Building on Geospatial Information Capacity for Sustainable Development in Africa

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Presentation Outline

1)Overview of GI activities driving capacity requirements in Africa

2)Geoinformatics education and training requirements

3)Challenges facing GI capacity development & utilisation in Africa

4)Ways of achieving required GI education & training

5)Proposals for building on existing capacity

1. Overview of GI activities driving capacity requirements in Africa

- SDI development
- AFREF
- Developments in SST
- Land reform programmes
- New trends

SDI Development

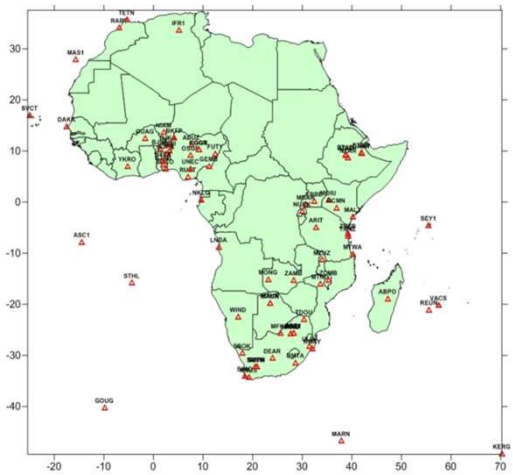
- Increased interest in SDI at regional and national levels (South Africa, Botswana, Nigeria, Rwanda, Namibia, ….)
- Determination of the regional Fundamental Data Sets
- Catalogue of the datasets & gap analysis for all the countries
- Development of African Regional SDI
- Metadata Profile for Africa

SDI Development…./2

- Gradual implementation of unified African Geodetic Reference Frame
- Contribution to Global Mapping & WHO's SALB
- Committed participation in the UN Global Geospatial Information Management (GGIM) Initiative
- Preparation of Guidelines & Best Practices for the Acquisition, Storage, Maintenance and Dissemination of Fundamental Geo-spatial Datasets [in progress]

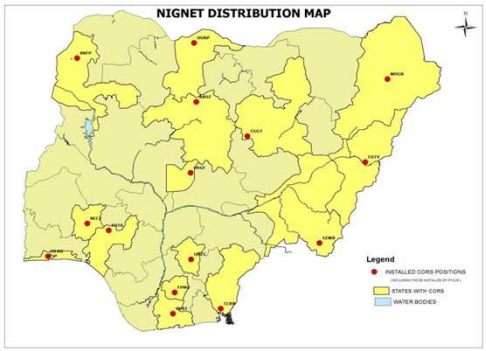
AFREF Implementation

- 110 CORS as at December 2012
- But only 49 of the stations on average, are archiving data daily at the ODC
- Plus other CORS not yet integrated into AFREF e.g. ≥ 20 in Nigeria: OSGOF (11), Lagos (1), Osun (3), Land Reform (5)



(Source: Wonnacott, 2013)

AFREF Implementation…/2

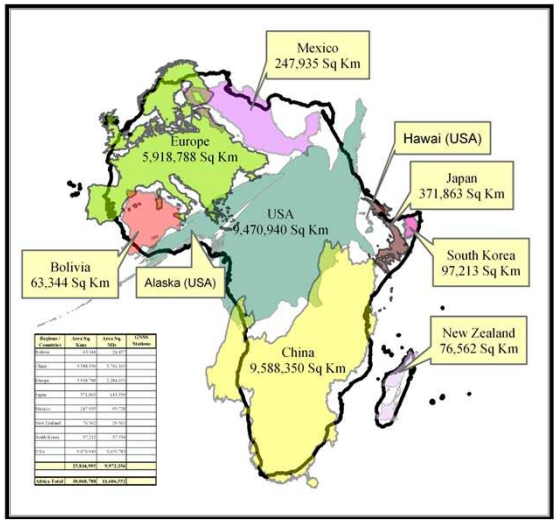


Nigerian NIGNET CORS (Edozie and Adebomehin, 2013)

State of Osun CORS Antennae

State of Osun CORS Receiver

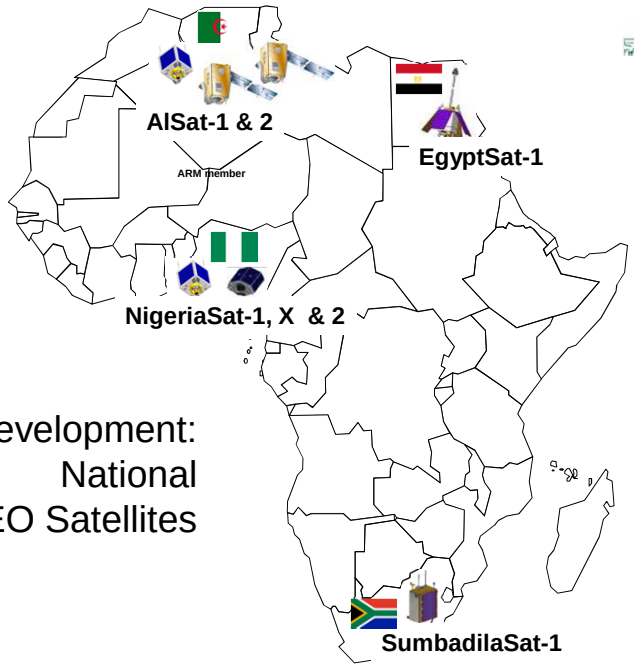
Relative Indication of GNSS Station Requirement for Africa



(Courtesy: Ezigbalike/ECA/ISTD/GiSS)

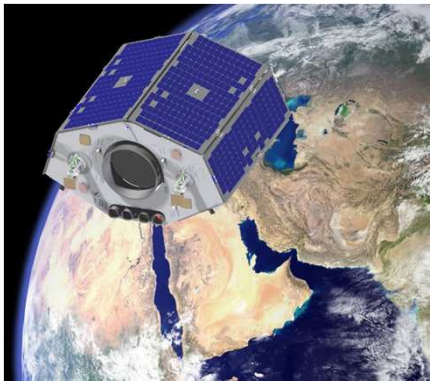
Development in SST

SST development:
National
EO Satellites



SST: NigeriaSat-2

NigeriaSat-2 over Africa



Salt-Lake Runways from NigeriaSat-2

http://www.sstl.co.uk/news-and-events

SST: NigeriaSat-X

A Nigerian Engineer working on NigeriaSat-X

1st Image of NigeriaSat-X over Auckland

http://www.sstl.co.uk/news-and-events

SST….. African Resources Management Satellites constellation

- ARMS constellation – aimed at:
  - Building on indigenous knowledge to develop and transfer satellite technology;
  - Developing African human resources by means of joint participation and knowledge sharing; and
  - Providing Africa with rapid, unrestricted and affordable access to satellite data thereby ensuring effective indigenous resource management in Africa by Africa.
- MoU signed by 4 countries: Algeria, Nigeria, Kenya & South Africa
- GEO-guided proposal for AfricaGeoSat with 25m resolution XS and daily revisit.

SST…. Communication Satellites

- Egypt, Morocco, Nigeria
  - ICT
  - Telemedicine
  - Tele-education
  - Tele-centres
  - Can bring down price of telecommunication services in African countries

SST…. African participation in GEO

- 15+ African countries (Algeria, Cameroon, Central African Republic, Republic of Congo, Egypt, Guinea-Bissau, Mali, Mauritius, Morocco, Niger, Nigeria, South Africa, Sudan, Tunisia and Uganda)

  => but only few are active!!
- AARSE, EIS-Africa & UNECA (ISTD-GIS) as participating organizations
- A number of African experts are contributing to various GEO WGs pertaining to the 9 GEO Societal Benefits

Land Reform Programme

- Systematic country-wide land registration
- Use of innovative low-cost methodology
- Also contributing to AFREF

New Trends

- Cloud computing: processing and storage in the cloud.
- Increased availability of efficient FOSS.
- Use of global datasets to generate appropriate fundamental datasets at cheaper rates
- Appropriate use of VGI / Community mapping/ crowd sourcing for continuous data updating
- Modern mapping technology such as LiDAR (Light detection and ranging), UAS (Unmanned Aerial System), etc.
- 3D (geometry and topology) GIS implementation: 3D Cadastre, 3D City Models, etc

2. Geoinformatics education and training requirements

Three Levels of Capacity Building (Georgiadou and Groot, 2002)

	PURPOSE	FOCUS
CAPACITY BUILDING FOR GEOINFORMATICS	Human resources development	Supply of technical and professional personnel
	Organizational strengthening	Strengthening the management capacity of organisations; institutionalise geo-ICT solutions (systems and processes(as well as strategic management principles
	Institutional strengthening	Strengthen the capacity of organisations to develop & negotiate appropriate mandates and modus operandi as well as appropriate (new) legal and regulatory frameworks

Levels of Education & Training Requirements

- High-level policy-makers e.g. Thro', short-term workshops
- Management and Professional staff: Well-educated new professional/management cadre employees plus opportunity for life-long learning
- Technical Support Staff: Well-educated technicians and technologists plus opportunity for life-long learning.
- General Public: through mass media and public lectures, to sensitise the public on the benefits derivable from GIS and GI production

Existing Human Capacity Development Institutions & Organisations….

- Universities and Polytechnics offering courses at diploma, first degree and postgraduate levels – e.g. 13 Universities offering Surveying & Geoinformatics education in Nigeria apart from many more Geography departments running RS & GIS postgraduate education.

- Organisations/Professional Networks that regularly organise conferences and workshops such as: AARSE, EIS-Africa and African Leadership Conference on Space Science and Technology; also such national networks.

Existing Capacity Development Institutions & Organisations…/2

- Regional Centres: RECTAS (a bilingual Centre – English & French, offering education and training programmes at technical and postgraduate levels), RCMRD (short-courses & project training), AOCRS (networking), ACMAD (weather-related courses/projects), ARCSSTE-E (postgraduate courses in SST [English]), CRASTE-LF (postgraduate courses in SST [French]), AGRHYMET (short-courses/project training in French);

- National specialised institutions offering regular and/or short-term training programmes in GI, such as: CRTS (Morocco), CSE (Senegal), CERSGIS and Ghana School of Surveying and Mapping (Ghana), Federal School of Surveying (Nigeria)

BUT…..

…… there are challenges!!!!!

Although human capacity in geoinformatics is improving in Africa but the quantity, quality and utilisation are still low due to a lot of challenges

3. Challenges

- Obsolete curricula and facilities
- Continued use of obsolete production techniques in production organisations
- Difficulty of releasing many officers for long-term training
- Lack of intra-campus cooperation
- Lack of financial resources for overseas training
- Absence of uniform academic standard and lack of networking
- Lack of provision for continuing education and training
- Inadequate enabling technologies
- Insufficient capacity utilisation and knowledge transfer
- Fast evolution of technology

4. Achieving the Capacity Needs …which way?

- Face-to-face, on-campus based
- e-Learning and Web-based Distance Education
- Cross-border (Joint) Education Programmes

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Face-to-face, Single campus based?

- Universities, Polytechnics & Specialized institutions
- Universities & Polytechnics: mainly production of new graduates.
- Specialized institutions: mainly manpower development of serving officers.
- More flexibility in specialized institutions - continuing education of serving officers through short courses that are part of the regular programmes.

➢ Challenges:

- The fresh graduates require further training before productive work.
- In some countries, geoinformatics departments face threat of being closed down due to lack of equipment and personnel to meet accreditation standards.

Can e-Learning help?

- Web-based distance learning, video conference, but ….. Many challenges to overcome at the moment:
- low human capacity in ICT
- low density of ICT
- narrow internet bandwidth, and
- But improving fast & should be encouraged

Joint (Cross-border) Education?

- A very viable solution, building on strengths of partners, sharing costs:

Cross-border education: Advantages…..

- Regular update of curriculum including staff and student exchange programmes.
- ….facilitates increased critical mass of manpower in LDCs.
- Part (& later whole) training in the home partner institution & shorter stay Overseas thus at least 2 persons at the cost of training 1.
- Multiplier effect resulting from the trainers training the others in their institutions

Cross-border Education: Advantages….

- Skilled, fresh graduates
- Retraining existing personnel
- Significant savings in foreign exchange
- Well-equipped consultancy services for IGR: fund for further development

Cross-border education: implementation models

(National Universities Commission NUC, Nigeria)

- Twinning/Articulation: foreign university collaborates with home university to offer courses, enrich curricula content and pedagogy and/or offer joint/dual degrees.
- Branch Campus: Foreign university uses home country's standing procedure to establish a replica of its campus in the home country.
- Open & Distance Learning (ODL): in accordance with home country's guidelines for open & distance learning.

Cross-border education programmes at different levels

- Master of Science course with a duration of 18 months;
- Professional Master or Post-Graduate diploma course with duration of 12 months;
- Short term refresher courses; and
- PhD by sandwich

5. BUILDING ON EXISTING HUMAN CAPACITY: SOME PROPOSALS

Proposals for building on existing capacity

- Inventory of existing educational and training institutions offering geoinformatics and related courses in Africa including the curricula, staff capacity and existing training facilities.
- Strengthening of the institutions to enable each country to have capacity for research and development.
- .Development of unified and standardised geoinformatics curricula.

Proposals for building on existing capacity…/2

- Implementation of modular cross-border GI education (north-south and south-south) and web based education/e-learning.
- Participation of African GI capacity building Institutions and Organisations in the related activities and tasks of International Organisations such as ISPRS, GEO, GSDI and FIG to facilitate quick uptake of resulting capacity building innovations that may emanate from the activities.

Proposals for building on existing capacity…/3

- Establishment of an *African Network of Geoinformatics Education* comprising of African universities, regional centres and polytechnics to facilitate joint education, research and training programmes thereby sharing facilities and promoting greater access to the latest geoinformatics technology.
- Encouragement of in-country execution of mapping and other GI-related projects and inclusion of “Local Content” clause in national mapping and geoinformation policies to nurture indigenous talent and facilitate technology transfer.

Proposals for building on existing capacity…/4

- Involvement of indigenous private sector in the production and management of geospatial data through job outsourcing and public-private sector partnerships to create job opportunities for fresh graduates.

- Encouragement of utilisation of regionally owned communication satellites through special pan-Africa price regime to contribute to appreciable increase in the density as well as the bandwidth of Internet services for efficient delivery of web-based education and e-Learning.

Thank you !