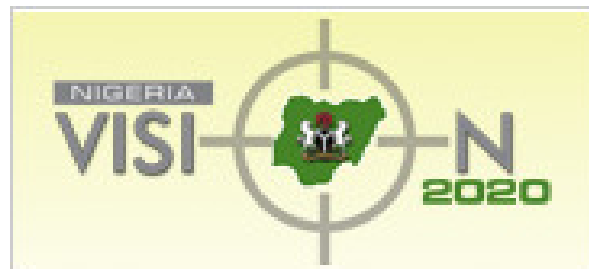




Report of the Vision 2020
National Technical Working Group

**Information and Communication
Technology**



October, 2009



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LIST OF ABBREVIATIONS

S/N	ABBREVIATION/ ACRONYM	DEFINITION
1	ADB	African Development Bank
2	ADSL	Asymmetric Digital Subscriber Line
3	AISI	African Information Society Initiative
4	ARCEDEM	African Regional Centre for Engineering Design and Manufacture
5	ARCIS	African Regional Centre for Information Science
6	ASP	Application Service Providers
7	BPO	Business Process Outsourcing
8	BPSR	Bureau of Public Service Reforms
9	CANI	Computer for All Nigerian Initiatives
10	CAT	Centre of Adaptation for Technology
11	CBN	Central Bank of Nigeria
12	CCC	Community Communication Centres
13	CDMA	Code Division Multiple Access
14	CERDI	Center for Energy Research and Development
15	CFIN	Computer Forensic Institute of Nigeria
16	CMM	Capability Maturity Model
17	CMMI	Capability Maturity Model Integration
18	COTS	Commercial Off the Shelf Software
19	CPN	Computer Professionals Registration Council of Nigeria
20	CPU	Central Processing Unit
21	CSP	Content Service Provider
22	DBI	Digital Bridge Institute
23	DSL	Digital Service Line
24	EFCC	Economic and Financial Crimes Commission
25	EMDI	Engineering Materials Development Institute
26	EMIS	Education Management information system
27	ETF	Education Trust Fund
28	EU	European Union
29	FCT	Federal Capital Territory
30	FDI	Foreign Direct Investment
31	FIRS	Federal Inland Revenue Service
32	FGN	Federal Government of Nigeria
33	FIIRO	Federal Institute for Industrial Research
34	FMCI	Federal Ministry of Commerce & Industry
35	FME	Federal Ministry of Education
36	FMI&C	Federal Ministry of Information and Communication
37	FMJ	Federal Ministry of Justice
38	FMF	Federal Ministry of Finance
39	FMS&T	Federal Ministry of Science and Technology
40	FOI	Freedom of Information
41	FRSC	Federal Road Safety Commission
42	FY	Financial Year

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S/N	ABBREVIATION/ ACRONYM	DEFINITION
43	G2B	Government-to-Business
44	G2C	Government-to-Citizen
45	G2G	Government-to-Government
46	GBps	Gigabit per second
47	GDP	Gross Domestic Product
48	GII	Global Information Infrastructure
49	GIS	Geographic Information Systems
50	GITR	Global Information Technology Report
51	GPS	Global Positioning Systems
52	GSM	Global System for Mobile Communication
53	IBM	International Business Machine
54	ICT	Information and Communication Technology
55	ICT4D	Information And Communication Technology for Development
56	IDI	Information Technology Development Index
57	IPR	Intellectual Property Right
58	ISO	International Standards Organisation
59	ISPs	Internet Service Providers
60	IT	Information Technology
61	ITU	International Telecommunications Union
62	KICTDA	Kano State Information and Communication Technology Development Agency
63	KIICT	Kano State Institute of Information and Communications Technology
64	KPI	Key Performance Indicator
65	KPO	Knowledge Process Outsourcing
66	LAN	Local Area Network
67	LASGEMS	Lagos State's Government Education Management System
68	LII	Local Information Infrastructure
69	LLU	Local Loop Unbundling
70	MAN	Metropolitan Area Network
71	MBps	Megabit per second
72	MDAs	Ministries, Departments and Agencies
73	MFA	Ministry of Foreign Affairs
74	MHz	Mega Hertz
75	MInfSc	Master in Information Science
76	MMDS	Multichannel Multipoint Distribution Service
77	MNCs	Multinational Corporations
78	Mphil	Master in Philosophy
79	NA	Not Available
80	NACETEM	National Center for Technology Management
81	NARICT	National Research Institute for Chemical Technology
82	NASRDA	National Space Research and Development Agency
83	NASS	National Assembly
84	NBS	National Bureau of Statistics
85	NBTE	National Board for Technical Education

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S/N	ABBREVIATION/ ACRONYM	DEFINITION
86	NBC	National Broadcasting Commission
87	NCC	Nigerian Communication Commission
88	NCCE	National Commission for Colleges of Education
89	NCoC	Nigeria Copyright Commission
90	NCS	Nigeria Computer Society
91	NEARNet	The Nigerian Education, Academic and Research Network
92	NEEDS	National Economic Empowerment Development Strategy
93	NeGST	National e-Government Strategies Agencies
94	NEPC	Nigeria Export Promotion Council
95	NEPC	Nigerian Export Promotion Council
96	NERDC	National Education Research and Development Council
97	NGFL	National Grid for Learning
98	NGOs	Non-Governmental Organizations
99	NHIS	National Health Insurance Scheme
100	NICEP	National Information Communication Education Programme
101	NIGCOMSAT	Nigeria Communication Satellite
102	NII	National Information Infrastructure
103	NIMC	National Identity Management Commission
104	NIPC	Nigeria Import Promotion Council
105	NITDA	National Information Technology Development Agency
106	NITDF	National Information Technology Development Fund
107	NITEL	Nigerian Telecommunication Limited
108	NJC	National Judicial Council
109	NLB	National Library Board
110	NMC	National Mathematical Centre
111	NNPC	Nigerian National Petroleum Corporation
112	NOTAP	National Office for Technology Acquisition and Promotion
113	NPC	National Planning Commission
114	NPF	Nigerian Police Force
115	NPS	Nigerian Prison Service
116	NRI	Networked Readiness Index
117	NSDI	National Software Development Initiative
118	NSDTF	National Software Development Task Force
119	NTWG	National Technical Working Group
120	NUC	Nigerian University Commission
121	NUNET	The Nigerian Universities Network
122	NV20:2020	Nigeria Vision 20: 2020
123	OAGF	Office of Accountant General of the Federation
124	OHCSF	Office of the Civil Service of Federation
125	PCs	Personal Computers
126	PENCOM	Pension Commission
127	PgMO	Programme Management Office
128	PhD	Doctorate degree
129	PjMO	Project Management Offices
130	PLR	Policy, Legal and Regulatory

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S/N	ABBREVIATION/ ACRONYM	DEFINITION
131	PMO	Project Management Office
132	PolyNet	Polytechnics Network
133	PPP	Private Public Partnership
134	PRODA	Project Development Institute
135	PTOs	Private Telephone Operators
136	R&D	Research and Development
137	RMRDC	Raw Materials Research and Development Council
138	SAT3	Satellite 3
139	SEDI	Scientific Equipment Development Institute
140	SEI	Software Engineering Institute
141	SGF	Secretary to the Government of the Federation
142	SHESTCO	Sheda Science and Technology Complex
143	SI/SP	System Integration/Software Provider
144	SII	State Information Infrastructure
145	SMEDAN	Small and Medium Enterprise Development Agency of Nigeria
146	SMoE	State Ministries of Education
147	SMS	Short Message Services
148	SON	Standard organization of Nigeria
149	SQL	Structured Query Language
150	TAC	Technical Aid Corps
151	TeachNet	The Teacher Network
152	TV	Television
153	UBEC	Universal Basic Education Council
154	UBEC	Universal Basic Education Commission
155	UNECA	United Nations Economic Commission for Africa
156	UNESCO	United Nations Education Scientific and Cultural Organization
157	USPF	Universal Service Provision Fund
158	VOIP	Voice Over Internet Protocol
159	VSAT	Very Small Aperture Terminal
160	WAN	Wide Area Network
161	WDM	Wave Division Multiplexing
162	WEF	World Economic Forum
163	WIN	Wire Nigeria
164	WSIS	World Summit on Information Society

FOREWORD

Information and Communication Technology (ICT) presents Nigeria with great opportunities to promote her growth and development. ICT is a potent input for improving quickly and substantially, socio-economic activities and human conditions. Also, as a productive sector, ICT that can be grown rapidly to become a major sector of the economy in terms of GDP contribution, employment and income generation, and foreign exchange earnings. Each of the currently top 20 developed countries in the world depends on ICT for these purposes. ICT is the strategic weapon that Nigeria can use to achieve national competitiveness to leap-frog into the group of the top 20 largest economies in the world by Year 2020.

The Government of Nigeria under current Administration has already demonstrated its readiness to use ICT as a strategic transformation lever for Nigeria's development by establishing the National Technical Working Group for ICT Thematic Area (NTWG-ICT) as one of the 29 working groups for the actualization of the Vision 20-2020.

In consonance with current global trends and best practices and forecast future developments in the global environment, the NTWG-ICT focused on the formulation of an ICT vision and its objectives, goals and initiatives that are time bound and measurable, that will position ICT as an enabler of rapid growth in various socio-economic sectors of the national economy, and that will quickly grow a globally competitive ICT industry in Nigeria.

National Technical Working Group, ICT

July 2009

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We also wish to appreciate and thank the Honourable Minister of National Planning and Vice-Chairman, National Planning Commission for initiating the entire vision strengthening process and for appointing and empowering the members of the NTWG-ICT to prepare this Report.

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The NTWG-ICT also acknowledges the support given by various government agencies and private companies that permitted their employees to serve as members of the NTWG-ICT as well as agencies which hosted the meetings of the NTWG-ICT. In this latter category are Galaxy Backbone Plc, National Information Technology Development Agency (NITDA) and Digital Bridge Institute (DBI).

In the course of preparing this report, the committee members benefited from resources and materials from different sources. Finally, numerous other organizations also assisted the work of the group with documents, reports, memoranda, etc. We acknowledge and commend them all.

The members of the NTWG-ICT comprised experts from government ministries and agencies, private sector organizations and the academia. All members exhibited strong commitment to the



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task of developing a viable ICT sectoral and cross-sectoral vision under the Vision 20-2020 framework. The high degree of commitment and intellect is reflected in the high level of effort, team work, deliberations, and sacrifices that all members made to ensure a well ground report herewith presented. This Report is the output of the work of the NTWG-ICT during April to September 2009

As Chairman and Coordinator of the NTWG-ICT, we acknowledge the role played by Dr. Olu Agunloye and Mr. Gerald Ilukwe who steered the group as Take-Off Group Chairman and Coordinator respectively. Also, we express great delight for the privilege in being able to work with the entire group members and to lead the group to prepare this report and present it to the Honourable Minister and Deputy Chairman of the National Planning Commission. The full membership list of the NTWG-ICT group is given below. Finally, we thank the Honourable Minister and Deputy Chairman of the National Planning Commission for giving us the opportunity to serve.

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Executive Summary

The ICT sector comprises all socio-economic activities concerned with the production, distribution, consumption and use of ICT products and services. The sector comprises two parts: (1) activities that produce or provide ICT products and services for use by other activities, and (2) activities in various other sectors of the economy that consume or use ICT products and services as productivity tools.

The NTWG-ICT identified the following major areas of the ICT components of the ICT thematic area: (1) Infrastructure; (2) ICT industry; (3) Human Capital Development; (4) Policy, Legal and Regulatory framework; (5) ICT in government; (6) ICT Research and Development, and Innovation; and (7) Sectoral Applications of ICT.

The Group focused on developing ICT sector visions, goals and plans to facilitate rapid and pervasive growth and development in all socio-economic sectors, and to create a globally competitive ICT industry. The propelling philosophy is that, in order for the ICT sector to propel Nigeria into top 20 countries, its economy should have:

- globally competitive industrial and service sectors that are driven by cutting-edge ICT tools
- an advanced and reliable national ICT infrastructure
- a rich pool of highly skilled human resources with relevant ICT skills
- a modern ICT-driven educational system for the effective delivery of educational services at all levels
- wide-spread deployment and exploitation of ICTs within the government to support good governance and the delivery of services
- a high proportion of the population with access to and use of ICT products and services in productive and consumptive activities.

Key Success Factors

- Adequate supply of electricity power country-wide.
- Investment through public and private sector initiatives to build a national communication backbone.

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- Legal and regulatory frameworks to promote the development of competitive and open ICT productive and consumptive activities
- Promotion by government of ICT industrial parks and incubation projects
- Substantial investment by government at all levels in education
- Synergy between policies for ICT in education (teaching, learning, administration, research) and education for ICT sector development (ICT human capacity development)
- Development and improvement of institutions, standards and curricula for the training of high level ICT human resources, including computer scientists, computer engineers, telecommunications engineers, software and web developers
- Mainstreaming ICT policies into the broader development of knowledge society and ensuring coordination and consistency between ICT policy strategies and national development policies at all levels
- Commitment by governments at the federal, state and local government levels to invest in e-Government on a massive scale
- Adequate and focused funding, as well as effective collaboration and successful partnerships between governments, private sector, research institutes and universities.

Strategic Challenges and Imperatives for Nigeria

- i. Inadequate infrastructure
- ii. Inadequate scope for competitive private sector participation in critical areas
- iii. Lack of trust in locally produced ICT products and services
- iv. Inadequate mass literacy and work force training in ICT
- v. Lack of Research and Development (R&D) in ICT
- vi. Inadequate ICT policies and policy implementation
- vii. Embryonic status of ICT in Government (e-Government)

Vision

Attain an information and knowledge-based economy and society that is efficient and technology-enabled through a globally competitive ICT industry

Objectives

1. To make ICT an enabler to transform the socio-economic sectors of Nigeria.
2. To deploy ICT in government for transparency and accountability as well as to enhance efficiency, effectiveness and increase government capacity to deliver citizen centred services to attain national competitiveness.
3. To attain globally competitive local capacity with regards to human capital in all aspects of ICT (software, hardware, networks, card technologies, security/biometrics, web and digital content development, etc).
4. To attain competitive local capacity in ICT Infrastructure (backbone, hosting, data centres, internet exchange / gateway etc).
5. To develop the ICT industry for the production of software and hardware to global standards.
6. To pursue research & development (R & D) activities and to encourage innovation in ICT.

1. Introduction

1.1 Overview of the Thematic Area

Globalization and advances in Information and Communication Technology (ICT) have brought about phenomenal improvements and great opportunities for developing countries to participate meaningfully in the global digital economy. The convergence of voice, video and data technologies coupled with advances in network and bandwidth capacities have helped position ICT as a major enabler of innovation, productivity and growth in all sectors of social economic activities of nations. There is seeming consensus that no nation desirous of a realistic national vision and quantum leap in holistic development in the twenty-first (21st) century can ignore the power and significance of ICT in development, especially in this information age.

There is ICT in almost every human activity. There is ICT in commerce and industry that help to grow the national Gross Domestic Product (GDP) and reposition any country's purchasing power parity. ICT in home appliances enables comfort and convenience. ICT allows for distant learning and collaborations in research and development (R&D) leading to innovations in health and food technologies. Phenomenal expansion in wireless communications in developing countries leading to enhanced social and economic relationships has been made possible by advances in ICT. This impact and significance of ICT makes it imperative for Nigeria as a developing country to have a hard look at using the ICT strategy to facilitate its socio-economic development. It requires the development of a vibrant ICT productive sector, alongside productive use of ICT systems, products and services to drive the different sectors of the national economy and governance.

In visioning for Nigeria therefore, the government mandated the National Planning Commission (NPC) to develop a blueprint that will propel Nigeria to be among the top 20 economies of the world by the year 2020. The government also identified 29 thematic areas of focus including the ICT thematic area. The strategy for realizing this objective has been the formation of a National Steering Committee ably supported by the National Technical Working Groups (NTWGs) from each thematic area. The aim of the ICT thematic group within the NTWGs is the formulation of an ICT vision with objectives, goals, and initiatives that are measurable and time-bound and will position ICT as an enabler of rapid growth in the socio-economic sectors, industrial sector, and the emergence of a globally competitive ICT industry in Nigeria.

1.2 Scope of the Thematic Area

The Nigeria Vision 2020 ICT thematic area focuses on the following major sub-themes and components:

1. **ICT Infrastructure:** This refers to the adequacy of local and international backbone infrastructure and last mile deployments. Existence and effective use of hosting facilities, internet exchange gateways by private and public sector institutions are also appraised.
2. **Industry:** The group will consider the following areas of the ICT industry:
 - i. **Hardware:** (manufacture/assembly, cables, network appliances, mobile devices, VSAT, computer peripherals, etc)
 - ii. **Software:** (proprietary and open source, standards, localization – production, knowledge transfer)
 - iii. **ICT-enabled services:** (BPO, project management, ISPs, Call Centres, ASP, CSP, SI/SP, KPO)
3. **Education and Human Capital Development:** This include, creating sizable pool of ICT professionals, evolving ICT in early education both at primary and secondary school levels, strengthening the tertiary institutions to meet the new challenge, consistency in workforce training, basic computer literacy for the masses, and access to interactive long distance learning for the entire population.
4. **Policy, legal and regulatory framework:** The value creation here includes the harmonization of existing ICT and telecommunications policies and resolving role duplications between Ministries, Departments, and Agencies (MDAs) and with other key sectors of the Nigerian economy. The legal and regulatory framework for ensuring copyright and intellectual property right, open standards and interoperability, outsourcing, and e-commerce should be defined. Funding of and investment in the ICT industry is crucial and requires promotion and provision of incentives. Concerns for cyber security and its threat to national security should be addressed. The collaborations between states and the central

government in embracing ICT as an enabler should be exploited. There is also the need to facilitate universal access to information. Issues of privacy also ought to be addressed.

5. **ICT in government:** ICT in government examines the present and future states of government networks and their connectivity. It also includes efficiency and consistency in data and ICT infrastructure management. Human capacity development, process automation, citizen access and strategic framework and policies are key issues to be considered. The adequacy of government expenditure on education, the political will for e-government, and the importance of ICT to government vision of the future will significantly impact the deployment and use of ICT in government.
6. **Research, Development and Innovation:** This evaluates the research capacities and adequacy of research institutions, and funding and alignment of research results with industry for commercialization purpose. It also includes implementation of localization policy, collaboration and partnership between public and private sector concerns with incentives for innovation being at the front burner.
7. **Other Sectoral Applications:** Other ICT sectoral application areas as already identified in the Information and Communications Technology for Development (ICT4D) Strategic Action Plan document include: general infrastructure development, education, health, agriculture, private sector development, governance and legislative framework, national security and law enforcement, and research and development.

1.3 Overall targets for the ICT thematic area

The overall objective of the Vision 2020 ICT thematic Area is to develop the productive capabilities of the ICT sector and expand the use of ICT towards transforming Nigeria into one of the Top 20 economies in the world, by Year 2020. To achieve this objective, the target would be to make Nigeria:

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- An economy with globally competitive industrial and service sectors that are driven by cutting-edge ICTs
- An economy based on a rich pool of highly skilled human resources with relevant ICT skills necessary for developing and maintaining a competitive edge on the global market
- An economy characterized by a wide-spread deployment and exploitation of ICTs within the government to support the delivery of healthcare, agriculture, security, electoral system, governance and social services
- A modern ICT driven educational system for the effective delivery of educational services at all levels
- An economy in which a reasonably large proportion of the population have access to ICT products and services
- An economy based on an advanced and reliable national ICT infrastructure

1.4 Process involved in the plan

To achieve its mandate of articulating a road map for ICT sector, the NTWG-ICT began from the perspectives of outcome of the Vision 2010, recommendations of the Needs-2 documents, and the Seven-Point Agenda of the President.

The group carried out extensive research, consultations and deliberations on global ranking documents, websites of benchmarked countries, and various reports on ICT sectoral overviews, plans and programmes produced by Federal Ministries, Departments and Agencies (MDAs), some state governments, private sector organizations, and key stakeholders that were supplied by the National Planning Commission (NPC) or downloaded from the institutional websites. In addition, the group relied on the national ICT4D Strategic Action Plan which documents various specific ICT-based initiatives, programmes and projects for various sectors of the economy.

The visioning process entailed, among other activities: (a) assessment of current development in the ICT sector with particular focus on global trends and local contexts; (b) comparative benchmarking of leading countries in the ICT sector in order to derive key learning points; (c) identification of strategic challenges and opportunities for Nigeria in the ICT sector; (d) development of a vision, objectives, goals and initiatives for the ICT sector; and the (e)

development of road maps and implementation frameworks for the various initiatives. The ICT sectors of the following ten countries were used to benchmark what Nigeria needs to do in order to enable the ICT sector propel the country towards achieving top-20 status by 2020: advanced economies - Denmark, USA, UK; emerging economies – India, Brazil, Turkey, Malaysia, Indonesia; peer African countries – South Africa, Egypt.

The NTWG-ICT had six sessions of three-day meetings in Abuja, FCT during April to July 2009. Sub-committees of the group were constituted at various times during the meetings to undertake background research at their different locations and shared information and reports online among members.

2. Current Assessment of ICT Thematic Area

The structure of the visioning process in the ICT thematic area mandates current assessment of ICT development with particular focus on global trends and local context in infrastructure deployment strategies, innovations in the ICT industry, education and human capacity development, policy and regulatory environment, and ICT in government. The objective is to set the stage for comparative benchmarking with countries of similar socio-economic challenges in order to derive key learning points.

2.1 Global Trends in ICT

Infrastructure

High-speed wireless networks have become part of the basic infrastructure of any country and are increasingly becoming one of the foundations of the knowledge economy. To ensure universal access to internet connectivity, broadband core fiber optic networks that can reach every part of the country is deployed while wireless and other capillary systems provide access beyond the core and create the network's outer reaches. The alternative is full deployment of wireless broadband without the wired component.

Specific country developments

1. Greece's national regulator set the country's broadband market on the path to fair network access and more competition. The two key events in 2006 were the adoption of the European Union (EU) framework for Electronic Communications into Greek law and new regulations on Local Loop Unbundling (LLU). As a result, broadband connections accelerated and Greece no longer occupies the last place in the EU broadband penetration ranking.
2. South Korean broadband Internet service was classified as a value-added service, not as an infrastructure communications service. Hence, it was largely free from strict government regulations and interventions. As a result, the entry barrier into the market was low and pricing was very competitive — quite the opposite of the heavily regulated phone market.
3. In order for wireless broadband to become a reality and have the impact that mobile telephony has, multiple large swaths of spectrum (of 20 MHz or preferably 30 MHz each) need to be dedicated to wireless broadband. Migrating analog TV spectrum to digital broadband service offers an important "digital dividend." The United States has already acted, with the recent auction of 700 MHz spectrum; other countries are moving in the same direction, with the European Union (EU) planning a 2010-12 rollout.

Industry

This consists of development or production of hardware, software, and ICT enabled services.

Hardware

One of the new trends in hardware is the movement towards 'green computing' (hardware that are energy efficient) which results in lower cost of ownership. In particular, such hardware reduces the cost of operation of large data centres and they are gradually becoming important considerations in the acquisition of large server computer infrastructure.

Also, traditional usage of mobile devices/phones includes making and receiving voice calls and sending and receiving short message service (SMS) messages. A new class of usage involves running applications on mobile devices to:

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- Capture data, and transfer the data to organizational data bases,
- Interface to email servers to send and receive emails,
- Interface to messaging applications to send and receive instant messages and
- Give current location on a map on the mobile device using a GPS (Global Positioning Systems) technology and GIS (geographic information systems) and digital maps etc.
- Enable 'location-aware computing', i.e. applications on a mobile phone that displays hotels, restaurants or hospitals a certain radius from the user's current location.

Software

Software is the general term that is used to describe computer programs, procedures and documentation that is used to perform specific tasks on computers and other computing devices. Software can be broadly categorized into System software and Application software. Another classification by nature of the approach by which the software is acquired, divides software into either commercial off the shelf software (COTS) or custom software. Another classification, which is based on the layer in a typical technology stack in which the software resides, gives the following classes: embedded software (or firmware); system software; middleware, and application Software. Two of the major players in the Nigerian software industry are Neptune Software (formerly Computer Systems Associates) and SystemSpecs.

Proprietary software refers to software that is the legal property of a particular party. The terms of use for other parties is usually stipulated in contracts and licensing agreements which often prevent third parties from modifying or re-distributing the software. Examples include Microsoft SQL Server, Oracle 11g database server, IBM AIX Unix.

Open Source Software refers to software for which the source code and other rights usually reserved by copyright holders are either in the public domain, or have been made available under a software license that meets the open source definition. The term 'public domain' is used to refer to a range of abstract materials, usually intellectual property which are not owned or controlled by anyone. Materials in the public domain are available for use by anyone for any purpose. The open source definition for software licenses is a definition which among other things, seeks to ensure that: the software can be freely redistributed; the software includes the source code; the software

allows derived works from the software, as well as the re-distribution of the derived works. Examples of open source software include Linux, Open Office, MySQL.

Open standards refers to standards which are publicly available with rights to use them also available and royalty free. It also refers to standards that have been developed through an open collaborative and participatory process. Software based on open standards is classified as 'open standards based software', or simply 'standards based software'. Examples of standards based software include Java (Java Community Process). A number of approaches to the large-scale acquisition of software assets exist, namely: Single vendor; Standards-based; Best of breed solution; and Independence (or heterogeneity).

Globally, open standards based software solutions are preferred by organizations and enterprises of all sizes. Software solutions conforming to open or industry standards (not proprietary standards) favour system integration and interoperability. They also make it possible to select the best solutions from a pool of software offerings from different vendors (best-of-breed) in which all the solutions adhere to the same standards.

In the world of software development and system integration, the major bodies providing independent assessments of technology companies are International Standards Organisation and the Software Engineering Institute (SEI), Carnegie Mellon. The ISO standard related to software development is ISO 9001. The Software Engineering Institute (SEI) is a US federally funded research and development centre which has come up with the globally accepted models for technology development and acquisition named 'Capability Maturity Model for software (CMM), now retired' and 'Capability Maturity Model Integration (CMMI)'.

Three types of CMMI process models exist namely: CMMI for Development (applies to software development); CMMI for Acquisition; and CMMI for Services. It is important to mention that in many developed countries (e.g. US), the CMMI level (or rating) of a company determines the kinds of contracts or projects that the company can bid for.

ICT-enabled services

Business Process Outsourcing (BPO) is a potential means of creating jobs, reducing unemployment and increasing the incomes of those who are engaged in it. BPO enables some emerging nations to participate effectively in the emerging global economy, as well as derive significant revenue. India is the leading destination for outsourcing, as Figure 1 below shows.

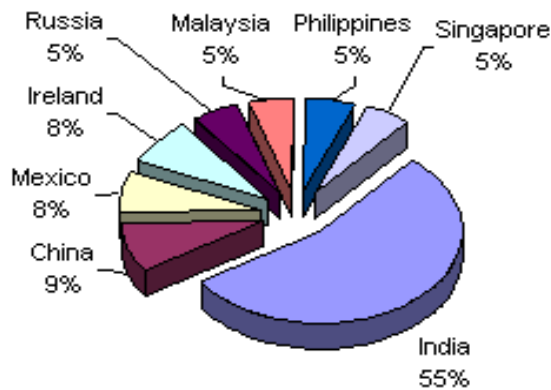


Figure 1: Outsourcing Destinations

Source: Computer World and InterUnity Group Inc., Concord.

Education and human capital development

Denmark adopted combined strategies and action plans for the integration of information and communication technologies (ICT) in the education system in the period 1998-2003. The strategy described five central areas, where quite a number of ICT-initiatives were implemented during the five years: (i) Pupils and ICT (ii) Teachers and ICT (iii) Subjects and ICT (iv) Equal and flexible access to lifelong education and (v) Coordination of ICT-based research and education.

The UK government invested substantially in order to meet its targets for ICT in education in the period from 1998 to 2002. This included funding for:

- i. The National Grid for Learning (NGFL);
- ii. Connecting every school in the country to the Internet; providing additional computer equipment for every school in order to meet the government targets

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- iii. Setting up of a number of Centres of Excellence for IT and High Technology training and skills;
- iv. ICT hardware and Internet access in schools
- v. Cutting bureaucracy in schools through the use of ICT.

In Malaysia, a SchoolNet project aimed at providing internet broadband facilities to all 10,000 primary and secondary schools in the country is being implemented. The first phase of the project involving 110 schools in Sabah and another 110 schools in Sarawak has been completed. Steps are underway to hand over the pilot schools to the Ministry of Education, and to merge these 220 schools into the broader SchoolNet Project.

Policy, legal and regulatory framework

The trend in the advanced countries is to develop and sustain PLR environments that are:

- i. *Coherent* (achieves harmony among the different aspects of the PLR environment);
- ii. *Transparent* (enables industry participants to adequately assess opportunities, risks and costs);
- iii. *Just* (enforce the rule of law in accordance with internationally acceptable standards, ensure the protection of life and property, including investments and intellectual property)
- iv. *Competitive* (permit variety of options and strategies for both ICT producers, providers and consumers)
- v. *Efficient* (facilitate low cost ICT production, consumptive and regulatory activities)

Specific country developments

- France implemented a bold regulatory framework that led to a very competitive market. Free Ilyad and Neuf-Cegetel are among the most successful challengers in the world. Both have crafted business plans that focus on fiber deployment and innovative convergent services. In response to this competition, France Telecom has become one of the most innovative firms in the world.

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- South Africa's regulatory authority announced in November 2008 that it had decided to convert all value-added network service licenses to network infrastructure licenses under the Electronic Communications Act. The move is expected to open South Africa's telecommunications industry to new infrastructure investors able to inject competition and expand services into the market.
- India issued several successful measures to implement network sharing. The first allows providers to spin off their passive network infrastructure in order to offer it to other providers in the market. This new passive network company receives good access to government subsidies in order to continue expanding its network. Furthermore, in April 2008 regulators allowed active network sharing.
- Many observers now see Egypt as the emerging gateway for outsourcing in the Middle East. In recent years, seizing a larger share of the global outsourcing market has become a priority objective for the Egyptian government. Several key measures have been implemented to achieve this goal, with immediate results. The Egyptian national vision is mainly focused on attracting more foreign direct investment, especially in BPO activities in view of its positive spillover on employment rates. This is carried out through a comprehensive framework that aims to attract more MNCs that are interested in BPO, encouraging technology and knowledge transfer and building qualified human capital pool that would meet international standards while being cost-competitive.

ICT in government

The global trends in ICT in government have been complete migration to e-Governance platforms to improve the process of government. The three components of e-Governance being implemented are:

- G2C (Government-to-Citizen) which involves transactions between government and the citizens e.g payment of utility bills, tax collection, and download of information on government programmes

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- G2B (Government-to-Business) which involves transactions between government and corporate community e.g business registration, corporate tax payment, and download on government policies and regulations
- G2G (Government-to-Government) that involves intra and inter government communications at the various levels of governance – local, state, and federal e.g sharing of information between the Federal Ministry of Health and the National Planning Commission

2.1.1 Comparative Benchmarking

In selecting the benchmarked countries for this purpose monitoring progress towards vision 20-2020 and in order to make realistic comparison, the group considered countries that have high population, similar social and economic problems, and lead Nigeria in the ICT deployment global ranking. The selected countries are:

1. Denmark
2. United State of America (USA)
3. Indonesia
4. United Kingdom
5. Brazil
6. Malaysia
7. Turkey
8. Republic of South Africa
9. India
10. Egypt

The World Economic Forum (WEF) Global Information Technology Report 2008 – 2009 places Nigeria as 7th in Africa and 90th in the world in terms of the country's networked readiness (NRI). A country's networked readiness implies its preparedness to leverage ICT advances for increased competitiveness and development. In its 2007 ICT Development Index (IDI), the International Telecommunications Union (ITU) also rated Nigeria 21st in Africa and 130th in the world. The benchmarked countries from both reports have led Nigeria in GDP per capital and in global ICT

development ranking. Tables 1-6 below show the position of Nigeria in ICT by global ranking in the selected parameters and also in relation to the benchmarked countries.

Infrastructure

Table 1 provides data on a number of infrastructural availability, accessibility and usage variables from the NRI for 2008-09. The data in the table show that Nigeria is currently better off than some of the benchmarked countries only in t Mobile telephone Subscribers per 1000 persons. This is due to the rapid growth in the mobile telephony segment of the telecommunications sector. But Nigeria underperforms on each of the remaining variables and indices.

Industry

Nigeria is ranked 6th globally in heavy importation of ICT hardware and software (see Table 2). . But most of such imports are limited to low-end ICT products, as the country is ranked 81st on that variable. High-technology exports are also very low (115th). Finally, the country ranked 111th on secure Internet servers, which points to the country's very low global status on ICT value-added services such as Internet-based application and content service provision.

Education and human capital development

Table 3 shows that the country is ranked 123rd out of 137 countries on the availability of scientists and engineers, and is below the median rank of 68.5 in internet access in schools and in education expenditure out The only exception is in quality of the educational system on which the country ranked 60th.

Policy, legal and regulatory framework

Table 4 shows that Nigeria ranked lowest amongst the benchmarked countries in overall socio-economic environment indicators. In some policy, legal and regulatory parameters, the country is currently underperforming especially in *intellectual property protection* (96th), *time required to start a business* (85th), and *property rights* (86th).

However, the country performs better than the average on such variables as: *state of cluster development* (39th), *intensity of local competition* (36th) and *time needed to enforce a contract* (45th).

The data also show that governments in Nigeria are currently not adequately positively oriented to using ICT in their processes, for promoting online access by individual and business to government information and transaction, or in vigorously promoting the popularization of ICT among its Nigerians.

Compared to South Africa, Nigeria ranks lower on all the selected variables and indices in the table except on the *quality of competition in the ISP sector*. Similarly, Nigeria outperforms Egypt on only the following variables: *state of cluster development, intensity of local competition, effectiveness of law making bodies, number of procedures to enforce a contract, and time to enforce a contract*.

However the lower ranking of Nigeria (88th) compared to Egypt (64th) overall is due to the relative substantial under performance of Nigeria on the government readiness and usage variables, compared to Egypt. Similar insight is gained by comparing Nigeria with Brazil, whose overall socio-economic environment conditions are ranked globally as 88 and 87 respectively. Brazil substantially underperforms Nigeria in terms of: *burden of government regulation, time required to start a business, effectiveness of law making bodies, number of procedures to enforce a contract and time to enforce a contract*. But Nigeria's superiority in these aspects is counterbalanced by the country's relative under-performance in respect of the government readiness and usage indicators.

ICT in Government

Nigeria's ranking in relations to the benchmarked countries on ICT in Government is as highlighted in table 5. The parameters considered include network connectivity, data management, human capacity, process automation, and citizens' access. Also considered are strategic framework and policy, justice and security, and international framework. The country only faired above the median ranking in citizen access and in Justice and security.

Research, Development and Innovation

Table 6 shows that Nigeria ranks a very lowly 125th out of 137 countries on quality of scientific research institutions and 80th on university-industry research collaboration.

Table 1: Comparison of Infrastructure Accessibility among benchmarked countries

Network readiness index /variable	Nigeria	South Africa	Egypt	Malaysia	Brazil	India	Turkey	France	Denmark	UK	USA
Key Indicators											
Internet Users per 100 pop.	6.8	8.2	11.4	59.7	26.1	6.9	17.7	49.6	64.3	66.2	71.9
Internet Bandwidth (Mbs per 10,000)	NA	0.7	1.4	1.2	1.5	0.2	12.1	32.9	346.0	NA	NA
Mobile telephone Subscribers per 1000	27.3	87.1	39	87.9	63.1	20	104	89.8	114.7	118.5	83.5
Availability of latest Technologies	81	37	60	33	58	43	82.8	11	4	30	15
Accessibility of digital content	106	76	83	31	63	61	42	19	5	9	1
Infrastructure Environment											
Number of Telephone Lines	119	93	76	73	63	108	56	7	14	9	12
Secured Internet Servers	111	52	103	56	57	99	50	29	7	9	2
Electricity Production	118	44	85	58	73	104	72	14	30	33	8
Availability of Scientists and Engineers	36	110	47	24	57	3	59	5	13	32	6
Availability of new Telephone Lines	77	113	25	46	39	38	62	12	3	30	15

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Extent of business internet use	64	47	36	29	28	41	46	23	5	9	1
Business Telephone connection charge	106	61	116	21	44	57	4	18	34	41	16
Business Monthly Telephone subscription	100	90	64	69	106	83	86	25	16	65	46
Local Supplier Quality	60	24	103	32	41	37	55	10	9	23	7
Local Supplier Quantity	65	43	86	16	13	4	32	7	15	41	6
Computer Comms, and other services	6	68	56	32	18	23	94	30	41	36	47
Individual Readiness											
Internet in Schools	104	91	99	40	67	60	55	31	6	15	11
Residential telephone Connection charge	110	66	107	22	49	64	3	19	37	51	9
Residential Monthly Subscription	109	97	59	66	100	99	70	37	26	31	45
High Speed Monthly Broadband Subscription	NA	66	89	39	58	68	74	10	15	14	3
Lowest cost of broadband	NA	70	83	43	38	85	68	3	22	10	3
Cost of mobile telephone call	107	90	63	29	93	74	82	41	3	15	39
Individual Usage											
Mobile Telephone subscribers	111	55	96	53	82	120	62	51	23	15	61
Personal Computers	115	66	88	35	48	94	78	13	8	5	6



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Broadband Internet subscribers	126	87	89	49	55	94	46	13	1	12	20
Internet Users	100	97	88	18	57	99	74	31	16	13	8
Internet bandwidth	124	82	71	74	69	96	38	24	1	NA	NA

Table 2: Nigeria's GTR 2008-09 ranking on some ICT industry variables

ICT Variable	Ranking
Availability of latest technologies	81
High-tech exports, 2006*	115
Secure Internet servers, 2007*	111
Computer, communications and other services imports, 2005*	6

Table 3: Nigeria's GTR 2008-09 ranking on some Education and Research Development variables

ICT Variable	Ranking
Availability of scientists and engineers	123
Tertiary enrollment, 2003*	86
Education expenditure, 2006*	98
Quality of math and science education	77
Quality of the educational system	60
Internet access in schools	104

Table 4: Networked Readiness Ranking of Nigeria versus Benchmarked Countries*

Network readiness index /variable	Nigeria	South Africa	Egypt	Malaysia	Indonesia	Brazil	India	Turkey	France	Netherlands	UK	USA
Overall Socio-Economic Environment	88	39	64	26	81	87	60	56	21	11	12	3
Market environment	68	33	60	18	55	119	50	66	25	8	13	2
Financial market sophistication	75	12	95	31	72	21	33	39	15	8	9	3
State of cluster development	39	40	46	13	18	43	24	54	23	12	15	2
Burden of government regulation	57	95	55	13	46	133	90	104	126	81	82	50
Time required to start a business	85	65	15	33	122	129	83	9	15	25	33	9
Intensity of local competition	36	59	92	31	44	43	11	42	12	3	10	4
Freedom of the press	77	33	78	102	63	34	23	106	22	3	32	24
Political and regulatory environment	64	26	62	24	83	82	57	56	16	12	20	19
Effectiveness of law making bodies	62	28	81	8	75	119	25	35	23	21	14	33
Laws relating to ICT	65	34	64	19	71	49	38	55	16	20	17	9
Judicial independence	57	30	42	47	90	68	43	64	29	6	18	23
Intellectual property protection	96	23	60	33	102	79	57	93	7	11	22	18

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Efficiency of legal framework	72	20	55	21	66	98	42	82	16	9	18	28
Property rights	86	20	67	38	117	70	52	83	18	14	36	26
Quality of competition in the ISP sector	57	112	20	29	78	44	23	62	28	9	21	6
Number of procedures to enforce a contract	78	14	103	14	78	116	117	48	14	4	14	31
Time to enforce a contract	45	82	120	82	71	86	126	40	22	59	35	17
Government readiness	120	63	51	12	111	65	57	87	19	23	26	6
Government prioritization of ICT	119	79	32	10	124	112	24	101	47	50	44	18
Importance of ICT to govt. vision of future	88	89	45	9	106	73	33	85	32	51	48	28
Government usage	83	61	53	20	99	32	47	60	10	22	26	5
Government success in ICT promotion	103	95	30	13	99	74	23	84	29	53	52	21
Availability of government online services	58	60	55	24	73	26	49	50	22	29	16	10

* Table values are country ranks out of 137 ranked countries

(Source: Global Information Technology Report 2008-2009, World Economic Forum and INSEAD)

Table 5: Nigeria’s Global ranking on ICT in Government amongst benchmarked countries

S/n	Country	Data & Infrastructure Mgt	Networks & Connectivity	Human Capacity	Process Auto	Citizen Access	Strategic Framework & Policy*	Justice & Security**	Institutional Framework ***
1	Denmark	3	4	4	2	3	9	3	5
2	USA	18	16	45	4	10	16	16	20
3	Singapore	1	1	110	23	2	1	9	1
4	UK	47	24	30	10	16	40	18	48
5	Malaysia	12	21	20	34	24	8	33	12
6	RSA	80	57	32	59	60	76	32	87
7	India	33	67	77	94	49	61	41	24
8	Brazil	50	43	64	22	26	79*	59	93
9	Turkey	45	66	90	70	50	96	60	93
10	Egypt	62	76	59	72	55	39	53	31
11	Nigeria	68	91	127	109	58	107	61	111

Source: World Economic Forum Global Information Technology Report 2008 – 2009.

* Figures are average score on importance of government vision of the future and procurement of advanced tech products scores in the WEF-GITR.

** Figures are average score of judicial independence and availability of laws relating to ICT scores in the WEF-GITR.

*** Institutional framework is the average score of government prioritization of ICT and its promotion scores in the WEF-GITR.

Table 6: Nigeria’s GITR 2008-09 ranking on some research and development variables

Quality of scientific research institutions	125
University-industry research collaboration	80

2.1.2 Key learning points

ICT infrastructure

Observers already point to some issues that need to be faced with regard to achieving the ambitious goal of transforming the Malaysian society from a developing third-world economy into a knowledge and information economy. The first relates to doubts about the shortage of skilled labor and ability to generate sufficient numbers of knowledge workers.

It is not clear that the goal of entering the knowledge society is best served by a capital intensive focus on multimedia applications, as opposed to a strategy which is more focused on extending infrastructure, increasing ICT and general literacy, and focusing on SME and government usage of ICT so as to improve a country's global positioning through more widespread productivity gains and deeper access to global markets for local businesses.

Specific country success stories

India: India's concentration on the export-oriented software industry meant that the primary focus was on ensuring good external connectivity and incentives for enterprise (secured through the software park scheme). Improvement of domestic infrastructure and reduction in access charges, which would have helped to expand the domestic market for ICT, was not a priority.

Brazil: If a national ICT sector develops without being subject to competitive pressures, incentives for the adoption of cutting edge technologies can be lost. In addition, lower costs typically associated with ICT may not be passed on to users, inhibiting the expansion of ICT demand and deployment. This was the case in Brazil in the initial phases of their ICT sector development. Unlike the case of an ICT export sector, a national ICT capacity focus is more likely to lead to the development of local technical capabilities, spare parts production, component supplier networks and other linkages. As Brazil's experience shows, these developments can help to facilitate the diffusion and deployment of ICT more broadly.

South Africa: Adopting an ICT as enabler strategy often demands a more comprehensive approach because there is a need to go beyond the requirements of a single sector and to facilitate a more general deployment of ICT. In the case of South Africa, development-focused ICT deployment could not go beyond micro-level initiatives until the central and state governments

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recognized the need to address infrastructure, access, local language content, SME support and e-government.

- ICT tools, including biometric identification methods have been successfully deployed in voter registration and election, helping south Africa to achieve a transparent electoral process where the votes of the people counted and election process and results were generally accepted.
- To enable the South African government cope with educating the black peopled that were left out, e-learning systems were deployed, which in the case of one university alone a million admissions were offered in one year.
- As a policy, the South African government also requires that products, ICT and even others such as cars are assembled locally with South African components and specification.

Singapore: The country implemented TradeNet, a nationwide electronic trade documentation system which allows the trading community to submit permit application electronically to relevant government bodies for processing and approval. The TradeNet structure has 35 controlling units, 7,000 business rules, 12,000 users, 9,000 trade declaration and a processing time frame reduced from four hours to 10 minutes. The country also has e-judiciary that has shortened the life span of cases from 5 -10years to 18 months.

The main components that are important for an ICT strategy to address—with some variation in range and scope depending upon the focus of the strategy—are:

- i. *Human capacity*—specifically the creation of knowledge or technical workers—is important for both the production and use of ICT
- ii. Creating a favorable environment for *enterprise* such as through tax and trade policies is instrumental in stimulating foreign and local investment in ICT
- iii. *Infrastructure* development, particularly global connectivity, is a prerequisite to leveraging the benefits of the global economy, improving domestic productivity, and attracting foreign investment.

Industry

A policy consistency that will encourage public sector patronage of locally assembled products. This policy will ensure demand flow while also assuring volume sales that will inevitably promote more labour increase and excellence.

The policy on local patronage was first introduced by the Indian government, Chinese, Taiwan, Singapore etc, which led to the emergence of indigenous companies producing all services and products in the sphere of ICT.

Policy on zero duty for imports of completely knocked down parts for manufacturers and relatively moderate duties payable for importation of finished goods as against what is obtainable today. This will greatly reduce cost of ownership and generally improve access to ICT for the general public.

The local assembly of servers should be encouraged as they play a vital role in the sharing of resources on computer networks. More server grade computers locally assembled and deployed on national networks will make it easier for businesses and individuals to publish content on the web by bringing down web hosting costs. This will lead to more local content.

Countries that are disadvantaged in terms of hardware production usually opt to develop their software and business process outsourcing sub-sectors of the ICT industry. The sub-sectors however depend on effective government implementation of appropriate policies on human resource development and localization.

Education and human capital development

In order to ensure synergy between the human capital development education for the growth of the ICT sector and use of ICT in the development of education, there is need to

- Ensure that the ICT in Education Programme is part of the national development plan and national budgets.
- Ensure that the ICT in Education Programme is part of the national ICT policy and master plan.
- Ensure that the ICT in Education Programme is in line with the country's educational philosophy, goals, objectives and curricula.

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- Ensure that ICT in education policies are translated into implementable projects.

Policy, legal and regulatory framework

- Government ICT procurement policies need to be reviewed periodically to allow for innovative procedures to enable government and MDAs acquire best solutions from the ICT industry
- Key issues that need to be addressed towards promoting an enabling environment for the development of the ICT sector include transparency of the tax system, anti-trust laws and incentives for sub-sectors of the ICT sector in which a country desires to develop.
- Since 2004, the Egyptian government has been consistently working to increase the attractiveness of Egypt's business environment. Hence an antitrust law and a unified tax law have been enacted. The latter increased the transparency of the Egyptian tax system and reduced corporate and personal taxes by half. In 2007, Egypt was ranked 13th as an outsourcing destination, according to the A.T. Kearney Global Services Location Index. This puts Egypt ahead of delivery locations in Eastern Europe such as the Czech Republic, Hungary, and Poland, as well as other African locations such as South Africa and Tunisia.

ICT in government

- Introduction of citizen relationship management in the e-governance.
- Making e-Governance a national priority
- Improve connectivity, increase access and lower costs.
- Enhance human capacity development, knowledge creation and Sharing
- Expand opportunities for training, education and knowledge sharing for people living in rural and remote areas through distance learning
- Creation of ICT Departments in MDAs and headed by professionals with ICT backgrounds
- Frequent re-training of ICT practitioners in government

2.2 Local Context

2.2.1 Local Trends and Recent Developments

Infrastructure

The current policy statement on ICT Infrastructure states that the government, through National Information Technology Development Agency (NITDA) shall establish and develop a National Information Infrastructure (NII) backbone as the gateway to the Global Information Infrastructure (GII) interconnecting it with State Information Infrastructure (SII) and the Local Information Infrastructure (LII). The thrust of this policy is expected to have positive impacts and also actively facilitate social, economic and political transformation of Nigeria. Main One, Glo, MTN, and Nitel networks are current participants in fiber optics deployment in the country.

Industry

Mobile devices are still essentially viewed as communication devices for voice calls and for sending and receiving messages. Gradually, mobile phones are being recognized as computing devices in their own right for which custom software applications can be developed and run. To this end, a number of local companies including Anabel Mobile are seeking to investigate ways of designing localized applications and contents for mobile phones in the Nigerian context.

Local awareness of open source software development is very low in Nigeria. Also, participation on global open source software development projects in the country is virtually non-existent.

The assembly of computers from imported components is a relatively mature industry. In particular, companies assembling desktop computers abound and they provide after sales services (repairs and maintenance) to their customers. Both individuals and companies engage in desktop computer assembly.

The assembly of laptops demands specialized components, assembling equipment and testing procedures; consequently only a few companies (Zinox Technologies, Pragmatic Technologies, and Omatek) have ventured into it with varying degrees of success.

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Assembly of server grade computers, including entry-level tower servers or rack-mountable servers, is not yet commercially done in Nigeria. Some of the major players in Nigeria are Zinox Technologies and Omatek Computers.

Internet Service Providers (ISPs) offering customers access to the internet include LinkServe, Swift, MTN, GlobaCom, Skannet, Starcomms, Multilinks etc. Reliable high-speed internet access is relatively scarce and expensive in Nigeria. Most of the offerings by ISPs which are termed 'broadband' have speeds that are no where near those of their counterparts in developed nations.

The majority of ISPs connect to their customers (or subscribers) via wireless data transmission technologies. Such wireless transmission technologies offer low performance (transmission and receiving speeds) to the customers when compared with the wired (e.g. ADSL) and cable modem alternatives. The net result of this is that in Nigeria, most ISP subscribers pay relatively more for poorer Internet access than in developed countries, making access to information services more prohibitive and costly.

Education and human capital development

The Ministry of Education created its ICT department in February of 2007 and has established the Education Management Information System (EMIS). This system allows for Analysis, Modeling, Research, Personnel management, education planning and budget development. But it is yet to design its ICT policy for education. Several government agencies and other stakeholders in the private sector have however initiated ICT driven projects and programmes to impact all levels of the educational sector. Such initiatives include:

- The Nigerian Universities Network (NUNET) project
- The Polytechnics Network (PolyNet) project
- The school net project
- The Nigerian Education, Academic and Research Network (NEARNet)
- The Teacher Network (TeachNet) project
- National Open University
- National Virtual (Digital) Library (Ministry of Education/NUC)
- National Virtual Library (Ministry of Science and Technology/NITDA)

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Private sector initiatives include:

- Community teaching and learning centres
- Lagos Digital Village
- Owerri Digital Village
- Computer literacy for older persons
- Community Teaching and learning centres by Teachers without borders

ICT initiative in educational sector:

- Government, NGOs, banks and individuals have funded the implementation of ICT in schools at all levels. Others include NCC, ETF, UBEC and MTN
- Online payment and registration which has improved the administrative problem of higher and secondary educational institutions in Nigeria.
- Improving internet access in schools, government offices, banks, cyber cafe, portals, and university information websites.

ICTs are essential tools in any educational system and have the potential of being used to meet the learning needs of individual students, promote equality of educational opportunities, offer high quality learning materials, increase self-efficacy and independence of learning among students and improve teachers' professional development. It is also a tool to enhance school administration. There has been the implementation of Education Management information system (EMIS) in the Federal Ministry of Education, Kano, Kaduna and some other states. This system allows for Analysis, Modelling, Research, Personnel management, education planning and budget development.

ICT has the potential to deepen basic skills in reading, writing and in the sciences, it motivates and engages students in learning, it is relevant in increasing the economic viability of tomorrow's workforce. It also strengthens teaching as it provides powerful tools to teachers enabling them to meet individual learner's needs. ICT provides opportunity for connecting schools to the world, as learning expands beyond the classroom and students and teachers can access information and resources and can communicate with experts and peers and make useful contributions to knowledge through electronic contribution. It encourages critical thinking and offers unlimited means of achieving educational goals. The current state of ICT in Nigeria does not, however, allow for the above listed advantages of ICT to be maximised.

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One very important factor that must be cleared is that it is not ICT itself but understanding ICT and effectively employing it in the delivery of knowledge and reaching goals in a short time. When the meaning of ICT and its unlimited offer to education is clear, then rapidly changing technologies will not seem overwhelming but enable more critical thinking and problem solving in education. ICT in Nigeria is currently in the infant stage as many educational institutions are in the emerging stage.

Policy, legal and regulatory framework

The first national ICT policy was issued in 2001. The general objectives of the policy were to:

- I. Ensure that Information Technology resources are readily available to promote efficient national development;
- II. Guarantee that the country benefits maximally and contributes meaningfully by providing the global solutions to the challenges of the Information Age;
- III. Empower Nigerians to participate in software and IT development;
- IV. Encourage local production and manufacture of IT components in a competitive manner;
- V. Improve accessibility to public administration for all citizens;
- VI. Bring transparency to government processes;
- VII. Establish and develop IT infrastructure and maximize its use nationwide;
- VIII. Improve judicial procedures and enhance the dispensation of justice

The NITDA Act 2007 establishes the National Information Technology Development Agency, the National Information Technology Development Fund, and provides for the President or the supervising minister to designate and facilitate the establishment of Information Technology Parks. The Act empowers NITDA to plan, develop and promote the use of information technology in Nigeria. The National Information Technology Development Fund constitutes the main expected source of funding of NITDA programmes.

The overriding objective of the National Telecommunications Policy of 1999 is to achieve the modernization and rapid expansion of the telecommunications network and services. This is expected to enhance national economic and social development, and integrate Nigeria internally and into the global telecommunications environment. The policy also sets out in more detail the objectives and guiding principles pertaining to: Competition Policy; Restructuring and Privatisation (of NITEL and MTel); Economic Regulation; Internet; Satellite Communications; Universal Access, including the Universal Access Fund; Finance; Manpower (including expected input from the NUC

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and NBTE in terms of training programmes and curriculum); Research; Domestic Development; Safety and Security; International Perspective; Implementation and Review.

The NCC Act 2003 establishes the National Frequency Management Council, the Universal Management Council and the Universal Access Fund. The Act also reforms the Nigerian Communications Commission (NCC). The primary objective of the Act is to create and provide a regulatory framework for the Nigerian communications industry and all related matters, including the implementation of the national communications policy.

The Nigerian Telecommunications Policy has served Nigeria well since it was issued in 1999. But it was designed for the period up to about 2005 and, therefore, requires to be updated in line with rapid developments in the sector. The NCC Act 2003 appears to be adequate for now going by the major successes that the NCC has achieved in fostering the objectives of the Telecommunications Policy, promoting the deregulation of the sector, deepening of competition, etc. However, much still need to be done in such areas as development of broadband services, interconnectivity among telecom companies, reduction in telecommunication tariffs, call completion rates, rural telephony, consumer protection, etc.

The Nigeria Science and Technology Policy identifies the ICT sector as key for development, along with other ICT relevant areas such as education and intellectual property and innovation systems. For the ICT area, the policy thrusts are in terms of development of the National ICT infrastructure backbone; establishment of IT Parks as incubating centres for the development of software applications; encouraging massive IT skills acquisition through training in both private and public sectors; establishing national IT awareness promotion frameworks; and creating national database management systems.

The ICT4D strategic plan is synthesis of policy objectives, programmes and specific plan actions with corresponding specific time bound measurable targets and implementation agencies. The plan covers the following eleven sectors of Nigerian economy:

- i. Human Resource Development
- ii. Electronic Government
- iii. Infrastructure Development
- iv. Education
- v. Health

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- vi. Awareness, Popularization and Development
- vii. Agriculture
- viii. Private Sector Development
- ix. Governance and Legislation Framework
- x. National Security and Law Enforcement
- xi. Research and Development

ICT in government

The context of ICT in government may be characterized as follows:

- *Networks and connectivity:* Not many MDAs have established LANs and WANs. Some Parastatals like NHIS are at initial stages of LAN-WAN deployment.
- *Data and Infrastructure management:* Very few MDAs have so far deployed ICT to manage data. The CBN, NNPC, and FMOF are at advanced stages of ICT deployment
- *Human capacity development:* As a result of lack of full ICT departments in government MDAs, training budgets for ICT have been minimal and in many cases non-existent.
- *Process automation:* e-government concepts are generally at infancy in Nigeria. e-Payment was launched in January 2009 at federal level. Lagos, Edo, Delta, and Kano states have indicated migration to e-platforms.
- *Citizen access/services:* Many MDAs now have websites for information publishing and downloads. These websites need maintenance for updates and shorter request process time.
- *Strategic framework and policies:* There is a national IT policy and national Telecommunications policy in Nigeria. The direction may be to merge these polices and come up with common standards for adoption.
- *Justice and security:* In recent times, government has demonstrated its willingness to encourage judicial independence.

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- *Institutional framework:* There is no institutional framework in place at the moment. Government knows the importance of ICT in governance but has so far not developed an enabling framework or strategy for e-government.

Research, Development and Innovation

The Research, Development & Innovation sector on Information and Communications Technology (ICT) in the country is still at its infancy. The following are the main research institutes in Nigeria whose activities are ICT-related:

1. African Regional Centre for Engineering Design and Manufacture (ARCEDEM), Ibadan
2. Raw Materials Research and Development Council (RMRDC), Abuja
3. Federal Institute for Industrial Research (FIIRO), Oshodi
4. National Center for Technology Management (NACETEM), Ile- Ife
5. National Information Technology Development Agency (NITDA), Abuja
6. Center for Energy Research and Development (CERDI), Ile-Ife
7. National Mathematical Centre (NMC), Abuja
8. National Office for Technology Acquisition and Promotion (NOTAP), Abuja.
9. National Space Research and Development Agency (NASRDA), Abuja.
10. Sheda Science and Technology Complex (SHESTCO), Abuja.
11. Project Development Institute (PRODA), Enugu.
12. National Research Institute for Chemical Technology (NARICT), Zaria.
13. Centre of Adaptation for Technology (CAT), Awka
14. Scientific Equipment Development Institute (SEDI), Enugu
15. African Regional Centre for Information Science (ARCIS)
16. Engineering Materials Development Institute (EMDI), Akure

2.2.2 Current Plans and Programmes in Nigeria

Infrastructure

National Communications Commission (NCC), Galaxy Backbone and Nigeria Communications Satellite (NIGCOMSAT) are currently working on the provision of adequate connectivity to the global information infrastructure through various programs. Surban Telecoms has also provided the second access via SAT3 to complement the one deployed by Nigeria Telecommunications Limited (NITEL). SAT3/WASC/SAFE is a submarine fiber optic digital communication cable that links Europe, Africa and the Far East. It provides a global information superhighway capable of linking 90% of the sub-Saharan countries. The SAT3/WASC Part of the cable is a 17,380km long cable with ultimate data rate of 120Gbps. It has four cores and uses Wave Division Multiplexing (WDM) technology to carry digital data.

The proposed national backbone infrastructure by NITEL is given in figure 1.0.

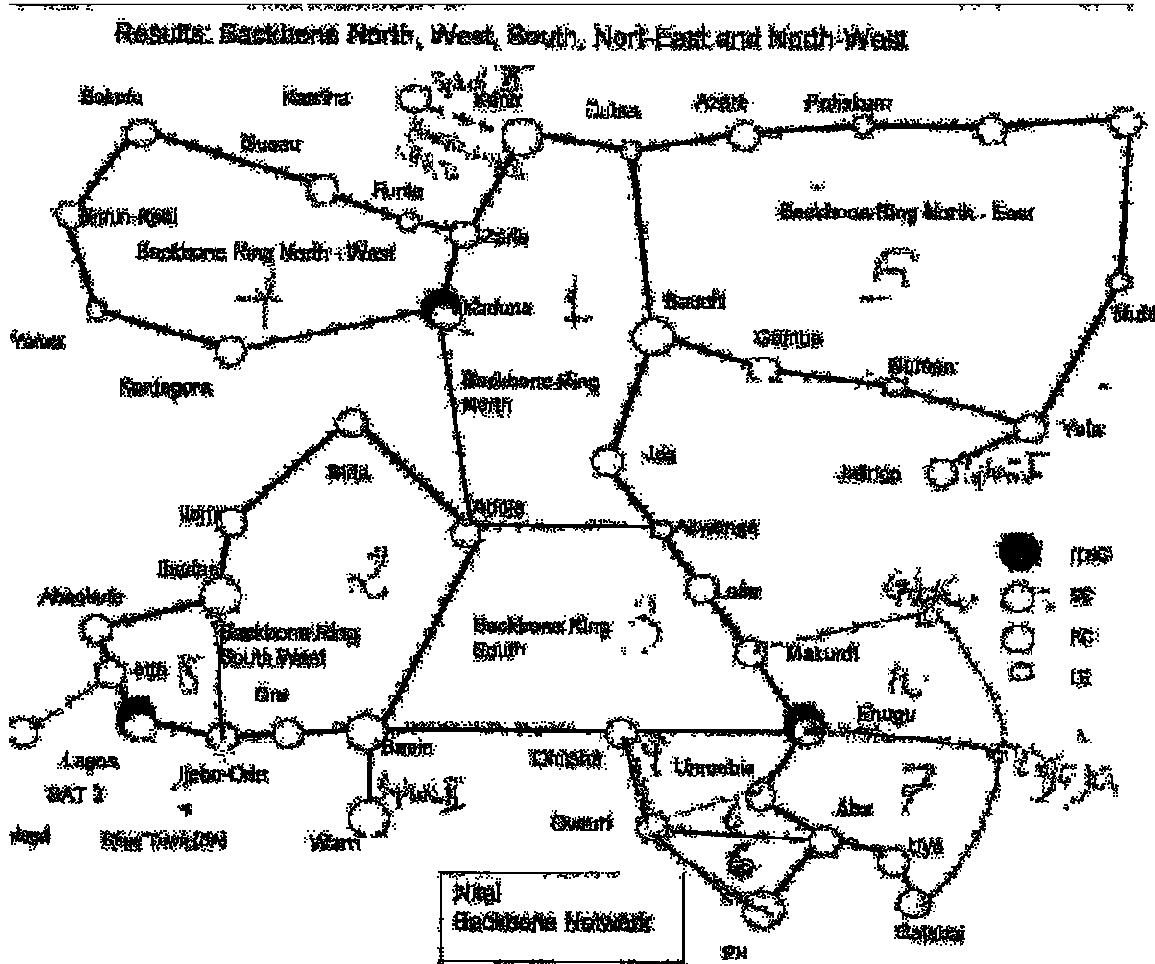


Figure 2: Existing National Backbone Infrastructure as deployed by Nitel

There are many abandoned and malfunctioning towers spread across the country

Deployment of LAN at Local Government Secretariats is yet to be implemented. Only a handful of Local Governments have taken the initiative to deploy LANs on their own. The target was for 50% of the secretariats to have LAN by 2009.

80% of Local Government Secretariats' LANs were expected to have been connected to the State or other LANs via cable, optic fibre or wireless by 2009 to form WANs.

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About 70% of all the government owned WANs were expected to be linked to the NII by 2009. LANs are expected to be created in all Federal Ministries and institutions in Abuja by December 2009. LANs are installed in the institutions and they are easily linked by fibre with other networks forming a large Metropolitan Area Network (MAN). The MAN should be linked to the NII by December 2009.

Broadband connectivity is virtually absent except for wireless modems provided by GSM/CDMA operators. The absence of fixed networks which has prevented the utilization of broadband solutions over copper (DSL) is mainly responsible for the absence of last mile broadband connectivity. Nigeria currently has about 58 million connected GSM, 5.9 million CDMA and 1.4 million fixed wired/wireless subscribers.

NCC, through USBF is also working towards connecting schools and setting up Community Communication Centres (CCC) to provide VOIP, computers and cyber café. NCC is providing bandwidth for 3 years. In the mean time, rural area information and ICT service needs remain unmet by public and private ICT investments.

Reliable power is lacking for ICT. Current solutions do not employ energy saving ICT options such as the use of low power IT equipment and power saving procedures. A mix of alternative power sources must be encouraged, such as expansion of the national grid, solar, generators, small wind, micro-hydro, and batteries.

In the area of hosted services, there are only a handful of companies such as CSCs, 21st Century and recently Galaxy.

There are no Internet Exchanges/Gateways. Galaxy is currently working towards hosting the country's top level domain which is now being hosted abroad.

Industry

The assembly of computers from imported components is a relatively mature industry. In particular, companies assembly desktop computers abound and they provide after sales services (repairs and maintenance) to their customers. Both individuals and companies engage in desktop computer assembly.

The National Software Development Task Force (NSDTF) and the National Software Development Initiative (NSDI) have been given the task of championing the idea of bringing the software sector to the forefront of the Nigerian Economy.

Mobile phones, especially those based on GSM and CDMA technologies have gained widespread acceptance in Nigeria, resulting in an increasing demand for mobile devices and phones to enable communication on these networks. This demand has been wholly met by foreign mobile device brands until Anabel Mobile began assembling mobile phone locally in late 2008. Anabel Mobile has four different mobile phone models targeted at different classes of mobile phone users.

Policy, legal and regulatory framework

- NITDA is drafting a new ICT policy. The new policy seeks to mainstream the policy with developmental imperatives contained in the NEEDS framework and the Millennium Development Goals. The new policy is expected to address emerging IT issues and ensure synergy between it and the other policy instruments in the ICT sector, such as the Telecommunications Policy, Education Policy, Science and Technology Policy, Broadcast Policy, Industrial Development Policy and the Intellectual Property Rights Policy, and their corresponding Acts.
- Both the Data Protection Bill and the Freedom of Information Bill are currently before the National Assembly. Their passage into law will provide the legal framework for the development content aspects of the ICT sector. The PLR environment is currently very weak in respect of the protection of intellectual property rights pertaining to ICT products, software and content.
- At the sub-national level, most state governments in Nigeria have adopted some policies to guide their acquisition and use of ICT in their MDAs, particularly the key ministries such as governor's office, finance, budget and planning, education and health, as well in some state-owned secondary and tertiary education institutions. A few states have introduced innovative policy and regulatory frameworks, Examples are

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- i. The Kano State's ICT Policy and Park, which provides for the creation of the Kano State Information and Communication Technology Development Agency (KICTDA), the Kano State Institute of Information and Communications Technology (KIICT), and an ICT Park. The agency would be the main vehicle for the implementation of the policy, and its functions at the state level are generally modeled after those of NITDA at the national level
- ii. Lagos State's Government Education Management System (LASGEMS) Law, which provides legal backing for the LASGEMS. The LASGEMS project is currently collecting and updating the data on all students in both public and private schools in the state into a database that would be accessed online through the Internet. Other relevant features of LASGEMS that are expected to be integrated into the Education System include; Curriculum Management, Student Performance management (Continuous Assessment Scores), Disciplinary Administration, Contact management, on-line enquiries, Examination Planning and Management

ICT in government

The National e-Government Strategies Agencies (NeGST) was established in 2004 to facilitate e-government implementation in Nigeria through Private Public Partnership (PPP) framework. The PPP approach is premised on the following considerations:

- i. Technological requirements for e-government such as infrastructure details, software architectures, database management and security required to effect transformation are well known
- ii. Development path for e-government is not well known
- iii. Real difficulties lie in the organizational change and the re-structuring of traditional departmental divisions

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The e-Government strategy aims to deliver the following programmes and systems:

- National Information & Communication Infrastructure
- Multi-stakeholders portals for access to government information
- IT Skill Acquisition for all
- Human Resources Administration
- Payroll & Pension Administration
- Electronic Tax Administration
- Treasury & Revenue Management
- Accounts Receivable/Payable
- Works & Contract Administration
- e-Procurement & Price Intelligence
- Health & Hospital Administration
- e-Payment, eMarket place
- Online permits, renewals, e-filing etc.
- Education & Students Administration
- Agriculture & Natural Resources
- Housing & Urban Planning
- Judiciary, Laws & Regulation
- Police Command & Control System
- Legislature
- Project Management
- Transportation
- Investment Place Marketing
- e-Tourism, eKiosk

Research, Development and Innovation

- NITDA is working on an effort to foster collaboration among researchers through the creation of a database

2.3 Issues and Challenges

ICT infrastructure

- Poor integration and usage of the available infrastructure
- High proportion of uninformed citizens
- Long decision-making processes
- Lack of single point of regulation
- Unpredictable shift in government policies
- Unstable government policies that change with every new government
- Poor civil and economic security coupled with undeveloped banking system
- Unstable and inadequate electric power

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- Restrictive and sometimes disabling policies
- Information hiding; many institutions tend to treat information concerning their industry as secret thereby hindering inquiry, data collection, research and analysis. Where such information is made available, the process of acquiring the information tends to be cumbersome

Industry

- Lack of standardization; Poor Demand; Lack of quality
- Lack of Incentives
- Assembly only
- No manufacturing of components, peripherals, accessories
- Lack of standardization
- Low HR capacity
- Lack of Intellectual property protection
- Lack of trust in local software
- Lack of patronage

Education and human capital development

ICT in the education sector of Nigeria is currently in the infant stage as many educational institutions are in the emerging stage. The following factors have contributed to this situation:

- Lack of technically experienced teachers: Literate ICT teachers are few. There is a need for teachers to be computer literate and educated on how to integrate ICT in their taught subjects
- Limited ICT facilities: Most learning institutions do not have dedicated laboratory for ICT training and most teachers and students do not have access to the computer or the internet
- Inadequate course content for ICT: The curriculum should not only include computer appreciation stages but also include how ICT can be integrated into all subjects covered in the classrooms
- Lack of National standard: There are no set academic or professional ICT standards
- High cost of ICT services: High cost of internet access at cyber cafes due to high operating cost of maintenance, equipment renewal and broadband
- Unsteady and Inadequate Electrical Power Supply
- Poor state of infrastructures in Primary and secondary schools

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- Most schools, especially government schools, across the country do not have computer labs. Much of the training is through notes, handouts and sometimes poorly prepared books
- Most teachers at all levels lack basic computer literacy skills
- Most schools, especially government schools, across the country do not have computer labs
- Nigerian universities were absent from the list 1000 global institutions of higher learning, partly because they have less than 5% ICT operations in their processes

- Ratio of computers to a student is currently at 200:1
- Few university libraries have library connectivity and library management software
- Poor ICT capacity and infrastructure has prevented the universities from achieving their full potential

Policy, legal and regulatory framework

Policy makers delay in passing legislation on ICT related bills. The Computer Security Critical Network Infrastructure Bill which has been before the National Assembly for more than 24 months has not been passed. Similarly, the Electronic Transactions Bill sponsored by Computer Professionals Registration Council of Nigeria (CPN) has also been pending in the National Assembly, with neither the Executive nor the Legislature interested in passing it

ICT in government

- *Inadequate ICT Infrastructure within the government:* Most ministries have a largely inadequate number of computers. Very few government offices have their computers connected to the Internet and fewer have internal networks.

- *Inadequate ICT awareness by government officials:* It has been identified that more than anything else, it is the mindset of government officials that poses the biggest bottleneck to e-Government. There are a number of reasons why they resist the use of computers beyond usual typing of letters and documents preparation. Some of the primary reasons are: (i) resistance to change in their familiar working environment; (ii) the fear that computerization of government processes may make some people redundant; (iii) the thinking that computers are meant for low-level data processing work.

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- *Lack of adequate training programs:* Many e-Government or computerization projects suffer gravely from lack of adequate training programs. Training is vital in familiarizing users with computers and breaking their fears. Some officials go through unplanned 'ICT Training', often in another country, and then come back not getting any scope for utilizing his/her newly gathered knowledge of ICT and forgetting it all in due time.
- *Lack of ICT professionals:* Government organizations are facing the problem of lack of ICT professionals. There are many vacant posts, but not attractive for good ICT professionals. As a result people from non-ICT background take up ICT positions leading to MDAs not receiving good ICT support. Nigeria scores quite low in budget for education and training of its workforce in ICT. Lack of adequate compensation and low professional development has also led to brain drain on ICT graduates in the country. Implementing ICT in government will require a reasonable pool of ICT professional for it to be successful.
- *E-Governance implementation at state and local levels:* The voluntary nature of state and local government participation and implementation of e-governance is quite a challenge since not many local governments have the required resources to completely migrate to ICT environment.
- Technological requirements for e-Government such as infrastructural details, software architectures, database management and security required to effect transformation are relatively well-known but the development path for e-Government is not well known, appreciated or practiced. The real difficulties lie in the associated organisational change and the demolition of traditional departmental divisions.

Research, Development and Innovation

- Some pressing needs of the country, for example, alternative power (solar, wind) are not being researched by the research institutions
- The level of collaboration and partnerships among institutions in the R and D sector is very low. The major incentive for now is by the industry that research on specific products to

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bring to the market. Academic research happens because research is a major requirement for the academics' career progression

- Private sector research and development initiatives are few as most organisations rely on farmed out technology transfer and are often not willing to apply research findings of agencies within the country due to inadequate trust in the quality of their research

Sub-theme	Aspects	Issues/Challenges
Infrastructure	Backbone	<ul style="list-style-type: none"> • Inadequate National Coverage
	Last mile	<ul style="list-style-type: none"> • Poor Access • Poor Quality • Non-existence in rural areas
	Broadband Access (>= 1MBs)	<ul style="list-style-type: none"> • Lack of fixed Lines • Affordability • Low Speed
	Voice and Data	<ul style="list-style-type: none"> • Very limited, Not Integrated
	Private versus Public role	<ul style="list-style-type: none"> • Dominated by Public Sector
	Hosting Facilities	<ul style="list-style-type: none"> • Inadequate Capacity; Inadequate competition
	Internet Exchange/Gate way	<ul style="list-style-type: none"> • Virtually non-existent; Off-shore hosting of top level domain
Industry	Hardware	<ul style="list-style-type: none"> • Lack of standardization; Poor Demand; Lack of quality • Lack of Incentives • Assembly only • No manufacturing of components, peripherals, accessories

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Sub-theme	Aspects	Issues/Challenges
	Software	<ul style="list-style-type: none"> • Lack of standardization • Low HR capacity • Lack of Intellectual property protection • Lack of trust in local software • Lack of patronage
Human Capital Development	IT Professionals	<ul style="list-style-type: none"> • Inadequate training and mentoring • Outdated Curricula • Lack of standards
	Basic IT education	<ul style="list-style-type: none"> • Inadequate manpower • Gross inadequacy of ICT tools • Lack of digital content
	Access	<ul style="list-style-type: none"> • Affordability • Mass ICT awareness
	Skills	<ul style="list-style-type: none"> • Workforce Training • Mass ICT literacy
	e-learning	<ul style="list-style-type: none"> • Lack of Infrastructure • Funding • Lack of local digital content
ICT in Education		See details in the ICT4D Strategic Action Plan

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Sub-theme	Aspects	Issues/Challenges
Policy and Legal Framework	Strategic policies/e-strategies	<ul style="list-style-type: none"> • Disjointed Policies • Inadequate policies • Bureaucratic bottleneck • Absence of framework for policy Initiatives • Poor communication • Lack of enforcement • Weak PPP framework
	Operational Policies	<ul style="list-style-type: none"> • Lack of Standards
		<ul style="list-style-type: none"> • Lack of connectivity • Lack of data and Infrastructure management • Lack of human capacity • Lack of work force training and re-training • Lack of Process automation • Lack of IT cadre in Government(scheme of service) • Inadequate citizen access • Inadequate e-Government strategy
	IT Governance	<ul style="list-style-type: none"> • Lack of enterprise architecture • Lack of Institutional framework • Lack of Project and Change management

Sub-theme	Aspects	Issues/Challenges
R & D and Innovation		<ul style="list-style-type: none"> • Lack of IT Research Institutes • Lack of funding • Lack of collaboration & partnership • Lack of alignment with Industry • Lack of Incentives & localization policies • Lack of Innovation • No strategy • No research parks
	Cross-cutting aspects	<ul style="list-style-type: none"> • Inadequate power • Access • Cost • Lack of management buy-in

2.4 Strategic Imperatives

Infrastructure

Nigeria has access to the latest and best technology for its communication infrastructure. The Nigerian government has already made substantial investment in the installation of fiber optic cable through NITEL for both domestic and official use. The capacity is therefore available, and ought to be completed and put into use. There is need for government to invest adequately in the creation of a national communications backbone.

Industry

The local assembly of computers should be encouraged as they play a vital role in the sharing of resources on computer networks. More server grade computers should be locally assembled and deployed on national networks to make it easier for businesses and individuals to publish content on the web by bringing down web hosting costs. This will lead to more local content

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Nigeria can and should become a desirable destination for Business Process Outsourcing (BPO). Needed for this, however, are the right infrastructure (especially fibre-optic networks) and appropriate policy and legal frameworks.

Education and human capital development

Nigeria lacks adequate supply of highly qualified ICT professionals to drive the production aspects of the industry. There is need to popularize mathematics, science and ICT education at the lower levels in order to ensure that adequate numbers of entrants into universities opt for science, engineering and computing programmes.

The curricula of ICT in tertiary programmes need to be modernized to attain global standards in tertiary education.

2.5 Opportunities

ICT in government

The opportunities in ICT cut across all the thematic areas identified in the Nigeria Vision 20-2020. Satellite imaging systems, nano-technologies, biotechnology, digital border surveillance, and tele-medicine are some of the accelerated progress that ICT proves relevance in human and societal advances. The opportunities of ICT in governance include:

- *Health management information systems:* With ICT, the government could adequately manage the huge data generated from healthcare service delivery to support healthcare policy planning and monitoring.
- *Transparency and Accountability in governance:* Lack of transparency inspires corruption. Accountability can only materialize when leakages in government revenue sources are blocked. ICT in governance can help streamline these problems.
- *Government guaranteed loans management:* Part of the 7-Point Agenda is to facilitate citizen access to agriculture loan for farmers. Managing a database of who got what, the refund mechanism, and sharing the information will need ICT support.

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- *Information dissemination:* Lack of information on Government activities and many services it offers to its citizen creates opportunity for ICT in awareness creation.
- *Integrating the physically challenged:* Physically challenged people comprise a significant part of the society. With ICT, Government can take some initiatives to integrate these groups of individuals into the workforce.
- *Weather management:* ICT in government will enable weather forecasting for deep sea fishing and precautionary measures against bad weather.
- *Justice and Security:* Automation of court processes to enable transparency in monitoring cases, solve problem of congestion, and ensure efficiency and effectiveness in court operational processes. Uploading and down loading information from a central criminal database will provide real time information for effective community policing.

2.6 Key Success Factors

ICT infrastructure

- Significant improvement in the supply of electricity power country-wide is required. Alternative sources of energy need to be identified in achieve this. Without energy, cost profiles in the sector will be very high and uncompetitive globally

Industry

- Need for legal and regulatory frameworks to promote the development of competitive and open ICT productive and consumptive activities, combined with focused policies to develop specific aspects of the ICT industry or sectoral uses of ICT
- Promotion by government of ICT industrial parks, incubation projects, clusters (Computer villages)

Education and human capital development

- Synergy between policies for ICT in education (teaching, learning, administration, research) and Education for ICT sector development (ICT human capacity development)
- Development and improvement of institutions, standards and curricula for the training of high level ICT human resources, including computer scientists, computer engineers, telecommunications engineers, software and web developers

Policy, legal and regulatory framework

- Visible support, endorsement and total commitment to the realization of the ICT Strategic action vision by key top level stakeholders in the public sector, private sector and civil society
- Mainstreaming ICT policies into the broader development of knowledge society and ensuring coordination and consistency between ICT policy strategies and national development policies at all levels
- Consistency and sustainability of ICT development visions, missions and policies and plans

ICT in government

- Commitment by governments at the federal, state and local government levels to embrace ICT in government on a massive scale
- A well-formed e-government policy and strategy which will provide the frameworks for policies, supportive legislation, plans and programmes for expanding and deepening ICT applications for process automation as well as for G2G, G2B and B2C

Research, Development and Innovation

- Adequate and focused funding, as well as effective collaboration and successful partnerships between governments, research institutes and universities and the private sector

3. Strategies for Improved Information and Communication Technology in Nigeria

3.1 Vision

Vision Statement:

Attain an information and knowledge-based economy and society that is efficient and technology-enabled through a globally competitive ICT industry

3.2 Objectives, Goals, Strategies and Initiatives

Objective 1: To make ICT an enabler to transform the socio-economic sectors of Nigeria			
S/N	Goals	Strategies	Initiatives
1	Provide a framework for the successful coordination and implementation of the ICT NV 2020 strategies and initiatives by 2010	Set up a Programme Management Office (PgMO) for ICT NV2020 to ensure effective implementation of ICT sector strategies and initiatives. Set up Project Management Offices (PMO) for specific ICT NV 2020 projects in relevant MDAs	Enabling legislation for the Project Management Office to be formulated by January 2010 and passed by July 2010.
			Set up an inter-agency drafting committee to work on the Bill that will enable the PgMO by 2010.
			ICT NV 2020 Programme and Project Management Offices (and guidelines) to be created in line with the Programme Management global best practices by July 2010
			Implement the report recommending the creation of ICT Ministry by 2010
2	75% of the workforce to acquire basic and work-relevant ICT skills by 2015 and 100% by 2020	Carry out Skills Gap Analysis to assess ICT skills deficiencies. Implement the Strategic Action Plan (ICT4D) to mainstream ICT policies, ICT-based processes, and ICT products and services into different sectors of the economy. Provide incentives for the workforce to acquire ICT skills, equipment and connectivity. Update curricula in educational	Plan and budget for the implementation of the ICT for Development (ICT4D) Strategic Action Plan in 2010.
			Undertake Skills Gap Analysis for all sectors of the economy by July 2010, and the outcome used to implement workforce skills improvement strategies by 2011.

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Objective 1: To make ICT an enabler to transform the socio-economic sectors of Nigeria			
S/N	Goals	Strategies	Initiatives
		institutions to promote ICT skills learning	<p>Make the use of basic and specialized and work-related ICT skills a requirement for employment and advancement in MDAs by 2010.</p> <p>Incorporate the use of ICT tools and applications in the curricula of all subjects in all primary and secondary schools by 2011.</p>
3	Achieve computer density of 1:20 in 2015, and 1:3 in 2020	Promote the personal acquisition and ownership of computers by pupils, students, employees and households. Promote citizens online access to government information. Promote the availability of local digital content and online databases	<p>Create incentives and promote schemes to enhance personal ownership of computers and other ICT tools by pupils, students, employees and households by 2010.</p> <p>Issue regulatory standards on government web sites for the purpose of online access to government information and services by 2010.</p> <p>Create and enforce guidelines for data architecture and management by 2010</p> <p>Develop a programme to enable the commercial production by private companies of local digital content and online databases for different sectors of the economy by 2010.</p> <p>Pass the Freedom of Information (FOI) bill by 2010</p>

Objective 2: To deploy ICT in government to improve the efficiency and effectiveness of service delivery			
S/N	Goals	Strategies	Initiatives
1	Ensure that critical public services (e.g. citizen, birth and death registration, revenue collection, driver's license applications, etc) are offered online by 2015 and all public services are online by 2020	<p>Develop ICT architecture to guide the automation, interconnection, and service provision by MDAs and ensure compliance.</p> <p>Deploy networking infrastructure, electronic data management systems and Internet connectivity in all MDAs.</p> <p>Adopt a common pool approach to the deployment of critical government ICT assets (infrastructure, equipment, software, skills) in MDAs to enhance efficiency.</p>	Publish and ensure compliance on appropriate ICT architecture to guide the automation and interconnection of MDAs and public services by 2010.
			Provide internet connectivity for all ministries by 2010 and 100% by 2012
			Mandate all MDAs to make their services and information accessible on their websites and portals by 2011
			Design and deploy network infrastructure and electronic data management systems for the backroom automation and interconnection of key MDA's by 2012, and all MDAs by 2015.
			Formulate appropriate policies and guidelines for the acquisition, use, deployment, project management and operation of ICT in MDAs by 2011.
			Issue guidelines for government websites by 2010
			Provide adequate resources to Computer Professional Registration council for monitoring and compliance purposes
2	Ensure that 80% of the government workforce acquire and use work-related ICT applications and	Train and re-train continually all government personnel in the use of appropriate ICT applications to their functions	Sensitize all MDAs on the ICT in government provisions of Vision 2020 by December 2009.

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Objective 2: To deploy ICT in government to improve the efficiency and effectiveness of service delivery			
S/N	Goals	Strategies	Initiatives
	skills in their functions by 2015 and 100% by 2020	<p>Create an ICT cadre in the public service, and create ICT departments in all MDAs headed by Directors of ICT.</p> <p>Promote and implement incentives to enhance personal ownership of computers and other ICT tools by public servants with the collaboration of the private sector suppliers and financial institutions</p>	Implement the annual budgetary provision for ICT training of staff by all MDAs beginning from January 2010
			Review the Scheme of Service to create a distinct ICT cadre July 2010
			Provide one-off corporate Tax incentives (1%) for the implementation of systems for geographical location of subscriber terminals to enhance security (longitude and latitude)
			Develop e-transaction certification administration guidelines including PKIs by 2010
			Streamline overlapping legislation and policies and their implementation through different MDAs by 2010
			Provide adequate resource annually for the Computer Forensics Institute Nigeria (CFIN) for training and registration of computer forensics experts starting 2010
			Create ICT Departments in all MDAs by September 2010
			Promote and implement incentives to increase personal ownership of computers and other ICT tools by public servants with the collaboration of the private sector suppliers and financial institutions
			Enact enabling legislation for e-Government, e.g. Digital Signature Act.

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Objective 2: To deploy ICT in government to improve the efficiency and effectiveness of service delivery			
S/N	Goals	Strategies	Initiatives
			Implement Enterprise Architecture documents by July 2010
3	Achieve computerisation of 75% of the business processes of MDAs by 2015 and 100% by 2020.	Create enterprise architecture document(s) at the different levels of the government to guide the acquisition, deployment and operation and maintenance of interoperable technology systems. Develop/Build/Acquire appropriate technology and systems to automate business processes in all MDAs. Develop an appropriate framework for maintenance and support.	Create Enterprise Architecture documents by July 2010, and implement ICT subsystems and applications based on the documents by December 2010. Make the level of automation of business processes a criterion for evaluating performance of MDAs with effect from December 2011
4	Achieve high level efficiency and effectiveness in the deployment and operation of ICT infrastructure and systems in MDAs for key public services by 2015	Develop, promote and implement appropriate PPP frameworks and arrangements for the building, operation and transfer (BOT) of public sector ICT infrastructure. Develop, promote and Implement PPP based arrangements for key public services to citizens (G2C) and businesses (G2B).	Identify ICT infrastructure, applications and services for PPP arrangements by July 2010. Design, implement and operate PPP arrangements for the provision of ICT networks, applications and services for key MDAs by July 2011, and for all MDAs by 2015 Deploy the human capacity, policies and guidelines for the acquisition, deployment, use, and operation of ICTs in MDAs by 2011. Eliminate duplication of infrastructure and save costs by ensuring the operation of a single, robust network platform for MDAs with failover redundancy

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)

S/N	Goals	Strategies	Initiatives
1	To have operational a new curricula for educational institutions at the primary, secondary and tertiary levels to incorporate appropriate ICT skills content by 2015	Promote the importance and use of ICT in the teaching and learning of all subjects in primary and secondary schools	Facilitate the update and implementation of new ICT-driven curricula for primary and secondary schools by 2011
		Review the curricula of all subjects and courses at all levels to integrate ICT assisted learning	Sponsor programmes to ensure that teachers of computer science, computer engineering and information technology programmes in universities acquire modern ICT knowledge and skills (including open source technologies) for teaching and research by 2011
		Update the curricula of ICT courses and subjects at the tertiary, secondary and primary levels of education	Conduct baseline and periodic certification of ICT training programmes offered by private sector organizations by July 2010
2	To increase the computer-to-student ratio from the estimated 1:40 in rural schools to at least 1:3, and from the estimated 1:35 in urban schools to at least 1:2 by 2015	Certify ICT training programmes offered by private sector organizations to assure quality	
		Promote the use of open source software and open source standards in tertiary-level ICT programmes and courses	
		Invest substantially in equipping and deploying ICT laboratories in primary and secondary schools	Provide incentives to local manufacturers of ICT products by 2010
		Provide Internet connectivity for all institutions to enable access to Internet resources for teaching and learning	Establish ICT laboratories with Internet connectivity in all schools, and facilitate the procurement, installation, operation, maintenance and use of ICT equipment, software and consumables in the schools by 2011
		Partner with Local manufacturers to produce affordable functional computer systems at subsidized rate	

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Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)

S/N	Goals	Strategies	Initiatives
		Establish e-learning facilities and programmes accessible to the different levels of education	Provide ICT-driven instructional materials for use by teachers and students in Nigerian schools by 2011
3	Achieve ratio of computer scientists, engineers and technologists to population of 1:7,000 in 2015 and 1:3000 in 2020.	<p>Update continuously the knowledge and skills set of ICT teachers, trainers and researchers in the universities and polytechnics</p> <p>Increase the support for students in ICT, engineering and technical programmes in universities and polytechnics</p> <p>Establish and support e-learning facilities and programmes particularly for science and technology-oriented courses and subjects throughout the country</p>	<p>Increase the number of scholarships available for the training of students in ICT programmes by 100% annually from 2010 to 2015 and additional 20% annually thereafter, making special provision for women and the physically challenged</p> <p>Train a critical mass of ICT teachers and trainers in the universities and polytechnics on open source software development tools and platforms by 2012</p> <p>Formulate policies and provide incentives for e-learning programmes for computing, engineering and technical courses and subjects by 2010</p> <p>Establish ICT support departments in tertiary institutions that do not currently have them to initiate and support ICT development programmes by 2011</p>

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)			
S/N	Goals	Strategies	Initiatives
			Harmonize and strengthen the existing resources, programmes and centres for ICT skills acquisition in underserved areas for retraining of non ICT graduates by 2010
4	Ensure that 75% of the literate population is ICT literate by 2015 and 100% by 2020	<p>Facilitate increased awareness of potential of ICT by literate people in rural and urban areas of the country</p> <p>Facilitate access to and use of ICT infrastructure and ICT-mediated public and private sector services in rural areas</p> <p>Incentivize the commercial production and provision by the private sector of Nigerian digital content and online databases in English and major Nigerian languages</p> <p>Make ICT skills training an aspect of the NYSC programme to enable youth corps members to acquire, consolidate or upgrade ICT skills for entrepreneurial innovations in the different sectors of the economy</p>	<p>Formulate and implement policies to facilitate the commercial private sector production and provision of Nigerian digital content in English and major Nigerian languages by December 2010</p> <p>Develop e-learning portals and labs for self-learning, and for technical and vocational education by 2011</p> <p>Establish national digital library with access points in both rural and urban areas by 2011</p> <p>Amend the Education Minimum Standard Act 1985 to recognise virtual studies and certification by December 2010</p> <p>Provide certification guidelines for ICT companies, products, services and ICT professionals by 2010</p> <p>Train trade attaches on the marketing of Nigerian ICT products and services</p>

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)

S/N	Goals	Strategies	Initiatives
			Organize ICT Expositions in foreign missions in selected countries by 2012
			Roll-out Internet connectivity in all schools beginning from 2009 and achieve 100% by 2020
			Facilitate the procurement, installation, operation, maintenance and use of ICT equipment, software and consumables in the schools by 2011
			Increase the number of scholarships available for the training of students in ICT programmes by 100% annually from 2010 to 2015 and additional 20% annually thereafter, making special provision for women and the physically challenged
			Establish ICT and e-learning support departments in tertiary institutions that do not currently have them to initiate and support ICT development and e-learning programmes in the institutions by 2011
			Sponsor and support media-based programmes to increase awareness among school administrators, teachers and students/pupils of the role of ICT in education, subjects, employment and careers

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)

S/N	Goals	Strategies	Initiatives
			Provide ICT-driven classroom and e-learning instructional materials for use by teachers and students in Nigerian schools by 2011
			Formulate policies and provide incentives for e-learning programmes for computing, engineering and technical courses and subjects by 2010
			Encourage the development of e-learning portals and labs for self-learning, and for technical and vocational education by 2011
			Implement training programmes for NYSC members on specific ICT application relevant to both their subject disciplines and for careers, and entrepreneurial innovations by 2011
			Provide incentives to tertiary institutions and ICT companies to collaborate towards the development and commercial production and provision of access to digital content in English and Nigerian languages

Objective 4: To attain competitive local capacity in ICT Infrastructure (backbone, hosting, data centres, internet exchange / gateway etc)			
S/N	Goals	Strategies	Initiatives
1	Have a national fibre-optic backbone infrastructure that ensures high bandwidth availability, universal access and no single point of failure in computer and telecommunications throughout the country by 2015	Assess the coverage, gaps and weaknesses in the existing infrastructure for high bandwidth communications, and plans and projects for new infrastructure by public agencies and private sector organizations	Undertake survey and compatibility assessment of existing ICT infrastructure owned or planned by Government and private sector entities by 2010
		Build and own a National ICT Backbone	Build a National ICT Backbone, and facilitate interconnectivity to the backbone of existing public and private sector platforms by 2013
		Develop plans and modalities for the Interconnection of existing and planned high bandwidth infrastructure	Enact appropriate acts and formulate appropriate policies for National backbone governance and management by 2011
		Formulate policies and legislation to ensure reliable and efficient management and operation of the interconnected communications backbone	Provide mechanisms and incentives for ICT products manufacturers to enable them produce low cost systems for schools and pupils/students with flexible payment terms by 2010
			Update survey and interoperability assessment of existing ICT infrastructure owned or planned by Government and private sector entities by 2010
			Facilitate the building of National fibre Backbone and metropolitan fibre networks linking all major telecom sites in and around major cities by 2013 and further facilitate deployment of fibre to homes by 2015
			Upgrade the GSM facilities in rural areas by 2010

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Objective 4: To attain competitive local capacity in ICT Infrastructure (backbone, hosting, data centres, internet exchange / gateway etc)			
S/N	Goals	Strategies	Initiatives
2	All federal and state government networks connected to the National backbone by 2020	See relevant strategies and initiatives under Goals 2.1 and 2.3	Sensitize and agree with all stakeholders in the private and public sectors (federal, state, and local) on the required standards and performance thresholds for interconnectivity of their networks by 2010
		Support State and Local Governments to link their ICT Backbone to the National backbone	State governments to develop and synchronize their ICT plans with that of the federal government towards interconnectivity of federal and state networks by 2011
		Facilitate interconnectivity of private networks to the National backbone	Commence the connection of all MDAs (federal and state) to the national backbone via state or federal networks by 2011.
		Create an enabling environment to promote the private sector provision of data centre facilities	Deploy intranets in all MDAs by 2011
			Formulate and implement policies and guidelines to achieve interconnectivity between private communication networks by 2011
3	Improve teledensity from the present 47% to 75% in 2015 and 90% in 2020	Improve the provision of last mile communication facilities (including landlines and fixed wireless) in rural areas	Implement Rural Telephony Projects using viable technologies by 2012
		Facilitate the deployment of last mile infrastructure to rural and underserved urban areas by telecommunication companies	Provide fiscal incentives to private telecommunications companies to extend and expand services to rural areas as from 2010
			Implement appropriate policies from previous studies on power generation by 2010.

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Objective 4: To attain competitive local capacity in ICT Infrastructure (backbone, hosting, data centres, internet exchange / gateway etc)

S/N	Goals	Strategies	Initiatives
			Establish a National camera surveillance system
			Enforce connection of all ISPs and international gateway license holders to internet exchange points in Nigeria
			Enforce the registration of all telecommunication lines
			Free up 698-862MHz spectrum currently used by analog TV for broadband services by 2010
			Free up 2500-2690MHz spectrum currently used by MMDS for broadband services by 2010
			Ensure one-stop shop for end-user frequency assignment coordination and management by 2010
			Deploy additional satellites with full satellite and transponder redundancy
			Provide Tax incentives for the importation of components for manufacture of mobile-broadband enabled terminals

Objective 5: To develop the ICT industry for the production of software and hardware to global standards

S/N	Goals	Strategies	Initiatives
1	Availability of national standards for software, hardware and other ICT products and services, and a framework to ensure compliance with the standards by 2015	<p>Develop and review periodically national standards for software and hardware products and services to ensure that they meet global standards</p> <p>Strengthen mechanism for monitoring to ensure compliance with the standards</p> <p>Provide/Strengthen mechanisms to encourage patronage of local ICT products and services</p>	Review and update the existing policies and standards for ICT industry by 2010
			Direct MDAs to acquire local products and services that meet global standards by 2010
			Organize a stakeholders forum on national standards for software and hardware
			Create public awareness on standards for software and hardware policy in the country
2	Five per cent contribution by the ICT sector to GDP by 2015 and 10% by 2020	<p>Develop global equipment, software and human resources standards for Nigerian ICT companies to ensure that they are globally competitive</p> <p>Target the West African market for the export of ICT software and hardware components and accessories</p> <p>Create an ICT industry environment that makes the country the leading outsourcing destination in Africa</p> <p>Government-driven strategies to enable the country to attain global business standards</p> <p>Implement the National Outsourcing Policy and Institutional Framework</p>	Provide certification guidelines for ICT companies, products, processes and services and human resources by 2010
			Provide incentives for the private sector to establish ICT Parks through tax rebates, easy access to land, etc by 2010
			Undertake more bilateral and multilateral trade missions with specific emphasis on ICT products and services by 2011
			Introduce ICT products and services into the Technical Aid Corps and other aid programmes by 2011

Objective 5: To develop the ICT industry for the production of software and hardware to global standards

S/N	Goals	Strategies	Initiatives
			<p>Train trade attaches on the marketing of Nigerian ICT products and services</p> <p>Undertake more bilateral and multilateral trade missions with specific emphasis on ICT products and services by 2011</p> <p>Implement Phase 1 of the National Outsourcing Policy by organizing a stakeholders sensitization forum by March 2010</p> <p>Implement Phase 2 of the NOP by March 2011</p> <p>Implement Phase 3 of the NOP by March 2012</p> <p>Organize bi-annual stakeholders review sessions on NOP</p>
3	Achieve forty per cent of local content in ICT hardware, software and services by 2015 and 60% by 2020	Formulate and implement an enabling ICT local content policy	Enforce legislation for ICT local content by 2010 and organize quarter review sessions on the effectiveness of the ICT local content policy
4	To increase the level of ICT-Centric FDI (Foreign Direct Investment) flows to Nigeria by 50% annually from 2011 to 2015, and by 25%	<p>Make electricity supply adequate and reliable</p> <p>Create ICT-centric industrial parks, estates and export processing zones</p>	Review and develop appropriate policies from previous studies on power generation, security, corruption, cyber-crime, etc by 2010.

Objective 5: To develop the ICT industry for the production of software and hardware to global standards

S/N	Goals	Strategies	Initiatives
	annually from 2016 to 2020	<p>Improve security of life and property</p> <p>Reduce bureaucratic delays in the assessment and approval of FDI offerings</p> <p>Reduce substantially the level of official corruption</p> <p>Reduce Internet fraud and other white collar crimes.</p> <p>Improve and sustain fiscal, monetary and other incentives to attract FDI</p>	Streamline overlapping legislation and policies and their implementation through different MDAs by 2010
5	To enable Nigerian tertiary institutions achieve a top 30 ranking in international collegiate ICT competitions (such as the International Collegiate Programming Competition) by 2015 and top 20 ranking by 2020.	<p>Institute an annual national ICT competition</p> <p>Make participation in local and regional ICT competitions mandatory for federal and state tertiary institutions.</p> <p>Give allocations to relevant departments of federal tertiary institutions to enable them prepare for and participate in local and international ICT competitions.</p> <p>Promote healthy competition by giving sizeable rewards (e.g. equipments, scholarships and grants) to institutions successful at the regional, national and international levels.</p> <p>Give incentives to private sector companies to sponsor local ICT competitions among secondary and tertiary institutions</p>	<p>Implement a framework to public and private bodies sponsor software projects and ICT competitions in tertiary institutions by 2010</p> <p>Harmonize the academic calendar across tertiary institutions (as currently obtains in highly developed countries) to allow the institutions take part in competitions by 2010</p> <p>Establish national and regional ICT competitions (e.g. programming, electronic/robotics competitions) by 2010</p>

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Objective 6: To pursue research & development (R & D) activities and encourage innovation in ICT			
S/N	Goals	Strategies	Initiatives
1	To achieve at least 0.5% of GDP investment in ICT R&D annually to improve local software and hardware capacity	Develop a framework for the coordination and management of funding for ICT R & D activities	Establish a National Institute for ICT Research (for software, hardware and services) by 2015.
		Encourage public and private funding of research and development in ICT in tertiary educational institutions and research institutes	Equip the current patent offices in the country with adequately trained human resources to facilitate ICT patent registration in the country by 2010
		Promote R & D collaboration between local ICT research centres and private ICT companies	Facilitate the effective training of lawyers, judges and employees of agencies concerned with the administration of ICT-related intellectual property and cyber laws by 2010
	Strengthen frameworks and legislation for the protection of Intellectual property in ICT		
	To increase local content in hardware production from 2% to 10% by 2015 and 30% by 2020	Provide policies and fiscal incentives to encourage ICT hardware manufacturers to invest towards improving the amount of local content in their products and services	Undertake a study to establish the ICT components in which Nigeria has potential competitive advantage by 2010
			Review the national local content policy to provide adequate incentives for local hardware manufacturers to research into and manufacture local substitutes for imported hardware components by 2010.
2	To develop software and digital content in English and in at least three Nigerian languages by 2015 and most other languages by 2020	Develop local adaptations of foreign ICT systems and solutions that do not infringe patent rights through support and incentives Promote the development of local software that interface with Nigerian	Provide grants for research on the production of digital content such as databanks, courseware, portals, digital libraries and archives, etc. by 2011

Objective 6: To pursue research & development (R & D) activities and encourage innovation in ICT			
S/N	Goals	Strategies	Initiatives
		languages in either voice-text or text-voice modes Development of digital content of Nigerian language materials	Provide grants for projects in Nigerian universities, polytechnics and research institutes for the development of software by 2011 Establish legal framework for the protection of copyright and other IPR issues. Establish open source software competitions and scholarships and promote the establishment of open source clubs in tertiary-level ICT programmes and courses

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3.3 Change Themes

S/N	Initiatives	Expected Result
1	Set up an inter-agency drafting committee to work on the Bill that will enable the PgMO/PgMos by 2010	Standards and best practice adhered to for ensuring project success
2	ICT NV 2020 Programme Offices (and guidelines) to be created in line with the Programme Management global best practices by July 2010.	Standards and best practice adhered to for ensuring project success
3	Implement the report recommending the creation of ICT Ministry by 2010	More effective coordination of ICT policies and activities
4	Undertake Skills Gap Analysis for all sectors of the economy by July 2010, and the outcome used to implement workforce skills improvement strategies with special consideration for women and physically challenged by 2011.	Skill gap report for use in the design for skills development programmes, implementation plans and as baseline for performance assessment
5	Plan and budget for the implementation of the ICT for Development (ICT4D) Strategic Action Plan in 2010	Integration of ICT initiatives and programmes in other sectors of the economy
6	Make use of basic and specialized and work-related ICT skills a requirement for employment and advancement in MDAs by 2010.	Skilled and qualified workforce capable of implementing ICT strategies in MDAs
7	Incorporate the use of ICT tools and applications in the curricula of all subjects in all primary and secondary schools by 2011.	Basic ICT knowledge skills acquired by school leavers from the lower levels of education
8	Create incentives and promote schemes to increase personal ownership of computers and other ICT tools by students, employees and households by 2010.	Increase in computer density
9	Issue guidelines for government websites by 2010.	Adherence to best practices
10	Pass the Freedom of Information (FOI) bill by 2010	Increased transparency and accountability
11	Create and enforce guidelines for data architecture and management by 2010	Adherence to best practices
12	Develop a programme to enable the commercial production of local digital content and online databases for different sectors by 2010.	Increased transparency and improved access

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S/N	Initiatives	Expected Result
13	Publish and ensure compliance on appropriate ICT architecture to guide the automation and interconnection of MDAs and public services by 2010.	uniformity, consistency, sustainability, interoperability of ICT infrastructure and systems
14	Implement the National Identity Management System as a critical foundation for all citizen-centric services	Master national database available
15	Provide Internet connectivity for all ministries by 2010 and for all parastatals nationwide by 2012.	Improved access to information for effective decision making, communication and knowledge improvement in MDAs
16	Mandate all MDAs to make their services and information accessible on their websites and portals by 2011.	Increased transparency and accountability, information sharing and access in MDAs
17	Design and deploy government-wide network infrastructure and electronic data management systems for the backroom automation and interconnection of all ministries by 2010, and all parastatals nationwide by 2012.	More efficient operations, availability, accountability, effective communication and smooth collaboration among MDAs
18	Deploy the human capacity, policies and guidelines for the acquisition, deployment, use, and operation of ICTs in MDAs by 2011.	Effective and efficient use of ICT tools in Government operations
19	Eliminate duplication of infrastructure and save costs by ensuring the operation of a single, robust network platform for MDAs with failover redundancy	Cost savings in shared assets and networks
20	Sensitize all MDAs on the ICT in government provisions of Vision 2020 by December 2009.	Create awareness and get buy in for implementation
21	Implement the annual budgetary provision for ICT training of staff by all MDAs beginning from January 2010	Better skill manpower
22	Review the Scheme of Service to create a distinct ICT cadre by July 2010	Strategically position ICT to drive all processes
23	Create ICT Departments in all MDAs by September 2010	Support for effective ICT administration capacity building in MDAs
24	Promote and implement incentives to increase personal ownership of computers and other ICT tools by public servants with the collaboration of the private sector suppliers and financial institutions	Encourage the use of ICT tools
25	Enact enabling legislation for e-Government, e.g. Digital Signature Act.	Effective communications and legal acceptability of digital documents

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S/N	Initiatives	Expected Result
26	Implement Enterprise Architecture documents by July 2010	Ensure standards in ICT procurement
27	Facilitate the update and implementation of new ICT-driven curricula for primary and secondary schools by 2011	Integration of ICT teaching and learning into the lower levels of education systems
28	Sponsor programmes to ensure that teachers of computer science, computer engineering and information technology programmes in universities acquire modern ICT knowledge and skills (including open source technologies) for teaching and research by 2011	Updated knowledge and skills of teachers in tertiary institutions to train students in modern ICT development tools
29	Conduct baseline and periodic certification of ICT training programmes offered by private sector organizations by July 2010	ICT training programmes that meet global standards, bridge local skill gap needs
30	Establish legal framework for the protection of copyright and other IPR issues.	Enables IPR
31	Establish open source software competitions and scholarships and promote the establishment of open source clubs in tertiary-level ICT programmes and courses	Enhanced innovations
32	Roll-out Internet connectivity in all schools beginning from 2009 and achieve 100% by 2020	Increase internet access in schools
33	Facilitate the procurement, installation, operation, maintenance and use of ICT equipment, software and consumables in the schools by 2011	Use of ICT tools
34	Provide mechanisms and incentives for ICT products manufacturers to enable them produce low cost systems for schools and pupils/students with flexible payment terms by 2010	Enhance local companies global competitiveness
35	Provide ICT-driven classroom and e-learning instructional materials for use by teachers and students in Nigerian schools by 2011	Enhance human capacity development
36	Formulate policies and provide incentives for e-learning programmes for computing, engineering and technical courses and subjects by 2010	Enhance human capacity development
37	Harmonize and strengthen the existing resources, programmes and centres for ICT skills acquisition in underserved areas for the retraining of non ICT graduates by 2010	Enhance human capacity development

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S/N	Initiatives	Expected Result
38	Increase the number of scholarships available for the training of students in ICT programmes by 100% annually from 2010 to 2015 and additional 20% annually thereafter, making special provision for women and the physically challenged	Increased enrolment in ICT training programmes by disadvantaged groups
39	Establish ICT and e-learning support departments in tertiary institutions that do not currently have them to initiate and support ICT development and e-learning programmes in the institutions by 2011	Tertiary institutions equipped with adequate ICT infrastructure to support administration, teaching, learning and research
40	Sponsor and support media-based programmes to increase awareness among school administrators, teachers and students/pupils of the role of ICT in education, subjects, employment and careers	Awareness of the role ICT created
41	Amend the Education Minimum Standard Act 1985 to recognise virtual studies and certification by December 2010	Provide incentives for people to use online learning facilities
42	Establish national digital library with access points in both rural and urban areas by 2011	Improve access to local and global content
43	Encourage the development of e-learning portals and labs for self-learning, and for technical and vocational education by 2011	Increased innovation and research
44	Implement training programmes for NYSC members on specific ICT application relevant to both their subject disciplines and for careers, and entrepreneurial innovations by 2011	Capacity building for NYSC non-ICT graduates
45	Provide incentives to tertiary institutions and ICT companies to collaborate towards the development and commercial production and provision of access to digital content in English and Nigerian languages	Increased local production of ICT components
46	Update survey and interoperability assessment of existing ICT infrastructure owned or planned by Government and private sector entities by 2010	Feasibility report for use in strategic action plans for the ICT industry
47	Facilitate the building of National fibre Backbone and metropolitan fibre networks linking all major telecom sites in and around major cities by 2013 and further facilitate deployment of fibre to homes by 2015	Reliable nationwide communications infrastructure for voice, data and video

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S/N	Initiatives	Expected Result
48	Provide fiscal incentives to private telecommunications companies to extend and expand services to rural areas as from 2010	To promote widespread access
49	Upgrade the GSM facilities in rural areas by 2010	To promote access to New Generational Networks (NGN)
50	Review and update the existing policies and standards for ICT industry by 2010	Existing policies and standards updated
51	Organize a stakeholders forum on national standard for software and hardware	Stakeholders forum held
52	Create public awareness on standards for software and hardware products in the country	Public awareness created on software and hardware products
53	Provide adequate resources to Computer Professionals Registration Council of Nigeria (CPN) for monitoring and compliance purposes	Provide regulatory provisions in the standards document
54	Provide incentives to local manufacturers of ICT products to enhance their competitiveness in the global market place	Increased GDP
55	Provide certification guidelines for ICT companies, products, services and ICT professionals by 2010	Global best practices by ICT companies and increased domestic and global market for locally produced ICT products and services
56	Train trade attaches on the marketing of Nigerian ICT products and services	Better informed attaches, improved ICT exports and improved ICT Centric FDI
57	Organize ICT Expositions in foreign missions in selected countries by 2012	ICT Expositions organized
58	Create public awareness on the standards for equipment, software and human resource	To removal substandard products and services
59	Undertake more bilateral and multilateral trade missions with specific emphasis on ICT products and services by 2011	Increased FDI
60	Provide incentives for the private sector in collaboration with Public sector to establish ICT Parks through tax rebates, easy access to land, etc by 2010	Increased research and development
61	Implement Phase 1 of the National Outsourcing Policy by organizing a stakeholders sensitization forum by March 2010	Increased FDI and employment

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S/N	Initiatives	Expected Result
62	Implement Phase 2 of the NOP by March 2011	Increased FDI and employment
63	Implement Phase 3 of the NOP by March 2012	Increased FDI and employment
64	Organize bi-annual stakeholders review sessions on NOP	Improved sensitisation and framework of operations
65	Enforce legislation for ICT local content by 2010 and organize quarterly review sessions on the effectiveness of the ICT local content policy	Increased usage of local content
66	Implement appropriate policies from previous studies on power generation by 2010.	Improved power supply in the country
67	Establish a National camera surveillance system	Improved crime detection and prevention
68	Enforce connection of all ISPs and international gateway license holders to internet exchange points in Nigeria	To control access
69	Enforce the registration of all telecommunication lines	Improved security
70	Free up 698-862MHz spectrum currently used by analog TV for broadband services by 2010	Encourage more competition
71	Free up 2500-2690MHz spectrum currently used by MMDS for broadband services by 2010	Encourage more competition
72	Ensure one-stop shop for end-user frequency assignment coordination and management by 2010	Encourage better administration
73	Deploy additional satellites with full satellite and transponder redundancy	Increased bandwidth
74	Provide Tax incentives for the importation of components for manufacture of mobile-broadband enabled terminals	Increased local content and production
75	Provide one-off corporate Tax incentives (1%) for the implementation of systems for geographical location of subscriber terminals to enhance security (longitude and latitude)	Effective deployment of GIS

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S/N	Initiatives	Expected Result
76	Develop e-transaction certification administration guidelines including PKIs by 2010	Enhance secured online transaction
77	Streamline overlapping legislation and policies and their implementation through different MDAs by 2010	More efficient policy administration, more investor friendly regulatory environment
78	Provide adequate resource annually for the Computer Forensics Institute Nigeria (CFIN) for training and registration of computer forensics experts starting 2010	To prevent cybercrimes
79	Establish a National Institute for ICT Research (for software, hardware and services) by 2015.	Increased ICT research and innovation, local content and ICT prototypes
80	Equip the current patent offices in the country with adequately trained human resources to facilitate ICT patent registration in the country by 2010	International recognition of local patents
81	Provide grants for research on the production of digital content such as databanks, courseware, portals, digital libraries and archives, etc. by 2011	Availability of local digital content
82	Provide grants to fund projects in Nigerian universities, polytechnics and research institutes by 2011 for the development of software by 2011	Encourage development of software
83	Provide grants to fund ICT projects in Nigerian universities, polytechnics and research institutes by 2011	Encourage research and innovation

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4. Implementation Roadmap

4.1 Implementation Plan – Short term, Medium term and Long term

Objective 1: To make ICT an enabler to transform the socio-economic sectors of Nigeria							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
Goal 1: To provide a framework for the successful coordination and implementation of the ICT NV 2020 strategies and initiatives by 2010							
1) Set up a Programme Management Office (PgMO) and Project Management Offices (PjMO) for ICT NV2020 to ensure effective implementation of ICT sector strategies and initiatives.	a) Set up an inter-agency drafting committee to work on the Bill that will enable the PgMO/PgMos by 2010	√			NPC	NITDA/ NIGCOMSAT, ICT industry representative s	NPC FY2010 BUDGET
	b) ICT NV 2020 Programme Offices (and guidelines) to be created in line with the Programme Management global best practices by July 2010.	√			NPC/MDA's for PgMO	Private sector as members	NPC FY2010 BUDGET
	c) Implement the report recommending the creation of ICT Ministry by 2010	√			Presidency	NITDA, FMI&C, FMS&T	NPC FY2010 BUDGET
Goal 2: 75% of the workforce to acquire basic and work-relevant ICT skills by 2015 and 100% by 2020							
1) Carry out Skills Gap Analysis to assess ICT skills deficiencies.	a) Undertake Skills Gap Analysis for all sectors of the economy by July 2010, and the outcome used to implement workforce	√			NPC	NBS, NITDA	NPC FY2011 BUDGET

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Objective 1: To make ICT an enabler to transform the socio-economic sectors of Nigeria							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	skills improvement strategies with special consideration for women and physically challenged by 2011.						
2) Implement the Strategic Action Plan(ICT4D) to mainstream ICT policies, ICT-based processes, and ICT products and services into different sectors of the economy.	a) Plan and budget for the implementation of the ICT for Development (ICT4D) Strategic Action Plan in 2010	√			NITDA		NITDA FUND
3) Provide incentives for the workforce to acquire ICT skills, equipment and connectivity.	a) Make the use of basic and specialized and work-related ICT skills a requirement for employment and advancement in MDAs by 2010.	√			OHCSF		OHCSF FY2010 BUDGET
4) Update curricula in educational institutions to promote ICT skills learning	a) Incorporate the use of ICT tools and applications in the curricula of all subjects in all primary and secondary schools by 2011.	√			NERDC, FME, FMS&T		FME,FM S&T FY2011 BUDGET
Goal 3: To Achieve computer density of 1:20 in 2015, and 1:3 in 2020							
1) Promote the personal acquisition	a) Create incentives and promote schemes to increase personal	√			OHCS F	NITDA, FMS&T	BANKS, ICT

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Objective 1: To make ICT an enabler to transform the socio-economic sectors of Nigeria							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
and ownership of computers by students, employees and households.	ownership of computers and other ICT tools by students, employees and households by 2010.						COMPA NIES
2) Promote citizens online access to government information.	a) Issue guidelines for government websites by 2010.	√			NITDA, FMI&C		NITDA FUND
	b) Pass the Freedom of Information (FOI) bill by 2010	√			AG/Presidency	National Assembly & Presidency	
3) Promote the availability of local digital content and online databases	a) Create and enforce guidelines for data architecture and management by 2010	√			NITDA	MDAs	NITD FUND
	b) Develop a programme to enable the commercial production of local digital content and online databases for different sectors by 2010.	√			NITDA, NBS		NITDEF, USPF

Objective 2: To deploy ICT in government to improve the efficiency and effectiveness of service delivery							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
Goal 1: Ensure that critical public services (e.g. citizen, birth and death registration, revenue collection, driver's license applications, etc) are offered online by 2015 and all public services are online by 2020							
1) Develop an ICT architecture to guide the automation, interconnection, and online services provision by MDAs and ensure compliance.	a) Publish and ensure compliance on appropriate ICT architecture to guide the automation and interconnection of MDAs and public services by 2010.	√			Galaxy, MDAs	NITDA, NeGST	NITDA
	b) Implement the National Identity Management System as a critical foundation for all citizen-centric services	√	√	√	NIMC	Galaxy, PenCom, NHIS, FRSC, ONSA, OPS FIRS UNIFORMED SERVICES	FGN, OPS
	c) Provide Internet connectivity for all ministries by 2010 and for all parastatals nationwide by 2012.		√		GALAXY	NITDA	FGN
	d) Mandate all MDAs to make their services and information accessible on their websites and portals by 2011.		√		NITDA	NeGST, FMIC	MDAs
	e) Design and deploy government-wide network infrastructure (1-Gov.net) and electronic data management systems for the backroom		√		MDAs, NEGST	NBS, ONSA	MDAs

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Objective 2: To deploy ICT in government to improve the efficiency and effectiveness of service delivery							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	automation and interconnection of all ministries by 2010, and all parastatals nationwide by 2012.						
	f) Deploy the human capacity, policies and guidelines for the acquisition, deployment, use, and operation of ICTs in MDAs by 2011.	√			NITDA, DBI	Galaxy	NITDA
2) Adopt a common pool approach to the deployment of critical government ICT assets (infrastructure, equipment, software, skills) in MDAs to enhance efficiency.	a) Ensure full compliance with Procurement policy that is inclusive and open and allows for competition	√			MDAs, BPP, OSGF	Galaxy, NITDA, NIGCOMSAT	
	b) Eliminate duplication of infrastructure and save costs by ensuring the operation of a single, robust network platform for all FG MDAs with redundancy		√	√	Galaxy	PTOs, USPF	FGN and donors
	c) Define and implement modalities for the identification and implementation of transversal (common) applications across FG MDAs. Commence with implementation of IPPIS, GIFMIS, GWMC and e-Payment platform				√	OHCSF, OAGF, NITDA	World Bank, EU and other donors

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Objective 2: To deploy ICT in government to improve the efficiency and effectiveness of service delivery							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	d) ICT NV 2020 Project Management Office (and guidelines) to be created in line with the Programme Management global best practices by July 2010.	√			NPC/MDA's PMO's		MDAs
Goal 2: <i>Ensure that 60% of the government workforce acquire and use work-related ICT applications and skills in their functions by 2012 and 90% by 2020</i>							
1) Train and re-train continually all government personnel in the use of appropriate ICT applications to their functions.	a) Sensitize all MDAs on the ICT in government provisions of Vision 2020 by December 2009.	√			NPC	PgMO	NPC, PgMO
	b) Implement the annual budgetary provision for ICT training of staff by all MDAs beginning from January 2010	√	√	√	MDAs	OHCSF	MDA
2) Create an ICT cadre in the public service, and create ICT departments in all MDAs headed by Directors of ICT with ICT backgrounds.	a) Review the Scheme of Service to create a distinct ICT cadre July 2010	√			OHSCF	NITDA	
	b) Create ICT Departments in all MDAs by September 2010	√			OHSCF	NITDA,	

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Objective 2: To deploy ICT in government to improve the efficiency and effectiveness of service delivery							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	c) Promote and implement incentives to enhance personal ownership of computers and other ICT tools by public servants with the collaboration of the private sector suppliers and financial institutions	√			MDAs	NITDA ,Banks	
Goal 3: Achieve computerisation of 30% of the business processes of MDAs by 2015 and 60% by 2020.							
a) Enact enabling legislation for e-Government, e.g. Digital Signature Act.	a) Enact enabling legislation for e-Government, e.g. Digital Signature Act.	√			NASS, NITDA, GALAXY, PRESIDENCY, BPSR, FMJ		FGN, World Bank
b) Create enterprise architecture document(s) at the different levels of the government to guide the acquisition, deployment and operation and maintenance of interoperable technology systems.	a) Implement Enterprise Architecture documents by July 2010	√	√		Galaxy, NEGST		
	b) Sanitisation and capacity building to be implemented for				NITDA, PgMO	Galaxy	NITDEF

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
Goal 1: To have operational a new curricula for educational institutions at the primary, secondary and tertiary levels to incorporate appropriate ICT skills content by 2015							
1. Promote the importance and use of ICT in the teaching and learning of all subjects in primary and secondary schools	a) Sponsor and support programmes to increase awareness among school administrators, teachers and students/pupils of the role of ICT in education, subjects, employment and careers	√			NERDC, FME & SMoE	Local governments	FME, NITDF and SMoE
2. Review and update the curricula of all subjects and courses at all levels to integrate ICT assisted learning	a) Facilitate the update and implementation of new ICT-driven curricula for primary and secondary schools by 2011	√			NERDC, FME & SMoE		FME, ETF, IDPs
	b) Sponsor programmes to ensure that teachers of computer science, computer engineering and information technology programmes in universities acquire modern ICT knowledge and skills (including open source technologies) for teaching and research by 2011	√			FME & SMoE NUC		
3. Certify ICT training programmes offered to assure quality	a) Conduct baseline and periodic certification of ICT training programmes offered by private sector organizations by July 2010	√			NCS	FME, NITDA, NCC, DBI	NCS, OPS

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
4. Promote the use of open source software and open source standards in tertiary-level ICT programmes and courses	a) Establish legal framework for the protection of copyright and other IPR issues.			√	NITDA, NCC	NITDEF, USPF	
	b) Provide incentives to promote the development and adoption of open source application			√	FME,SMoE, NITDA, NCC	NITDEF, USPF	
	c) Establish open source software competitions and scholarships and promote the establishment of open source clubs in tertiary-level ICT programmes and courses			√	FME, NITDA, NCC	NITDEF,USP F	
Goal 2: <i>To increase the computer-to-student ratio from the estimated 1:100 in rural schools to at least 1:10 and from the estimated 1:40 in urban schools to at least 1:5 by 2015</i>							
1) Provide Internet connectivity for all institutions.	a) Roll-out Internet connectivity in all schools beginning from 2009 and achieve 100% by 2020	√			FME & SMoE	Local government	USPF, ETF, NITDEF, IDPs
2) Invest substantially in equipping and deploying ICT laboratories in primary and secondary schools	a) Facilitate the procurement, installation, operation, maintenance and use of ICT equipment, software and consumables in the schools by 2011	√			FME & SMoE	OPS	FME

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
3) Partner with Local manufacturers to produce affordable functional computer systems at subsidized rate	a) Provide mechanisms and incentives for ICT hardware/software manufacturers to enable them produce low cost systems for schools and pupils/students with flexible payment terms by 2010	√			FME, MINISTRY OF COMMERCE AND INDUSTRY, FMF,	OPS	FME, OPS
4) Establish e-learning facilities and programmes accessible to the different levels of education	a) Provide ICT-driven classroom and e-learning instructional materials for use by teachers and students in Nigerian schools by 2011	√			FME & SMoE, NERDC	DBI	FME, NERDC, NITDA
Goal 3: Achieve ratio of computer scientists, engineers and technologists to population of 1:7,000 in 2015 and 1:3000 in 2020							
1) Update continuously the knowledge and skills set of ICT teachers, trainers and researchers in the universities and polytechnics	a) Train a critical mass of ICT teachers and trainers in the universities and polytechnics on open source software development tools and platforms by 2012		√		NUC, NBTE		FME & SMoE
	b) Formulate policies and provide incentives for e-learning programmes for computing, engineering and technical courses and subjects by 2010	√			FME, FMST		

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	c) Harmonize and strengthen the existing resources, programmes and centres for ICT skills acquisition in underserved areas for the retraining of non ICT graduates by 2010	√			NITDA, NCC, NGCOMSAT, FME, SME		
2) Increase the support for students in ICT, engineering and technical programmes in universities and polytechnics	a) Increase the number of scholarships available for the training of students in ICT programmes by 3500 annually For the duration of the entire vision, making special provision for women and the physically challenged	√	√	√	FME, SME, LGA, OPS		FME, SME, LGA, OPS
3) Establish and support e-learning facilities and programmes particularly for science and technology-oriented courses and subjects throughout the country	a) Establish ICT and e-learning support departments in tertiary institutions that do not currently have them to initiate and support ICT development and e-learning programmes in the institutions by 2011	√			NUC, NBTE, NCCE	OPS, FME & SMoE	OPS, FME & SMoE
Goal 4: Ensure that 75% of the literate population is ICT literate by 2015 and 100% by 2020							

Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
1) Facilitate increased awareness of potential of ICT by literate people in rural and urban areas of the country	a) Sponsor and support media-based programmes to increase awareness among school administrators, teachers and students/pupils of the role of ICT in education, subjects, employment and careers	√			FME & SMoE	Local governments	FME & SMoE
2) Provide recognition for non-formal and distance e-learning modes of education	a) Amend the Education Minimum Standard Act 1985 to recognise virtual studies and certification by December 2010 b) Extend ICT access to all inmates in Nigerian Prisons and introduce virtual training programmes by 2010	√			FME, NPS, PRESIDENCY, NASS		FME,NPS
3) Facilitate access to and use of ICT infrastructure and ICT-mediated public and private sector services in rural areas	a) Establish national digital library with access points in both rural and urban areas by 2011				NATIONAL LIBRARY OF NIGERIA		FME & SMoE
	b) Encourage the develop e-learning portals and labs for self-learning, and for technical and vocational education by 2011	√			FME, FMST, NITDA		
4) Enable NYSC members to acquire or upgrade ICT skills for careers and entrepreneurial	a) Implement training programmes for NYSC members on specific ICT application relevant to both their subject disciplines and for	√			NYSC	NITDA, DBI,	FME, NYSC NITDA

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Objective 3: To attain globally competitive local capacity with regards to Human Capital in all aspects of ICT (Software, Hardware, Networks, Card Technologies, Security/Biometrics, Web and Digital Content Development, etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
innovations in the different sectors of the economy	careers, and entrepreneurial innovations by 2011						
5) Incentivize the commercial production and provision by the private sector of Nigerian digital content and online databases in English and Nigerian languages	a) Provide incentives to universities, research institutes and ICT companies to collaborate towards the development and commercial production and provision of access to digital content in English and Nigerian languages by 2010	√			FME, FMST	OPS, TERTIARY INSTITUTIONS	NITDA, NCC

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Objective 4: To attain competitive local capacity in ICT Infrastructure (backbone, hosting, data centres, internet exchange / gateway etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
Goal 1: <i>Have a national fibre-optic backbone infrastructure that ensures high bandwidth availability, universal access and no single point of failure in computer and telecommunications throughout the country by 2015</i>							
1. Assess the coverage, gaps and weaknesses in the existing infrastructure for broadband access, plans and projects for new infrastructure by public agencies and private sector organizations	a) Update survey and compatibility assessment of existing ICT infrastructure owned or planned by Government and private sector entities by 2010	√			GALAXY, NCC	USPF PTOs	FGN NITDA NCC
2. Build a National ICT Backbone	a) Facilitate the building of National fibre Backbone, and facilitate interconnectivity to the backbone of existing public and private sector platforms by 2013 and further facilitate deployment of fibre to homes by 2015		√		GALAXY, NCC	PTOs, NCC, USPF, NITDA	FGN, NCC
3. Support the pervasive availability of internet access nationwide.	a) Significantly reduce the cost of internet and data access by supporting the build out of multiple subsea fibre optic cable systems and acquire bulk capacity from operators	√			Galaxy, NIGCOMSAT	USPF, OPS, NITDA, NCC	GALAXY, FGN, IDPS

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Objective 4: To attain competitive local capacity in ICT Infrastructure (backbone, hosting, data centres, internet exchange / gateway etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
4. Encourage private operators to rollout nationwide high speed broadband and data infrastructure	a) Develop a scheme of targeted incentives to encourage and guarantee investment of operators	√			NCC, FMIC,	GALAXY, PTOs	USPF
Goal 2: Improve tele-density from the present 47% to 75% in 2015 and 90% in 2020							
1. Improve the provision of last mile communication facilities (including landlines and fixed wireless) in rural areas	a) Provide fiscal incentives to private telecommunications companies to extend and expand services to rural areas as from 2010		√		FMF,NCC,FMI &C,NIPC	OPS, PTOs	USPF
	b) Free up 698-862MHz spectrum currently used by analog TV for broadband services by 2010		√		NBC	NCC	NCC
	c) Free up 2500-2690MHz spectrum currently used by MMDS for broadband services by 2010		√		NBC	NCC	NCC
	d) Ensure one-stop shop for end-user frequency assignment coordination and management by 2010		√		NFMC, FMIC	NCC	NCC

Objective 4: To attain competitive local capacity in ICT Infrastructure (backbone, hosting, data centres, internet exchange / gateway etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	e) Identify key areas of Telecomms and ICT such as RF, Optical Networks etc for which there are shortage of skills and provide scholarship for both national and overseas training in those areas		√		DBI, FME, FMS&T	NCC	NCC
	f) Deploy additional satellites with full satellite and transponder redundancy		√		NIGCOMSAT	NCC	NCC
	g) Provide Tax incentives for the importation of components for manufacture of mobile-broadband enabled terminals		√		FMF, Customs, NCC	NCC	NCC
	h) Provide one-off corporate Tax incentives (1%) for the implementation of systems for geographical location of subscriber terminals to enhance security (longitude and latitude)		√		PTOs, FIRS	NCC	NCC
	i) Encourage technology-neutral as well as forward looking regulation		√		NCC		
	j) Develop e-transaction certification administration guidelines including PKIs by 2010		√		NITDA	NCC	NITDA, NCC

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Objective 4: To attain competitive local capacity in ICT Infrastructure (backbone, hosting, data centres, internet exchange / gateway etc)							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	k) Streamline overlapping legislation and policies and their implementation through different MDAs by 2010		√		FMST	NCC	NCC
2. Facilitate the deployment of last mile infrastructure to underserved areas by service providers	a) Upgrade the GSM facilities in rural areas by 2010		√		NCC	PTOs	USPF

Objective 5: To develop the ICT industry for the production of software and hardware to global standards							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
Goal 1: Availability of national standards for software, hardware and other ICT products and services, and a framework to ensure compliance with the standards by 2015							
1) Develop and review periodically national standards for software and hardware products and services to ensure that they meet global standards	a) Review and update the existing policies and standards for ICT industry by 2010	√			NITDA	NCS, ITAN, ISPON	NITDEF, USPF
	b) Organize a stakeholders forum on national standard for software and hardware	√			NITDA		NITDEF, USPF
	c) Create public awareness on standards for software and hardware products in the country	√			NITDA		NITDEF, USPF

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Objective 5: To develop the ICT industry for the production of software and hardware to global standards							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	d) Provide adequate resources to Computer Professionals Registration Council of Nigeria (CPN) for monitoring and compliance purposes	√			CPN	NCS, NITDA	FME
	e) Institute efficient and effective consumer complaint channels	√			CPN, NITDA	NCS	
2) Provide/Strengthen mechanisms to encourage patronage of local ICT products and services	a) Direct MDAs to acquire local products and services that meet global standards	√			OHCSF, NITDA	SGF	
	b) Enforce import controls to prevent inflow of inferior ICT products by 2010			√	SON, FMCI, CUSTOMS		SON, FMCI, CUSTOMS
	c) Provide incentives to local manufacturers of ICT products to enhance their competitiveness in the global market place by 2010	√			FMI&C, NITDA	FMF	
Goal 2: Achieve 5% contribution by the ICT sector to GDP by 2015 and 10% by 2020							
1) Develop global equipment, software and human resources standards for Nigerian ICT companies to ensure that they are globally competitive	a) Provide certification guidelines for ICT companies, products, services and ICT professionals by 2010	√			(NITDA, CPN, NCS, SON)		NITDEF, CPN, NCS, SON
	b) Introduce ICT products and services into the Technical Aid Corps and other aid programmes by 2011	√			TAC	MFA	OPS, MFA
	c) Train trade attaches on the marketing of Nigerian ICT products and services		√		FMI&C, MFA	OPS	FMI&C, MFA

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Objective 5: To develop the ICT industry for the production of software and hardware to global standards							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	d) Organize ICT Expositions in foreign missions in selected countries by 2012		√		FMI&C, MFA	OPS	FMI&C, MFA, OPS
	e) Create public awareness on the standards for equipment, software and human resource	√			FMI&C		FMI&C
2) Target the West African market for the export of ICT software and hardware components and accessories	a) Undertake more bilateral and multilateral trade missions with specific emphasis on ICT products and services by 2011	√			FMI&C, MFA	OPS	FMI&C, MFA
3) Create an ICT industry environment that makes the country the leading outsourcing destination in Africa	a) Provide incentives for the private sector to establish ICT Parks through tax rebates, easy access to land, etc by 2010	√			FMF, FMI&C, FMST	NITDA	FMF, FMI&C, FMST
4) Implement the National Outsourcing Policy (NOP) and Institutional Framework	a) Implement Phase 1 of the NOP by organizing a stakeholders sensitization forum by March 2010	√			NITDA, NCS	MDAs, OPS, PRESIDENCY	NITDEF, OPS
	b) Implement Phase 2 of the NOP by March 2011		√		NITDA, NCS	MDAs, OPS, PRESIDENCY	NITDEF, OPS
	c) Implement Phase 3 of the NOP by March 2012		√		NITDA, NCS	MDAs, OPS, PRESIDENCY	NITDEF, OPS
	d) Organize bi-annual stakeholders				NITDA, NCS	MDAs, OPS,	NITDEF,

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Objective 5: To develop the ICT industry for the production of software and hardware to global standards							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	review sessions on NOP					PRESIDENCY	OPS
Goal 3: <i>Achieve 40% of local content in ICT hardware, software and services by 2015 and 60% by 2020</i>							
b) Formulate and implement an enabling ICT local content policy	4) Enforce legislation for ICT local content by 2010	√			NITDA	FMI&C, FMST, OPS	NITDEF
	5) Organize quarterly review sessions on the effectiveness of the ICT local content policy				NITDA	FMI&C, FMST, OPS	NITDEF
Goal 4: <i>To increase the level of ICT-Centric FDI (Foreign Direct Investment) flows to Nigeria by 50% annually from 2011 to 2015, and by 25% annually from 2016 to 2020</i>							
1) Make electricity supply adequate and reliable	a) Implement appropriate policies from previous studies on power generation, security, cyber-crime, etc by 2010.	√			PRESIDENCY, MDAS		PRESIDENCY, MDAS
2) Create ICT-centric industrial parks with export processing zone status	a) Facilitate the process of building ICT parks from 2010				NCC, NITDA		USPF, NITDEF
	b) Encourage States to invest in ICT parks by 2010				NCC, NITDA		USPF, NITDEF
	c) create awareness through adequate publicity				NCC, NITDA		USPF, NITDEF
3) Improve security of life and property	a) Establish a National camera surveillance system				NSA, NCC		NCC, NSA
	b) Enforce connection of all ISPs				NITDA, NCC		NITDEF,

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Objective 5: To develop the ICT industry for the production of software and hardware to global standards							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
	and international gateway license holders to internet exchange points in Nigeria						NCC
	c) Enforce the registration of all telecommunication lines				NCC	PTOs, OPS, NPF	
	d) Enforce compulsory citizen registration				NIMC	NASS	NIMC
	e) Develop e-transaction certification administration guidelines including PKIs by 2010				NITDA	ONSA, NeGST	NITDEF, NeGST, ONSA
	f) Provide tax incentives to encourage telecommunication deployment				FMF	FIRS, FMF	NCC
4) Reduce bureaucratic delays in the assessment and approval of FDI offerings	a) Streamline overlapping legislation and policies and their implementation through different MDAs by 2010	√			NIPC	NASS, FMJ	NIPC
	b) Deploy e-platforms for assessment and approval of FDI	√			NIPC	NASS, FMJ	NIPC
5) Reduce Internet fraud and other cyber crimes	c) Train more security personnel annually on computer forensics starting January 2010	√			ONSA, EFCC,	NPF, CFIN	ONSA, EFCC, IDPs
	d) Provide adequate resource annually for the CFIN registration of computer forensics experts starting 2010.	√			FGN	OPS	FGN
Goal 5: To enable Nigerian institutions achieve a top 30 ranking in international collegiate ICT competitions (such as the International Collegiate Programming Competition) by 2015 and top 20 ranking by 2020							

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Objective 5: To develop the ICT industry for the production of software and hardware to global standards							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
1) Institute ICT competitions at all levels of education	a) Establish national and states ICT competitions (e.g. programming, electronic/robotics competitions) by 2010	√			NCS, CPN, NITDA,	OPS, NCC	

Objective 6: To pursue research & development (R & D) activities and to encourage innovation in ICT							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
Goal 1: <i>To achieve at least 0.1% of GDP investment in ICT R&D annually to improve local software and hardware capacity</i>							
1. Develop a framework for the coordination and management of funding for ICT R & D activities	a) Establish a National Institute for ICT Research (for software, hardware and services) by 2015.		√		NITDA	NASS	NITDEF
2. Encourage public and private funding of research and development in ICT in tertiary educational institutions and research institutes	a) Equip the current patent offices in the country with adequately trained human resources to facilitate ICT patent registration in the country by 2010	√			FMI&C, FMC&I, NOTAP, NCoC		FMC&I
3. Promote R & D collaboration	a) Arrange workshops and seminar to create avenues for	√			NITDA	RESEARCH INSTITUTES	NITDEF, OPS,

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Objective 6: To pursue research & development (R & D) activities and to encourage innovation in ICT							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
between local ICT research centres and ICT companies	interactions between private sector and research institutes by 2010						IDPs
4. Strengthen frameworks and legislation for the protection of Intellectual property in ICT	a) Facilitate the effective training of lawyers, judges and employees of agencies concerned with the administration of ICT-related intellectual property and cyber laws by 2010	√			FMJ, ONSA, NASS, NJC	NCLE, AGF	NJC
Goal 2: To increase local content in hardware production from 2% to 10% by 2015 and 30% by 2020							
1. Provide policies and fiscal incentives to encourage ICT hardware manufacturers to invest towards improving the amount of local content in their products and services	a) Undertake a study to establish the ICT components in which Nigeria has potential competitive advantage by 2010	√			NITDA, FMI&C, NCC	MAN, OPS	NITDEF, IDPs
	b) Review the national local content policy to provide adequate incentives for local hardware manufacturers to research into and manufacture local substitutes for imported hardware components by 2010.	√			FMST, FMI&C	NCC, SON, NITDA, MAN	NITDEF
Goal 3: To develop software and digital content in English and in at least three Nigerian languages by 2012 and most other languages by 2020							
1. Develop local adaptations of foreign ICT systems and solutions that do not	a) Provide grants for research on the production of digital content such as databanks, courseware, portals, digital libraries and	√			NCC, NITDA, NIGCOMSAT, FME, NUC)		NITDEF

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Objective 6: To pursue research & development (R & D) activities and to encourage innovation in ICT							
Strategies	Initiatives	Timeline			Implementing Agencies	Collaborating Agencies	Source of Funding
		Short term	Medium term	Long term			
infringe patent rights through support and incentives	archives, etc. by 2011						
2. Promote the development of local software that interface with Nigerian languages in either voice-text or text-voice modes	a) Provide grants fund projects in Nigerian universities, polytechnics and research institutes for the development of software in Nigerian languages by 2011	√			NCC, NITDA, NIGCOMSAT, FME, NUC)	RESEARCH INSTITUTES	NITDEV, ETF, NUC
3. Encourage the development of digital content of Nigerian language materials	a) Provide grants fund projects in Nigerian universities, polytechnics and research institutes for the digitization of content in Nigerian languages by 2011	√			NCC, NITDA, NIGCOMSAT, FME, NUC)	RESEARCH INSTITUTES	NITDEV, ETF, NUC

4.2 Implementation Monitoring Framework

Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Set up an inter-agency drafting committee to work on the Bill that will enable the PgMO/PjMos by 2010	SGF	Monthly	Draft bill for the PgMO and PjMOs in place PgMO and PjMOs bill passed			<ul style="list-style-type: none"> – Delays from NPC – Delay from NASS 	<ul style="list-style-type: none"> – Presidential directive on deadline – Lobbying
ICT NV 2020 Programme Offices (and guidelines) to be created in line with the Programme Management global best practices by July 2010.	SGF	Monthly	PgMO set up PjMOs set up			<ul style="list-style-type: none"> – Delays from NPC – Inadequate monitoring by SGF – Delays/ lack of cooperation from MDAs 	<ul style="list-style-type: none"> – Closer monitoring by SGF
Implement the report recommending the creation of ICT Ministry by 2010	Presidency	Quarterly	ICT Ministry created			<ul style="list-style-type: none"> – Lack of political will 	<ul style="list-style-type: none"> – Secured commitment from the Presidency
Undertake Skills Gap Analysis for all sectors of the economy by July 2010, and the outcome used to implement workforce skills improvement strategies with special consideration for women and physically challenged by 2011.	PgMO	Monthly	Skills gap report produced Skills improvement programmes			<ul style="list-style-type: none"> – Delay in commissioning study – Substandard report – Inability to produce appropriate programmes – Programme implementation 	<ul style="list-style-type: none"> – Effective monitoring by PgMO – Sanctions by Presidency

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
						delay	
Plan and budget for the implementation of the ICT for Development (ICT4D) Strategic Action Plan in 2010	PgMO	Monthly	Budget Prepared Budget Approved			– Lack of funds to drive the process	– Adequate Funding
Make the use of basic and specialized and work-related ICT skills a requirement for employment and advancement in MDAs by 2010.	Presidency	Monthly	Directive issued Directive complied with			– Conflicting directive – Lack of enforcement	– Sanctions by Presidency – Define and apply punitive measures for non-compliance
Incorporate the use of ICT tools and applications in the curricula of all subjects in all primary and secondary schools by 2011.	PgMO	Quarterly	Updated curricula Circulation of curricula			– Inaction by the implementing agencies	– Sanctions by Presidency
Create incentives and promote schemes to increase personal ownership of computers and other ICT tools by students, employees and households by 2010.	NITDA	Quarterly	Incentives established Number of households acquiring computers under the scheme			– Inappropriate incentives – Lack of buy-in by households	– Ensure Monitoring – Adequate publicity
Issue guidelines for government websites by 2010.	NPC, PgMO	Monthly	Guidelines issued			– Inconsistent guidelines – Lack of compliance	– NITDA to pre-approve all government websites

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Pass the Freedom of Information (FOI) bill by 2010	FMIC, cross-cutting issue with media	Monthly	Bill Passed			<ul style="list-style-type: none"> – Delay in passage – Bill not passed into law – Not signed 	<ul style="list-style-type: none"> – Intensive lobbying
Create and enforce guidelines for data architecture and management by 2010	PgMO	Monthly	<p>Guidelines created</p> <p>Guidelines implemented</p>			<ul style="list-style-type: none"> – Inconsistent guidelines – Lack of compliance 	<ul style="list-style-type: none"> – NITDA to pre-approve all data architecture and specification of MDAs
Develop a programme to enable the commercial production of local digital content and online databases for different sectors by 2010.	PgMO	Monthly	Volume of digital content and online databases created			<ul style="list-style-type: none"> – Inaction 	<ul style="list-style-type: none"> – Effective monitoring
Publish and ensure compliance on appropriate ICT architecture to guide the automation and interconnection of MDAs and public services by 2010.	PgMO, NITDA	Quarterly	<p>Architecture Document produced</p> <p>Compliance</p>			<ul style="list-style-type: none"> – Delay in producing architecture document – Non compliance 	<ul style="list-style-type: none"> – Effective monitoring
Implement the National Identity Management System as a critical foundation for all citizen-centric services	PgMO	Quarterly	<p>% population covered</p> <p>National Identity Management standards issued</p>			<ul style="list-style-type: none"> – Delayed funding – Inadequate publicity – Lack of buy-in 	<ul style="list-style-type: none"> – Make national ID card the most preferred ID document

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Provide Internet connectivity for all ministries by 2010 and for all parastatals nationwide by 2012.	NITDA	Quarterly	% of ministries and parastatals connected			<ul style="list-style-type: none"> – Lack of cooperation from the MDAs – Non performance by implementing agency 	<ul style="list-style-type: none"> – Publicity, sensitization and advocacy – Sanction by OHCSF
Mandate all MDAs to make their services and information accessible on their websites and portals by 2011.	SGF,OHCSF	Quarterly	% of MDA's information accessible % of services provided online Degree of availability of information online			<ul style="list-style-type: none"> – Poor content management 	<ul style="list-style-type: none"> – Update guidelines on official publication
Design and deploy government-wide network infrastructure and electronic data management systems for the backroom automation and interconnection of all ministries by 2010, and all parastatals nationwide by 2012.	OHCSF	Quarterly	% of ministries and parastatals connected			<ul style="list-style-type: none"> – Lack of cooperation by MDAs – Non-performance by implementing agency 	<ul style="list-style-type: none"> – Publicity, sensitization and advocacy – Set goals and performance measuring system with rewards for implementation
Deploy the human capacity, policies and guidelines for the acquisition, deployment, use, and operation of ICTs in MDAs by 2011.	PgMO	Quarterly	Guideline document produced			<ul style="list-style-type: none"> – Non-compliance to guidelines 	<ul style="list-style-type: none"> – Set and monitor deadlines

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Eliminate duplication of infrastructure and save costs by ensuring the operation of a single, robust network platform for MDAs with failover redundancy	PgMO	Monthly	All duplications removed			– Non implementation	– Proper monitoring
Sensitize all MDAs on the ICT in government provisions of Vision 2020 by December 2009.	NITDA	Quarterly	% of application deployed in MDAs			– Non performance applications – Resistance to change – Poor implementation	– Carry out rigorous testing and integration – Regular monitoring implementation – Establish service desk for complaints
Implement the annual budgetary provision for ICT training of staff by all MDAs beginning from January 2010	SGF	Quarterly	PMO created			– Non-implementation	– Adequate monitoring
Review the Scheme of Service to create a distinct ICT cadre by July 2010	BPSR	Monthly	IT cadre introduced			– Lack of buy-in	– Sensitize and convince
Create ICT Departments in all MDAs by September 2010	BPSR	Quarterly	IT departments created			– Inadequate technical Human Resources	– Special incentives to attract and retain required Human Resources

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Promote and implement incentives to increase personal ownership of computers and other ICT tools by public servants with the collaboration of the private sector suppliers and financial institutions	OHCSF	Quarterly	Incentives established Number of Public Servants acquiring computers under the scheme			<ul style="list-style-type: none"> – Inappropriate incentives – Lack of buy-in by households 	<ul style="list-style-type: none"> – Ensure monitoring – Adequate publicity – Ensure monitoring – Adequate publicity
Enact enabling legislation for e-Government, e.g. Digital Signature Act.	PgMO	Quarterly	Act enacted			<ul style="list-style-type: none"> – Bureaucratic delay – Ignorance 	<ul style="list-style-type: none"> – Set and monitor deadlines – Educate on benefits
Implement Enterprise Architecture documents by July 2010	PgMO, NITDA	Quarterly	Enterprise architecture document			<ul style="list-style-type: none"> – Overlapping roles and attendant confusion 	<ul style="list-style-type: none"> – Classify boundaries of responsibilities
Facilitate the update and implementation of new ICT-driven curricula for primary and secondary schools by 2011	PgMO	Quarterly	New curricula implemented			<ul style="list-style-type: none"> – Delay in the design and implementation of ICT driven curricula 	<ul style="list-style-type: none"> – Effective monitoring
Sponsor programmes to ensure that teachers of computer science, computer engineering and information technology programmes in universities acquire modern ICT knowledge and skills (including open source technologies) for teaching and	PgMO	Bi-annually	Number of programmes Number of benefiting teachers			<ul style="list-style-type: none"> – Lack of funding 	<ul style="list-style-type: none"> – Adequate funding

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
research by 2011							
Conduct baseline and periodic certification of ICT training programmes offered by private sector organizations by July 2010	NPC	Annually	Standardized training programmes in ICT			– Lack of capacity to conduct certification	– Strengthen CPN with funds
Establish legal framework for the protection of copyright and other IPR issues.	NPC, PgMO	Quarterly	Percentage of Open Source solutions against propriety products			– Vendor dependency	– Ensure reduced cost of open source solutions
Establish open source software competitions and scholarships and promote the establishment of open source clubs in tertiary-level ICT programmes and courses	PgMO	Quarterly	Number of open source scholarships			– Independent buy-in	– Advocacy sensitization
Roll-out Internet connectivity in all schools beginning from 2009 and achieve 100% by 2020	PgMO	Quarterly	Number of schools connected			– Lack of funding – Lack of power supply	– Timely and adequate funding
Facilitate the procurement, installation, operation, maintenance and use of ICT equipment, software and consumables in the schools by 2011	PgMO	Quarterly	Extent of ICT use in schools Number of schools using ICT			– Resistance to change – Lack of skills – Inadequate funding – Misuse of ICT resources	– Advocacy – Training – Adequate fund – Monitoring

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Provide mechanisms and incentives for ICT hardware/software manufacturers to enable them produce low cost systems for schools and pupils/students with flexible payment terms by 2010	PgMO, NITDA	Quarterly	Number of low cost schemes introduced Number of schools/pupils benefiting			<ul style="list-style-type: none"> – Inadequate incentives – Abuse of incentives 	<ul style="list-style-type: none"> – Adequate incentives – Effective monitoring
Provide ICT-driven classroom and e-learning instructional materials for use by teachers and students in Nigerian schools by 2011	FME	Monthly	E-learning materials			<ul style="list-style-type: none"> – Funding 	<ul style="list-style-type: none"> – Provide incentives and funding for implementation
Formulate policies and provide incentives for e-learning programmes for computing, engineering and technical courses and subjects by 2010	NITDA	Quarterly	Policy formulated			<ul style="list-style-type: none"> – Lack of buy-in 	<ul style="list-style-type: none"> – Sensitization
Harmonize and strengthen the existing resources, programmes and centres for ICT skills acquisition in underserved areas for the retraining of non ICT graduates by 2010	FME	Quarterly	Reduced underserved areas			<ul style="list-style-type: none"> – Lack funds and capacity 	<ul style="list-style-type: none"> – Ensure availability of funds and capacity
Increase the number of scholarships available for the training of students in ICT programmes by 100% annually from 2010 to 2015 and additional 20% annually thereafter, making special provision for women and the	FM	Quarterly	Increase in sponsorships			<ul style="list-style-type: none"> – Lack of commitment from OPS 	<ul style="list-style-type: none"> – Have a policy for baseline contribution

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
physically challenged							
Establish ICT and e-learning support departments in tertiary institutions that do not currently have them to initiate and support ICT development and e-learning programmes in the institutions by 2011	PgMO, FME	Quarterly	% of tertiary institutions with ICT support departments			<ul style="list-style-type: none"> – Inadequate technical staff – Lack of funding 	<ul style="list-style-type: none"> – Effective monitoring – Advocacy – Adequate and timely funding
Sponsor and support media-based programmes to increase awareness among school administrators, teachers and students/pupils of the role of ICT in education, subjects, employment and careers	PgMO	Quarterly	Number of programmes completed Number of administrators, teachers sensitized			<ul style="list-style-type: none"> – Inadequate funds – Ineffective programmes 	<ul style="list-style-type: none"> – Proper programme planning – Adequate and timely funding
Amend the Education Minimum Standard Act 1985 to recognise virtual studies and certification by December 2010	PgMO	Quarterly	Act amended			<ul style="list-style-type: none"> – Delay in drafting amendments – Delay by NASS 	<ul style="list-style-type: none"> – Lobby by FME/Presidency
Extend ICT access to all inmates in Nigerian Prisons and introduce virtual training programmes by 2010	PgMO	Quarterly	Act amended			<ul style="list-style-type: none"> – Delay in drafting amendments – Delay by NASS 	<ul style="list-style-type: none"> – Lobby by FME/Presidency
Establish national digital library with access points in both rural and urban areas by 2011	FME	Monthly	Digitised Library Contents			<ul style="list-style-type: none"> – Funds 	<ul style="list-style-type: none"> – Provide resources

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Encourage the development of e-learning portals and labs for self-learning, and for technical and vocational education by 2011	PgMO, FME	Quarterly	No of portals			<ul style="list-style-type: none"> – Lack of buy-in – Inadequate technical capacity – Inadequate infrastructure availability 	<ul style="list-style-type: none"> – Government directive – Ensure technical capacity and infrastructure availability
Implement training programmes for NYSC members on specific ICT application relevant to both their subject disciplines and for careers, and entrepreneurial innovations by 2011	PgMO, NITDA	Quarterly	<p>Programmes completed</p> <p>Proficiency certificates issued</p>			<ul style="list-style-type: none"> – Lack of funding – Inadequate in-house technical capacity 	<ul style="list-style-type: none"> – Make it statutory part of NYSC programmes
Provide incentives to universities, research institutes and ICT companies to collaborate towards the development and commercial production and provision of access to digital content in English and Nigerian languages by 2010	PgMO, NASS, FMST	Quarterly	Volume of digital content available			<ul style="list-style-type: none"> – Inadequate fund and misapplication of fund 	<ul style="list-style-type: none"> – Effective monitoring
Update survey and interoperability assessment of existing ICT infrastructure owned or planned by Government and private sector entities by 2010	PgMO	Quarterly	Report produced			<ul style="list-style-type: none"> – Delay in commissioning studies 	<ul style="list-style-type: none"> – Effective monitoring

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Facilitate the building of National fibre Backbone and metropolitan fibre networks linking all major telecom sites in and around major cities by 2013 and further facilitate deployment of fibre to homes by 2015	NASS	Quarterly	LGAs covered per state Kilometres of fibre			<ul style="list-style-type: none"> – Lack of government commitment and support – Lack of NASS support – Lack of Right of way – Security 	<ul style="list-style-type: none"> – Intensive Lobbying – Enforcement of relevant regulations
Significantly reduce the cost of internet and data access by supporting the build out of multiple subsea fibre optic cable systems and acquire bulk capacity from operators	NASS	Quarterly	Reduction in cost of Internet access			<ul style="list-style-type: none"> – Lack of government commitment and support 	<ul style="list-style-type: none"> – Intensive Lobbying – Enforcement of relevant regulations
Provide fiscal incentives to private telecommunications companies to extend and expand services to rural areas as from 2010	PgMO	Quarterly	Number of underserved areas connected			<ul style="list-style-type: none"> – Inadequate incentives – Abuse of incentives 	<ul style="list-style-type: none"> – Advocacy and consultation – Monitoring of the usage of incentives
Upgrade the GSM facilities in rural areas by 2010	NCC	Quarterly	Number of LGAs and rural schools broadband service			<ul style="list-style-type: none"> – PTOs reluctance 	<ul style="list-style-type: none"> – Enforce licensing conditions
Review and update the existing policies and standards for ICT industry by 2010	NPC, PgMO	Monthly	Reviewed standards and policies			<ul style="list-style-type: none"> – Delay 	<ul style="list-style-type: none"> – Prompt Action
Organize a stakeholders forum on national standard for software and hardware	NPC, PgMO	Monthly	Draft standards adopted			<ul style="list-style-type: none"> – Buy-in by stakeholders 	<ul style="list-style-type: none"> – Flexible on views

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Create public awareness on standards for software and hardware products in the country	PgMO	Monthly	Acceptance and compliance			– Non-compliance	– Monitor and Enforce
Provide adequate resources to Computer Professionals Registration Council of Nigeria (CPN) for monitoring and compliance purposes	NITDA	Monthly	High skilled Professionals			– Non-compliance	– Education
Institute efficient and effective consumer complaint channels	NITDA	Monthly	High skilled professionals			– Non-compliance	– Education
Direct MDAs to acquire local products and services that meet global standards	NITDA	Monthly	Standardised ICT products			– Non-compliance	– Strict control
Enforce import controls to prevent inflow of inferior ICT products by 2010	NITDA	Monthly	Standardised ICT products			– Non-compliance	– Strict control
Provide incentives to local manufacturers of ICT products to enhance their competitiveness in the global market place	SON	Quarterly	Export volume and market share			– Abuse of funding	– Audit output
Provide certification guidelines for ICT companies, products, services and ICT professionals by 2010	NASS	Bi-annually	Published guidelines			– Abuse – Lack of capacity – Lack of funding	– Institute professionalism and oversight
Introduce ICT products and services into the Technical Aid Corps and other aid programmes by 2011	MFA	Annually	ICT trained corpers				

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Train trade attaches on the marketing of Nigerian ICT products and services	MFA	Annually	Number of Missions with trained staff			<ul style="list-style-type: none"> – Lack of commitment and collaboration – Incompetent Staff 	<ul style="list-style-type: none"> – Pre-qualify before posting out
Organize ICT Expositions in foreign missions in selected countries by 2012	NPC	Quarterly	Exposure			<ul style="list-style-type: none"> – Funds and will to do 	<ul style="list-style-type: none"> – Ensure commitment
Create public awareness on the standards for equipment, software and human resource	PgMO	Quarterly	Increase public Awareness			<ul style="list-style-type: none"> – Lack of Funds 	<ul style="list-style-type: none"> – Provide resources
Undertake more bilateral and multilateral trade missions with specific emphasis on ICT products and services by 2011	PgMO, NITDA, BPP	Quarterly	Directive issued and gazetted Local content meeting demand			<ul style="list-style-type: none"> – Local content capacity to meet demand 	<ul style="list-style-type: none"> – Incentives to increase capacity
Provide incentives for the private sector in collaboration with Public sector to establish ICT Parks through tax rebates, easy access to land, etc by 2010	PgMO	Quarterly	No of ICT Parks established			<ul style="list-style-type: none"> – Lack of Incentives 	<ul style="list-style-type: none"> – Create incentives
Implement Phase 1 of the NOP by organizing a stakeholders sensitization forum by March 2010	CPN, PgMO	Bi-Annual	Established guidelines for certifications of ICT products, companies, processes and services.			<ul style="list-style-type: none"> – Abuse of incentives and tax rebates – Lack of proper coordination 	<ul style="list-style-type: none"> – Stiff penalties for abuse of processes – Involve professional services and stakeholders

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Implement Phase 2 of the NOP by March 2011	NITDA, PgMO PgMO	Bi-Annual Quarterly	Adequacy of incentives available Number of missions undertaken and nations visited			<ul style="list-style-type: none"> – Abuse of incentives and tax rebates – Lack of proper coordination 	<ul style="list-style-type: none"> – Stiff penalties for abuse of processes – Involve professional services and stakeholders
Implement Phase 3 of the NOP by March 2012	NITDA, PgMO PgMO	Bi-Annual Quarterly	Adequacy of incentives available Number of missions undertaken and nations visited			<ul style="list-style-type: none"> – Abuse of incentives and tax rebates – Lack of proper coordination 	<ul style="list-style-type: none"> – Stiff penalties for abuse of processes – Involve professional services and stakeholders
Organize bi-annual stakeholders review sessions on NOP	NITDA, PgMO NITDA, PgMO NITDA, PgMO	Annually Annually Monthly	ICT products and services introduced into TAC, VSO etc. Number of attaches in different countries trained Evidence of local content patronage			<ul style="list-style-type: none"> – Slow business processes 	<ul style="list-style-type: none"> – Adequate sensitization and enlightenment to carry along the stakeholders

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Enforce legislation for ICT local content by 2010 and organize quarterly review sessions on the effectiveness of the ICT local content policy	NIPC	Quarterly	Increase FDI flow			– FDI flow due to environmental factors	– Reduce or eliminate the impact of environmental factors
Implement appropriate policies from previous studies on power generation by 2010.	PgMO	Quarterly	Improved power supply, security, and more friendly business environment				
Establish a National camera surveillance system	NSA	Quarterly	National spread			– Security Risks	– Ensure implementation
Enforce connection of all ISPs and international gateway license holders to internet exchange points in Nigeria	NITDA	Monthly	No of connections to the gateway			– ISP resistance to the policy	– Enlightenment and regulation
Enforce the registration of all telecommunication lines	PgMO, ONSA	Monthly	% of telephone lines registered			– Lack of complete national database	– Ensure authentic national identity project is completed
Free up 698-862MHz spectrum currently used by analog TV for broadband services by 2010	ONSA, PgMO, FMIC	Monthly	No of stations and states freed up per month			– Non cooperation of NBC	– Ensure compliance
Free up 2500-2690MHz spectrum currently used by MMDS for broadband services by 2010	ONSA, PgMO, FMIC	Monthly	Completion by January 2010			– Non cooperation of NBC	– Ensure compliance

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Ensure one-stop shop for end-user frequency assignment coordination and management by 2010	OSGF	Monthly	Merger of spectrum management sections of NCC and NBC			<ul style="list-style-type: none"> Protection of Turf, Bureaucratic processes 	<ul style="list-style-type: none"> Ensure compliance by all concerned
Identify key areas of Telecomms and ICT such as RF, Optical Networks etc for which there are shortage of skills and provide scholarship for both national and overseas training in those areas	NCC, PgMO	Quarterly	No of Scholarships awarded, No of trained citizens per year			<ul style="list-style-type: none"> Lack of Government Support 	<ul style="list-style-type: none"> Ensure provision of Funds
Deploy additional satellites with full satellite and transponder redundancy	FMST,NCC	Quarterly	No of Satellites deployed			<ul style="list-style-type: none"> Lack of funding and support, natural disasters, lack of training 	<ul style="list-style-type: none"> Provide adequate funding and support
Provide Tax incentives for the importation of components for manufacture of mobile-broadband enabled terminals	PgMO	Quarterly	Level of reduction on tax rates			<ul style="list-style-type: none"> Non cooperation from FMF and Customs 	<ul style="list-style-type: none"> Ensure compliance
Provide one-off corporate Tax incentives (1%) for the implementation of systems for geographical location of subscriber terminals to enhance security (longitude and latitude)	PgMO	Quarterly	No of towers equipped with the systems			<ul style="list-style-type: none"> Non cooperation from FIRS 	<ul style="list-style-type: none"> Ensure compliance

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Encourage technology-neutral as well as forward looking regulation	PgMO	Quarterly	No of forward-looking regulatory frameworks developed			– Interference between different frequencies	– Ensure no harmful interference created in the process
Develop e-transaction certification administration guidelines including PKIs by 2010	PgMO	Quarterly	Increased sustainable and secured platforms			– Lack of compliance	– Enforcement
Streamline overlapping legislation and policies and their implementation through different MDAs by 2010	Presidency	Monthly	Harmonized policies			– Institutional resistance	– Monitor for compliance
Deploy e-platforms for assessment and approval of FDI	FMCI	Monthly	Easy access by FDI			– Facility failures	– Ensure robust and functional facilities
Provide adequate resource annually for the Computer Forensics Institute Nigeria (CFIN) for training and registration of computer forensics experts starting 2010	Presidency	Monthly	ICT Security experts			– Lack of manpower	– Train the trainer
Establish a National Institute for ICT Research (for software, hardware and services) by 2015.	PgMO	Quarterly	Institute established			– Lack of funds – Bureaucratic delay in enabling Act	– Provide adequate fund – Set and monitor deadlines

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Equip the current patent offices in the country with adequately trained human resources to facilitate ICT patent registration in the country by 2010	PgMO	Annually	Patent office equipped with adequate human resource			– Lack of funds	– Provide adequate funds
Arrange workshops and seminar to create avenues for interactions between private sector and research institutes by 2010	PgMO	Monthly	Enlightenment			– Lack of funding	– Ensure adequate funding
Facilitate the effective training of lawyers, judges and employees of agencies concerned with the administration of ICT-related intellectual property and cyber laws by 2010	NJC, NASS	Quarterly	ICT Proficiency			– Resistance from Lawyers	– Ensure compliance
Undertake a study to establish the ICT components in which Nigeria has potential competitive advantage by 2010	NCC	Monthly	Boost Manufacturing			– Sub-standard study	– Ensure proper monitoring
Review the national local content policy to provide adequate incentives for local hardware manufacturers to research into and manufacture local substitutes for imported hardware components by 2010.	NCC	Monthly	Boost Manufacturing			– Lack of funding	– Ensure proper funding

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Initiatives	Monitoring Agency	Monitoring Frequency	KPI	%Completion	Issues	Risks	Mitigation
Provide grants for research on the production of digital content such as databanks, courseware, portals, digital libraries and archives, etc. by 2011	NUC, NASS, NBTE	Bi-annually	Successfully completed projects Annually committed funds			– Abuse	– Strict prequalification guidelines and penalty for abuse and failures
Provide grants fund projects in Nigerian universities, polytechnics and research institutes by 2011 for the development of software by 2011	PgMO, stakeholders	Annually	Availability of software in Nigeria languages			– Failure to deliver quality results	– Regular production of progress report
Provide grants to fund ICT projects in Nigerian universities, polytechnics and research institutes by 2011	PgMO	Quarterly	Number and amount of grants given for research			– Abuse of process	– Establish controls to ensure transparency and accountability

Appendices

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