The Abdus Salam
International Centre for Theoretical Physics

United Nations
Educational, Scientific and
Cultural Organization

IAEA
International Atomic Energy Agency

2257-65

Joint ICTP-IAEA School of Nuclear Energy Management

8 - 26 August 2011

National Nuclear Programme – Internal and External Stakeholders

Andrey Kosilov
IAEA, Vienna
Austria

Strada Costiera 11, 34151 Trieste, Italy - Tel.+39 040 2240 111; Fax +39 040 224 163 - sci_info@ictp.it

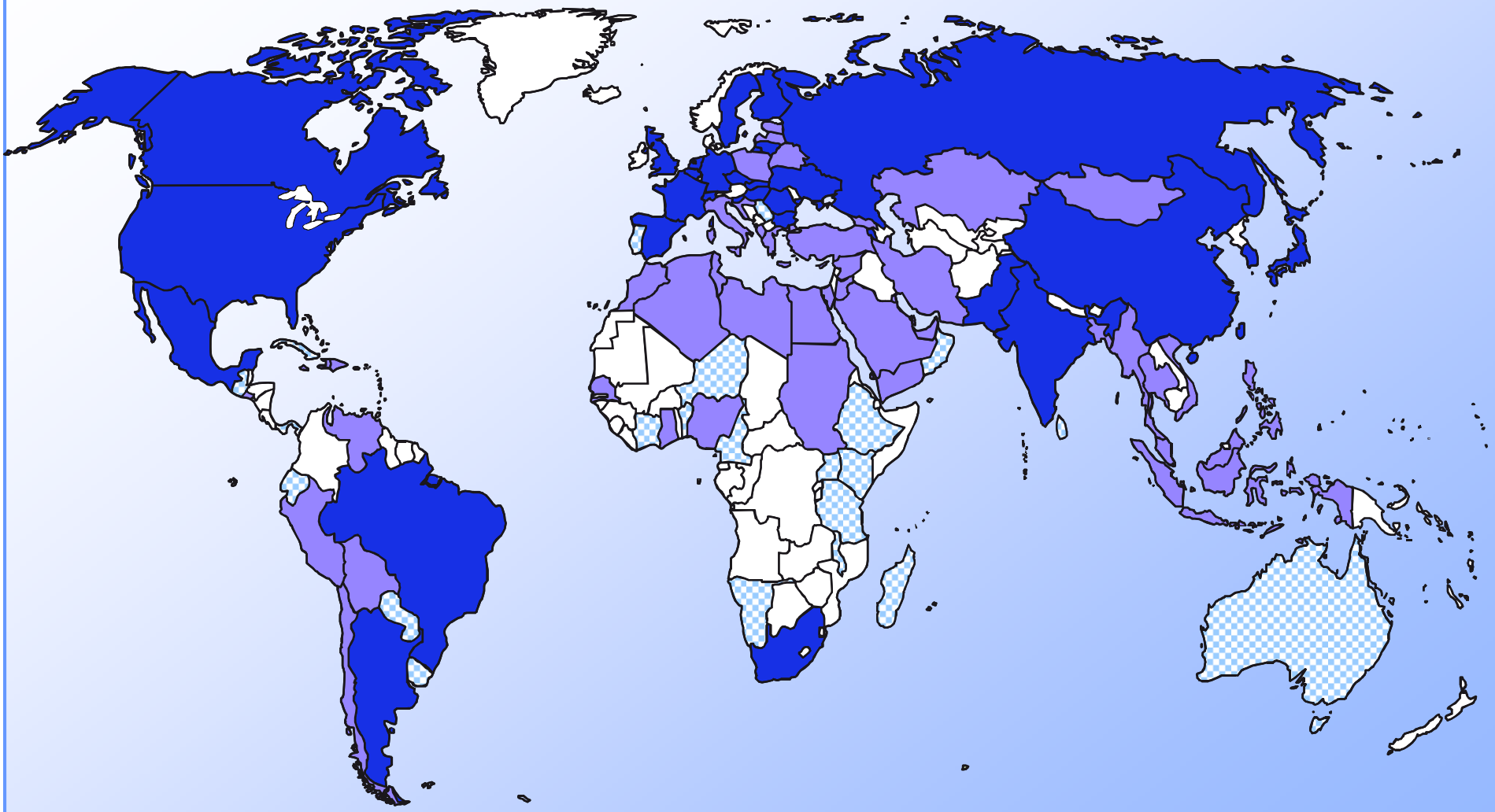
National Nuclear Programme: Internal and External Stakeholders

IAEA- Nuclear Energy Department – Nuclear Power Division

Andrey Kosilov

A.Kosilov@iaea.org

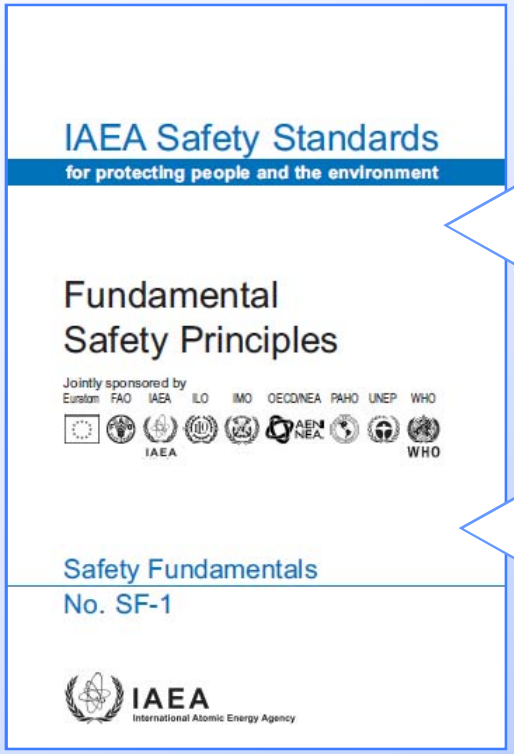
More than 60 countries have expressed their interest for nuclear power



Position of the IAEA

Extract from DG's 2008 General Conference speech:

"Every country has the right to introduce nuclear power, as well as the responsibility to do it right."

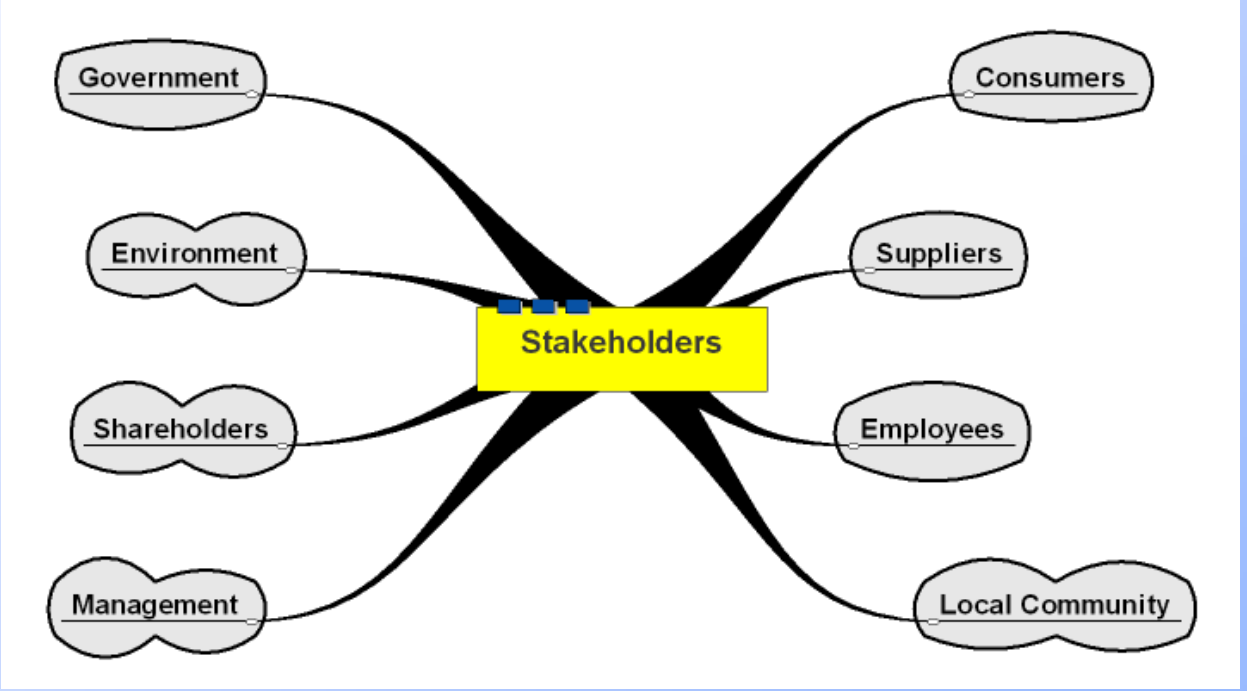


Principle 1: Responsibility for safety

Principle 2: Role of government

Stakeholder may refer to:

- Stakeholder (corporate), a person, group, organization, or system who affects or can be affected by an organization's actions
- Consumer stakeholder, a person or group with an interest in a business or organization
- Project stakeholder, a person, group or organization with an interest in a project




stakeholders
customers
prospects
employees
internal
customers
government
regulators
board
of directors
professional
associations
shareholders
investors
industry experts
academic
institutions
investment
analysts
financial
community
vendors
media
general public
community
organizations
volunteers
strategic alliances
partners
competitors

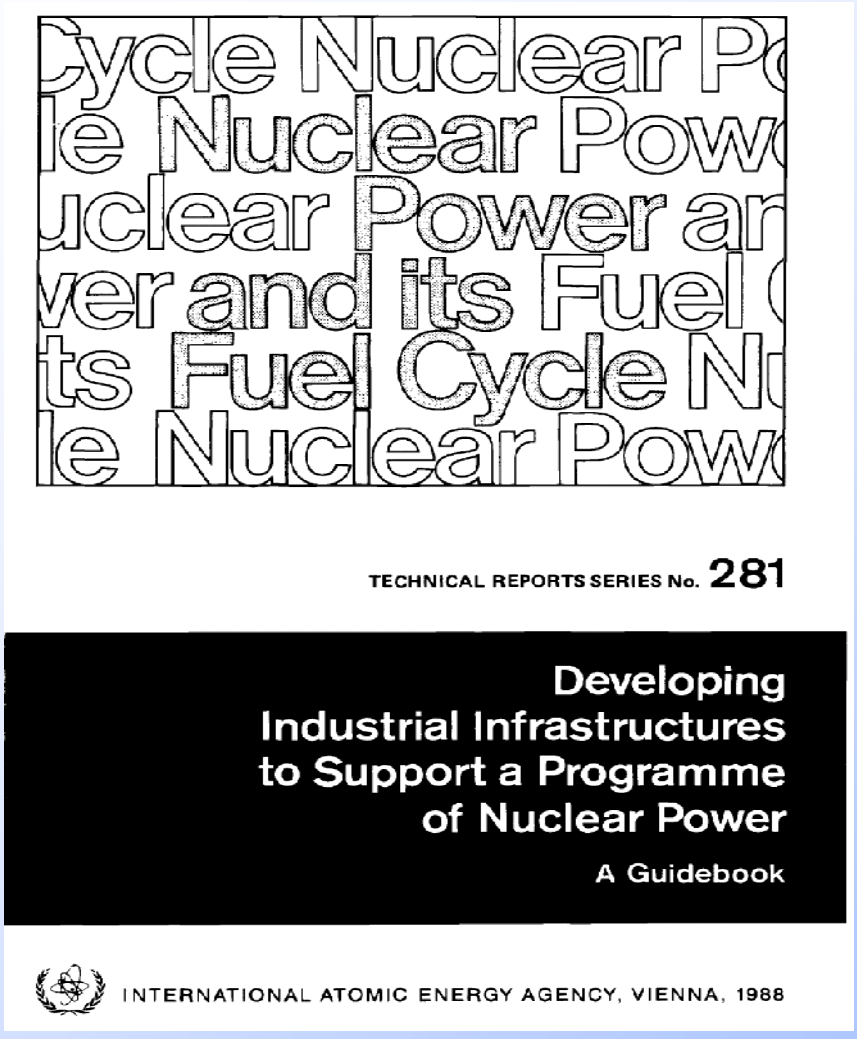
Outline

Industrial Involvement

Technology Transfer

Process Management

IAEA Technical Report, 1988



Contents

01 Executive Overview
02 The Nuclear Power Technology
03 Role of the Utility in Project Implementation
04 National Participation
05 The Transfer of Technology
06 Quality Assurance
07 Engineering and Project Management
08 Equipment Manufacturing and Materials Supply
09 Plant Construction, Erection and Commissioning
10 Fuel Cycle Activities

The Relevant IAEA documents

Milestone Approach, Nuclear Power Project

- Considerations to launch a nuclear power programme, GOV/INF/2007/2 (2007)
- Milestones in the Development of a National Infrastructure for Nuclear Power, NE-Series-Guide, NG-G-3.1 (2007)
- Basic infrastructure for a nuclear power project, IAEA TECDOC 1513 (2006)
- Evaluation of the Status of National Nuclear Infrastructure Development, NE Series Report NG-T-3.2 (2008)
- Managing the First Nuclear Power Plant Project, TECDOC-1555 (2007)
- Potential for sharing nuclear power infrastructure TECDOC-1522, 2006

BID Preparation

- Economic Evaluation of Bids for Nuclear Power Plants, TRS-396 (1999)

Safety

- SF-1 Fundamental Safety Principles, SF-1(2006) and relevant safety standards

Financing

- Financing of nuclear power plants, NE Series No NG-T-4.2

Scenarios of adoption of nuclear power
Scenario A

- The country/utility wishes to use nuclear power for the generation of electricity.
- There is no wish in the Country to develop an indigenous industry either in the nuclear field, or in the support of manufacturing or technology development.

Scenarios of adoption of nuclear power
Scenario B

- The country/utility wishes to use nuclear power for the generation of electricity.
- The country wishes to maximize its involvement in the construction project and wishes to look for participation in the first project with increased involvement later.
- The Country does not wish to develop any fuel cycle activities.

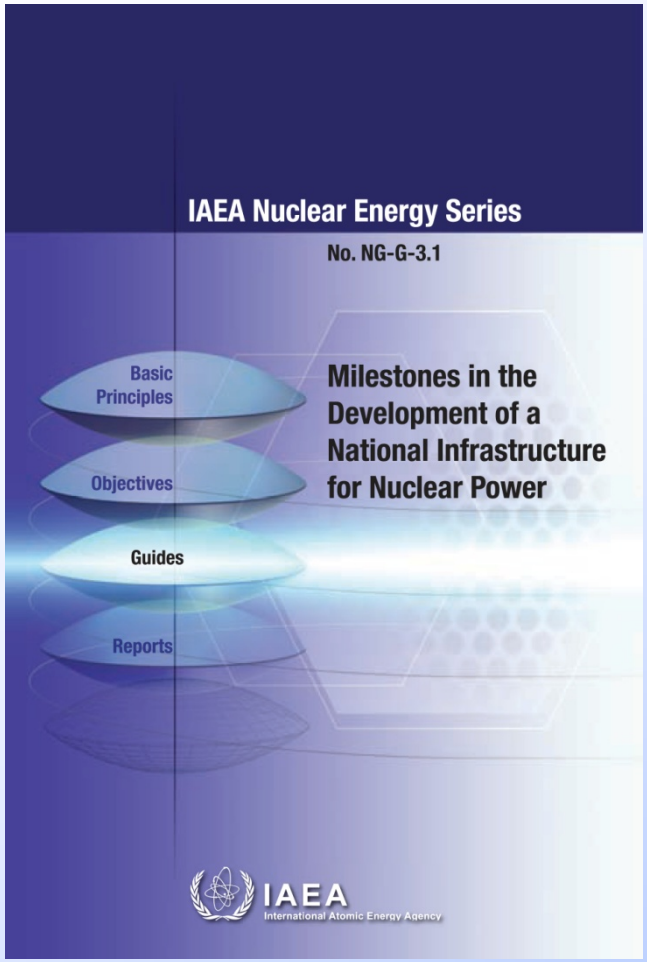
Scenarios of adoption of nuclear power
Scenario C

- The country/utility wishes to use nuclear power for the generation of electricity.
- The country wishes to maximize its involvement in the construction project and wishes to look for participation in the first project with increased involvement later.
- The Country wishes to develop fuel cycle activities on the basis of indigenous fuel available.

Scenarios of adoption of nuclear power
An alternative Scenario D

A country/utility wishes to purchase a Country of Origin Approved and precertified Series-production NPP, for an acceptably characterized site through a build and operate, Turnkey contract.

Milestones in the Development of a National Infrastructure for Nuclear Power, NE-Series-Guide, NG-G-3.1 (2007)



Issue 18 Industrial involvement

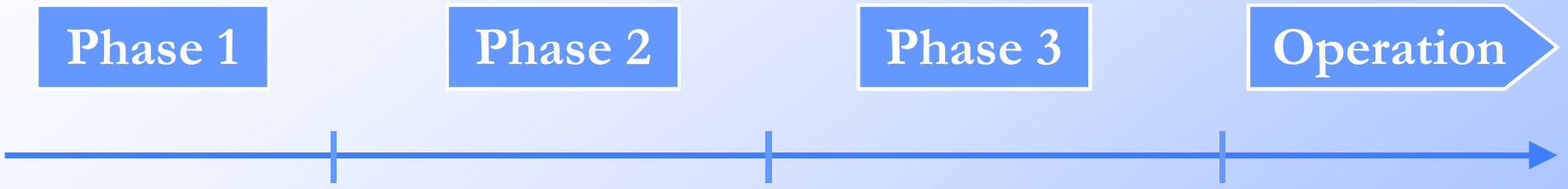
- Many commodities, components and services are required to **construct and support the operation** of a nuclear facility.

- These supporting activities can be a source of jobs and economic growth for the country and the local region.

- Supplying equipment and services to support a nuclear facility requires industrial organizations that can comply with the codes and standards and operate under rigorous quality programmes.

- The nation should adopt a policy of intent with respect to developing or enhancing industrial capabilities.

The 3 Milestones



Milestone 1

Ready to make a *knowledgeable* decision to launch a nuclear programme.

Milestone 2

Ready to issue the call for tenders for the NPP.

Milestone 3

Ready to commission and operate the NPP.

Industrial involvement: Milestone 1 — Ready to make a knowledgeable commitment to a nuclear programme

- Assessments of national and local industrial capabilities;
- Assessment of the interest of business and industrial leaders in participating in the nuclear programme considering the special requirements that are necessary;
- Consideration of the ability to obtain the necessary investment for intended upgrading of industrial facilities and programmes;
- Develop short term and long term policies to encourage the level of participation that is practical and desired.

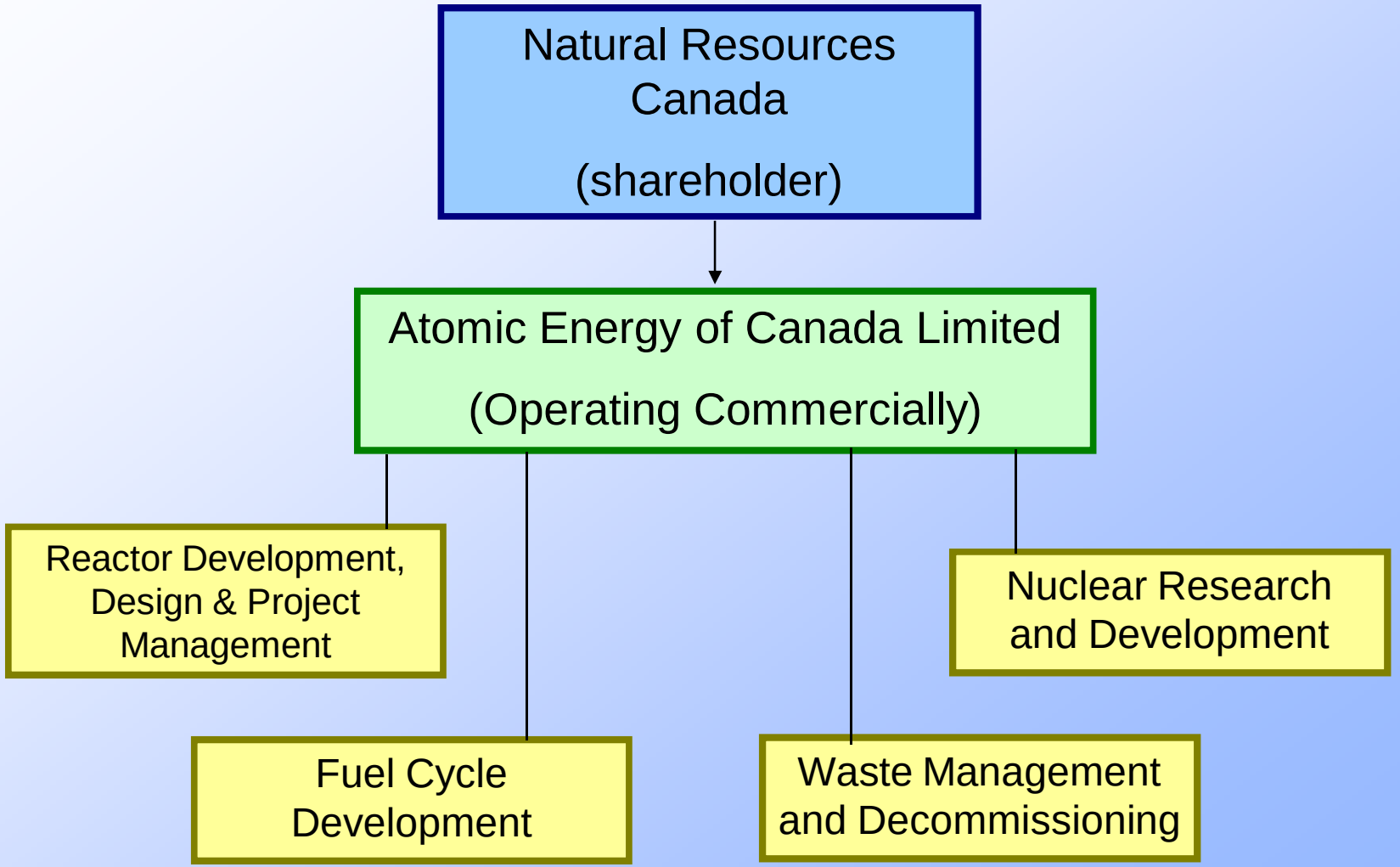
Industrial involvement: Milestone 2 — Ready to invite bids for the first nuclear power plant

- Which national or local suppliers can reliably supply commodities, components or services to the nuclear related or non-nuclear portions of the facility to be constructed;
- What upgrades in skills and capabilities are realistic in a time frame to support nuclear construction;
- Firm decisions on national or foreign sources of supply for commodities, components and services for the first nuclear power plant;
- Bid specification clarity in accordance with those decisions.

Industrial involvement: Milestone 3 — Ready to commission and operate the first nuclear power plant

- As the construction phase of the nuclear power programme nears completion, a reassessment of the sources of supply to support operation can be undertaken.
- If the national and local industrial structure has progressed sufficiently, the supply of spare parts, consumable supplies, maintenance services and calibration services can be allocated accordingly (Supplier qualification requirements similar as for the construction stage established).

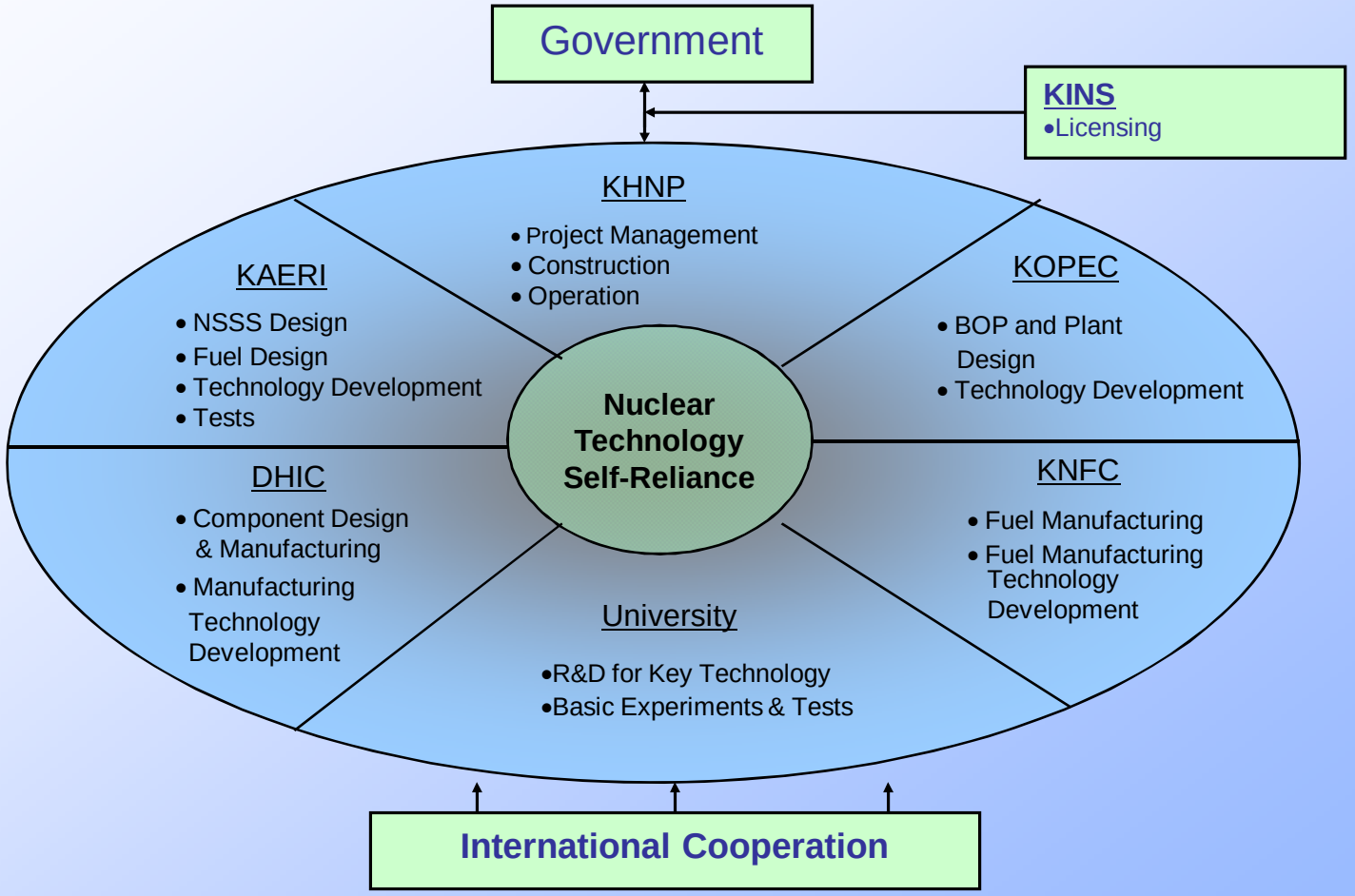
Nuclear Technology Development - Canada



Nuclear Project Implementation - Canada

- Nuclear design and licensing – AECL and private sector
- Nuclear component manufacturing – private sector
- Nuclear project management – AECL and private sector
- Nuclear fuel manufacturing – private sector
- Uranium mining and processing – private sector

Division of Responsibility - Korea



Example of Electrical Industry capabilities - Indonesia

No.	Company Name	Priority Product	Experience
1.	PT. Unindo	Power Transformer	Transformer, Switchgear and Accessories
2.	PT. ABB Trans & Distribution	Substation, Transformer, Switchgear	HVDC, AC System, Substation,etc
3.	PT. Kabelindo Murni	Power & Telecom cable, Accessories of cable	Low & medium voltage cable, bare conductor, and cable for communication
4.	PT. Trafoindo Prima Perkasa	Distribution Transformer	Current and voltage transformer distribution: medium voltage
5.	PT. LEN Industri	Professional electronics & components	Communication equipment, control system, defence electronic, IT Technology:automatic warning system, solar diesel hybrid power, etc.

Estimated local content for Thailand's first nuclear power plant

Activity	Local content (%)	Remarks
1. Architecture Engineering	0	No experience and no experts (% local content on man-month rate)
2. Construction work 2.1 Foundation, buildings, including civil work	20	Contribution on non-nuclear related work
2.2 Steel Stainless steel Structural steel Steel rods	20* (17.5**) 20* } (13.3**) 100*	Aggregate quantity from all categories of work
1. Concrete	100*	Contribution on non-nuclear related work
1. Transmission line	30***	The Engineering Division and Transmission Construction Division of Electricity Generating Authority of Thailand can make a conceptual design and detailed design of the transmission system and high-voltage stations.
1. Nuclear Steam Supply system	0	Contribution on equipment and part fabrication
1. Turbine / Generator	0	Contribution on equipment and part fabrication

Discussion and exercise:

Write down the main elements of industrial involvement you consider for the implementation of a nuclear project in your country .

15 minutes.

Outline

Industrial Involvement

Technology Transfer

Process Management

Technology Transfer

Technology transfer may cover every segment of the nuclear power cycle

- *In all areas of localization:*
  - Manufacturing
  - Engineering
  - R&D
  - Quality Management
  - Safety
- *Most often partnerships:*
  - Joint Ventures
  - Co-Investments
  - Co-Developments
  - Technical Cooperation
  - …

Localization and nuclear programs

- Nuclear projects are a stimulus for the economy.
- Localization should be developed proportionally to the nuclear construction program
- A comprehensive localization program requires a long term strategy and commitment.
- Nuclear projects do not accept any compromise with quality.
- Transfer of knowledge

Experiences on Technology Transfer - Korea

Transferred Materials and Knowledge

- Technical Document : about 8,000 volumes
- Reference Document : 1,300,000 pages
- Computer Program : 600 Packages
- Training : 1,800 MMs
- Consulting Services : 520 MMs
- R&D Participation : 310 MMs

Outline

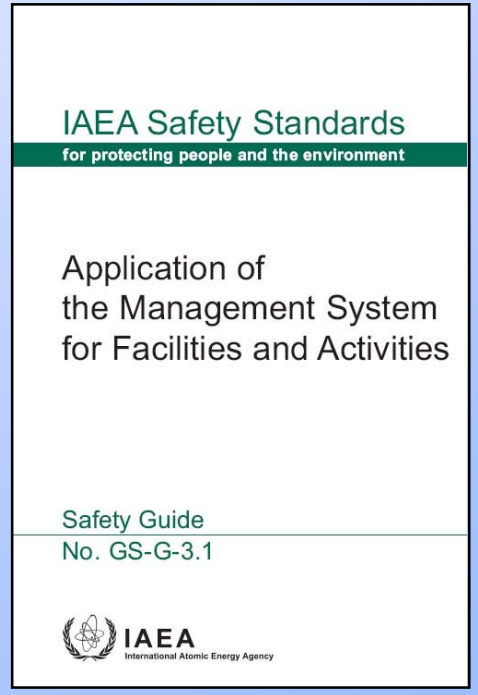
Industrial Involvement

Technology Transfer

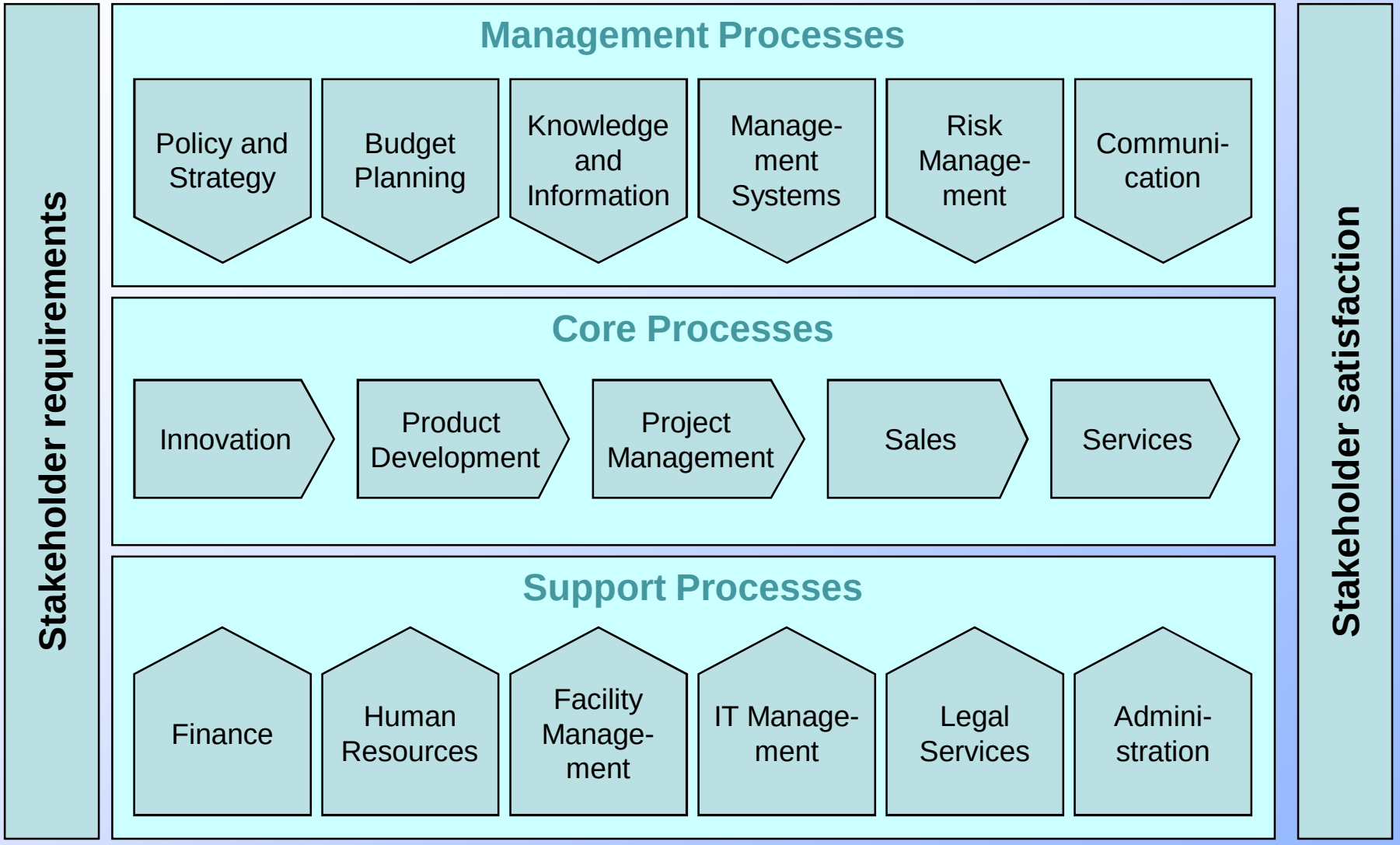
Process Management

PROCESS IMPLEMENTATION

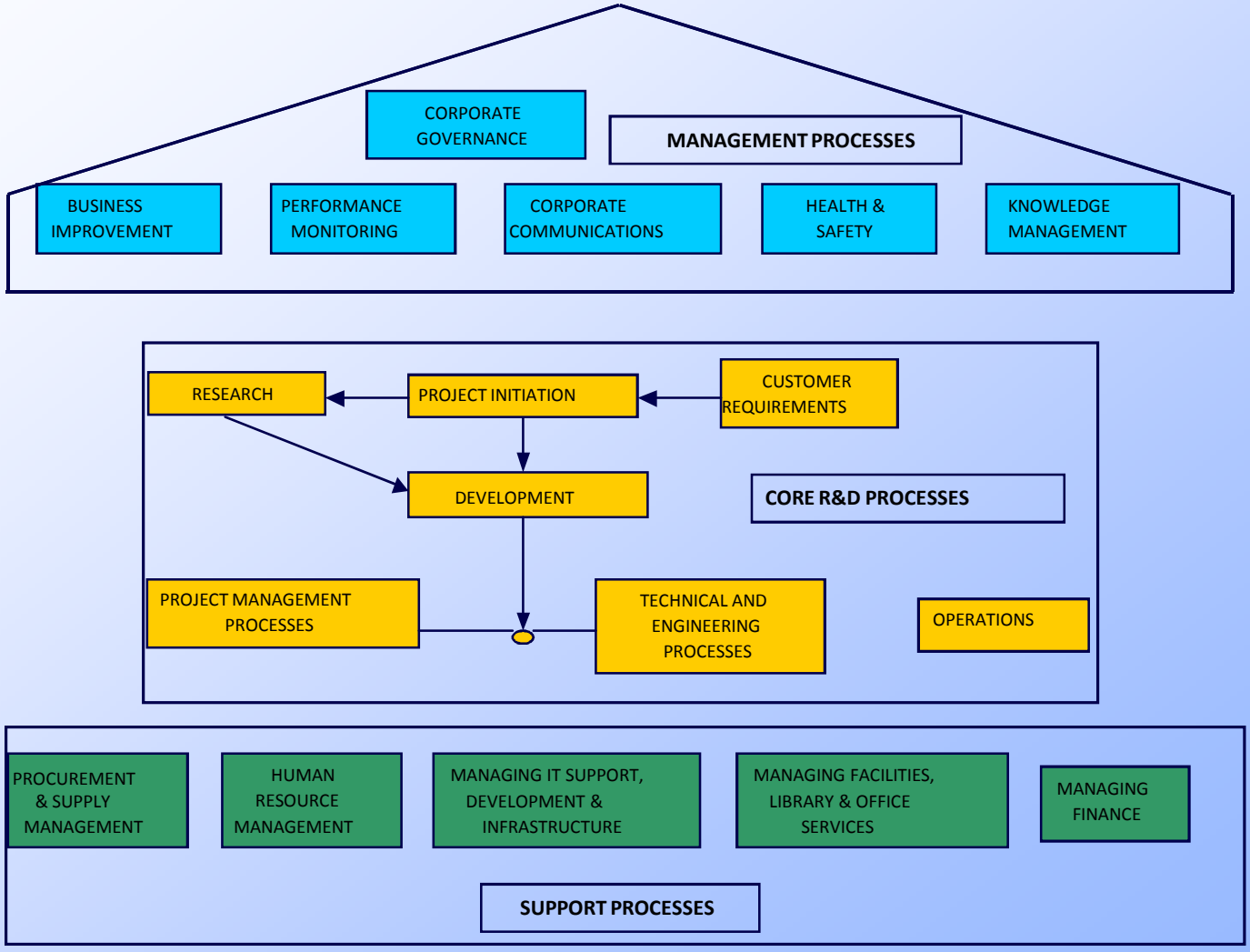
A specific management process should, on an ongoing basis, provide a vehicle for establishing priorities, including priorities for new work, and excluding lower priority activities. This process should also integrate all review and oversight activities by management, to ensure that there is a structured approach to decision making that meets the needs of the business plan.



Process Management



Processes in R&D organization



Process model (NPP)

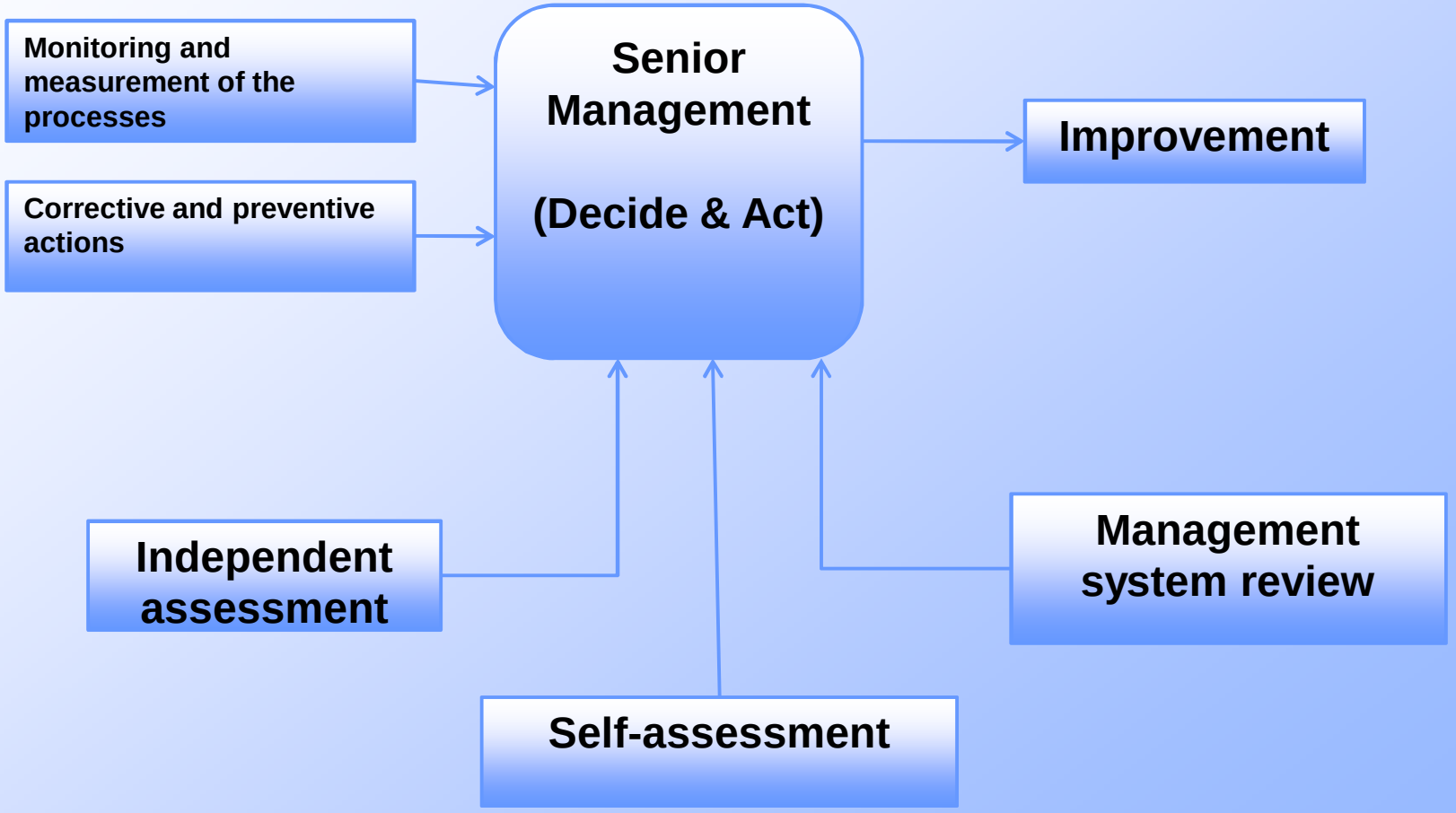
- Core processes
  - *Processes that produce the output critical to success of the organization*
    - Operation processes
    - Maintenance processes
    - Technical support processes
- Support processes
  - *Provide the infrastructural services necessary to perform all the core and management processes effectively, e.g.*
    - Providing training
    - Providing for personnel safety, radiation protection and fire protection
    - Providing for emergency preparedness and response arrangements
    - Providing for environmental monitoring and environmental protection
    - Providing information technology support
    - Procuring goods and services
    - Providing documentation and records

Examples of NPP processes

- staffing
- qualification and training
- commissioning
- plant operations
- maintenance
- in-service inspection
- fuel management
- plant modifications
- safety analysis/ review
- waste management and environmental monitoring
- emergency preparedness
- quality assurance,
- human factors
- document control and records

MONITORING AND MEASUREMENT

A strategic objective of an organization should be the continual improvement of processes in order to enhance the organization's performance.



Some important issues - Conclusion

- **Many countries are in the early phases of infrastructure development**
- **Countries getting help from various sources**
- **Need for better coordination and communication among:**
  - ***foreign actors*** *providing assistance to the countries (international organizations, foreign institutions, private consultants…)*
  - ***domestic actors*** *involved in the development of the national nuclear power programme (relevant ministries, operator, regulator…)*
- **The IAEA works to avoid any underestimation of the workload resulting from the activities that should be conducted for the implementation of a nuclear infrastructure sustaining long term safety**
- **International confidence and trust are important for a successful nuclear power programme.**

Thank you for your attention.

IAEA

International Atomic Energy Agency

Atoms For Peace

A.Kosilov@iaea.org

2011