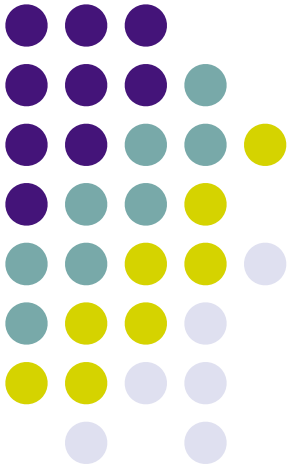
"Building an ICT Infrastructure in a hilly landscape: How the challenge can be met?"

The Case of the National University of Rwanda



NKURIKIYIMFURA K. Didier

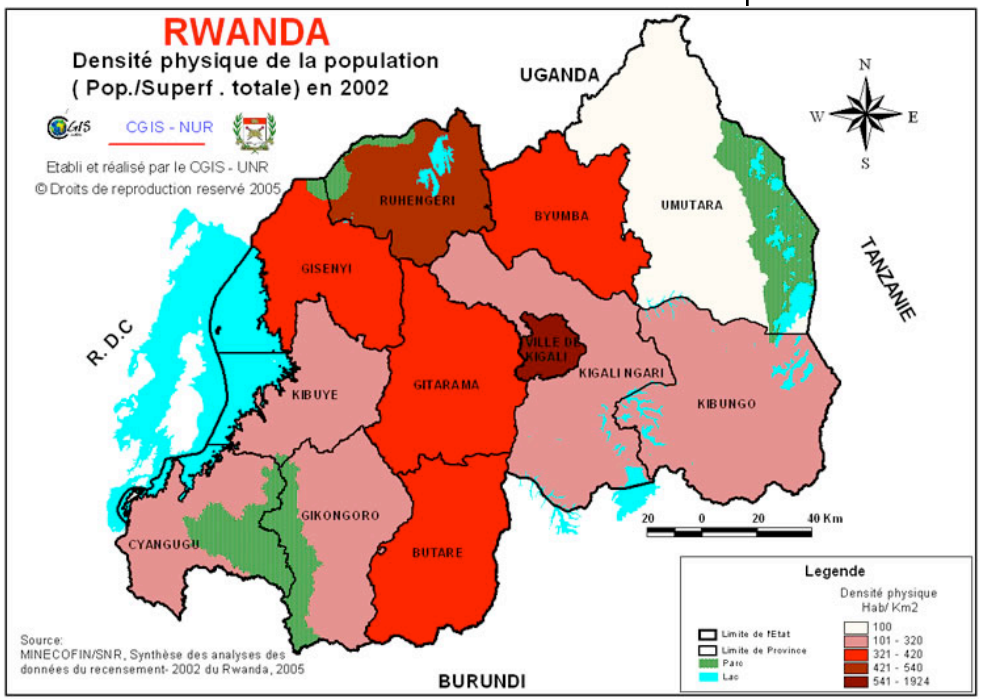
Computing Center, NUR

Rwanda in Brief

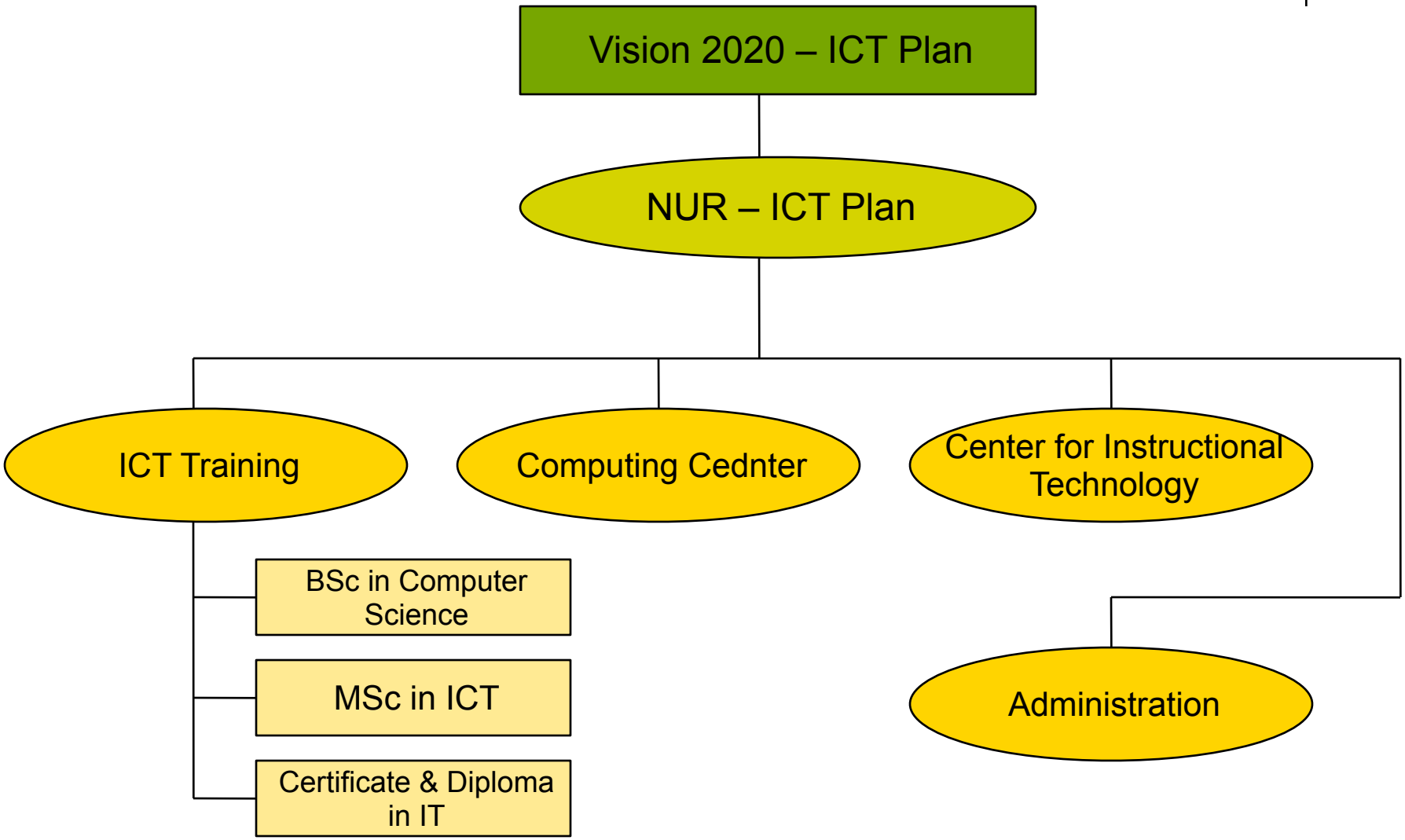
- Located between the eastern and central Africa:
- Small and landlocked country: 26, 338 sq. Km
  - Land: 24, 950 sq. Km (94.7%)
  - Water: 1, 388 sq. Km (5.3%)
  - Only 8, 600 sq. Km (32.7%) are suitable for cultivation.
  - To the Indian Ocean: 1700 Km
  - To the Atlantic Ocean: 2200Km
  - Therefore imported goods are relatively expensive and Rwanda's exports are less competitive on the global market.
- Population: 8.2 million

Rwanda in Brief

- Density: 311 inh. per sq. Km.
  - Taking into account only the arable area, density increases to 955 inh. per sq. Km => one of the most populated countries in the world
- Main source of revenue: Agriculture
- Geography:
  - Multitude of hills separated in most cases by swampy valleys.
  - Volcanic mountains in the North-West
- Climate: 12 – 27° C throughout the year.
- Growth Domestic Product per capita of US$250 per year.



Rwanda, NUR and ICT

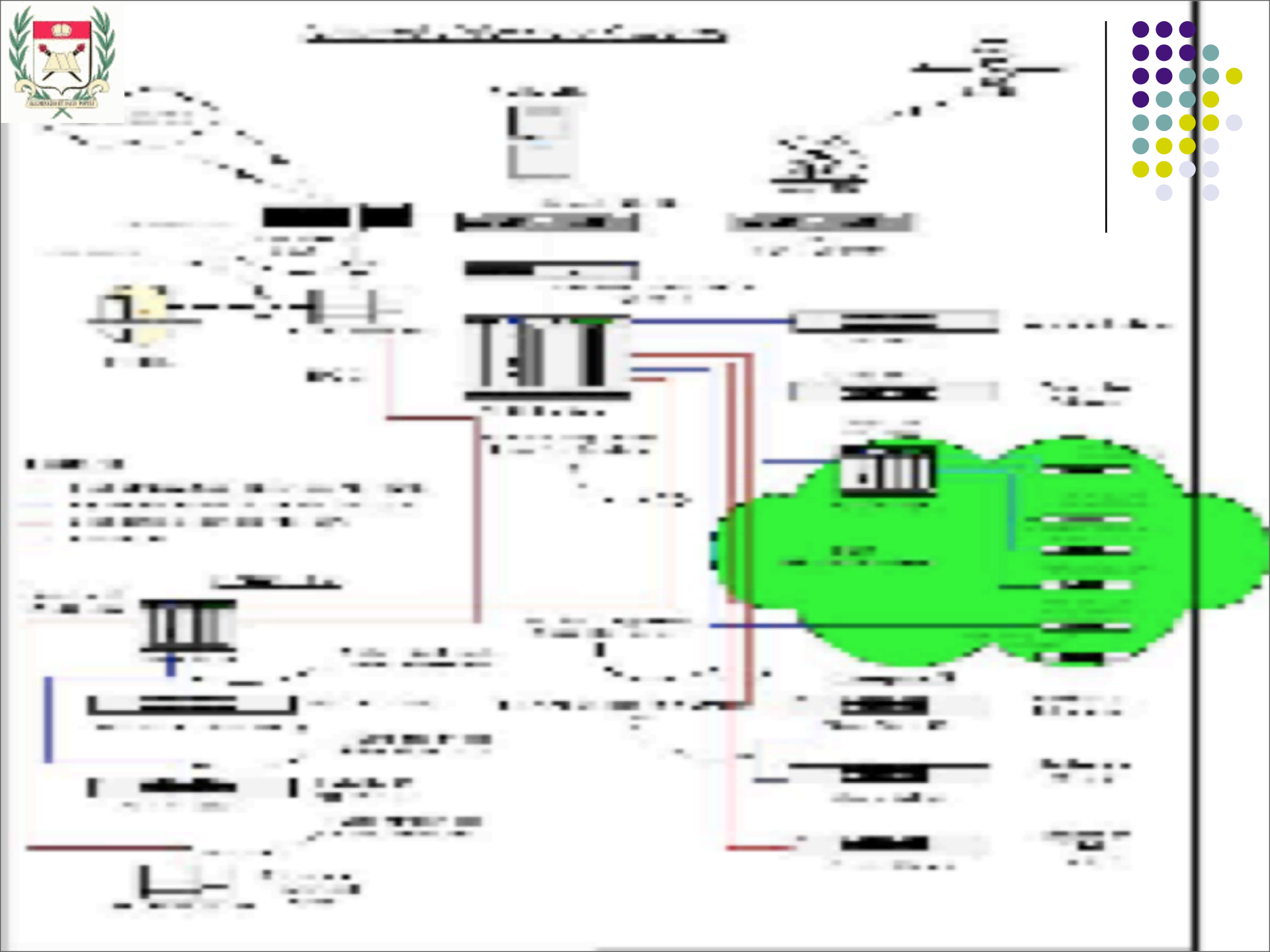


The National University of Rwanda

- Located at the South Province in Huye District.
- Founded in November 1963
- 7 faculties and 3 schools
- 450 Teaching Staff.
- 9000 students

The NUR Computing Center

- Started in 1997, after the re-opening of the NUR
- In charge of:
  - Infrastructure Development (LAN and WAN setup)
  - Acquisition of new ICT eqipements
  - Database and Software Development
  - E-Learning Platform
  - Capacity Building
  - Service to the Collectivity:
    - Telecenters
    - Training
- Involved in other initiatives
  - GIS Center (http://www.cgisnur.org)
  - Rwanda Development Gateway (http://www.rwandagateway.org)



Network Setup

- Campus Area Network : Monomode and Multimode Optic Fiber for the 3 main sites and buildings.
- 90% of wired LAN
- Network of approximately 1000 Computers
- Bandwidth (Expensive!): 2 Mbps Up / 768 Kbps Down
- 3 main sites of the NUR interconnected by Optic Fiber
- More than 10 small remote sites
- The wireless solution is seriously considered by the NUR as a way forward in its ICT Infrastructure Development Plan of the year 2006. The plan has included the building of 5 pilot wireless local loops points at the NUR main building as a first stage. The results of the pilot project should provide inputs for the next step consisting of providing ISP services to the South Province.

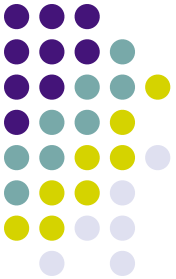
NUR Remote sites

- Small sites (remote experiments sites)
- No telephones infrastructure in some areas.
- Cannot benefit of the existing network
- Administrative delays, overhead!
- Internet connectivity trough other ISP sometimes (Rwandatel, Terracom, Mediapost, etc) but still expensive
- Solutions:
  - Fiber Optic?
  - Wireless?

Wired or Wireless?

- Both!
- Coupling to the wired LAN, the wireless is seriously considered by the NUR as a way forward in its ICT Infrastructure Development Plan of the year 2006.
- Pilot phase (2006): 5 pilot wireless local loops points at the NUR main building.
- Next steps:
  - Providing connectivity to remote sites
  - Service to collectivity by providing collectivity to remote villages
  - ISP services to the South Province for private and public institutions, schools, local business and homes

Wired Network



- Pros:
  - Reliability
  - Inexpensive
  - More stable infrastructure
  - Very good performance (10 – 100 Mpbs)
- Cons:
  - Ethernet cables must be run from each computer to another computer or to the central device.
  - Time-consuming and difficult to run cables under the floor or through walls, especially when computers sit in different rooms.
  - Limited mobility

Outcomes

- Better productivity of NUR remote sites
- Enhanced linkage in the overall process of delivering services to the community
- Extension of the network using inexpensive and easy to setup networks
- Ability to have increased access to knowledge, information for local NGOs, private and public institutions.
- Contribute to bridge the digital divide by providing Internet access and empower local communities

MURAKOZE!!!

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THANK YOU