Application of Geospatial technology for the collection of Environment Statistics

Andre Nonguierma
ECA/ISTD
Geoinformation Systems Section (GiSS)

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Outline

- Spatially-enabled Statistics
- Issues in Africa
- Geospatial Technologies insight
- Database building
- Indicators Portfolio
- From Data to Indicators
- Geospatial data infrastructure
- Challenges
- Conclusions

Spatially-enabled statistics

- Arguing that 80% of all human decisions involve a "where?" question
  - Location affects nearly everything we do in life: we choose where to build homes, where to eat, where the nearest hospital is in case of emergency, etc…
  - Location is also at the heart of some of the world's most pressing problems: immigration, poverty and starvation, environmental degradation, crime and security, natural hazards and disasters….

Spatially-enabled statistics

- Because we also…
  - Need to visualize complex social, economic and environmental indicators in a form of map
  - Need to provide various "what if" planning scenarios results in quantitative measures that allow developers, planners, and community groups to feel greater comfort with the ultimate design decision.

Environment Statistics imply…

- Knowledge, which is represented by using and analysing a series of information sets.
- Information, that are the sum of our interpretation and synthesis of data sets
- Data are the description or/and measurements of objects or phenomena.
  - We cannot provide relevant information without fundamental datasets as well as the interrelationships between these datasets, the management of them, and the means of accessing and distributing those data.

Issues in Africa…

- In Africa, the major source for statistical data is the National Statistics services, which conduct regular censuses, economic and household surveys.
- Environmental data are collected and maintained by specialized technical agencies, such as geological services, environmental protection authorities, etc.

Issues in Africa…

- Nexus issues in sustainable development and achieving millennium development goals require that all data sets be integrated.
- The nature of the issues further requires that they be presented in their spatial context

Geospatial Technologies insight

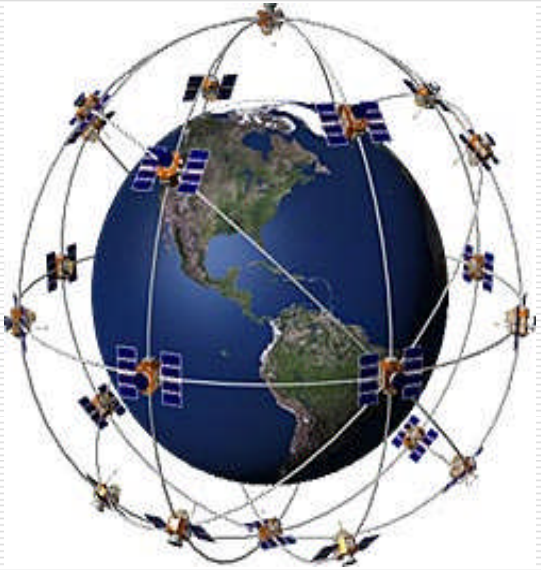
- Geospatial technologies provide the means to integrated these diverse datasets on the basis of their spatial attribute thereby allowing for holistic analyses.
- They also make it possible to observe environmental data in hard-to-reach places making accurate and timely spatially distributed data readily available.

Geospatial Technologies

- Geospatial technologies refer to all the means used for the measurement, analysis, and visualization of features or phenomena that occur on Earth. They include three different technologies that are all related to mapping features on the surface of Earth:
  - Global Positioning Systems (GPS)
  - Geographical Information Systems (GIS)
  - Remote Sensing (RS)

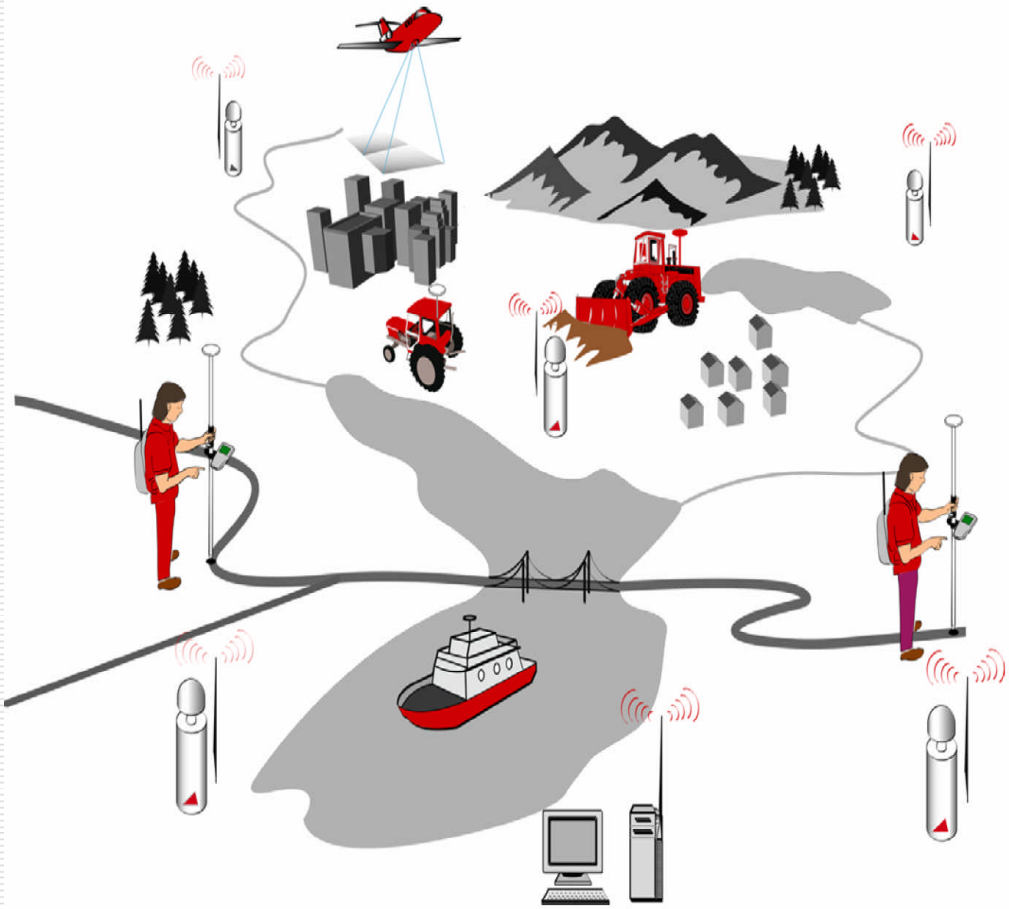
Global Positioning Systems (GPS)

- The Global Positioning System (GPS), is a network of two dozen satellites in medium Earth orbit, transmitting signals allowing GPS receivers to determine the receiver's location, speed and direction.
- Since 1978, GPS has become an indispensable aid to navigation around the world, and an important tool for map-making and land surveying.



GPS : Applications

- Geodetic control for surveying, engineering, mapping...
- Monitoring the Earth's crust, natural and man-made structures
- Cadastre survey
- ...



PS reference stations and networks support all types of users and applications

Geographic Information Systems (GIS)

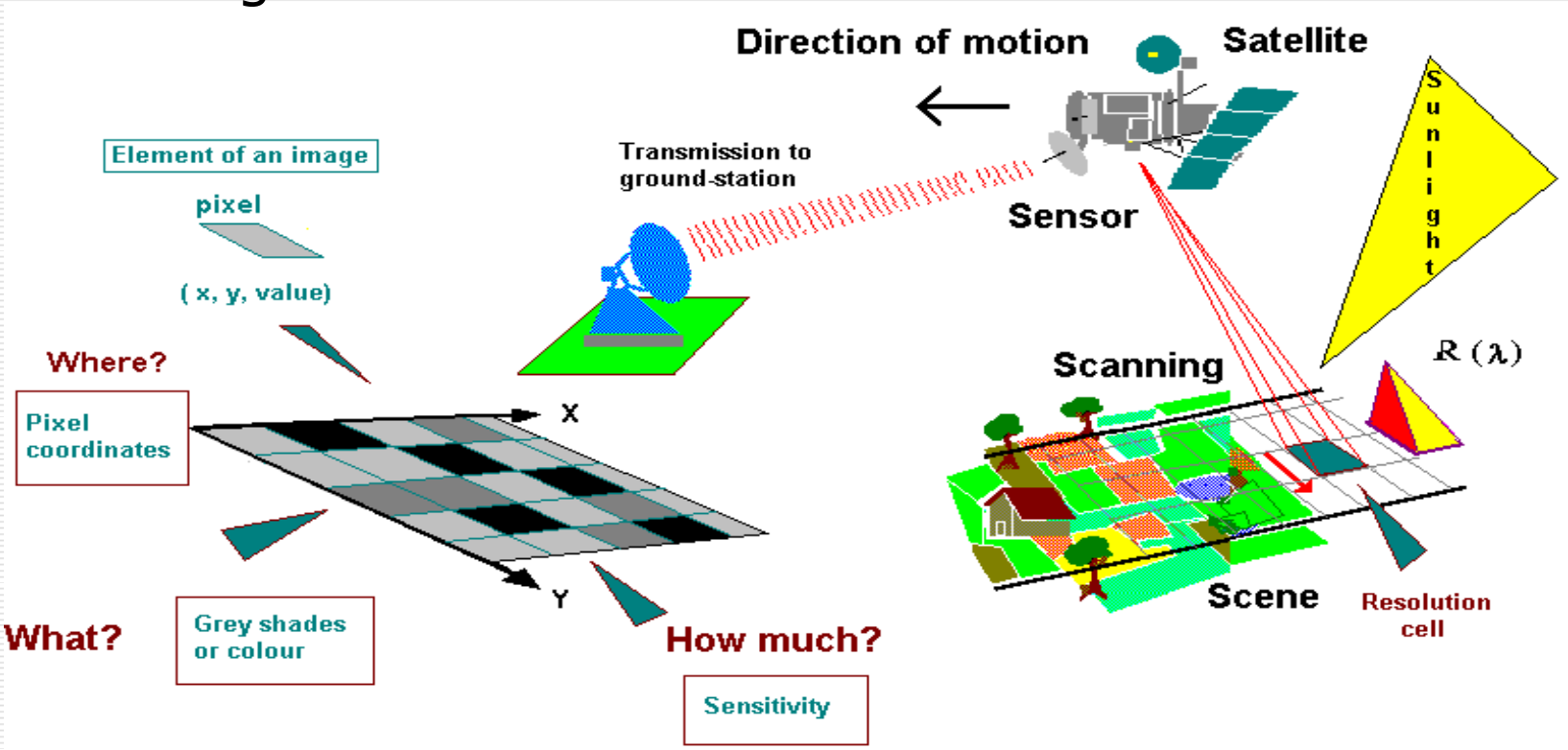
- A system for capturing, storing, checking, integrating, processing, analyzing and representing data which are spatially referenced to the Earth… (*Chorley, 1987*)
- All the data and information products exemplified would not be complete without the location attribute
- They need to be localized : Whatever we do, whatever happens, happens somewhere…
  - Where are the input factors?
  - Where are the population that will benefit? Or at risk?
  - Where are the markets for the products?
  - Where are the infrastructure elements, utilities..
  - How do we move (products, services) from source to destination?
  - Where are suitable area (or unsuitable) for specific activities?

GIS: Applications
Getting there without getting lost

- **Lands : Agriculture and food security**
  - **Land cover, soil types, topography, hydrography, rainfall, demographics, infrastructure, Suitability maps, yield statistics, etc**
- **Health**
  - **Hospitals locations, settlements and demographics, disease vectors, environmental factors distribution, infrastructure, etc.**
- **Education**
  - **Schools locations, demographics, infrastructure & utilities, etc.**
- **Housing**
  - **Demographics, infrastructure & utilities, topography, building materials, etc.**
- **Water Supply**
  - **Hydrography, aquifers & ground water, topography, etc.**
- **Mining & Minerals**
  - **Land cover, soil chemistry, topography, rock formations and physical properties, etc.**
- **Infrastructure Development**
  - **Demographics and settlements, socio-economic establishments, topography, hydrography, soil types, etc**

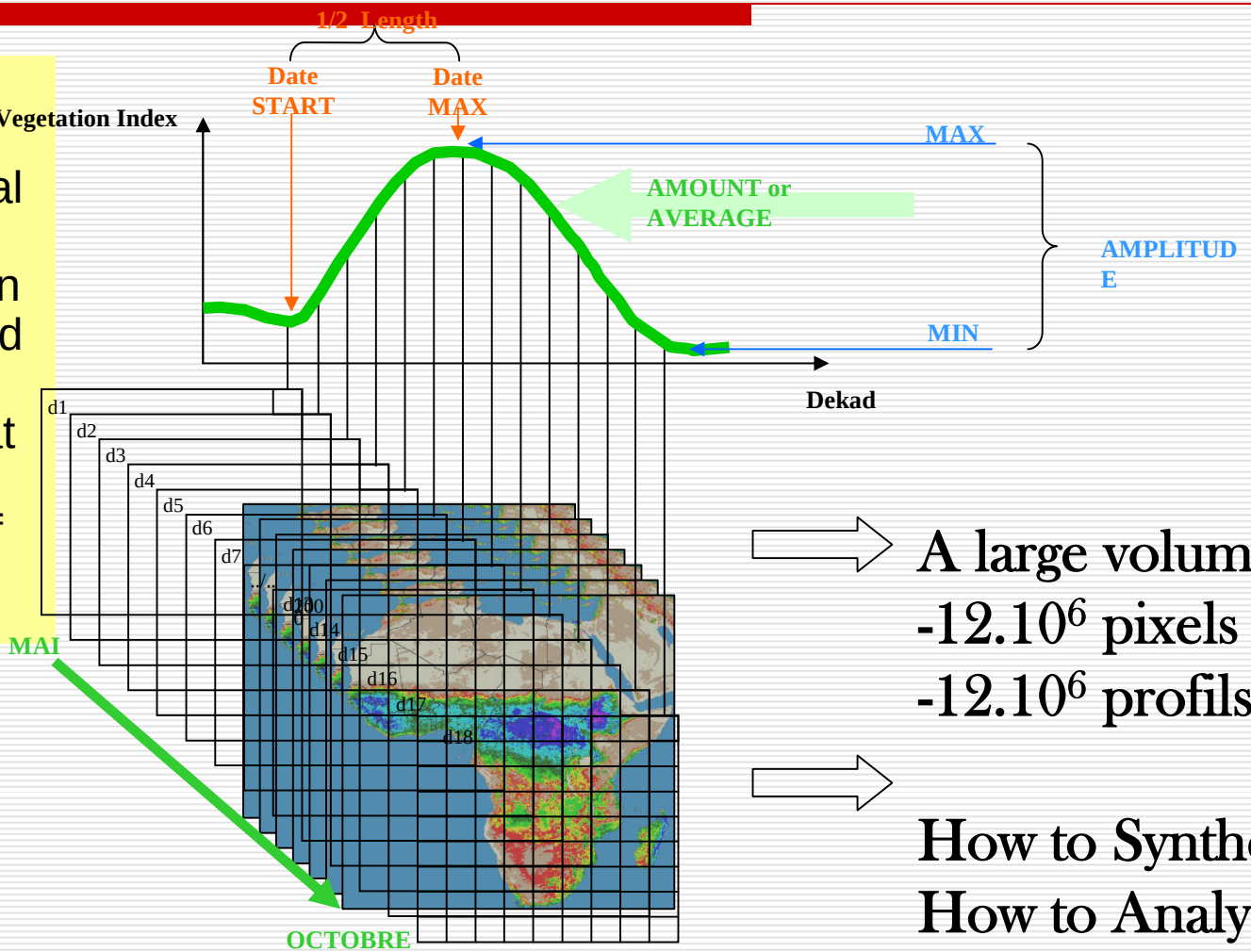
Remote Sensing (RS)

- Science and Technics of obtaining information about a phenomenoa without being in contact with it



RS: How data is provided

- Data is provided in a digital format which can be viewed and manipulated on a variety of software systems



A large volume of data
-12.10^6 pixels *36 dekads
-12.10^6 profils.

How to Synthesize ?
How to Analyse ?

RS : Applications

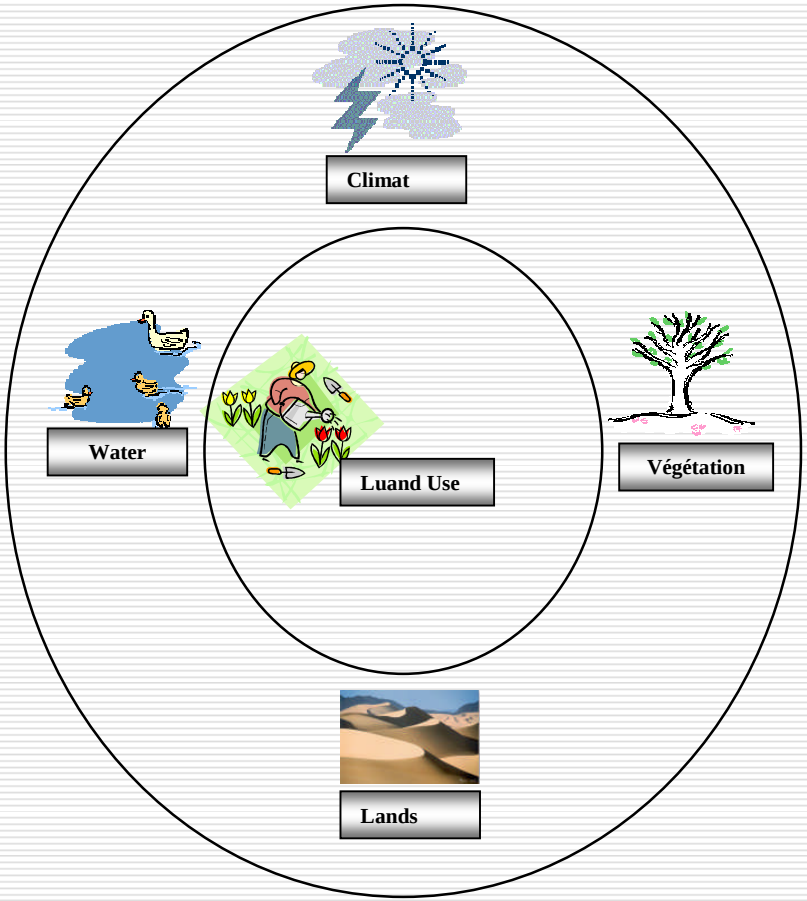
Agriculture, Forestry, and Range Resources	Land Use and Mapping	Water Resources	Coastal Resources	Environment
Discrimination of vegetative, crop, and timber types, and range vegetation	Classification of land uses	Determination of water boundaries and surface water areas	Determination of turbidity patterns and circulation	Monitoring environmental effects of man's activities (lake eutrophication, defoliation, etc.)
Measurement of crop and timber acreage	Cartographic mapping and map updating	Mapping of floods and flood plains	Mapping shoreline changes	Mapping and monitoring of water pollution
Estimating crop yields	Cartegorization of land capability	Determination of areal extent of snow and ice	Mapping of shoals and shallow areas	Determination of effects of natural disasters

RS: Applications

Agriculture, Forestry, and Range Resources	Land Use and Mapping	Water Resources	Coastal Resources	Environment
Forest harvest monitoring	Monitoring urban growth	Measurement of glacial features	Mapping of ice for shipping	Monitoring surface mining and reclamation
Determination of range readiness and biomass	Regional planning	Measurement of sediment and turbidity patterns	Tracing beach erosion	Assessing drought impact
Determination of soil conditions and associations	Mapping of transportation networks	Delineation of irrigated fields	Tracing oil spills and pollutants	Siting for solid waste disposal
Assessment of grass & forest fire damage	Mapping of land-water boundaries	Inventory of lakes		Siting for power plants and other industries
Wildlife habitat assessment	Siting for transportation and transmission routes	Estimating snow melt runoff		
	Flood plain management			

Which Data can we collect?

- RS is more relevant for a regional approche where we are interested by average characteristics of phenomena
  - Land use and Land Cover : Change detection, Assessment of land tenure
  - Vegetation : Dynamics and Seasonality
  - Lands : Degradation and Risk area
  - Water : Seasonal characteristics, spatial determinism
  - Atmosphere : Weather…



RS: Indicators Portfolio

Thematic	Lead Indicator(s)	Coverage
Socio Economic	Health Facilities,	Local
	Education Infrastr.	Local
	Population Density	Local
Land	Agriculture Land	Gobal to Local
	Forest Area	Gobal to Local
	Urban Area	Gobal to Local
	Land Degradattion	Gobal to Local

RS: Indicators Portfolio

Thematic	Lead Indicator(s)	Coverage
Vegetation	Area of forest and woodland	Gobal to Local
	Dry Matter Productivity	Global
	Cover	Gobal to Local
Atmosphere	Pluviometry	Global
	Temperature	Global
	ETP	Global
	Albedo	Global
	Global Change	Global

RS: Indicators Portfolio

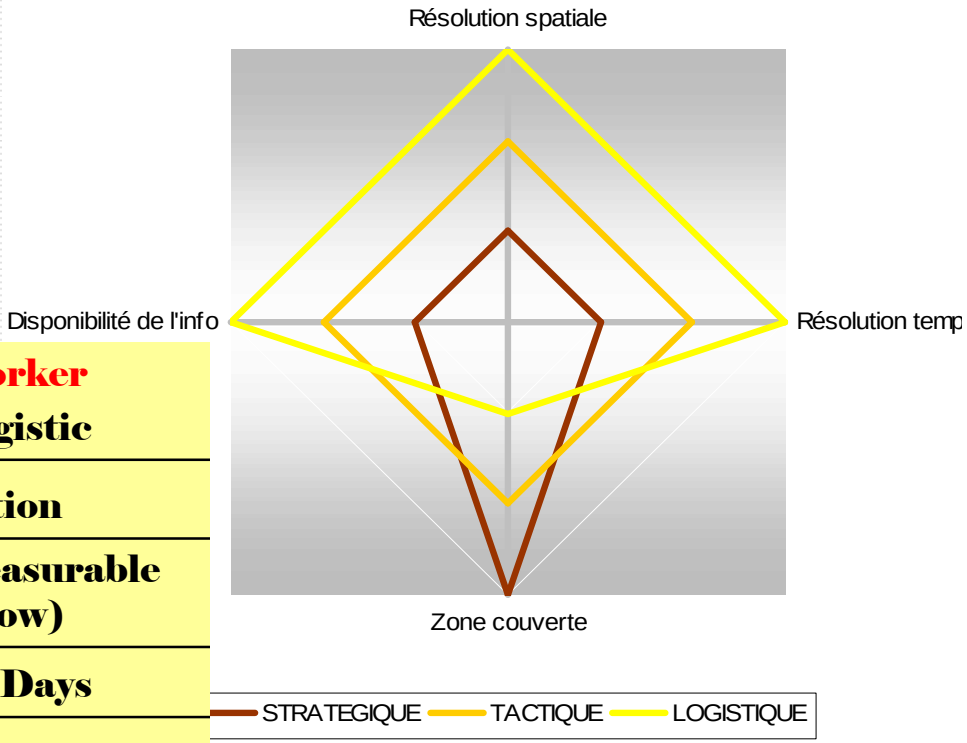
Thematic	Lead Indicator(s)	Coverage
Coastal and marine	Water quality	Global
	Coastal Pollution	Global
	Littoral degrdation	Global
Biodiversity	Protected areas	Global to Local
	Wetlands area	Global
Natural disasters	Invasives species	Global
	Flooding	Global
	Earthquake	Global
	Volcanic activities	Global
	Fires	Global

Defining the type of information

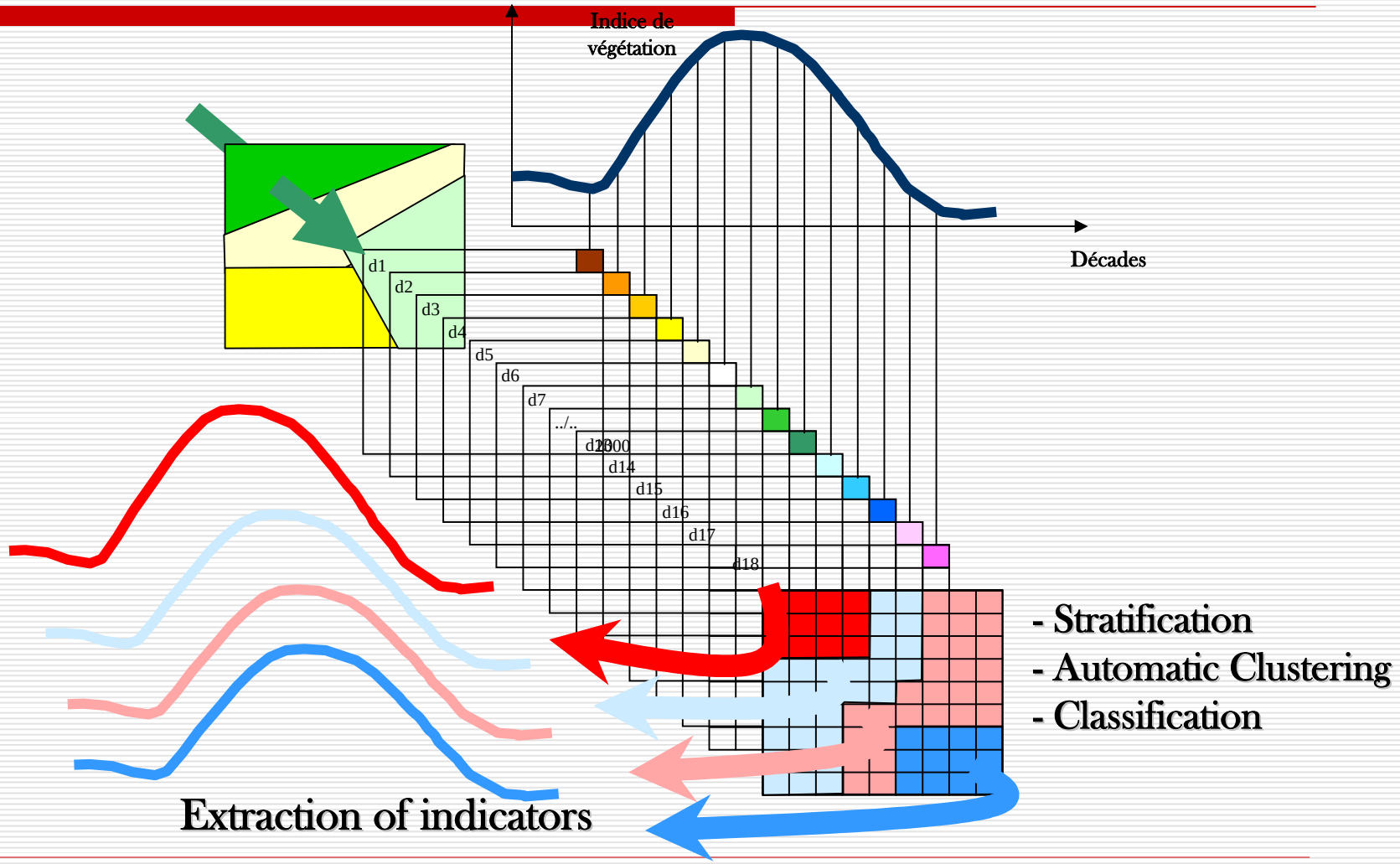
Utilization of Geospatial technologies will be based on :

- Type of information to be delivered
- Users needs

Users Information	Negociator Qualitative	Decider Quantitative	Worker Logistic
Objective	Strategic	Economic	Action
Nature	Indicative (What)	Estimative (Where)	Measurable (How)
Time frame	Yearly	Seasonnal	10-Days
Space	Global	National	Local
Accuracy	Poor	Average	High
Support	Negociation	Discussion	Intervention

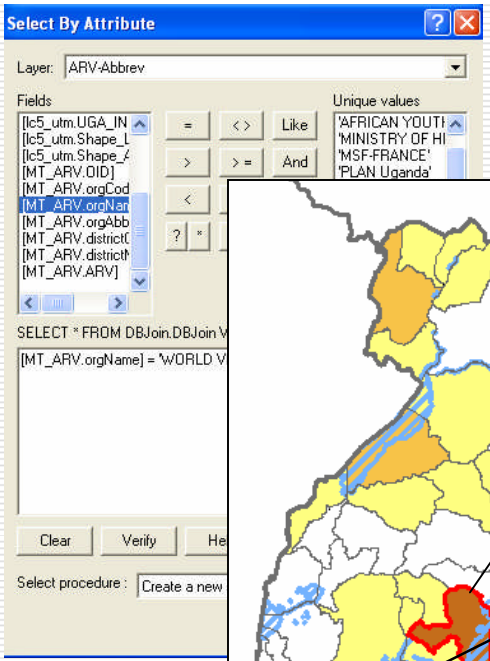


From Data to Indicators

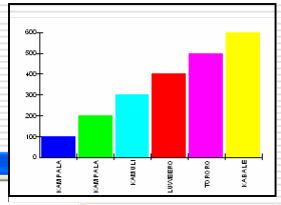


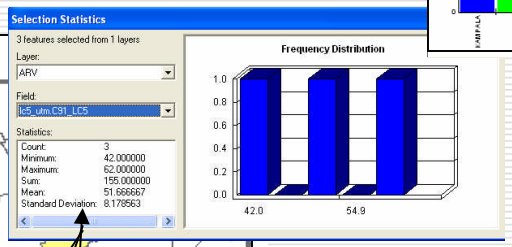
Analysis & Presentation

Remaining Issues: What are the Trends ? When? How?

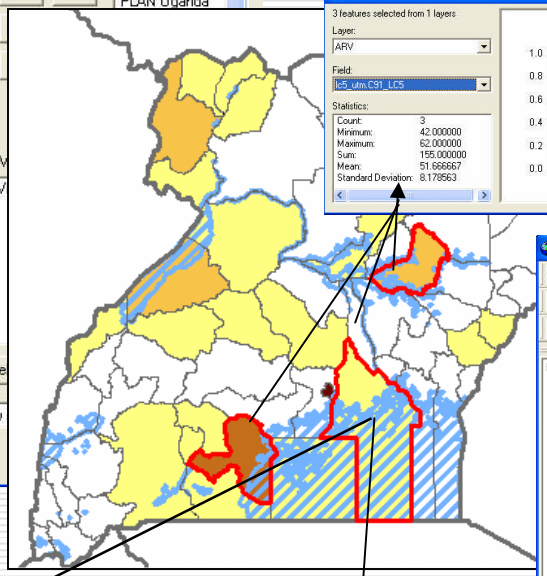


4. Interactive selection: e.g. where does a particular organisation provides services for ARV?

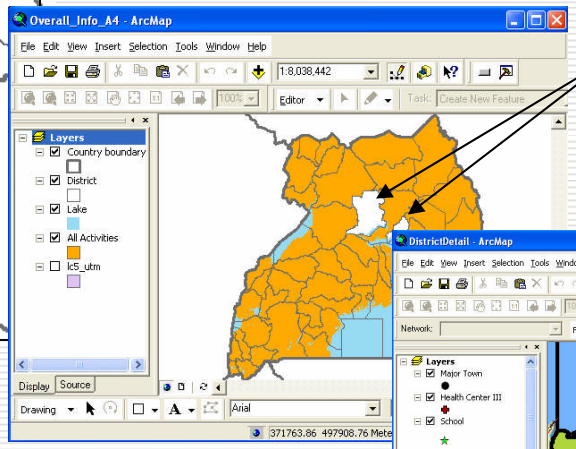




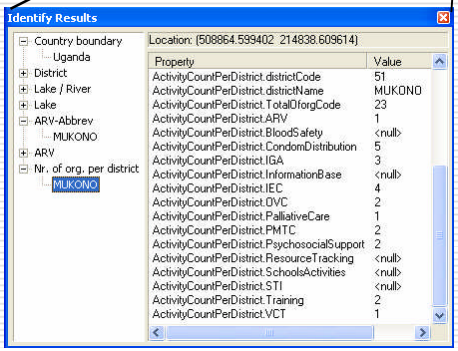
7. Deriving statistics – total nr. of people tested at selected VCT centers, resource information per intervention per district.



5. Presentation of selection



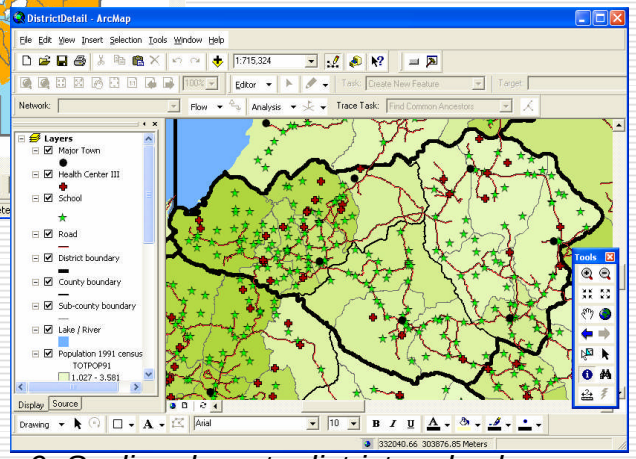
8. Gap analysis – guides resource allocation and service scale-up



6. Identification of other information available in the mapping database on HIV/AIDS interventions in this particular district:

- number of beneficiaries

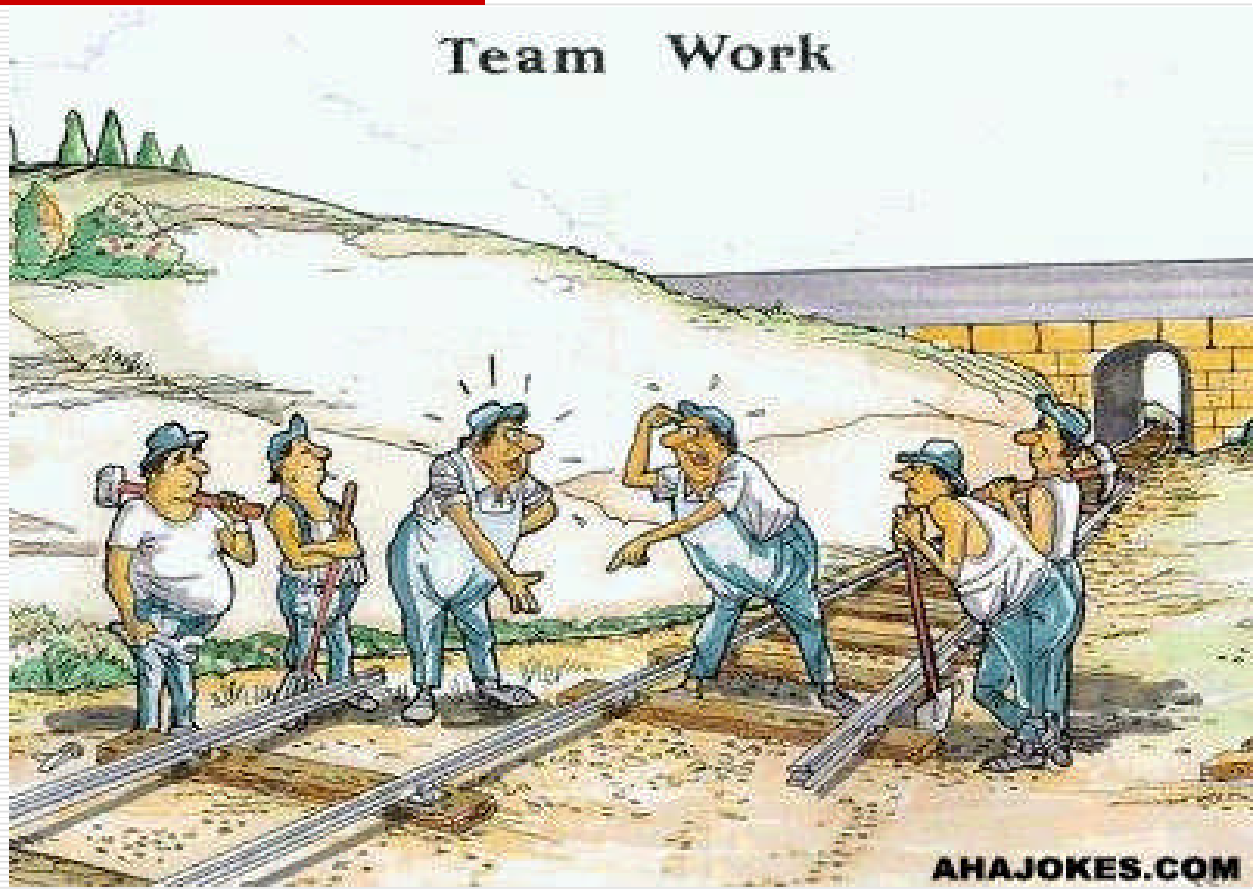
- resource information



9. Scaling down to district and sub-county level

Justifying Geo-Spatial Data Infrastructures

Cooperative Multi-Stakeholder Arrangements for Spatial Data Production, Management and Dissemination



Produce Once, Use Many Times

- Geoinformation content requires special field and lab operations to define the location against which data are collected
  - Operations: Surveying and mapping, photogrammetry, remote sensing, geodesy, etc
  - Location entities: reference frames, point coordinates, land parcels and administrative units
- Different applications need to cross reference data with one another
  - They refer to the same database entities
- No single agency can satisfy its geographic data needs on its own
  - Data collected for one purpose or project can be used for other purposes and projects

Re-use Data

- Data and information can be copied and disseminated without loss
- Therefore, we can re-use data and information products
  - Make maximum use of available data and info products
  - Adopt cooperative, multi-stakeholder approach to production, management, and dissemination of data
  - Must have appropriate policies, standards and institutional arrangements

Challenges

- It is possible …
  - If potential sources of information are known to everybody – clearinghouse and metadata management
  - And easily accessible
  - And even more so if integrated into the structure of society
- Like an infrastructure

Why Spatial Data Infrastructures ?

- Put in place policies, resources and structures to make spatial information available to decision makers and the community
  - When they need it
  - Where they need it
  - In a form they can use it (almost) immediately
  - Help them make sense of it
- That is best done by adopting an infrastructure approach
  - Justification: The SDI provides a basis for spatial data discovery, evaluation, and application for users and providers from many different sources and for a wide group of potential users

SDI Involves …

- Cooperating organizations and individuals …
- Following mutually accepted standards …
- Developing common base themes of data
- Establishing policies and plans that ensure the flow of data between the different agencies
- Using electronic technology to help find and share geographic information

Paradigm Shift

- We need to move….
  - From… Statistic as standalone data collection
  - To… Knowledge generation, sharing and dissemination
- Organize data so that information (spatially enabled) can be produced as and when needed
  - Just in time data on demand
- Empower users to do as much as possible by themselves

Contacting Us

- ICT, Science & Tech Division
  - Aida Opoku-Mensah, Officer in charge
  - aopoku-mensah@uneca.org

- **Geoinformation Systems Section**
  - Dozie Ezigbalike, Chief of section
  - ezigbalike.uneca@un.org
  - Andre Nonguierma, GIS Officer
  - ANonguierma@uneca.org
  - Paul Belanger, GIS Officer
  - PBelanger@uneca.org

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