



**MANAGING RESEARCH FOR IMPACT ON SOCIAL AND ECONOMIC DEVELOPMENT**

**BY**

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## INTRODUCTION

To fully be a successful participant in today's Globalized World, developing countries must evaluate the histories and urgently register the lessons and experiences of the developed and economically successful countries of the World, and adopt some or all the processes involved.

Europe was the "first" Continent to "discover" the "modern techniques" of sustainable development, and most of its countries emerged as members of the First World. The North Americans later also learnt and followed suit, and today we are witnessing the fast pace of quality development in several countries especially in the South East Asian Continent

Clearly, the addition to the deployment of traits of the free market, combined with stable polity that encouraged the practice of the “rule of law”, the common major driver in all these Continents remains to be the timely application of “formal” Science, Technology and high value knowledge.

Despite the fact that geographically, the African Continent can comfortably consume the USA, Europe, Australia, Japan and Brazil, in contrast, Africa has remained to be a “problem” continent in terms of the present norms of development, but why?

The subject matter of this paper is focussed on the linkage of Science, Technology and Innovation for development in Africa to drive its full participation in the globalised world. It therefore becomes natural to focus most of the discussions here around that broad spectrum.

To ensure clarity and focus while minimising the use of theoretical arguments, the author deliberately details the discussions based on Nigeria’s “experiences” and future development aspirations, especially in its strategies to use Science, Engineering, Technology and Innovation (SETI) to become a global economic player. A linear or tangential application of the arguments presented here may be applied for most other African economies.

## Fundamentals on SETI based Development

- Generally, the strategic use of knowledge for development is not new. It is especially imperative for developing any knowledge economy of the 21st century. Africa can learn from the experiences of the developed countries in Europe, North America and now Asia in the process of deploying SETI for achieving its development aspirations. It is worth noting that in the modern world, the evolution and use of a highly developed SETI system is unavoidable in steering any desired modern development. This is evident as we review the most common attributes of developed economies identified in Europe, America, Asia and Oceania, which may include the following:

- Having a clearly defined National SETI Policy that has been indigenously articulated based on transparent resolutions and active participation of both the leadership and the followership. This clearly demonstrates the total ownership on the evolution and application of SETI for development;
- The existence and functional vibrancy of a well coordinated SETI system including highly performing and globally rated Universities, Research Institutions and other secondary and tertiary education/capacity building institutions;

- ❑ The dynamic functionality of National Systems of Innovation (NSI) which imply the clustering, networking, partnerships and synergies of related institutions to operate and perform efficiently, especially in the process of producing and sharing information and competences and their mutual relationships;
- ❑ Maintaining high investment in Research, Development and innovation, including high and sustained investment in scientific R&D by the private sector;
- ❑ The use of clearly defined Technology Acquisition priority flagships that recognises the comparative advantages of the countries, mainly to unleash, trigger and drive their economies to perform better;

- ❑ The development of a measurable, sustainable and beneficial Intellectual property Rights (IPR) and Innovation culture to take advantages of knowledge “monopoly”;
- ❑ The strategic development and use of locally available Raw Material endowments for the highest benefits and in a sustainable manner;
- ❑ The intense use of Information and Communication Technology (ICT) to automate and speed-up the economic system for total development;

- Developing and maintaining firm Technology/Knowledge Planning and Governance to ensure national visibility, presence and relevance globally; and
- A deliberate development and sustained popularisation and regulation on the patronage of domestically acquired technologies competitively.

In essence, it may not be misleading to infer that the socio-economic strength of any nation/continent depends on first, its superior achievements in SETI, and secondly, its capacity and capability to translate those achievements into products and processes for prosperity and integrity (innovation).

Contrary to the traditions of classifying countries into First, Second and Third Worlds, lately classifications of the Third World into Developing Countries and Least Developing Countries (LDCs). Many of these are in Africa, the African Continent must therefore realise that the objectives of SETI in the process of solving problems are:

- To reduce cost;
- Reduce cycle time;
- Simplify work;
- Improve productivity;
- Improve quality; and
- Enhance customer (peoples) satisfaction.

These objectives are clearly the desires of the poor and since Africa has nearly 800 million poor people, using SETI to its highest level is a necessity in the Continent. Furthermore, it **MUST** be noted that for any sustainable socio-economic development, **there is no short cut to this**. Africa must further note that the developed countries will not “open their doors” of SETI. Access is continuously getting tighter. Africa Must learn and urgently apply the process of technology acquisition in all its ramifications either through R&D, Technology Transfer, Technology Adoption and Adaptation or in any other way possible.

### The case of Nigeria:

- Since independence, Nigeria has attempted to industrialise its economy severally, and has recorded experiences of mixed performance interpretations. Some of these activities included:
  - Failure to develop a virile Steel Industry (Ajaokuta, Katsina, Jos, Delta, etc) despite the heavy investment deployed;
  - Failure to develop an Automobile Industry despite the heavy investment to establish VW, Peugeot, Mercedes Benz, Styre Tractor, etc... assembly plants;

- Failure to establish effective agricultural production systems despite the heavy investments in many River Basin Development Authorities, Large sugar plantations, Cocoa plantations, Palm Oil plantations, etc;
- Failed attempts to develop infrastructure to develop Small and medium Enterprises despite the heavy investment into Industrial Development Centres (IDCs) , etc and industrial development despite the heavy investment in projects meant to establish industries such as, Textile industries, Aluminium smelting industries and several other Manufacturing Companies.

Nigeria has also experienced failures in many other areas aimed at meeting specific targets in the past. Some include:

- The Green Revolution programme for sustainable agricultural development;
- Operation Feed the Nation for food security
- Mass Mobilization for Social and Economic Reconstruction (MAMSER);
- National Economic Reconstruction Fund (NERFUND);
- Lately, the Millennium Development Goals (MDGs);
- Etc.

## The Current Nigerian Vision (Diagnosis)

- From the above experiences, it is apparent that since independence in 1960, Nigeria has had various attempts aimed at developing and modernising its economy, with debatable levels of successes and/or failures. Currently, Nigeria has launched a strategic vision, the **Vision 20-2020**. Through this, the present administration (since 2007) has clearly set the template for developing Nigeria into one of the top 20 World Economic Powers by the year **2020, meaning that in the next 10 years, Nigeria will be among the club of the First World Countries**. Towards achieving this target, the administration has further revealed its Mission strategy of deliberately concentrating on seven priority agenda areas commonly coded as **The 7-Point Agenda** to drive the economy towards attaining the 20-2020 target.

In launching these policies, His Excellency, President Umaru Yar'Adua had this to say among other motivational statements:

- “.....let us join hands together to erase the pains of today while working for the gains of tomorrow (SACRIFICE);
- Let us set aside cynicism and strive hard for the good society that we know is within our reach (DISCIPLINED and POSITIVE);
- Let us discard the habits of low expectations of ourselves as well as our leaders (CONFIDENCE);
- Let us stop justifying every shortcoming with that unacceptable phrase “the Nigerian factor”, as if to be a Nigerian is to settle for less (PRIDE);

- Let us capture the mood of optimism that defined us at the dawn of independence, that legendary “can-do-spirit” that marked our Nigerianness (INSPIRATION and PATRIOTISM);

- Let us join hands together now, to build a society worthy of our children (FUTURISTIC);

- We have the talent, we have the intellect, and we have the ability. THE CHALLENGE IS GREAT, THE GOAL IS CLEAR AND THE TIME IS NOW....”

Any great leader could not have said it better! Thus, for every Nigerian, it is necessary to recognise that the well known phrase “all hands MUST be on deck” must be the norm therefore, it is important to understand the focus of both the Vision 20-2020 and the 7-Point Agenda.

From the draft Vision 20-2020 document, it has been revealed that Nigeria’s economy must transform from the current \$295billion GDP in 2009 to a whopping \$900 billion by 2020. This target is beyond the economy concentrating just on oil and gas resources. Indeed, for this to happen, it cannot be business as usual. Many things must change! The economy has to diversify and deliberately change with the main aim of improving its productive capacity and capability. It must modernise and automate its production systems, improve the level of quality value addition to its domestic raw materials, drastically reduce poverty, improve the quality of infrastructure and transform the total economy from the current high consuming base to a producing one, etc all of which are possible, but highly dependent on the optimum evolution and application of Science, Engineering, Technology and Innovation (SETI) indigenously.

### The 7-Point Agenda

The seven priority areas culminating into the 7-Point agenda are as follows:

- Critical Infrastructure
- Food security
- Wealth Creation
- Land reforms
- National Security/Economic Stability
- Human Capital Development
- Niger Delta

A close appraisal of the 7-Points reveals that the selection is strategic, but highly coded. Quite appropriately, the following proposed implementation strategy is presented:

- ❑ The Government is driven by Ministries designed around sectoral lines, the implementation of the 7-Points must not follow sectoral lines since each one of them desires a holistic and synergised consideration to be effective;
- ❑ 2020 is only 10 years away; therefore the implementation MUST be designed on the basis of a radical and revolutionary 10 year plan;
- ❑ Though Nigeria has always implemented Federal projects in line with considerations of fairness to the six geopolitical zones, the seven point agenda MUST concentrate on the evolution of a National base and foundation that can set the agenda for total National development.

In line with these three considerations, the following is further presented in the process of decoding the 7-points for clarity and measurable implementation:

- ❑ Physically Nigeria resembles a rectangular shape with Abuja in the centre and the four corners being at Maiduguri, Port Harcourt, Lagos and Sokoto. We are aware that in simplistic engineering terms, a rectangle is an unstable structure that needs to be stiffened using reinforcements and use of triangles. Based on that argument, assuming that a ten year plan was revealed to portray that the “critical infrastructures – highways, Railways, Power Transmission lines and Information and Communication fibres” will be established to include an 8-lane dual carriage highways from Maiduguri through Abuja to Lagos and from Port Harcourt through Abuja to Sokoto to form a sort of “Autobahn” physical infrastructure backbone. Assuming additionally that the projects to implement such backbone is designed with firm conditions that Nigeria will NOT import 50% of the needs (steel, cement, aluminium, gravel, etc) for construction, and also that a minimum of the high level capacity (labour) required on the projects MUST be Nigerians;

- Similarly, the food security” agenda point should be associated with a firm policy required to evolve, say 500, commercial and mechanised farms along the above backbone infrastructure, with such agricultural enterprises deliberately focused on taking advantage of the proven agricultural resources and endowments known for each area. Again, a deliberate strategy for the use of high content of indigenous resources MUST be emphasized;
- In the same manner, the agenda point on “Wealth Creation” can be addressed through the implementation of a 10year plan to establish, say 500 industries located along the infrastructure backbone, deliberately set to take advantage of both the commercial farms, solid minerals and also the backbone infrastructure;

- Naturally, the fourth agenda point “human capital development” MUST follow cue since any strategy to deploy a high percentage of local content will naturally mean the production of competencies and technology evolution capabilities locally. Even in the present day highly developed and the rapidly developing countries, investments in human capacity development and education are on the increase. Therefore, in this regard, marching orders MUST be given to institutions (Universities, Polytechnics and Research Institutions) to target a clear reform in their institutions for higher performance, credibility and visibility;
- Similarly, for the infrastructure backbone, the commercially based mechanised farming systems and the industries to all be timely and effectively implemented, the fifth agenda point “Land Reforms” is a MUST, which is why the gradual and firm implementation of Point 5 in the Agenda is very strategic and imperative;

- ❑ If the above five agenda points are addressed as proposed, the agenda point 6, “National Security and Economic Stability” will automatically emerge;
- ❑ Finally, the seventh agenda point “Developing the Niger Delta Region” will also be automatically contained especially as all the other points will affect the area also, in addition to other special incentives that MUST be introduced to especially ensure that Capacity and Capability is enhanced in the region in a special manner. Specifically, the Education sector in the area MUST get special emphasis, highly functional and specialised skills acquisition facilities MUST be established. Relevant cottage industries MUST be established to harvest the creative abilities resulting from the other programmes, etc.

It must be clearly noted that the implementation of each of these points MUST NOT be shouldered by sectoral Ministries. A viable implementation strategy, which MUST consider each agenda point to require multidisciplinary teams, should evolve for this to materialise. If these points are implemented as proposed, it is highly likely that Nigeria will “leap-frog” and “quickly” change in the next 10 years just like Dubai did, or just like Global Companies like Microsoft, Kia and Proton did , just like established innovation centres like Infosys in India happened, and just like what is presently happening in Lagos. The case of transforming Oshodi become clear examples.

For this to happen, there **MUST** be a vibrant and effective re-orientation tool deployed to get all Nigerians to give the 20-2020 Vision a **BIG YES!** Just like the Obama administration, when Americans resolved that they **CAN**, Nigerians **MUST** realise and agree to the fact that this time we **MUST!** We must realise that we can **ONLY** achieve these lofty targets when we match these policies with clear and measurable actions. In short, Nigeria **MUST** understand that **WE** all **MUST** focus and deliberately apply SETI for our development in a revolutionary manner!

### Typical SETI application steps

The following are some typical steps for applying SETI for development riding on the concepts of attaining the Vision 20-2020 through the implementation of the 7-Point Agenda:

- We must recognise and assess **where we are** sincerely and clearly. This would require detailed studies of the physical, social and economic infrastructure to generate credible data, documentation and records on which all plans would be based upon;
- We must clearly quantify and spell out the meanings of the vision 20-2020, with yearly targets and milestones of **where we want to be**. This is what will be useful at the time of monitoring and gauging the progress we make;

- ❑ We MUST consider and recognise the Indigenous resources available (including expertise) to implement the plans, so that we can clearly estimate the partnerships, the “help” we may require from all our “friends” and when that help should come;
- ❑ We MUST conduct a detailed Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis to identify our strengths and niches as we venture into this “revolution”.
- ❑ We MUST then develop a clear road map with dates and firmed targets so that roles are clear, monitoring and evaluation can be clearly undertaken;
- ❑ We MUST adopt the culture of using logical knowledge in the whole process of implementation to avoid guesses, duplication, rivalry and wastages;

- ❑ We MUST develop and adopt the culture of tracking, monitoring and correcting project implementation and performance to sustain all efforts;
- ❑ We MUST agree and adopt the culture of maintaining institutional and operational memory, to ensure continuity and to avoid diversions and wastages;
- ❑ Most importantly, we all MUST be guided by credibility spirit (disciplined, transparent, sincere, committed, partnering, respect for each other and be patriotic).

## Status of SETI in Nigeria

- The knowledge and innovation infrastructure in Nigeria can fairly be classified as flamboyant, currently comprising of 104 Universities, 125 Polytechnics, about 100 Colleges of Education and over 200 research institutions and Centres, whose outputs have demonstrated that Nigeria clearly expressed clear “presence” in technologies at all levels including:
  - **Indigenous technologies** such as cooking utensils, farming tools, traditional housing technologies, traditional medicines, traditional techniques for clothing and apparels etc;
  - **Low technologies** including leather processing, shoe making, complex embroidery, processed food items etc;
  - Intermediate technologies including oil expellers, cereal processing machinery, garri making facilities etc; and
  - High technologies including being an active participant in Space programmes, IT innovation and manufacturing facilities, biotechnology capabilities, and high-level materials technologies (nanotechnology)

- Despite these expressions of presence:
  - Poverty is still high in the land (estimated at 70% of the population), translating to nearly 100 million people;
  - Unemployment is still high especially among the energetic youths;
  - Farming techniques are still mainly primitive with subsistence small holding farming dominating the agricultural sector;
  - Technical and entrepreneurial skills among Nigerians is still of low value, with most active participants operating within the “appropriate technology” class while most of the functional technology based enterprises are being operated by foreign expertise.
  - But as always, the potential for dramatic change to attain the set vision clearly exists. Despite all the above, attaining the Vision 20-2020 is still highly possible.

## What is wrong?

- Like many African countries, Nigeria has seen many visions, strategies and huge programmes in the past, many if not all, have failed to deliver the goals as set them. A close look at the education system since independence may reveal that the focus has remained on literacy education (mainly the ability to read, write, recite, get a qualification and boast). Hardly does the system inculcate the culture of technological education, creativity, innovation and entrepreneurship.

- Additionally, it is a fact that the visibility of the African knowledge infrastructure in the World is very hazy, with no African University among the top 300 highly rated Universities in the World. Among the top 500 highly rated Universities in the World, only University of Cape Town in South Africa is mentioned. Also just like most other Africa countries, Nigeria in the past has failed to meet many very clearly set goals of development. Such include “The Operation Feed the Nation (OFN)”, “The Green Revolution”, “The Housing for all by the year 2000”. Much recently, “The Millennium Development Goals (MDGs)” set by the United Nations in 1990 has received so much publicity, but clearly most African Countries cannot attain them.

- On the other hand, Africa has demonstrated the trait of jumping, accepting and owing any global development challenge that emerges with no reservations. For example, the current “Global Economic Melt Down” may not be that bad for many African countries. Indeed it could be a rare opportunity for the African economies to re-strategize. Indeed, in the heart of the economic melt down, African countries have seen a surge in the flow of investment into many countries especially by Western and Asian business communities, mainly on energy resources, solid minerals and on large projects designed to establish infrastructure. Interestingly, nearly all the technologies and the expertise in these investments are foreign, and the associated capital flights are alarming.

- Additionally, on most of the large infrastructure projects being implemented in the member countries, there is low technology transfer, low know-how transfer, very low meaningful investment and use of local R&D and low value addition on raw materials, all leading to the economies of Africa becoming highly dependent on foreign capacities which further leads to the member nations breeding and maintaining fragile economies. These undesirable manifestations seem to happen almost unnoticed. They happen because Africa maintains:
  - Low strategic awareness on the core long-term merits of Foreign Direct Investment (FDI), Company Corporate Social Responsibilities (CSR). Etc;
  - Weak leadership at all levels in terms of Political, Moral, Economic and Scientific leaderships;
  - Low partnership and synergy among relevant institutions within countries and among countries on the pursuance of clearly identified common goals for sustainable development.

## MANAGEMENT OF THE SETI SYSTEMS IN NIGERIA

Despite the presence of the aforementioned elaborate national innovation system, the country has not experienced the much desired economic and technological growth. The reason for this state of affairs can be traced to the lack of a coordinated management system that is desired to harness the vast potentials from the SETI systems.

- An efficient management system will be one that can break down inhibiting existing socio-cultural barriers while encouraging a vibrancy in the national innovation system. To achieve this the following must be critically assessed and managed.

## STI SYSTEM FUNDING

- 1% of GDP annually = \$294.8b = \$2.95b ~ N470 billion
- GOVERNMENT APPROPRIATION (**BUDGETARY AND LEGISLATION**)
- STI/R&D FUND (**SOURCES JUSTIFICATION**)
- PRIVATE FUNDS (**CONTRACT RESEARCH**)
- INTERNATIONAL FUNDS (**ACCESS**)
- TOTAL RESOURCES (?) ~ N20 billion ~ **0.04%**

- The Strategy for a well coordinated and result oriented STI governance must be put in place starting from the highest level of government

## STI GOVERNANCE

- PRESIDENCY (**ADVISER?**)
- MINISTRY and MINISTERS (**FMOST, MINISTER, NRDCC**)
- LEGISLATION and NATIONAL ASSEMBLY (**COMM**)
- STATE GOVERNMENTS (**FEW SMOST**)
- LOCAL GOVERNMENTS (?)
- HEADS OF INSTITUTIONS (**DGs, MDs, ESs, Ds**)
- OTHERS (?)

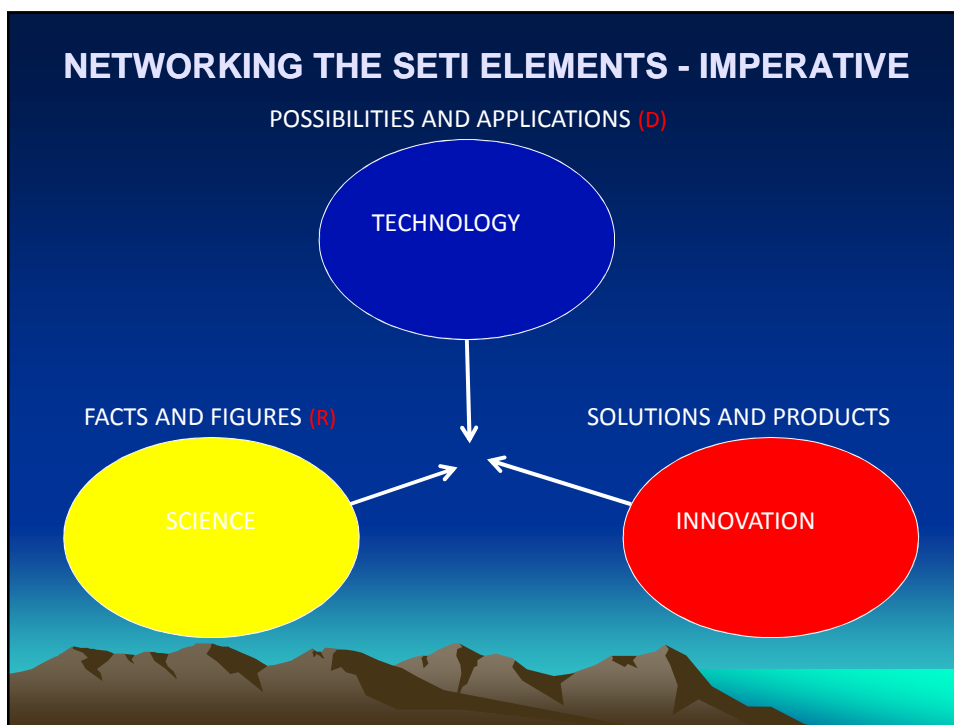
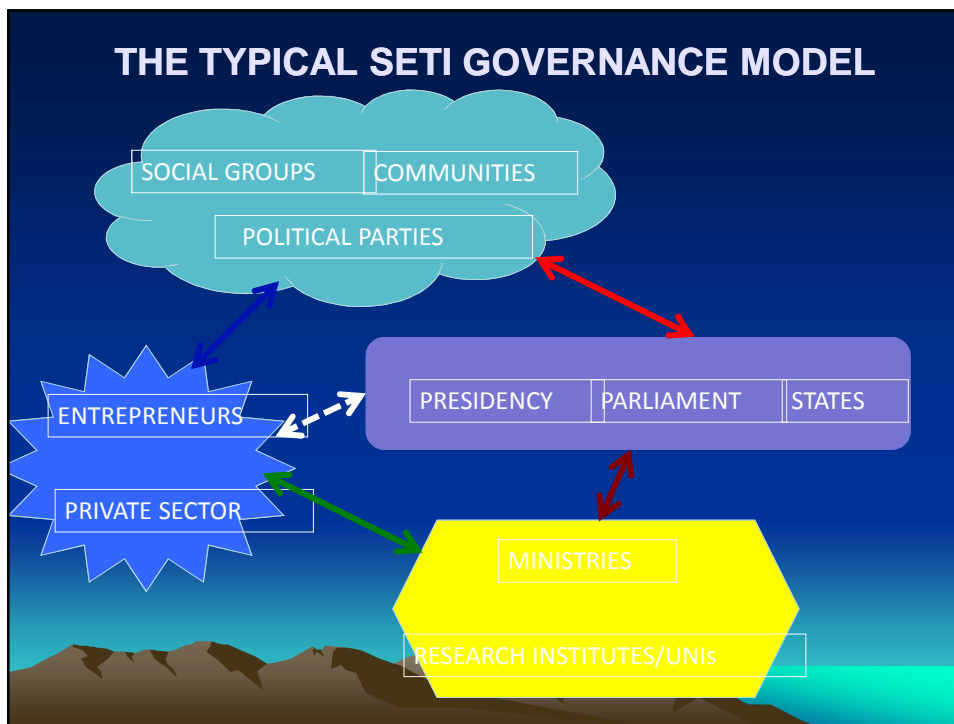
- An elaborate management system of result oriented STI performance model must be developed and driven to work efficiently.

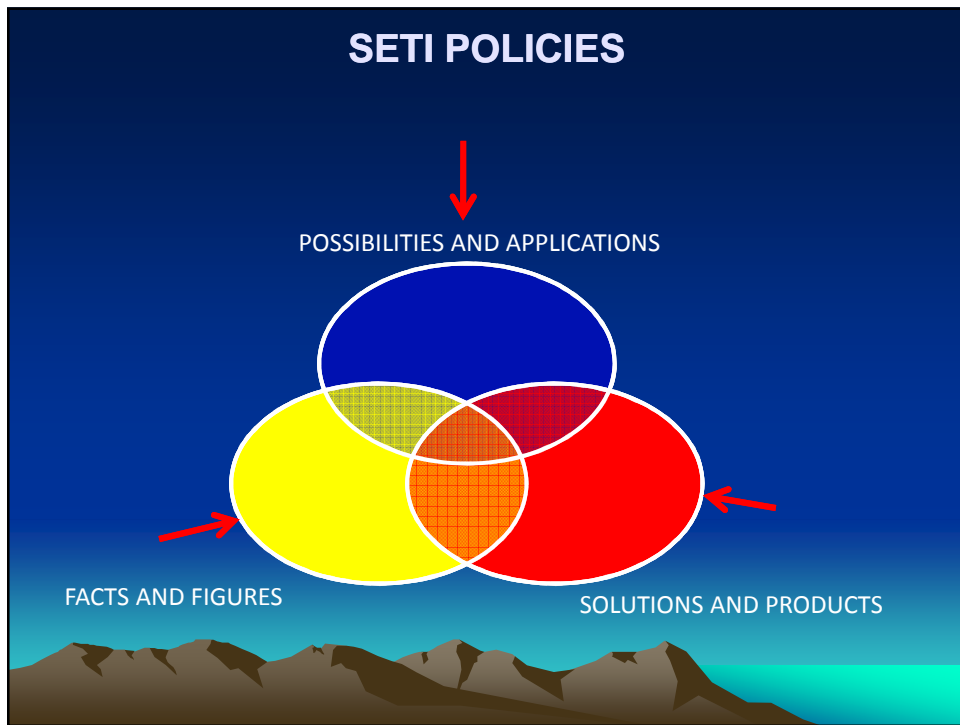
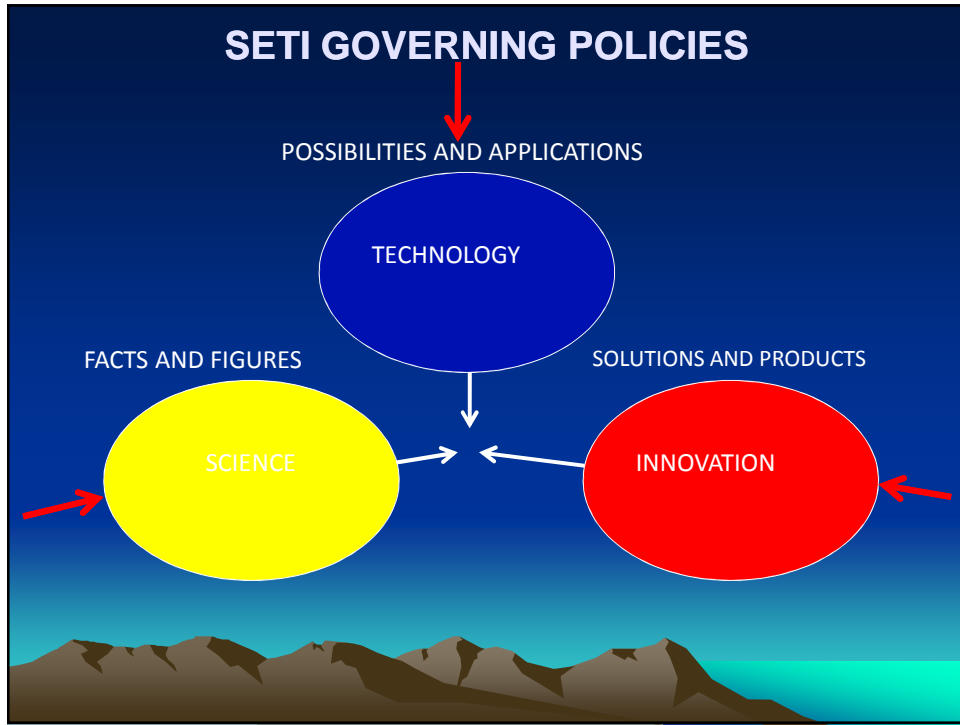
## STI SYSTEM PERFORMANCE

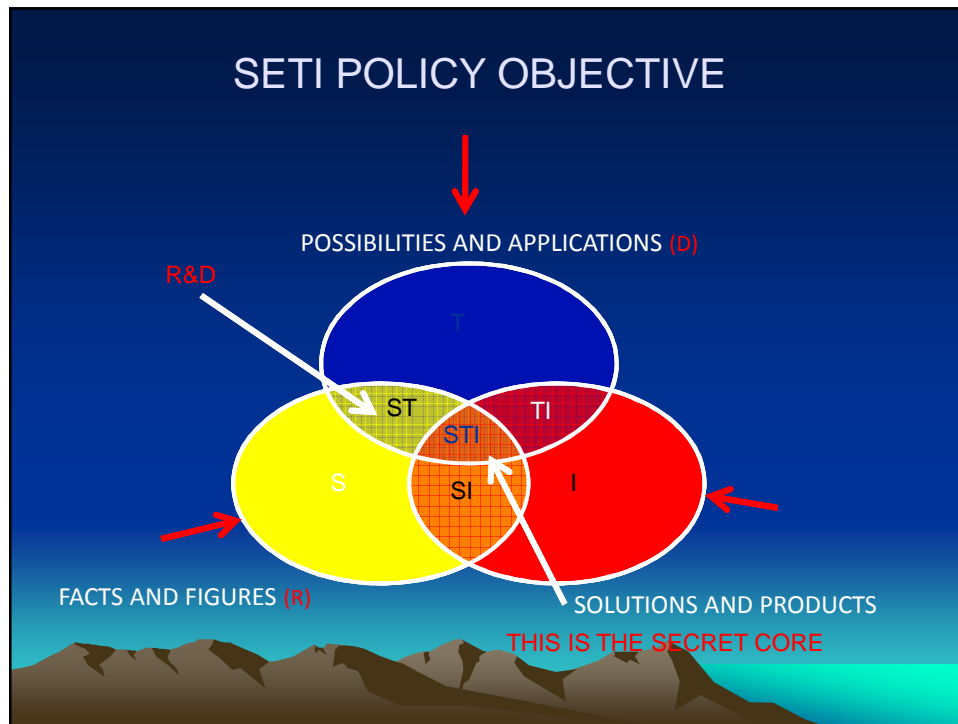
- INDICATORS (?) STI ON-GOING
  - DISCOVERIES
  - THEORIES
  - FORMULAE
  - PATENTS
  - PAPERS
  - **PRODUCTS**
  - **PROCESSES**
- 
- BREAK THROUGHS !**
- DESIRED S&T TARGET !**
- INNOVATIONS !**

## HOW TO GET THERE? (DEVELOPMENT RECIPE?)

- LEADERSHIP (ENGINEERING & TECHNOLOGY POLICY DIRECTION)
- RESOURCES (INTERNAL)
- **NATIONAL SCIENCE, ENGINEERING TECHNOLOGY & INNOVATION SYSTEM (SETI)**
- **APPLY OUTPUTS OF THE SETI**







- In all these, the National Office for Technology Acquisition and Promotion (NOTAP) recognizes the fact that achieving the core of SETI in Africa is not a mean feat. We have a society where the spiritualists and religious leaders (pastors) rather than researchers and research are consulted when confronted by physical problems. An ailing business man will rather go to a pastor for prayers rather than go to a knowledge center to seek solutions. An academic community that does research only for the purposes of promotions. Governments that would rather procure rather than fund indigenous SETI to proffer solutions.

- Conglomerates that depend totally on off-shore research for solutions to their industrial challenges with no thought at developing the indigenous R &D base. A society where there is a total ignorance of IPR and IPR issues across board.
- Despite all these hurdles, the National Office for Technology Acquisition (NOTAP) has refused to loose hope.

## WAY FORWARD

- We have designed programmes and processes that include Advocacy
- Presentations at every fora such this convention, Training Programmes, outreach programmes and projects, etc.
- We are looking ahead into the future of building up a crop of future scientists through Technology Story Board Teaching

project for primary and secondary schools, IPR capacity building programme through an annual invention and innovation competition for secondary schools

- Establishment Intellectual Property Technology Transfer Offices (IPTTOs) and training the personnel on patenting and patent searches in all tertiary institutions
- 28 such centers have been established in the last 4 years.
- Etc.

## CONCLUSION

- In conclusion, NOTAP invites all Africans both at home and in the Diaspora, friends of Africa such as the Association of Commonwealth Universities to join hands with us to Change the trend. No effort is too small and no assistance is too little.

I thank you for your attention and welcome  
any questions and comments

