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Human Resources Development Challenges for Nuclear Newcomers

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Global coordination of E&T players in France

International Institute of Nuclear Energy
Education & Training

Academic education → **Hands-on training**

Academic institutions

- Engineering and master degree level
- Operator in nuclear education & training
- Technician level and vocational training
  - Ministry of Education (Prof. High schools)
  - IRI/ AFPI, etc…

Industrials

- Leading companies in the nuclear industry

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EDF

GDF Suez

GIIN

French State departments

Higher education and research, Industry, Environment and Energy, Defense, and Foreign Affairs

Research, Safety, etc…

- Safety Authorities
- Techological Research
- Waste management

Topics

- The Importance of Human Resources Development (HRD).
- Essential aspects of an HRD strategy.
- Focus on HRD of selected stakeholders.
- Conclusion and take away messages.

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The importance of HRD.

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The importance of HRD. Background.

- **Recognized as first priority by IAEA. *Human resources form the cornerstone for all infrastructure activities!***
- **A nuclear program offers job creation opportunities.**
- **HRD has a strong lever effect on program sustainability**
  - **Safety and safety culture?**
  - **Program performance?**
  - **Public acceptance?**

19. Procurement 18. Industrial Involvement 17. Radioactive Waste Management 16. Nuclear Fuel Cycle 15. Security & Physical Protection 14. Emergency Planning	Implementation
13. Environmental Protection 12. Site & Supporting Facilities 11. Stakeholder Involvement **10. Human Resources** 9. Electrical Grid	Infrastructure
8. Radiation Protection 7. Regulatory Framework 6. Safeguards 5. Legislative Framework	Laws, Regulations, Standards
4. Funding & Financing 3. Management 2. Nuclear Safety	National Organisation & Control
1. National Position	Strategy

- **Engaging in a nuclear program is a long term commitment…**

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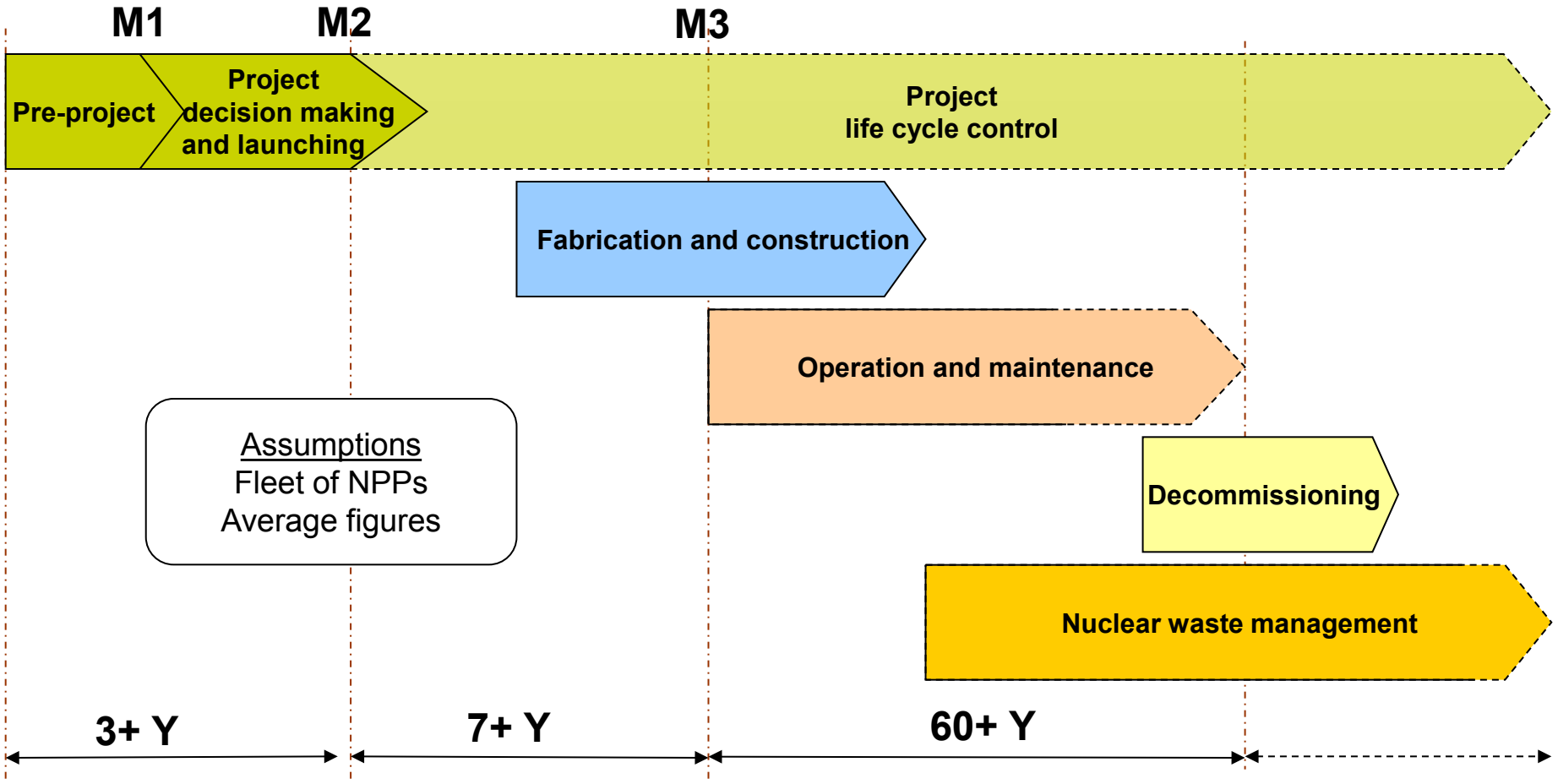
The importance of HRD.
Nuclear energy is a long time commitment.



Human resources must be dealt with carefully from the very beginning of the program and over its life cycle.

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The importance of HRD.
Dealing with a wide range of stakeholders.

- **Decision makers**
  - Government
  - Investors
  - Insurances
- **Regulators & Safety Authorities**
- **Fleet owner operator**
- **Nuclear waste mgt. orga.**
- **Supply chain**
  - Engineering
  - Manufacturing
  - Construction
  - Maintenance
- **Education and training**
- **Research**

Different activities, different competences, different time frames…

…But a similar need for a global and integrated HRD solution!

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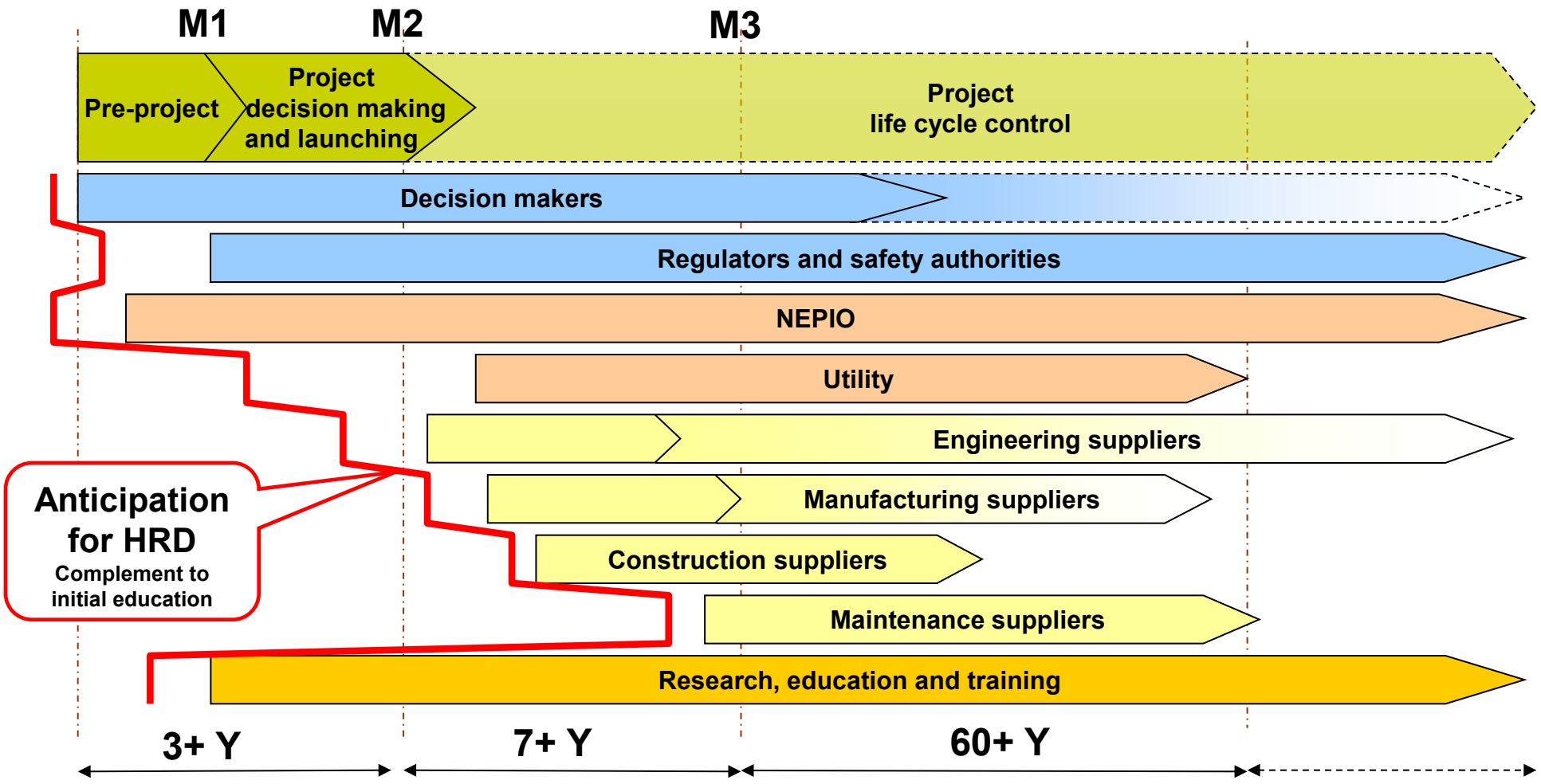
The importance of HRD.
Sequence and anticipation of HRD.



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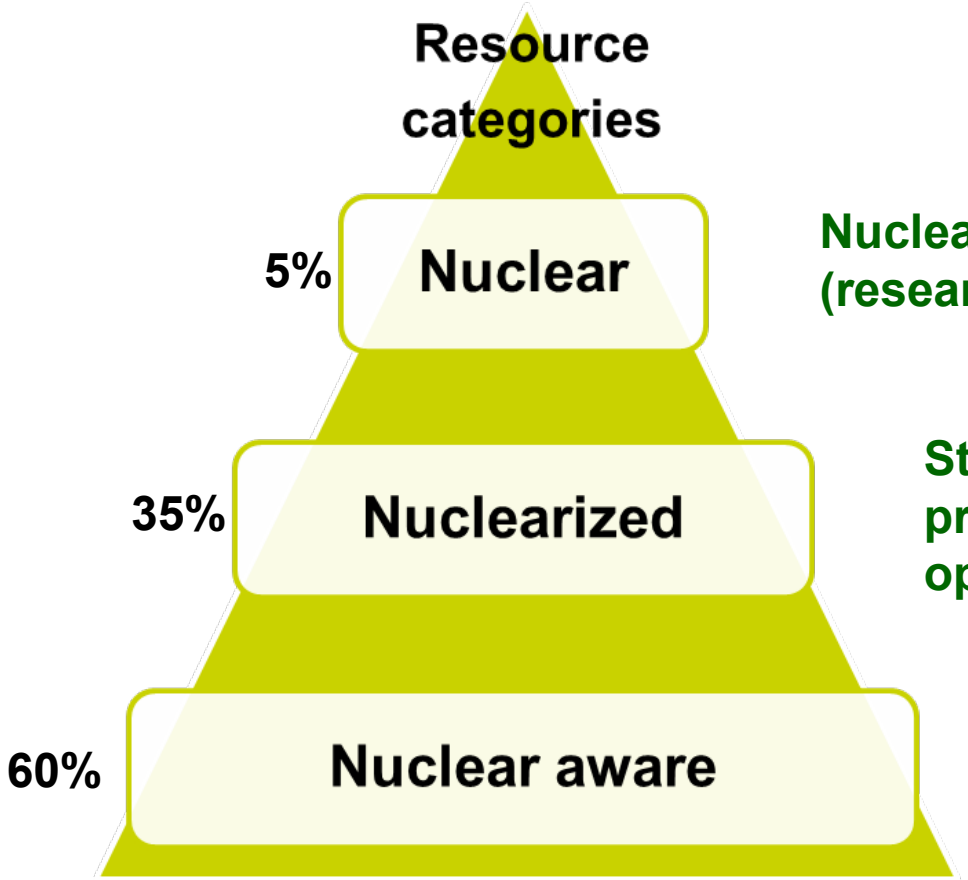
The importance of HRD. Considering “nuclearization”.



Nuclear specialists working on the process (research, core design, safety experts).

Staff having to deal with interfaces with the process (plant systems engineering, operation managers).

Staff having no contact with the process (manufacturing, non nuclear maintenance).

Note: Figures are indicative and account for all staff involved in the program. They significantly vary from one stakeholder to another.

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Essential aspects of HRD strategy.

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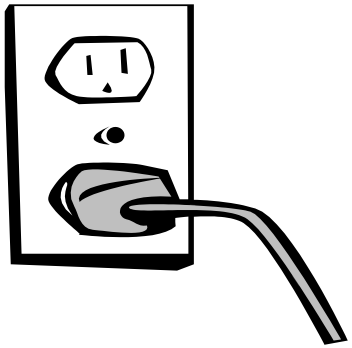
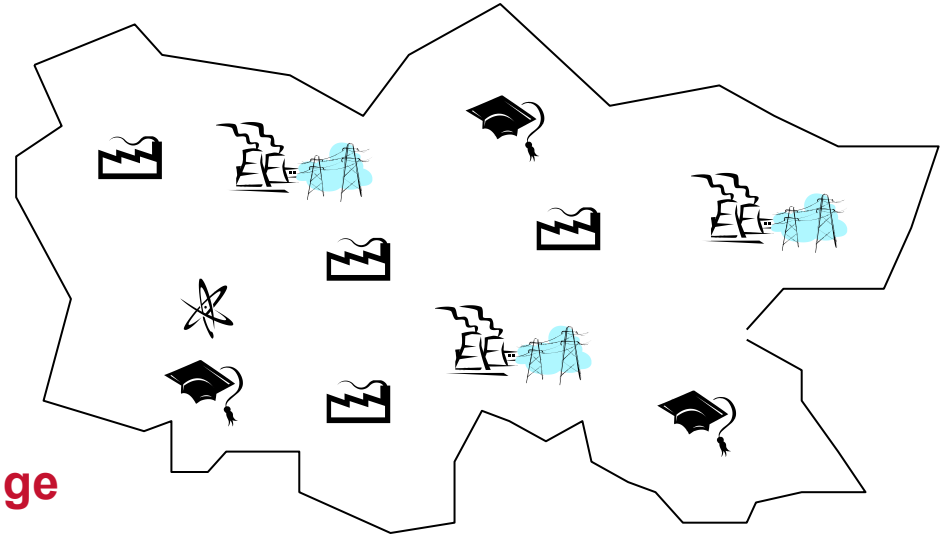
Essential aspects of HRD strategy. A look at country's strategy.



- Plug and light!
  - » Limited HRD challenge

- To develop a new national industry
  - National
  - Regional
  - International
  - » Extended HRD challenge



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Essential aspects of HRD strategy. Factors influencing the choice of a national strategy.

- **National development**
  - Energy mix.
  - Social & Economical situation.
  - Job market (national, regional, international).
  - Industrial development.
  - Level of infrastructures.
  - National education & training capabilities.
- **International network**
  - Relations with established nuclear countries.
  - Level of internationalization of stakeholders (industry, research, education and training).
- **National nuclear program key characteristics**
  - Targeted level of installed power.
  - Timeframe for program implementation.

Make use of local as well as international cooperation, e.g. strategic partnership involving an experienced utility and the selected technology and related vendor.

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Essential aspects of HRD strategy.
Building a HRD strategy.

Subsequent slides assume that a certain level of localization of nuclear activities is decided.

» Basically two approaches «

- **Hiring from abroad**
  - \+ Quick
  - \+ Experience
  - \- Cost
  - \- Turnover
  - \- Limited resources
- **Developing national resources**
  - \+ Jobs creation
  - \+ Motivation of people
  - \+ Autonomy
  - \- Delay
  - \- Potential tension on resources shared with other sectors

» **A flexible mix dependent on country's individual situation**

Attract – Retain - Develop

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Essential aspects of HRD strategy. Adapting with project phases.

	Pre-project	Program decision making	Fabrication and construction	Operating of the fleet
Hiring from abroad	+++	++	+	
Educating internationally	+	++	++	++
Educating nationally		++	+++	+++
Bridging training for unemployed		+	++	++
Bridging training for mobility staff		+++	++	+
Vocational training			+++	+++

More + means higher interest in the solution

- **Note: There is no fixed solution valid for all cases. Here is assumed one country with no nuclear history, but established industrial, education and training capabilities that can adapt to cope with the new needs.**

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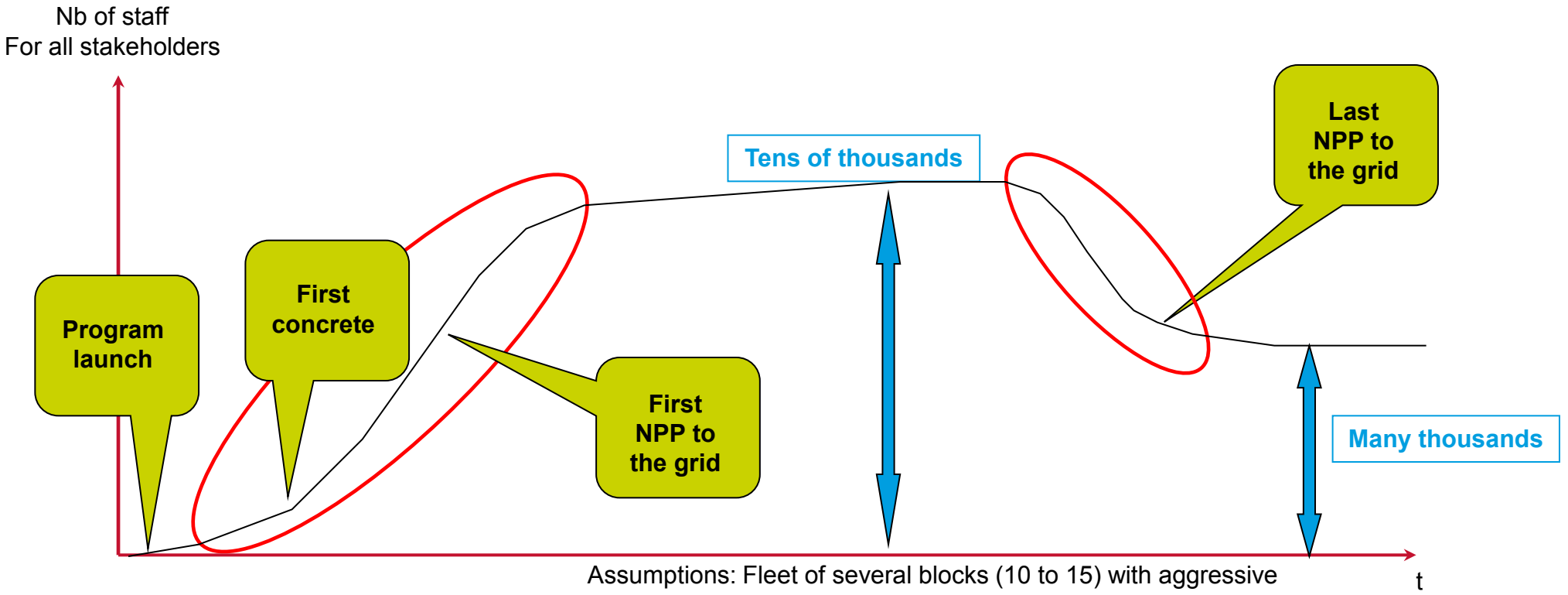
Essential aspects of HRD strategy. Managing critical phases.



Assumptions: Fleet of several blocks (10 to 15) with aggressive construction scheme and development of an ambitious national nuclear industry.

- **Two critical phases**
  - **Steep ramp up at program launch.**
  - **Significant ramp down at end of construction phase.**
  - ***Strong ramp down also when decommissioning will start… But this is another story!***

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Focus on HRD for selected stakeholders.

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Focus on HRD. Owner Operator.

- **Assumptions:**
  - High degree of localization with a long-term objective of a rather self-relying national nuclear industry
  - Quite ambitious nuclear power program (NPP fleet)

Project management, procurement, contract, site management	Fleet operation and maintenance
➢ Engineering degree necessary. ➢ Several hundred people with steep ramp up before decision making phase. ➢ Gradual transfer into fleet engineering team.	➢ To be recruited early enough, long and extensive training. ➢ A few thousands people (ca 350 per block). ➢ Involved in key activities (e.g. commissioning, prep. of operation). ➢ Small fraction of nuclear specialists

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Focus on HRD. Supply Chain.

- Assumptions: strong localization strategy.
- Local supply chain will represent the strongest opportunity for jobs creation.
- Generally easy to develop with local resources.

Engineering	Manufacturing	Construction	Maintenance
➢ Engineering degree, nuclearized or nuclear aware. ➢ Several hundreds people, ramp up before contract award. ➢Detailed engineering then support to engineering.	➢ Technicians and semi skilled, nuclear aware. ➢ Several thousands per block during fabrication and construction. Steep ramp up! ➢ Several hundreds per block in support to operation	➢ Mainly semi skilled, nuclear aware. ➢ Several thousands per block during construction. Steep ramp up!	➢ Mainly technicians and semi skilled, nuclear aware. ➢ Several hundreds per block.

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Conclusion and take away messages

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Conclusion and take away messages

- HRD solution is dependent upon country's economical, societal, industrial situation and development strategy.
- HRD to be integrated in the global HCB approach (education and training, KM, knowledge networks).
- Maximum local benefit with national development.
- International collaboration and partnership with competent and experienced partners is recommended (lever effect).
- Anticipation is key.

» **HRD for a nuclear program is challenging but achievable. Countries already did it and are ready to build long term partnerships.**

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Special French Side Event

NUCLEAR EDUCATION & TRAINING IN FRANCE
AND
SUPPORT TO NEWCOMER AND EXPANDING COUNTRIES

Wednesday, 14 May 2014
From 17:30 to 19:00
IAEA VIC, C Building, Board Room C, 4th floor

Human Resources Development Challenges for Nuclear Newcomers

Thanks for your attention!

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