Developing Spatial Data Infrastructure (SDI) in Africa: A cooperative Geospatial information Management process

United Nations Economic Commission for Africa

ICT and Sciences & Technology Division (ISTD)

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E-Applications Section

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Outlines

- Why Geographies
- Why Spatial Data Infrastructures
- What SDI is about
- Africa's Vision : ARSDI
- Priorities & Strategies
- Challenges & Conclusions

Why we need Geographies

Need for complex Information

Food Security	Land cover, soil, topography, hydrography, rainfall, moisture, demographics, infrastructure, yield, production..
Water Supply	Hydrography, topography, aquifers, waterbodies, land cover, soil types, vegetation, rainfall…
Resources Management	Ecosystems, biodiversity, vegetation, land cover, soils, water, wetlands, biomass…
Drought	Rainfall, temperature, evapo-transpiration, wind, aerosols…
Security and Emergency	Land cover, soil chemistry, topography, geology, utilities, settlements, transport infrastructure….
Health Planning	Hospitals locations, settlements and demographics, disease vectors, environmental factors distribution…
Etc..	Etc..

- All the information products exemplified would not be complete without the location attribute
- They need to be localized:
  - Where are the features located?
  - Where are the population involved in an activity, vis-à-vis location of the activity?
  - Who will benefit from an activity or event ? Or at risk? Where are they?
  - Where are the markets for the products? The input factors?
  - Where are the infrastructure elements, utilities, etc?
  - What areas are suitable (or unsuitable) for specific activities or events?
  - How do we move (people, products, services) from source to destination?

Why Spatial Data Infrastructures ?

- **Unlock the hidden potential in the data**
  - Arrange for widest possible dissemination of available information
- **Produce Once use Many Times**
  - Shift from mapping as standalone activity to mapping as component of information management
  - Move beyond single agency needs to community needs : No single agency can satisfy its geographic data needs on its own - Data collected for one purpose can be used for other purposes
- **Make information available** to decision makers and the community when they need it; where they need it; In a form they can use (almost) immediately
  - Empower users to do as much as possible by themselves
  - Put in place policies, resources and structures

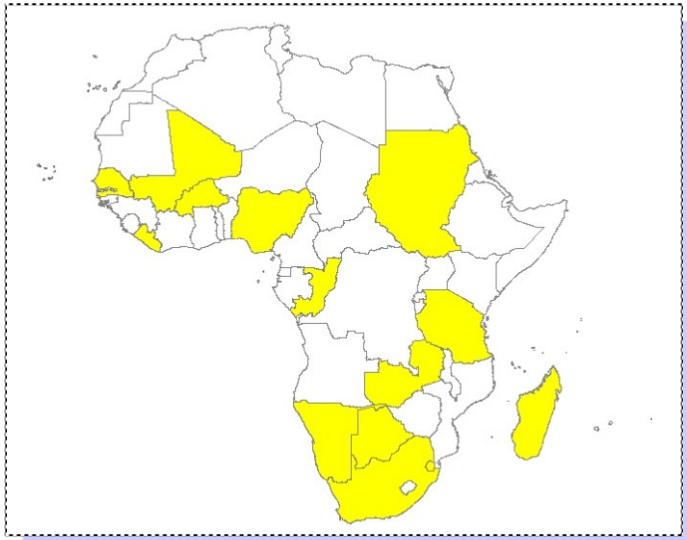
Spatial Data Infrastructure (SDI)

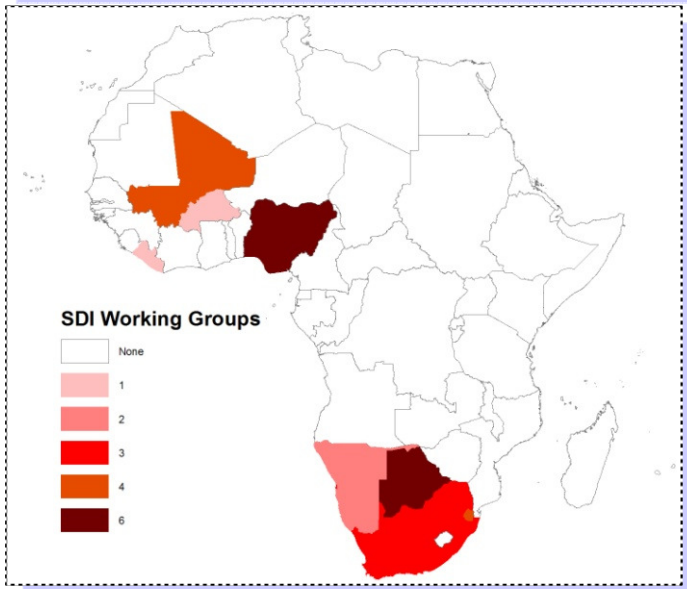
Critical mass of processes, policies, standards, enabling technologies, mechanisms and key datasets required to make geospatial data readily available to the growing community of end-users

GSDI -- The SDI Cookbook (version 2.0)

SDI Africa : National Governance

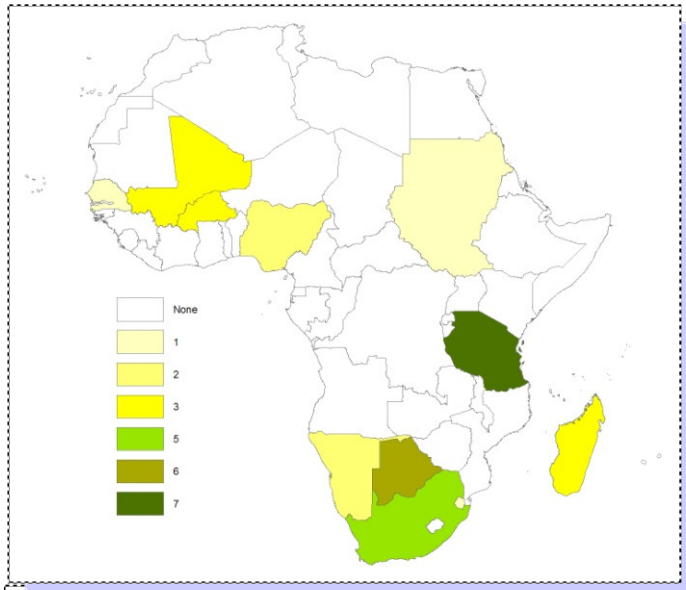
14 Countries with SDI Coordinating Bodies	**Botswana, Burkina, Congo, Liberia, Madagascar, Mali, Namibia, Nigeria, Senegal, South Africa, Sudan, Swaziland, Tanzania, Zambia**
9 Countries with SDI Committee, Sub-Committees, Working Groups	Botswana, Burkina, Liberia, Mali, Namibia, Nigeria, South Africa, Swaziland, Tanzania.

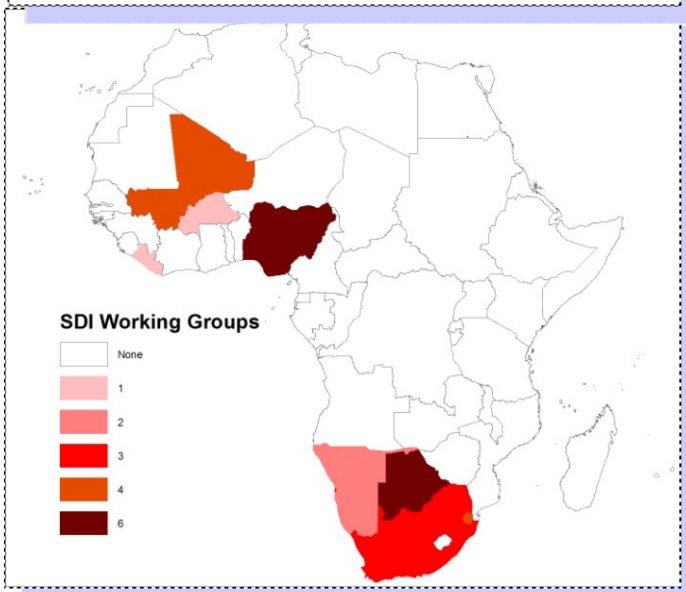




SDI Africa : National Implementation

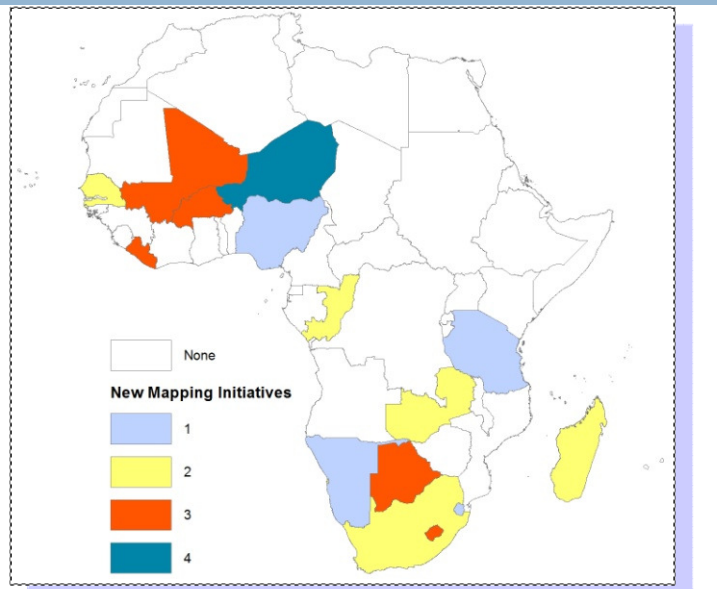
At least 1 Meeting held in a year	**Botswana, Burkina, Madagascar, Mali, Namibia, Nigeria, Senegal, South Africa, Sudan, Tanzania**
13Countries with Geographical Names Authority	Botswana, Burkina, Congo, Liberia, Madagascar, Mali, Namibia, Nigeria, Senegal, South Africa, Sudan, Tanzania, Zambia

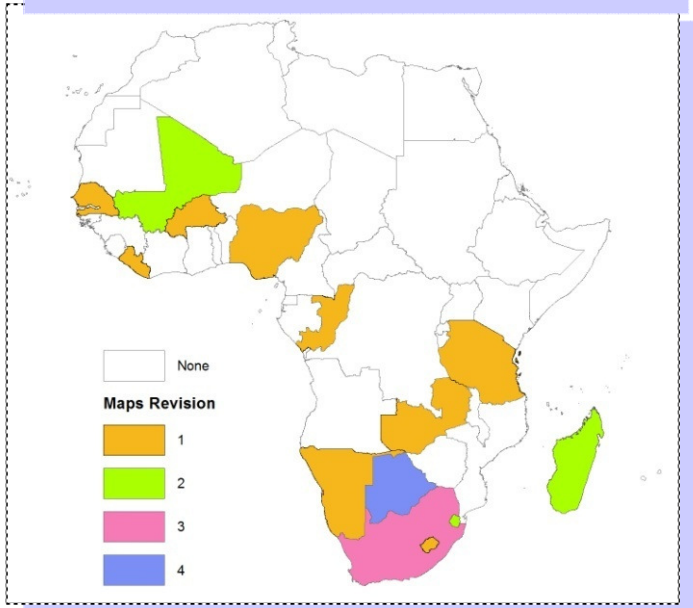




SDI Africa : Maps Revision

16 Countries with New Mapping Initiatives	**BBotswana, Burkina, Congo, Lesotho, Liberia, Madagascar, Mali, Namibia, Niger, Nigeria, Senegal, South Africa, Sudan, Swaziland, Tanzania, Zambia**
15 Countries with Maps Revision	Botswana, Burkina, Congo, Lesotho, Liberia, Madagascar, Mali, Namibia, Nigeria, Senegal, South Africa, Sudan, Swaziland, Tanzania, Zambia



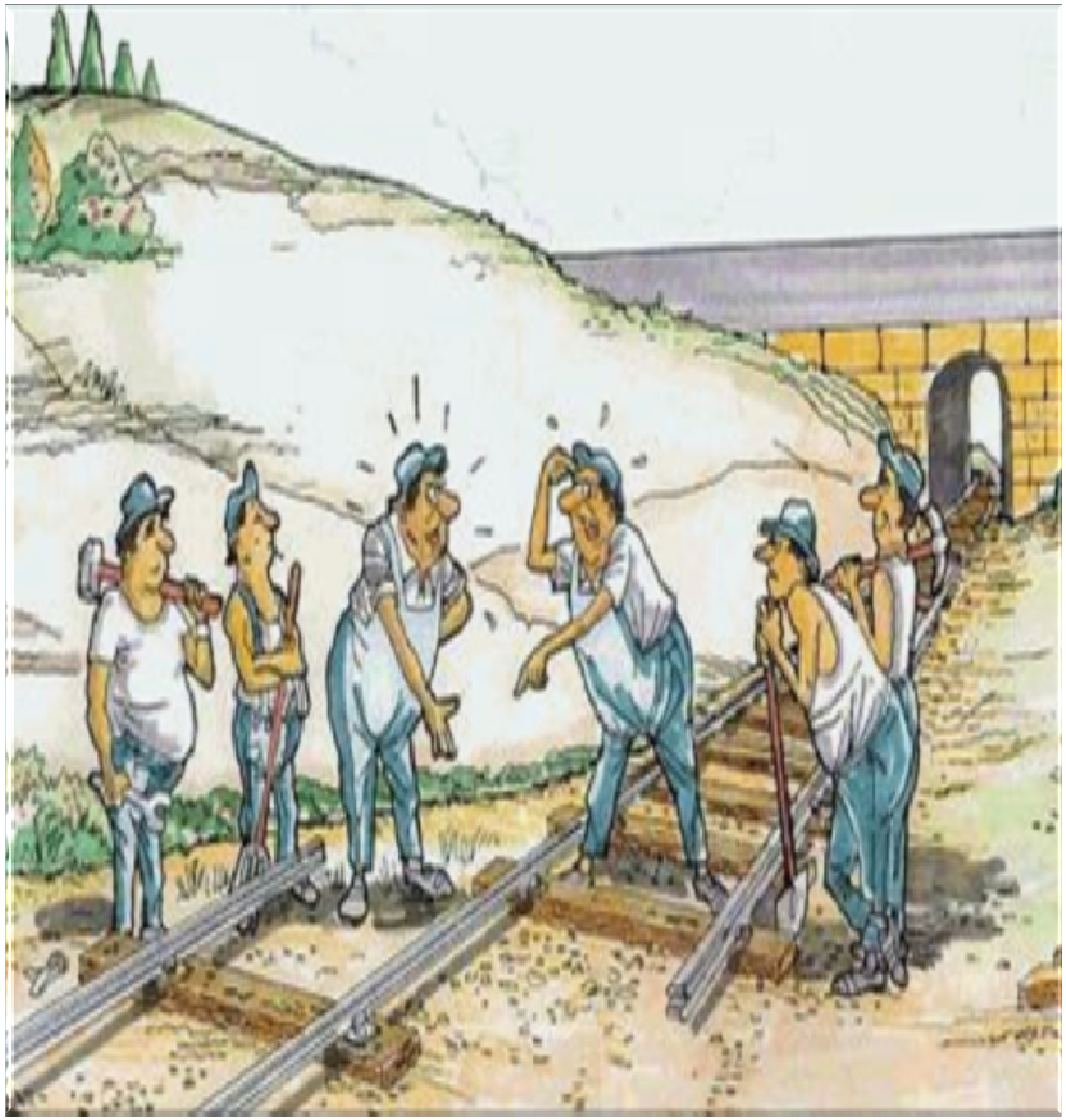


Let's Assume we do not have yet…

- … functional "SDIs" in Africa.
  - *The technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data*
- What should we do?

The African Regional Spatial Data Infrastructure

- **ARDSI Paradigm**
- Adopt cooperative, multi-stakeholder approach to production, management, and dissemination of spatially enabled data: Regional and National level
- Improve regional scale development decision-making
- Ensure that reliable information is easily available for policy, investment, planning, management and monitoring and evaluation purposes at the regional and sub regional scales:
  - Infrastructures, Agriculture, Environment, Health, Biodiversity, etc…
  - They all need to answer "where" questions from a regional perspective



Definition of Fundamental Geospatial Datasets for Africa

Data Theme	Data Set
Geodetic Control Network	Geodetic control points
	Height datum
	Geoid model
Rectified Imagery	Aerial photography
	Satellite imagery
Hypsography	Digital elevation model
	Spot heights
	Bathymetry
Hydrography	Coastline
	Natural water bodies
Boundaries	Governmental units
	Populated places
	Enumeration areas
Geographic names	Place Names
	Feature Names

Data Theme	Data Set
Land management units/ areas	Land Parcels/Cadastre
	Land Tenure
	Street Address
	Postal or zip code zones
	Land use planning zones
Transportation	Roads
	Road centrelines
	Railways
	Airports and ports
Structures	Bridges and tunnels
Utilities and services	Power
	Telecommunications
Natural environment	Land cover
	Soils
	Geology

Creation of Regional Databases

- Geospatial databases for regional use
- Infrastructures Development Database (Energy, Transport, Telecommunication…)
- African Climate Policy Development Database
- Agriculture Commodity Value Chain Database
- Disasters and Security Preparedness Database

Optical Fiber Network in Africa

Economic Commission for Africa

Legend

☆ Capital cities

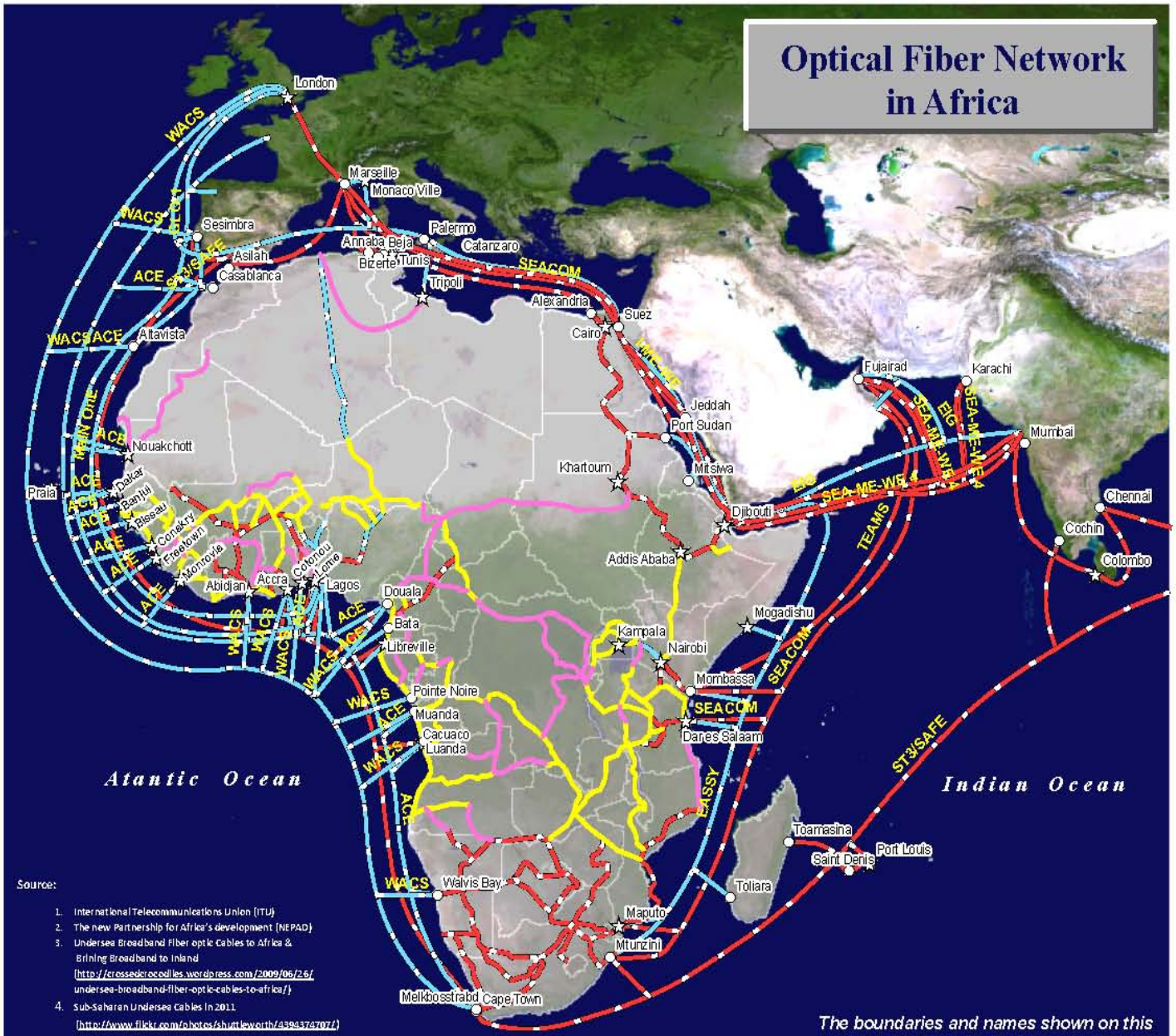
○ Other cities

Fiber Optic Cables

- Existing
- Ongoing
- Planned
- Proposed

Name	Length/Kms	Capacity
SEACOM	13,700	1.28Tb/s
EASSY	10,000	1.40Tb/s
TEAMs	4,500	1.20Tb/s
WACS	14,000	1.84Tb/s
MainOne	7,000	1.92Tb/s
GLO-1	9,500	0.64Tb/s
ACE	14,000	1.92Tb/s
I-ME-WE	13,000	3.84Tb/s
EIG	15,000	3.84Tb/s

Tb/s: Terabytes per second



Source:

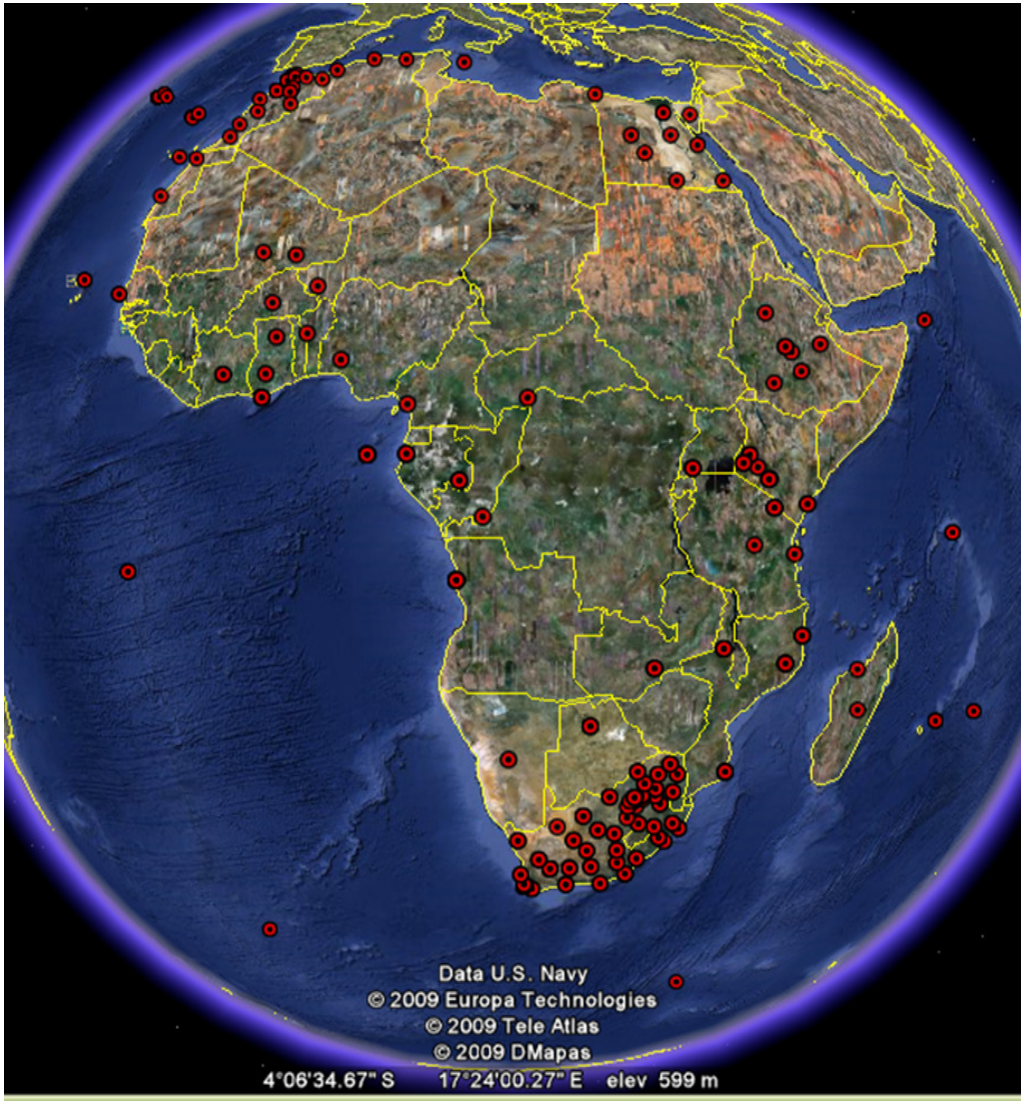
1. International Telecommunications Union (ITU)
2. The new Partnership for Africa's development (NEPAD)
3. Undersea Broadband Fiber optic Cables to Africa & Brining Broadband to Inland [http://crossedcrocodiles.wordpress.com/2009/06/26/undersea-broadband-fiber-optic-cables-to-africa/]
4. Sub-Saharan Undersea Cables In 2011 [http://www.flickr.com/photos/shuttleworth/4399374707/]

Map Prepared by: Information and Science and Technology Division / e-Application Section, March, 2010

The boundaries and names shown on this map DO NOT imply official endorsement or acceptance by the United Nations

Development of Interoperability & Standards: The Common Geodetic Reference (AFREF)

- Network of permanent GNSS base stations (CORS) covering the whole continent
- At least one in every country
- Eventually, everywhere in Africa less than 1000 km from a base station.
- Salient Features
  - 5 GPS CORS Stations installed in African Sub regions
  - 30 GPS Reference Stations to be installed
  - On-going inventory of existing and planned GNSS base stations in African countries
- http://geoinfo.uneca.org/afref/



Development of Interoperability & Standards: The Harmonized Administrative Boundary

- **Second Administrative Level Boundary (SALB)**
- Produce a comprehensive digital database of Second Administrative Level Boundaries
- Provide a flexible and intuitive coding scheme that can be applied to any country, independently from administrative structure.
  - an international borders template developed by the UN Cartographic Section in order to be able to create a global data set that is cross-boundary
  - an editing protocol in order to insure the comparability between the countries
  - a coding scheme for the identification of each administrative unit through time and space
  - a metadata profile that is associated with the information
  - a validation process of all the information by an official entity (generally the National Mapping Agency.
- www.salb.org

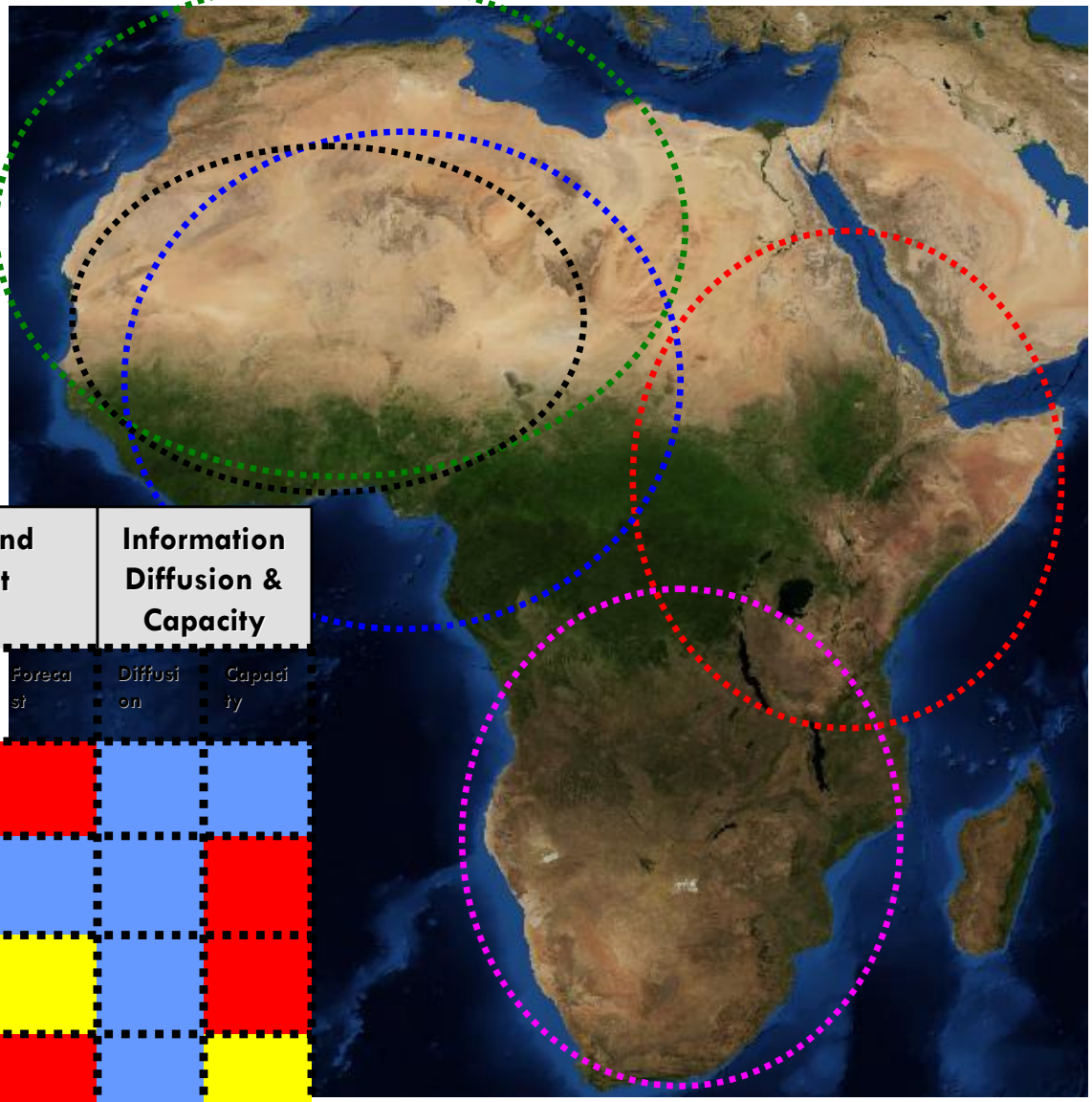
African Status : Infrastructures – Enabling Environment

- **Existence of many Operational Centres of Excellence**
  - AGRHYMET
  - RECTAS
  - RCMRD
  - RSAU
  - CRASTE
  - National Agencies

Yes

Yes/No

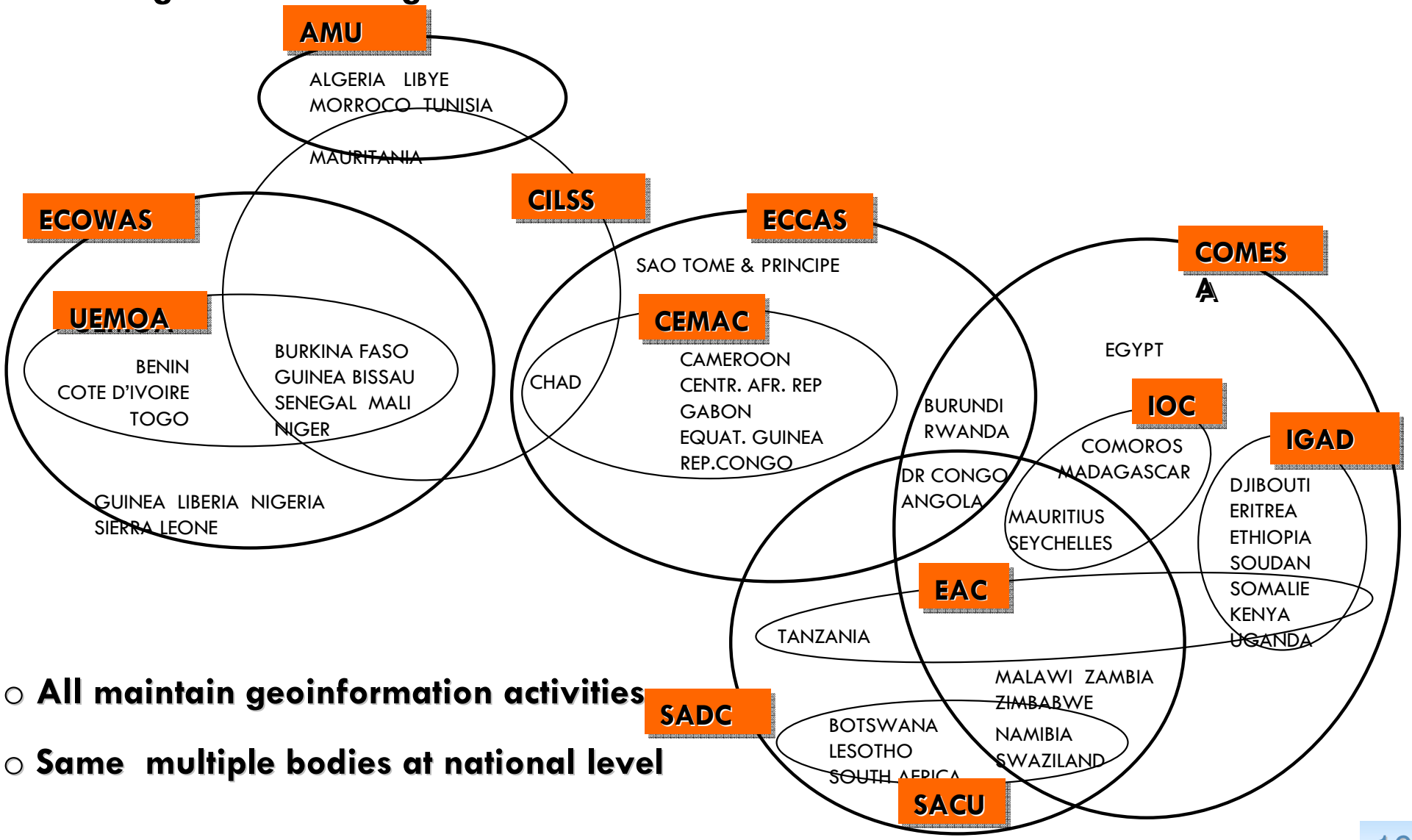
No



	Data collection, accessibility and integration			Monitoring and Assessment			Information Diffusion & Capacity	
Institutions	Collection	Access	Integration	Assessment	Monitoring	Forecast	Diffusion	Capacity
AGRHYMET								
RSAU								
CRTEAN								
RCMRD								

Institutional Capacity

- **Partnering Numerous Regional and Continental Bodies**



- **All maintain geoinformation activities**
- **Same multiple bodies at national level**

Geoinformation Governance in Africa

- **Institutional Frameworks**
  - **Objective**
    - To put in place a cooperative, multi-stakeholder approach to production, management, and dissemination of spatially enabled data: Regional and National level
  - **Committee on Development Information, Science and Technology (2-5 May 2011 in Addis Ababa, Ethiopia)**
    - ECA's parliamentary body to provide technical advice on, and oversight over the information science and technology including Geospatial Science (GSS) and Geospatial Information Technology (GIT).
    - Open to delegates from government and various observers
  - **CODIST-Geo Executive Working Groups :**
    - Fundamental Datasets, AFREF, Capacity Building, Standards

Networking with Others SDIs….

- United Nations Spatial Data Infrastructure (UNSDI) coordinated by the UN Geographic Information Working Group (UNGIWG)
  - Vision for comprehensive, decentralized geospatial information framework that facilitates decision-making at various levels by enabling access, retrieval and dissemination of geospatial data and services in a rapid and secure way
  - UNSDI initiative recognizes common interests with national, nongovernmental and multilateral development efforts
    - Coordination of activities and services
    - ECA role in coordinating African countries
    - ARSDI therefore overlaps with UNSDI in content and methodology

Strategies and Priorities

- **Strategy…** Indigenous African capabilities
  - Coordinate with other regional bodies a continental vision to foster the development of an indigenous African capability in Geospatial Science and Technology where all the technical capacities are maintained and shared by Africans.

- **Priorities…** African Holistic Geoinformation Vision
  - Build an African Geospatial policy and champion sound research and technology programmes development, where activities will be significantly expanded to cover the fostering of innovation, product and service development, and applications (linking global to local, based on prevailing social, economic and technological realities in the continent)

Contacting Us

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  - http://geoinfo.uneca.org/sdiafrica/
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