Independent Commission for Africa

I.C.-U.N.U/I.N.R.A Workshop

Accra 28-29 May 2001

"Bridging the Knowledge Gap"

PLACING SCIENCE AND ITS NETWORKS AT THE SERVICE OF THE AFRICAN SOCIETY

Introductory document of the Workshop "Bridging the Knowledge Gap" (Accra. 28-29 May 2001) organized by the United Nations Independent Commission "Millennium for Africa" (C.I.) opened to United Nations University/Institute for Natural Resources Africa (U.N.U/I.N.R.A) and the Association of African Universities in General Assembly in Accra.

Placing Science and its Networks at the Service of the African Society

- **Introduction**
- **Context**
  - Dominant trends in scientific and technical activities.
  - Scientific and socio-economic prospects at the 2050 horizon
  - Science and the African challenge
  - Science and Africans pressing problems
- **Objectives**
- **Actions**
  - Implement technological research programmes
    - Area 1: Basic Research for development
    - Area 2: Technological Applications for competitiveness
    - Area 3: Knowledge-Base for decision making
    - Area 4: Education and Training young researchers
  - Establish the African Institute of Technology and the Network of Centres of Excellence
  - Set up a Space Agency and launch the first communication and surveillance geostationary satellite.

Introduction

- **The "Dakar Declaration" and Science:**
- One of the major proposals of the "Dakar Declaration" of the I. C. is the establishment of the "African Institute of Technology, whose capacities would embrace : the African Space Agency empowered to revolutionise the continent's communications capacity through the acquisition of the first African communication satellite, whose research capacity would extend to remote sensing and environmental monitoring. This would give new impetus to areas like the biological sciences, information and communication technologies, entrepreneurial endeavours, the fight against AIDS, malaria, desertification and famine".

- **The U.N. "Millennium Declaration" and Technology:**
- At the UN Millennium Summit held in 2000, the Millennium Declaration by Heads of State highlighted the fact that the advantages of new information technologies and communication should be for all, especially Africans, in line with the recommendations of the Ministerial Declaration of the Economic and Social Council. To make up for the digital divide, the "Annan" Report "We the Peoples, the Role of the United Nations," at this same Summit, announced the launching of a telemedical centre and a United Nations Information Technologies (UNITeS) Service.

Context

Dominant trends in scientific and technical activity in the XX1st century

- **The efforts of scientists and engineers**
  - are channelled through “natural” scientific and technical paradigms
  - in spite of the change of context
- **The technoscientific waves are propelled by basic research and the science of transfer in :**
  - molecular biology
  - physics and mathematics
  - cosmology
  - seismology
  - neuroscience
  - palaeontology

Dominant trends

- The efforts of scientist and engineers are channelled through “natural” scientific and technical paradigms which include defining :

- the relevant problem
- the research methods
- the needs to be satisfied
- the scientific principle to be used
- the protocols and technologies to be applied

Overwhelming trends

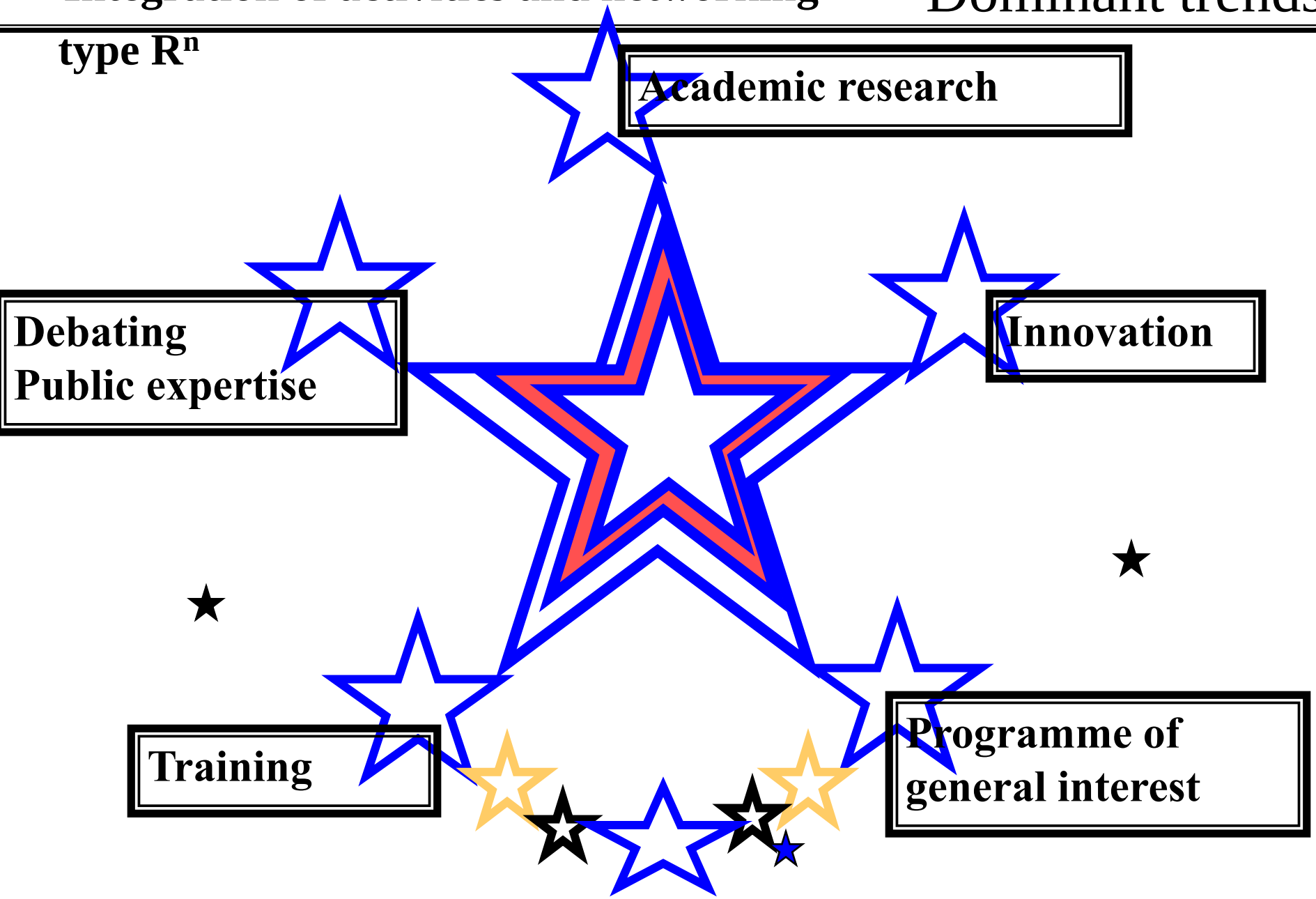
- Scientists and engineers become blind to the needs of peripheral regions like Africa.
- Regions and economic systems must adapt to each other by reason of their capacity to exploit research results
  - The importance of increasing returns of adoption (learning by using)
  - The importance of networks externalities (irreversibility of the process of adoption)
  - The importance of lock-in effects (almost impregnable character of a dominant technology)
- The regions of the Triad bloc trend to become self-sufficient
- Africa remains dependent
- Raw materials lose value
- The scientific and technological gap is compounded by the disparities in the capacity to disseminate results and to transfer expertise to industry and society
- Even wider gaps between the levels of productivity and education.

Dominant trends

- The efforts of scientists and engineers are channelled, despite the change of context.
  - The end of the cold war, which has given impetus to scientific explosion during the second half of the 21th century.
  - Inequalities and poverty of alarming proportions.
  - The appearance of new threats on the planet

Dominant trends

- **Integration of activities and networking type R^n**



- **Fundamental Research in**
  - Molecular Biology
  - Physics and Mathematics
  - Cosmology
  - Seismology
  - Neurosciences
  - Palaeontology
- **…spur Technoscientific waves**

Sources : J. Maddox ; Scientific american ;
Pour la science

Prospects for 2050

Fundamental Research in

- **Molecular Biology, to**:
- determine the mechanism of speciation
- establish the correlation between evolution and genetics
- discover the role of the viruses (by 2050)
- determine the appearance of the life
- the functioning of the human brain, the origin of the imagination, the comprehension of the cognitive processes (after 2050).
- **Physics and mathematics to:**
- Describe the starting of the universe through the resolution of the problem of the incompatibility between the quantic mechanism and the theory of gravitation (quantification of the gravitational field)
- Unify the diverse forces of the nature through the theory of the cords (by 2050).

Science and technology prospects for 2050

Fundamental Research

- **Cosmology** :

  to unveil the mysteries of the birth of the universe (density and nature of the dark matter), exploration of the solar system by spatial shuttle.

- **Seismology** :

  for the elaboration of the map of inside of the Earth

- **Neuroscience** :

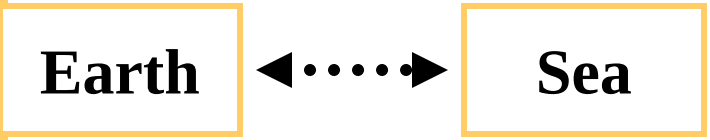
  to identify the neuronal manifestation of the thought (by 2050)

- **Paleontology** :

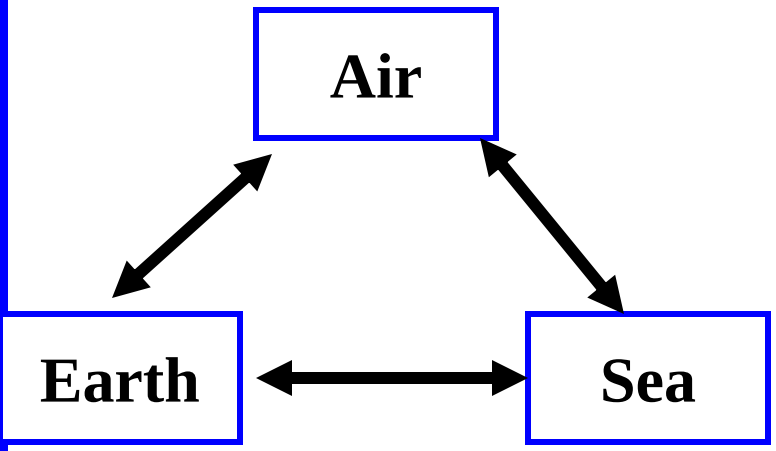
  to understand the history of the earth, the origin of the living beings and prospects for future filiations, the missing links between the groups of organisms, the mechanism of human being extinction.

THE STRATEGIC IMPORTANCE OF SPACE

- **1. The traditional dimensions of the strategy**

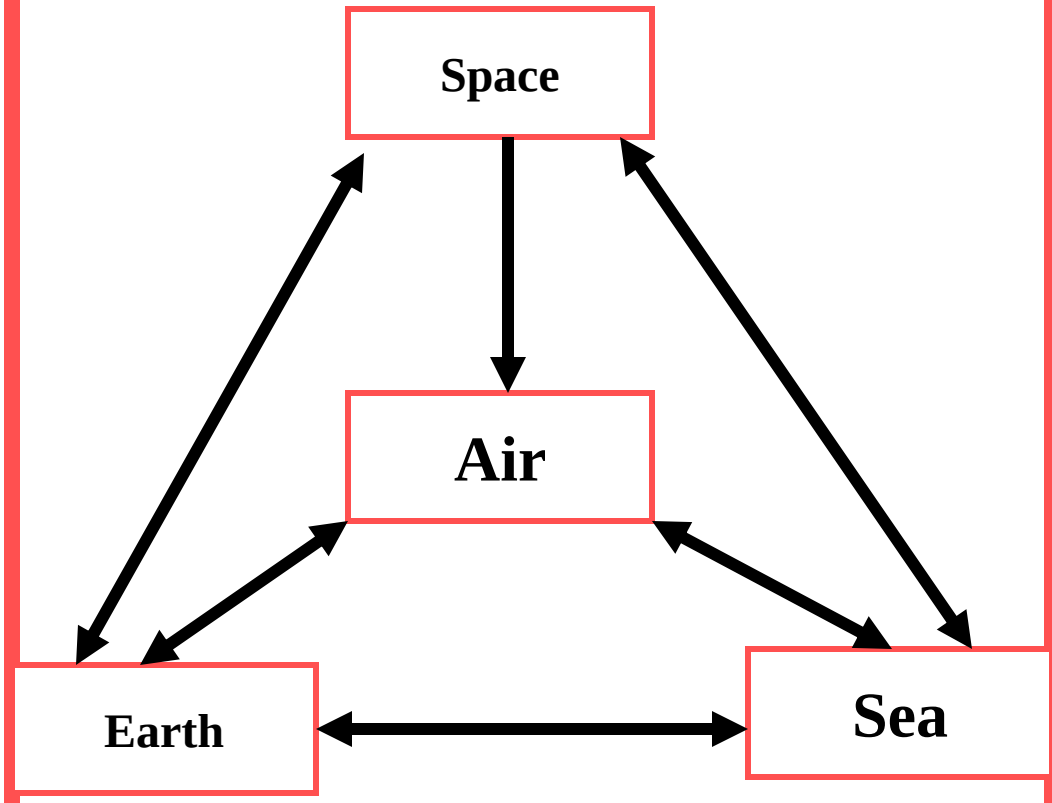


- **2. The dimensions of the strategy in the 20 th century**



- **3. The dimension of strategy today**

  Space appears in all the components of the strategy

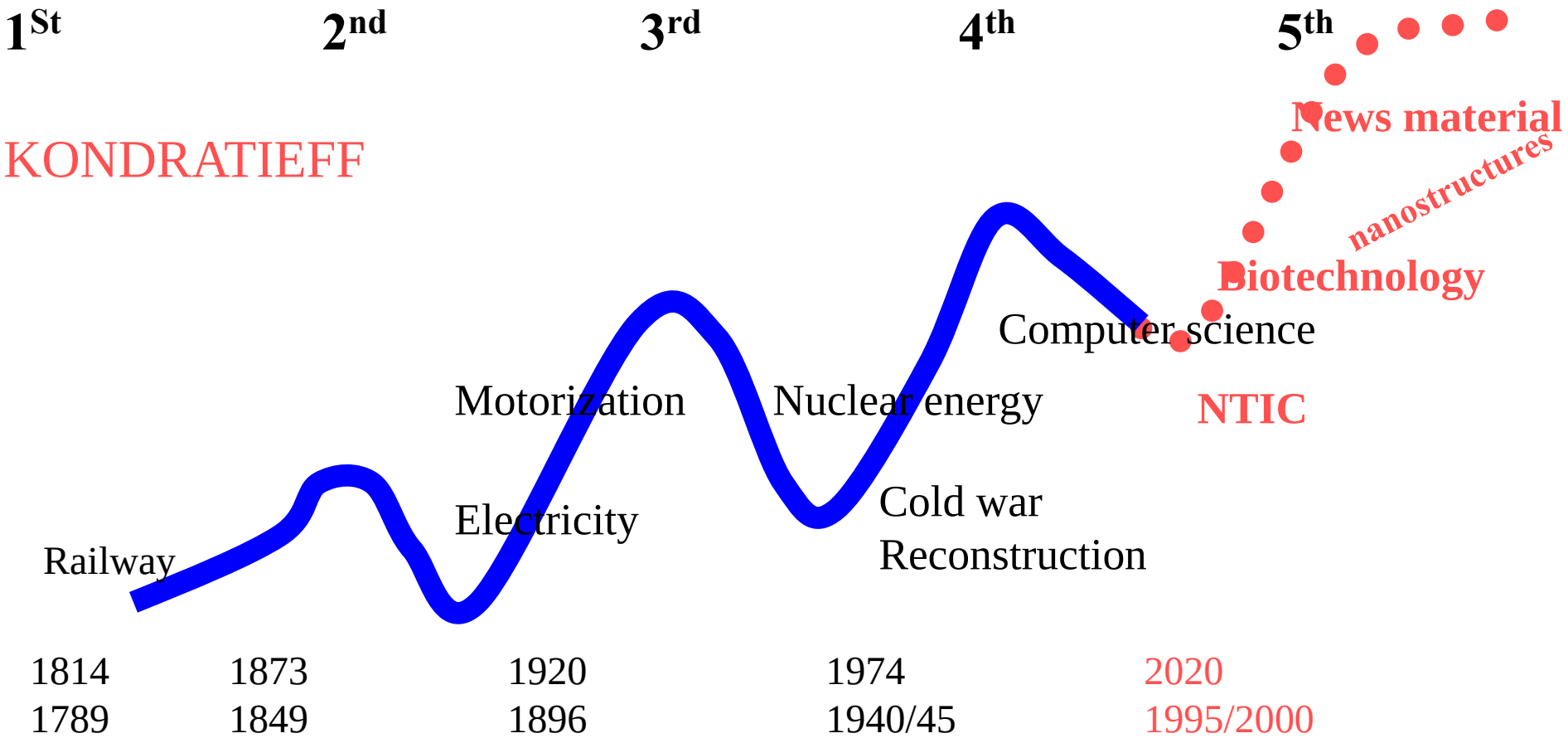


Source : H Couteau-Beguarie)

Socio-economic prospects

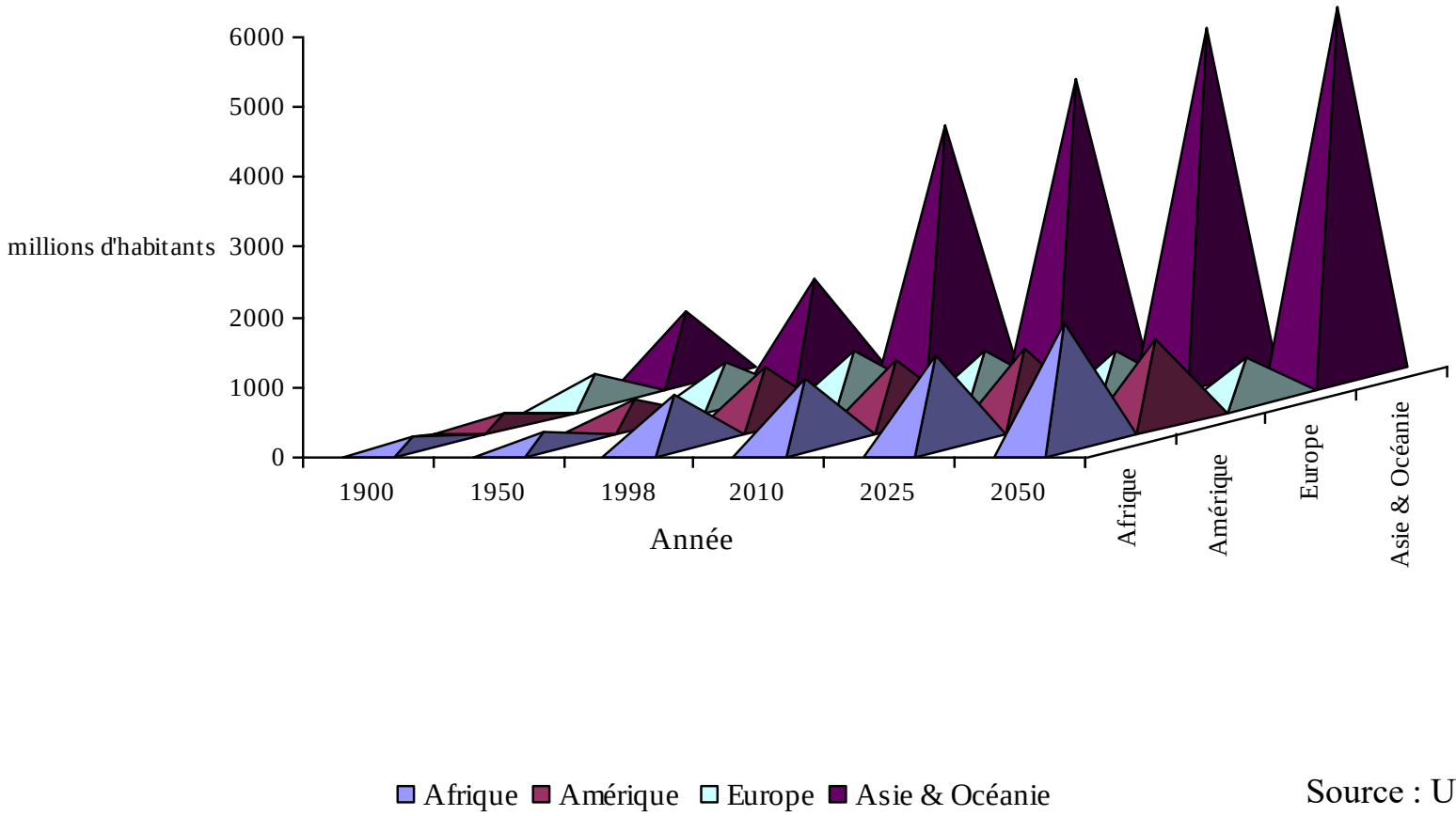
Toward a growth led by technoscientific vawes

In 200 years, the world economy shall have four cycles of a half-century each, called KONDRATIEFF. It would be in an ascendant phase of a 5th cycle since 1995.



Demography and urbanisation

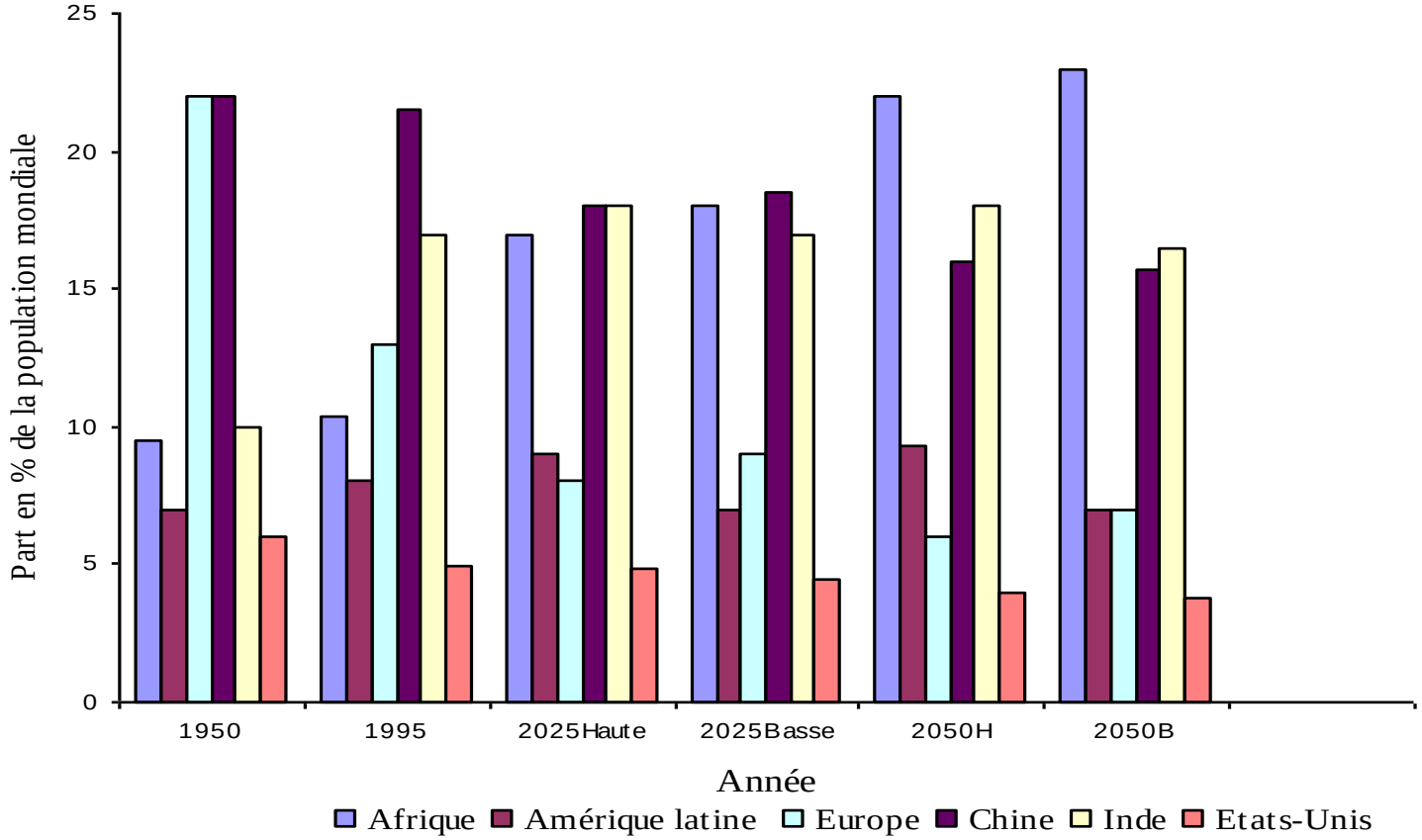
- In 2050, Africa shall be as much populated as Asia in 1990



Source : UN

Demography et urbanisation

Population by big regions in %
Variant High and variant Low for 2025 and 2050.

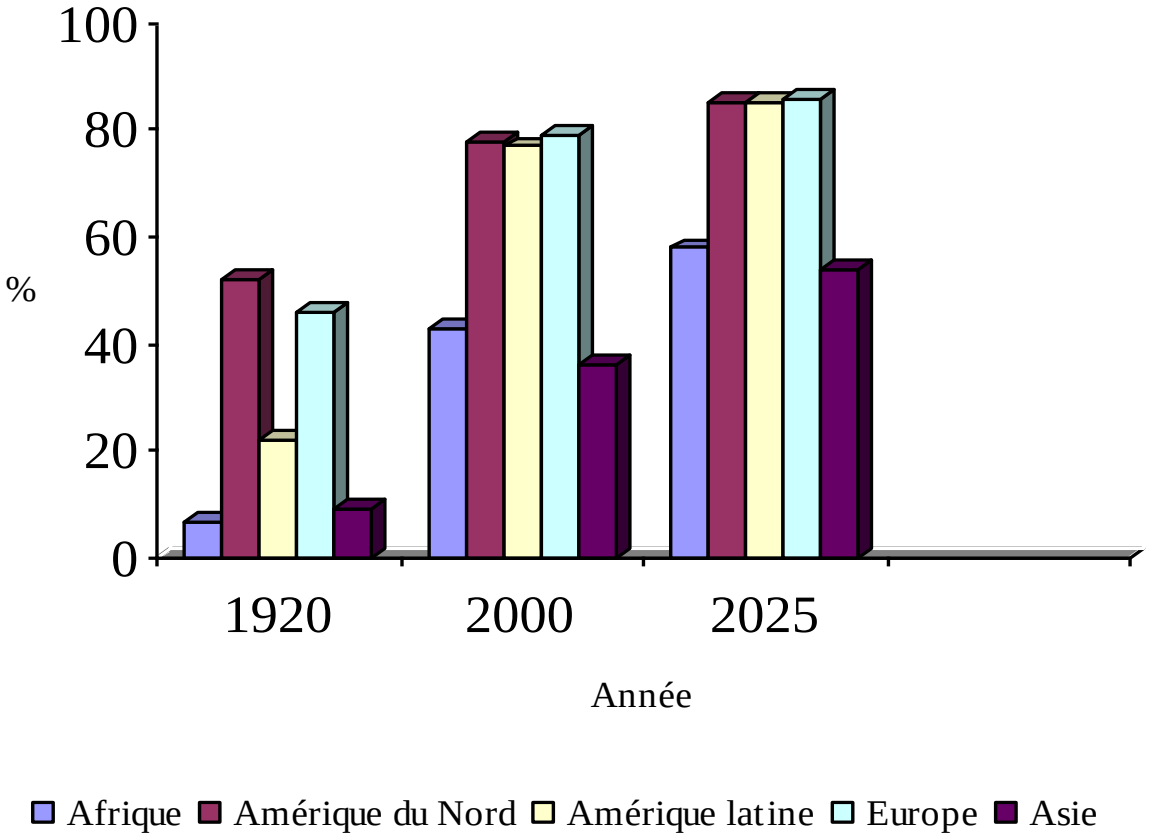


Source : UN

As of 2025, Africa catches up and exceeds India, then China.

Demography and urbanisation

Urbanisation
Share of the population living in towns



Source : UN

Erosion of the raw material prices

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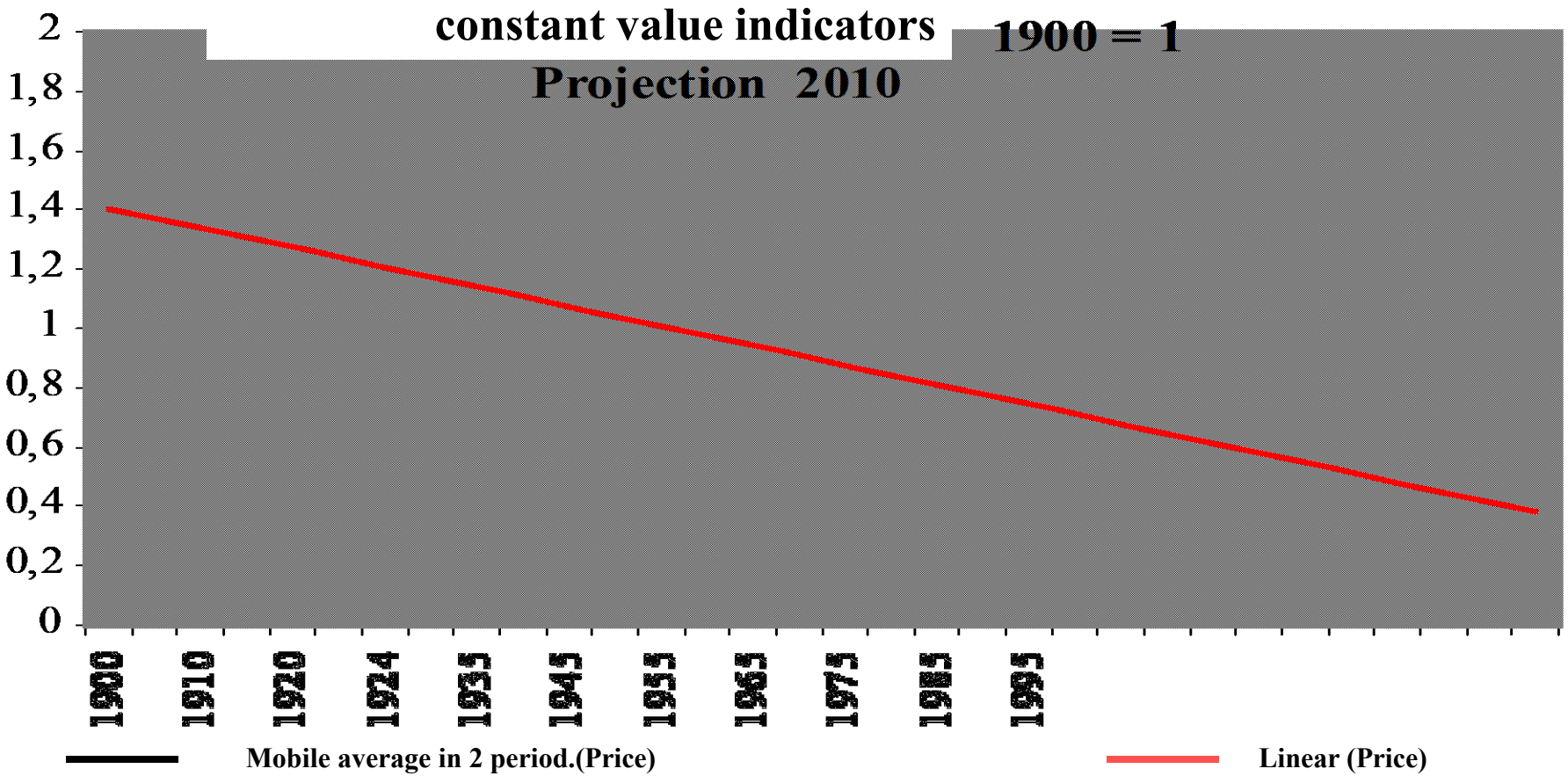
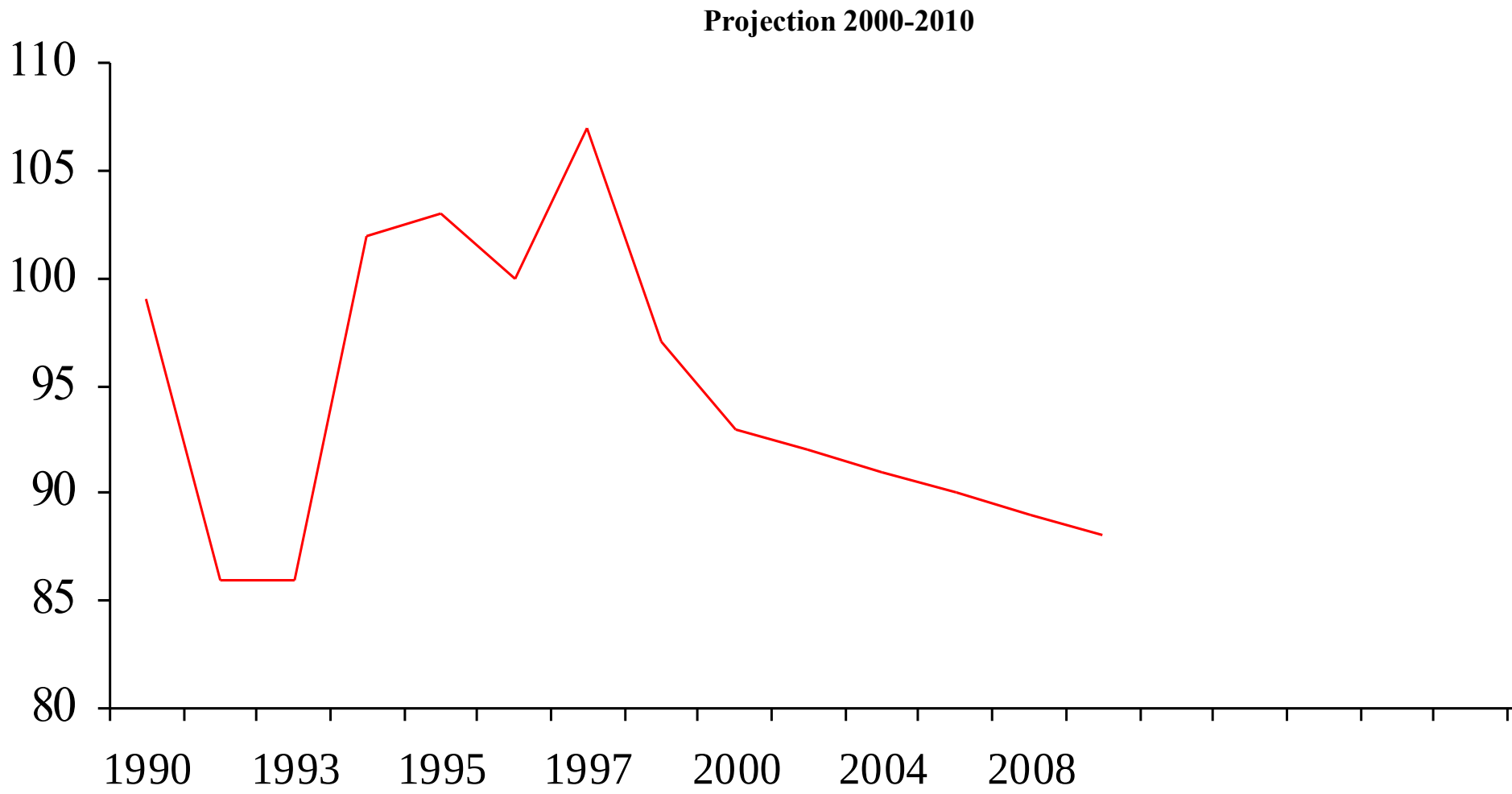


Source : Ramses 2000

Price of raw materials, except power

en dollars US constants, base 100 en 1990



Source : Ramses 2000

Degradation of Environmental Resources

- **Strong Growth of infrastructures and car pool in South countries**

Car-pool in Millions of car

	1990	2020	2060
Africa	0,7	100	340
India	0,5	150	340
China	0,3	150	340

Source : EU

- **Between 1990 and 2060, the car pool in South East countries is multiplied by 15, versus a world average of 6**.

Degradation of Environmental Resources

- Decimation of specific (the species) , genetic (genes) and ecological biodiversity
- 5 to 50 millions of known species including less than 1,5 millions are censused and 50 to 300 desappear daily
- Deregulation of carbon, oxygen and water cycles
- Triggering of tempests, warming, ouragans
- Adaption difficulties and reequilibrium during perturbations
- Regressions of resistance and health of the plants
- Modification of the invertebrate population
- Modification of the chemistry of the soils.

- Source : Center for population biology

Degradation of Environmental Resources

- **Dramatic climatic events by 2010 :**

- Disappearance of forests and arable lands.
- Perturbations of the Gulf Stream
- Rise of the price of common resources and eco-conflicts in poor countries around water, fire wood, fish, continuing deforestation, reduction of non domesticated areas; trebling of emissions in the air, noises, wastage, congestion,
- Global warming, pollution
- Shortage of the soils desertification, scarcity of common resources, $C0_2$ emission
- Two persons over 3, in situation of water shortage in 2025.

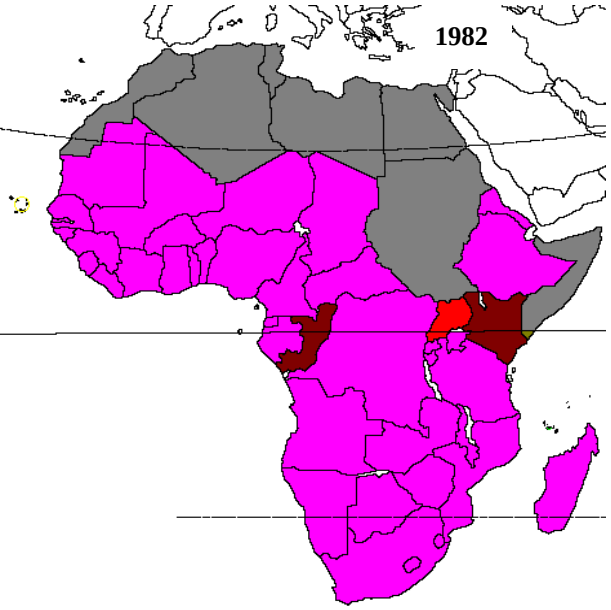
Science and African challenge

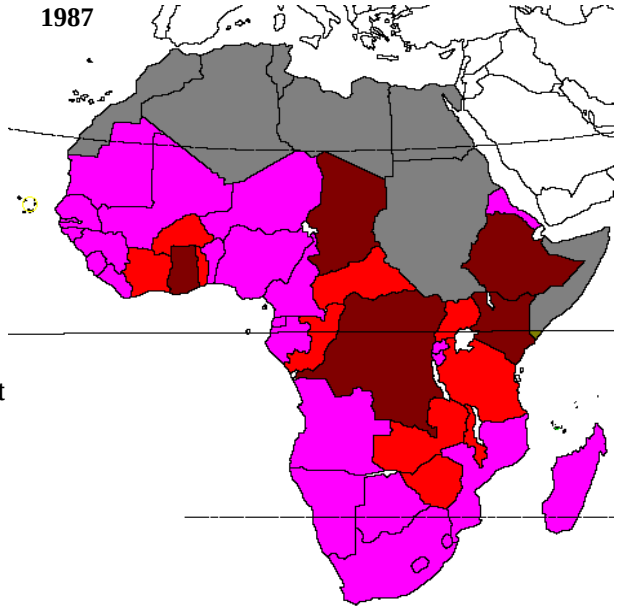
- The challenge of development
  - Bring population growth and urbanisation under control
  - Preserve the resources of the environment
- The challenge of competitiveness
  - Raise the valued of raw materials
  - March the development of market economy and enterprises
- Management challenges
  - Upgrade competence and the capacity of innovation
  - Develop strategic knowledge
- The challenge of education and training
  - Training for and through research
  - Education and learning

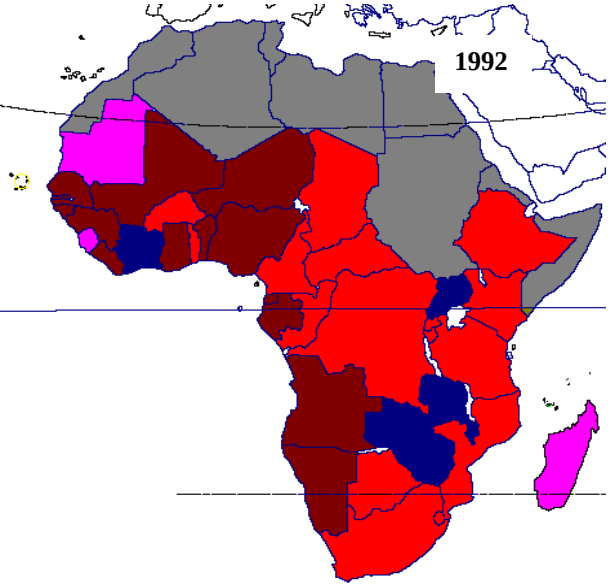
Science and the urgent problems of Africa

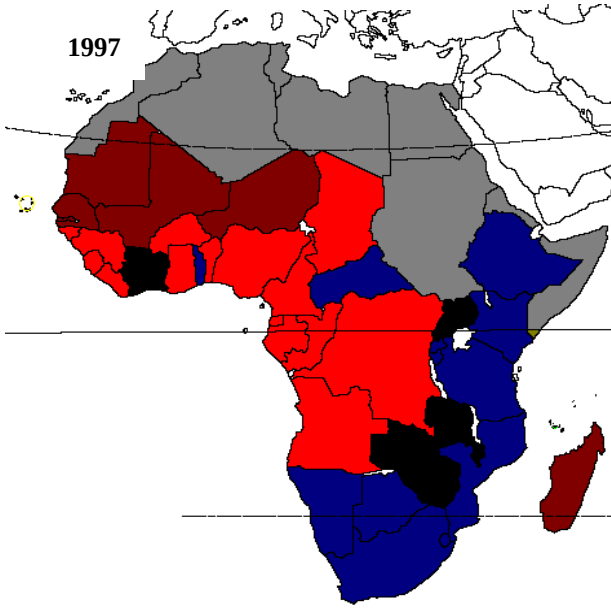
- Seeds to eradicate malnutrition and poverty
- Attraction of African brains and the Diaspora
- The penetration of the Space
- Crisis management and prevention included the Debt
- Vaccines to overcome AIDS and pandemics
- Correction of the negative image of Africa in the media.

Can we stop AIDS progress ?









AIDS Prevalent Rate /Adult

- **16% - 32%**
- **8% - 16%**
- **2 % - 8%**
- **0,5% - 2%**
- **0% - 0,5%**
- **Data non available**

Sou rce World Bank

Objectives

- **Basic objective**
  - Placing Science and its Networks at the Service of the African Society

- **Specific objective**
  - Contribute to development, competitiveness and decision making

Actions

- Undertake Technological Research Programmes for development, competitiveness and decision making

- Establish the African Institute of Technology and Network of Centre of Excellence

- Set up the African Space Agency to launch the first communication and surveillance geostationary satellite

Undertake Technological Research Programmes

- Area 1: Basic research for development
- Area 2: Technological applications for competitiveness
- Area 3: Knowledge-base for decision making
- Area 4: Educating and training young researchers

1. Basic research for development

- Improve endogenous knowledge
- Improve the state of health
- Raise the standard of living
- Improve the condition of soils and the environment

2. Technological applications for competitiveness

- Technologies for agro and food production
- Industrial technologies and technologies for materials
- Technologies for energy
- Technologies for transport
- Biotechnology
- AIDS and biomedicine
- Digital technologies
- Research into the ethics of science and technology

3. Knowledge-base for decision making

- Transfer research
- Science and technology foresight studies
- Scientific policies and programmes design and implementation, at the regional level
- Managing science networks and scientific and technical information (STI)
- Socio-economic research
- Interface between research and industry, research and society
- Financing innovation

4. Educating and training young researchers

- Networks of Centres of Excellence and African research laboratories
- Scientific exchanges between scientific of the North & South
- Training through and for research
- Outreach programmes in science for the youth an children

The African Institute of Science and Technology

- **Mission:** oversee the scientific development of Africa
  - Specific objectives:
  - Draw up scientific and technological programmes
  - Do write-ups and prospective research for the benefit of African public officials, the world scientific community, business organisations and citizens.
- **Network of centres of excellence**
  - **Mandate :** disseminate scientific and technical information (STI)
  - **Tasks :** fast collection of STI, treatment and dissemination in a standardised form
  - **Structure :** type **R^2** Network, which federates networks constituted on a national basis, according to subject area or area of expertise

The African Space Agency

- **The ASA : an independent commission project**
  - **Ambition :** revolutionalise the capacity of the continent in communication and surveillance
  - **Aims :** give impetus to the biological sciences, numerical technologies and the enterprising spirit; Fight AIDS, malaria, desertification and hunger

- …**launching the "First African Satellite"**
  - A geostationary satellite for
  - Communication and surveillance
  - Teledetection
  - Environment surveillance
  - A satellite to link Africa to her Diaspora

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THANKS YOU