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**Enhancing SSA's STI Capacity
to Harness Resources of Nature:
The Vision of the Nelson Mandela
African Institute of Science and Technology (NM-AIST)**

By
Burton LM Mwamila



Origin of the AIST Concept

African leaders (incl. Nelson Mandela) discussion with Jim Wolfensohn (then WB President), 2000/01.

Nelson Mandela greatly concerned by the knowledge gap (knowledge deficit) in SSA suggested to Jim that Institutes of S&T are perhaps Africa's single greatest need (*the likes of IITs & IISs in India*).

Frannie Leautier, then Vice President of WBI, was given the task of making this happen.

Hippolyte Fofack, an African WBI official, was charged with developing the concept in collaboration with some Africans in the Diaspora.

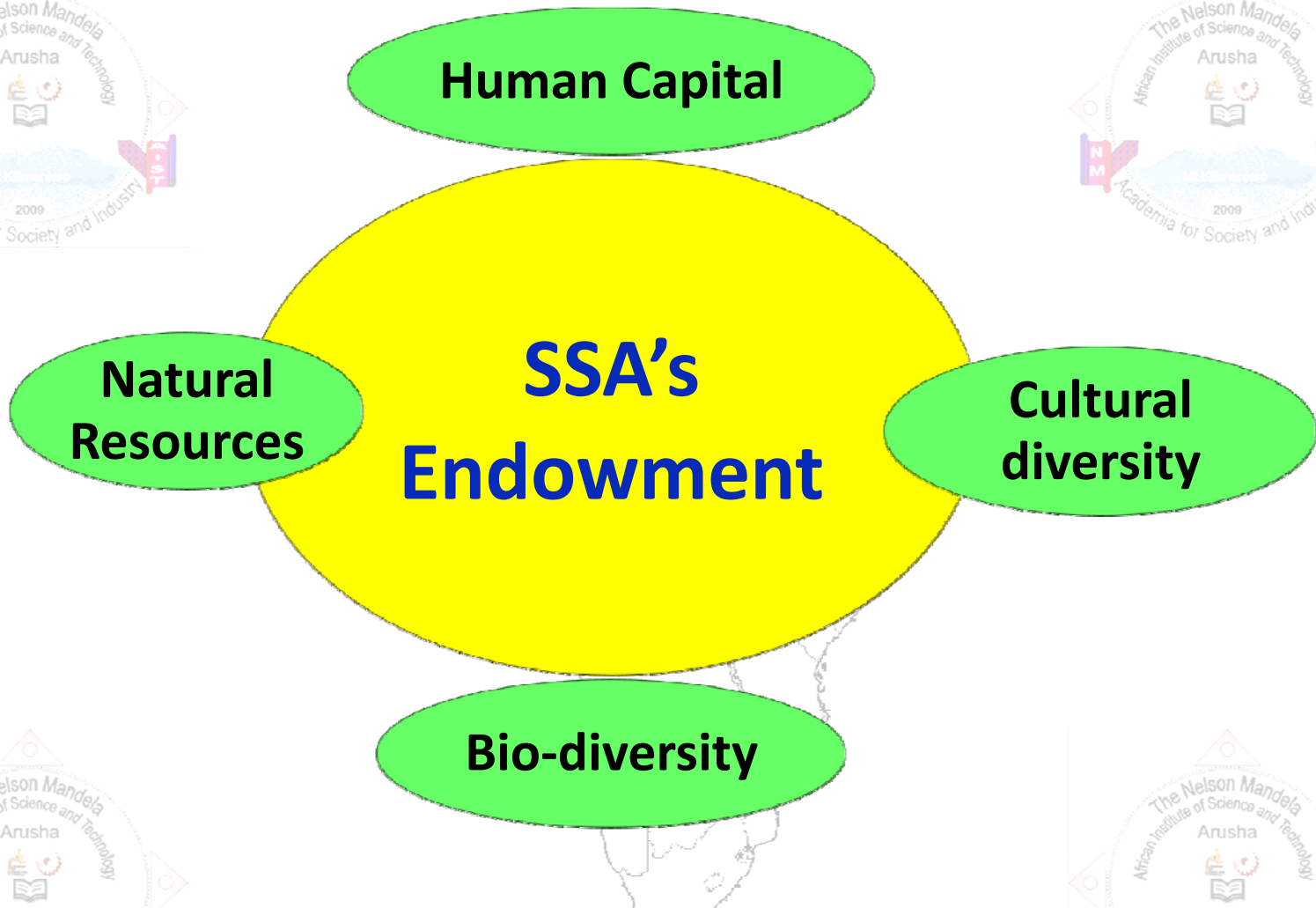


Situation Analysis



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Africa's Endowment is not properly nor adequately harnessed for the benefit of the continent !!

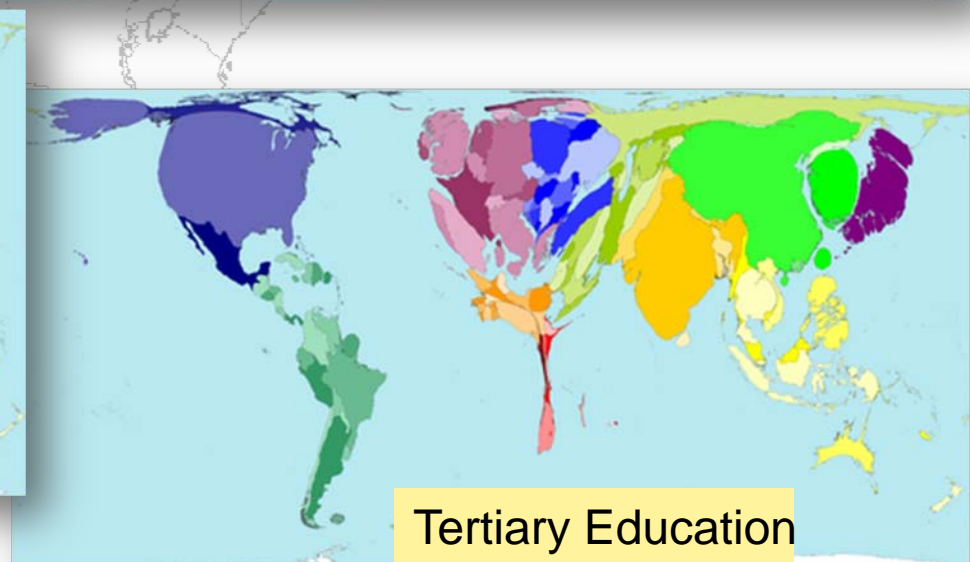
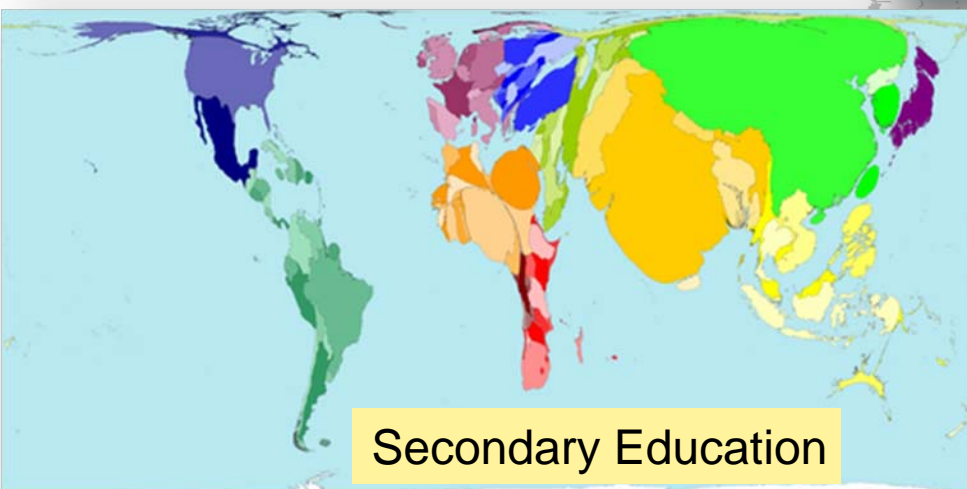
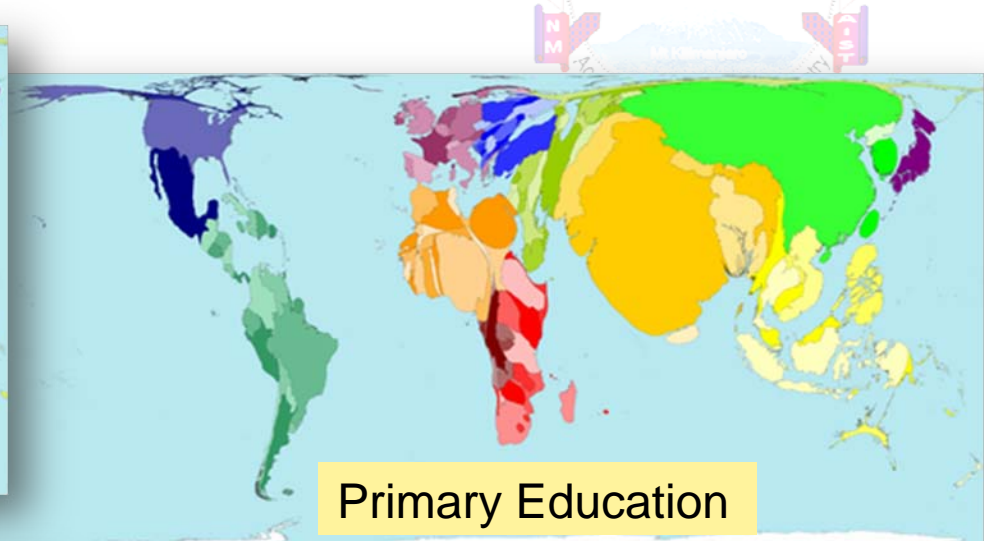
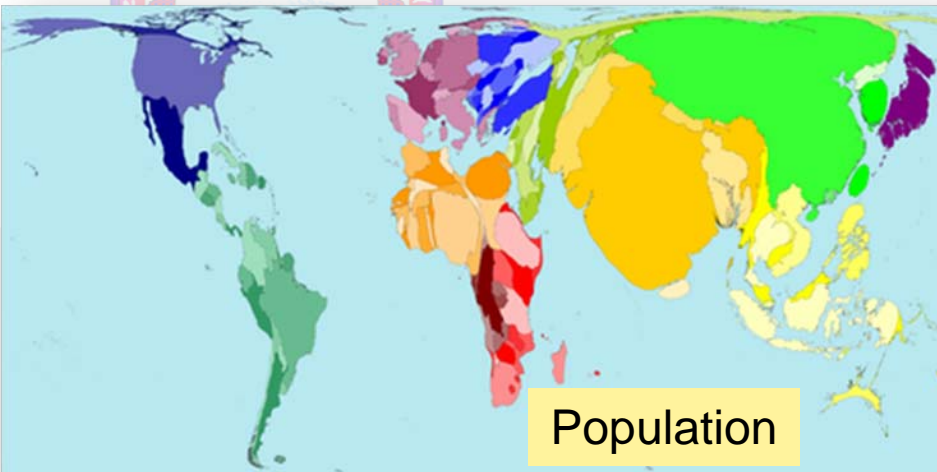


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- **The Greatest endowment any national can have is human capital.**
 - **Human Capital with knowledge & skills (value-added Human Capital) is the key to development!**

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- **Availability of other natural resources in itself is not as necessary and by no means a sufficient condition for Socio-economic development!**

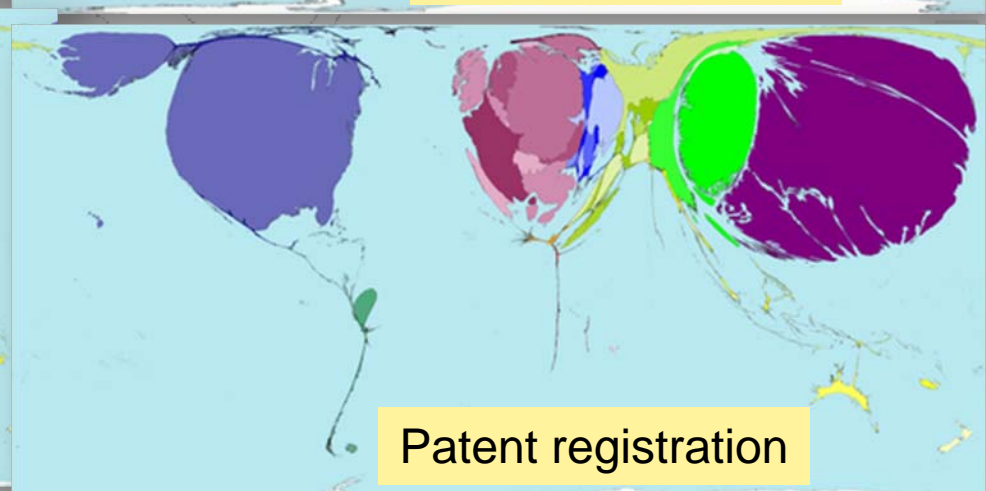
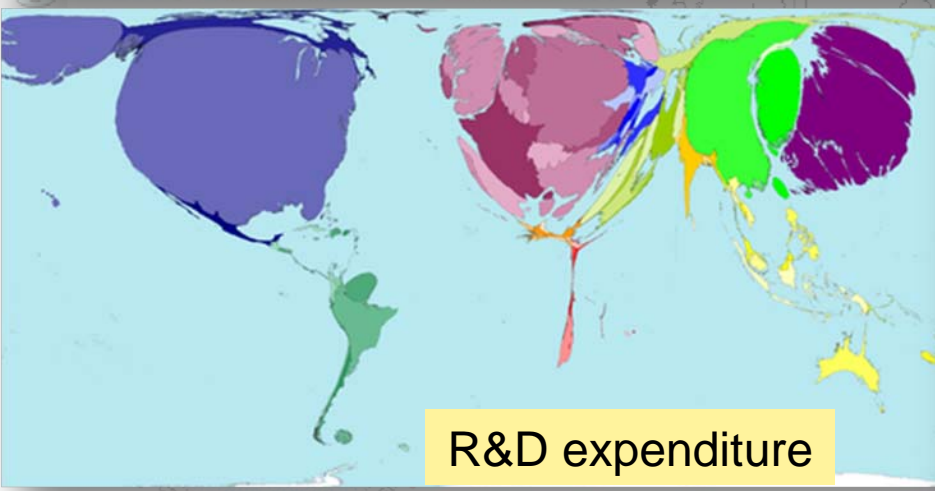
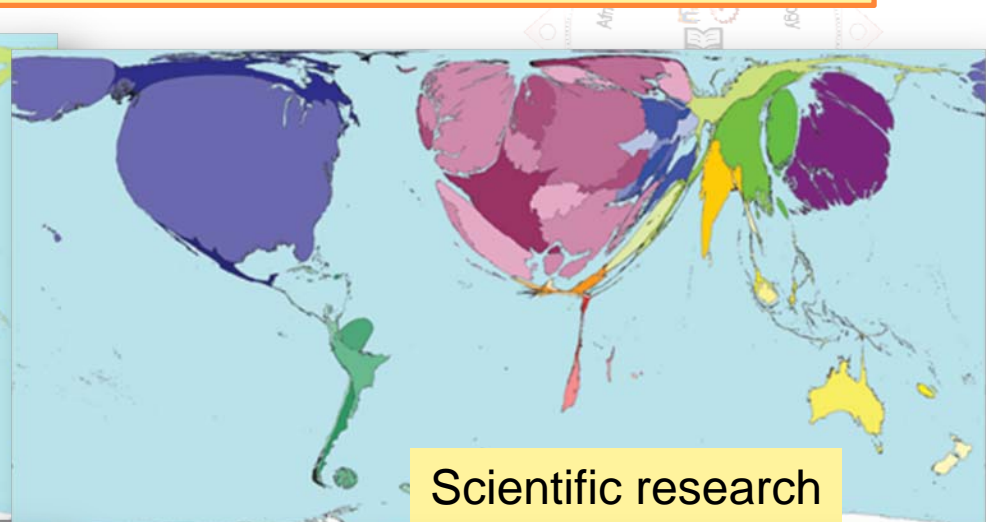
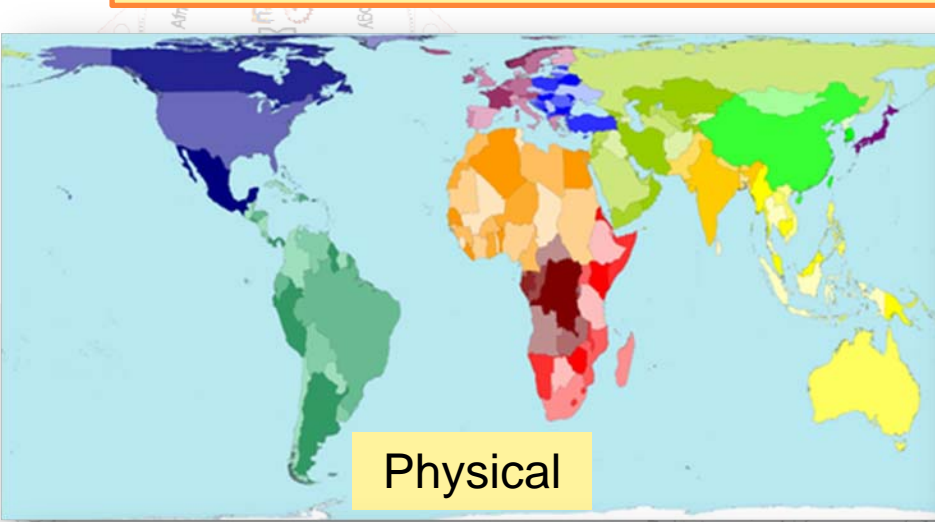


Extent of Value addition to Human Capital, the World over



Source: www.worldmapper.org

Science & Technology Performance – a function of Value-addition to Human Capital



Source: www.worldmapper.org

“... in the final analysis it is basically the mystery and utilization of modern science and technology which distinguishes the South from the North”. Abdus Salam African Nobel Laureate, 1979

To provide the best facilities for graduate and post-doc studies and research

Strong link with industry for technology transfer

Objectives of the AISTs

To bridge between research and industrial development

To catalyze the development of world class science and technology in Africa

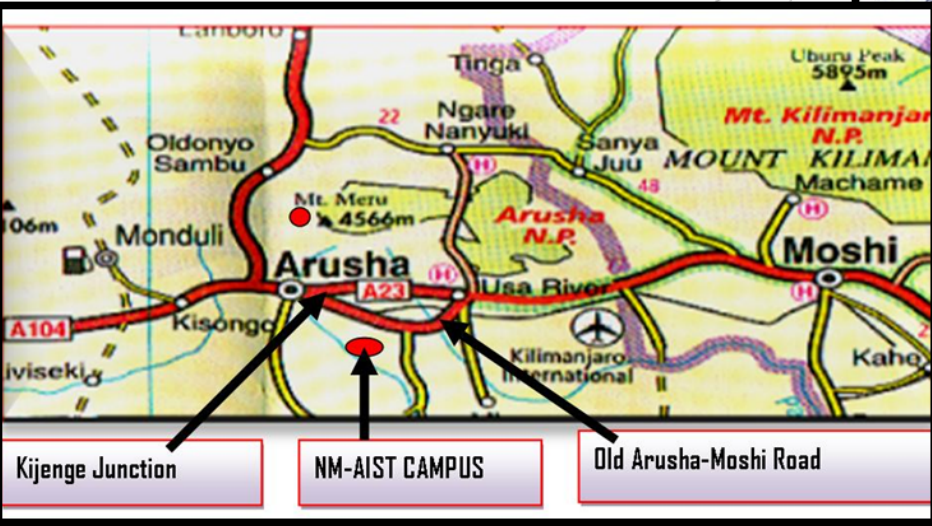
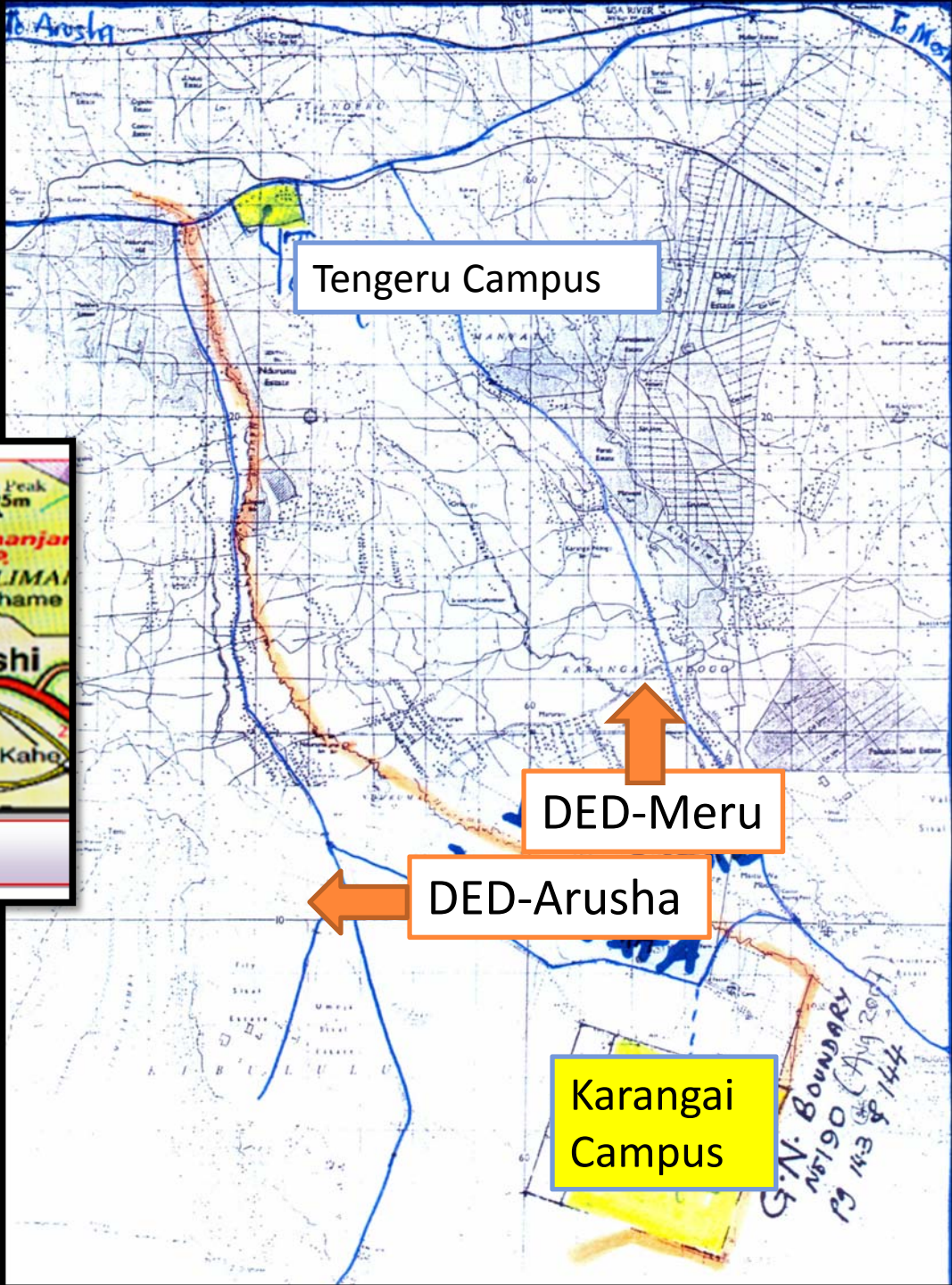
Technology parks with incubators and innovation centres for spin-offs

The Nelson Mandela African Institute of Science & Technology (NM-AIST)

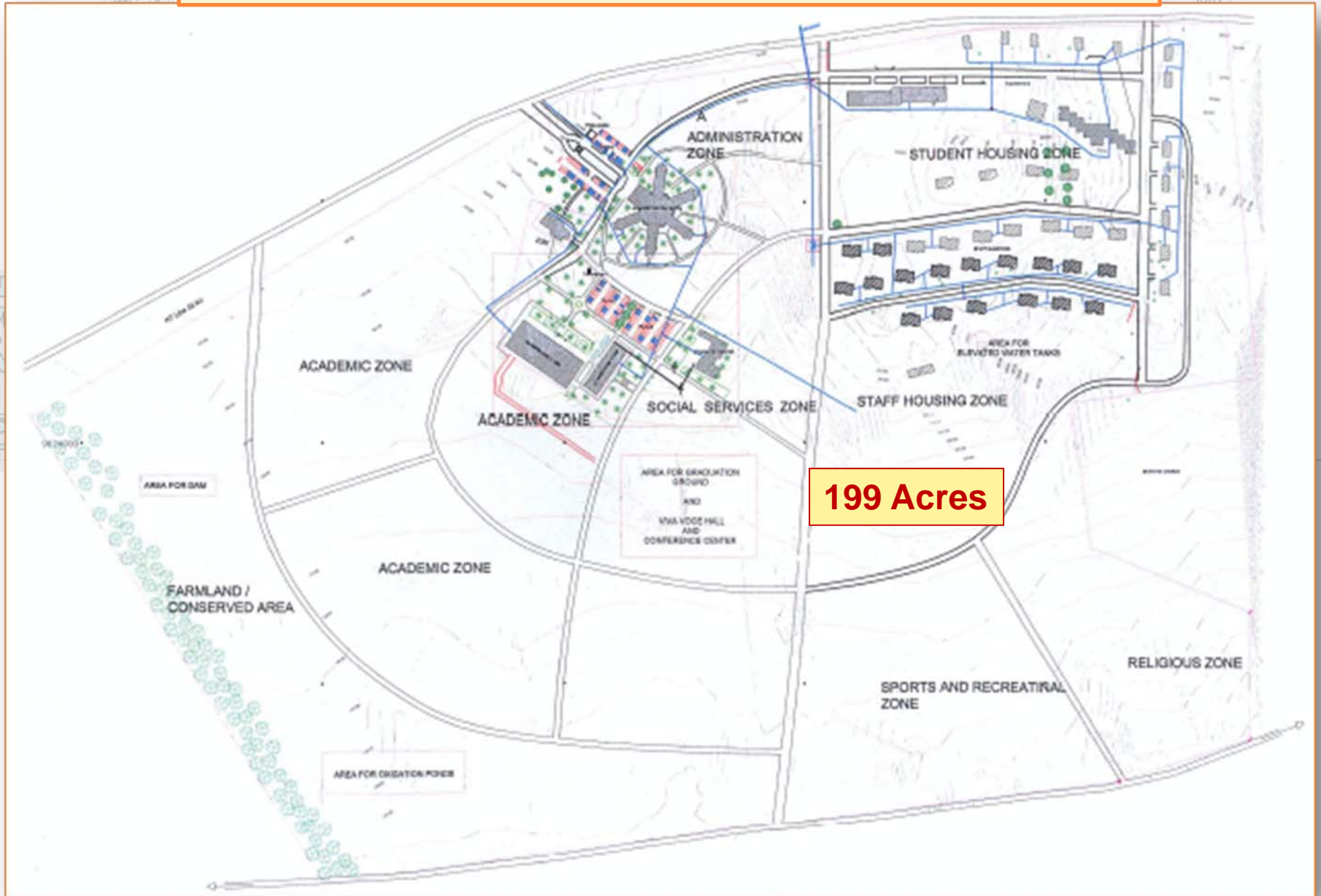
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NM-AIST's Campuses - Tengeru & Karangai



From CAMARTEC to NM-AIST



NM-AIST

Is for **research intensive** graduate and post-doc training in SET, viz. a **Research University**.

Its vision is to become a world-class institution dedicated to the pursuit and promotion of excellence in SET, and their applications for economic growth and sustainable development.

Maintains strong national and regional ownership.

MISSION Statement



To deliver and **promote high quality and internationally competitive** teaching and learning, research and innovation, and public service in SET for enhanced **value addition to people and natural resources**, emphasizing **entrepreneurship**.



Thrust and Focus

To stimulate, catalyze and promote intensification of agricultural production, value addition to natural products, and human & animal health.

To promote & harness linkage to society and the local industry, and scientific and technological response to local needs (*thereby avoiding the traditional social divide between academia and industry*).

To strive for a combination of strong local and global connections.

The Motto:

ACADEMIA FOR SOCIETY AND INDUSTRY

Key Deliverables

Production of:

- Top-notch SET **academics** for higher learning institutions;
- Competent **researchers** for R&D institutions;
- **Techno-prenuers, industry captains, innovation managers** for stimulating, catalyzing and promoting business start-ups and the growth of the local industry.

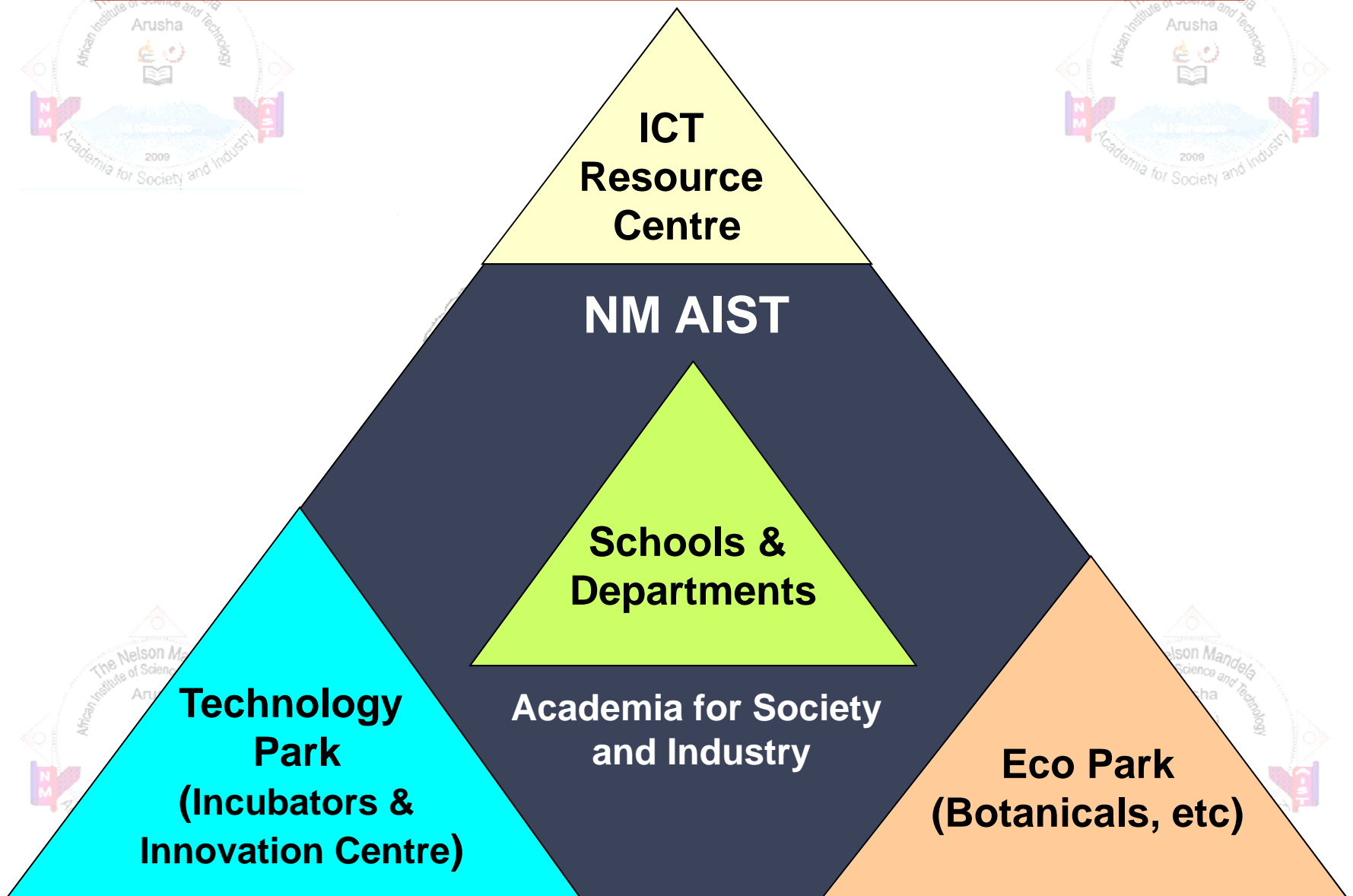
Establishment of a **world-class environment** for the generation and application knowledge *(through research, innovation and technology development)* for wealth creation and sustainable development.



How NM-AIST hopes to contribute to changing the situation



Structural Pillars of NM-AIST



Life Sciences and Bioengineering (LSBE)

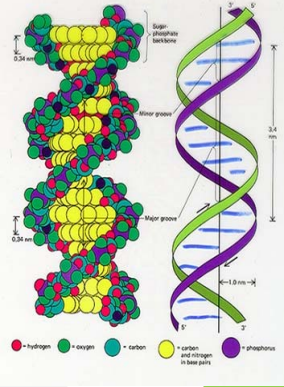
Biological Engineering

Sustainable Agriculture, Plant and Animal Biotech

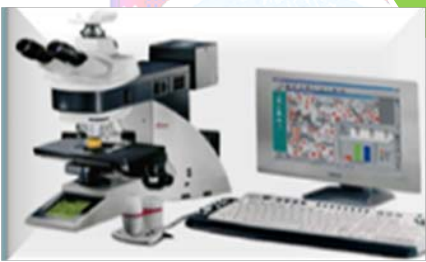
Health and Medical Biosciences

Food Science & Industrial Biotechnology

Biodiversity Conservation & Management



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Mathematics, Computational & Communication Science & Engineering (MCCSE)



Information
Technology,
Development &
Management

Mathematics &
Computational
Science

Information &
Communication
Science &
Engineering

Mathematics &
Computational
Science &
Engineering

Telecommunications
Systems &
Engineering

Communication
Science &
Engineering

Applied
Mathematics &
Computational
Engineering



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Water & Environmental Science & Engineering (WESE)

Hydrology and Climate Change

Environmental Science

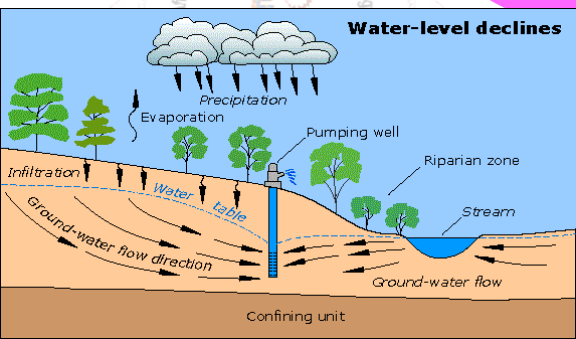
Hydrology and Water Resources Engineering (HWRE)

Environmental Science and Engineering (EnSE)

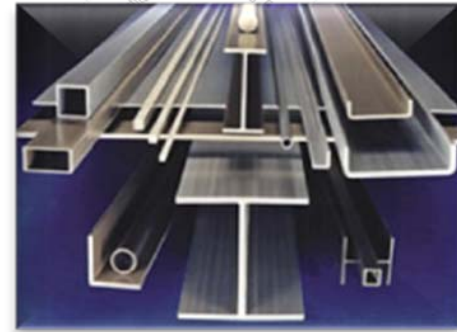
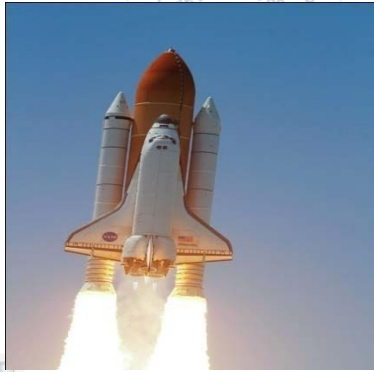
Water Resources Engineering

Biological & Irrigation Engineering

Environmental Engineering



Materials Science and Engineering (MaSE)



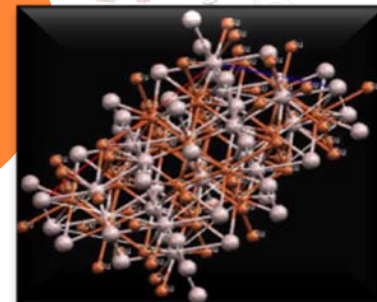
Bio & Polymeric
Materials

Smart Materials

Ceramic
Materials

Metallic
Materials

Electronic
Materials



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Sustainable Energy Science and Engineering (SESE)



Sustainable Energy
Generation and
Utilization

Bio Energy and
Renewables

Nuclear Power
Engineering and
Technology



Business Studies and Humanities (BuSH)

- Management & Entrepreneurship
- Innovation Management
- Innovation Systems & Clusters
- IPR & Patent Management

Enterprise
Development &
Management

Communication
Skills & Research
Methodology

Philosophy,
Law & Ethics



What Developing a World-Class University Entails

Concentration of Talents:

Students, Faculty, Researchers & Staff

Concentration of Resources:

Govt & Private sector support, Multi & Bi-lateral donors, Philanthropists, Endowment

Enabling Environment:
Strategic & Visionary Leadership, Institutional Autonomy, Conducive Academic & Research Infrastructure



Staffing and Students

Core permanent and contract faculty recruited competitively from within and outside EA Region

Pool of visiting faculty from the Diaspora (coordinated by ARIST) and other collaborating institutions

Students to be admitted competitively from the EA Region, and SSA generally.

10 Yrs Projected Total Annual Student Population

Year	Tengeru Campus					Tengeru & Karangai				
	1	2	3	4	5	6	7	8	9	10
Master's	60	140	180	220	260	640	1100	1300	1500	1800
Ph.D.	30	70	120	180	220	430	680	970	1300	1550
Total	90	210	300	400	480	1070	1780	2270	2800	3350
Faculty Projections	-	34	48	64	77	171	285	363	448	536
	-	4	6	8	10	22	36	46	56	67
	-	4	6	8	9	21	35	45	56	67

Key: Resident; Visiting; Post-docs

Resources - Financing Mechanism

Capital development funds from:

- Government of Tanzania – **already committed approx. USD 60 mills**
- Multilateral and bilateral sources in form of grants/soft loans

Operational funds from student fees

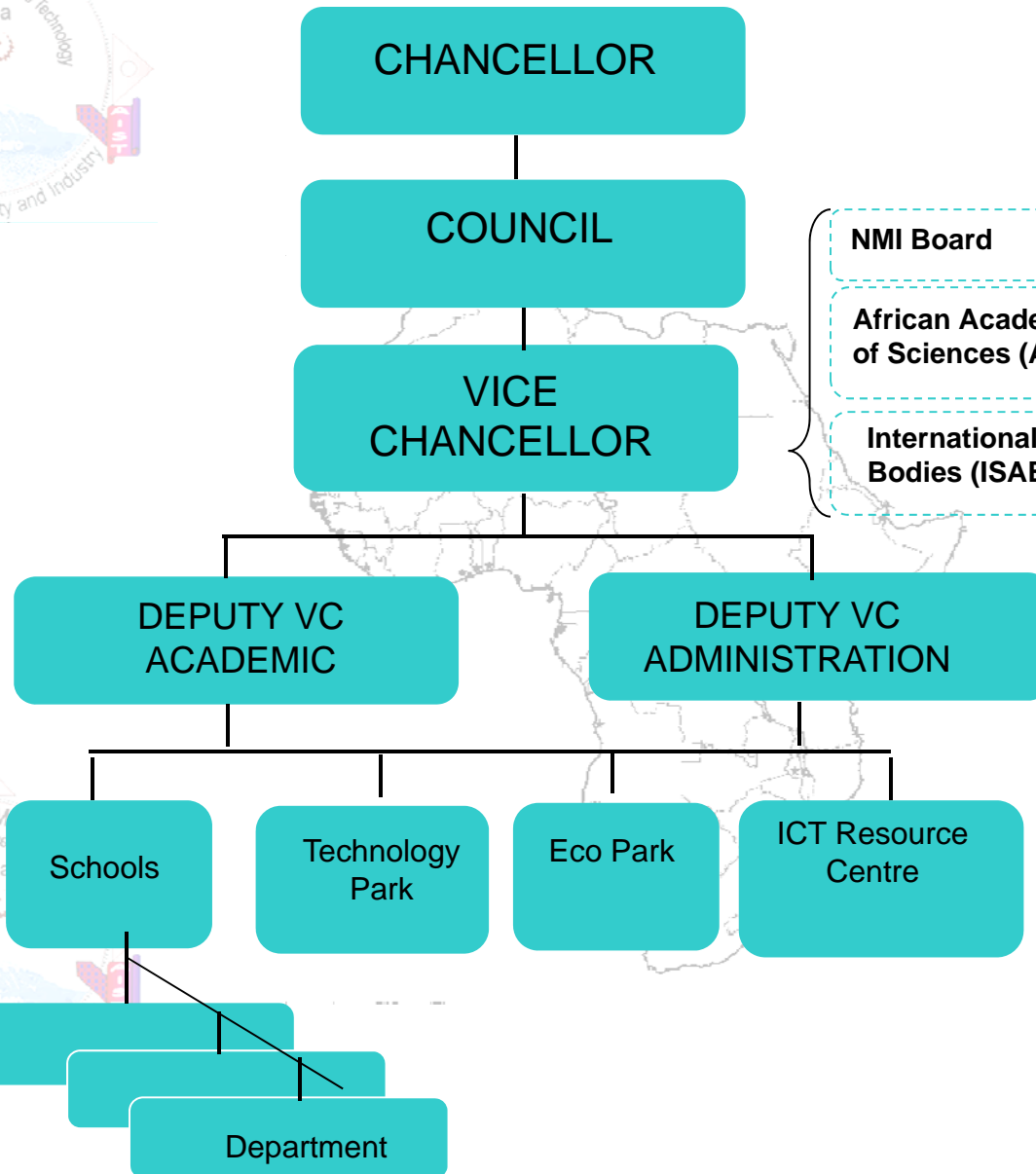
Research grants, sought through winning proposals, from philanthropists & others

An Endowment Fund for Excellence – PPP sought

SET Graduate Student Fellowship Fund

Buy-in contributions by countries in the catchment area

Governance - Organization Structure



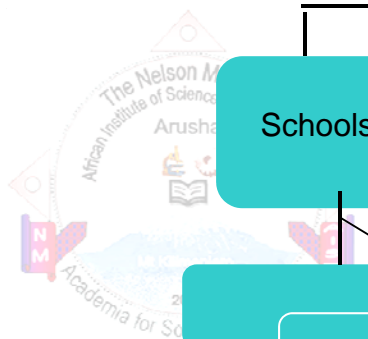
NMI Board

African Academy of Sciences (AAS)

International Advisory Bodies (ISAB, ARIST)

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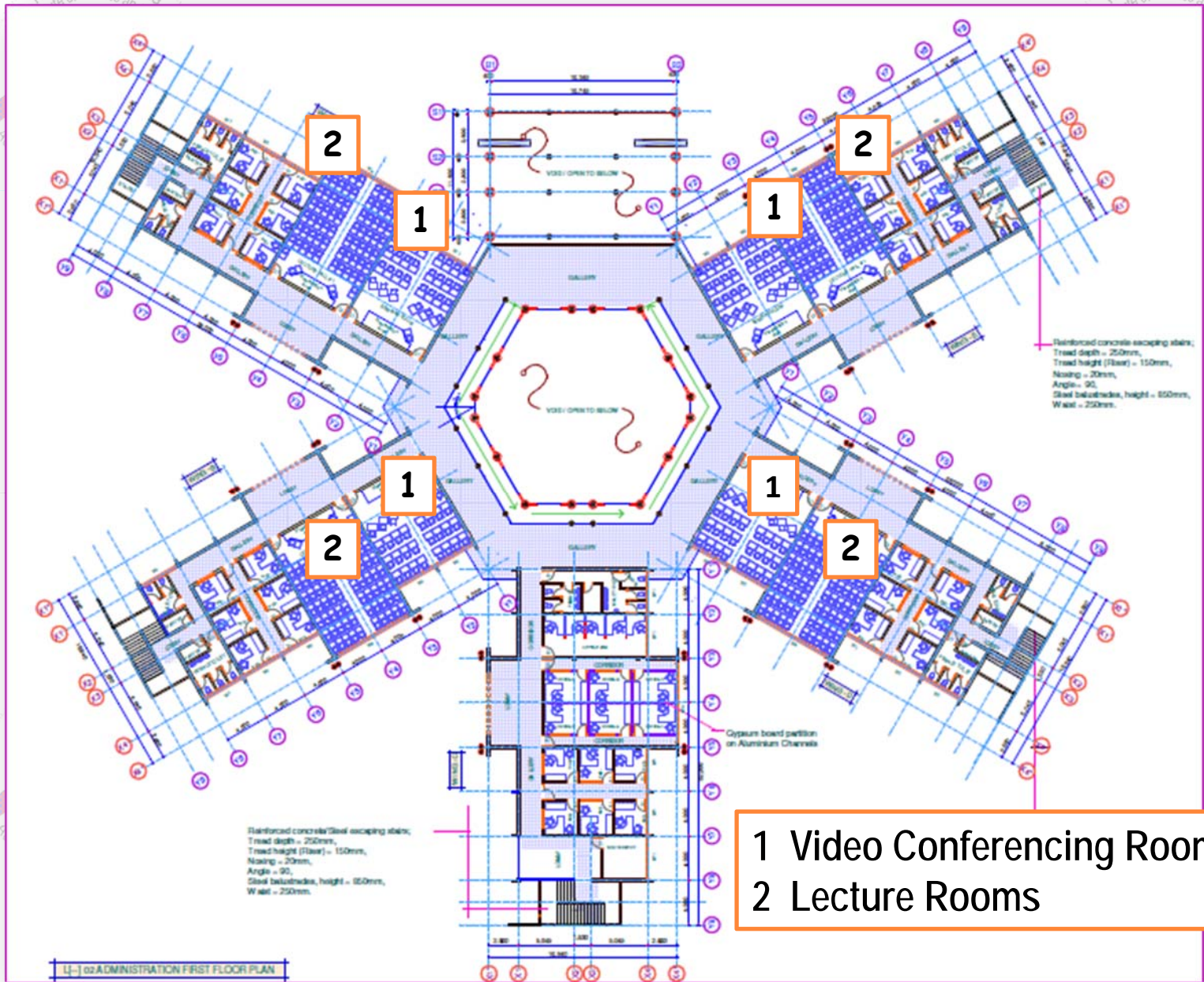




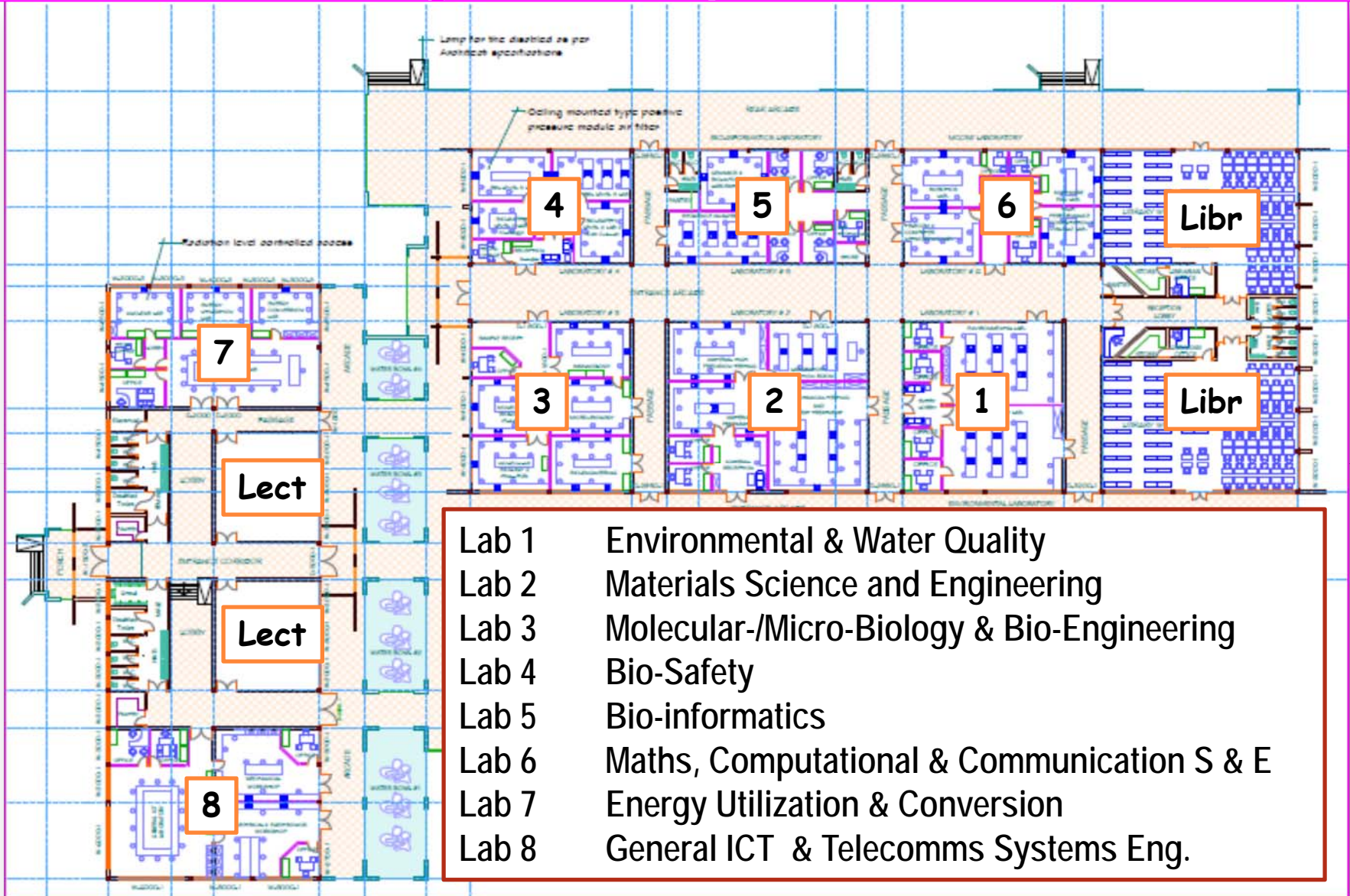
The Infrastructure for Teaching & Learning, and Research & Innovation



Admin /Academic Complex - 1st Floor



Laboratory Complex ~ 5,000 m²



Progress made To-date

Human capital – *Recruitment in progress, ~ 80 already reported.*

Equipment – *Delivery and installation in progress*

Establishment of collaboration with various world-class universities abroad – *Partnerships with USA, Korean, Canadian, European and Indian institutions established.*

Operational Policies and Procedures (OPPs)
– *Some draft documents in place.*

Curriculum Development – *Master's and PhD Curricular developed for six programme areas.*

Resource Mobilization

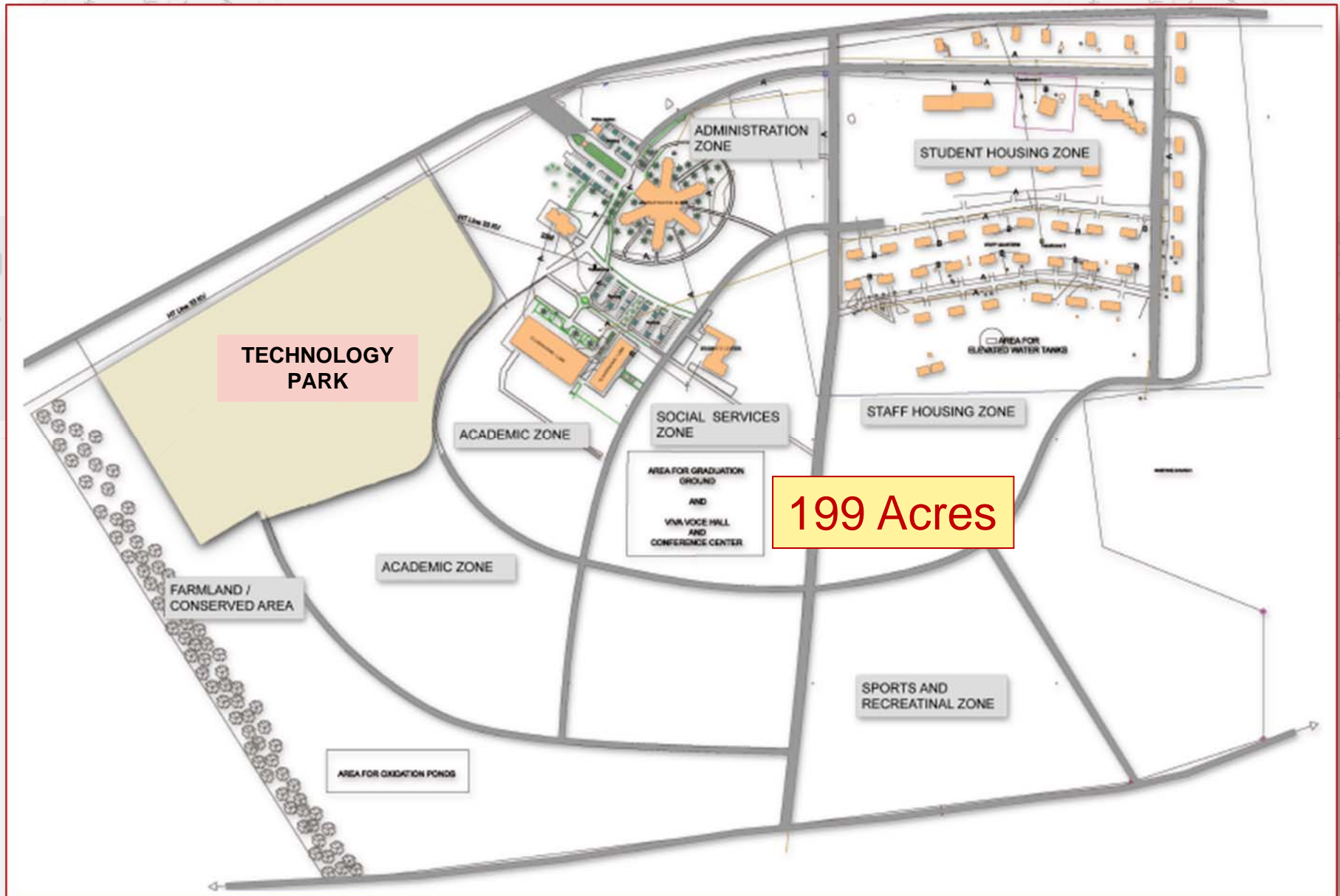
- *Indian Govt granted USD 1.3 mill for ICT Resource Centre*
- *Proposals submitted to WB, AfDB, ACBF, etc*



Stimulating and Catalyzing the Development of the Local Industry



Possible Start-up Technology Park at the Tengeru Campus



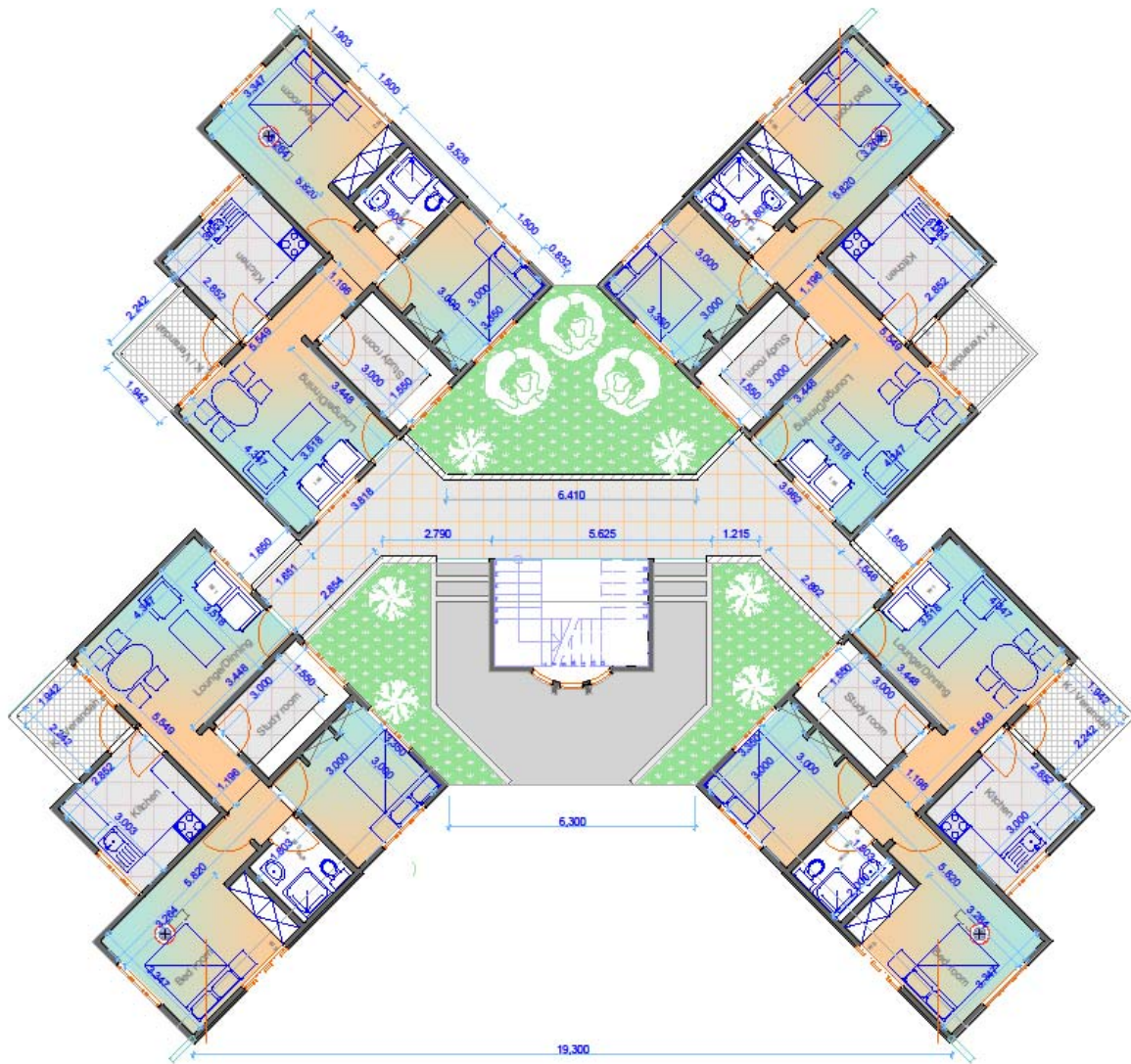
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MEETING THE DEMAND FOR MORE PhDs, POST-DOCS & VISITING RESEARCHERS

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Notes

GENERAL:

- All dimensions are shown in millimetres unless otherwise specified.
- All dimensions to be checked on the work on site.
- Any dimensions to be checked on the work on site.
- Color shaded dimensions are to be taken.
- Dimensions are given in millimetres.
- The drawing is the property of YIP Architects Ltd.
- All work to be in accordance with the relevant standards.
- All work to be in accordance with the relevant standards.
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- All work to be in accordance with the relevant standards.
- All work to be in accordance with the relevant standards.
- The contractor must check and verify all dimensions on the before commencement of any work.

CONSTRUCTION:

GENERAL:

- All work to be done in the ground over 100 gauge post-tensioning on 30mm clear out on concrete.
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FINISHES:

- All work to be done in the ground over 100 gauge post-tensioning on 30mm clear out on concrete.
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UTILITIES:

- All plumbing and drainage to comply with all relevant specifications.
- All services shall be installed in the ground.
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GENERAL:

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LEGEND:

- FOR FINISHES
- FOR FINISHES
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- FOR FINISHES

PROJECT:

PROPOSED CONSTRUCTION OF PHD STUDENT'S HOSTEL FOR NELSON MANDELA UNIVERSITY

CLIENT:

NELSON MANDELA UNIVERSITY ARUSHA, TANZANIA.

CONSULTANT:

YIP Architects (T) Ltd.
 Dar es Salaam, 5th Floor,
 New Kigamboni Rd,
 Plot No. 16 Block 45A, Kigamboni
 P.O.Box 12072, Dar es Salaam, Tanzania
 Tel: +255 22 2774540, Fax: +255 22 2774539
 Email: yip@yipanarusha.com

JOB STAGE AND DESCRIPTION:

CONSTRUCTION DRAWING

DRAWING TITLE:

PROPOSED FLOOR PLAN

JOB No: **CHECKED BY:**

DRAWING No: **DRAWN BY:**

DATE: October 2011 **SCALE:** 1:100 **REV No:**

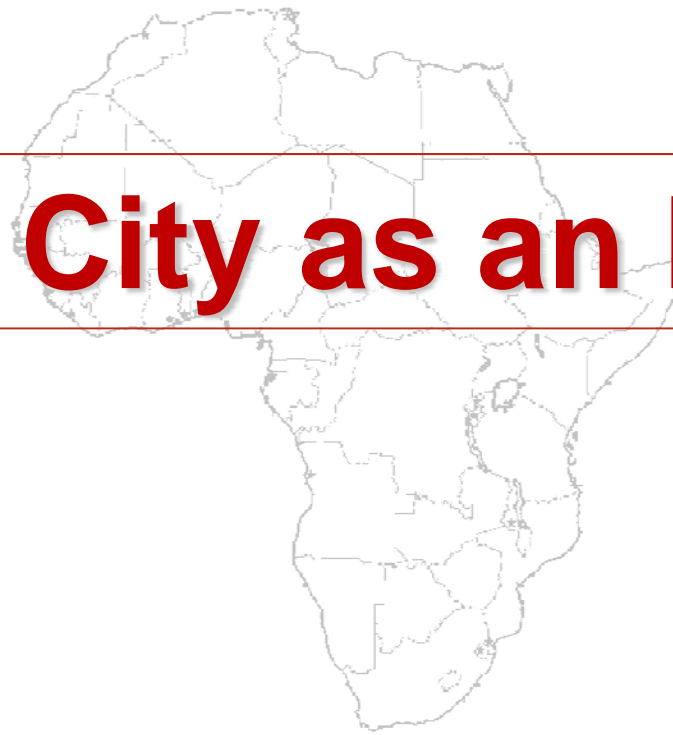
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PROPOSED CONSTRUCTION OF PHD STUDENT'S HOSTEL FOR NELSON MANDELA UNIVERSITY



PREPARED BY Y & P ARCHITECTS
P.O BOX 12072
TEL: +255222774540



Arusha City as an EA Hub



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Salient Features of Arusha

Tanzania is one of the world's bio-diversity hot-spots

Arusha is HQ of EAC and well placed midway between Cairo and Cape Town

Fast growing city, stable and peaceful with excellent climate

Vibrant Tourist Industry within range of Serengeti, etc.

Easy International Access through KIA

Experience with hosting international programmes:
ESAMI, ICTR, PAPU

- *Nicknamed the Geneva of Africa by Bill Clinton*
- *NM-AIST & AKU promoting Arusha into an EA Education Hub*
- *Why shouldn't Arusha be the Brussels of E, C & Southern Africa!!!*

Admin-cum-Academic Complex



Before August 10, 2010



Laboratory Complex



Before August 10, 2010

Hostels for PhD Students, Post-docs



Before August 10, 2010



Thank you very much !
Asanteni sana !

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