVITIES	OUTCOMES
	Information Security Standards at the National Level	be adopted • Awareness Sessions and Information Dissemination • Security categorisation of information and security standards for private companies	Security Standards for Critical Sectors • Security categorisation of companies in the private sector
S2P12	Implement the recommendations of the Anti-Spam Action Plan	• Conduct a planning exercise to recommend the following ○ Technical solutions to reject spam at the ISP's mail gateways ○ Aggregate demand for spam filtering and antivirus software, then distribute licenses for spam and virus filter software at cheaper costs ○ Education and training of personnel, systems and network administrators to raise awareness and encourage development of best practices ○ Formulation of an anti-spam policy for ISPs ○ Enactment of an Anti-Spam Legislation • Businesses to reach out to ISPs and ISP associations, associations of computer users to educate and empower users, and to sensitise them, while at the same time making their Internet experience much more productive for them • Massive and widespread public education and awareness campaigns among school and office goers	• Mauritius Comprehensive Anti-Spam Action Plan Report • Awareness Sessions organised by Businesses, ISPs and other organised Internet User Communities • Government organised Public Awareness and Sensitisation Campaigns • Anti-spam Policy and Code of practice for ISP
S2P13	Develop a Child Safety Action Plan	• Planning Exercise to formulate recommendations on ○ Designation of a watchdog body/ Ombudsperson to promote, enforce, and regulate legal provisions ○ Developing processes of reporting offences to the watchdog body/ Ombudsperson ○ Development of a content rating system for websites ○ Development of a filtering mechanism that will filter out content that is undesirable, ○ Development of a monitoring software to track the child's usage of the Internet • Periodical awareness and sensitisation camps aimed at sensitising parents, Internet operators, service providers, educational interventions targeted at parents, teachers and children	• Online Child Safety Recommendations Report • Watchdog body to promote, enforce and regulate • Reporting procedures for online offences • Content Rating System • Filtering system • Child usage monitoring software • Awareness and Sensitisation Campaigns
S2P14	Consultative process towards building a National Cryptography Policy	• Draft Cryptography Policy • Consultative Process • Finalise Policy	• National Cryptography Policy
S2P15	Organisation of Regional Information Security Event	• Invitations, Guest Speakers, Sponsors • Agenda Preparation • Hosting	• Regional Information Security Event
S2P16	Adopt and Implement	• Adopt and Implement Information Security Standards in the Civil Service and parastatal	• Implementation of Information

	PROJECTS	ACTIVITIES	OUTCOMES
	Information Security Standards in the Civil Services and parastatal organisations	organisations	Security Standards

Programme Governance Framework

A National Information Security Committee needs to be constituted with representatives from the National Computer Board (chair), MITT, ICTA, MCCI, representatives from Critical Information Infrastructure areas, PMO, ITSU, a member from the Police Department, eGovernance Cell representative and a member representative of ISPs in Mauritius[33], to oversee and monitor the programme.

Projects, Owners and Priority

Table 8 S2- Project Priorities

Project Code	PROJECTS	Owner	High	Medium	Low
S2P1	Establish a PKI infrastructure	ICTA	✔		
S2P2	Setting Up of Mauritian CERT	NCB	✔		
S2P3	Implement a code of good practices for ISPs as a first line of defence from hazards of using Internet	ICTA	✔		
S2P4	Institute a framework to monitor Internet traffic which might be harmful to the nation and society	CERT		✔	
S2P5	Create a baseline security standard framework to be adopted by SMEs	NCB	✔		
S2P6	Promote the setting up local chapters of international professional information security associations	NCB	✔		
S2P7	Setting up and institutionalising an Information Security Assurance Framework	CERT	✔		
S2P8	Include Information about information security threats, safety measures in the curriculum at lower secondary level	MoEHR[34]		✔	
S2P9	National information security awareness programme	NCB	✔		
S2P10	Critical Information Infrastructure Protection and performing information security risk profiling	CERT	✔		
S2P11	Promote the adoption of Information Security Standards at the National Level	NCB	✔		
S2P12	Implement the recommendations of the Anti-Spam Action Plan	NCB	✔		
S2P13	Develop a Child Safety Action Plan	NCB	✔		
S2P14	Consultative process towards building a National Cryptography Policy	ICTA		✔	
S2P15	Organisation of Regional Information Security Event	NCB		✔	
S2P16	Adoption and Implementation of Information Security Standards in the Civil Service and Parastatal Organisations	NCB/ITSU		✔	

[33] ISP: Internet Service Provider, PMO: Prime Minister's Office, ITSU: IT Security Unit in the MITT, MITT: Ministry of Information Technology and Telecommunications, MCCI: Mauritius Chambers of Commerce and Industry

[34] Ministry of Education and Human Resources

Programme Monitoring Indicators

Table 9 S2- Project Milestones and Indicators

No	Parameter	Indicator(s)
S2P1	Institutional and Technology Infrastructure	• Policies and Processes are established • Technology infrastructure established • Local Certifying Authorities established in the private sector • Local Certifying Authorities established in the government • Information Security Best Practices are disseminated
	Promotional and Awareness Measures	• Promotional and awareness measures undertaken for local eCommerce sites • Number of eCommerce sites that use the established PKI
S2P2	Institutional and Technology Infrastructure	• Mauritian Computer Emergency Response Team is constituted • Incident Management Services are established • Processes for Monitoring threats and vulnerability established
	Promotional and Awareness Measures	• Training and Education sessions are undertaken • Number of Research Papers and Publications issued • Number of Research Papers and Publications subscribed/purchased
	International Cooperation Measures	• Agreements with other countries on cooperation in emergency response systems
S2P3	Drafting and adoption of the code of good practices	• Drafting and agreement on the code of good practices for ISP is completed • Code of good practices for adoption among ISPs is adopted • Monitoring Systems are in place
S2P4	Evolving a framework to monitor Internet traffic	• Framework to monitor Internet traffic is established • Framework to monitor Internet traffic is adhered to
S2P5	Establishment of the Baseline Security Standard Framework	• Baseline Security Standard Framework is established • Baseline Security Standard Framework is adhered to
S2P6	Local Chapters of international bodies	• Local Chapters of international bodies are established • Collaborative activities between Mauritius Information Security agencies and the local chapters are initiated
S2P7	Establishment of the Information security assurance framework	• Information Security Assurance Framework is established • Compliance and monitoring processes are established
S2P8	Curricula change at the lower secondary levels	• Curricula change at the lower secondary level is effected • Curricula change at the lower secondary level is followed up
S2P9	Information Security Awareness Exercises	• Number of awareness campaigns conducted for the government and the private sectors • Number of participants in the awareness sessions from the government and the private sectors
S2P10	Risk Profiling of Operators	• Parameters for risk profiling are evolved, agreed and adopted • Operators are profiled for their risks • Risk profiling information is disseminated • Number of operators covered

SUPPORT

No	Parameter	Indicator(s)
S2P11	Adoption and Dissemination of National Information Security Standards	• National Information Security standards are evolved • Awareness sessions are undertaken • Standards are disseminated among the private and the government bodies
S2P12	Institutional measures to fight spam	• Technical solutions are recommended • Number of such technical solutions/products purchased/adopted • Anti-spam policy for the ISPs is formulated and adopted
	Sensitisation measures	• Educational and awareness measures for ISPs, network administrators are undertaken • Sensitisation measures for users are undertaken • Publicity measures among school and office-goers are undertaken
S2P13	Institutional measures	• Ministry of Women, Child Development and Consumer Protection is designated as the Ombudsperson for children to report Child offences and is operational in that capacity • Number of offences reported to the body • Number of cases amicably resolved by the body • Number of referral cases by the body to the court • Processes for reporting transgressions to the Ombudsperson is finalised • Processes for reporting transgressions to the Ombudsperson is disseminated • Content rating systems for websites is finalised and adopted
	Awareness and Sensitisation Measures	• Sensitisation measures to protect online child safety is undertaken • Number and type of stakeholders involved in the sensitisation campaigns
S2P14	Establishment of the Cryptography Policy	• Consultative exercises are undertaken • Agreement on policy guidelines for a National Cryptography Policy • Formulation and adoption of the Policy
S2P15	Regional Information Security exercises	• Number of participants in the event • Number of security boot camps organised
S2P16	Adoption and Implementation of Security Standards	• Security Standards to be adopted are agreed upon • Timely adoption of the same • Number of Organisations implanting the adopted standards • Number of new organisations added every year

7.3 PROGRAMME S3: HARNESSING EMERGING TECHNOLOGIES AND ENHANCING INFRASTRUCTURE CAPABILITY

Programme Context and Overview

Comprehensive analysis was conducted for initiatives required for creation of a reliable, robust, affordable and scalable ICT infrastructure in a progressive environment that embraces challenges and exploits opportunities offered by convergence. Harnessing emerging technological developments for the collective benefit of society was also looked at. The main recommendations advanced are as follows.

- A mix of measures is required towards reducing IPLC tariff rates for users in Mauritius, including options of unbundling cable landing station, interconnection, regulatory intervention and possible options for re-selling.
- In Broadband a two-staged transition, comprising a feasibility study (in the dimensions of technology options, policy and fiscal recourses, tariff structures, funding alternatives and ownership models) and a mix of supply-side and demand-side interventions need to be concurrently pursued to "prime" up the market, followed by a rapid rollout in accordance with recommendations of the study.
- Power line and fibre to the home options as well as wireless options including Wi-fi and WiMax for broadband need to be explored.
- A comprehensive telecommunication licensing reform is recommended encompassing licensing for providing a service and issues related to spectrum with the objective to (a) arrive at a more unified / converged model which would provide incentive for a competitive market resulting in better quality, efficiency and reduced costs, and (b) establish a spectrum licensing and regulation policy to address challenges engendered by convergence and continuous growth of new wireless devices and services.
- There needs to be a comprehensive policy for IP based networks including Universal access/service provisions, consumer protection, supervision of dominant market player(s), emergency and essential services, access for disabled persons, allocation of scarce resources, dispute resolution, privacy and security, content restriction, and awareness building.
- Within a consultative framework there must also emerge a roadmap for a transition from IPv4 to IPv6, including awareness exercises involving equipment vendors, system software developers, ISPs[35], and other relevant stakeholders.
- Similarly, an approach needs to be adopted, along guidelines mentioned in the analysis conducted earlier, for the adoption of Next Generation Networks (NGN), including improving preparedness, government facilitation, competitiveness imperatives, encouraging innovation and investment. The GoM must come out with a White Paper for NGN to unequivocally express its approach for the same.
- Infrastructure sharing in a transparent and non-discriminatory way must be encouraged and it must be mandatory for all operators to publish the entire available infrastructure with detail of extent of sharing possible in all such locations.
- Voice Over Internet Protocol (VoIP) needs to be introduced by embarking on interventions on several dimensions including promoting an environment conducive to development of IP technology, stipulating licensing requirements, evolutionary approach towards regulatory measures, including industry self-regulation, quality of service issues and the development of technical interface standards.
- The feasibility for adoption of ENUM[36] within the country needs to be studied while at the same time keeping an eye on developments in the global space. A roadmap for a trial run of ENUM needs to be laid out.
- Local Loop Unbundling is suggested but needs to be preceded by a comprehensive cost-benefit evaluation for determination of the prices to be charged and services to be extended to new entrants by the incumbent. There must also be a pronouncement of a policy objective which in principle encourages unbundling in the local loop.

[35] Internet Service Providers
[36] Electronic Numbering and Mapping

- In the Information Technology space, interventions are required (a) towards advancement in competency in computer software and engineering, and (b) towards performing an independent software quality assurance and testing.
- A Quality of Service Framework needs to be created covering parameters like service features and characteristics, the cost of service, the time taken to install services, the time taken to repair services, reliability of services, service quality of service provider's helpdesk - time to answer, time in queue, time to conclude etc.
- RFID frequency range, not falling under any of the criteria under which the spectrum is subject to licensing, must not be subjected to any licenses by GoM. Regulations to this effect need to be introduced.
- With ICT business expected to grow and the Cyber City capacity getting increasingly saturated, there would emerge a need for new technology parks. A planning and design exercise is recommended that takes into account factors of capital (sources of debt, venture capital, business incubator, anchor tenants), linkages (with internal services, Centres of Excellence, value chain and markets), infrastructure (land, communication, social and physical Infrastructure) and people (salary, quality, throughput etc).

Programme Strategic Objectives

- to facilitate an all pervasive electronic communications infrastructure across different service and technology options in a cost-effective and user-centric way.
- to facilitate an operating environment in which services can be provided in a fair, equitable and transparent manner.
- to help establish telecommunications infrastructures that takes into account emerging technologies and provides for fast, secure, continuous and quality services at affordable prices.
- to help establish a broadband market where a combination of competition and targeted assistance will remove barriers to bandwidth-intensive ICT adoption and usage and facilitate innovation.
- to explore options to make international bandwidth available at competitive rates to support the growth of ICT industry and provide an affordable connectivity for all service providers and operators.
- to roll-out applications, services for adoption by SMEs coupled with a system of rewards and incentives that would encourage people to adopt and use ICT in their daily lives.
- to plan for and allocate scarce resources like spectrum and telephone numbers in a way that takes into account increasing socio-economic needs, emerging technological advancements and user-convenience and does so in a fair, transparent and user-centric way.
- to roll out a regulatory regime that allows for market forces to operate and minimises regulatory cost, and ensures that prices are fair and quality of telecommunication services attain basic international benchmarks.
- to ensure that public policy pronouncements take into account emerging challenges and opportunities engendered by convergence.
- to ensure that public policy initiatives provide for universal service/access, consumer protection, appropriate regulatory steps, preparedness for emergency services, dispute resolution mechanisms and requirements of equitability, privacy and security and user-convenience.

Projects and Outcomes

Table 10 S3-Projects and Outcomes

	PROJECTS	ACTIVITIES	OUTCOMES
S3P1	Planning Exercise to explore alternatives for reduction of IPLC tariff rates	Constitution of a focus group for discussions on the following • Regulatory measures to reduce IPLC tariffs • Business case by other operators to MT asking it to change from a low volume to high margin to a high volume low margin business model • Unbundle access to cable landing station and interconnection • Allow Reselling to other bandwidth providers in Mauritius • Exploration of options over SAFE, upcoming EASSY and possibilities of a potential third alternative	• Mauritius IPLC Rationalisation Roadmap Report • New Tariffs for IPLC • Unbundling of access to Cable Landing Station
S3P2	Planning exercise to explore technical and commercial feasibility for broadband implementation in Mauritius	• Broadband Feasibility Exercise to have the following outputs ○ Technology options for an all-pervasive broadband network to be deployed in Mauritius ○ The above to include all fixed and wireless access modes including Fibre to the Home and Broadband Over Powerline; the last two mentioned must include infrastructure sharing possibilities like duct sharing etc ○ Planning exercise must optimise capacity increase including exploration of differential options for accessing content resident within Mauritius and outside. ○ Optimal mode of ownership, operation and support of broadband network and services keeping in mind both economic and social goals of the programme. ○ sourcing options for funds to support broadband rollout in Mauritius ○ optimal tariff structure ○ Recommendations for government incentive/subsidy, tax rebates, subsidies or incentives to promote investments ○ Suggestions for awards and rewards to promote usage among business communities and society • Implementation of recommendations of the feasibility report	• Mauritius Broadband Feasibility and Roadmap Report • Optimal mix of fixed and wireless broadband throughout Mauritius at cost-effective rates • Enhanced uptake of Broadband
S3P3	Comprehensive telecommunication licensing reform	• Formulating a Spectrum Policy after a consultation exercise with stakeholders • Allocation strategy of spectrum • Decision on Spectrum fees	• Mauritius Spectrum Licensing Report • RFID license exemption • Spectrum Policy

	PROJECTS	ACTIVITIES	OUTCOMES
		• Periodic review framework for spectrum management • Include recommendations for RFID as exempt from licensing	• Transparent and efficient spectrum management
S3P4	Review of Technical and Regulatory Review for NGN	• Collaborative discussions towards evolving future roadmap • Recommend regulatory and technical capabilities for NGN adoption including changes to brought about for ICTA in this regard • Concomitant reforms to comply with NGN adoption • NGN White Paper from the GoM and a roadmap for NGN adoption	• Mauritius NGN White Paper • NGN Roadmap for adoption • Increased preparedness and collaboration towards NGN adoption
S3P5	Study of the feasibility of making the transition from IPv4 to IPv6	• Development of technical guidelines for making the transition • Testbed trial of small scale systems on Ipv6 environment • Undertake IPv6 awareness exercises among software professionals, ISPs and other stakeholders	• Technical Guidelines Manual for IPv4 to IPv6 transition • Testbed Trials Report and recommendations • Enhanced awareness and preparedness for IPv6 environment
S3P6	Formulate an IP Policy	• Collaborative discussions for evolving a National IP Policy for Mauritius • Formulation of a National IP Policy for Mauritius	• National IP Policy • Increased awareness of government's encouragement of IP based networks
S3P7	Consultative process for the adoption of VoIP[37]	Discussions for • Promotion of the VoIP environment • Any licensing requirements where VoIP impedes PSTN markets • Quality of Service issues • Regulatory Practices to be followed including regulation and self-regulation	• GoM's White Paper on VoIP adoption • Regulatory Practices for VoIP document • Enhanced collaboration and self-regulation towards offering quality service • Increased awareness of government's encouragement of VoIP
S3P8	Feasibility exercise for the adoption of ENUM[38]	• Constitution of a group for this • Desirability of ENUM in Mauritius • Roadmap for ENUM	• ENUM Roadmap • Enhanced awareness and preparedness for ENUM
S3P9	Consultative exercise on Unbundling of Local Loop	• Constitution of a group for this • Finalisation of Unbundling Principles and Practices • Finalisation of a Schedule for Unbundling • Policy component for unbundling	• Comprehensive Roadmap for Unbundling of the Local Loop • Finalised unbundling principles and practices • Efficient and customer-centric access networks

[37] Voice Over Internet Protocol
[38] Electronic Numbering and Mapping

	PROJECTS	ACTIVITIES	OUTCOMES
S3P10	Creation of a National Centre for Software Testing and Quality Assurance (NCSTQA)	Planning Exercise for creation of the Centre, including • Mandate for the NCSTQA • NCSTQA staff and infrastructure requirements • Roadmap including business model for NCSTQA • Collaborative arrangements with international institutes	• NCSTQA Detailed Project Report • Implementation based on the DPR[39] • Standardised and certified software applications for adoption
S3P11	Creation of a Centre for Advancement in Computer Software Engineering (CACSE)	Planning Exercise for creation of the Centre, including • Mandate for the CACSE • CACSE staff and infrastructure requirements • Roadmap including business model for CACSE	• CACSE Detailed Project Report • Implementation based on the DPR • Enhanced uptake of research
S3P12	Creation of a Quality of Service framework	• Constitution of a group for this • Finalisation of QoS Principles and Practices • Rollout	• QoS Principles Document • Efficient, cost-effective and Customer-centric service provision
S3P13	Implementation of the Numbering Plan	• Phased migration to the eight-digit numbering system ○ Pre-announcement for the mobile and other numbers[40] migration ○ Migration of the mobile numbering ○ Parallel run ○ Guided Shift ○ Completion of the migration • Phased migration to the eight-digit numbering system ○ Pre-announcement for the fixed line migration ○ Migration of the fixed line numbering ○ Parallel run ○ Guided Shift ○ Completion of the fixed line migration	• Finalised Migration Plan • Migration to the eight-digit numbering system • Media campaigns, pre-announcements • Adequate numbering capacity to cater for future services • A common, closed, consistent numbering system that is easy for subscribers to understand
S3P14	Planning and Design of New Technology Parks	• Planning and design Exercise for the feasibility of a technology park, leading to a Detailed Project Report with at least the following requirements ○ Sources of capital (including debt, venture capital, business incubator, anchor tenants), ○ Linkages with other services (internal services, Centres of Excellence, value chain and markets), ○ Infrastructure (land, communication, social and physical Infrastructure) and ○ People (salary, quality, throughput etc) • Outputs include	• Detailed Project Report for the technology park including design, operations and management, technology infrastructure, costs required, expected revenue streams etc • Increased clustering and networking opportunities among ICT players • Economies of scale • Cost-effective provision of social infrastructure like

[39] Detailed Project Report
[40] Includes special numbers, free phone numbers, paging and teleservices can also be migrated along with mobile numbers

	PROJECTS	ACTIVITIES	OUTCOMES
		○ Capacity planned and technical design ○ Infrastructure requirement (physical and social) ○ Revenue streams and expected revenue earnings ○ Expected costs that would be incurred ○ Break-even possibilities ○ Operations and management structure	transport systems etc • Regional dispersion of ICT industry • Enhanced employment levels

Programme Governance Framework

A National Committee on Modernising Technology Infrastructure Availability will be formed chaired by the MITT with representatives from MITT, ICTA, NCB, MT, ISP, IBA, ACT, MITIA[41], and business entities in the ICT sector, particularly those catering to export markets.

Project Priority

Table 11 S3- Project Priorities

Project Code	PROJECTS	Owner	High	Medium	Low
S3P1	Planning Exercise to explore alternatives for reduction of IPLC tariff rates	ICTA	✔		
S3P2	Planning exercise to explore technical and commercial feasibility for broadband implementation in Mauritius	ICTA	✔		
S3P3	Comprehensive telecommunication licensing reform	MITT	✔		
S3P4	Review of Technical and Regulatory Review for NGN	ICTA			✔
S3P5	Study of the feasibility of making the transition from IPv4 to Ipv6	ICTA			✔
S3P6	Formulate an IP Policy	MITT			✔
S3P7	Consultative Process for the adoption of VoIP in Mauritius	ICTA	✔		
S3P8	Feasibility exercise for the adoption of ENUM in Mauritius	ICTA			✔
S3P9	Consultative exercise on Unbundling of Local Loop	ICTA	✔		
S3P10	Creation of a National Centre for Software Testing and Quality Assurance (NCSTQA)	MoEHR		✔	
S3P11	Creation of a Centre for Advancement in Computer Software Engineering (CACSE)	MoEHR		✔	
S3P12	Creation of a Quality of Service Framework	ICTA		✔	
S3P13	Implementation of the Numbering Plan	ICTA		✔	
S3P14	Planning and Design of New Technology Parks	BPML		✔	

Programme Monitoring Indicators and Milestones

Table 12 S3- Project Milestones and Indicators

No	Parameter	Indicator(s)/ Milestone(s)
S3P1	Planning Exercise to explore alternatives for reduction of IPLC tariff rates	• Regulatory measures are agreed upon • Unbundled access to the Cable landing station • Extent of lowering of international connectivity
S3P2	Planning exercise to explore	• Feasibility exercise is completed timely

[41] MT: Mauritius Telecom, MITIA: Mauritius IT Industry Association, ISP: Internet Service Provider, IBA: Independent Broadcasting Authority, NCB: National Computer Board, MITT: Ministry of Information Technology and Telecommunications

No	Parameter	Indicator(s)/ Milestone(s)
	technical and commercial feasibility for broadband implementation in Mauritius	• Awareness of broadband is generated • Tax rebates, subsidies etc are agreed upon • Tariff structures are agreed upon and rolled out • Broadband penetration rate increase • Mix of fixed and wireless adoption rates after rolling out • All inhabited areas are covered; highway completely covered by technologies that allow individuals to stay connected while they are on the move • Coverage does not suffer for want of affordable and reliable technology
S3P3	Comprehensive telecommunication licensing reform	• Spectrum policy is formulated timely • Spectrum allocation strategy and fees is agreed upon • RFID interventions are made • Spectrum policy framework is reviewed as per the plan chalked out
S3P4	Review of Technical and Regulatory Review for NGN	• Collaborative discussions for NGN are concluded successfully • Technical and regulatory interventions are made • NGN Roadmap is submitted timely • Government comes out with an NGN White Paper timely • Number of copies requested of the report
S3P5	Study of the feasibility of making the transition from IPv4 to Ipv6	• Technical Guidelines for transition are drawn out timely • Testbed trials take place as per schedule • Awareness exercises are conducted timely • Extent of alignment that results between Mauritius and other advanced countries • Number of copies requested of the report
S3P6	Formulate an IP Policy	• Timely formulation of the Government's IP Policy
S3P7	Consultative Process for the adoption of VoIP in Mauritius	• Discussions on VoIP issues are satisfactorily concluded • QoS issues are agreed • Timely announcement of the GoM's White Paper on VoIP adoption • Regulatory Practices for VoIP Document • Extent of collaboration and self-regulation • QoS Levels achieved
S3P8	Feasibility exercise for the adoption of ENUM in Mauritius	• Submission of Roadmap for ENUM • Adherence to recommendations of the Roadmap • ENUM trial is conducted successfully • Number of copies requested of the report
S3P9	Consultative exercise on Unbundling of Local Loop	• Discussion on Unbundling completed satisfactorily • Unbundling Principles and Practices are finalised • Unbundling schedule is finalised • Policy component for unbundling is introduced • Extent of competition introduced at the access l\network levels • Extent of cost-effectiveness of access network
S3P10	Creation of a National Centre for Software Testing and Quality Assurance (NCSTQA)	• Mandate for the NCSTQA is finalised • NCSTQA staff and infrastructure are rolled out • Business model for NCSTQA is operationalised • Number of applications that are tested and certified • Extent of collaboration with other international institutes

SUPPORT

No	Parameter	Indicator(s)/ Milestone(s)
S3P11	Creation of a Centre for Advancement in Computer Software Engineering (CACSE)	• Mandate for the CACSE is finalised • CACSE staff and infrastructure are rolled out • Business model for CACSE is operationalised • Adherence to the business plan • Number of research initiatives taken up through sponsorships with the industry • Number of research findings that are made available to others
S3P12	Creation of a Quality of Service Framework	• QoS Principles and Practices are finalised • Adherence to the principles and practices
S3P13	Implementation of the Numbering Plan	○ Adherence to the Migration Plan ○ Extent of disruptions observed during the migration ○ Number of lost calls during the migration process ○ Extent of awareness generated for the migration
S3P14	Planning and Design of New Technology Parks	○ Timely completion of the planning exercise ○ Coverage of the planning exercise ○ Capital issues considered comprehensively and exhaustively, including costs required and revenue expected ○ Linkage issues considered comprehensively and exhaustively ○ Infrastructure issues considered comprehensively and exhaustively, including both physical and social infrastructure ○ People issues considered

7.4 PROGRAMME S4: EDUCATION THROUGH ICT

Programme Context and Overview

Large drop-out rates at the primary and secondary levels characterise the education system in Mauritius. Across all academic streams in general, and ICT in particular, the problem in Mauritius is both of quantity and quality. In quantity terms, numbers that could potentially be available for the ICT sector (and this includes disciplines outside IT too) do not even total up to 10,000[42] from the tertiary level.

Education is also seen as a "once and for all" intervention, a knowledge acquisition process rather than an application-oriented one that is required in today's real world. Largely a teacher-controlled rather than a possibly more exciting student-centred experience, the course structures too are inflexible and give little room to students to pursue their special interests or to encourage and reward innovation.

Education in ICT

As regards ICT manpower availability, the problem, again, is primarily of numbers (there being inadequate supply to meet the demand). Required for a target of 7% of the GDP from ICT export services, is a cumulative ICT manpower availability of 29,000 qualified individuals, of which Mauritius can at best internally generate only about 16,000[43]. Concerted interventions to expand intake at the tertiary levels can generate only marginally higher numbers leaving largely unaddressed the core issue of there not being enough professionals coming up the secondary education ladder. The latter is an absolute necessity if numbers to the tune of what may be required for a growing ICT sector are to be met substantially internally in the long run.

Paradoxically, though, at the tertiary level, there also exists a large pool of educated unemployed in the ICT sector. This could either be a matter of curriculum misalignment with industry requirements or an induction system into ICT education that does not have appropriate filtering mechanism that would help select only the best into the system.

In light of the above, interventions are required in two areas

- Long-term interventions of course curricula refinement at the primary and secondary levels to generate and sustain high enrolment at pre-tertiary levels (covered under this programme, "S4")
- Focussed interventions, on a more immediate basis, at the tertiary levels to influence education in ICT for better alignment between academic outputs and industry requirements (discussed later under programme "L1")

Long-Term Interventions

The education process must imbibe in the students a spirit of lifelong learning and must instil in them capabilities that help them tackle the untoward. Schools and institutions must make the transition from being providers of well-defined educational services to becoming learning Organisations that prepare students to acquire competencies like autonomous learning, collaborative working, authentic problem solving and an ability to adapt to a rapidly changing world.

Curriculum review needs to have a coverage wider than what is currently initiated by MoEHR in the following respects

- the curriculum review must span across different levels of education (primary, secondary and tertiary),
- it must cover not just the contents, but also the processes of learning in schools, that is to say it must include aspects of structure and delivery of the curriculum too. Indicatively the following are suggested, though it s recommended that a comprehensive consultancy exercise that integrally involves MoEHR[44], be undertaken involving education specialists with a view to reducing the drop out levels.
  - CONTENT
    - Emphasise project work as part of all courses.
    - Encourage "independent projects" to be taken up by students, and give these academic credits.

[42] A rough calculation shows that corresponding to a total annual intake of 35,000 at the level of primary schools, the output at the tertiary level is of the order of 5,000 students every year. This highlights the problem and the extent of drop-out rate of students in Mauritius.
[43] Final Analysis Report of this project, an earlier deliverable.
[44] Ministry of Education and Human Resources

- Deploy a system for rewards/awards for "independent projects".
- Involve industry in specially-designed technology courses; students would get "hand-on" from a very early stage.
- Encourage specialty beyond the normal curriculum resulting in an "Honours" degree.
- Encourage projects that help the students meet the needs of the industry or social communities.
- Encourage language training (non-English and non-French) as an extra course with some credits in the educational system.

○ STRUCTURE

- Employ flexibility in scheduling of courses by the student.
- Reduce the number of pre-requisite courses to be done in the very beginning.
- Employ a concept of "flexi-core" courses where the courses stay compulsory although they could be flexibly scheduled.

○ DELIVERY

- Encourage applied learning wherein learning is applied to real-life problem solving situations.
- Use more instructional methods that are aimed at stimulating active learning (group and individual assignments, practical work).
- Exploit ICT to the fullest.

Other recommendations include

- Teachers' Empowerment, comprising
  - Initial Qualification through the introduction of an IT License for new teachers entering the profession.
  - Continuing competency development, including
    - regularly updating their ICT knowledge and skills as well as to exchange their views on changing curricula and pedagogical practices;
    - handling of hardware and software, curriculum redesign, coaching, monitoring, developing digital materials, cooperation with colleagues etc; and
    - using instructional methods that are aimed at stimulating active learning (group and individual assignments, practical work).
- Creation of educational websites (portals)[45] to build and share knowledge base of best practices and experiences, and staff development programmes to acquaint educational practitioners with content of these knowledge bases, serving as a platform that brings together different stakeholder groups, including teachers, students and parents.
- Directions for introducing ICT into other courses to meet the demands for IT professionals by including IT into senior levels of the school system, and through delivering an IT literate workforce for national development.

Programme Strategic Objectives

- to undertake a series of course curricula interventions at the primary and secondary levels that help reduce dropout rates and inculcate the spirit of lifelong learning among the students.
- to inculcate in students an acumen of tackling the untoward and staying prepared for challenges in an increasingly professional and knowledge-driven world.
- to use ICT as a key enabler in this endeavour, and make education undergo transition from “Education about ICTs” to “Education through ICTs” in a larger effort to make education more creative and less subject to rote.
- to collaborate in international educational networks at the teachers and the students’ level using ICT to bring about better knowledge exchange and interaction among the different stakeholder groups of the educational system.

[45] Related initiatives have taken place in other countries including Australia and Singapore.

- to evolve and develop a portal to represent the education sector in Mauritius that would be the single-most preferred point of reference for education in Mauritius and would bring about increased networking among stakeholders including students, teachers and parents.
- to undertake interventions in the educational system so as to bring a gradual change towards a system which is less pedagogical and more project-based.

Projects, Activities and Outcomes

Table 13 S4- Projects and Outcomes

Project code	Project	Activities	Outcomes
S4P1	Review of Curricula for primary and secondary levels (including enhancement of ICTs in education)	• Draft Terms of Reference for an external consultancy exercise (education and ICT specialists on board) • Draft Request for Proposals • Invite Bids and award work • Implement Recommendations	• Detailed Project Report • Reformed Curricula with following indicative outputs ○ more emphasis on information, investigation, communication and social skills ○ learning content more adjusted to real life context ○ greater diversity of methods for student assessment ○ instructional methods that stimulate active learning ○ focus on individual interests and needs ○ more teamwork among students ○ higher responsibility among students for their own learning ○ learning more flexible in terms of time and location ○ multidisciplinary team of teachers work together • Improvement in student outcome with regard to motivation and enjoyment in learning, self-esteem, ICT skills, collaborative skills, subject matter knowledge and information handling skills • Improvement in teacher outcome with regard to self-confidence through peer recognition, ICT skills, pedagogical skills and other professional competencies • Reduced Dropout rates at the primary and secondary levels
S4P2	Teachers' IT Licence (licenses for serving teachers, requirements for new entrants)	Draft Conditions and Tests for Licence Conduct Tests	• IT Competent Teachers at entry level
S4P3	Teachers Training for ICT in education	• Conduct Teachers Training on Training of Trainers Mode • Downstream training by teachers already trained	• Enhanced IT Competencies in teachers • Increased levels of networking among teachers and between teachers and other stakeholders

S4P4	Design and Deployment of a portal for education (including the career counselling network features)	• Draft Terms of Reference for an external consultancy exercise • Draft Request for Proposals • Invite Bids and award work • Implement Recommendations	• Portal for Education • Participation of all streams of education including vocational pursuits • Participation in the International Education Network
S4P5	Increase Primary School PC Penetration	○ Discussions between GoM, banks and/or other financiers and OEMs ○ Decision on bulk rates between GoM, DBM and the OEM ○ Decision on the modality with which the PCs would be provided including different strata of target recipients and their specific packages ○ Decision of production of authentic certificates or other testimonials required as a proof of low-income ○ Decision of the pricing of the PC, bundled facility, Internet Connectivity charges ○ Necessary arrangement between GoM and MT on the bundled connectivity ○ Phased distribution of PCs ○ Awareness exercise among schools for the packages	○ Structured packages and guidelines for PCs to be offered ○ Raised Primary school level PC penetration ○ Increased Broadband penetration ○ Will lead to a higher raking of Mauritius in terms of international indices like DOI, NRI etc

Programme Governance Framework

A National Committee on Course Curricula Redesign for a Modern Workforce will be formed chaired by the MoEHR and will consist of representatives from MITT, MoEHR, MCA, MIE[46], NCB, TEC, UTM, UoM, IVTB, MQA, and representatives from other stakeholders.

Project Ownership and Priorities

Table 14 S4- Project Priorities

Project Code	PROJECTS	Owners	High	Medium	Low
S4P1	Review of Curricula for primary and secondary levels (including enhancement of ICTs in education)	MoEHR		✔	
S4P2	Teachers' IT Licence (acquisition of licenses by serving teachers, passing the license requirements for new entrants)	MoEHR	✔		
S4P3	Teachers Training for ICT in education	MoEHR	✔		
S4P4	Design and Deployment of a portal for education (including the career counselling network features)	MoEHR	✔		
S4P5	Increase Primary School PC Penetration	MITT	✔		

[46] MiE: Mauritius Institute of Education, MCA: Mauritius College of Air, TEC: Tertiary Education Commission, UoM: University of Mauritius, UTM: University of Technology, Mauritius, MQA: Mauritius Qualifications Authority

Programme Monitoring Indicators and Milestones

Table 15 S4- Project Milestones and Indicators

Project Code	Parameter	Indicator(s)
S4P1	Number of schools participating	• Schools must include both Public and Private Schools
	Planning Exercise including the extent of Course Re-structuring	• Timely undertaking of the planning exercise • Detailed Project Report for the Course Curricula Re-Design at the primary and secondary levels` • Coverage of schools in the course re-design to include all types of schools • Decided by the committee keeping in mind educational content adjusted to real life context, diversity in methods of assessment, changes in instructional methods including project-oriented delivery, individual focus, enhanced team working, flexible learning systems, increased ICT skills among the student community, increased information handling skills, enhanced communication skills
	Extent of Induction of ICT in Education	• To be decided by the Committee before drafting the Terms of Reference for the Consultancy
	Deliverables of the Planning Exercise	• Detailed Project Report for the Course Curricula Re-Design at the primary and secondary levels
S4P2	Teachers' IT Licence Requirements	• Tests for Licence • Incorporating license requirements at the entry level • Timeplan for the acquisition of licenses by existing teachers • At least half of the teachers trained in the first lot to be lady teachers
	Number of "Licensed" Teachers	• All teachers to be licensed at the primary and secondary level
S4P3	No of Teachers covered	• Detailed timeplan for the training of teachers • Training to be undertaken in four batches spread across four years on a ToT[47] basis
	Outcome of Training	• Full usage of ICT for education in accordance with the Detailed Project Report • Enhanced ICT-enabled networking among teachers and between teachers and other stakeholders, including parents • Full coverage of all teachers through the ToT basis at the primary and secondary levels in four years' time
S4P4	Timely undertaking of the ICT portal for education	• Timely undertaking of the consultancy exercise for the ICT in education portal
	Number of networking groups	• Number of networking groups among the educational community within Mauritius • Participation in international educational networks • Covering separately teachers, parents, principals, students, researchers
S4P5	Increase Primary School PC Penetration	• Rates negotiated with the OEM and financier (DBM) • Number of PCs given through subsidised loans • Target low income groups identified

[47] Training of Trainers

Project Code	Parameter	Indicator(s)
		• Number of PCs to low-income categories[48] (subsidised loans plus a subsidy from the government)

[48] A total of 12,000 PCs with bundled Internet connectivity to be given over a period of five years, further adding to the PC and Broadband penetration.

7.5 PROGRAMME S5: ICT MEASUREMENT AND EVALUATION TERM REVIEW (ICT METER)

Programme Context and Overview

Smooth implementation of programmes and projects calls for continual monitoring and evaluation. This programme is meant to provide the monitoring and evaluation support structure required to inform planners and implementers of the progress on a continual basis of (a) implementation of the programmes and projects envisaged under the NICTSP, and (b) track the growth of the larger information economy towards meeting the ICT vision-linked targets. The programme also enhances preparedness of ICT sector for benchmarking with other countries of the world.

The following initiatives are envisaged.

Need for Definitions

- For "ICT sector" and "ICT services", Mauritius needs to adopt definitions that are aligned with evolving current international practice in order to track growth in the ICT sector and to facilitate cross-country comparison.

Streamlining Roles and Processes

- The process of ICT data collection and analysis needs to be streamlined. Clear and unambiguous role allocation in data collection and analysis, and effective collaborative arrangements to streamline activities among stakeholders in the sector must bring about a common understanding of what data must be collected.
- ICT components in larger common-purpose surveys or ICT surveys, once finalised, should be regularised and given uniform periodicity.

Content Recommendations

At least the Core Indicators must find inclusion in the two segments of surveys covering the households and businesses. Until a comprehensive list of ICT indicators data to be collected is finalised, use can be made of core indicators suggested by NCB[49] in its ICT Outlook Report. Survey questions should be such as to facilitate disaggregating based on various sub-parameters.

Analysis and Research Outputs

- To really gauge the progress of ICT uptake for development in Mauritius, a biennial report on "State of ICT in Mauritius" needs to be prepared to include an analysis of Internet uptake, national ICT readiness, trends in ICT manpower and employment, impact of ICT on output and productivity in key sectors, assessment of efficacy of initiatives, international trade in ICT products (by type of ICT product, and by principal destination and source), migration of potential ICT employees to foreign shores and any other parameters thought relevant.
- The State of the ICT Report must ideally be so comprehensive in scope that it is better that it evolves in stages with the first two versions concentrating on areas where data is readily available.

Institutional Arrangements

- A sub-committee of the Statistical Advisory Council of the CSO[50] could be created to extend advisory inputs on activities of data collection and analysis.
- The group of people entrusted with data collection needs to be enriched with functional expertise.
- There must be group of research and analysis personnel who would be tasked with monitoring international and national ICT data collection and analysis, indicator concepts and definitions and the production of the "State of the ICT Report". This group, the "National ICT Research and Analysis Network" (NICTERN) must take responsibility for all research and analysis activities in the ICT sector.

Programme Strategic Objectives

- to help policy makers formulate policies and strategies for ICT-driven growth, social inclusion and cohesion and monitor and evaluate ICT-related developments in both economic and social contexts

[49] National Computer Board
[50] Central Statistical Office

- to undertake comprehensive analysis, documentation, dissemination of activities in ICT sector with a view to making available information to citizens and business entities to help them take informed investment and business decisions.
- to arrive at a set of agreed objective indicators that could be used to measure preparedness of individuals and communities to participate in the networked world, to gage the depth of usage of ICT in different segments of involvement, and to measure benefits expected to follow from specific interventions.
- to achieve a common set of ICT indicators that are harmonised with what is agreed upon internationally with an objective to help Mauritius benchmark its information economy and society with those of developed countries.
- to enhance the capacity of the statistical agencies in Mauritius and build competence to develop statistical compilation programmes on the information society, based on internationally agreed upon indicators.
- to arrive at a clear and unambiguous definition of roles and responsibilities in the sphere of ICT data collection and analysis between the multiple organisations involved with the same.
- to accord due priority to ICT data collection, analysis and dissemination by undertaking comprehensive data collection exercises with an agreed pre-defined periodicity and coverage across stakeholder groups.
- to arrive at agreed collaborative arrangements between various bodies in ICT sector to facilitate data sharing between them based on a common understanding of what data must be collected.
- to arrive at definitions for “ICT sector” and “ICT services” that are aligned with current international practice and help qualify and quantify the contribution of various activities into the Mauritian GDP in an unambiguous way.

Projects and Outcomes

Table 16 S5-Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
S5P1	Setting up of a National ICT Evaluation and Research Network (NICTERN)	• Identification of a group of National ICT Evaluation and Research Network (NICTERN) • Recruitment/redeployment of the same	• Constitution of National ICT Evaluation and Research Network • Increased capability to monitor, analyse, document and disseminate developments on the information economy
S5P2	Definitions for “ICT sector” and “ICT services”	• Preparation of draft definitions by NICTERNs • Submission of the definitions to the ICT Statistical Sub-Committee for review • Endorsement of definitions by ICT Indicator Taskforce[51]	• Definitions for “ICT sector” and “ICT service” • Increased readiness for evaluating the growth of the information economy • Increased capability to benchmark with other countries
S5P3	Definition of ICT Indicators	• Start with NCB’s Core ICT Indicators • Collate with Global ICT Data Requirements, including data	• Definitions for ICT Indicators • Increased capability to benchmark with other countries

[51] Described later in the Programme Governance Framework section

		required for readiness indices like DoI[52], NRI etc • Statistical Sub-Committee for review • Endorsement of the definition by the ICT Indicator Taskforce	• Increased readiness for evaluating the growth of the information economy • Increased capability of emerging as a regional expertise centre in ICT statistics • Better impact assessment of all projects
S5P4	State of the ICT Report	• In house exercise to define broadly the agencies collecting, analysing and disseminating in the current scenario • In house exercise to define the set of ICT indicators required to be collected • In house exercise to define the modality of collection of these data • Collate and analyse other research findings • Training Workshop for the team • Production of the "State of the ICT" Report	• Mauritius "State of the ICT Report" • Enhanced competency to take informed decisions by businesses, government and society through ready and comprehensive availability of relevant data

Programme Governance Framework

A National ICT Indicator Taskforce (NICTIT) needs to be constituted with representatives from MITT (chair), Central Statistical Office, National Computer Board, ICT Advisory Council, members from ICT industry representing the ITs and the ITeS sub-sectors, ICT Authority, and members from academia. MITT will chair the Taskforce.

The taskforce will be entrusted with monitoring the ICT METER programme. A sub-committee of the Statistical Advisory Council will be constituted that would extend advisory inputs for activities under the ICT METER programme and ensure necessary facilities are made available to the group.

Project Priority and Ownership

Table 17 S5- Project Priorities

Project Code	PROJECTS	Owner	HIGH	MEDIUM	LOW
S5P1	National ICT Evaluation and Research Network (NICTERN)	NCB	✔		
S5P2[53]	Definition of ICT Sector and ICT Service	NCB	✔		
S5P3	Definition of ICT Indicators	NCB	✔		
S5P4	State of the ICT Report	NCB	✔		

[52] The DOI (Digital Opportunity Index) and the NRI (Network Readiness Index), promoted respectively by the International Telecommunications Union (ITU) and the World Economic Forum (WEF) are two widely used ICT indices across a majority of countries of the world and provide objective means on which to compare countries' advancements in ICT.

[53] Please note that for the projects S5P2 and S5P3, NCB is owner to the extent that it will propose the definitions but recommendations will get accepted and endorsed at the level of the National ICT Indicators Taskforce

SUPPORT

Programme Monitoring Indicators and Milestones

Table 18 S5- Project Milestones and Indicators

Project Code	Parameter	Indicator(s)/ Milestone(s)
S5P1	Constitution of NICTERN	• NICTERN is constituted timely in accordance with the Action Plan • Detailed tasks are laid out for the NICTERN in a phased manner
S5P2	Finalisation and Updating of the Definitions	• Recommendations in the FAR are consulted • Draft definitions are prepared • Definitions are finalised and disseminated • GDP growth is calculated for the ICT sector • Percentage contribution of ICT services is estimated • Necessary benchmarks are drawn and findings are disseminated • NICTERN is notified about updating requirements for definitions
S5P3	Finalisation and Updating of Indicators	• Core Indicators are agreed upon • Other non-core indicators are agreed upon based on international requirements • Data collection mechanism and modalities are agreed upon • Required capacity building of data collectors is completed • Data is collected, analysed and disseminated directly and used for preparation of the State of the ICT Report
S5P4	State of the ICT Report	• NICTERNs are notified about requirements from the State of the ICT report in the first and second editions • NICTERNs analyse data currently available • External data requirements are identified • Timely production of the State of the ICT Report • Coverage of the report • Growth on coverage with time • Utility of the report as reflected by the number of copies picked up by the private sector • Measurement indicators include number of copies of the report requested by agencies outside GoM, within and beyond Mauritius

7.6 PROGRAMME C1: ENHANCE ICT UPTAKE AMONG SMEs TO PROMOTE MARKET EXPANSION AND PRODUCTIVITY

Programme Context and Overview

Small and Medium Enterprises (SMEs), already constrained by limitations of size and isolation, are now increasingly subject to severe competition from low-cost producing countries. However, even as movements in the global economy towards increased integration and the reduction in trade barriers materialise, advances in ICT offer an unprecedented opportunity to SMEs in Mauritius to participate and grow in regional and international markets.

The programme aims at pushing up the ICT uptake and eBusiness adoption rates in the Small and Medium Enterprises sector in Mauritius through a mix of value-added services, capacity building and awareness creation measures. Among the services envisaged are hosted facilities (applications, web pages, databases etc) available at cost-effective rates to SMEs to increase clustering and networking opportunities, thus enabling SMEs to take advantage of economies of scale and scope. Rewards and incentives as motivational measures are also planned to push up the ICT uptake and eBusiness adoption rates.

Recommendations advanced include the following.

- Operationalisation of a multi-disciplinary initiative for SMEs that is centred on facilitating export-oriented marketing and utilising concepts of clustering and networking, both globally and locally, that need to be pursued.
- A comprehensive planning and design exercise should be undertaken that must result in a roadmap for
  - enhancements in the EM[54] portal for SMEs to one that serves as a one-stop platform for matchmaking and knowledge sharing between the stakeholders concerned in addition to the marketing initiatives being currently pursued.
  - conception of a web-enabled technology infrastructure on a shared model that would help SMEs have cost-effective access to applications and databases for their operational use to increase efficiency and productivity.
  - regular capacity building sessions on the skills required for ICT usage and awareness generation for ICT adoption.
  - facilitation of clustering and networking initiatives among SMEs.
  - recommendations for fiscal incentives, rewards and tax benefits to be made available for SMEs who adopt ICTs.
  - modalities of induction of business incubation experts into this initiative to assist on various counts including the preparation of business plans, recommendation of policy and regulatory facilitation mechanisms, facilitating funding for emerging SMEs, sharing of best practices etc.
  - exploration of virtual and semi-virtual modes of incubation by these experts.
  - operational models for the working of the above.
- Recommendations in the roadmap must be followed through vigorously and implemented.

Programme Strategic Objectives

- to enable appropriate cost-effective use of ICTs in SMEs aimed at ushering internal efficiencies and cost reduction in administrative and other processes.
- to roll out a system of subsidies, rewards and incentives linked to the adoption of ICTs, in particular information systems and the Internet, towards democratising ICTs among SMEs.
- to make profitable use of existing sharable ICT infrastructure available within the country to accelerate the adoption of ICTs by the SMEs at cost-effective rates.
- to deploy ICTs in such a way as to facilitate increased clustering and networking among SMEs in an overall effort respectively to enable economies of scale and achieve integration of services within sectors.

[54] Enterprise Mauritius

- to undertake regular capacity building sessions among SMEs in an effort to identify their ICT needs and to prepare them to use ICTs made available to them.
- to undertake awareness and sensitisation campaigns to drive home benefits that could be harnessed of ICTs by SMEs, not just in terms of better internal management but also in helping them grow their businesses.
- to make use of ICT to participate in international SME networks to bring about overall sectoral growth and advancement.
- to expand market reach of SMEs through use of ICTs.
- to use ICTs to make available in a cost-effective way advantages that arise from standardisation, training, market intelligence, logistics, technology innovation and generally enable SMEs to take advantage of unfolding new market opportunities.
- to help roll out in a cost-effective way ICTs which can have a positive impact on the operations of SMEs like hosting of applications and websites, providing back-office support, introduction of eCommerce and the like.
- to ensure that conducive conditions are provided to bring about a more uniform spread in ICT adoption not just across sectors but also across locations.

Projects and Outcomes

Table 19 C1- Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
C1P1	Planning and Design Exercise to recommend a roadmap to promote eBusiness among SMEs	• Drafting the Terms of Reference for the exercise (and the RFP[55], if an external consultancy) • Conducting the exercise ○ Recommendations on eBusiness needs of the SMEs ○ Recommendations on the solutions that could be adopted ○ Specifications for re-fashioned EM portal ○ Specifications for shared ICT solutions on a hosted infrastructure basis ○ Training requirements for SMEs ○ Recommendations for fiscal incentives, lower connectivity rates, rewards and tax benefits to be made available for SMEs who adopt eBusiness ○ Recommendations on clustering and networking modalities that could be made available through ICTs ○ Recommendations on package deals for SMEs • Submission of Comprehensive Roadmap on enhancing eBusiness among SMEs	• Comprehensive Roadmap for ICT adoption among SMEs in Mauritius • All round measures required for promotion of eBusiness among SMEs • Clear strategy on what needs to be done • Criteria for ICT Awards for SMEs • Will lead to well-directed implementation
C1P2	Rolling Out Rewards, Incentives, and Subsidies	• Study of recommendations made in C1P1 • Formalising Criteria for Rewards, including innovative use of ICT • Rolling out recommendations made for subsidy • Rolling out tax and other incentives	• ICT Awards for SMEs • Increased motivation to adopt eBusiness among SMEs

[55] Request for Proposal

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
C1P3	Enhancements on the Enterprise Mauritius portal	• Developing enhancements in the EM portal for SMEs for matchmaking and knowledge sharing between the stakeholders. ○ Study of recommendations made in C1P1 ○ Drafting the RFP ○ Inviting and Awarding Bids ○ Portal Development Work ○ Roll-out of the Portal • Marketing measures for enhancements made in the portal.	• Enhanced EM Portal and its awareness among target beneficiaries. • Increased networking among SMEs • Representative digital window for SMEs in Mauritius • Increased earnings through enhanced matchmaking possibilities
C1P4	Data, web page and application hosting on shared infrastructure	• Identification and hosting of applications on a shared infrastructure • Study of recommendations made in C1P1 • Procuring/manufacturing applications • Hosting of applications and databases • Drafting access procedures	• Enhanced ICT adoption among SMEs • Increased efficiencies among SMEs • Advantages of digital storage of information in well-protected environment
C1P5	eBusiness Awareness among SMEs	• Publicity and awareness exercise for eBusiness adoption • Study of recommendations made in C1P1 • Preparation of Brochures and other promotional material • Identification of sectors • Conducting awareness and sensitisation camps and workshops	• Increased awareness of benefits from eBusiness
C1P6	Capacity Building among SMEs for ICT use	• Capacity Building exercises among SMEs • Study of recommendations made in C1P1 • Preparation of Training Material • Identification of sectors • Conducting capacity building sessions	• Increased ability to use ICT

Programme Governance Framework

An ICT in SMEs Committee chaired by the Ministry of Industries, SMEs, Commerce and Cooperatives (MISCC) and including representatives from Enterprise Mauritius, SEHDA, MITT, NCB, NWEC, SME Federation should be setup to drive and oversee the implementation and monitoring of the programme.

Project Priority and Ownership

Table 20 C1- Project Priority

Project Code	PROJECTS	Owner[56]	HIGH	MEDIUM	LOW
C1P1	Planning and Design Exercise to recommend	MISCC	✔		

[56] EM- Enterprise Mauritius, MISCC- Ministry of Industry, SMEs, Commerce and Cooperatives, SEHDA- Small Enterprise and Handicrafts Development Authority

Project Code	PROJECTS	Owner[56]	HIGH	MEDIUM	LOW
	a roadmap to promote eBusiness among SMEs				
C1P2	Rolling Out Rewards, Incentives, and Subsidies	MISCC		✔	
C1P3	Enhancements on the Enterprise Mauritius portal	EM		✔	
C1P4	Data, web page and application hosting on shared infrastructure	EM		✔	
C1P5	eBusiness Awareness among SMEs	SEHDA			✔
C1P6	Capacity Building among SMEs for ICT use	SEHDA		✔	

Programme Monitoring Indicators

Table 21 C1- Project Milestones and Indicators

No	Parameter	Indicator(s)
C1P1	Planning and Design Exercise to recommend a roadmap to promote eBusiness among SMEs	• Number of SMEs participating in the user requirements study • Number of sectors covered in the user requirements study • Regional Spread of the SMEs covered in the user requirements study
C1P2	Rolling Out Rewards, Incentives, and Subsidies	• Number of SMEs earning rewards for ICT adoption and usage
C1P3	Enhancements on the Enterprise Mauritius portal	• Number of successful clusters built • Number of successful sectoral networks created • Number of business incubation experts registered on the portal • Percentage increase in the number of matchmaking hits on the Enterprise Mauritius portal • Percentage increase in number of successful matchmaking cases
C1P4	Data, web page and application hosting on shared infrastructure	• Extent of data hosted on shared infrastructure • Extent of internal efficiencies generated • Cost savings generated
C1P5	eBusiness Awareness among SMEs	• Number of Awareness Building sessions conducted • Number of SMEs graduating from non-ICT usage to Internet/websites • Extent of increase in usage of IT systems • Extent of increase in usage of digital media for networking
C1P6	Capacity Building among SMEs for ICT use	• Number of Capacity Building Sessions conducted • Extent of increase in actual usage of ICT

7.7 PROGRAMME C2: PROMOTING INTEGRATED ADOPTION OF ICTs TO DELIVER BETTER HEALTHCARE

Programme Context and Overview

The ICT uptake in the Health Sector has been largely piecemeal and not the result of an overall strategic approach for ICT adoption in the sector. A conspicuous lacuna in ICT implementation in the health sector is the absence of a centralised Medical Record System. Telemedicine has not been used effectively and widely so far either.

Digital Health Record: The population of Mauritius is particularly conducive to maintenance of a digital health record of every individual, facilitating smoother administration process in hospitals and lower waiting time in queues.

Underutilisation of ICT: ICT adoption has not capitalised on the potential of the Internet with its usage being predominantly restricted to stand-alone hospital management systems, stock management systems in pharmacies etc.

Interventions, then, in the Health sector must eventually result in better delivery of healthcare through enhanced efficiency and effectiveness in internal administrative systems, improved access to information and knowledge exchange and through higher levels of citizen convenience.

The following constitute the main recommendations.

Need for a Comprehensive eHealth Plan

There needs to be a comprehensive eHealth[57] plan preparation which would focus on at least the following.

- Health Informatics, implying the use of information systems to healthcare provision, administration and decision-making[58], including
  - Identification, development and deployment of replicable hospital management systems including an electronically facilitated citizen self help.
  - Development of a Digital Health Record in a larger Patient Information System for all citizens that will describe the citizen's health history. This could be followed by appropriate Business Intelligence solutions which can extract trends of diseases and can thus inform policy making and programme formulation.
  - Development of a comprehensive eHealth portal with role-based access to stakeholders. Thematic interaction forums for healthcare workers need also to be considered.
  - Capacity building initiatives that need to be taken up to advance usage of ICT. This should also be done for technicians in administrative issues through material on the health portal (e.g. Personnel Management, Guidelines for Tender and other management modules).
  - Options also need to be explored for use of new technologies for input of data via touch screen/handwriting technology which will save doctors precious time lost in making data inputs.

Telemedicine

Telemedicine or the system of remote healthcare needs to be re-introduced with past lessons being incorporated. Potential benefits from telemedicine include the saving in both time and money as fewer patients and healthcare professionals would need to visit hospitals in the mainland. Rescue workers, too, would be better able to coordinate their response to emergencies for mitigating their effects.

Telemedicine, implying providing remote healthcare also needs to be explored with Mauritius possibly launching tele-medicine with other countries in the region with participants from Mauritius doctors in their roles as both service providers and consumers. Telemedicine could also cater to the outlying islands of Rodrigues and Agalega too.

Tele-Health

Tele-health meaning the provision of health care, both curative and preventative, remotely without the use of information systems, could also be considered involving remote professional consultation and sharing of data amongst professionals.

[57] eHealth is the combined use of electronic communication and information technology in the health sector (Source: World Health Organisation)
[58] It may be noted that internal computerisation and re-engineering of the Ministry is not included within the scope and actually falls within the later programme "Accelerated eGovernment through Process Re-engineering and Coordinated Planning".

Comprehensive and Integrated Coverage
An integrated coverage needs to be given to the implementation of recommendations of the plan including technology solutions and infrastructure, stakeholders to be brought on board in a participative framework, and an Organisation structure that would be responsible to run this initiative.

Outcomes resultant on the eHealth Action Plan include

- enhanced convenience to the stakeholders including healthcare professionals and patients, including online booking of hospital appointments.
- faster turnaround time in cases of emergency through access to easily available data on electronic systems, remote or otherwise.
- better preventative care through increased access to literature and better networking among and across stakeholders.
- informed decision-making from policy makers with easy and continued access to relevant data.

Programme Strategic Objectives

- to arrive at an overall strategic approach for ICT adoption in the Health sector, including comprehensive eHealth Action Plan.
- to facilitate a smoother administration process through adoption of a system of Digital Health Record of every individual.
- to develop a Mauritius eHealth portal that serves as a true collaborative platform that brings together diverse stakeholders of the Mauritius health industry, and helps present a unified window for access to health services.
- to enable cost-effective roll-out of information and communication technologies, including health informatics, tele-health and health telematics, to bring about quick and effective preventative and curative healthcare to residents.
- to explore the feasibility and desirability of telemedicine implementation not just as a tool for better healthcare delivery, training and education but also as an instrument of expertise sharing with other countries of the region.
- to undertake regular capacity building sessions among heath workers in an effort to identify their ICT needs and to prepare them to use ICTs made available to them.
- to undertake awareness and sensitisation campaigns to drive the home the benefits that could be harnessed of ICTs by the health workers in helping them extend better health care delivery, both curative and preventative.
- to ensure that conducive conditions are provided to bring about a more uniform spread in ICT adoption across health workers and locations.
- to harness ICT as a tool with which to bring about greater knowledge sharing and facilitating innovation amongst healthcare practitioners.
- to use ICT to facilitate consolidated data maintenance of patients and associated attributed for analysis, decision-making and future planning.
- to exploit emerging technologies and applications in an effort to free doctors and others engaged in providing critical healthcare services from repetitive tasks.
- to make appropriate and cost-effective use of ICT as a tool with which to provide consultative services to healthcare practitioners and rescue workers in outlying areas.

Projects and Outcomes

Table 22 C2- Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
C2P1	Design and	• Conducting a meeting with all stakeholders of	• eHealth Plan of Action

Project Code	PROJECTS	ACTIVITIES	OUTCOMES

	Implementation of an eHealth Action Plan	the Health sector
		• Specification of the overall requirements in the eHealth system
		• Preparation of a Request for Proposal to invite consultancy for the preparation of the eHealth Action Plan
		• Invite and award bids
		• Commissioning the consultancy exercise
		• Recommendations and specifications in the Draft eHealth Action Plan, including
		  ○ Thematic interaction forums for healthcare practitioners to undertake knowledge sharing and learning
		  ○ Appropriate Business Intelligence solutions
		  ○ Modus operandi on which suggested solutions would work (organisation design etc)
		  ○ Feasibility for deploying telemedicine and areas where it could be deployed, including the setting up of telemedicine at the Cardiac Centre under the Pan African Network
		  ○ Pilot project for telemedicine and subsequent roll-out based on results
		  ○ Comprehensive eHealth portal with role-based access to stakeholders
		  ○ Exploiting emerging technologies to free doctors of repetitive work
		  ○ Networking requirements between hospitals
		  ○ Internal systems to deployed for bodies in the Health sector
		  ○ Preparation of a Request for Proposal for the development and implementation of the eHealth solutions
		  ○ Phases in which this exercise needs to be taken up
		• Preparation and submission of the eHealth Action Plan
			• Request for Proposal for eHealth Action Plan
			• Mauritius comprehensive eHealth System including the eHealth portal
			• Telemedicine roll-out plans
			• Request for Proposal for the development and implementation of the eHealth system
			• The plan will facilitate enhanced convenience to stakeholders, faster turnaround time in cases of emergency, better preventative and curative care and informed decision-making.

C2P2	Development, testing, implementation and roll-out of the eHealth solutions	• Agree on the RFP for the phase-wise implementation adoption approach recommended
		• Invite and Award Bids
		• Commission the development exercise
		  ○ Development and Implementation of the eHealth portal
		  ○ Implement the operational requirements recommended
		  ○ Pilot Testing and Roll Out
		  ○ Implementing Networking Requirements between hospitals
		  ○ Horizontal Transfer of Hospital
			• Integrated eHealth Portal
			• Networking of Hospitals
			• Replicable Hospital Management Information Systems and their rollout
			• Increased collaboration and networking among stakeholders leading to better healthcare

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
		Management Information Systems ○ Estimate customisation requirements, in already available or Commercial Off the Shelf (COTS) solutions ○ Implement Integrated Hospital Management Systems ○ Customise and rollout appropriate Hospital management solutions/ Integrated Health Management Systems	• Integrated Hospital Management Systems
C2P3	Awareness creation and capacity building sessions among health workers	• Usage of community portal, referred to under the Programme "ENHANCING CONNECTIVITY AND CONTENT FOR COMMUNITY EMPOWERMENT" • Usage of other eServices launched by the GoM • Usage of the eHealth portal after its launch	• Enhanced ICT adoption rates • Enhanced usage rates

Programme Governance Framework

A National eHealth Committee comprising representatives from Ministry of Health and Quality of Life (Chair), MITT, EGC, MIH[59], and from public and private sector health agencies to oversee and monitor the programme and serve as the Steering Committee for specific projects.

Project Priority

Table 23 C2- Project Priorities

Project Code	PROJECTS	Owner	HIGH	MEDIUM	LOW
C2P1	Design and Implementation of an eHealth Plan of Action	MoHQL[60]	✔		
C2P2	Development, testing, implementation and roll-out of the eHealth solutions	MoHQL			✔
C2P3	Awareness Creation and Capacity Building Sessions among health workers	MoHQL	✔		

Programme Monitoring Indicators and Milestones

Table 24 C2- Project Indicators and Milestones

No	Parameter	Indicator(s)/ Milestone(s)
C2P1	Design and Implementation of an eHealth Plan of Action	• Timely completion of the eHealth Action Plan • Scope of the eHealth Action Plan • Stakeholder groups represented in the exercise • Area coverage of the eHealth Plan discussions and implementation • Number of health centres covered in eHealth • Number of patients with Digital Health Record
C2P2	Development, testing, implementation and roll-out of the eHealth solutions	• Timely completion of the eHealth Implementation • Scope of the eHealth Action Plan in the different phases of implementation • Number of health centres covered in eHealth

[59] Mauritius Institute of Health
[60] Ministry of Health and Quality of Life

No	Parameter	Indicator(s)/ Milestone(s)
		• Number of hits on the eHealth portal • Number of thematic forums established • Number of patients/people reporting to have benefited from the eHealth network • Number of other stakeholder groups reporting to have benefited from eHealth network • Number of successfully treated cases owing directly to facilitation by the eHealth network • Number of patients with Digital Health Record • Number of hospital in which the Digital Health Record could be gainfully used • Number of patients reporting with an adverse feedback on the facility made available through the eHealth network
C2P3	Awareness Creation and Capacity Building Sessions among health workers	• Number of people attending the eHealth awareness building and capacity building sessions • Number of capacity building workshops to enable stakeholders to make use of ICT • Awareness building sessions to enhance ICT adoption among stakeholder groups of the health sector • Awareness generated for the sessions • Increase in the adoption and usage rates after the sessions

7.8 PROGRAMME C3: PROMOTING INTEGRATED ADOPTION OF ICTs IN AGRICULTURE THROUGH COLLABORATIVE WORKING

Programme Context and Overview

Significant ICT initiatives have been taken up in the sector. However, there are two main problems hampering increased adoption and usage of ICT: proper institutional mechanisms with which to review, monitor and evaluate the efficacy of ICT initiatives and the need for a sector-wide ICT adoption plan that would form the basis of a well-coordinated ICT uptake.

Although the Ministry of Agriculture is one of the first departments to come up with a strategic plan, the implementation remained largely restricted to office administration systems and the like at the level of the Ministries and the Secretariats. Aspects of culture and ownership structure are attributed for these. The usage of the Internet as a tool with which to bring about knowledge sharing and as an enabler of innovation has not been fully exploited either.

Interventions, then, in the Agriculture sector must lead to better coordination, collaboration and planning, enhanced levels of efficiency and effectiveness in internal administrative systems, improved access to information and knowledge exchange and substantively adding to decision-making capability through effective use of GIS[61].

The following constitute the main recommendations.

<u>The need for a comprehensive eAgriculture Action Plan</u>
There needs to be a comprehensive eAgriculture Action Plan[62] which would focus on at least the following

- Comprehensive Business Process Re-engineering of parastatal organisations involved in the sector[63].
- Preparation of a complete geo-database invoking all necessary layers and their associated attributes; this geodatabase would be shared for deployment and usage with the respective bodies in their solutions.
- Installation of an institutional framework that would help operationalise the ICT initiatives recommended in the plan and also facilitate the adoption of further enhancements required.
- Identification of capacity building initiatives that need to be taken up to advance usage of ICT.
- Development of a comprehensive eAgriculture portal with selective access to stakeholders including farmers, corporates, farmers' and fishermen associations, agricultural forums, ministries and departments, clubs and associations, policy planers and other agriculture enthusiasts.
- Development and replication of early-warning systems.
- Upgradation of the eAgriculture portal into a comprehensive GIS-based Mauritius Agriculture Resource Information System (MAGRIS).
- Possible partnerships between public and private for collaboration on different initiatives that could be taken up in the sector.
- A comprehensive outcome-based monitoring and evaluation process for recommended initiatives
- Thematic interaction forums for agriculture stakeholders.
- GIS-aided Decision Support Systems for government policy planners.

The above initiative needs to get kick started through detailed conceptualisation following the points mentioned above as to the technology solutions that need to be adopted, the stakeholders that need to be brought on board with MoUs to bind them into participation in a win-win collaboration model,

<u>Horizontal Transfer of Indigenous Solutions to other countries of the region</u>
A concerted effort needs to be made to investigate the possibility of deployment of solutions for Agriculture in other countries of the region under a larger government-to-government understanding.

[61] Geographical Information System covers a genre of ICT applications and tools that facilitate analysis and decision-making through visually-aided linkage of geographical entities with their associated attribute data.
[62] It may be noted that internal computerisation and re-engineering of the Ministry is not included within the scope and actually falls within the later programme "Accelerated eGovernment through Process Re-engineering and Coordinated Planning".
[63] Ministries and departments are all covered under the Programme A1 as part of the eGovernance Master Plan exercise.

This initiative has been covered in greater detail under the programme "Building Leadership Competencies in ICT".

The need for Capacity Building

Undertaking ICT capacity building initiatives wherever appropriate, particularly for those who opt for the Voluntary Retirement Schemes in the sugar sector, so that they could be gainfully re-deployed elsewhere.

Figure 14 Mauritius Agricultural Resource Information System

MAURITIUS AGRICULTURAL RESOURCE INFORMATION SYSTEM (MAGRIS)

Socially desirable, technologically appropriate, economically viable, and ecologically sound pattern of resource use to promote sustainable development in agriculture can be addressed through the development of a comprehensive Mauritius Agriculture Resource Information Systems (MAGRIS) that includes aspects of soil, water, livestock, plant and seed, fisheries, forest, climate, rainfall, human resources, capital, fodder, land owners' data, environment data, socio-economic and infrastructure data, and production inputs resources.

The development of MAGRIS has the potential to lead to

- Utilisation of ICT to advance the needs of agricultural planning and management.
- Increasing the farmer's production through enhanced yields.
- Help farmers maximise profits by buying inputs cheaply and efficiently and then marketing product at best prices.
- Focus on ICTs for farmers but with support from Researchers, Industry, Students and Extension.
- Utilise ICT solutions to deliver timely information during the growing season, bring about knowledge sharing of research activities, agro-industry based sharing of knowledge, market agricultural produces and products , undertake training and extension activities.

Outcomes resultant on the eHealth Action Plan include

- increased coordinated and collaborative working leading to better resource utilisation and cost savings.
- enhanced availability of timely information for decision-making to the stakeholders ranging from the farmer to the policy planner.
- better land area utilisation, crop planning, and increased revenue through appropriate matchmaking.
- informed decision-making from policy makers with easy and continued access to relevant data.

Programme Strategic Objectives

- to arrive at an overall strategic approach for ICT adoption in the Mauritius agriculture sector, including the preparation of a comprehensive eAgriculture Action Plan.
- to develop a Mauritius eAgriculture portal that serves as a true collaborative platform that brings together diverse stakeholders and helps present a unified window for role-based access to agricultural information and services.
- to undertake awareness and sensitisation campaigns to convey benefits that could be appropriated of ICTs by the stakeholders in the sector in helping them extract better benefits from operations in the sector.
- to ensure that conducive conditions are provided to bring about a more uniform spread in ICT adoption across locations and stakeholders of varying financial strength.
- to harness ICT as a tool with which to bring about greater knowledge sharing and facilitating innovation amongst agriculture practitioners in Mauritius.
- to set up proper institutional mechanisms with which to review, monitor and evaluate the efficacy of ICT initiatives in the sector and take appropriate actions.
- to undertake the preparation of a complete geo-database invoking all necessary layers with their required attributes; this geodatabase would be shared for deployment and usage with the respective bodies in their ICT solutions.

- to undertake the development and replication of early-warning systems, including systems that help prepare for pre-emptive and rehabilitative treatments.
- to take up the development of a comprehensive GIS-based Mauritius Agriculture Resource Information System that would serve as a tool to facilitate better decision-making among agricultural practitioners.

Projects and Outcomes

Table 25 C3- Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
C3P1	Design and Implementation of an eAgriculture Action Plan	• Conducting a meeting with all stakeholders • Specification of the overall requirements in the eAgriculture system • Preparation of a RFP to invite consultancy for the preparation of the eAgriculture Plan of Action • Invite and award bids • Commissioning the consultancy exercise • Recommendations in the draft eAgriculture Action Plan including ○ Specifications for an eAgriculture portal for all stakeholders ○ Specifications for exploiting emerging technologies in a cost-effective manner ○ Specifications for thematic interaction forums to undertake knowledge sharing and learning ○ Recommendations and specification for appropriate Business Intelligence solutions ○ Specification for a modus operandi on which suggested solutions would work (organisation design etc) ○ Specification for Early-Warning and Post-Disaster Systems ○ Specification for a GIS-enabled Decision Support System for use of policy planners ○ Specifications for a larger Mauritius Agricultural Resource Information System (MAGRIS) (an enhanced form of the eAgriculture portal) ○ Specifications for internal systems to deployed for bodies ○ Preparation of RFP for development and implementation of the eAgriculture solutions ○ Recommendations on phases in which this exercise needs to be taken up • Preparation and submission of the eAgriculture Action Plan	• eAgriculture Action Plan • Request for Proposal for eAgriculture Action Plan • Mauritius Agricultural Resource Information System • Request for Proposal for the development and implementation of the eAgriculture System • The plan will facilitate collaborative working, ready availability of relevant information for decision making at all levels, and higher levels of internal efficiencies and effectiveness
C3P2	Development, testing, implementation and roll-out of eAgriculture solutions	• Agree on the RFP based on the phase-wise implementation adoption approach recommended • Invite and award Bids • Commission the development exercise (Phase I) • Development and implementation of the eAgriculture portal • Implement the operational requirements recommended • Pilot Testing and Roll Out	Increased adoption of ICT

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
C3P3	Awareness and Capacity Building initiatives	• Usage of community portal, referred to under A3 • Usage of other eServices launched by the GoM • Usage of eAgriculture portal after its launch	• Enhanced ICT adoption rates • Enhanced usage rates

Programme Governance Framework

A National eAgriculture Committee chaired by the Ministry of Agro-industries and Fisheries and including representatives from MITT, EGC, Mauritius Chamber of Agriculture, and representatives of public sector and private sector stakeholders should be set up to drive and oversee the implementation and monitoring of the programme closely.

Project Priority

Table 26 C3-Project Ownership and Priorities

Project Code	PROJECTS	Owner	HIGH	MEDIUM	LOW
C3P1	Design and Implementation of an eAgriculture Action Plan	MoAF[64]	✔		
C3P2	Development, testing, implementation and roll-out of the eAgriculture solutions	MoAF		✔	
C3P3	Awareness and Capacity Building initiatives	MoAF	✔		

Programme Monitoring Indicators and Milestones

Table 27 C3- Project Indicators and Milestones

No	Parameter	Indicator(s)/ Milestone(s)
C3P1	Design and Implementation of an eAgriculture Action Plan	• Timely completion of the eAgriculture Action Plan • Scope of the eAgriculture Action Plan • Stakeholder groups represented in the exercise • Area and stakeholder coverage of the eAgriculture Action Plan discussions and implementation
C3P2	Development, testing, implementation and roll-out of the eAgriculture solutions	• Number of hits on the eAgriculture portal • Number of thematic forums established • Number of farmers reporting to have benefited from the eAgriculture network • Area of land covered in the geo-database • Number of farmers reporting with an adverse feedback on the facility made available through the eAgriculture network
C3P3	Awareness and capacity Building initiatives	• Number of people attending the eAgriculture awareness building and capacity building sessions • Capacity Building Workshops to enable stakeholders to make use of ICT in the agriculture sector • Awareness building sessions to enhance ICT adoption among stakeholder groups of the agriculture sector

[64] Ministry of Agro-industries and Fisheries

7.9 PROGRAMME C4: ENABLING INCLUSIVE GROWTH OF TOURISM INDUSTRY THROUGH ICT

Programme Context and Overview

Tourism as a sector is a powerful economic engine for Mauritius and one that is on a growth path. In fact, GoM's objective is to bring 2 million tourists annually to Mauritius by 2015. However, the industry in Mauritius is a heterogeneous and fragmented one and involves many different players, both private and public, small as well as big, and draws on the widest possible range of cross-cutting skills.

There is considerable Internet penetration with ADSL connection and widespread use of email and significant website presence by hotels, travel agent and tour operators with some of the big hotels and travel agent providing online reservations too. The Mauritius Tourism Promotion Authority (MTPA) provides online booking facilities through its portal through an arrangement with the Worldwide Travel Exchange (WWTE).

Mauritius tourism players, though, have not fully capitalised on opportunities brought forth by ICTs, particularly the Internet, with a few big players offering online facilities to tourists. eCommerce has not really been taken up as a tool to offer tourist-centric services.

The tourism sector in Mauritius comprises a few big players but in numerical terms is predominantly constituted by small and medium players. This SME segment is not Organised enough to take advantages of economies of scale and has not taken up eTourism in any significant way.

ICT usage is disparate with diverse Organisations in the sector maintaining their own data with no significant collaboration between them on sharing and upkeep of an industry database.

The following recommendations are advanced

<u>An Enhanced eTourism Initiative</u>

There is a need for an enhanced eTourism initiative with the aim of ensuring that Mauritius makes the most of its tourism potential through a larger stakeholder involvement, aimed at bringing about (a) sector growth and development through higher returns to the industry brought about by increased tourist convenience and (b) increased collaboration in an inclusive participative framework that involves all stakeholders of the industry.

MTPA provides online booking arrangement through its portal that allows for arrangements to be made for flight tickets, hotels, car rental agencies and combinations thereof. The following enhancements could also be provided.

- the coverage of the two segments of hotels and car rental agencies could be broadened to include the hotels in the SME sector, or other places of accommodation which could be arranged for tourists (for example, villas, bungalows etc). Other stakeholders, for example tour operators do not find an inclusion in this online booking facility.
- the search facility could also be enhanced by including tourist budget based searches for tourist convenience.
- additionally, map-based searches could also be provided for better visual clarity to the tourist.
- during the duration of their stay in Mauritius, a value-add could be provided with a local cell-phone. connection additionally, through the cell phone. SMS-based services (for example, the location of a nearest hospital, in case the tourist is in need of one) could also be extended.

<u>Integrated Management Tools</u>

Integrated management tools will allow a detailed analysis of tourist profile to Mauritius which can then inform further efforts to be taken up by the tourism promotion agency and other stakeholders. Options need to be explored in this area too, including the generation of queries/reports using data warehousing and mining systems, monitoring of web-site users (by category, types of services contracted for, personalised web pages, online price adjustments, promotions) and clients to be profiled/targeted (nationality, socio-professional group, services requested, etc.).

<u>Increased Collaboration and the Emergence of a One-Stop Shop for Tourists</u>

It needs to be explored how more and more stakeholders could be brought under the MTPA initiative, since MTPA is the official tourism agency for the country; as of now, there is a multiplicity of agencies

that provide online booking facilities. While the existing initiatives taken up by the different players separately may continue, options need to be explored how MTPA could emerge as the most preferred shop for tourists to Mauritius, with an enhanced portal that takes off as the one-stop-online-shop for tourists to Mauritius and with MTPA-sponsored kiosks that could serve as access points to online conveniences provided through this portal.

Tourist Convenience- An eTourism Kit

Imagine a tourist to Mauritius going through the three stages of planning, undertaking and, on her return, cataloguing her trip.

Planning the Visit

On a prominent search engine she fires a search for "Mauritius Tourism" or simply "Mauritius". The search engine's page ranking system ensures that the enhanced MTPA portal, the one-stop shop for tourists to Mauritius, shows itself as first among the search engine's results.

She checks out the site, and registers another conditional search with inputs that include her budgetary constraints, requirements of accommodation, a car to carry her during her stay in Mauritius, and kind of places she might like to visit. Results of this search operation yield several combinations, all within the declared budget, that include

- hotels/ villas for accommodation with other details like proximity to the sea etc,
- vehicle options and
- places she could visit based on preferences she has earlier declared.

From among these alternatives she opts for one. The eTourism platform then makes out an itinerary for her and requests payment. She agrees with the offering, makes the resultant payment using her credit card and has the eTicket mailed to her.

Undertaking the Trip

Upon landing in Mauritius with the eTicket, she is delivered an "eTourism Kit" that comprises keys to the vehicle she has chosen, access to her accommodation, a mobile phone with a local SIM, her itinerary and a brochure for general guidelines.

Necessary arrangements are also made out with guides etc who would accompany her during her visits to sites she has selected in accordance with the itinerary. The mobile handset with the local connection ensures that , wherever she is on the island, location-based services are constantly available to her. On her preference, other digital media and devices, like an electronic chip for data storage, could also be made available to her.

On the eve of her return she returns the eTourism Kit but retains the storage media with her.

Cataloguing Memories

Upon her return, she retrieves digital data stored during her trip, transfers that to another, more permanent repository and returns to the MTPA portal to register her feedback. MTPA takes her suggestions, using it to offer better services in future and makes available certain bonus points to the tourist which she could use to avail of discounts on her next trip to Mauritius.

Throughout the exercise she has never had to navigate away from the one-stop-shop.

Figure 15 C4- An eTourism Kit

Programme Strategic Objectives

- to transform the existing eTourism initiative of the MTPA into a true collaborative platform that brings together diverse stakeholders of the tourism industry and helps present a unified, one-stop point of reference for tourism in Mauritius
- to undertake initiatives towards facilitating a more equitable sharing of the proceeds of the tourism industry by involving all tourism stakeholders, and giving them an ICT window through which to offer their products and services to the tourist.
- to facilitate overall growth of the tourism industry by offering value-added services, including multi-channel and location-based services, to the tourist keeping tourist convenience the uppermost priority.
- to enhance the existing eTourism portal of the MTPA into one which offers in a convenient and structured way not just tourism-related information but also end-to-end services to the tourist from before her visit to the time the tourist returns to her home country.

- to undertake ICT-enabled promotional campaigns of the Mauritius tourism industry to expand the tourist profile of Mauritius across locations in the world.
- to use ICT to offer convenience-oriented services to low-budget tourists from different parts of the world.
- to undertake regular capacity building sessions among SMEs in tourism in an effort to identify their ICT needs and to prepare them to use ICTs made available to them.
- to undertake awareness and sensitisation campaigns to convey benefits that could be extracted of ICTs by operators in helping them grow their businesses.
- to ensure that conducive conditions are provided to bring about a more uniform spread in ICT adoption in the tourism sector across locations and business sizes.
- to use ICT to facilitate decision-making and future planning of interventions to be taken through consolidated data maintenance and analysis.
- to use ICTs to bring together stakeholders of the tourism industry towards achieving economies of scale, maximising synergies and matchmaking opportunities between service-seekers and service providers.

Projects and Outcomes

Table 28 C4- Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
C4P1	Planning to decide between making a fresh eTourism effort or request enhancements from WWTE	• Planning exercise for the decision on whether to request enhancements from WWTE or build an eTourism portal	• eTourism Committee constituted • Decision is taken
C4P2	Enhanced eTourism portal	Planning and Design Exercise for detailed recommendations on the following • specification for the end-to-end service to be provided to the tourist, including → a comprehensive search facility → location-based service to be provided → detailed listing of the modus operandi for the end-to-end service to be offered to the tourist → MTPA-sponsored kiosks → content description for the eTourism portal • window to offer tourism products and services for players in the Small, Medium and Micro-enterprise segment, including a modus operandi on how this would operate • specification for integrated management tool for tourism planners • recommendation for ICT-enabled marketing measures to promote the Mauritius tourism	• Mauritius Collaborative eTourism Report • eTourism Portal Requirement Specifications Report • Request for Proposal document • Mauritius eTourism Portal • Service Level Agreements[65] with service providers on the eTourism initiative

[65] A Service Level Agreement (SLA) is a formal negotiated agreement between two parties that is a contract between service providers, which would record the common understanding about services, priorities, responsibilities, guarantee, etc. with the main purpose to agree on the level of service. For example, it would specify levels of availability, serviceability, performance, operation or other attributes of the service like billing and even penalties in the case of violation of the SLA. In this particular case, for example where location-based mServices are proposed SLAs would need to exist between MTPA and the mobile operators to provide guaranteed SMS-based services, among other things. (Definition extracted and tailored from Wikipedia)

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
		industry • Specification for hosting portals, applications and databases on a shared infrastructure • Drafting a Request for Proposal for the development of such a portal • Selection and award of work to IT vendor(s) • Testing of the solution and roll-out of the tourism portal	
C4P3	Awareness Campaigns and Capacity Building Sessions	• Conduct Awareness Building Sessions among operators in the tourism sector • Conduct Capacity Building Workshops among operators in the tourism sector	• Enhanced uptake of ICT in the sector • Enhanced capability to make use of ICT in the sector

Programme Governance Framework

A National eTourism Committee chaired by MoTL with representatives from MTPA, MITT, EGC, Tourism Authority, AHRIM, ASMH, Mobile operators, travel agents, car rental agency representative, representatives from the SMME[66] sector in Tourism to oversee and monitor the programme closely.

Project Priority and Ownership

Table 29 C4- Project Priorities

Project Code	PROJECTS	Owner	HIGH	MEDIUM	LOW
C4P1	Planning to decide between making a fresh eTourism effort or request enhancements from WWTE	MoTL[67]	✔		
C4P2	Enhanced eTourism portal	MoTL	✔		
C4P3	Awareness Campaigns and Capacity Building Sessions	ASMH & AHRIM[68]	✔		

Programme Monitoring Indicators

Table 30 C4- Project Indicators and Milestones

No	Parameter	Indicator(s)/ Milestone(s)
C4P1	Planning to decide between making a fresh eTourism effort or request enhancements from WWTE	• Timeliness of completion of the exercise • Agreement of stakeholders to the conclusion drawn of the exercise
C4P2	Enhanced eTourism portal	• Complete and timely implementation of the portal • Number of stakeholder groups represented • Number of large operators participating • Number of players in the SMME segment participating • Number of operators registering to offer their services on the portal

[66] Small, Medium and Micro Enterprises
[67] Ministry of Tourism and Leisure
[68] ASMH: Association of Small and Medium sized Hotels, AHRIM: Association hôteliers et restaurateurs de L'île Maurice

No	Parameter	Indicator(s)/ Milestone(s)
		• Number of stakeholder groups represented in the SLAs[69] • Increase in the number of hits on the portal • Increase in the number of hits on the portal from potential tourists • Number of end to end booking cases successfully undertaken • Number of operators dropping out of the system • Increase in the number of operators joining into the system • Number of SLA failure cases • Number of adverse feedbacks from tourists availing of the end to end booking facilities provided by the eTourism portal • Number of adverse feedback cases reported from those joining into the eTourism framework • Incidence of anti-competitive practices • Increase in tourism revenue generated • Increase in inclusiveness of the growth through the eTourism platform
C4P3	Awareness Campaigns and Capacity Building Sessions	• Increase in ICT adoption rates • Increase in ICT usage rates

[69] Service Level Agreements

7.10 PROGRAMME A1: ACCELERATED E-GOVERNMENT THROUGH PROCESS RE-ENGINEERING AND COORDINATED PLANNING

Programme Context and Overview

Substantial progress has already been made and Mauritius now ranks along with other developed countries of the world in its readiness for eGovernment. There are areas, though, where interventions are now required to accelerate excellence in governance to the next stage through comprehensive process re-engineering and coordinated planning. Citizens need to be able to extract some value-added benefits from government's efforts while government entities effect enhancements in efficiency and effectiveness.

Measures now need to be taken towards beefing up internal processes of the government in an overall effort to deliver citizen-centric services through convenient channels of service delivery. Beyond the regular portal-based services, m-services too on cellphones are envisaged. Even as new bundles of services and information become available, publicity among citizenry would not just raise awareness of these but would also boost uptake by driving home the advantages through accessing eServices. Indeed, eGovernance must be marketed as a tool for good governance covering aspects of efficiency, accountability and transparency

Recommendations here are to facilitate delivery of good governance through electronic means of service delivery that accords paramount importance to citizen-centricity and is fully supported by comprehensive back-office process re-engineering including clear accountability structures and implementation by a high-powered national body exclusively responsible for eGovernance in the country.

Key Recommendations include

Process Re-engineering

- For clear accountability structures, the process re-engineering exercise must necessarily associate every task/activity in a process with an official role. More precise role allocation needs to be done than that shown in the process map that forms part of the current eBusiness Plan template. The usage of "swim-lanes" is recommended.
- Within the scope of service to be rendered as part of the eBusiness Plan, the drafting of the implementation RFP and recommendations on service delivery channels for citizen convenience must be included too.
- The recast eBusiness Plan template (now renamed "eGovernance Master Plan" template) must necessarily include
  - Service prioritisation
  - Process maps with swim lanes with clear role-allocations
  - Definition of the target users
  - Approach by which services would be taken online
  - Communication strategies and
  - Capacity building plans
  - Identification of collaborative strategies
  - IT strategy based on the GPR[70] exercise
  - Change management on the multiple dimensions of people, process and technology.

Institutional Arrangements

- There must be a central body, an eGovernance Cell (EGC), working under the aegis of the MITT, and involving representatives from Ministry of Finance and Economic Development, Ministry of Civil Service and Prime Minister's Office, that would perform planning, coordinating, advisory, and monitoring and evaluation functions.
- Inter alia, this body must facilitate, in collaboration with CIOs of the individual departments, a high-level central coordination that will prioritise between the departments on the implementation of eGovernance.
- Consequent upon this arrangement, the departments will draft their Annual Plans of Operations, listing down the services and the internal systems that need to be computerised as well as training and communication initiatives to roll out.

[70] Government Process Re-engineering

- At every step of the eGovernance implementation, the EGC will be closely associated (from tendering, to procurement, to project management and post-implementation activities). The accountability of eGovernance implementation will be jointly of the eGovernance Cell and the CIOs; objectively verifiable indicators will be evolved in the Annual plan though which the progress can be assessed.
- Awards on eGovernance need to be constituted and eGovernance officers with exemplary achievements will be awarded on an annual basis.

eGovernance Awareness

- Publicity and advertisement measures through both electronic and print media are recommended whenever it is felt that adequate number of eServices that bring citizens convenience has gone online.

Citizen-Centric Service Delivery

- The transition be made to the multi-channel delivery model for services needs to be made in degrees
- There also needs to be a comprehensive exercise undertaken that would determine the approach as to how the services must be exposed to the citizens (whether, the complete development of the services needs to be ready before it is taken online, or whether the parts of the service could be made online, even as the technology behind the remaining parts gets built and tested).
- A "Centre for Good Governance" must be established that would enforce a "Code for Good Governance". The code would lay down detailed rules for transacting services with the government, including an accountability framework.
- Online rules, regulations and requirements for government services need to be posted to minimise subjective actions.
- Highly-placed public officials can expedite transparency and accountability efforts by making their offices positive examples of openness.
- The citizens need to be able to track the status of their applications.
- There must be dedicated window in the government portal which would offer citizens direct access to government officials, report any irregularities and seek redress.

Programme Strategic Objectives

- to constitute an eGovernance Cell (EGC) at the national level under the aegis of the MITT to serve as the entity responsible for and empowered with planning, coordination, advisory, promotion and monitoring functions.
- to enable transparency and accountability in governance and promote civic engagement through greater access to government information.
- to promote democratic involvement and scrutiny by deploying dedicated windows for access and speedy redressal of grievances.
- to enhance the existing government-on-line portal to an integrated one-stop shop that would provide information and services to citizens and businesses in a user-centric way.
- to undertake comprehensive Government Process Re-engineering in departments and ministries to bring about efficient delivery of services to businesses and citizens and improve internal efficiencies and effectiveness.
- to exploit appropriate technology for the re-defined processes so as to facilitate faster process completion, clearer role-allocation and enhanced user-convenience.
- to ensure that a certain minimum level of technology capability resides with the target stakeholder groups that will empower them to use the e-services made available.
- to make multi-channel service delivery, including those of the Internet, mobile phones and the conventional telephone, an integral part of ANYTIME, ANYWHERE, ANYHOW e-Governance service delivery.

- to ensure that traditional manual methods continue to co-exist with ICT-enabled delivery of information and services.
- to foster a spirit of collaboration between departments and adopt common IT infrastructure and architecture standards and guidelines to ensure ongoing development takes place in a coherent way, eliminates redundancy or duplication of efforts and maximises reuse of efforts already made.
- to inculcate within the ranks of the civil services and other government officials a culture of transparency that would encourage them to share information with citizens, except if required otherwise for public order or official secrecy.
- to engender a public sector that gives equal opportunity all through user-centric services that are inclusive and exclude no one from its services and respect everyone as individuals by providing personalised services.
- to evolve upon a set of key performance indicators that not just measure the efficiencies and effectiveness of the different processes but also lay out clear accountability mechanisms for the different parts of the processes.
- to undertake eGovernance publicity and awareness campaigns through a combination of print and electronic media to make Mauritians across the country abreast of latest information and services available and to drive home benefits accruing to communities.

Projects and Outcomes

Table 31 A1-Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
A1P1	Centralised Planning and Implementation of eGovernance in Mauritius	○ Preparation of a Terms of Reference for the eGovernment Cell ○ Constitution of the eGovernment Cell ○ Prioritisation between departments for the implementation of eGovernance ○ Coming up with a consolidated Plan for 5 years for eGovernance in Mauritius ○ Annual Action Plans for eGovernance across departments ○ Undertaking Quarterly Review of the Action Plans based on indicators in the Action Plans ○ Day to day coordination of eGovernance activities ○ Facilitating Capacity Building and Innovation in eGovernance	○ High-powered eGovernance Cell (EGC) ○ Five Year High-Level Plan for eGovernance for all ministries and departments ○ Annual Plans of Operations for the individual departments ○ Quarterly Review Reports for the Action Plan Implementation ○ Annual Report for Innovation in eGovernance by the EGC ○ Review of the role of the CIOs in the departments ○ Coordinated planning and deployment of eGovernance across Ministries and departments ○ Clear accountability structures for eGovernance implementation ○ Objective indicator-based evaluation of eGovernance implementation ○ Reformed budgetary allocation framework for eGovernance ○ Better fund utilisation ○ Ready and continued availability of eGovernance expertise
A1P2	Recast Process Reform Template for Implementation of IT solutions in the	○ Recasting the eBusiness Plan, renaming it eGovernance Master Plan template ○ Include roles with responsibilities	○ eGovernance Master Plan Template ○ Introduction of RFP making into the exercise ○ More comprehensive process description as a forerunner to the implementation of eGovernance

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
	departments	○ Include RFP making into the exercise ○ Introduce concept of swim-lanes ○ Include any other recommendations ○ Draft and Submit eGovernance Master Plan template	○ Clearer accountability structures ○ Time-saving to the departments by inclusion of RFP into the Master Plan template ○ Will facilitate easier calculation of Key performance indicators for the eServices rolled out ○ Will facilitate easier estimation of time requirements for the eServices rolled out and comparison between "As-Is" and "To-Be"
A1P3	Conducting eGovernance Master Plan exercises for the departments followed by the implementation of IT solutions	○ Conducting eGovernance Master Plan in departments in line with High-Level Plan for eGovernance ○ Preparation of RFP for the implementation of the Master Plan in the departments ○ Commissioning of the eGovernance Master plan exercises in the departments ○ Draft eGovernance Master Plan reports ○ Draft Request for Proposal documents for the implementation ○ Commissioning of the Implementation Exercises ○ Pilot Trial and Complete Roll-out	○ eGovernance Master Plan Reports ○ Complete and comprehensive process re-engineering ○ Elimination of process redundancies and bottlenecks, reduction of turnaround time, recommendation of process outsourcing ○ Implementation of eServices ○ Better service-delivery to citizens and businesses ○ Convenient citizen-centric service delivery ○ Reduced number of visits by the citizens and businesses to the Government offices ○ More convenience to citizen through multiple channel service delivery and easier tracking of service status ○ Enhanced internal effectiveness and efficiencies in the departments and ministries ○ Clearer understanding of roles to be played by different officials in the Ministries and departments ○ Enhanced Public Image for the Government ○ ANYHOW and ANYTIME service delivery to citizens
A1P4	eGovernance Communication Initiative	○ Conducting regular workshops and sessions for departments on advancements in eGovernance in Mauritius ○ Meetings between eGovernance Change Managers[71] and EGC ○ Meetings between eGovernance Change Managers and their respective departments ○ Conducting publicity campaigns through both electronic and print media	○ Internal Communication Drives to spread awareness and elicit feedback on eGovernance initiatives ○ Campaigns designed both for electronic and print media ○ Campaigns conducted both on electronic and print media ○ Higher levels of awareness among citizenry of eServices available ○ Higher levels of eService usage and thereby of ICT uptake among the citizens ○ Positive impact also on the Broadband uptake and visits to the Public Internet Access Points ○ Increase in ICT penetration in general,

[71] Officials responsible for implementing eGovernance in their respective departments

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
		○ of eGovernance achievements in Mauritius ○ Design of promotional material ○ Launching promotional campaigns	and Internet penetration in particular ○ Cost saving for citizens ○ Ready channel of feedback to then government from within the government and from outside ○ Enhanced public Image of the Government

Programme Governance Framework

An eGovernance Taskforce chaired by the MITT and including Head of the eGovernance Cell, department heads of select departments, NCB, representatives from the business community, and representative of civil society groups, will be monitoring the progress of the programme closely.

Project Priority

Table 32 A1- Project Priorities

Project Code	PROJECTS	Owner	HIGH	MEDIUM	LOW
A1P1	Centralised Planning and Implementation of eGovernance in Mauritius	EGC	✔		
A1P2	Recast Process Reform Template for Implementation of IT solutions in the departments	EGC	✔		
A1P3	Conducting eGovernance Master Plan exercises for the departments followed by the implementation of IT solutions	Respective eGovernance Change Managers		✔	
A1P4	eGovernance Communication Initiative	MITT	✔		

Programme Monitoring Indicators and Milestones

Table 33 A1- Project Milestones and Indicators

No	Parameter	Indicator(s)/ Milestone(s)
A1P1	Constitution of the EGC	• Terms of Reference for the EGC are drawn timely • EGC is constituted timely • Allocation of responsibilities among the members of the EGC takes place timely in a clear and unambiguous way
	EGC Operations	• High-level action plan is drawn timely • Ministries and departments are prioritised • Annual action plans for eGovernance takes place as recommended • Coverage of the annual action plans is comprehensive and complete ensuring that (a) all eServices are taken up for consideration, (b) channels and devices to be considered are taken up, (c) internal systems are all considered, (d) budgetary requirements are laid out • EGC is involved in a streamlined way in all procurement and bidding operations as well as development and monitoring of solutions • EGC's expertise is taken timely and regularly as and when felt necessary by the eGovernance Change Managers • Clear accountability structures are drawn between the EGC and the eGovernance Change Managers assigned to the respective departments
A1P2	Template Modification Exercise	• Revised eGovernance Master Plan template is formulated timely • Role allocations are considered • RFP making is included in the scope of services for the consultant • Agreement across all departments and template is universally adopted

No	Parameter	Indicator(s)/ Milestone(s)
	Adherence to template	• Number of Request for Proposals based on this new template
A1P3	eGovernance Master Plan exercises	• Adherence to time-frames for the preparation and implementation of Master Plans with the declared Annual Plans • Deviation of the actual budgetary requirement as occurs in the winning bidder's response in comparison to the declared requirement in the Annual Plans • Deviation of the actual budgetary requirement as occurs in the winning bidder's proposition in the Master Plan in comparison to the declared requirement in the Annual Plans for implementation • Process re-engineering results in the number of processes dropped, merged, re-allocated, re-designed, outsourced • Reduction in turnaround time in the processes post re-engineering • Clearer role allocation in the processes post re-engineering • Reduction in costs resultant upon re-engineering • Number of channels of service delivery explored and adopted • Number of devices on which to access service selected for service delivery • Extent to which Change Management requirement is addressed in terms of "people" dimension • Number of services prioritised for electronic delivery
	eGovernance Implementations	• Deviation of the proposed budgetary requirement in the Master Plan in comparison to the actual requirement in the implementation phase • Number of services implemented for citizens and businesses • Number of channels through which eServices can be availed • Number of Visits citizens need to make if they wish to avail of the services when fully implemented • Number of Visits citizens need to make if they wish to avail of the services when fully implemented • Number of channels being used and the respective intensity of their usage by businesses and citizens • Number of complaints received from citizens on eServices that are implemented
A1P4	Indicators for review are finalised between the EGC and the Ministries	• Number of Internal Communication Workshops conducted • Number of departments covered in the workshops • Extent of feedback generated on the implementation of eGovernance • Number of adverse feedback from internal employees
	External Communication	• Number of publicity campaigns over electronic media • Number of publicity campaigns over print media • Number of media covered • Budgetary allocation for publicity and expenditure • Coverage of regions and target audience in the external communication exercise • Extent of citizen involvement in the exercise

7.11 PROGRAMME A2: UPSCALING E-GOVERNMENT THROUGH FLAGSHIP APPLICATIONS

Programme Context and Overview

Even as elaborate process re-engineering exercises and coordinated planning take place to lay the foundations for the delivery of citizen-centric services, it is equally important that certain other initiatives be taken up which would either (a) lead to high visibility quick-win projects that touch the daily lives of citizens thus conveying the government's sincere pursuit of eGovernance or (b) promote investments into core applications and competencies that act as the support structure for the other eGovernment efforts. Indeed, such investments would become the nuclei around which other efforts would grow and develop. Prominent among the latter initiatives are smart-card based identification systems that would not only lead to higher efficiencies by reducing time for data entry across multiple eServices and the like, but would also double up as a universally accepted PKI-enabled authentication system.

It is recommended that even as initiatives under "A1" are taken up and follow their own maturity cycles to deliver benefits, these flagship investments must also be concurrently pursued.

A. The following Initiatives are envisaged to promote VISIBILITY OF EGOVERNMENT EFFORTS

Introduction of Smart-Card based Electronic Identification Systems

- Feasibility study for a Smart Card based electronic identity system needs to be undertaken whose output would include cost-benefit, both real and perceived, for the EID initiative, Possibility of the use of the EID system by the private sector once it is operational, cost-sharing model between the government and the citizens for the EID hardware/software requirements.
- Exhaustive recommendations for a phased implementation of the system.

Setting up and Operationalising a VoIP based eGovernment Call Centre

- Planning and Design exercise needs to be undertaken for the setting up of the Call Centre which must yield as its outputs, the number of services to be launched over the call centre, usage of toll-free numbers, the mix of interactive voice response systems and manual response systems, the number of staff required for the exercise, technology infrastructure required, collaborative arrangements between the centre and the departments whose services are launched and service level agreements with external vendors and service providers.
- A comprehensive Operations Manual is also envisaged at this stage to cover the business processes to be followed for the call centre operations.

Awards and Incentives to adopt eGovernance

- Awards and incentives are also envisaged to recognise and promote excellence in implementation of e-governance initiatives. Awards, for instance, are envisaged in the categories of
  - Excellence in Government Process Re-engineering,
  - Exemplary Horizontal Transfer of ICT-based Best Practice
  - Outstanding achievement in Citizen-Centric Service Delivery/ Best implementation of the Code of Good eGovernance[72]
  - Innovative Technology Usage in e-Governance
  - Best Government Website

The development and implementation of a Crime occurrence Tracking System for the Mauritius Police and installation of GPS-based systems in government vehicles are also conceived at this stage to promote high visibility of eGovernment efforts.

B. Initiatives in the second category that develop CORE COMPETENCIES AND APPLICATIONS include

Streamlining Procurement

- The scoring system currently utilised employs various functions of technical and financial scores which may lead to unbalanced results. An additive scoring system, utilised by most multi-lateral donors for their bidding processes, is recommended.

[72] The Code of Good eGovernance is the set of formalised principles and practices of eGovernance implementation as seen from the citizen's perspective and necessarily includes objective parameters of implementation of eServices like the time required for service delivery, grievance redressal in the event of breach and the like.

- Clear and unambiguous rules as to which type of evaluation applies to which kind of procurement in so far as they relate to eGovernance, need to be laid down. the need is also for Standard Bidding Documents that would apply depending upon the type of service requested in the RFP, the type pf procurement deployed and the type of evaluation that would be required for the work.
- Following this up with the implementation of eProcurement system that would make for transparent and efficient procurement for GoM with a significantly reduced process turnaround time for procurement.

Comprehensive Integrated Capacity Building for eGovernance

- At the national level training needs must be defined, training curricula must be prepared and, in the long run, in-house competencies need to be built for eGovernance functions; for a kickstart experts of eGovernance could also be invited from other countries, like India and Singapore, to undertake knowledge sharing sessions with eGovernment officers in Mauritius.
- Common course standards need to be evolved for imparting training in the various disciplines related to eGovernance. Part-time courses and executive programmes can also be designed exclusively for the Civil Service cadre since they would be at the key leadership positions, and, as such, would take up the mantle of ushering eGovernance. Capacity building needs to cover aspects of organisational change management, leadership capabilities, and the acquisition and upgradation of skills, including those in technology.

Transition to a Shared Service Model

- In the long-run, the transition needs to be made from a single-service, single-stage delivery model to a multi-service multi-stage one, whereby public agencies in Mauritius can come together to deliver part of their business – be they front-line services or support functions –in a combined or collaborative operation. Typically, though not exhaustively front-office and back-office integration is imagined.

Revised eGovernment Interoperability Framework.

- There needs to be a revised EGIF document which includes management, enforcement and governance structures that would help EGIF being adopted and also being periodically updated, the adoption of EGIF lifecycle model, and the enunciation of objectively verifiable indicators through which to assess and measure the progress on adherence to the EGIF by public sector agencies in Mauritius.

Introduction of Open Source

- GoM agencies must work together to arrive at joint decisions to introduce open standards, which is essential if greater competition is to be established, with the application of open source as one of the options. Open-source software must be judged on the same terms as proprietary software, and in calls for tender and other purchasing open source must be assessed on the basis of a realistic costing which takes account of all economic factors. An initial pilot project could be established in which open-source software could be adopted.

Public Private Partnerships

- Public sector sensitivities and private sectors competencies could be brought together in a productive collaborative arrangement whereby risks and responsibilities are shared between the two. A feasibility study for exploring Public Private Partnership (PPP) options is recommended whose outputs would include the recommendations of services for PPP, PPP models to be deployed, standard RFPs and Contracts, and the risk-sharing arrangement[73].
- The PPP Feasibility exercise has to be taken in conjunction with that recommended in a subsequent section on self-financing eGovernance initiatives.

[73] Advantages of Public Private Partnership are owing to sharing of risks and responsibilities between the government and its private partner and typically, areas that do not fall in the government's core competence area are typically taken up for PPP. The most common PPP model deployed is the one where payment to the private partner is incremental and staggered and critically dependent on the level of service provided. Setting up and operationalisation of PIAPs is one area where this approach has been taken up in many countries, though a more comprehensive study would be required before committing to the PPP model for this..

Programme Strategic Objectives

- to undertake the development and implementation of applications that touch the daily lives of citizens and bring about high visibility of eGovernment initiatives among potential users.
- to undertake the development of certain core applications and competencies in the sphere of eGovernance which can serve as nuclei around which other initiatives could grow and develop.
- to explore the possibility of shared services for eGovernance in Mauritius with the aim of bringing about cost reductions, streamlining government operations and facilitating inter-departmental collaboration.
- to identify measures required to be taken up to make the transition from a single-stage, single-service delivery stage to a multi-service, multi-stage delivery that aims at citizen-centric services through sharing of citizen data and presenting a single window of interaction to the citizen.
- to bring about cost-reductions in government through sharing applications and other reusable components across different wings of the government.
- to convey the government's seriousness in its pursuit of eGovernance in Mauritius through taking some core eGovernment applications of high cost which would have long-term benefits for citizens.
- to bring about cost-reduction and risk-sharing through combining the best of public sector sensitivities and private sector efficiencies in operationalising eGovernance by involving private sector players in the design, development and operationalisation of eGovernance in Mauritius.
- to explore alternatives in cost reduction and interoperability in eGovernance by exploring the possibility of adopting open source in eGovernance at the infrastructure, desktop and application levels.
- to use ICT to bring about better knowledge management and sharing among officials in the government.
- to promote good governance through eGovernance by institutionalising a system of rewards and incentives for exemplary initiatives taken up by public officials in Mauritius.
- to streamline the procurement system in the government by undertaking reform of the procurement process and using ICT to operationalise it across departments.

Projects and Outcomes

Table 34 A2- Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTPUTS
A2P1	Electronic Identification Systems for Citizens	• Consultancy exercise for an appropriate cost-effective Electronic Identification System for Mauritians • Implementing the recommendations • Distribution and publicity of EID systems in Mauritius	• DPR[74] on the EID systems in Mauritius • Phased distribution of EIDs to citizens • Unique electronic representation of citizens • Faster authenticated access to services and facilities • Easy and portable storage of citizen information in a user-friendly way
A2P2	Mauritius Police Force - Crime Occurrence Tracking System	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Implementing	• Fully Operationalised Crime Occurrence Tracking System • Faster access to crime data • Quicker reactive interventions • Ready analysis for proactive steps

[74] Detailed Project Report

Project Code	PROJECTS	ACTIVITIES	OUTPUTS
		Recommendations	
A2P3	M/Arts & Culture- Computerisation of National Archives	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Implementing Recommendations	• Fully Computerised National Archives • Compressed digital storage of information on national heritage
A2P4	National Assembly - e-Parliament	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Implementing Recommendations	• Fully Operationalised e-Parliament solution • Better preservation and easy retrieval of parliamentary proceedings
A2P5	Setting up of a VoIP Call Centre for Government Services	• Planning and Design exercise for setting up a VoIP Call Centre • Implementation recommendations, including (a) number of services to be considered, (b) decision on toll-free numbers, (c) extent of combination of interactive voice response systems and manual response systems, (d) identification and implementation of solutions, (e) Service Level Agreements, if any and (f) identification of CC executives and setting up the infrastructure for the Call Centre	• Detailed Project Report on the implementation of VoIP Call Centre for eGovernance • Fully Operationalised Call Centre • Single-window access to government services • Higher levels of citizen convenience • Cost reductions for the government
A2P6	Awards and incentives to adopt eGovernance and generally reform governance	• Formulating a Code of Good eGovernance • Arriving at an objective criteria for awarding on eGovernance accomplishments • One of the awards to be of being a model implementation of the Code of Good eGovernance • Annual evaluation for Awards	• Model Code of Good eGovernance • eGovernance Awards • Higher awareness of eGovernment initiatives • Higher motivation levels for eGovernance in officials through recognition

Project Code	PROJECTS	ACTIVITIES	OUTPUTS
A2P7	Ministry of Information Tech. & Tel. - e-Document Management System	• Preparation of a Terms of Reference for Consultants, including study of the processes and the workflows, roles associated with various components of the processes, and identification of appropriate Document Management System • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Implementing Recommendations	• Fully Operationalised e-Document Management System • Better storage and retrieval of documents • Faster and informed decision-making • Efficient workflows
A2P8	Cost Sharing Alternatives in eGovernance	• Planning and Design exercise on the use of alternative sources of funding eGovernment projects • Further course of action • Implementation of recommendations and alternative sources of funding	• Detailed Project Report on cost-sharing alternatives • Risk sharing and cost savings for Government • Higher sense of ownership for citizens
A2P9	Planning and Design on the Feasibility of PPP in eGovernment	• Prepare Indicative List of Services where PPP could be deployed • Draft the RFP • Invite and Award bids • Commission the Work • Preparation of a Detailed Project report • Recommended Services where PPP is to be deployed ○ Appropriate PPP Model recommended for the different services ○ RFPs for the different models ○ Standard Contracts for the different models ○ Expected Revenue Models for the different PPPs	• Detailed Project Report on the implementation of PPP in eGovernment • Risk and Responsibility sharing of eGovernment initiatives • Higher sense of ownership from private participants • Cost-savings • More efficient and transparent service provision

Project Code	PROJECTS	ACTIVITIES	OUTPUTS
A2P10	Streamlined Procurement Systems for eGovernance	• Planning and Design exercise for streamlining procurement process and benchmarking with international practices • Implementation of eProcurement solution	• Standard Bidding Documents with evaluation criteria • Request for Proposal document for eProcurement • Operationalised eProcurement system • Streamlined procurement with transparent systems • Due weightage to quality and cost • Increased chances of selection of the best vendor
A2P11	Implementation of a Project Management Solution	• Identification of a Project management Solution • Implementation of the same • Capacity Building on the solution of EGC and eGov Change Managers in the departments	• Fully Operationalised Project Management solution • Regular tracking of project status • Increased chances of better and timely project delivery • Ready availability of project status
A2P12	Mauritius Police Force - GPS in all Govt. Vehicles and Implementation	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Implementing Recommendations	• Location-based Service from the Mauritius Police Force
A2P13	Cabinet Office - e-Cabinet	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Implementing Recommendations	• Fully Operationalised e-Cabinet System • Better storage and retrieval of documents • Faster and informed decision-making • Efficient workflows
A2P14	Comprehensive Feasibility exercise to explore the possibilities of shared services	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Implementing Recommendations	• Request for Proposal document • Shared Services Roadmap report • Shared Services and systems • Increased chances of cost savings from the government's side • Fully integrated joined-up services to citizens and businesses • One-stop Non-stop service to the citizens • Increased chances of productive collaboration among officials

Project Code	PROJECTS	ACTIVITIES	OUTPUTS
A2P15	Identification of part-time courses and executive programmes for taking up eGovernance capacity building exercises	• Liaison with the Universities on possible courses for eGov change managers • Deputation of personnel for the courses • Timely review of the courses including the need to incorporate change into the courses	• Capacity Building of eGovernance Officials on a periodical basis and identification of new requirements • In-house competencies • Career-oriented civil service • Better awareness and uptake of eGovernment among officials
A2P16	Exploring possibilities of Open Source deployment	• Decision on Scope of deployment • Identification of department/unit of governance • Preparation of a ToR and RFP • Invitation and Award of Bids • Commissioning the work • Analysis and Specifications for Deployment • Preparation and Submission of Master Plan for Open Source • Development of applications • Pilot Trials and Complete Rollout • Lessons Learnt and Future recommendations • Open Source Policy	• Master plan for Open Source deployment • Pilot trails for open source • Cost savings for the Government • Enhanced interoperability among systems if fully deployed • Recommendations for an Open Source Policy
A2P17	Security Audit	• Definition of Audit Requirements • Agreement on the same • Conducting the Audit • Submission of the Security Audit Report	• Fully audited Security procedures • Better awareness for future requirements
A2P18	Enhancement of GINS Infrastructure	• Definition of Enhancement Parameters • Agreement on the same • Recommendations for Enhancement • Implementation of Enhancement	• Enhanced GINS Infrastructure • Better Reliability • Better eServices leading to higher levels of citizen convenience • Better knowledge sharing and higher internal efficiencies
A2P19	Electronic filing system for the judiciary	• Preparation of a Terms of Reference for Consultants • Study of the processes and the workflows • Roles associated with various components of the processes • Identification of appropriate Solutions	• Fully Operationalised eFiling System • Better filing, storage and retrieval of documents • Faster and informed decision-making • Efficient workflows

Project Code	PROJECTS	ACTIVITIES	OUTPUTS
		• Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Pilot Trials and Complete Rollout	
A2P20	A Web-Based System for the LGSC with support for online applications	• Preparation of a Terms of Reference for Consultants • Study of the processes and the workflows • Roles associated with various components of the processes • Identification of appropriate Solutions • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Pilot Trials and Complete Rollout	• Fully Operationalised Web-Based System • Better storage and retrieval of documents • Faster and informed decision-making • Efficient workflows • Better awareness of local governance information
A2P21	Redesign of computerised system at National Transport Authority (NTA)	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Study of the processes and the workflows • Roles associated with various components of the processes • Identification of appropriate Solutions	• Fully Operationalised System at the NTA • Better storage and retrieval of documents • Faster and informed decision-making • Efficient workflows
A2P22	e-Business plan for the Traffic Branch & implementation of recommendations	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Final Submission of the eBusiness Plan • Implementing recommendations of the eBusiness Plan	• Fully Operationalised system for the Traffic branch • Better storage and retrieval of documents • Faster and informed decision-making • Efficient workflows • Re-engineered processes
A2P23	Review and Modernise Work Permit System	• Preparation of a Terms of Reference for Consultants • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Final Submission of Review and Recommendations • Implementing	• Fully Operationalised system for the Work Permit System • Better storage and retrieval of documents • Faster and informed decision-making • Efficient workflows • Re-engineered processes

Project Code	PROJECTS	ACTIVITIES	OUTPUTS
		recommendations	
A2P24	Implementation of a new prison management system at Prisons Department	• Preparation of a Terms of Reference for Consultants • Study of the processes and the workflows • Roles associated with various components of the processes • Identification of appropriate Solutions • Drafting an RFP • Invitation of Bids and Selection of Consultants • Commissioning the work • Pilot Trials and Complete Rollout	• Fully Operationalised system for the Prisons Department • Better storage and retrieval of documents • Faster and informed decision-making • Efficient workflows • Re-engineered processes
A2P25	e-payment Gateway	• Discussion on features required in the ePayment Gateway • Agreement of the same • Drafting the Functional Requirement Specifications • Selection of COTS application • Establishment of inter-linkage requirements (with Credit Card service providers and the like) • Implementation of the ePayment solution • Pilot trials and rollout	• Implementation and a fully functional ePayment system for Mauritius • Service Level Agreements • Rolling out and use of the system as a shared resource
A2P26	Setting up a Disaster Recovery Centre (DRC) for the Government Online Centre	• Carry out a study to come up with a business continuity plan DR policy • Identify requirements for setting up of the disaster recovery centre. • Agree on Operating Procedures	• Detailed Project Report for the DRC • Fully Defined Requirements for the DRC • Business Continuity Plan for the GOC vis-à-vis the DRC • Manual of Operating Procedures

Programme Governance Framework

A National eGovernance Taskforce constituted by the MITT, NCB, EGC, alongwith representatives from departments, ICT industry representative operational in the domestic sector, and representatives of civil society groups. MITT will chair the taskforce.

Project Priority and Ownership

Table 35 A2- Project Priorities

Project Code	PROJECTS	Owner[75]	High	Medium	Low
A2P1	Electronic Identification Systems for Citizens	MISS	✔		

[75] MISS: Ministry of Social Security, MoFED: Ministry of Finance and Economic Development, PMO: Prime Minister's Office, MPF: Mauritius Police Force, MoAC: Ministry of Arts and Culture

A2P2	Mauritius Police Force - Crime Occurrence Tracking System	MPF	✔		
A2P3	M/Arts & Culture- Computerisation of National Archives	MoAC	✔		
A2P4	National Assembly - e-Parliament	PMO	✔		
A2P5	Setting up of a VoIP Call Centre for Government Services	MITT			✔
A2P6	Awards and incentives to adopt eGovernance and generally reform governance	MITT		✔	
A2P7	Ministry of Information Tech. & Tel. - e-Document Management System	MITT	✔		
A2P8	Cost Sharing Alternatives in eGovernance	MITT		✔	
A2P9	Planning and Design on the Feasibility of PPP in eGovernment	MITT			✔
A2P10	Streamlined Procurement Systems for eGovernance	MOFED		✔	
A2P11	Implementation of a Project Management Solution	MITT	✔		
A2P12	Mauritius Police Force - GPS in all Govt.Vehicles and Implementation	MPF and respective user departments	✔		
A2P13	Cabinet Office e-Cabinet	PMO	✔		
A2P14	Comprehensive Feasibility exercise to explore the possibilities of shared services	MITT		✔	
A2P15	Identification of part-time courses and executive programmes for taking up eGovernance capacity building exercises	MITT		✔	
A2P16	Exploring possibilities of Open Source Deployment	MITT		✔	
A2P17	Security Audit	MITT	✔		
A2P18	Enhancement of GINS Infrastructure	MITT	✔		
A2P19	Electronic filing system for the judiciary	Judiciary	✔		
A2P20	A Web-Based System for the LGSC with support for online applications	Local Government Service Commission		✔	
A2P21	Redesign of computerised system at National Transport Authority (NTA)	NTA	✔		
A2P22	e-Business plan for the Traffic Branch & implementation of recommendations	Prime Minister's Office, Police Dept		✔	
A2P23	Review and Modernise Work Permit System	Ministry of Labour (Employment Division)		✔	

A2P24	Implementation of a new prison management system at Prisons Department	Prime Minister's Office, Prisons Dept		✔	
A2P25	e-payment Gateway	MITT		✔	
A2P26	Setting up a Disaster Recovery Centre (DRC) for the Government Online Centre	MITT	✔		

Programme Monitoring Indicators and Milestones

Table 36 A2-Project Milestones and Indicators

Project Code	Parameter	Indicator(s)/Milestone(s)
A2P1	Design of the EID System	• Terms of Reference and Request for Proposal document prepared for the EID consultancy exercise • Inclusion of technology, features, authentication systems, interoperability, costing and cost-sharing possibilities • Detailed Project Report and an Implementation RFP is prepared • Publicity of EID system in Mauritius is undertaken
	Implementation and distribution of EIDs	• Cost-sharing arrangements, if any, that are successfully worked out • Uptake of EID cards by citizens • Number of services and systems outside the government fold that accept EID as an authenticated input • Number of services that could be accessed using the EID • Number of private Organisations using the Smart card as inputs
A2P2	Development of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data
	Implementation and Roll-out of the system	• Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Ease with which offences could be tracked, criminal history could be available, status of trial could be obtained etc • Reduction in crime owing to more efficiency on account of systems implementation
A2P3	Development of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data

Project Code	Parameter	Indicator(s)/Milestone(s)
	Implementation and Roll-out of the system	• Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Extent of preservation and easy retrieval of the files digitally archived • Extent of savings generated by the exercise
A2P4	Development of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data
	Implementation and Roll-out of the system	• Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Extent of preservation and easy retrieval of the parliamentary proceedings • Extent of savings generated by the exercise
A2P5	Design of the System	• Detailed Project Report is prepared containing number of services, toll-free numbers, extent of combination of interactive voice response systems and manual response systems, identification and implementation of solutions, Service Level Agreements, and identification of CC executives and setting up the infrastructure for the Call Centre • Costs required to operate the centre is also prepared • Operations Manual is prepared
	Implementation and Roll-out of the system	• Call Centre is fully operational after successful conduct of trials • Extent of adherence of the implementation to the timeplan chalked out earlier • Number of services considered • Failed Service Level Agreements if any • Call centre executives are recruited/re-deployed
A2P6	Awards for eGovernance conceptualised	• Number of categories and number of wards considered • Objective criteria drawn out and documented • Extent of buy-in to the criteria from officials
	Awards made	• Number of awards given every year • Unawarded category in any area for lack of achievement

Project Code	Parameter	Indicator(s)/Milestone(s)
A2P7	Development of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data • Extent of process flows captured, extent of process re-engineering done
	Implementation and Roll-out of the system	• Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P8	Conception of cost reduction and implementation	• Number of alternative sources considered • Number of sources found viable • Number of alternative cost sharing arrangements successfully rolled out • Extent of cost savings generated
A2P9	Design and implementation of PPP for eGovernment	• Number of services considered • Number of alternative models considered • Number of services and applicable models rolled out • Preparation of he Standard Bidding Documents and Standard Contract is completed timely • Extent of risk and responsibility sharing done • Extent of cost savings generated • Satisfaction levels of customers from the services rolled out through PPP
A2P10	Design of the System	• Criteria of evaluation is standardised using considerations of quality and cost • Standardised RFPs are prepared • Clear rules are drawn out for national / international bidding • Terms of Reference and Request for Proposal document prepared for the eProcurement exercise • Preparation of the Design and system populated with data • Extent of process flows captured, extent of process re-engineering done
	Implementation and Roll-out of the system	• Pilot trials are conducted • Extent of adherence to rollout plan proposed during design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P11	Development of the System	• PMS identified, customisation requirements agreed • Requirements are documented
	Implementation and Roll-out of the system	• Project data is populated into the system • Streamlined project management generated by the system • Extent of readiness of information availability • Number of people enabled to use he system • Number of people actually using the system

Project Code	Parameter	Indicator(s)/Milestone(s)
A2P12	Implementation of GPS in all Government Vehicles	• Terms of Reference and Request for Proposal document prepared for the development exercise • Pilot trials are conducted • Number of Vehicles covered under the system • Extent of easy location-based services generated • Number of people trained and actually using the system • Extent of savings generated by the exercise
A2P13	Development of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data • Extent of process flows captured, extent of process re-engineering done
	Implementation and Roll-out of the system	• Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P14	Shared Services Consulting	• Terms of Reference and the RFP is prepared • Bids are invited and tender is awarded • Number of departments participating in the exercise • Timeliness in initiating and completing the exercise
	Implementation	• Number of fully joined-up services provided • Extent of front-office and back-office integration achieved • Number of departments partaking of shared services • Extent of cost savings generated
A2P15	Identification of part-time courses and executive programmes for taking up eGovernance capacity building exercises	• Number of part-time courses rolled out • Number of public servants trained on the courses rolled out • Periodicity of the courses at the Universities • Number of people building competencies in eGovernance areas and hence can be future sources of competency and training for other public servants
A2P16	Design of Open Source Requirement	• Decision on parity to open source is taken and documented • Extent of adherence to this decision • Pilot for open source is chosen • Open source platforms are identified • Complete Bidding process for the open source pilot is undertaken
	Implementation and Lessons Learnt	• No of departments in which open source successfully deployed • No of interoperability issues reported for open source • Number of people trained in using open source solutions • Cost savings generated through open source • Detailed Project Report on Open Source adoption prepared
A2P17	Completion of the Audit	• Audit Requirements timely and completely defined • Agreement timely achieved • Audit recommendations are complied with

Project Code	Parameter	Indicator(s)/Milestone(s)
A2P18	Enhancement of the GINS	• Enhancement Parameters timely and completely defined • Agreement timely achieved • Recommendations for enhancement complied with • Timely implementation of enhancement
A2P19	Development and implementation of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data • Extent of process flows captured, extent of process re-engineering done • Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P20	Development and implementation of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data • Extent of process flows captured, extent of process re-engineering done • Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P21	Development and implementation of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data • Extent of process flows captured, extent of process re-engineering done • Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P22	Development and implementation of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data • Extent of process flows captured, extent of process re-engineering done • Pilot trials are conducted

Project Code	Parameter	Indicator(s)/Milestone(s)
		• Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P23	Development and implementation of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data • Extent of process flows captured, extent of process re-engineering done • Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P24	Development and implementation of the System	• Terms of Reference and Request for Proposal document prepared for the development exercise • Preparation of the Software Requirement Specifications, Software Design Document and the system itself populated with data • Extent of process flows captured, extent of process re-engineering done • Pilot trials are conducted • Extent of adherence to the rollout plan proposed during the design • Extent of paperlessness generated by the system • Reduction in process turnaround time • Extent of savings generated by the exercise
A2P25	Implementation of the ePayment System	• Comprehensiveness of features required in the ePayment Gateway • Agreement timely achieved • Functional Requirement Specifications timely drafted • Selection of COTS application timely completed • Number of Quality of SLAs • No of services using the ePayment system
A2P26	Setting up a Disaster Recovery Centre (DRC) for the Government Online Centre	• DPR timely accomplished • Requirements and procedures are fully defined • Business Continuity Plan timely established • Performance at the trials

7.12 PROGRAMME A3: ENHANCING CONNECTIVITY AND CONTENT FOR COMMUNITY EMPOWERMENT

Programme Context and Overview

Although interventions aplenty have been taken up towards building up an Information Society through facilitating an increased uptake of ICT in society, they have largely been top-down in their orientation and geared to provide PCs rather than an wholesome access for opportunity that communities would see value in. Consequently the "real" ICT penetration has remained low despite certain other indicators like PC penetration showing better values. Lack of appropriate local content, sub-optimal levels of community involvement and the requirement of widespread affordable access are some of the reasons identified.

The overall impact of the programme, then, is to enhance the real ICT penetration rates in society through embarking on multi-pronged interventions along the above lines. A direct fallout of these interventions would be an upward movement of the nation's standing in global benchmarking exercises, like the Digital Opportunity Index (DOI) and the Network Readiness Index (NRI).

The following constitute the main recommendations addressed through this programme.

Infrastructure and Access

For Real ICT penetration to be achieved, the strategy for provision of ICT infrastructure and access should be a mix of "Universal Service" and "Universal Access". Measures that need to be taken include those that accelerate the uptake of ICT in society, provide communal access points where a complete individual or household access seems unlikely at least in the near term.

Recommendations towards facilitating universal access include

- Undertaking a comprehensive planning and design exercise to make
  - suggestions for enhancements in existing PIAP[76]s from Mauritius Posts Ltd. (MPL) to make them more multi-purpose.
  - suggestions for desired number and precise locations of new PIAPs, both manned and unmanned, so as to spread out the PIAPs as uniformly as possible among communities' vantage points of access.
  - suggestions on the mix of government-owned and privately-owned PIAPs.
  - suggestions for suitable operational models for both sets of PIAPs (government-owned and otherwise).
  - suggestions for regulatory measures to prevent any misuse to operationalise the PIAPs.
  - suggestions for multi-purpose features of the PIAPs to make PIAPs self-sustainable in the long run and to increase the number of footfalls.
- Thematic PIAPs could be explored for example, those run by SEHDA[77] (for an SME focus) or by NWEC (for women focus), youth clubs (for youth focus), British Council, IT Clubs etc.
- Suggestions for community-based management structures for PIAPs.
- Suggestions for the use of cost-effective technology rather than the most advanced.

Universal Service Provision

- Suggestions for working out a tripartite arrangement between DBM[78], GoM and the Private sector OEM, and working out strata-base detail in the packages evolved for both households and primary schools.

Local Content

- Local content development needs to be vigorously encouraged; this could be triggered through enhancement of the Mauritius Development Gateway portal prototype by giving it over to students at the UoM or the UTM who would then enhance it to make a full-fledged community portal.

Launching the Universal Service Fund (USF)

A planning exercise for sourcing and deployment needs to be taken up to determine,

[76] Public Internet Access Points, variously referred to as CyberCafe, Community Telecentre, Community Information Centre etc
[77] SEHDA: Small Enterprises Handicrafts Development Authority, NWEC: National Women Empowerment Council
[78] Development Bank of Mauritius

- Contributions from the government budgetary support, arrangement fro the development banks through seed finance, and other sources.
- The administration of the USF has to be simple, fast and centrally, though independently regulated to facilitate streamlined allocation, it is recommended that revenue contribution from the operators, in line with the global trend between 1 and 2% be adopted for building up the fund.
- To kick-start the whole process, it is recommended that budgetary grant or the option of seed finance also be explored.
- Indicative areas of deployment suggested for the UAF are
  - Provision of PC loan schemes to enhance residential PC penetration rates.
  - Provision of PC loan schemes to enhance PC penetration rates in primary schools.
  - Provision of connectivity to homes and primary schools through wireless broadband in areas hitherto untapped.
  - Provision of equipment, connectivity and content through Public Internet Access Points (Universal Access feature).

Some other recommendations include

- Details need to be worked out as to how to enhance the utility of IC3 certifications by linking it to any ICT learning that is required to be done beyond the basic skills acquired through IC3.
- Enhanced to be included include setting up employment portals that would matchmaking between job seekers and potential employers, undertaking ICT-enabled re-skilling programmes, thematic forums or a sub-portal on the community portal on women, senior citizens, health workers, SMEs, teachers, students, disabled and the like.
- Launching of advocacy networks through NGOs and the media to convince the population (at least their target communities) of the use of ICT in significant numbers, eCampaigning networks.

Programme Strategic Objectives

- to bring about an increased uptake of ICT in society through a judicious mix of universal service and universal access including respectively, easy financing options for PC purchase with free Internet access to homes and schools and a nation-wide chain of publicly and privately held Public Internet Access Points (PIAPs).
- to enable PIAPs serve as a common vehicle for providing affordable Internet access and ICT learning to communities and generally serve as nuclei of ICT-enabled productive activity at the community level.
- to promote ICT-enabled advisory, advocacy and other participative knowledge-sharing networks to raise informational awareness among communities and bring about citizen empowerment.
- to undertake appropriate ICT deployment to ensure that communities isolated by geographical, economical, technological or any other handicap are inducted into the mainstream of socio-economic activity.
- to take up appropriate capacity building measures to ensure that communities are increasingly encouraged to take to ICT as the preferred medium to obtain information and services and to generally use it as a key enabler of their socio-economic betterment.
- to offer the unemployed, under-employed or otherwise vulnerable sections of society a set of formalised educational interventions that will increase their employability.
- to generate awareness among communities of the usefulness of ICT as a tool and a platform to produce and share local content for the individual and collective good of the society.
- to gainfully use ICT to bring together communities that would facilitate the extension of social services and engender safety nets for the benefit of those of them who get marginalised in the process of development.
- promote accelerated deployment of broadband across the country to decentralise the ICT and ICT-enabled services industry.

- to facilitate greater access to resources, including income-generating avenues, as well as networking options, to citizens in general and, in particular, those rendered unproductive by other shrinking sectors like sugar, textiles etc.
- to promote improved ability of associations of young people, the handicapped, the marginalised and other vulnerable groups to take advantage of information and knowledge resources for their own purposes, including development and empowerment.

Projects and Outcomes

Table 37 A3-Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
A3P1	Setting up, operationalising a network of Public Internet Access Points (PIAPs)	• Comprehensive Planning and Design Exercise to setup and operationalise the chain of Public Internet Access Points (PIAPs) ○ Enhancements desired over the existing MPL PIAPs ○ Number and Locations of the PIAPs in Mauritius (three types of PIAPs- those owned and operated by MPL, those owned by GoM but managed by local communities, and those that are owned and operated by private entities but as a public resource) ○ Operational Models for the last two type, including (a) arrangements with other facility owners for multi-purpose features (for example banks for ATMs), (b) whether manned or unmanned, (c) people to man the PIAPs, (d) monetary requirements in the beginning but self-sustainable over period of 3-5 years, (e) identified local community for management of the PIAPs, (f) set of equipments required and services to be provided, and (g) specifications for the best PIAP award ○ Guidelines for operating PIAPs, applicable to all three types of PIAPs as above • Setting up and Operationalising the PIAPs	○ Detailed Project Report on the setting up and operationalising PIAPs ○ Numbers and Locations for the different types of PIAPs ○ Operational Models for each ○ Local management structures and guidelines ○ Fully Connected Island ○ Enhanced ICT Uptake levels ○ Enhanced ICT Penetration rates ○ Enhanced Broadband Penetration rates ○ Citizen Convenience ○ Better community-level collaboration and decision-making ○ Will lead to a higher raking of Mauritius in terms of international indices like DOI, NRI[79] etc
A3P2	"Community Empowerment Programme"	○ Enhance Mauritius Development Gateway Portal Proof of Concept (PoC) into a full-fledged portal through a student project ○ Handing over of the PoC to the academia for a project ○ Enhancement of the PoC into a full-fledged portal ○ Lay out the maintenance structure for the portal, hosting etc and maintenance of data on the portal	○ Enhanced Community Empowerment Portal ○ Hosting of Portal at GoC ○ Maintenance of the portal by the University of Technology, Mauritius ○ Enhanced ICT and Internet penetration rates ○ Enhanced broadband penetration rates

[79] The Digital Opportunity Index (DOI) and the Network Readiness Index (NRI) are two indices that are regularly computed for different countries in an effort, inter alia, to compare the relative standing of different countries among each other and are initiatives respectively of the International Telecommunications Union (ITU) and the World Economic Forum (WEF). They are one of the key guidelines agreed upon at the World Summit for Information Society at both the Geneva and Tunis summits.

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
		○ Involve a sample representative of communities to decide on the enhancements required ○ Awareness exercise for the portal	○ Better collaboration and community networking ○ Enhanced availability of information and opportunity for socio-economic betterment ○ Will lead to a higher raking of Mauritius in terms of international indices like DOI, NRI etc
A3P3	Increase Household PC and Broadband Internet Penetration	○ Discussions between GoM, banks and/or other financiers and OEMs ○ Decision on bulk rates between GoM, DBM and the OEM ○ Decision on the modality with which the PCs would be provided including different strata of target recipients and their specific packages ○ Decision of production of authentic certificates or other testimonials required as a proof of low-income ○ Decision of the pricing of the PC, bundled facility, Internet Connectivity charges ○ Necessary arrangement between GoM and MT/Other ISP[80]son the bundled connectivity provision ○ Phased distribution of the PCs ○ Public awareness exercise	○ Structured packages and guidelines for PCs to be offered ○ Raised Household PC penetration ○ Increased percentage of Monthly income for Internet usage ○ Increased number of Households online ○ Will lead to a higher raking of Mauritius in terms of international indices like DOI, NRI etc
A3P4	Digital Literacy Project	○ Conception of another advanced computer training course that ends in certification ○ Industry recognition of the IC3 certificate ○ Promote Computer Clubs ○ Identify new target groups ○ Promote IC3 as industry pre-requisite for employment ○ Work out modalities to share schools' IT infrastructure after school hours	○ Another follow-up course is identified ○ Industry recognises IC3 certificates as proof of basic computational ability ○ Higher IT Literacy rates among the population ○ Better employability for Mauritians
A3P5	Awards for Local Content and Community Internet Penetration	○ Work out criteria for awards (one for Local Content, and the other for the most effective PIAP) ○ Recommend awards to GoM ○ Operationalise the initiative	○ Local Content award to individuals ○ Best Run PIAP award to community managed PIAPs ○ Higher motivation level to run PIAPs more effectively ○ Higher motivation levels to go on the Internet ○ Greater possibility of Internetworking ○ More footfalls in the PIAPs

[80] MT: Mauritius Telecom, ISP: Internet Service Provider

Programme Governance Framework

A National Information Society Taskforce constituted by representatives from MITT, NCB, ICTA, MT, UNDP, SEHDA, MACOSS, MoEHR, MoYS[81], and MPL would supervise the implementation of the programme. The taskforce will be monitoring the progress and also act as a Steering Committee if any of the projects is an external consultancy. NCB would chair the taskforce.

Project Priority

Table 38 A3-Projects, Ownership and Priorities

Project Code	PROJECTS	Owner	HIGH	MEDIUM	LOW
A3P1	Setting up and operationalising a network of Public Internet Access Points (PIAPs)	NCB	✔		
A3P2	"Community Empowerment Programme"	NCB	✔		
A3P3	Increase Household PC and Broadband Internet Penetration	MITT	✔		
A3P4	Digital Literacy Project	NCB	✔		
A3P5	Awards for Local Content and Community Internet Penetration	MITT		✔	

Programme Monitoring Indicators/ Milestone(s)

Table 39 A3-Project Milestones and Indicators

No	Parameter	Indicator(s)/Milestone(s)
A3P1	Designing the PIAPs	• Completion of the planning and design exercise • Suggestions on making it multi-purpose in place • Suggestions on the business model in place • Suggestions on the agreements with other service providers in place • Detailed costing recommendations are in place • Split between the manned and unmanned portal are in place
	Operationalising the PIAPs	• Number of MPL PIAPs successfully operationalised (multi-purpose)[82] • Number of GoM PIAPs successfully operationalised (multi-purpose) • Number of private PIAPs successfully operationalised (multi-purpose) • Number of unmanned PIAPs • Manning of the PIAPs • Extent of visibility of the PIAPs • Number of visitors to the PIAPs • Number of visitors to the PIAPs who access the Internet • Number of PIAPs becoming self-sustainable • Number of capacity building sessions Organised at the PIAPs • Age dispersion of visitors to the PIAPs • Number of awards given to the PIAPs • Number of traffic landmarks are deployed to indicate the location of the PIAPs • Increase in internet Penetration rates • Increase in Broadband penetration rates

[81] Ministry of Youth and Sports

[82] Over a period of five years, a total of 150 PIAPs are envisaged to be operationalised; of the 150, 90 are assumed of MPL, NWEC, SEHDA, EM and others, and the remaining 60 to are to be operationalised by MITT. Broadband penetration will be increased by 150,000 through the PIAPs over a period of five years (2007-2011).

No	Parameter	Indicator(s)/Milestone(s)
A3P2	Generation of Local content	• Identification of the target community portal • Definition of the specifications of the portal • Completion of the Development Gateway portal • Number of hits on the Development Gateway Portal • Number of new users registered on the portal • Growth in the number of locally generated web pages on the portal • Number of new portals/sub-portals spawned[83] • Number of advocacy campaigns raised through the portal • Stakeholder groups participating in the portal • Number of Internet Forums active • Number of local content awards given away
A3P3	Increase Household PC and Broadband Internet Penetration	• Rates negotiated with the OEM and financier (DBM) • Number of PCs given through subsidised loans[84] • Target low income groups identified • Number of PCs to low-income categories (subsidised loans plus a subsidy from the government)
A3P4	Digital Literacy Project	• Follow up courses drawn up • Number of people acquiring IC3 certificates • Number of people opting for the follow-up courses • Industry certifications are obtained • Extent of usefulness of the industry certificates • Number of people for whom these certificates made a difference in their getting employed
A3P5	Generation of Local content	• Criteria for award is finalised • Extent to which the award has generated interest among communities to adopt the Internet • Extent of awareness generated for award and extent of publicity and coverage to the awarded individuals • Extent of recognition by the private sector to individuals who get this award • Years in which award was missed
	Effectiveness of PIAPs	• Criteria for award is finalised • Extent to which the award has generated interest among communities who run the PIAPs • Extent of awareness generated for award and extent of publicity and coverage to the awarded individuals • Number of new PIAPs coming up outside the government ownership structure • Number of PIAPs "breaking even" • Extent to which footfalls in PIAPs go up • Years in which award was missed

[83] For a target the number of Internet hosts under ".mu" will be tripled.
[84] A total of 20,000 PCs with bundled Internet connectivity to be given over a period of five years, further adding to the Broadband penetration.

7.13 PROGRAMME L1: COLLABORATIVE PLANNING FOR MANPOWER DEVELOPMENT IN IT AND ITES/BPO SECTOR

Programme Context and Overview

As discussed under the programme "S4", focussed interventions at the tertiary levels are required to influence education in ICT for better alignment between academic outputs and industry requirements. The following recommendations[85] are advanced.

Biennial Collaborative Plans between the Academia and the Industry

On a biennial (two-year) basis, collaborative plans need to be drawn out between the academia, industry and the government, as part of which, the following must be taken up.

- Collaboration on Course Curriculum to evaluate the extent to which the course content, structure and delivery are able to meet the ICT industry requirements on 2-year horizon basis. Discussions would include, though not be limited to, the following issues.
  - Forecast manpower requirements of the participating industries,
  - Expected technology profile of new entrants into the industry,
  - Curriculum changes industry thinks is appropriate,
  - Expectations of the industry by the academia,
  - Human Resources issues like poaching etc,
  - Research requirements by the industry to be conducted in the Universities,
  - Executive Development Programmes to be rolled out by the universities over the next 2 years,
  - Industry internship requirements over the next 2 years,
  - BPO training requirements over the next 2 years,
  - Quality issues and Communication skills,
  - Work Culture Issues,
  - Training in Languages, including English accent neutralisation, and
  - MoUs required with other countries to bridge gaps in manpower supply
- On an annual basis, ICT Industry-Academia conference must be hosted that would publicise successes achieved over the last two years and the next activities to be taken up. Invitations for the event would be sent to ICT firms outside Mauritius too.
- Encouraging research through an annual system of awards.

Meeting the Immediate Shortfall

On an immediate basis, to meet any shortfall in ICT manpower supply from other countries of the region[86], the following approaches are recommended.

- In both the universities in Mauritius and other institutes of excellence in disciplines related to ICT, the GoM must invite candidates from other countries of the region who would undergo education in ICT and other relevant streams mentioned at these institutes followed by employment in either their home countries or in Mauritius itself. Though employment in Mauritius needs to be a voluntary choice of the candidates, a burgeoning ICT industry will encourage students to opt for employment in Mauritius, both for higher remuneration and for skill advancement. The cooperating countries' governments too could encourage this by offering scholarships to the students venturing out.
- ICT firms in Mauritius could actually go on recruitment missions in reputed institutes in other countries of the region not just to make up for the deficit in supply of manpower but also to recruit highly skilled resources from institutes of excellence in those countries or alternatively set up shop in other countries of the region and tap resources returning to their home countries after education in Mauritius.
- The third recourse is for extensive awareness campaigns to encourage students to take to education in general in larger numbers and to ICT education in particular. Again, this situation

[85] Through the clutch of interventions in this programme, it is targeted to employ about 29,000 people employed in ICT sector, including at least 16000 Mauritian nationals, leading to a contribution of about 7% into GDP from export services through offshoring. At least 90% ICT graduates absorbed are targeted to be absorbed in the ICT industry. Also, targeted is a 100% increase in enrolment for ICT courses at the tertiary levels.

[86] However, in welcoming foreign talent a balance needs to be attained between economic benefits and socio-cultural fallouts arising out of any demographic shifts.

would arise when the Mauritius ICT industry is doing well and demonstrative effects of the same would be available in both the economy at large and in the society. However, such extensive campaigns must be started in a prioritised way and be timed with the success of the ICT sector.

Collaboration in Research

A sustained collaboration is recommended towards directing research into areas that are of immediate use to the industry. For the institutes too this is another source through which they can generate their own revenues and, to that extent, to relieve the government of funding responsibility. Collaborative persuasion of research activities by the industry and academia together synergises conceptualising skills of academicians and knowledge of practical requirements of those in the industry. As has been mentioned above this is recommended to be taken up under the Biennial Collaboration exercises too.

Towards furthering research and development efforts need to be undertaken towards supporting ICT industry to increase its research activities through tax incentives, infrastructure support and partnership programs, establishing an energetic private sector R&D environment.

Attracting non-resident Mauritian

- Formulating preferential policies for returnees: however, this can increase the numbers going abroad, since preferred benefits are available only to returnees.
- Improving services for returned students including
    - Job facilitation centres for returned students
    - Preferential logistical arrangements to returnees (for example housing etc)
    - Permitting students who were on short-term assignments to either remain or switch jobs once their agreements expired
- Encourage people who remained overseas to return to Mauritius for short visits for lecturing or research collaboration. Some scholars may take such trips to see if conditions in Mauritius warranted returning.
- Increase investment in higher education and encouraged universities to use those funds to attract overseas talent.
- Established offices/ chambers in embassies and consulates
- Preferential incubation facilities for those wishing to set up businesses in the ICT sector
- According weight age to education in some selected universities abroad for induction into some faculty positions

Partnerships with ICT Multinationals

Government of Mauritius can also initiate the teachers training in partnership with private sectors like Microsoft (Partners in learning Grants Program) and Cisco system (Network Academy). Under partners in learning, Microsoft is working closely with governments, ministries of education and other key stakeholders to offer a spectrum of education resources including tools, programs and practices. On Similar lines, Cisco Networking academy program is a public private partnership between Cisco systems, education, business, government and community Organisations around the world aimed at nurturing IT professionals. The education program employs an eLearning model, using a combination of web based and instructor- led training along with a hands on lab environment to teach students how to design, build and maintain computer networks.

An ICT Industry Association

Given the size of ICT industry, increasing requirement of facilitation from and interfacing with the government, the need to network with organisations globally, it is desirable that the ICT industry be represented by a single body, that would not just advocate the cause of the ICT industry in Mauritius, but would also bring about higher levels of coordination among the industry players for their collective benefit.

Such an association would undertake industry surveys & studies to develop strategies for offshore-centric operations. They would act as a nodal agency in promoting the excellence frameworks in various ICT services and conduct annual benchmarking exercises for various service lines.

The association would be maintaining an information database of ICT related activities for use of both the local ICT companies as well as interested companies overseas and disseminate various policies, market information and other relevant statistics to all the members and keeping them informed with latest trends in the industry worldwide.

The scope of activities of the body must address the diverse issues facing the industry including, to start with

- Arriving at industry codes of governance related to matters like data protection and piracy, intellectual property, productively building up and deploying ICT skill sets, anti-poaching practices etc.
- Collectively taking up industry-academia collaboration exercises aiming at transforming skill sets in the universities and other academic institutions into employable resources.
- Arriving at a common understanding among all the players in the ICT industry to be recognised as the representative face of the industry in all matters including, (a) interfacing with the government on issues related to policy interventions, (b) collaborating with the academia on different aspects, (c) spreading awareness of ICT industry activities and encouraging ICT adoption among businesses, (d) interfacing with other sectors of socio-economic activity to build awareness and promote adoption in those sectors, (e) representing ICT industry at various forums within and outside Mauritius, (f) representing ICT industry in Mauritius and interfacing with bodies at the regional and global level, including, but not limited to WSIS, COMESA, SADC, WITSA and the like, (g) maintaining a database of companies and their key offerings, (h) representing Mauritius ICT industry in all country promotion activities towards building the Mauritius brand in ICT, and (i) any other matters identified.
- Organising events to enhance relationships amongst its members, organising conferences, seminars, workshops and exhibitions on specific ICT-related topics at the national level to build awareness and promote ICT adoption.
- Conducting and facilitating uptake of research in fields related to ICT by academia, firms and other bodies; following this up with linkages between upstream academic research and downstream industrial activity.
- Promoting trust and confidence in eBusiness across sectors.
- Instituting awards of excellence on various fields related to ICT.
- Continuously engaging with member companies to streamline and promote activities of the sector.
- Facilitating quality certifications like CMM level certificates for the IT industry.

<u>The Need for Career Counselling Expertise</u>

Unproductive job-hopping dictated by narrow considerations of remuneration, the urge to acquire new skills, increased stress levels that are a part of modern-day employment, disruption of the biological rhythm owing to working at odd hours in the BPO industry and the need inculcate better work culture and practices that must be the ethos of the modern-day workforce are some of the factors that accentuate the need for effective career counselling networks. With a growing ICT industry, career counselling is one of the areas where Mauritius stands a good chance to assume a regional leadership role.

<u>Collaborative Counselling Networks</u>

- Establishment of collaborative counselling networks together by the academia and the industry, is recommended to be built up by resources specialising in human resources or be something which is taken up on a voluntary basis by the industry or the academia.
- Regular career guidance needs to be held and options to deploy eTutoring should also be considered.
- Ways and means need to be explored to bring about, (a) unification of manpower databases so that the maximum data on ICT resources is retained in the system (b) since the LMIS caters to all sectors, options need to be explored to treat ICT separately, (c) the private sector, a key employer in the ICT sector, should have access to individual profiles available in the database, (d) career counselling networks need to come up which go beyond mere matchmaking requirements, to include career guidance etc.

Programme Strategic Objectives

- to jointly identify a set of focus technology areas and dovetail educational and training interventions in identified areas with industry requirements.
- to identify and implement a set of continuing educational and training interventions to foster the spirit of lifelong learning and bring about better productivity in individuals employed in the ICT sector.
- to recognise and reward innovative and research activities that are of practical relevance to the ICT industry.
- to jointly organise periodical events that bring together stakeholders in the ICT sector from both academia and industry to publicise collaborative successes aimed at attracting investors into the ICT industry and expanding student intake into the profession.
- to jointly identify and undertake research of practical relevance to the ICT industry in the tertiary educational institutions of Mauritius.
- to regularise a system of recruitment and internship arrangements into the ICT industry from the tertiary educational institutions imparting ICT learning.
- to develop advanced faculties and expertise in the area of ICT counselling that would serve not just Mauritius in good stead but also make for a regional leadership position for Mauritius in this area.
- to build facilities that would kickstart the process of generating BPO professionals for the industry.
- to develop a system of industry-academia collaboration that helps the two communities synchronise their efforts through guest lectures, industry visits, project assignments etc.

Projects and Outcomes

Table 40 L1- Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES

L1P1	Production of Biennial Collaboration Plans	• Constitution of the Industry-Academia Taskforce
		• Invitation to the industry and academia to participate with MITT as observer
		• Discussion on at least the following issues
		  ○ Forecast manpower requirements of the participating industries
		  ○ Expected technology profile of new entrants into the industry
		  ○ Curriculum changes industry thinks is appropriate
		  ○ Discussion of expectation from the industry by the academia
		  ○ HR issues
		  ○ Discussion on Research Projects' requirements by the industry to be conducted in the Universities
		  ○ Discussion on the expected EDP programmes to be rolled out by the universities over the next 2 years
		  ○ Discussions on the internship requirements over the next 2 years
		  ○ Discussions on the MoUs
		  ○ Discussions on the BPO training requirements over the next 2 years
			• Comprehensive Biennial ICT Collaboration Plan
			• Increased, continual and symbiotic collaboration between academia and industry
			• Increased synchronisation between academic outputs and industry requirements
			• Increased employability for ICT professionals
			• Enhanced uptake of industry-relevant research
			• More of intra-industry collaboration towards self-regulation
			• Higher intake into ICT tertiary courses

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
L1P2	Setting up and Operationalising a BPO training centre	• Designing the BPO Training Centre • Operationalising the BPO Training Centre • Arranging faculty for the BPO Training Centre	• Fully operational BPO Training Centre • Boost to the ITeS sector • Immediate gains in terms of readily available and employable manpower • Higher intake into the ITeS sector
L1P3	Scheme for providing BPO training for prospective employees	• Training to be imparted by appropriate training institutions • 75% financed by the HRDC (existing provision) • Remaining borne by the Industry • 100% recruitment of trainees	• BPO Training in batches at the BPO Training Centre • Increased supply to the BPO industry based on requirement • Availability of competencies in BPO training is enhanced
L1P4	Internship arrangements (summer projects)	• Implementing the recommendations of the Biennial Collaborative Plan	• Regular Internship arrangements • Higher employability of ICT professionals • Advanced paid and productive training to professionals • Reduced investment at the time of actual employment in terms of training
L1P5	Academia industry conferences	• Sending out invitations • Hosting the conference	• Annual Conferences between Academia and Industry • Remarkably enhanced awareness levels of successes in the ICT sector in Mauritius • Most powerful conference highlighting successes etc coming from the industry and academia itself • Awareness generated for other potential investors will encourage them to invest • Attendance to comprise academia, industry in Mauritius, industry outside Mauritius, potential investors, government and awareness generated of successes in the ICT sector will positively influence (a) intake of students (b) entry of more of the ICT industry into the collaboration arrangement, (c) encourage more investment, (d) inform

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
			Government on where actions must lie, (e) generate positive awareness in society of the ICT sector
L1P6	Research projects to be sponsored by industries and government	• Implementing recommendations of the Biennial Action Plan • Communication of Research areas for focus from the industry to the academia • Undertaking research at the academia	• Research Projects taken up in the Universities • More business areas, expansion of the business basket • Enhanced innovation in the ICT sector
L1P7	Award for three best research projects	• Criteria for award for research to be decided during the discussions • Awards for research projects every year from the government which gives the award money and adjudication jointly by industry, academia and government	• Awards for Best Research Projects • Increased motivation for research for students • Increased financial sustainability for the universities
L1P8	Executive Development Programmes to be run by the universities	• Decision on Batch size • Decision on experience and educational profile of prospective students • Decision on curriculum to be adopted for the EDP	• Annual Executive Development Programmes to be taken up in the Universities • Lifelong Learning internalised in the professionals • Would help them keep in touch with latest developments • Better preparedness among professionals towards meeting untoward challenges
L1P9	Partnership with ICT Multinationals	• Identification of areas of partnership • Preparing the approach paper • Discussions with MNCs • Drafting MoUs • Concluding agreement • Operationalising initiative	• MoUs between GoM/ Universities with MNCs • Enhanced expertise level in select areas
L1P10	Return of Non-resident Mauritians	• Comprehensive planning exercise to come out with recommendations on ○ Preferential policies for returnees ○ Services to be made available for returnees, including job facilitation, preferential logistical arrangements, among other things ○ Preferential treatment for non-resident Mauritians in Mauritius on short-term assignments ○ short visits for lecturing or research collaboration. ○ increase investment in higher education to attract overseas talent	• Plan of Action for encouraging return of non-resident Mauritians • Enhanced availability of expertise in Mauritius with international exposure • Enhanced investment into the ICT sector • Will bridge the gap between demand and supply to some extent

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
		○ Collaboration with established offices/ chambers in embassies and consulates ○ Preferential incubation facilities for those wishing to set up businesses in the ICT sector	
L1P11	Memorandum of Understanding with countries in the region	• Study of recommendations on MoU in L1P1 • Discuss terms of participation • Discuss win-win framework and prepare an approach paper • Initiate discussions with Governments in the region • Highlight successful ICT industry gains and assured employment • Highlight quality of education in ICT (employment trends etc) • Highlight capacity availability • Highlight VISA etc requirements • Discuss fee structure and sharing arrangements, if any • Discuss scholarship requirements with governments in the region • Discuss terms of participation with educational institutes of the region • Draft MoU	• Memorandum of Understanding with countries in the region on manpower to be potentially made available for the ICT sector • ICT sector growth • Regional hub emergence • Awareness spreading of Mauritius' ICT education quality
L1P12	ICT Career Counselling	• Develop a network of career counsellors • Sharing of Career Counselling expertise • Expansion of and Access to LMIS database, including ○ unification of manpower databases to have maximum data on ICT resources ○ options need to be explored to treat ICT separately, ○ access for the private sector to individual profiles available in database, ○ career counselling networks need to come up which go beyond mere matchmaking requirements, to include career guidance etc • Possibilities of eTutoring	• Career Counselling Networks • Expanded LMIS database and application with special focus on ICT • eTutoring platform • Well-planned career paths for professionals • Reduced attrition levels • Higher productivity and longevity

Programme Governance Framework

A National ICT Industry-Academia Taskforce would be constituted by member representatives from Human Resources Development Council (HRDC), Ministry of Education and Human Resources (MoEHR), Ministry of Information Technology and Telecommunications, Tertiary Education Commission, Academia, the ICT Association, and member representatives from the ICT industry both from the domestic and the exports sector. The Taskforce will be chaired by the MoEHR.

Project Priority and Ownership

Table 41 L1-Project Priorities

Project Code	PROJECTS	Owner	High	Medium	Low
L1P1	Production of Biennial Collaboration Plans	HRDC	✔		
L1P2	Setting up and Operationalising a BPO training centre	MoEHR	✔		
L1P3	Scheme for providing BPO training for prospective employees	HRDC		✔	
L1P4	Internship arrangements (summer projects)	MoEHR	✔		
L1P5	Academia industry conferences	ICT Assoc.	✔		
L1P6	Research projects to be sponsored by industries and government	MRC		✔	
L1P7	Award for three best research projects	MITT			✔
L1P8	Executive Development Programmes to be run by the universities	Universities	✔		
L1P9	Partnership with ICT Multinationals	MITT			✔
L1P10	Return of Non-resident Mauritians	MoEHR			✔
L1P11	Memorandum of Understanding with countries of the region	MITT		✔	
L1P12	ICT Career Counselling	MoLIRE	✔		

Programme Monitoring Indicators/ Milestone(s)

Table 42 L1- Project Milestones and Indicators

Project Code	Parameter	Indicator(s)
L1P1	Conducting the Collaboration exercise	• Biennial Action Plan is prepared and agreed upon • Number of ICT companies participating in the Biennial Planning exercise • Number of academic institutions participating in the exercise • Extent of coverage of the agenda • Participation in preparation of the agenda • Coverage of issues deliberated during the collaboration exercises • Extent of clarity in the action plan drawn out during the collaboration exercises
	Implementing the recommendations	• Extent of adherence to the Action Plan drawn out • Number of students educated/trained who are successfully employed • Number of students wishing to take up ICT as a career • Number of lecture sessions Organised at the universities by the industry
L1P2	Designing and operationalising the BPO training centre	• Design of the Centre is drawn out timely • Capacity planning is conducted as per discussions during the collaboration exercise • Infrastructure is installed, physical and technical • Operational and management staff is deployed • Centre is timely operationalised
L1P3	Rolling out the Scheme for BPO Operations	• Agreement is reached on operational issues of the BPO centre

Project Code	Parameter	Indicator(s)
		• Batch sizes are decided with the industry • Batches of BPO training is conducted in accordance with the plan • Batches trained are fully absorbed • Number of batches trained over a period of five years • Number of trained professionals
L1P4	Internship Arrangements	• Internship requirements are spelt out • Interns are sent to the industry • Number of successful internships • Number of internships converted to employment • Number of industries participating • Number of academic institutes participating
L1P5	Hosting Annual Conferences	• Invitations for the Annual conferences sent out • Extant of awareness generated for the conferences • Number of participating stakeholders • Number of domestic and foreign participants • Media Coverage of the event within and outside Mauritius • Participation and presentations showcasing achievements and potential from other players like Government bodies involved in ICT, BoI, eM, BPML
L1P6	Research Projects Undertaken	• Number of research projects underway • Extent of coverage of research projects in terms of emerging technologies • Number of industries participating • Number of academic institutes participating • Extent of usefulness of research projects to the industry • Number of Research Projects jointly sponsored by Government and the Industry every year • This scheme must not suffer disruption in any particular year. All industries must continue to sponsor and partake of benefits of the research done in the Universities
L1P7	Award for best research projects	• Criteria for awards timely drawn out • Extent of participation in the criteria process from the industry • Number of awards given out • Missing years for awards
L1P8	Executive Development Programmes	• EDP requirements are spelt out • Industries depute professionals for EDP courses • EDPs value-added after the education process • Number of industries participating • Number of academic institutes participating
L1P9	Partnership with ICT Multinationals	• Approach paper is drawn out • Areas of collaboration identified • Number of MNCs with whom partnerships succeed • Number of successful partnerships resulting from the exercise
L1P10	Return of Non-resident Mauritians	• Number of NRMs returning to the ICT sector • Number of NRMs setting up shop • Extent of preferential arrangements made for NRMs
L1P11	Memorandum of Understanding with countries in the region	• Timeliness of MoU • Extent of participation promised • Extent of financial support to students from governments in the region

Project Code	Parameter	Indicator(s)
		• Number of students visiting • Number of students staying on • Increase in the number of students visiting
L1P12	ICT Career Counselling	• Number of Career Counsellors from abroad invited • Number of students attending career counselling sessions

7.14 PROGRAMME L2: BUILDING LEADERSHIP COMPETENCIES IN ICT

Programme Context and Overview

In comparison to recommendations made under "L1" which would lead to development of generic ICT skills and expertise, thus enabling Mauritius to emerge as a regional Hub, it is also proposed that certain select areas be identified, wherein less than substantial expertise exists in the region, and in which Mauritius could, therefore, assume a regional leadership role. The outcome of the programme would be an increased acceptance of Mauritius as a regional leader in certain identified areas, development of expertise in the same and heightened opportunities for Mauritius to play a global role with time in these domains.

The main recommendations in this direction are as follows.

Regional Anchor and a Centre of Excellence

- The government, ICT Industry Association and the academia must work together to explore the potential for attracting an "ICT Anchor Company". Presence of these large high-tech companies would help attract the brightest IT talent, both technical and creative, and foster research and development. Anchor Companies would result in the spin-off of numerous feeder companies by becoming major suppliers or buyers of goods and services.
- There are specialised areas where skills are not readily available in other countries of the region. This ideally places Mauritius to take the first-mover advantage. A Centre of Excellence that concentrates on education, training and research on such identified areas would help.
- A joint initiative could be worked out that ties the establishment of anchor firms with the setting up of a "Centre of Excellence" either (a) in a Synergic Arrangement between the Centre of Excellence and a Regional Anchor, or (b) as an independent establishment of the Centre of Excellence with an industry tie-up on a case-by-case basis.

A comprehensive feasibility study is recommended to be undertaken that would lay out a detailed roadmap for at least the following.

- Possible areas in which the education, training and research could be pursued in the centre.
- Possible operational models tailored to requirements of at least five potential anchor firms, including a business plan for the centre and the added value it would bring to the potential anchor.
- Development of marketing proposition for different firms including the number of students in the different courses that would be planned, the indicative set of research fields and how collaborative research opportunities would be worked out, the source of faculty for the centre and the funding requirements and, above all, the added value it would bring to the potential anchor including the possibility of enhanced penetration into the African market.

Horizontal Transfer of indigenous ICT Solutions

Domestic ICT companies in Mauritius could develop industry or sector-specific IT solutions including those for Tourism, Agriculture, Financial services which it could effectively deploy in other countries in the African mainland or in other neighbouring island economies. Concerted and collaborative efforts are recommended to (a) identify countries where solutions developed in Mauritius can be effectively rolled out, (b) align the requirements in those countries with the sectoral offerings that emerge in Mauritius, and (c) set out a mechanism of marketing these solutions.

Mauritius as an ICT Incubation Leader in the region

With substantial expertise having been acquired by the NCB in the region, Mauritius can now use this expertise to become a regional leader in ICT incubation. Recommendations advanced include

- development of new business incubators in areas that are not currently served.
- encouraging innovative uses of ICT and entrepreneurship at the local level, for example ICT training institutes.
- establishing a network of knowledge sharing among business incubators through good practices, toolkits etc that support SME development could be considered.

- taking the incubator's work should beyond the incubation period to include promotion of their incubates' services and products and help provide their services to remote users.
- new models of incubation like virtual and semi-virtual incubator arrangements.
- models of replicating incubators could be considered through schemes like "Incubating the Incubators".

National Technology Test Bed Initiative

- A comprehensive study needs to be conducted to crystallise milestones of the Mauritius Technology Test Bed initiative, including, an estimation of finances required to set up the infrastructure, self-sustainability model, an organisation structure for operationalising the initiative, research opportunities and promotional efforts required towards converting it into a regional leadership initiative.

Programme Strategic Objectives

- to collaboratively explore the potential of attracting an ICT anchor company that would help attract the brightest IT talent and foster training and research not just through direct employment in the "anchor" but also through employment in many feeder organisations.
- to identify specialised areas in which Mauritius could have the first mover advantage by undertaking focused research and education in the region.
- to establish a Centre of Excellence in Mauritius which would assume the status of a leadership institution in education and research activities in some focus technology areas, and thus serve the region as a fountain of expertise in such areas.
- to generally foster research and learning in various disciplines of ICT of direct practical relevance to the industry through the centre of Excellence and serve region and its industries.
- to collaboratively identify a set of applications, either developed or to be developed, which could be promoted and rolled out in other countries of the region in a mutually beneficial way.
- to identify ways by which to share ICT incubation expertise developed within Mauritius among other countries of the region in a way that enhances the brand image of Mauritius as well as goes a long way in helping incubate ICT enterprises in other target countries of the region.
- to take steps to emerge as a centre of expertise in the realm of information security in the region through a combination of learning, expertise sharing, event hosting, awareness spreading and generally taking a leadership role in the area of information security.
- to emerge as a regional nucleus for investment into the ICT sector not just for targeted businesses in Francophone offshoring markets but also as a gateway for investments into Africa.
- to take steps towards identifying a leadership institution for the ICT industry in Mauritius which would serve and be recognised as the one ICT industry representation body for Mauritius for coordination, regulation and promotion of activities in the ICT sector.

Projects and Outcomes

Table 43 L2- Projects and Outcomes

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
L2P1	Regional Anchor and Centre of Excellence	• Identification of niche technology areas for research • Making business case for inviting anchor firms into Mauritius • Synergising Anchor firm requirements with the output of the Centre of excellence • Synergising other ICT firms' requirements with outputs from the Centre of excellence • Identification of funding sources for establishing the anchor firms and the	• Regional Anchor(s) and Centre of excellence • Higher uptake of research • Enhanced employment levels • Indirect and induced employment • Development of

Project Code	PROJECTS	ACTIVITIES	OUTCOMES
		Centre of Excellence	specialised competencies
L2P2	Horizontal Transfer of Indigenous Solutions (HORTIS)	• To identify areas where functional requirements are likely to be similar between Mauritius and other countries of the region • To stocktake and assess the feasibility of development and/or marketing the above solutions in other countries • Undertaking Mission Visits into other countries for this purpose • Undertaking horizontal transfer of ICT solutions	• Horizontal transfer of indigenously developed ICT solutions • Growing ICT Industry with movement up the value chain • Increased collaboration levels with other countries • Expertise growth in ICT "Domestic" industry
L2P3	Island of Expertise in ICT Business Incubation	• To identify a clutch of other countries of the region where incubation expertise available in Mauritius could be shared for mutual profit • To identify and execute modalities of incubation knowledge transfer in a way that is mutually beneficial to both the participating countries • To explore options whereby incubators themselves could be incubated in Mauritius	• Development of Incubation Networks • Incubating Incubators • Building Incubation networks • Emergence as an Incubation Hub
L2P4	Regional Leadership in Information Security	• Undertake a combination of learning, expertise sharing, event hosting, awareness spreading and generally taking a leadership role in the area of information security	• Expertise Sharing • Event Hosting • Awareness Sessions
L2P5	Creation of a National Technology Testbed	• Planning Exercise for creation of the Testbed, including ○ Mandate for the National Technology Testbed (NTT) ○ NTT staff and infrastructure requirements ○ Roadmap including business model for NTT ○ Plans for regional forays to deploy the testbed for regional use	• NTT Detailed Project Report

LEAD

Programme Governance Framework

A Regional ICT Leadership Team to be constituted by member representatives from ICT Association, Board of Investment, ICTA, Ministry of Information Technology and Telecommunications (MITT), Ministry of Labour, Academia, National Computer Board, EGC and member representatives from the ICT industry both from the domestic and the exports sector. The team will be led by the MITT.

Project Priority and Ownership

Table 44 L2- Project Priorities

Project Code	PROJECTS	Owner	High	Medium	Low
L2P1	Regional Anchor and Centre of Excellence	Universities	✔		

L2P2	Horizontal Transfer of Indigenous Solutions (HORTIS)	Export Promotion Agency [87]		✔	
L2P3	Island of Expertise in ICT Business Incubation	NCB	✔		
L2P4	Regional Leadership in Information Security	NCB	✔		
L2P5	Creation of a National Technology Testbed	MoEHR		✔	

Programme Monitoring Indicators/Milestone(s)

Table 45 L2- Project Milestones and Indicators

No	Parameter	Indicator(s)
L2P1	Regional Anchor and Centre of Excellence	• Number of Regional Anchors Invited successfully • Number of project-based sponsorships of research • Number of seats in the Centre Excellence • Number of Research Projects taken up • Extent of self-financing of the CoE
L2P2	Horizontal Transfer of Indigenous Solutions (HORTIS)	• Number of countries in which horizontal transfer successfully undertaken • Sectoral coverage of horizontal transfer of solutions
L2P3	Island of Expertise in ICT Business Incubation	• Increase in the number of new businesses incubated • Number of Incubators incubated • Number of businesses virtually and semi-virtually incubated
L2P4	Regional Leadership in Information Security	• Number of security events hosted
L2P5	Success of the National Technology Testbed	• Timely completion of the planning exercise • Timely implementation of the plan recommendations • Number of trials conducted by the government • Number of trails by bodies outside the government • Extent of awareness generated about this facility at the local and regional levels • Number of trails asked for by organisations outside Mauritius • Revenue earned with respected to what was originally planned

[87] Mauritius ICT Export Promotion Agency

7.15 PROGRAMME E1: A PREFERRED OFFSHORE DESTINATION FOR IT AND ITES-BPO SERVICES

Programme Context and Overview

Like in tourism where Mauritius is synonymously identified as a tourist destination par excellence, creating an international brand image in ICT is an essential pre-requisite if the GoM's ICT Vision has to be realised. Though significant recent events help (for example the inclusion of Mauritius in A T Kearney's Global Service Location Index in 2007 at 25th position), the greater need is for an exclusive and focussed country branding and investment promotion efforts in ICT.

The establishment of well-directed ICT investment and business facilitation services has emerged as a key requirement for Mauritius ICT industry, particularly the offshore segment. Both quantity and quality of business must be targeted, with quality being measured in terms of job creation, exports or technology transfers.

Investment promotion needs to include the following activities.

Image -Building or creating a perception of Mauritius as an attractive site for international investment in ICT, particularly those related to offshore. Measures include focused advertising, public relations events, the generation of favourable news stories and so on.

Investor Facilitation and Investors Servicing would include the range of services provided in a host country that can assist an investor in analysing investment decisions, establishing a business, and maintaining it in good standing. For example information provision, "one-stop shop" service aimed at expediting approval process, and other assistance in obtaining sites, utilities, etc.

Investment Generation entails targeting specific sectors and companies to create investment leads. Activities include identification of potential sectors and investors, direct mailing, telephone campaigns, investor forums and seminars and individual presentations to targeted investors.

Policy Advocacy including activities through which the agency supports initiatives to improve the quality of the investment climate though collaboration with the private sector, and advocating policy measures like fiscal incentives, tax rebates and the like.

Major recommendations include

- Setting up and institutionalising a body to act as the single-point focus agency for ICT export promotion with at least the following items on its agenda.
  - Facilitating provision of start-up and capacity development financial support, including access to capital for setting up export units, undertaking research and development, marketing, product development, quality upgrade, promotional efforts etc.
  - Enable export competency development support including export incubators, advisory services, specialised training support etc.
  - Other logistical management support including arrangements with other local service providers and other international procurement, whenever required.
  - Providing market intelligence information including market requirement, commercial opportunities, standards/ quality requirements.
  - Off-shore promotional support including representation services abroad, participation in trade fairs, trade missions, and other publicity efforts and generally collaborating with the country promotion efforts.
  - Advocacy and Advisory services, including support from sectoral/export associations and chambers of commerce, policy facilitation from the government.
  - Publication of handbooks/brochures detailing all incentives available to Mauritius ICT service providers for the exports market, complete procedural detail on setting up an enterprise in Mauritius dedicated to exports and continuing support available from the export promotion body.
  - Creation of an Export Development Fund from which the different activities of this promotion body could be financed; possible ways of building up the fund could be through levy of an export development surcharge on all export items, contribution from the association of ICT service providers.

- There must be Annual Plans of action detailing the export promotion efforts to be undertaken in the year, including the following,
  - New geographies to be targeted;
  - New products and service lines to concentrate;
  - Business potential through comprehensive market intelligence gathered by its teams;
  - Facilitation inputs that it intends making available to the export units in Mauritius for the above; and
  - Targets to be achieved in each of the export segments
- Conscious efforts need to be made to advertise recruitment and training opportunities in the ICT sector; growing employment figures in the ICT sector need to be advertised too (recommendations for this are addressed under L1).

Other recommendations include the following.

- Building an interface and ensuring an ongoing dialogue with IT analysts e.g. Giga, Gartner, IDC and Forrester, and key influencers with a special focus on creating awareness of Mauritian capabilities in new service lines.
- Conducting a series of focused CEO workshops/roundtables in countries such as France, US and UK on an annual basis to build top management commitment for off shoring to Mauritius.
- Promotion of the core strengths/competencies of the Mauritian IT industry in order to build credibility by showcasing key elements like continued political commitment, cost-quality advantage, highly-skilled bilingual labour pool, world-class physical and telecom infrastructure and a hassle free environment.
- Working with target geographies' Mauritian embassies/consulates/local industry associations in to promote the Mauritian ICT industry.
- Conducting regular benchmarking exercises to assess the relative advantages of Mauritian Inc. vis-à-vis other countries.
- Publishing country-specific reports that guide Mauritian companies on how to do business in a particular market.
- Providing Media Coverage by actively issuing Press Releases, Press Statements and Industry Status Studies to ensure wide media coverage, within all forms of media, in Mauritius and abroad.

Programme Strategic Objectives

- to establish and institutionalise an exclusive and focussed export promotion body for the ICT sector, with particular emphasis on offshoring and aimed at addressing identified target markets of the world.
- to create a perception of Mauritius as an attractive offshoring centre of the world through a series of public relations initiatives including advertisement, road shows, fairs and other such events.
- to establish a world class investment climate for ICT in the country through a series of measures like ready availability of information through a portal, single-window services, fast approval processes, flexible labour regulations and other means of assistance.
- to establish a streamlined system of gathering, analysing and exploiting market intelligence in the sphere of offshore activities by promoting alliances with leading market intelligence firms of the world and sharing the findings with the ICT industry.
- to collaboratively arrive at export promotion plans on an annual basis that fully exploit market intelligence findings, and dovetail them with promotional efforts.
- to foster a sprit of productive collaboration between the industry and the government with an objective to facilitating requite policy and fiscal measures for an attractive investment climate.
- to undertake focussed campaigns and other means of participation in identified target countries to highlight recent gains made by Mauritius in offshoring.
- to undertake promotional measures in countries of the region, including China and India, that are planning to invest in Africa, to promote Mauritius as a natural geo-cultural bridge.

Projects and Outcomes

Table 46 E1- Projects and Outcomes

	PROJECTS	ACTIVITIES	OUTCOMES

E1P1	Institutional and Planning Arrangements	<u>Institutional Arrangements</u>
		• Setting up the Mauritius ICT Export Promotion Agency with two constituent wings
		  ○ The ITS Wing
		  ○ The ITeS Wing
		• Definition of Terms of Reference for the Export Promotion Agency and detailing its activities
		• Constitution of an management board comprising representatives from ICT industry (both ITs and ITeS segments) and its association, the regulator and the government
		
		<u>Planning Arrangements</u>
		• The ITs and ITeS wings will prepare annual plans of action in their respective domains and advance suggestions on activities to be done over a period of one year including in the following domains
		  ○ Plans and the requirement envisaged for start-up financial support
		  ○ Plans and the requirement envisaged for capacity building, including incubation arrangements
		  ○ Plans and the requirement envisaged for Research and Development
		  ○ Plans and requirement for marketing
		  ○ Plans and requirement for product development
		  ○ Plans and requirement for quality upgrade
		  ○ Plans and requirement for promotional efforts
		  ○ Plans and requirement for Policy facilitation
		  ○ Identification of Targets, countries and sectors
		  ○ Promotional efforts to be taken up in these countries including representation services abroad, participation in trade fairs, trade missions, and other publicity efforts and generally collaborating with the country promotion efforts
		  ○ Suggestions for extra-governmental sources for an Export Development Fund, including agreement for levies, cesses its member companies are agreed on paying, together with suggestions on how to utilise the fund gainfully
		  ○ Advocacy and Advisory services, including support from sectoral/export associations and chambers of commerce, policy facilitation from the government
			• Setting up of Mauritius ICT Export Promotion Agency and its two wings
			• Terms of Reference and definition of activities for Export Promotion Agency
			• Annual Plans of Action for 2007-12 for Offshore services promotion
			• Annual Report highlighting achievements of Export Promotion Agency
			• Greater Awareness of Mauritius as an attractive Offshore Location
			• More Offshore Business for ICT exports industry
			• Revamped package of incentives for investments in the ICT sector

	PROJECTS	ACTIVITIES	OUTCOMES
		○ Review of package of investments available to investors in the ICT sector and making recommendations towards attracting FDI into the ICT sector through image-building, investor facilitation, investment generation and policy measures required • Export Promotion Agency will integrate the planning requirements from the two wings and produce an integrated Annual Plan of Action for the year for the entire offshore service segment	
E1P2	Web Presence for the Export Promotion Agency and the two wings	• Prepare RFP for portal development • Invite bids and award tender for portal development • Develop Portal Requirement Specifications, including ○ SME Window ○ Other Interaction forums ○ New possibilities ○ Agency's membership ○ Member services ○ Activities ○ Annual Report • Portal Development • Pilot Run and Launch the Export Promotion Agency Portal	• Mauritius Offshore Service Team's portal • Increased awareness of Export Promotion Agency as the investment promotion agency in Mauritius for ICT • Increased investment facilitation for potential investors • Increased awareness of Mauritius' successes in the ICT offshoring sector across the world • Web-enabled assistance to potential investors in the ICT sector, particularly the offshore segment
E1P3	Mauritius ICT Export Development Fund	• Agree on sources for the Export Development Fund (EDF) • Agree on the Fund's charter and utilisation • Draft procedures for fund sourcing utilisation • Operationalise the EDF	• Fully Operational EDF • Increased assistance to investors • Increased participation from SMEs in ICT export services
E1P4	Constituting the ICT Exports Market Intelligence Wing	• Drafting the Terns of Reference for the Market Intelligence Wing • Recruitment/Redeployment of the same • Draft Detailed job descriptions for members of the wing and operationalise the wing • Facilitate arrangements with leading global market intelligence agencies with focus on offshore	• 2 member team constituted • Increased competency and availability of market intelligence • Development of new markets for offshore
E1P5	Export Service fairs in countries such as France, Canada and UK	• One export fair/ roadshow every year to countries such as Canada, UK and France. Either participation in an already existing fair or otherwise. • Selection, assistance of Event Management Agency active in target markets. • Promote Mauritius as an ICT investment destination including for disaster recovery. • Government can finance ICT firms choosing to have their physical presence in the event.	• Roadshows, fairs, other events • Increased awareness of Mauritius as offshore destination • Increased awareness of offerings in offshore segment • Increased publicity for Mauritian firms • Increased Foreign Direct Investment[88] into the ICT sector

[88] It is targeted to double the number of Foreign Direct Investors into the ICT sector over a period of five years.

	PROJECTS	ACTIVITIES	OUTCOMES
E1P6	Advertisement and Country Branding	• Advertisement design through selection of agencies. • Decision on where to be launched. • Official Launching of the Advertisements.	• Advertisements in the print and electronic media • Increased awareness of Mauritius as an offshore destination • Increased awareness of Mauritius' successes in the offshore segment • Country Branding as an offshore destination
E1P7	Memoranda of Understanding with countries of the region	• Produce Country marketing Material as a "gateway" to Africa. • Promotional Campaigns to organisations in identified countries, including government. • Identify Opportunities • Undertake Missions culminating in business agreements • Draft MoUs • Undertake projects	• Country Marketing Brochure • Memoranda of Understanding with countries of the region including India and China • Projects • Emergence of Mauritius as a preferred "Gateway" to Africa

Programme Governance Framework

A Joint Public Private Partnership Working Group to be constituted by member representatives from MITT (Chair), ICT Association, Board of Investment, Export Promotion Agency (as part of NCB), National Computer Board, and member representatives from the ICT industry primarily from the exports sector, will be monitoring the programme closely. MITT will lead the Working Group.

Project Priority and Ownership

Table 47 E1- Project Priorities

Project Code	PROJECTS	Owner	High	Medium	Low
E1P1	Institutional and Planning Arrangements	MITT	✔		
E1P2	Web Presence for Mauritius ICT Export Promotion Agency and the two wings	NCB		✔	
E1P3	Mauritius ICT Export Development Fund	MITT		✔	
E1P4	Constituting the ICT Exports Market Intelligence Wing	NCB	✔		
E1P5	Export Service fairs in countries such as France, Canada and UK	MITT		✔	
E1P6	Advertisement and Country Branding	MITT		✔	
E1P7	Memoranda of Understanding with countries of the region	MITT			✔

Programme Monitoring Indicators and Milestones

Table 48 E1- Project Milestones and Indicators

No	Parameter	Indicator(s)/Milestone(s)
E1P1	Institutional Setup	• Terms of Reference for Export Promotion Agency agreed • Export Promotion Agency is setup • Job Descriptions are laid out • Functional wings are constituted

No	Parameter	Indicator(s)/Milestone(s)
	Planning Arrangements	• Terms of Reference for the functional wings are drawn out • Annual Plans are made separately for the ITs and ITeS sectors • Collated and integrated plans are made for the ICT Offshore sector • Number of Annual Plans made timely • Extent of adherence to the annual plans • Comprehensiveness of the Annual plans in terms of coverage • Number of new sectors and countries addressed and targeted
E1P2	Portal Development	• Timely development of the RFP • Timely award of the tender • Comprehensiveness of the portal requirements specifications
	Portal Access	• Number of hits on the portal • Number of registered users on the portal • Number of hits on the portal from offshore target countries • Number of businesses enabled through the portal • Comprehensiveness of portal content coverage
E1P3	Constitution of the Fund	• Timely identification of sources for the fund • Timely identification of utilisation targets • Timely and comprehensive formulation of processes • Extent of contribution into the EDF
		• Number of new businesses enabled • Number of new business enabled that are successful • Number of new SME entrants through the EDF into the ICT sector
E1P4	Constitution of the Market intelligence Wing	• Timely constitution of the wing • Definition of the Terms of reference for the wing • Facilitation arrangements made available to the wing
	Activities of the Wing	• Extent of inputs into the Annual Plan making process • Number of new sectors, technologies and countries identified
E1P5	Conduct of promotional events	• Years in which such events were missed • Number of new countries, sectors covered • Number of countries covered where French is spoken • Extent of active participation in the event from the local industry • Number of sponsorships attracted • Number of continuing participants in the events • Extent of increase of FDI into the Mauritius ICT sector
E1P6	Advertisement	• Timely availability of the copy • Timely launch of the advertisement
E1P7	Memoranda of Understanding with countries of the region	• Number of Organisation referred to within the countries with whom MoUs were signed • No of projects resulting from the MoUs

PART THREE

Structure of Part Three

This section details the institutional structure required for the ICT sector and is contained in two parts. The first part provides the "Implementation Framework" required to implement the programmes and projects recommended in this report as part of the NICTSP. The second part dwells on the "Institutional Framework" that is required for the ICT sector, and follows a scope review exercise earlier done during the "Analysis" phase of the project. The two parts have been covered independently of each other so that operationalising one of them is not dependent on the other's successful completion.

Implementation Framework

A three-tier Implementation framework has been proposed with the tiers being (top-down) a High-Level Inter-Ministerial Committee(IMC) for the monitoring of the NICTSP, Programme Committees and Taskforces (PCTs) for implementing and monitoring the different programmes earlier described in the report and "owner" institutions that are separately and individually responsible for the implementation of the different projects. A secretariat to be attached to the IMC has also been suggested.

Terms of Reference have been outlined for the High-level Inter-Ministerial Committee, the Programme Committees and Taskforces (PCTs) and the Secretariat.

Institutional Framework

The Institutional Framework for the ICT sector is covered sequentially under the following broad headings,

- Functions that need to be performed for a growing ICT sector by a few identified bodies have been detailed;
- Lacunae earlier revealed during the "Analysis" phase gives a picture of where weaknesses in the current setup exist and hence provide indications as to what needs to be done;
- Critical Success Factors that at once become important for bodies in the ICT sector have also been covered, and, determined by these factors, recommendations have been made as to the type of body that must ultimately result; and
- Recommendations are then made that involve a two-step transition to the recommended "End State", involving first a "Near Term Institutional Framework" before moving on to the "End State" of the National ICT Authority of Mauritius.

For both of these steps described above, the functions that need to be performed by the different institutions have been provided. For more clarity, the transition from the current state to the "End State" has also been diagrammatically illustrated.

Part Three Table of Contents

8. Implementation and Institutional Framework

The Importance of an Institutional Framework

An institutional framework is the quintessential vehicle used to implement government initiatives. Well-defined institutional structures become important for the following reasons.

- Institutional structures promise continued leadership, involvement and ownership of the initiatives that are planned and thus comfort implementers with a sense of continuity and commitment, be it from political or from the executive.
- They also make for clear ownership and accountability structures by detailing unambiguous roles and responsibilities for participating entities of the framework, even as they enable collaboration among them.
- Well-defined frameworks also ensure that the appropriate and compatible skill sets are deployed for the initiatives underway, while, at the same time providing adequate room for induction from outside.
- Institutional frameworks also have built into them proper monitoring and evaluating mechanisms which define terms under which a review of initiatives would be taken up and thus facilitate regular stock-taking of the progress achieved during implementation.

Recommendations for Institutional Structures in the NICTSP

As part of the NICTSP, recommendations for institutional setups fall into two broad, relatively independent categories. They are as follows.

A. Institutional structures required to implement and monitor the different initiatives (programmes, projects and recurring activities) under the NICTSP as covered severally under the programmes dealt with earlier; this is being referred to here as the IMPLEMENTATION FRAMEWORK.

B. Institutional structure required within the government to fulfil its varied functions for the ICT sector. This, in fact, follows from a review of the scope of the organisational entities undertaken earlier during the analysis phase of the project, which has lead to rationalisation of the activities being pursued by different bodies, and is being called the INSTITUTIONAL FRAMEWORK[89].

8.1 IMPLEMENTATION FRAMEWORK FOR THE NICTSP

A three-tiered implementation framework (Figure 16) is proposed for the implementation of the NICTSP programmes discussed earlier, comprising, bottom-upwards:

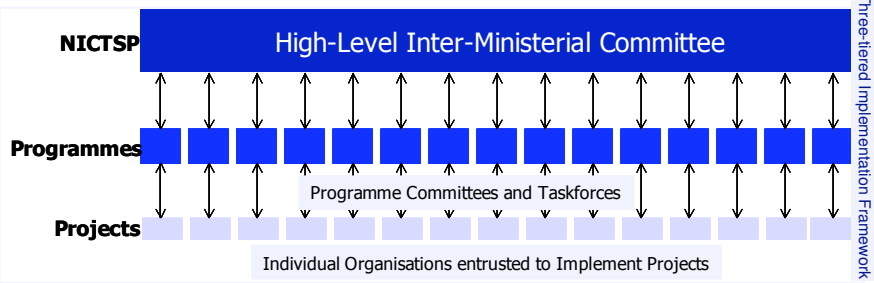


Figure 16 Three-tiered Implementation Framework

- Project Execution and Monitoring: As earlier discussed organisations have been identified that would take ownership of the different projects, with the team selection for the different projects being left to the different organsiations themselves. The identified “owner” organisations for the different projects would be responsible for execution and monitoring of the individual projects.
- Programme Execution and Monitoring: A tier above is the programme implementation and monitoring which covers all projects that are associated with the programme. Programme Committees and Taskforces (PCTs)

[89] Since the INSTITUTIONAL FRAMEWORK would likely take some time to be effected fully, it is necessary that the IMPLEMENTATION FRAMEWORK for NICTSP be kept as independent of it as is possible. In other words, implementation of the NICTSP has been de-linked from the rationalisation process.

have been identified that are responsible separately for execution and monitoring the programme, including all the projects under it.

- NICTSP Monitoring: At the apex level, a High-Level Inter-Ministerial Committee (IMC) has been identified that will responsible for monitoring the implementation of the whole of the NICTSP recommendations including the programmes that form a part of it. The IMC would be assisted in this with a Secretariat attached to it.

The following sections bring out a description of the functions to be performed at the three different levels.

1. The Inter-Ministerial Committee for NICTSP Implementation

However, at the apex level, there would be required a high-powered multi-stakeholder body, an Inter-Ministerial Committee to oversee and monitor the progress of the national Information and Communication Technologies Strategic Plan (2007-2011). The constitution of this body needs to have representation from the following stakeholder groups, at the minimum.

a. the Ministry of Information Technology and Telecommunications (MITT)
b. Ministry of Education and Human Resources (MoEHR)
c. Ministry of Finance and Economic Development (MoFED)
d. Ministry of Industry, Small and Medium Enterprises, Commerce and Cooperatives
e. Ministry of Health and Quality of Life
f. Ministry of Tourism, Leisure and External Communications
g. Ministry of Agro-Industry and Fisheries
h. Ministry of Labour, Industrial Relations and Employment
i. the ICT Authority
j. the National Computer Board
k. ICT industry representatives, both domestic and export
l. Academia
m. Civil Society

Terms of Reference for the Inter-Ministerial Committee for Implementation of the NICTSP

The constitution of the Inter-Ministerial Committee for the implementation of the NICTSP (IMC) shall formally trigger the commencement of NICTSP. Through a group of meetings the IMC must formally adopt a Terms of Reference for itself in its role of rendering overseeing and monitoring functions for the plan.

The IMC must also decide upon a quorum (a minimum representation of its members) in any meeting where key decisions are taken.

An indicative Terms of Reference for the body is as follows.

The Inter-Ministerial Committee for the Implementation of the NICTSP (2007-2011) will be the single body at the apex level, chaired by the Ministry of Information Technology and Telecommunications (MITT), and with representation from other bodies as mentioned above, that would be responsible for monitoring and evaluating the implementation of the NICTSP.

Key functions the IMC would render are as follows.

Rolling out the NICTSP

- The IMC would collaboratively adopt its own Terms of Reference, and set up Committees/ Taskforces for implementation and monitoring of individual NICTSP programmes. The IMC would also roll out a General Terms of Reference for monitoring of individual NICTSP programmes which shall be adopted by the committees/taskforces.
- The IMC would collaboratively agree upon the timelines adopted and indicators with associated targets agreed upon by the Committees/Taskforces for their respective programmes. For this purpose the Committees/ Taskforces would submit their individual action plans, along with indicators and targets at least two weeks in advance of IMC's meeting for the purpose. This process would take place at the beginning of every year of the NICTSP implementation, except the first year, for which the Action Plan Report delivered as part of this consultancy would suffice.

Monitoring the NICTSP

- The IMC would convene a meeting of its members on at least a monthly basis to formally take stock of progress of the programmes whose implementation is underway. This process would be facilitated by implementation reports for the 15 programmes sent by respective Programme Committees and Taskforces (PCTs) at least a week in advance of the meeting of the IMC. The implementation reports must carry, at a minimum, the following information.
    - list of projects underway;
    - progress on the projects as measured by
        - adherence to timelines as adopted by the PCT;
        - self-evaluation of the projects by the PCTs in terms of indicators that were set out to measure the implementation progress;
    - reasons for slippage of time, if any;
    - measures proposed by the PCT to address the slippage;
    - ways in which indicators were measured or are proposed to be measured;
    - progress in terms of meeting targets associated with indicators;
    - reasons the PCT feels are responsible for any shortfall in meeting targets associated with indicators;
    - measures proposed by the PCT to bring about better performance on the indicators, if the targets associated with the indicators have not been met;
    - any other observations which the PCTs feels is important to highlight to the IMC.
- The IMC would take on board suggestions of the PCTs and evaluate the efficacy of the measures being proposed. Should the Committee think appropriate it would suggest changes in the PCT's approach.
- The IMC would also evaluate repercussions of any under-achievement in a programme (in terms of time, or otherwise) on any of the other programmes. Should it detect any such fallout, it would communicate the same to the affected programme's PCT and ask for concomitant changes to be introduced in the PCT's plans.

Endorsing and Communicating the Annual Budgetary Requirements

- Influenced by the above, the IMC would also endorse and communicate budgetary requirements for each of the succeeding years, with the first one having been completed through the Action Plan Report of this consultancy itself. This process would be facilitated by Annual Budgetary Requirement Reports for the 15 programmes sent by respective PCTs at least a month in advance of the meeting of the IMC in which this would be taken up.

Risk Mitigation

- The IMC would also need to take stock of any emerging risks and such other imminent possibilities that it thinks would significantly affect the smooth running of the NICTSP. The IMC, while addressing this issue would also come out with mitigation strategies to tackle such risks.

Inclusion/Exclusion/Amendment for the Projects

- The IMC would also need to deliberate on (a) the inclusion of any new project in any programme which it thinks has become important and therefore needs to be included, or (b) the deletion of any project which it thinks is no longer required or is no more feasible to implement, or (c) changing the contours of the project by taking into account any finding that was not known at the time the project was conceived. In all of these cases, the requisite changes would be made by the Committee/Taskforce in charge of overseeing the programme itself. Also, in all of these cases the IMC would fully take into account changes on account of inter-linkages between the different programmes.

NICTSP Representation

- The IMC would, on the basis of its meetings, also decide on representation aspects related to the NICTSP, be it to stakeholders in Mauritius or to audiences abroad. In drafting the content of such representation the IMC would be assisted by respective PCTs assigned for the individual programmes.
- The IMC would also be the sole authority to formally endorse all deliverables of the NICTSP that are for public circulation or amount to representing the country's interests. Indicatively, while the “State of the ICT Report” falls in the former category, the latter would typically be made up by draft Memoranda of Understanding with external agencies.

Facilitating Linkages and Finances

- The IMC would also facilitate linkages (a) among PCTs for different programmes on matters that demand collaborative working, and (b) facilitate linkage between one or more Committees/ Taskforces and any body that is outside the NICTSP implementation apparatus.
- Based on the budgetary requirements outlined in the Action Plan Report, the next deliverable of the project, and on any other considerations the IMC deems important, the IMC would ensure to make available to the respective PCT, the finances required to implement the programmes.

Any Other Matter

The IMC would take on board for deliberation and decision-making any other matter highlighted by the PCTs that demand its intervention. Conversely, the IMC would take into consideration all matters over and above the ones referred to above that it collectively decides to take up.

2. The Secretariat to the Inter-Ministerial Committee

Being a high-powered body with members drawn from various areas, the IMC may not be in a position to undertake the ground work required for the set of activities to be taken up. It is proposed, that, a 2-3 member Secretariat be also constituted who would do the necessary follow-up and coordination required to be undertaken for the purpose.

Brief Terms of Reference for the Secretariat is as follows

- The Secretariat to the IMC (SIMC) will be the single-body responsible for undertaking follow-up measures required upon decisions taken by the IMC, unless otherwise required and communicated by the IMC itself.
- The SIMC shall maintain written record of all minutes and deliberations at the IMC meetings for the NICTSP, and will be facilitated by an authorised email identification to help elicit and receive information on matters related to NICTSP.
- The SIMC shall function as the sole interface between the PCTs and the IMC for purposes of NICTSP.
- The SIMC will ensure that all implementation and budgetary requirement reports are obtained from PCTs requisite days in advance of the IMC's meeting. Should any delays arise the SIMC will accordingly schedule the meeting so as to give members of IMC adequate time required to go through the PCTs' deliverables.
- The SIMC will send out the formal invitation for the meeting of the IMC at least seven days in advance after due consultation with the members on their availability.
- The SIMC will collate all individual reports coming in from PCTs into a single document and highlight, where appropriate, action areas that demand attention from the IMC during its meeting. In such highlighting it will either use its own discretion, or work on general guidelines from the IMC or be informed by the PCTs.
- The SIMC will also ensure that all logistical arrangements are in place for the IMC meeting to run smoothly without interruption.
- For the Annual Budget Reports sent in from the PCTs, the SIMC will collate and highlight areas that represent deviation from what was originally planned in order to expedite proceedings during the IMC's meetings.
- Working under the IMC's directions, the SIMC will also undertake the required coordination efforts between the different PCTs and between members of the IMC itself.
- The SIMC will also undertake such other responsibilities which the IMC thinks are required and are of secretarial nature to facilitate smooth implementation of the NICTSP.

3. The Programme Committees and Taskforces (PCTs)

To implement the programmes (and the projects covered therein), taskforces and committees have been proposed separately under the different programmes earlier described in the report. The following is a brief Terms of Reference for the PCTs.

<u>Terms of Reference for the Programme Committees and Taskforces (PCTs)</u>

The constitution of the Programme Committees and Taskforces (PCTs) by the IMC for the implementation of the individual programmes under NICTSP shall formally trigger the commencement of the programme. The PCT will also adopt the Terms of Reference as laid out by the IMC.

The PCT will be the single body responsible for executing, monitoring and evaluating its programme.

Key functions the PCT would render are as follows

Rolling out the Programme

- The PCT would collaboratively decide on timelines to be adopted and the indicators with targets to be associated with the implementation of its programme. This process would take place at the commencement of every project that falls under the programme and at such other times that the PCT feels necessary. The PCT would convene a meeting for taking stock of the programme on a fortnightly basis.

Monitoring the Programme

- The PCT would collaboratively prepare and submit to the IMC Monthly Implementation Reports for its programme. The implementation reports must carry, at a minimum, the following information
    - list of projects underway;
    - progress on the projects as measured by
        - adherence to timelines as adopted by the PCT;
        - self-evaluation of the projects in terms of indicators that were set out to measure the implementation progress;
    - reasons for slippage of time, if any;
    - measures proposed by the PCT to address the slippage;
    - ways in which indicators were measured or are proposed to be measured;
    - progress in terms of meeting targets associated with indicators;
    - reasons the PCT feels are responsible for any shortfall in meeting targets associated with indicators;
    - measures proposed by the PCT to bring about better performance on the indicators, if the targets associated with the indicators have not been met; and
    - any other matter which the PCTs consider important to highlight.

Endorsing and Communicating the Annual Budgetary Requirements

- By at least a month in advance of the commencement of each of the NICTSP years, the PCT will ensure to have ready for submission the Annual Budgetary Requirement for the coming year. for the first year such a report already stands prepared in the Action Plan Report of this consultancy itself.

Risk Mitigation

- The PCT would also need to take stock of any emerging risks and such other imminent possibilities that it thinks would significantly affect the smooth running of the programme. The PCT, while addressing this issue would also suggest mitigation strategies to tackle such risks. Such risks should be included in its Monthly Implementation Report submissions to the IMC.

Inclusion/Exclusion/Amendment for the Projects

- The PCT would also need to advance suggestions on (a) the inclusion of any new project in any programme which it thinks has become important and therefore needs to be included, or (b) the deletion of any project which it thinks is no longer required or is no more feasible to implement, or (c) changing the contours of the project by taking into account any finding that was not known at the time the project was conceived. Again, such suggestions should be included in its Monthly Implementation Report submissions to the IMC.

Any Other Matter

- The PCT would also have within its scope any other matter highlighted by the IMC that the latter feels is required to be taken up.

Figure 17 brings out the institutional structure for the implementation of the NICTSP through a diagram.

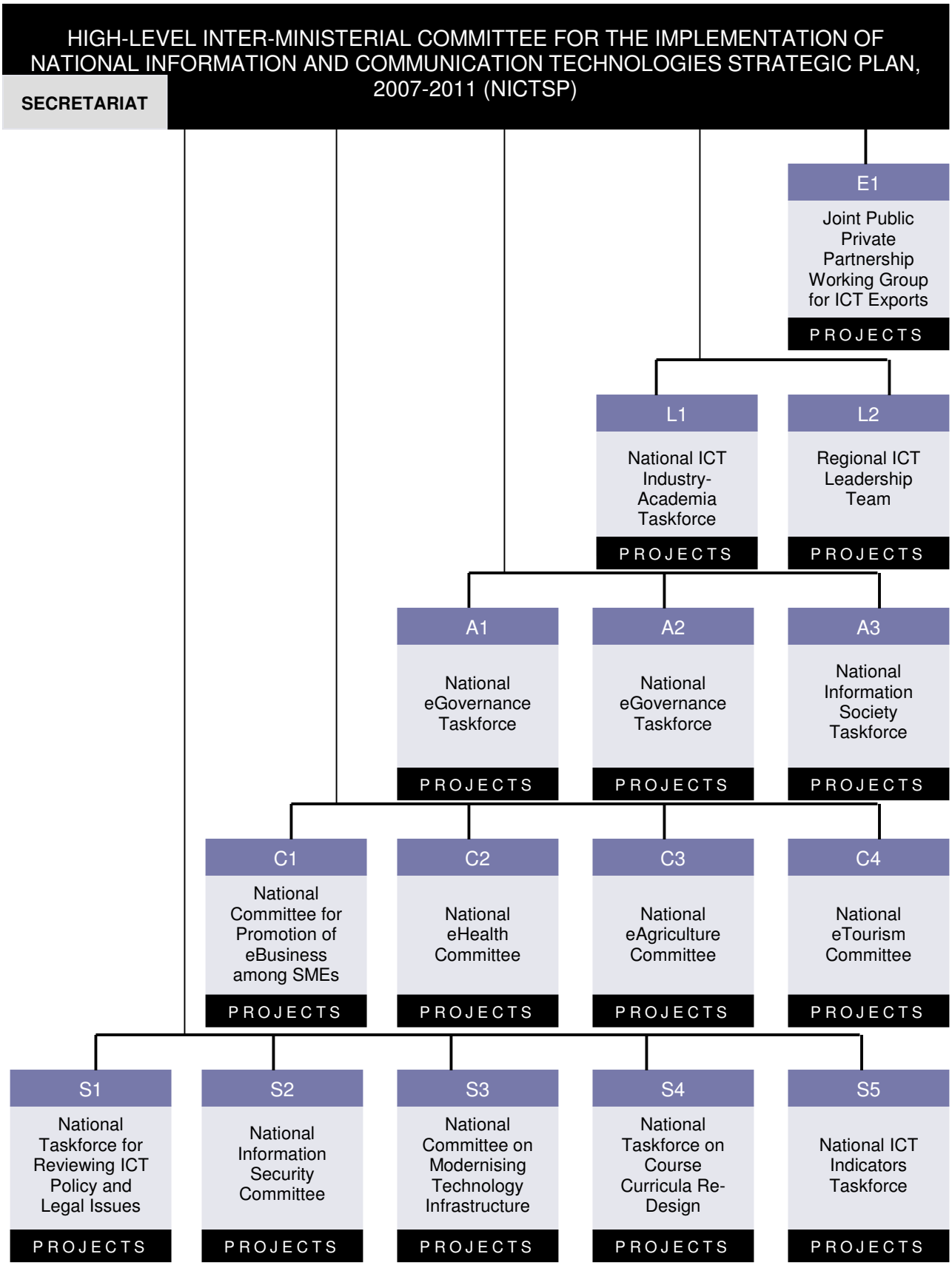


Figure 17 NICTSP Implementation Institutional Structure

The two tables over the next two pages (Tables 49 and 50) summarise the recommendations for the institutional structure required to implement the NICTSP programmes.

NICTSP level		PROGRAMME level	
		Programme Name	Programme Monitoring
High-Level Inter-Ministerial Committee to Monitor the Implementation of the NICTSP 2007-2011	SUPPORT	S1-FORMULATING AN ICT POLICY, EFFECTING LEGAL AND REGULATORY CHANGES	A National Taskforce on Revamping the ICT Legal and Regulatory Framework needs to be constituted, chaired by the MITT, including representatives from ICTA, State Law Office, HRDC, National Computer Board, ICT Industry Association.
		S2-INFORMATION SECURITY CULTURE AND EMERGENCY RESPONSE SYSTEMS	A National Information Security Committee needs to be constituted with representatives from the National Computer Board (chair), MITT, ICTA, MCCI, representatives from Critical Information Infrastructure areas, PMO, ITSU, a member from the Police Department, eGovernance Cell representative and a member representative of ISPs in Mauritius, to oversee and monitor the programme.
		S3- HARNESSING EMERGING TECHNOLOGIES AND ENHANCING INFRASTRUCTURE CAPABILITY	A National Committee on Modernising Technology Infrastructure Availability will be formed chaired by the MITT with representatives from MITT, ICTA, NCB, MT, ISP, IBA, ACT, MITIA , and business entities in the ICT sector, particularly those catering to export markets.
		S4- EDUCATION THROUGH ICT	A National Committee on Course Curricula Redesign for a Modern Workforce will be formed chaired by the MoEHR and will consist of representatives from MITT, MoEHR, MCA, MIE , NCB, TEC, UTM, UoM, IVTB, MQA, and representatives from other stakeholders. The committee will closely supervise and monitor the programme and, in case the work is awarded to an external consultancy, will serve as the Steering Committee for individual projects.
		S5-MAURITIUS ICT MEASUREMENT AND EVALUATION TERM REVIEW (MAURITIUS ICT METER)	A National ICT Indicator Taskforce (NICTIT) needs to be constituted with representatives from MITT (chair), Central Statistical Office, National Computer Board, ICT Advisory Council, members from ICT industry representing the ITs and the ITeS sub-sectors, ICT Authority, and members from academia. MITT will chair the Taskforce.
	CATALYSE	C1- ENHANCE ICT UPTAKE AMONG SMES TO PROMOTE MARKET EXPANSION AND PRODUCTIVITY	An ICT in SMEs Committee chaired by the Ministry of Industries, SMEs, Commerce and Cooperatives (MISCC) and including representatives from Enterprise Mauritius, SEHDA, MITT, NCB, NWEC, SME Federation should be setup to drive and oversee the implementation and monitoring of the programme.
		C2- PROMOTING INTEGRATED ADOPTION OF ICTS TO DELIVER BETTER HEALTHCARE	A National eHealth Committee comprising representatives from Ministry of Health and Quality of Life (Chair), MITT, EGC, MIH, and from public and private sector health agencies to oversee and monitor the programme and serve as the Steering Committee for specific projects.
		C3- PROMOTING INTEGRATED ADOPTION OF ICTS THROUGH COLLABORATIVE WORKING	A National eAgriculture Committee chaired by the Ministry of Agro-industries and Fisheries and including representatives from MITT, EGC, Mauritius Chamber of Agriculture, and representatives of public sector and private sector stakeholders should be set up to drive and oversee the implementation and monitoring of the programme closely.
		C4- ENABLING INCLUSIVE GROWTH OF TOURISM INDUSTRY THROUGH ICT	A National eTourism Committee chaired by MoTL with representatives from MTPA, MITT, EGC, Tourism Authority, AHRIM, ASMH, Mobile operators, travel agents, car rental agency representative, representatives from the SMME sector in Tourism to oversee and monitor the programme closely.

ACCELERATE	A1- ACCELERATED E-GOVERNANCE THROUGH PROCESS RE-ENGINEERING AND COORDINATED PLANNING	A National eGovernance Taskforce chaired by the MITT and including Head of the eGovernance Cell, department heads of select departments, representatives from the business community, and representative of civil society groups, will be monitoring the progress of the programme closely.
	A2- UPSCALING E-GOVERNMENT THROUGH FLAGSHIP APPLICATIONS	A National eGovernance Taskforce constituted by the MITT, NCB, EGC, alongwith representatives from departments, ICT industry representative operational in the domestic sector, and representatives of civil society groups. MITT will chair the taskforce.
	A3- ENHANCING CONNECTIVITY AND CONTENT FOR COMMUNITY EMPOWERMENT	A National Information Society Taskforce constituted by representatives from MITT, NCB, ICTA, MT, UNDP, SEHDA, MACOSS, MoEHR, MoYS , and MPL would supervise the implementation of the programme. The taskforce will be monitoring the progress and also act as a Steering Committee if any of the projects is an external consultancy. NCB would chair the taskforce.
LEAD	L1- COLLABORATIVE PLANNING FOR MANPOWER DEVELOPMENT IN IT AND ITES/BPO SECTOR	A National ICT Industry-Academia Taskforce would be constituted by member representatives from Human Resources Development Council (HRDC), Ministry of Education and Human Resources (MoEHR), Ministry of Information Technology and Telecommunications, Tertiary Education Commission, Academia, the ICT Association, and member representatives from the ICT industry both from the domestic and the exports sector. The Taskforce will be chaired by the MoEHR.
	L2- BUILDING LEADERSHIP COMPETENCIES IN ICT	A Regional ICT Leadership Team to be constituted by member representatives from ICT Association, Board of Investment, ICTA, Ministry of Information Technology and Telecommunications (MITT), Ministry of Labour, Academia, National Computer Board, EGC and member representatives from the ICT industry both from the domestic and the exports sector. The team will be led by the MITT.
EMERGE	E1- A PREFERRED OFFSHORE DESTINATION FOR IT AND ITES-BPO SERVICES	A Joint Public Private Partnership Working Group to be constituted by member representatives from MITT (Chair), ICT Association, Board of Investment, Export Promotion Agency (as part of NCB), National Computer Board, and member representatives from the ICT industry primarily from the exports sector, will be monitoring the programme closely. MITT will lead the Working Group.

Table 49 NICTSP Implementation Institutional Framework

Representation Matrix for bodies required to implement NICTSP programmes discussed earlier is as follows. The cells marked red indicate the entity identified to take ownership of the programme, the letter “M” denotes the entity as a member representative in the Committee/Taskforce while the letter “C” indicates the entity as a chair of the Committee/Taskforce, while “F” in all cases denotes follow-up action by the Secretariat.

STAKEHOLDERS	INTER-MINISTERIAL TASKFORCE FOR NICTSP IMPLEMENTATION & MONITORING														
SECRETARIAT	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
MITT	C	M	M	M	C	M	M	M	M	C	C	M	M	C	C
NCB	M	C	M	M	M	M				M	M	C	M	M	M
ISPs		M	M												
ICTA	M	M	C		M							M			
EM						M									
BOI														M	M
NGOs												M			
ICT Association													M	M	M
Private Sector	M	M	M		M		M	M	M	M	M		M	M	M
Academia				M	M							M	M	M	
HRDC	M			M									M		
IBA	M		M												
TEC				M									M		
Police		M													
eGovernance Cell*		M					M	M	M	M	M			M	
MoEHR				C									C	M	
MPL												M			
SLO	M														
Primary and Secondary Schools				M											
CSO					M										
NICTERN*					M										
MACOSS						M						M			
SEHDA						M						M			
MoTL									C						
MoAF								C							
MISCC						C									
MoHQL							C								
BPML			M												
NWEC						M									
SMEF						M									
Others			M				M	M	M	M	M	M	M		M
	S1	S2	S3	S4	S5	C1	C2	C3	C4	A1	A2	A3	L1	L2	E1

Table 50 NICTSP Institutional Responsibilities

8.2 INSTITUTIONAL FRAMEWORK for the ICT sector

This follows a scope review exercise undertaken during the Analysis phase of the project of a few identified organisations in the ICT sector. Concurrently, an exercise was also undertaken to understand the functions that need to be discharged by such organisations in a related country setting with comparable focus on the ICT sector as part of its larger economy. In this section, in light of findings of the above two exercises the following are covered.

- A Description of the functions that need to be discharged;
- Extracts from scope review undertaken during the "Analysis" phase of the project;
- Critical Success Factors that determine the type of organisation(s) that need(s) to exist for the ICT sector in Mauritius;
- Approach adopted for making recommendations on the Institutional Framework; and
- Recommendations for a gradual transition to the new institutional framework .

Functions to be Discharged

The spectrum of Functions to be performed by government agencies in the ICT sector are as covered in Figure 18.

Description of the Functions to be Discharged

In light of the comprehensive analysis done during our analysis stage, activities of the Institutional setup would involve the following functions

- Regulation and Enforcement, including activities related to regulating the activities of the ICT sector and enforcing the legal requirements as laid out in the statutes for the ICT sector.
- Promoting ICT Awareness and Adoption, including spreading the awareness of the need for and efficacy of ICT , and taking up initiatives that would encourage the adoption of ICT in the economy and in society at large.
- Educational Interventions, implying determining and recommending measures that need to be undertaken towards building up the manpower base for the ICT sector and to help internalize a "technology" temper in the society.
- ICT Statistical Operations, implying the monitoring and evaluation of various programme and projects being undertaken and employing statistical analyses to make recommendations on what needs to be taken up.
- Country Promotion and Investment, including taking up initiatives that would promote the country globally as a regional hub of activity as well as identifying markets for both the ITS and ITeS domains. This would also include undertaking activities to promote investments into the ICT sector both from within the country and beyond.
- eGovernance, implying using electronic means towards delivering good governance.
- Good eGovernance, implying the electronic enablement of and adherence to the principles of good governance as relevant for eGovernance.
- Technology Trends and Standards, implying keeping track of latest emerging technologies and standards, and ensuring their adherence and encouraging their adoption.
- Strategic Advisory and Policy Making, or extendinginputs to the government in the required domains which would help GoM arrive at strategic plans and policies that would serve as guiding documents for stakeholders in the sector.
- Research and Innovation, which involves exploring and evolving new ways of discharging the above functions in a more efficient and cost-effective way for the collective benefit of the economy and society.
- Monitoring and Evaluation, implying activities related to undertaking periodical monitoring and evaluation of programmes and projects underway using objectively verifiable indicators.
- ICT Incubation, or promoting the growth of ICT businesses by offereing incubation facilitites to startups, including office space, basics technology infrastructure and other business support services.
- Information Security, including all activities related to building awareness and promoting adoption of Information Security and ensuring adherence to guidelines and best practices shared with the stakeholders from time to time.

Figure 18 Description of the Functions to be Discharged

Results of the Scope Review done during the Analysis Phase

Figure 19 brings out excerpts from the Analysis Report on the scope review done for organisations in the ICT sector attached to the MITT.

Excerpts from the Scope Review exercise executed during our Analysis Phase

- Agencies active in the ICT sector have ample overlap among them; there is noticeable duplication of efforts which may lead to ambiguity in execution and diseconomies of scale (for example, eGovernment activities are taken up by CIB, CISD and NCB). Similarly, ICT statistics are collected by NCB and ICTA, among entities attached to the MITT, and also by the CSO.
- Beyond ambiguity considerations, duplication of efforts may also lead to inappropriate competencies being used since the same skill set being required at many places, may not be available in full measure everywhere.
- For eGovernance operations, bodies like CIB, CISD, NCB etc are all MITT entities. The present institutional framework lacks representation from various other key ministries where eGovernance will actually take place. This may make for sub-optimal levels of ownership in eGovernance initiatives.
- Institutions analysed were originally created some specific mandates in late 80s and early 90s. However, even as they appear to have taken up activities that do not strictly lie within their assigned domains, no rationalisation has been done in the interim to define their activities more unambiguously. For example NCB was created to advice GOM on the formulation of national policies and legal framework for promotion and development of ICT and its application, has taken up activities in the sphere of eGovernment also.
- In the domain of ICT, a period of 15-20 years is a long one, and new activities and competencies have emerged that need to be considered. For example, BPO or the ITeS sector, or even off shoring, did not exist in significant measure when these Organisations were founded but constitutes a considerable share of revenue stream in ICT sector now.
- There is also no entity specifically entrusted with activities related to Research, Analysis and Innovation. Government needs to beef up efforts to disseminate information from its own research programs to trigger opportunities for innovation.
- There is lack of a coordinated mechanism to elicit feedback from citizens on how well eGovernance efforts are doing towards providing them convenience.
- For Mauritius to become a regional ICT hub, it is important for GoM to initiate strategic communications with other partnering nations. Although BOI is making efforts towards promoting investments into ICT, the need is felt for a more focussed agency that caters exclusively to ICT for attracting both business and investments into the sector from abroad.
- Although, going by the NCB Act, 1988, one of its objects for the Board is to undertake interventions in ICT education towards aligning it to industry requirements, NCB does not appear to be involved substantially in this area. However, though industry-academia exercises do happen, the need is felt for a more continual, comprehensive and collaborative approach facilitated by the MITT. MITT's involvement would ensure that initiatives that support such collaborative measures are in place, for example the necessary facilitation required for export promotion in order that targets set in industry-academia efforts succeed.

Figure 19 Excerpts from the earlier Scope Review done during the Analysis Phase

Critical Success Factors for the Institutional Framework

Keeping the observations of the Analysis Phase made during the scope review in the Analysis phase including the ones highlighted in Figure 19, the following Critical Success Factors are identified to be key to a successful implementation of initiatives in ICT sector, including those under the NICTSP.

- Political Leadership Involvement and Ownership, implying continued involvement, ownership, direction and support from the political leadership.
- Multi-stakeholder Involvement and Ownership, meaning continued involvement, ownership and commitment from government, private firms, academia, and civil society.
- Minimal Duplicity and Maximum Collaboration, or in other words, the revamped institutional setup must minimise duplication and maximise collaboration.

- Clear and Unambiguous mandate for the units/ Organisations, meaning that the institutional setup must be such as to facilitate clear and unambiguous roles and responsibilities of the constituent units/organisations.
- Compatible Employee Skillsets, or that employee skillsets available to be compatible with the mandate of their organisations.
- Minimum Professional Culture Shock, or that the rationalised institutional setup must minimise professional disruptions brought about by a radical change in work culture or by even more drastic requirements like downsizing of the workforce.
- Benefits of Synergy and Economies of Scale, implying that the new institutional setup must bring about economies of scale, minimise overheads, and facilitate synergistic networking.
- Easy and Quick Transition, or that the revamped institutional setup must be such as to enable easy and quick transition.
- Absorption and Induction of External Talent, implying that the revamped institutional setup must make for easy induction and absorption of professional talent and expertise from beyond what is currently available.
- Legal Flexibility, or that the institutional setup must be flexible enough to accommodate any changes through, if required, amendments to the very law under which the institution(s) has/have been set up. This, for example, is a key requirement in ICT where new skill sets may need to be inducted or organisations may need to get re-structured owing to developments in technology. Too rigid an institutional structure may not really make it amenable to such changes.
- Monitoring and Evaluation, meaning that the revamped institutional framework must facilitate a streamlined and closely monitored and evaluated implementation framework.

Approach followed for recommendation of an Institutional Framework

The Approach adopted for recommendation of an Institutional Framework is considered in two parts.

- PART ONE- The first part assess two alternatives. It assesses a multi-organisation setup for the ICT sector as against a unified single-body setup. The methodology followed for this is to evaluate how the two alternatives would fare when measured against the Critical Success factors discussed above. As the analysis below shows, a single-body setup is what must result.
- PART TWO- Given that there must be a single-body setup, the second part assesses different types of the single-body setup. Among the types considered are a Council, an Authority, a Board, a Public Limited Company that is government-owned and Public Limited Company that is owned by bodies outside the government. The methodology followed for this is also to evaluate how the five different options would fare when measured against the Critical Success factors discussed above. Again, as the analysis below shows, that a national-level authority is best suited to perform the functions identified with the unified single-body agency.

PART ONE

Table 51 brings out a comparison of the results of the assessment of the two alternatives

A- Multi-Organisation setup for the ICT sector

B- A Single Unified body for the ICT sector

Critical Success Factors	Alternative A- Multi-Organisation setup for the ICT sector	Alternative B- A Single Unified body for the ICT sector
Political Leadership Involvement and Ownership	**Low to Medium**, since political leadership may not be equally interested with equal vigour in all the Organisations. Organisations where the leadership is not as committed may lag	**High**, since it would be easier for the political leadership to be associated with one organisation. Also, being associated with one Organisation enables leadership to be more focused
Multi-stakeholder Involvement and Ownership	**Low to Medium** The same entity from outside the government may be required to become a part of different bodies. Entity may not be equally inclined to contribute fruitfully into ALL different ventures	**High** it is easier for the private firm to become associated and contribute into the same entity, Saves them time
Minimal Duplicity and Maximum Collaboration	**Low to medium**, No matter how well the role allocation is done, there would always be ground for turf issues (duplicity factor). Initiatives often require multi-competency which would then reside in different organisations (collaboration factor).	**High**, All different competencies reside in one Organisation that has a single leadership. Even in the case of a contested piece of work, the leadership would always ensure that the same work is not being performed by two different units of the same organisation
Compatible Employee Skillsets	**Medium** Once rationalisation of Organisational mandate and re-deployment of staff is done, it would substantially increase employee compatibility	**High**, Different units will have their own mandates and they can select their staff accordingly. If ever a compatibility issue arises, it can conveniently be handled by a transfer from one unit to another.
Minimum Professional Culture Shock	**Medium**, No downsizing is expected to result in the new institutional framework vis-à-vis the old one. Incidence of culture shock is greater here for staff who shift from one organisation to another, following rationalisation of mandates	**Medium**, No downsizing expected to result in the new institutional framework vis-à-vis the old one. Incidence of culture shock is a little less here for staff who shift from their old organisation to the new entity, but under a common management
Benefits of Synergy and Economies of Scale	**Low**, Skill sets would be distributed in disparate organisations, each with its own overheads. Problems of coordination would arise whenever competencies that are distributed are required	**High**, Skill sets concentrated in the same single entity. Much less of coordination problems since essentially all skillsets are available under the same roof
Easy and Quick Transition	**Medium**, It would take some time for this transition to be made	**Medium**, It would take some time for this transition to be made
Absorption and Internalisation of External Talent	**Low**, Different organisations all well into their operations and attraction/retention of talents into a well-heeled setup will be difficult	**High**, People would be expecting change anyway. Discomfort arising out of the introduction of a new person at a key level will tend to get overlooked in the maze of other changes that are unfolding
Legal Flexibility	**Low** Difficult to effect changes in legislations for different organisations, with each of them requiring a sitting of the assembly	**High** Only one legislation needs be effected for the particular entity in question and this could be accomplished in one sitting of the assembly itself

Critical Success Factors	Alternative A- Multi-Organisation setup for the ICT sector	Alternative B- A Single Unified body for the ICT sector
Closely monitored and evaluated implement ation	**Low**, Right now no M&E setup exists as such, and coming out with one may require substantial changes to be made	**Medium**, There being no M&E setup in the current framework, one needs to be created in the new framework; however, any discomfort arising out of this will tend to get overlooked

Table 51 NICTSP Organisational Possibility Assessment

It is apparent that Alternative B, where a single, cohesive organisation, is in charge of the complete spectrum of responsibilities, is the obvious answer that would help tide over most of the problems associated with the current institutional framework.

PART TWO- Type of Organisation in a Single Organisation Set Up

Five types of organisational entities have been considered

a. Authority as a parastatal body established by an act of law, managed by a multi-stakeholder Board, chaired by top level political leadership, and legally empowered to regulate and enforce legal provisions.

b. Council managed by a multi-stakeholder Board, led by the top political leadership, and entrusted with regulatory, coordination and promotional activities but not implementation.

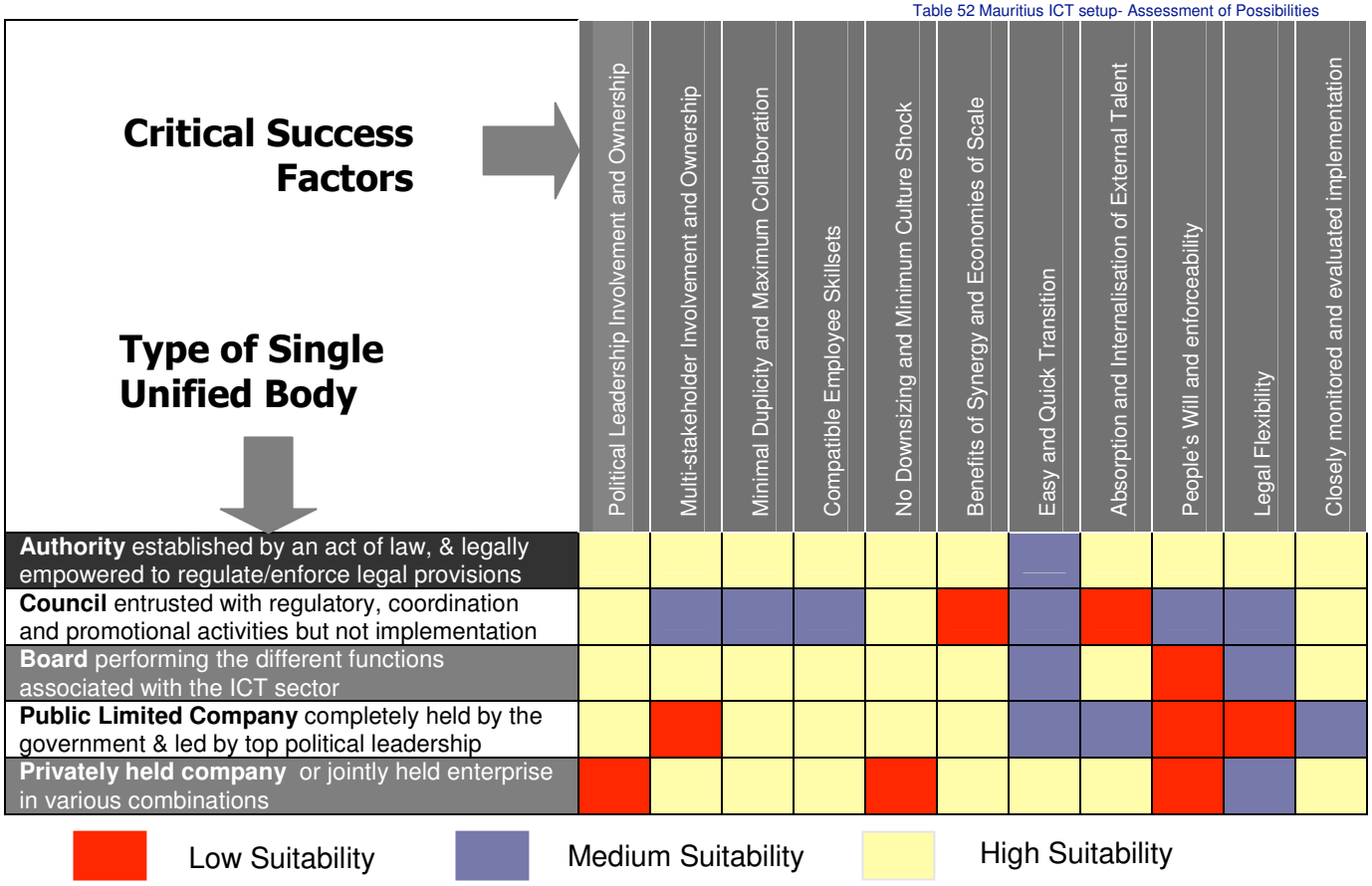
c. Board as a parastatal body, managed by a multi-stakeholder Board established by an Act and led by top political leadership performing the different functions associated with the ICT sector.

d. A public limited company completely held by the government, with a management board that has representatives from the political leadership of the day at key positions, that performs the different functions associated with the ICT sector.

e. A limited company that is profit-oriented and is completely privately held or jointly held by the government and the private sector, with an independent management board and entrusted with performance of different functions associated with the ICT sector.

Table 52 brings out how the five different organisational setups will fare on the different CSFs earlier discussed. As the figure illustrates the Authority as a parastatal body established by an act of law and managed by a multi-stakeholder Board, and chaired by the political leadership of the day is the most suitable option.

Table 52 Mauritius ICT setup- Assessment of Possibilities



Details of the Analysis

Of the five options considered above, the one of a "Privately held company" is ruled out owing to its poor ranking on the parameters of "Political Leadership", "Culture Shock" and "People's Will". Being a profit-driven entity, it would be poorly placed on all of these.

Similarly, a "Publicly held company" would not fare very well on multi-stakeholder representation at the management board level (civil society representation may languish, for example), on legal flexibility requirements and when it comes to enforcing people's will by taking up interventions in which to fulfil larger social responsibility requirements.

The choice then essentially boils down to choosing between a Council, a Board and an Authority. Of the three it is only the Authority which scores reasonably well on all the counts. Whereas a Council may be more of a decision-making, promotion, advisory and regulatory body, it would not delve into execution issues.

A Board, which again is the result of an Act, is not normally a body which would take care of people's will and enforceability requirements, which is a handicap the Authority is unlikely to suffer from. It is easier for authorities to promote, regulate, advise and enforce. Change in work culture, though, necessitated by a movement to either the Board or the Authority is likely to be similar.

Figure 20 Details of Comparison between entities

Recommendation

Given the current institutional setup, it may not be completely realistic to move to the single unified body stage, the "End State" at once. What may be more prudent is to undertake the transition more gradually keeping requirements of change management in mind.

It is recommended that the movement to the "End State" be done in two stages:

- STAGE ONE or the Near Term Institutional Framework, and
- STAGE TWO, or the "End State" Institutional Framework.

Details of this transition are as follows.

STAGE ONE, OR THE NEAR TERM INSTITUTIONAL FRAMEWORK

In this stage, the multi-body setup is retained with some rationalisation taking place towards a more coherent distribution of roles and responsibilities that what is currently the case. Table 53 brings out aspects of this rationalisation. The following are the key points.

The National Computer Board

- The National Computer Board (NCB) will be the main planning and advisory body in the different spheres of involvement of ICT. It will continue with its operations in the areas of ICT business incubation, event hosting, awareness creation etc. However, it would not be doing operations in the sphere of eGovernance for example like the running of the GoC etc.

- The NCB would perform functions in the following areas, and in doing so would be the only body performing these roles with no overlaps with any other entity, except in the sphere of regulation as explained below.
    - Strategic Advisory and Policy
    - Monitoring and Evaluation of initiatives implemented by NCB (whether as part of NICTSP, or outside it)
    - ICT Business Incubation
    - Information Security (all functions except those under ITSU which continues as earlier)
    - ICT Awareness Building and Adoption
    - ICT Statistical Operations and Analysis

The NCB, will take on some new functional areas for performance of its roles, and in doing so would be the only body performing these roles with no overlaps with any other entity. The new areas are the following.

- ICT Educational Interventions, constituted largely by the scope of work as defined under programmes "S4" and "L1", in both of which NCB is a member
- Research, Innovation and Analysis, as constituted by NICTERN, referred to earlier in the report under the programme "S5"
- Country Promotion and Investment for ICT, including functions discussed earlier under the programme "E1"
- Technology Trends and Standards, to be associated with the NICTERN as part of the group's research and analysis work.

Information Security and the CERT-MU

- NCB will be responsible for all awareness creation measures and advisory inputs in the sphere of Information Security

- Additionally NCB will also be responsible for convening meetings of the National Information Security Forum, with representatives from Critical Information Infrastructure areas, that would be providing advisory inputs from functional standpoints in the forum meetings
- The CERT-MU would take responsibility of all operational aspects of information security` and will be housed in the NCB to begin with. However, after the CERT-MU's operations stabilise, the same would be moved to the MITT where it would take charge additionally of Information Security Assurance matters including compliance with guidelines etc. In such capacity the CERT-MU would also have enforcement powers.
- The ITSU may exist as earlier.

The ICT Authority

- The ICT Authority continues with its role as the regulator and would extend advisory inputs only in the sphere of regulation of ICT. However, ICTA would be the only body that would extend advisory inputs in the sphere of regulation and its enforcement, in both of which it would take into full cognisance requirements emanating from developments in convergence.
- In so far as regulatory matters are concerned particularly in relation to telecommunications, ICTA would also continue to perform its functions for "Technology Trends and Standards" as described in Table 53.

eGovernance

Like in ICT regulation, all eGovernance matters, of planning and advisory nature, will now be concentrated and centralised in the eGovernance Cell (EGC) which would be stationed in the Ministry of Information Technology and Telecommunications. The EGC will be the only body performing these roles with no overlaps with any other entity.

- For project management and operations' functions, the EGC will now be completely responsible for operating the Government Online Centre. Other changes recommended to be introduced to render project management and implementation functions are as follows.
    - The project managers of CIB would be associated with and positioned in the respective departments where eGovernment applications are implemented; together with the eGovernance Cell, the project managers (now eGovernance Change Managers in their departments) will take responsibility of implementing eGovernance in their respective departments. They would not be changing their departments, except under extraordinary circumstances which the MITT could define.
    - The CISD staff would also be tied up in small bundles of 5-7 people each for individual departments and would work closely and report to the eGovernance Change Managers who have been positioned there.
    - The top management of the CIB and the CISD will now become a part of the EGC and will need to work together towards delivering eGovernance.
    - A separate exercise will need to be undertaken (already mentioned under the Project "S1P11") which would find out if they, the top management of the CIB and the CISD have the requisite skills required to plan, innovate and implement eGovernance in Mauritius. Outcome of the exercise, in so far as eGovernance is concerned, would be (a) recommending the total strength required for the eGovernance Cell, (b) complete Organisation Chart for the EGC, along with job descriptions for members of the EGC, (d) allocation of roles and responsibilities to top management of CIB/CISD in EGC, and (e) if required, following a study of EGC's mandate, recommending whether an external eGovernance expert would be required or not and in what position within the EGC hierarchy.

- A separate exercise involving HR consultants will be carried out to finalise the placement of CIB and CISD officers in the new eGovernance Cell (EGC) and e-Governance Change Managers organisational set up.

Table 53 Alternative A- Distribution of Responsibilities

Parameter	MITT[90]	NCB	EGC	ITSU	ICTA
Strategic Advisory and Policy Formulation[91]	■	■			■
Regulation and Enforcement	■			■	■
Good Governance through eGovernance			■		
Promoting ICT Awareness and Adoption	■	■			
Country Promotion for ICT and Promotion of ICT Investments	■	■			
Interventions in ICT Education and Education through ICT	■	■			
ICT Statistical Operations and Analysis	■	■			
eGovernance	■		■		
Technology Trends and Standards	■	■			■
Research, Innovation and Analysis	■	■			
ICT Business Incubation	■	■			
Monitoring and Evaluation[92]	■	■	■		
Information Security	■	■		■	

STAGE TWO, OR THE "END STATE" INSTITUTIONAL FRAMEWORK

The following are the key points of this alternative, with reference to the results from our analysis done earlier. There would be one body for the ICT sector, which as discussion above shows will be an "Authority", the National ICT Authority of Mauritius (NICTAM), to take responsibility for all functions of the ICT sector except matters related to regulation which will continue to exist with the ICT Authority.

The following are the key points associated with this recommendation. Reference is also made to the organisation chart shown overleaf (Figure 21).

- NICTAM will have a multi-stakeholder representation in its management board comprising representatives from the private sector, academia (Public sector) and other pubic sector representatives. The management board would also have in its decision-making capacity the heads of the Strategic Business Units into which NICTAM would be divided
- The following are the Strategic Business Units (SBUs) that would constitute the Authority
  - SBU- Planning, Advisory and Research, which will consist of the following sub-units.
    - The National ICT Evaluation and Research Network (NICTERN), that continues as earlier and moves in from NCB
    - The Office of Strategic Advice and Policy, which would be constituted by the Planning, Research and Development Wing of the current NCB and would take charge of all matters related to Strategic Advice and Policy.
    - The Information Security Cell, which would be constituted by staff in NCB working on Information Security aspects of advisory and awareness creation, the ITSU[93] (now in the MITT) and the

[90] MITT- Ministry of Information Technology and Telecommunications, Government of the Republic of Mauritius, NCB- National Computer Board, CIB-Central Informatics Bureau, CISD- Central Informatics Systems Division, EM- Enterprise Mauritius, MITT
[91] As explained above, Strategic Advisory and Policy Formulation in the sphere of ICT regulation will continue to be provided by ICTA. Similarly, in the sphere of adherence to IT Security Guidleines ITSU will continue to extend its functions as earlier
[92] All agencies covered here continue to perform their Monitoring and Evaluation (M&E) roles for their respective activities while the Secretariat to the IMC discussed earlier performs M&E functions in so far as they are related to NICTSP programmes and projects

CERT-MU. Together they would take charge of all matters related to Information Security. The cell would also convene meetings of the NISF as earlier, and, being part of an Authority will have enforcement powers.

- The Monitoring and Evaluation Cell (M&E Cell) which would be responsible for continual monitoring and evaluation of all programmes and projects underway as part of strategic plans (the current and subsequent ones). The M&E Cell would be made up by the Secretariat to the IMC of NICTSP.

- SBU-Operations which would take responsibility of all functions associated with eGovernance Cell and which will be made up by the EGC itself.

- SBU-Country Promotion and ICT Awareness which would take responsibility of all functions associated with spreading awareness of ICT adoption benefits, matters related to business incubation in ICT and general country promotional aspects related to ICT. The SBU will be constituted by the following units.
  - Centre for Incubation, to be completely responsible for all matters related to ICT Business Incubation, and will be made up by the ICT Incubator Centre moving in from NCB.
  - Country Promotion Cell, responsible for the promotion of Mauritius at regional and global levels in coordination with other public and private Organisations of the ICT sector and would be constituted primarily by the Business Development and Promotion Division of the current National Computer Board.
  - Awareness Building Unit, which will be responsible for all matters related to increasing the uptake of ICT in the country among businesses and society and will be constituted by the ICT Culture Promotion unit of the NCB.

- The "Centre for Good Governance through eGovernance" will be operationalised as a new initiative to enforce the Code of Good Governance through eGovernance, and will be an independent body though reporting to the Chairperson of NICTAM.

[93] Alternatively since ITSU renders its functions in the sphere of bringing about adherenece to IT Security principles and guidelines related to IT Security for government officials, it could also move into the SBU "Operations" that is constituted by the eGovernance Cell.

NATIONAL ICT AUTHORITY OF MAURITIUS

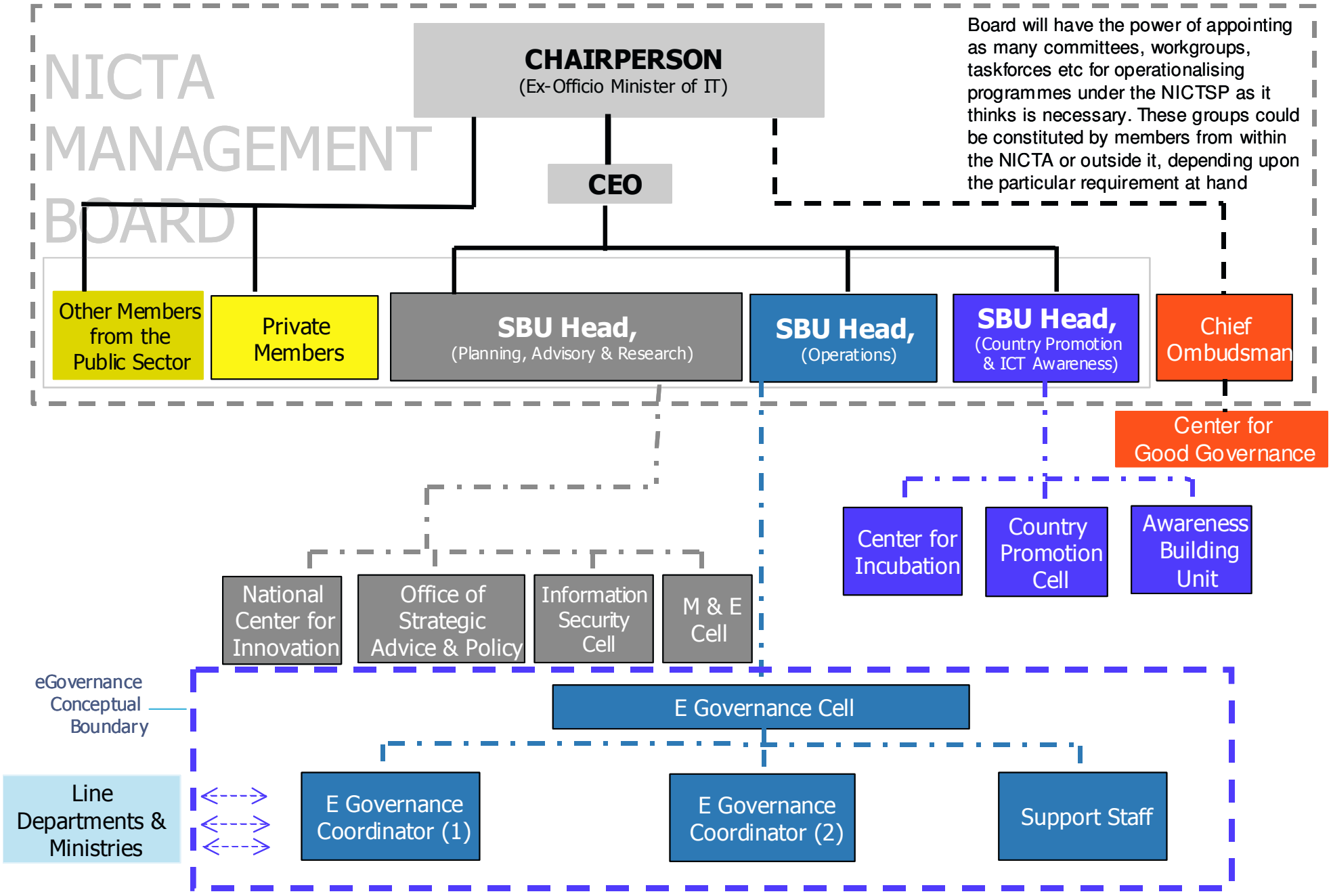
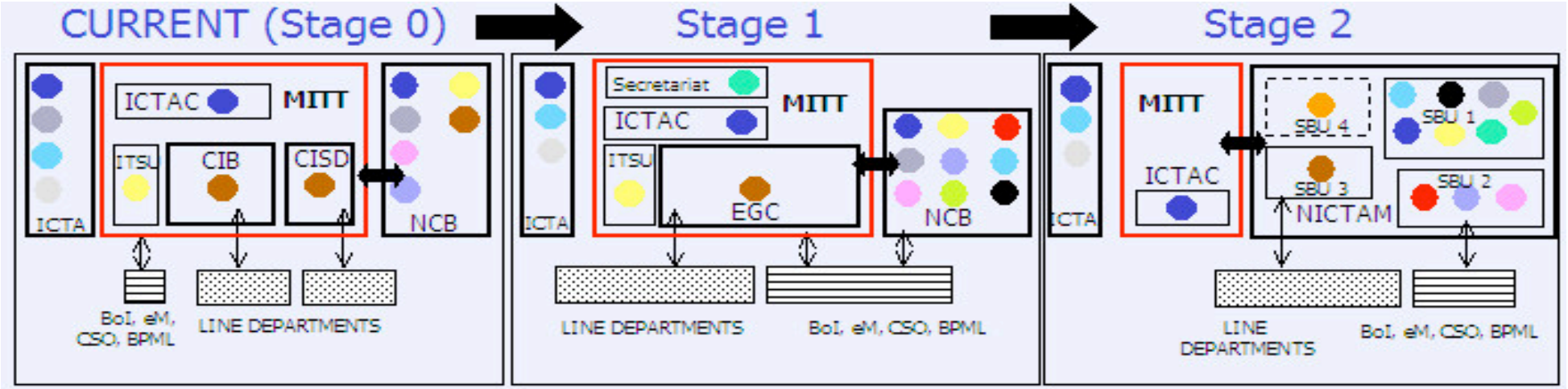


Figure 21 NICTAM Organisation Chart

Summarising and Illustrating the Transition from the Current Institutional Setup to the "End State" of NICTAM

Figure 22 captures essentials of what has been discussed above and illustrates the transition from the current state to the "end state" of the National ICT Authority of Mauritius as described above.



- ICT Educational Interventions
- Strategic Advisory & Policy
- Monitoring & Evaluation
- Research, Innovation and Analysis
- Incubation
- Country Promotion and Investment for ICT
- Information Security
- ICT Awareness Building
- Ombudsperson
- eGovernance
- ICT Regulation
- ICT Statistical Analysis
- Technology Trends and Standards

MITT:	Ministry of Information Technology and Telecommunications
NCB:	National Computer Board
ICTAC:	ICT Advisory Council
ITSU:	IT Security Unit
EGC:	eGovernance Cell
CIB:	Central Informatics Bureau
CISD:	Central Information Systems Division
BoI:	Board of Investment
eM:	Enterprise Mauritius
CSO:	Central Statistics Office
BPML:	Business Parks of Mauritius Ltd.
Secretariat:	NICTSP Implementation Secretariat
SBU1:	Planning Advisory and Research, NICTAM
SBU2:	Country Promotion for ICT and ICT Awareness, NICTAM
SBU3:	eGovernance Cell, NICTAM
SBU4:	Office of the Chief Ombudsperson (associated with eGov)

Figure 22 Transition from the Current State to the End State

The following constitute the salient points for the transition from
(a) "Stage 0" to the "Stage 1", and
(b) "Stage 1" to the "End Stage" or the NICTAM

(a) "Stage 0" to the "Stage 1"

Key points associated with the transition are

The spectrum of functions to be rendered stand identified, as earlier described in Figure 21.

Bodies to deliver functions are uniquely identified

- The ICTA continues with its functions in the "Regulatory and Enforcement" domain. However, activities in the domain of ICT statistical analysis undertaken by the ICTA are now taken up by NCB. Modalities to effect this transfer are worked out.
- The NCB continues with its earlier functions, but adopts some new functional areas which it must take up, as described earlier.
- However, the NCB discontinues its functions in the area of eGovernance like the Government Online Centre and hands it over to the eGovernance Cell.
- An eGovernance Cell is constituted to lie in the MITT which would render all planning, advisory, monitoring and associated functions related to operationalising eGovernance in Mauritius.
- The CIB project managers move to their respective departments where they are stationed and are made responsible for implementation of eGovernance in their respective departments. A CIB project manager now becomes the eGovernance Change Manager in his/her respective department.
- The CISD staff also move in with project managers in bundles of 5-7 people and, together with eGovernance Change Manager become responsible for implementation of eGovernance in respective departments.
- The top management of both the CIB and the CISD now move in and together constitute the eGovernance Cell in the MITT. An exercise is undertaken to identify (a) the requisite skill sets required for the eGovernance Cell, (b) based on this drafting out Job Descriptions for the different members of the eGovernance Cell, and their reporting relationships etc, and (c) if, beyond the skillsets represented by the top management of the CIB and the CISD, any new skillsets are required, a decision is taken on either upskilling senior members of the CIB and CISD, or inducting new resources from outside. In other words, this exercise will result in the allocation of CIB and CISD personnel amongst the eGovernance Cell and the departments where eGovernance will be implemented. After this exercise, the EGC will stand completely defined.
- Both CIB and CISD cease to exist as earlier, and their top managements get merged to become the EGC, as discussed earlier.
- Since many of the new functions entrusted with the NCB do not fall as such in the mandate set out for it in the NCB Act, 1988, an exercise is undertaken to recommend amendments, if any to the said Act, including particularly the following domains
    - Information Security
    - ICT Statistical Operations and Analysis
    - Country Promotion and Investment for ICT
    - Technology Trends and Standards
    - Monitoring and Evaluation of the general efficacy of initiatives taken up in the ICT sector

(b) "Stage 1" to the "End Stage" or the NICTAM

- There is no impact on the ICTA

- The NCB as such as in “Stage 1” ceases to exist and, in its place, the National ICT Authority of Mauritius is formed with a much expanded role compared to what obtained for NCB in “Stage 1”
- The NICTAM is constituted by the four SBUs as defined earlier. A comprehensive Organisation Design with detailed Job Descriptions for officials of the NICTAM is worked out (Project “S1P11”). Necessary legislation required for this is also put in place.
- The NICTAM’s four SBUs are constituted by personnel sourced from bodies as described earlier.
- The eGovernance Cell merges into NICTAM.
- ITSU too merges into NICTAM as described earlier
- Necessary collaborative arrangements with entities like BoI and EM are worked out to make for streamlined operations.

9. Conclusion

As a successor to the earlier NITSP (1998-2005), the NICTSP (2007-2011) should be seen as a blend of reactive as well as proactive interventions towards influencing the socio-economic course of action for Mauritius. Though the seeds of the exercise were sown about 10 years ago, emerging economic realities in recent times decisively influence the recommendations made in the plan. They also threaten it with a sense of urgency.

The challenges for Mauritius in realising the ICT vision are manifold, and include,

- the constraint of a restricted supply of quality ICT manpower that would be the very fuel for an ICT-powered economy, not just in terms of the numbers in which they are available but also in the skill sets and abilities imbued in them through the educational process;
- sub-optimal levels of collaboration not just between sectors but also among entities in a sector itself, have not so far resulted in efforts being taken to their logical fruition; the results are often much less than what they could be;
- a steep cultural resistance to online transactions, owing primarily to ICT not having become a part of everyday life presents itself as a hurdle that needs to be surmounted, though in degrees; and
- a less than required acceptance of ICT not only as a career choice by the society but also as a stream at par with the other tracks of the economy is something that will need to be overcome.

Compounding the above challenges for Mauritius is the fact that, as an island nation, complexities it faces multiply even as the options available shrink. With the withdrawal of hitherto prevalent preferential trade regimes, the emergence of new and more competitive players in the international arena, and ICTs coming as a boon to some even as it threatens to leave many others behind, Mauritius cannot but look at ICT as a means to power its economy and take itself up the socio-economic ladder.

The SCALE framework gives us five broad strategic areas of thrust in which to pursue initiatives. The next deliverable, the Action Plan Report, supplies in detail the activities to be taken up within the framework of an actionable plan with loosely coupled interdependencies. As has been said earlier, if the holistic approach of the NICTSP strategy is its hallmark, a breach in adherence may well be a reason for the plan not doing as well as expected. Even as it is realised that getting the combined buy-in of all the stakeholders in the plan is not an easy task, every effort must be made to avert the possibility of the plan being implemented only in parts. Constructive collaboration is the main mantra and well coordinated and monitored efforts by stakeholders the chief instrument of delivery.

However, evolutionary, as against revolutionary, being the approach, the emerging situation needs to be visited as soon and as frequently as it may be affordable to discover emerging glitches, iron them out and identify new realities that surface.

10 Annexure I

ANNEXURE I : National Information Security Strategy

The National Information Security Strategy Plan (NISSP) is an important part of the Government's information society policy. Its main purpose will be to combat threats to information security. The NISSP will provide a common platform for the information security efforts of the Government, businesses, Organisations and individual citizens.

Information Security Concerns

The Information Society

Today's information society is epitomised by everyone now being able to send and receive vast quantities of information quickly, over great distances and at a low cost. At the same time, almost everyone can also access an infinite amount of information, knowledge and facts in a rapid manner. Rapid escalation in the level of e-business deployment leads to a multitude of electronic services currently available on the market today – and so far we have only scraped the tip of the iceberg in terms of developments within this area. The deployment of information technology has permeated almost every activity within society.

The risks are increasing in scope

Ubiquitous use of information technology has made society vulnerable within a variety of new areas. Malicious attacks on information systems can cause serious damage and disruption in normal services, e.g. in the form of unauthorised access, virus spreading and denial of service. Attacks can be mounted at any time, against anyone and from anywhere. In other words, society is facing completely new security challenges, the gravest of them being identifiable states' or factions' capabilities to organise and launch co-ordinated IT attacks with the intention of paralysing critical functions in a society. Beyond deliberate malicious attacks, vulnerability can also be attributable to inadvertent incidents – resulting from sheer carelessness or user ignorance. Vulnerability can also be increased by extreme weather conditions, such as floods and thunder storms, which also can have an effect on the scope of risk. Instability in information systems can also undermine confidence and thus inhibit widespread use of IT as a tool for creating new business opportunities.

Key challenges facing the information society

Identification of Critical Information Infrastructures

Information infrastructures can be described as critical if functionality of society, enterprises or individuals is severely affected by such a system's failure. It is imperative to identify these systems and gauge their position on a criticality scale. This is a prerequisite for risk assessments and implementation of critical protective measures. One distinct challenge here will involve identifying and securing infrastructures that are critical for the functioning of the society as a whole.

Securing critical IT infrastructures

Enterprises' security measures should be scaled according to an assessment of the identified risks. However, the challenge here will be to define a comprehensive set of generic criteria for securing critical functions in the society, partly because they differ so greatly. A generic set of common security measures will take care of the basic protection. Then, additional security measures at national, regional and local level can be implemented in particularly high-risk situations. Security should include measures on physical, logical, and administrative levels. The development of suitable codes of best practice / standards in this area will undoubtedly pose a challenge.

Secure e-transactions

Far more extensive use of cryptography is recommended if in order to strengthen trust and confidence in electronic communication, e.g. to ensure that financial transactions are indeed secure and that private communications remain private. However, there is a potential drawback to private individuals or enterprises using advanced cryptography to protect their own information against unauthorised access, as this could obstruct police investigations into serious crime and cyber terrorism. These considerations must be weighed carefully against each other.

Drawing up regulations

National legislation, regulations and guidelines on information security have been developed over time and are based on a variety of needs. Many enterprises are obliged to follow several different types of regulations when they process many different kinds of information. It is therefore important to ensure that relevant regulations accommodate various security needs and take privacy into sufficient consideration. Development of new, and amendment of already existing, regulations shall be done in such a way as to make enforcement as easy and straightforward as possible.

Enterprises' focus on security

The management is primarily responsible for assuring an enterprise's assets, whether on behalf of society or the enterprise itself. The employees must be made aware of the substantial financial damage that could occur if there is a security breach. Large and middle-sized companies need to set up an in-house IT-security unit / task force with clearly defined responsibilities. The management ought to allocate adequate resources for security work. The companies without an in-house security unit / task force must see to it that the company commands enough skills to be able to assure adequate IT-security by engaging the services of external security experts. Security consequences of outsourcing of IT services need also to be evaluated. Clear lines of responsibility must exist for those implementing the IT-security measures and those auditing the actual implementation.

Emerging Security Risks

Increasing use of laptops, mobile phones and PDAs with Internet access are bringing new risks for businesses. Broadband technology enables IT equipment to stay "always on". Exchanging and synchronising data between portable and stationary units is becoming easier all the time. All this creates new challenges connected with uncontrolled information exchange and results in increased vulnerability and exposure to potential new types of attack.

A culture of security in society

We need to establish a culture of security in enterprises, public sector and the citizens, linked to the use of IT. A lot of users are not aware of the risks arising from using an information network. Many do not know of existing solutions for avoiding potential threats. This makes it difficult for an individual to assess the risks associated with Internet access. This also indicates a need to raise users' awareness of security threats and improve their skills in dealing with them. Safe use of the Internet has also an ethical dimension. This exacts new demands on acceptable ethical codes of conduct both on the part of Internet service providers and users themselves.

2. Principles of the National Information Security Strategy

The World Summit on Information Society Geneva Declaration of Principles states "strengthening the trust framework, including information security and network security, authentication, privacy and consumer protection, is a prerequisite for the development of the Information Society and for building confidence among users of ICTs". It further states that

a "… global culture of cybersecurity needs to be actively promoted, developed and implemented in cooperation with all stakeholders and international expert bodies".

The WSIS Action Line C5 recommends that member states implement measures along the following areas for Information Security:-

- Critical information infrastructure protection;
- Promotion of a global culture of cybersecurity;
- Harmonising national legal approaches, international legal coordination & enforcement;
- Countering spam;
- Developing watch, warning and incident response capabilities;
- Information sharing of national approaches, good practices and guidelines;
- Privacy, data and consumer protection.

The National Information Security Strategy is thus based on the WSIS Action Line C5 of the Geneva Declaration.

National Information Security Vision and Objectives

The National Information Security Strategy (NISS) is an important part of the Government's ICT policy.

The vision for Information Security is aligned with the ICT vision is to "Transform Mauritius into an information-secure society, which supports the development of a trustworthy and competitive information economy"

The NISS will provide a common platform for the information security efforts of the Government, businesses, Organisations and individual citizens. The main goal of the NISS is to build trust and security in the use of ICTs.

The main objectives of the NISS are to:-

- Streamline and improve co-ordination on the implementation of information security measures at the national and international level;
- Protect critical information infrastructure from disruption through security breaches;
- Promote information security risk management and adoption of Information Security Standards at national level;
- Establish a framework for implementation of information assurance in critical sectors of the economy such as public utilities, telecommunications, transport, tourism, financial services, public sector, manufacturing and agriculture and developing a framework for managing information security risks at the national level;
- Establish an institutional framework that will be responsible for the monitoring of the information security situation at the national level, dissemination of advisories on latest information security alerts and management of information security risks at the national level including the reporting of information security breaches and incidents;
- Promote secure e-commerce and e-government services;
- Safeguard the privacy rights of individuals when using electronic communications and
- Improving awareness and competence in information security and sharing of best practices at the national level through the development of a culture of cyber security at national level.

National Information Security Strategy Measures

The measures of the NISS are based around the following areas of focus:-

A. Information Security co-operation at national and international level
B. Information Security Awareness and Education
C. Trust and Confidentiality

D. Information Security Risk Management
E. Internet Governance
F. Information Assurance

Information Security Cooperation at national and international level

The purpose of the National Information Security Strategy is to influence the creation of standards, policy guidelines and cooperation for promoting information security and to ensure that the division of responsibilities between the various actors in the field of information security is clear.

To this effect, it is proposed that a National Information Security Committee be set up under the aegis of the Ministry of IT and Telecommunications, including representatives from NCB, ICT Authority, operators of critical information infrastructure and regulatory bodies of other sectors to monitor the implementation of the measures of this Strategy, review and make proposals to update each regulatory authority's legislation impacting Information Security, propose clear cut guidelines for Information Security implementation in private sector and make proposals to Government for updating the Strategy after three to four years.

A working group will be set up reporting to the National Information Security Committee to provide status on information security and business continuity preparedness and national risk profiling on a regular basis. Operators of critical information infrastructure would also be represented in the working group. Closer collaboration with countries enjoying a more advanced culture of security will also be considered.

Information Security Awareness and Education

In a secure information society, everyone must be aware of the information security risks of their actions and of their responsibility in preventing these risks. The National Information Security Strategy is intended to raise the level of competence by investing in the expertise of information security professionals on one hand and in the general awareness of information security of all actors on the other.

All participants shall be made aware of potential threats, options, limitations and necessary action to advance establishment of a culture of IT security. The Government will promote awareness in this respect. All individuals are, however, responsible for obtaining necessary knowledge themselves, and to ensure compliance with the relevant legislation. Failure to gain essential knowledge could be detrimental to others, for which one could be held legally liable.

The following measures are proposed to this effect:-

- Implement a National Information Security Awareness campaign targeting people in the workplace, public sector, students and general public to increase the awareness of individuals regarding information security issues by distributing factual information, producing info spots and incorporating information security education at all school levels. Distribute best practices for raising awareness to all educational institutions.
- Review of curriculum for Computer Science and related subjects at Tertiary Level to include relevant information pertaining to needs of industry and businesses with regards to information security;
- Devise means for increasing number of professionals with Information Security Professional Qualifications (such as CISSP, CISA amongst others)

- Top management in private companies and public sector organisations are responsible to ensure their organisation have the necessary skills within Information Security based on well defined needs, and the organisation is committed to skills-promoting measures for its employees on Information Security.
- Suppliers of IT systems shall aim at transparency in informing customers with the level of security that their product can guarantee, under given circumstances. Suppliers should also follow internationally recognised security standards and provide support to users in the event of fault situations. Service Providers who place IT equipments and systems at the disposal of others should follow internationally recognised benchmarked security standards, defining security attributes as well as clarifying responsibilities held by the equipment's owner and its users
- Promote setting up of internationally recognised Information Security Association and local chapters of Internationally recognised bodies in the field
- Promote cooperation between industry and academia on knowledge sharing in information security areas through the holding of regular annual conferences on Information Security targeting major players and participants in the region.

Trust and Confidentiality

Building an information society with information security cannot happen at the expense of the fundamental rights and liberties of individuals and other actors. In a secure information society, all actors must be able to trust that their information and messages are processed and stored with confidentiality and will not be disclosed to unauthorised parties. Furthermore, everyone must have easy access to information for which they have authorisation.

To this end, the following measures will be implemented:

- The provisions under the Data Protection Act shall be implemented.
- Ensure that freedom of speech, confidentiality of communications, protection of privacy and other fundamental rights are taken into account in the legislation, official instructions and standards relating to information society services, electronic communications and information security, and in e-transactions services provided by public authorities;
- Establish a consultative process towards building a National Cryptography Policy;
- Implement appropriate mechanisms for the setting up of a Mauritian Public Key Infrastructure (PKI), including Controller of Certification Authority (CCA) for certifying local Certificate Authorities (CA). A Government PKI will be set up for the implementation of secure e-government services.

Information Security Risk Management

There is a need to provide greater transparency on how information security is handled in Organisations to improve trust and give comfort to users. In addition, monitoring of compliance to information security controls is done mainly at the level of the large organisations and Information Security standards has been adopted by the public and some large organisations mainly.

In Mauritius, there is no institution performing the role of a Computer Emergency Response Team (CERT) as is the case in other countries such as US, UK, India and Australia amongst others. To fight the increasing incidents of cybercrime, a vast majority of countries around the world have set up their own CERTs. The role of a CERT is to work with the Internet community to facilitate response to computer security incidents, to take proactive steps to raise the community's awareness of computer security issues, and to conduct research targeted at improving the security of

existing systems. Moreover, in case of national disaster, the leadership responsible for measures related to preparedness and recovery for the national economy is not clear.

The following measures are proposed:-

- Set up a Mauritian CERT, (CERT-MU) for monitoring the national situation in information security risks, and constantly updated to provide timely information on the national situation to the major stakeholders CERT-MU will also be involved in activities such as Critical Information Infrastructure Protection and performing information security risk profiling and convey information on them and required counter-measures to all stakeholders. CERT-MU will be represented in the National Information Security Committee as well to provide status on the information security preparedness at national level.;
- A common set of criteria will be created to facilitate identification of critical IT infrastructures and systems. A method will be devised for risk and vulnerability assessments. The sectors will outline quality assurance standards for confidentiality, integrity and availability. The government will stimulate the development of security models, tools and mechanisms for risk analysis in order to encourage more efficient and user-friendly handling of IT security implementation.
- Security categorisation of information and security standards for private companies information processing should be adopted as far as possible.
- Information Security standards will be implemented in the Civil Service and parastatal organisations.
- Set up a working group responsible for identifying and monitoring critical information infrastructure protection under the National Information Security Committee.
- Set up a framework for monitoring Internet traffic which might be harmful to the nation and society;
- Promote the adoption and compliance to Information Security standards across the critical sectors of the society including SMEs.

Internet Governance

The main components under the WSIS Action Line C5 for Security issues of Internet Governance pertain to the problem of spamming, new forms of cyber crimes such as phishing, and safety of children online.

The measures to this effect are as follows:-

- Implement the recommendations of the Anti-Spam Action Plan;
- Enact appropriate legislations to counter the problem of spamming, new forms of cybercrimes such as phishing and to protect children online.
- Develop a Child Safety Action Plan, which will provide a roadmap for the protection of children and consumers online.

Information Assurance

Current status shows that, in few sectors, there is a reasonable number of documented policies and processes on information security. However there is a noticeable lack of monitoring of its compliance. In sectors, like, banking and financial sector, where there is a regime of strict and mandatory compliance, assurance activities on Information Security compliances are carried as per the requirement.

There is a unanimous concern that mandatory compliance and assurance processes would be a harsh financial burden on SMEs or small organisations. International Information Security standards could be tailored to reduce this

burden. Moreover, in the initial stages, only critical sector organisations be targeted for a mandatory Information Assurance which would subsequently widened to all organisations after a specific timeframe.

Thus the broad objectives of this area of focus would be to:

a. Ensure that procedures and information security controls in place and are complied with.
b. Provide a high degree of confidence the appropriate security controls are being effectively put in place for critical information infrastructure, which would minimise any disruptions in case of security breaches.

It is proposed to adopt the National Information Security Assurance Framework similar to the one implemented in India. To meet the above objectives, the following measures will be implemented:

- Promote the adoption of Information Security Standards at the National Level.
- Develop and implement a National Information Security Assurance Program (NISAP) for the public sector and for Organisation operation Critical Information Infrastructure. The salient features of this programme will be as follows:-
    - Government and critical infrastructure organisations (public or private) must have a security policy and nominate a point of contact;
    - Mandatory requirement for organisations to implement security controls and report security incidents to CERT-MU;
    - CERT-MU will create and maintain a panel of auditors of IT security, including penetrations testing and vulnerability assessment;
    - All organisations must be subject to third party audit from the panel once a year and whenever major configurations change; and
    - Security compliance to be reported to CERT-MU on a periodic basis

11. List of Abbreviations

AHRIM	Association hôteliers et restaurateurs de L'île Maurice
ASMH	Association of Small and Medium sized Hotels
BOI	Board of Investment Mauritius
BPML	Business Parks of Mauritius Ltd
BPO	Business Process Outsourcing
CCA	Controller of Certification Authorities
CERT	Computer Emergency Response Team
CIB	Central Informatics Bureau
CISD	Central Informatics Systems Division
COMESA	Commonwealth of Middle, East and Southern African States
COTS	Commercial Off the Shelf
CSO	Central Statistics Office
DBM	Development Bank of Mauritius
DOI	Digital Opportunity Index
DPC	Data Protection Commissioner
EGC	eGovernance Cell
EID	Electronic Identification Systems
EM	Enterprise Mauritius
ETA	Electronic Transactions Act
EU	European Union
GoM	Government of Mauritius
GPS	Global Positioning System
HORTIS	Horizontal Transfer of Indigenous Solutions
HRDC	Human Resource Development Council
IBA	Independent Broadcasting Authority
ICT	Information and Communication Technology
ICTA	Information and Communication Technology Authority
ICTAC	Information and Communication Technology Advisory Council
IMC	Inter-Ministerial Committee for the Implementation and Monitoring of the NICTSP
IS	Information Security
ISP	Internet Service Provider
ITES	Information Technology Enabled Service
ITS	Information Technology Service
ITSU	Information Technology Security Unit
MACOSS	Mauritius Council of Social Services
MAGRIS	Mauritius Agricultural Resource Information System
MDG	Millennium Development Goals
MISCC	Ministry of Industries, SMEs, Commerce and Cooperatives
MITIA	Mauritius IT Industry Association
MITT	Ministry of Information Technology and Telecommunications
MoAC	Ministry of Arts and Culture
MoAF	Ministry of Agro-Industry and Fisheries
MoEHR	Ministry of Education and Human Resources
MoHQL	Ministry of Health and Quality of Life
MoLIRE	Ministry of Labour, Industrial Relations and Employment
MOST	Mauritius Offshore Services Team
MoTL	Ministry of Tourism and Leisure
MoWRCDCP	Ministry of Women's Rights, Child Development and Consumer Protection
MPL	Mauritius Posts Ltd
MQA	Mauritius Qualifications Authority
MT	Mauritius Telecom
MTPA	Mauritius Tourism Promotion Authority
NCB	National Computer Board

NGN	Next Generation Network
NGO	Non-Governmental Organisation
NICTAM	National Information and Communication Technology Authority of Mauritius
NICTERN	National Information and Communication Technology Evaluation and Research Network
NICTSP	National Information and Communication Technology Strategic Plan, 2007-2011
NRI	Network Readiness Index
NWEC	National Women Entrepreneur Council
OEM	Original Equipment Manufacturer
PCT	Programme Committee/ Taskforce
PIAP	Public Internet Access Point
PKI	Public Key Infrastructure
PoC	Proof of Concept (Prototype)
PPP	Public Private Partnership
RFID	Radio Frequency identification Device
RFP	Request for Proposal
SADC	South African Development Community
SBU	Strategic Business Unit
SEHDA	Small Enterprise and Handicrafts Development Authority
SIMC	Secretariat to the Inter Ministerial Committee for the NICTSP
SLA	Service Level Agreement
SLO	State Law Office Mauritius
SME	Small and Medium Enterprise
SMEF	Small and Medium Enterprises Federation
SMME	Small Medium and Micro Enterprise
TEC	Tertiary Education Commission
UNCITRAL	United Nations Convention on International Trade and Law
UNDP	United Nations Development Programme
UoM	University of Mauritius
UTM	University of Technology Mauritius
WWTE	Worldwide Travel Exchange

About the Exercise

The NICTSP was an extended collaborative exercise carried out from October 2006 to July 2007 involving ten Working Groups in the areas of ICT Domestic, ICT Exports, ICT Manpower Development and Planning, eGovernance, ICT for Social Development, ICT for Sectoral Exploitation, Information Security, Emerging Technologies Applications and Standards, Infrastructure and Electronic Communications, ICT Policy Regulatory and Institutional Framework.

PricewaterhouseCoopers India was the global consultant appointed for the exercise.

The exercise was supervised by the Technical Advisory Committee, chaired by the Chairman, National Computer Board, Mauritius and reviewed by a Steering Committee, chaired by the Hon'ble Minister, Ministry of Information Technology and Telecommunications, Government of the Republic of Mauritius, and co-chaired by the Country Head, United Nations Development Programme, Mauritius.

The exercise resulted in three main deliverables besides several working papers in the interim. The three main deliverables were

- The Final Analysis Report;
- The Strategic Framework Report; and
- The Action Plan Report.

NICTSP

2007-2011