NANOTECHNOLOGY RESEARCH AND TRAINING REQUIREMENTS FOR SUSTAINABLE DEVELOPMENT

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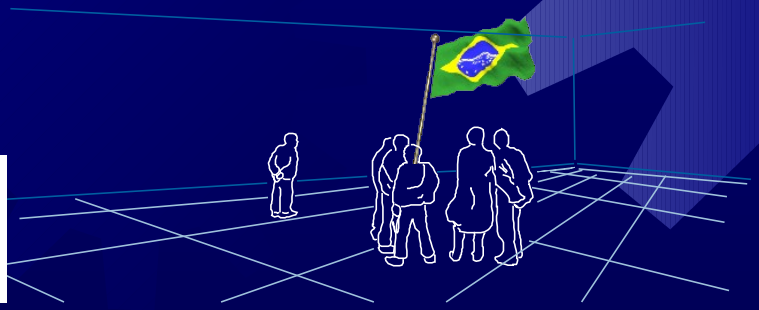


- Historical

Since the Industrial Revolution, the concept of economic development is based on the sequence:

This constitutes the source of richness of the countries

The factors of production:

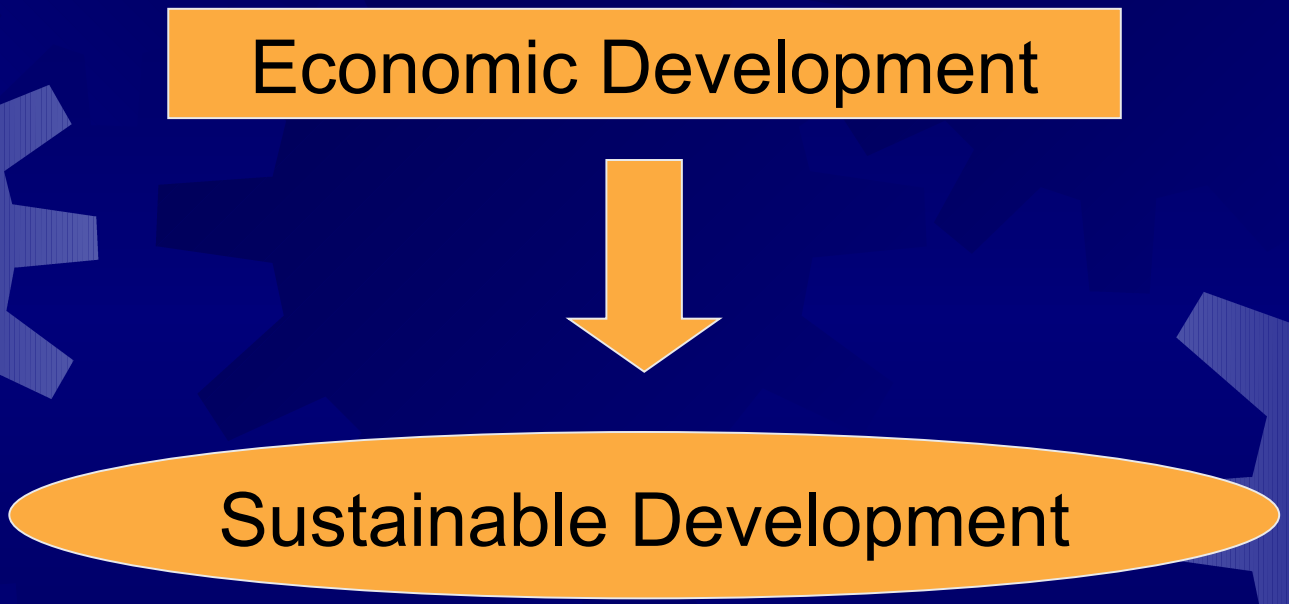
- Natural Resources
- Human Resources
- Machines and Equipments
- Technological Capacity
- Business Capacity

↓

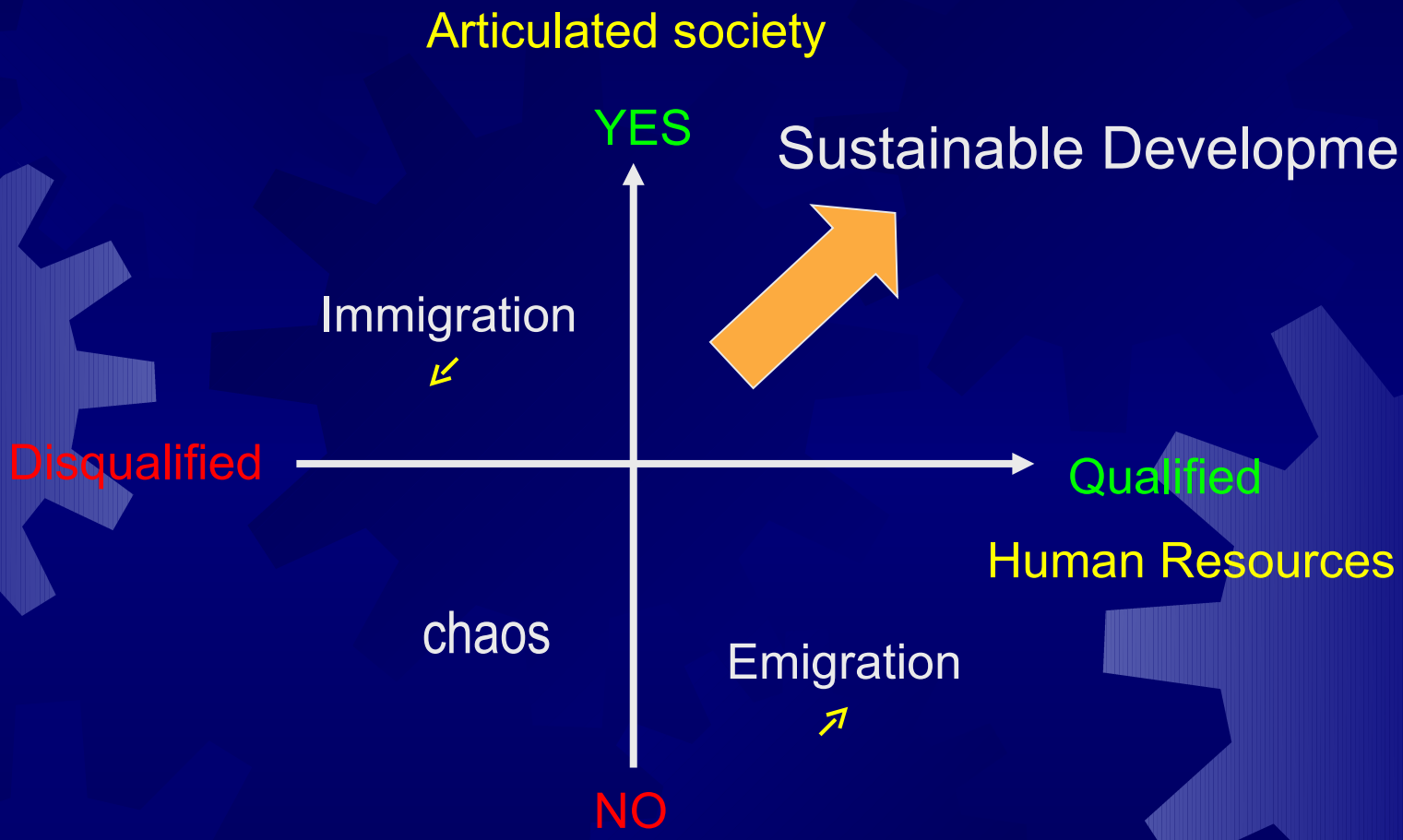
Production of goods and services

“Sustainable development may be defined as a matrix of systematic actions that guarantee the quality of life of the present and future generations, through a process of transformation of the actual model of economic growing”

What to produce, how to do it and to whom



Premise: change of paradigm !


Articulated society
YES
Sustainable Development
Immigration
Disqualified
Qualified
Human Resources
chaos
Emigration
NO

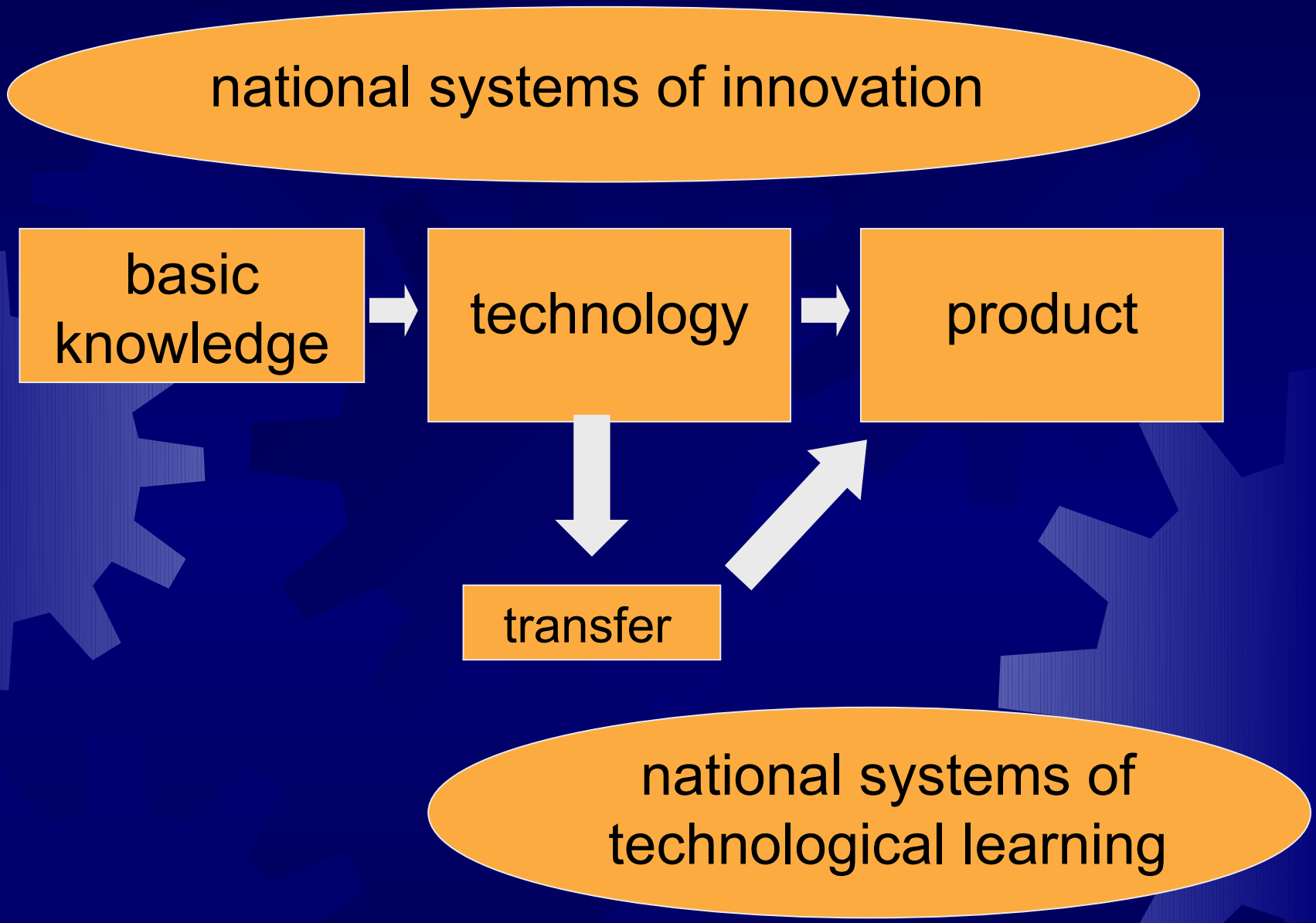
The Agenda 21 (Rio-92)

Central theme:
science and technology for sustainable development

TECHNICAL MODERNITY
(views the means as ends in themselves)

change of paradigm !

ETHICAL MODERNITY
(incorporates ecological and anthropological knowledge)


national systems of innovation
basic knowledge
technology
product
transfer
national systems of technological learning

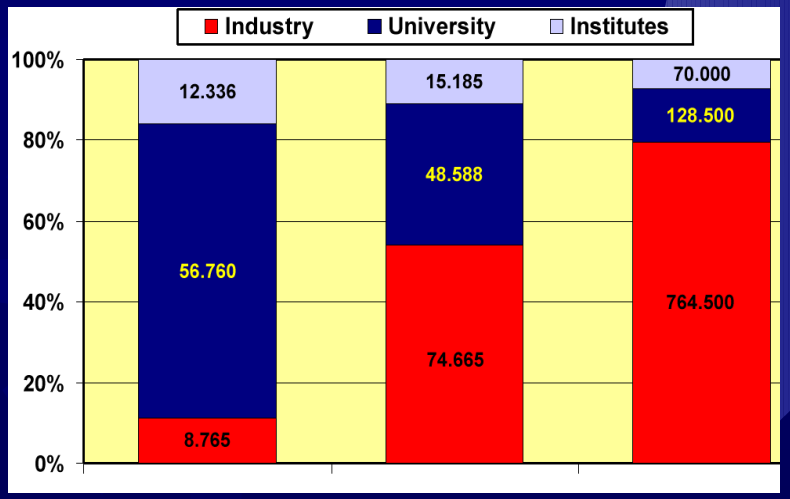
% of the GDP for R&D

Brazil	USA	EU	JAPAN
~ 1.2 %	~ 2.4 % (Average)		

Involvement of researchers with industry:

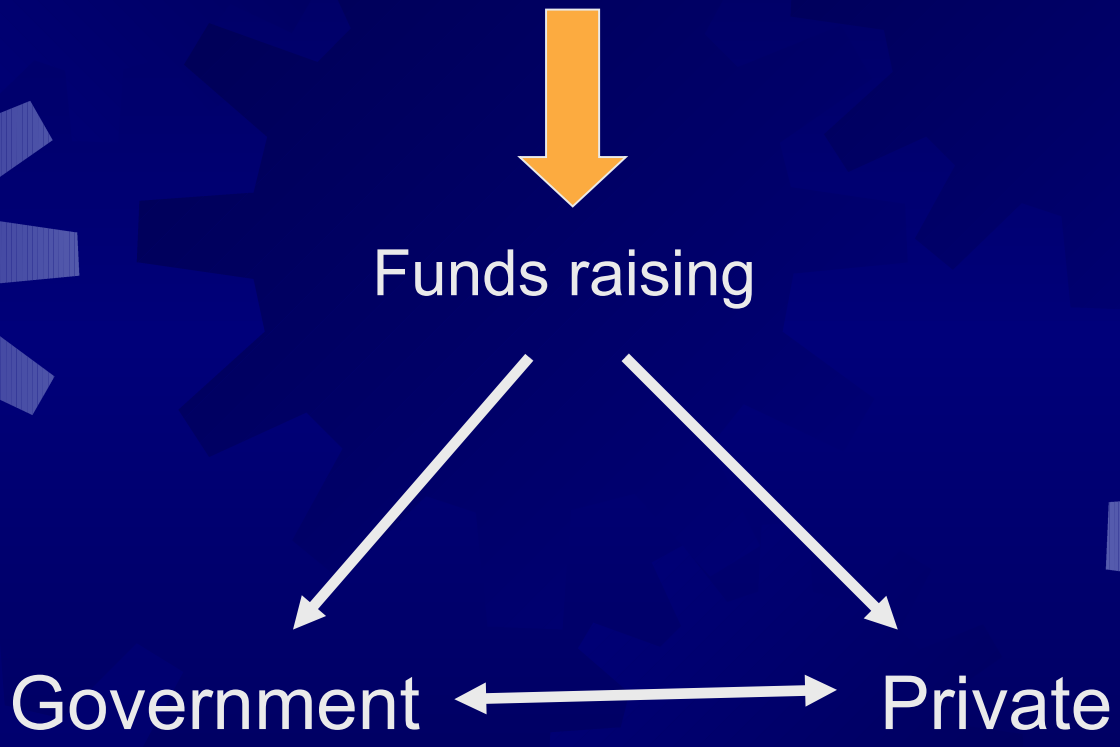
Brazilian GDP:

US$ 1.5 trillion



- Actions:

- Formation of human resources
- Interaction with the industrial and business sectors



Two main points:

- None of these actions can be successfully developed if they are undertaken in an isolated way

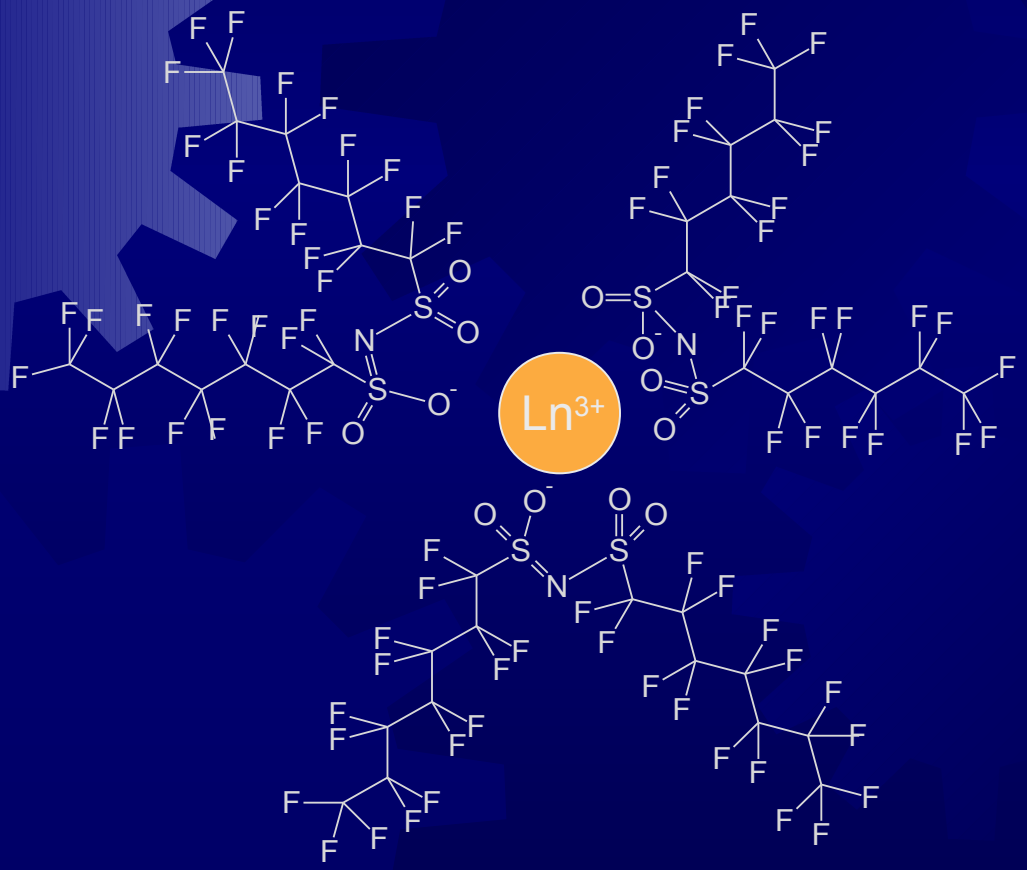
Scientific cooperation (national and international)

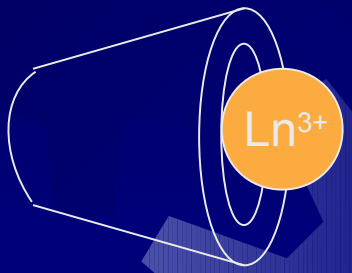
- Is it clear that government actions are supported by a real understanding of the fundamental and crucially necessary idea of sustainable development ?

Strengthened institutions

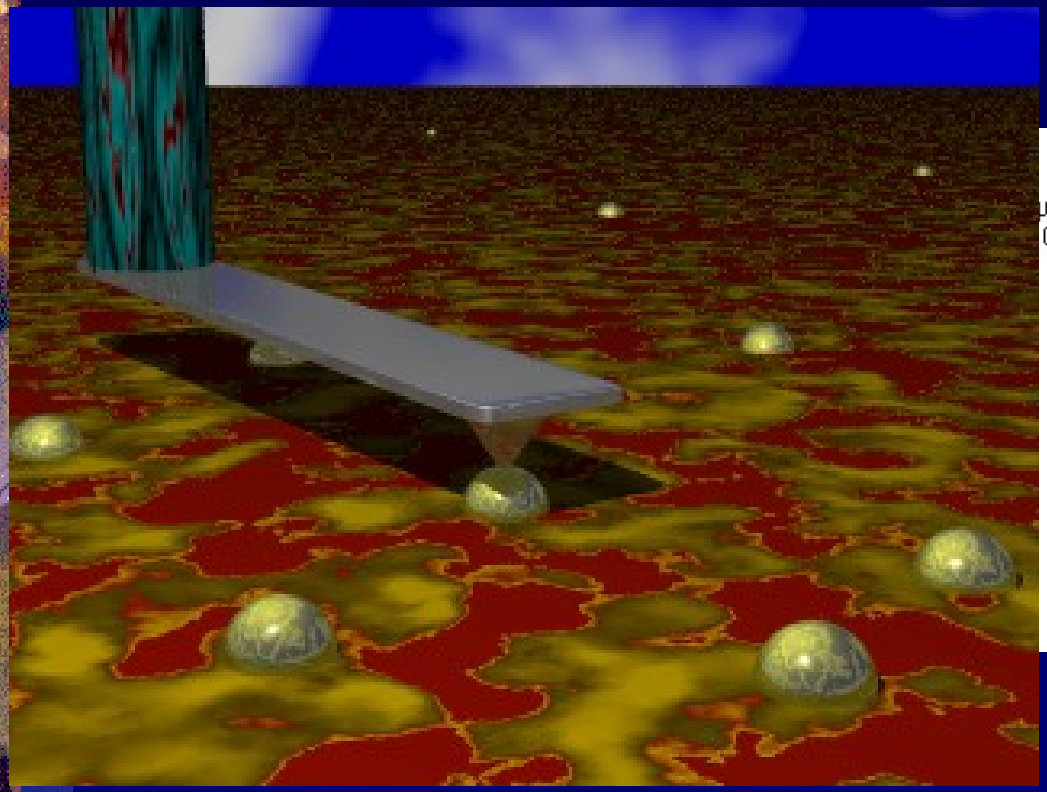
Nanotechnology in this scenery

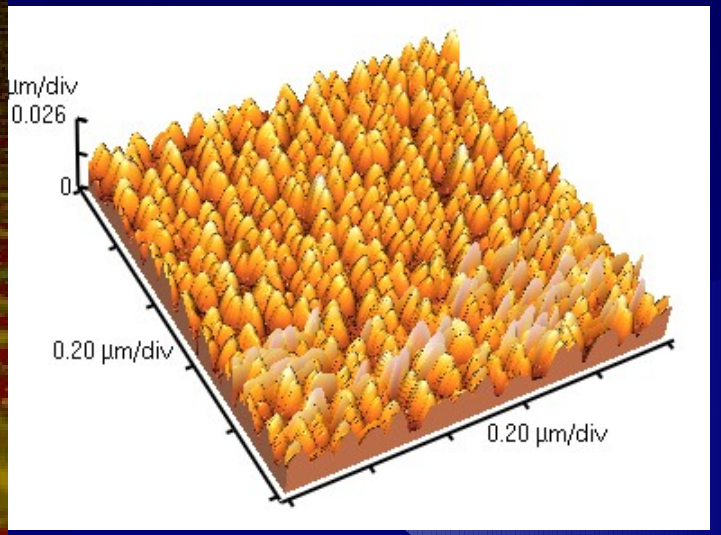
- Nanotechnology is the ability to manipulate atomic and molecular units to produce objects that present high functionality





Atomic Force Microscopy



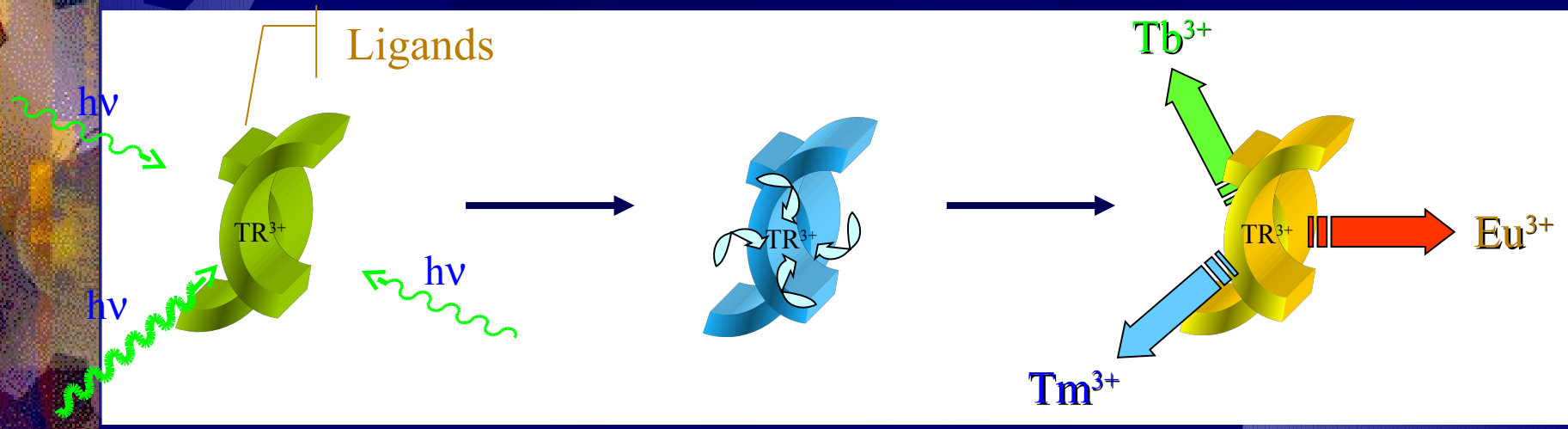


- It may be viewed as an “environmentally clean” technology
- It may shorten the technological distance between latecomer and industrialized countries

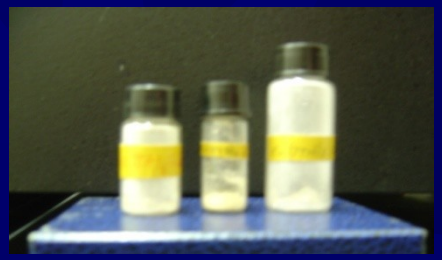
→ quality of life and social welfare

LIGHT CONVERSION MOLECULAR DEVICES

Ions Ln^{3+} { Molar absorptivity $\varepsilon \sim 0.01$ and 3 $M^{-1}cm^{-1}$



Strong UV absorption



Intramolecular

Energy Transfer

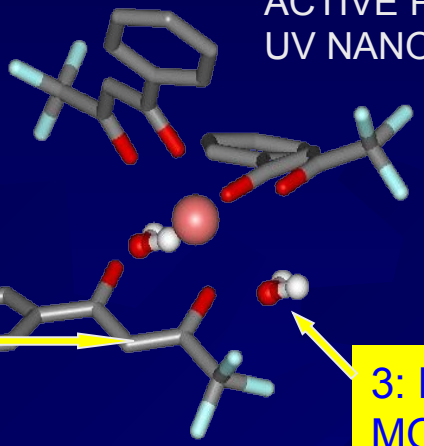
UV

Visible Emission

Complex - Eu^{3+}

UV Nanodosimeter

ACTIVE PART OF THE MOLECULAR UV NANODOSIMETER

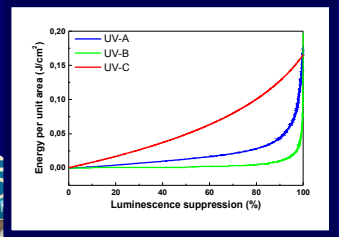


1: MIMETIZES THE SKIN

2: ALLOWS THE ASSIGNEMENT OF THE UV DOSE

3: PROTECTS THE MOLECULE FROM THE ENTRANCE OF WATER MOLECULES IN THE FIRST COORDINATION SPHERE

← IDENTIFICATION CARD

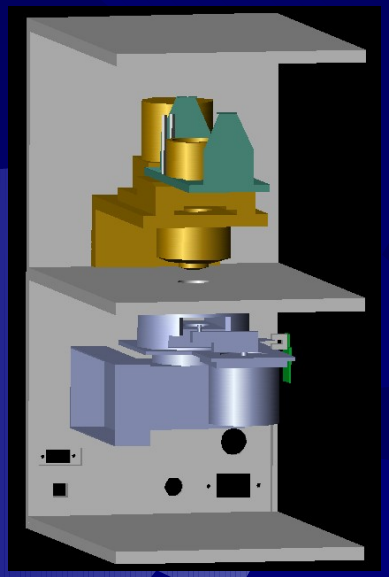


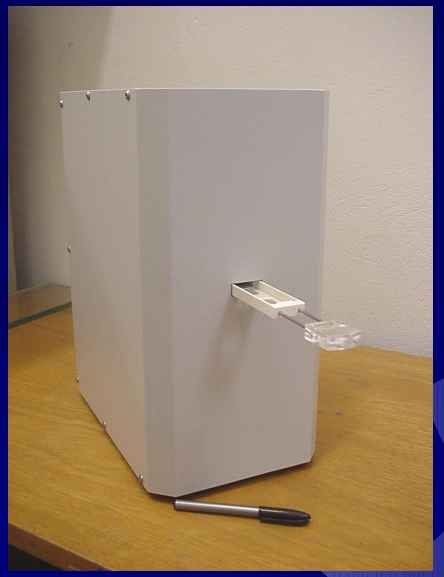
OLED FOR UV DOSIMETRY : n-DOMOLED

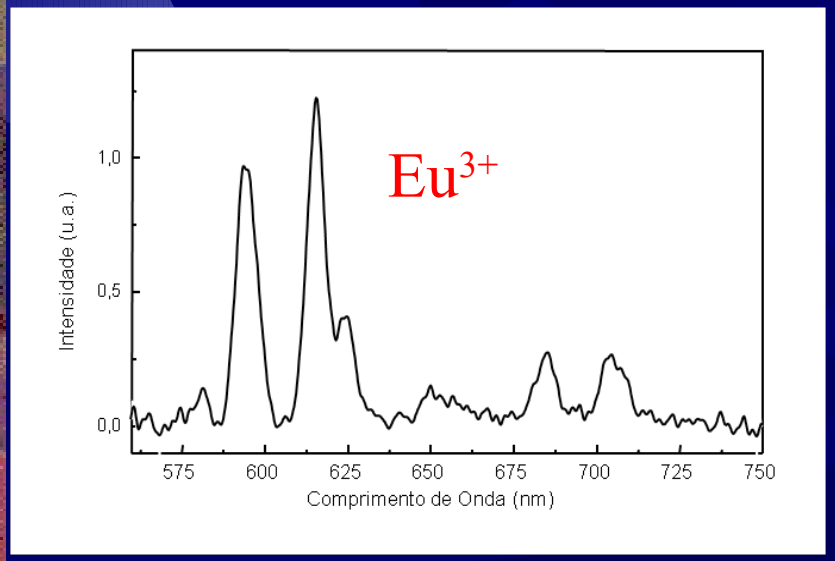
PATENT: PI0203053-5

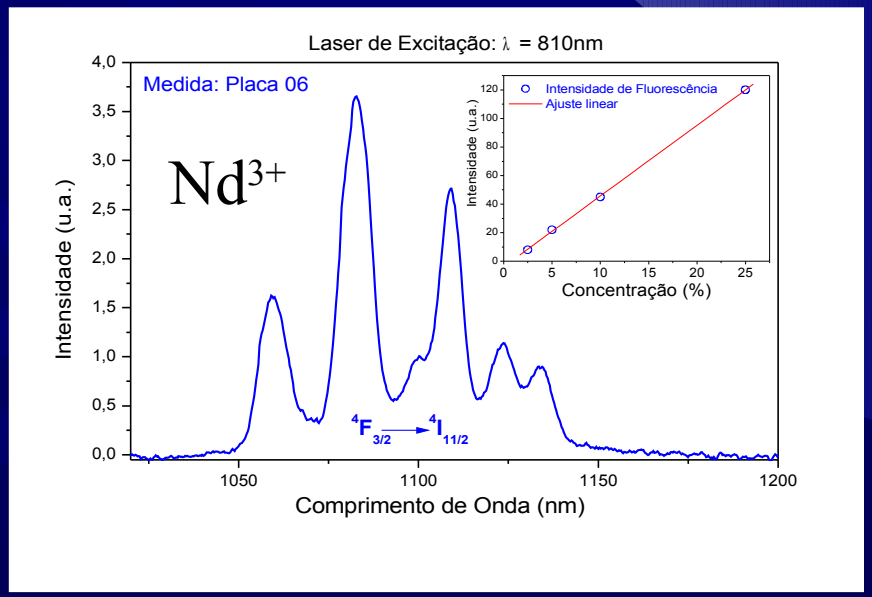
n-DOMO Nanodosimeter for personal use

Prototype Fluorim 1.0 using Nd^{3+} (patent)

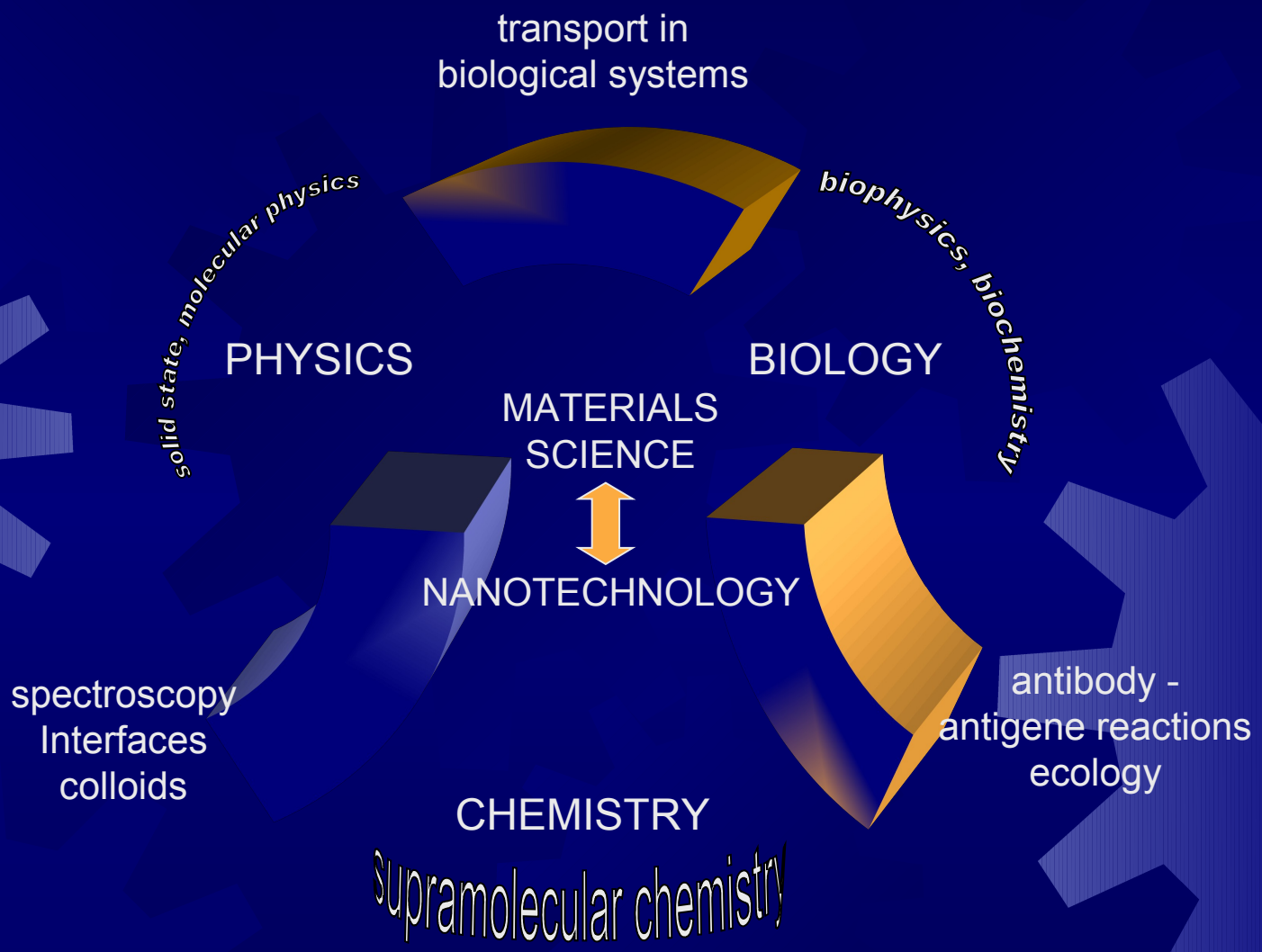








Nanotechnology: a multidisciplinary organization



Concluding remarks

• To attain a sustainable development, a change of paradigm in the way of conducting R&D is required;

• This must be based, including the formation of human resources, on an Ethical Modernity instead of a Technical Modernity, and on shared moral premises between industrialized and economy latecomer's countries;

• Nanotechnology, viewed as an environmentally clean and extremely powerful technology, opens a number of new possibilities towards sustainable development.

Let us make our best towards these goals for a sustainable future