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United Nations
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Joint ICTP-IAEA School of Nuclear Knowledge Management

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Nuclear Knowledge Management in R&D Organizations

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Session 5

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Nuclear Decommissioning Authority

Presentation Scope

- Overview of the global nuclear R&D environment
- Challenges for the nuclear R&D community
- Characteristics of nuclear R&D knowledge

Based on work recently conducted on behalf of IAEA to produce written guidance

Global Overview

Nuclear R&D Knowledge originated from the development of weapons:

- Small community of specialists
- Wide range of disciplines
- Mainly government secondments
- Clear and unambiguous team goal
- Understanding of individual role
- Absolute need to share knowledge

Is there anything we can learn from ‘the original’ nuclear R&D community of practice?

Global Overview

Development of peaceful uses:

- Medicine
- NPPs
- Industrial applications
- Agriculture

Knowledge domains created, particularly:

- NPP design, construction, operations
- NPP development
- Fission and fusion

Global Overview

A series of dramatic events compounded by increased social awareness had a profound impact on nuclear R&D:

- Windscale Pile
- Three Mile Island
- Chernobyl
- Global economic downturn
- ‘Green’ politics
- Societal choice

... slow down of nuclear R&D, migration of workforce, attraction of ‘new’ technology, gradual decline in expertise

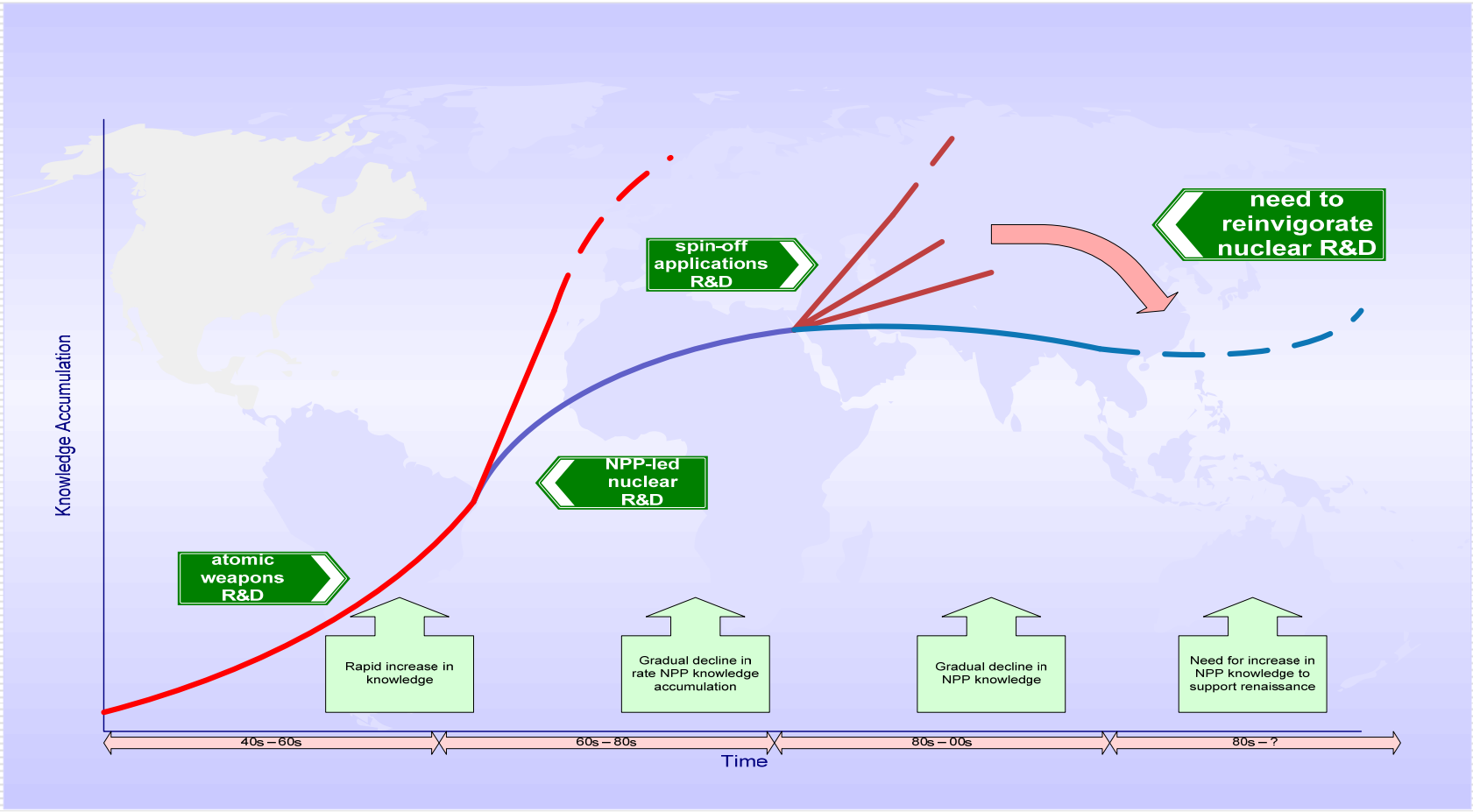
Global Overview

A new beginning?

- NPP life extensions
- Commercial applications (spin offs)
- Radioactive waste
- Improvements to NPP designs and materials
- Climate change
- Energy supply reliance

An increase in nuclear R&D knowledge will be necessary to support the industry in the 21st century

Knowledge Evolution



Potential Outcomes

- Safe operation of existing facilities
- Design, construction and operation of new facilities
- Safe, economic and environmentally responsible decommissioning of redundant facilities
- Management of radioactive waste
- Improvements in other nuclear applications
- Knowledge and technology transfer
- Development of novel materials

R&D KM Challenges

- Re-igniting the interest in nuclear research
- Linking the need for basic research with tangible benefits
- Securing funding over the long term
- Transition to a sharing culture whilst respecting the need to protect intellectual capital
- Communications with stakeholders

R&D KM Challenges

Product definition

- Principal product is knowledge
- Defining targets and goals

Protection of intellectual property

- Speculative research is difficult to justify
- Partnership development (e.g. with academia)

Human resources

- Limited pool of talent
- Making the industry attractive again
- Clear link to future benefits

R&D KM Challenges

Supporting Nuclear Renaissance

- Re-building and strengthening the infrastructure
- Optimise processes to gain maximum benefit and reduce duplication of effort
- Need to establish R&D goals
- Be prepared to consider the whole life-cycle

Characteristics

Nuclear Knowledge

- Highly complex
- Multi-disciplinary
- Costly
- Derived over long time periods
- Widely dispersed throughout stakeholder group

Characteristics

Nuclear Research Knowledge

- Research activities may not be goal orientated
- Potentially, no distinct ‘product’
- Immediate benefits may be unclear
- Value may only be apparent in longer term future

Nuclear Development Knowledge

- Generally based on existing knowledge
- Usually goal or product orientated
- Rapidly evolving (along with ‘product’)

Characteristics

Highly Complex

- Fundamental and applied science
- Models and simulations necessary
- Significant amounts of data

Multi-discipline

- Science, engineering
- Economics, social science

Characteristics

High Cost

- Specialist equipment, facilities, codes
- Human resources' skills set

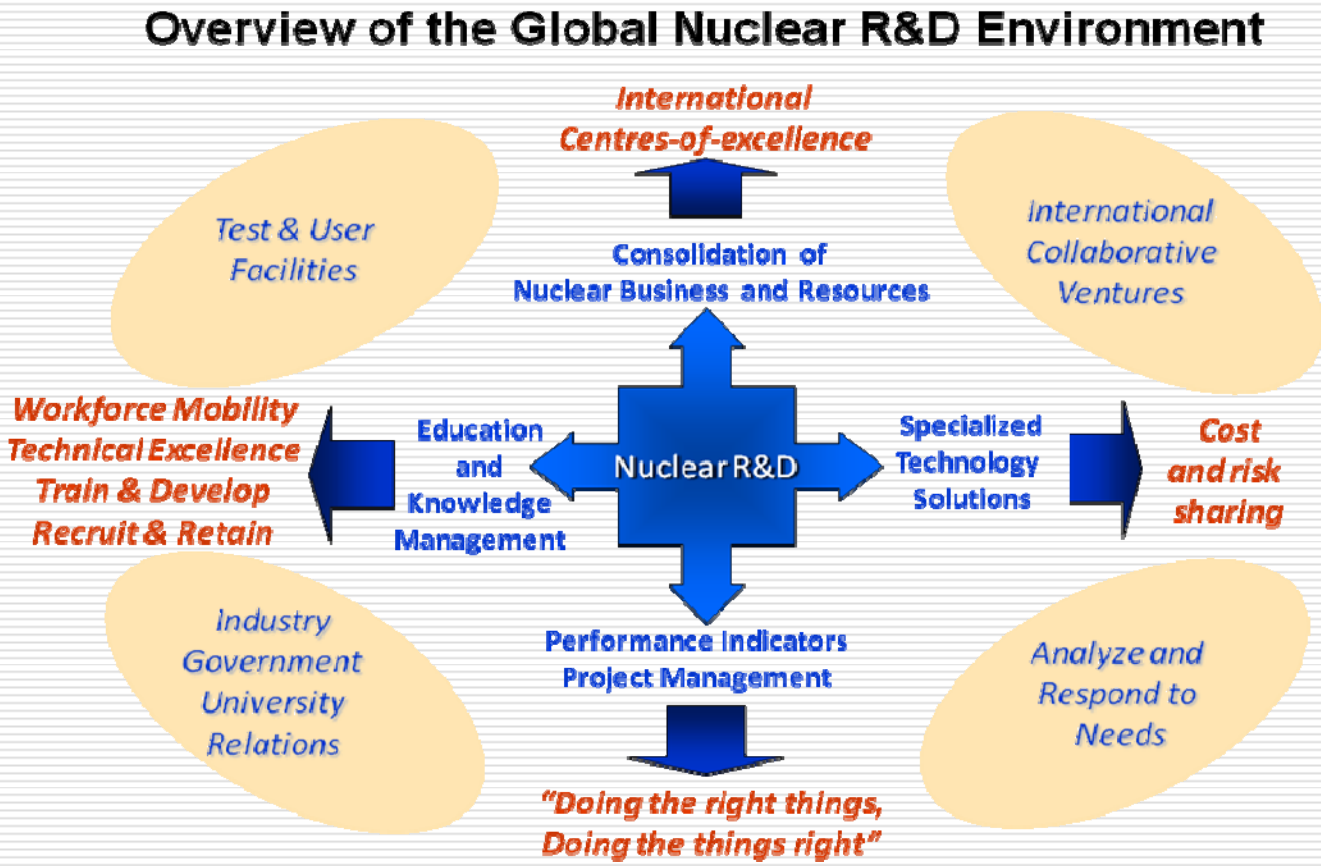
Long Term

- Need to demonstrate absolute safety
- Amalgamating wide range of inputs

Governance

- Significant national government involvement
- International implications
- Regulatory interests
- Long term implications of application
- Controlling potential misuse of information/knowledge gained

Visual Summary



The Benefits

Cost controls

- Avoids duplication of effort
- Identify real knowledge gaps
- Demonstrate need for funding

Strengthening the infrastructure

- Provides a resource to develop new talent
- Highlights contextual links between stakeholders
- Programme integration
- Access promotes knowledge enhancement

The Benefits

Communication

- Openness and transparency
- Establishment of knowledge domains

International Expectations

- Quality control
- Regulatory compliance
- Ethical responsibility

Questions