



The National Nuclear Laboratory and working with academia

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NNL Overview



- Created July 2008 from BNFL Research & Technology
- 850 staff – broad range of science & engineering
- Operate unique national facilities
- SBM Managing Contractor Appointed April 2009
- Initial DECC Objectives:
 - International nuclear R&D centre of excellence
 - Safeguard nuclear expertise, facilities and skills
 - Deliver value for customers
 - Trusted advisor
 - Collaborations/Partnerships/Links
 - Socio-economic focus



serco

Battelle
The Business of Innovation

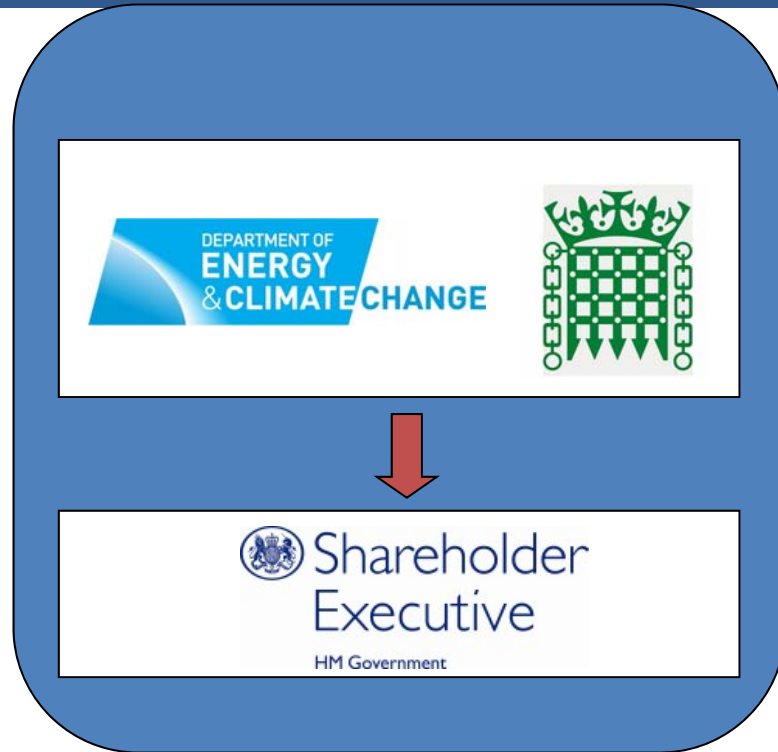
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Key messages from Nuclear Industry Strategy

- Nuclear strategy supporting long term Government energy policy, ongoing programmes and industrial exploitation
- Nuclear Innovation Research Advisory Board (NIRAB) to be established to advise Government.
- Nuclear Innovation Research Office (NIRO) to be established to deliver NIRAB strategy – NNL to host.
- Government to implement long term R&D programmes based on advice from NIRAB.
- NNL mission to be restated to give emphasis to supporting UK national programmes
- Skills, including R&D, a dominant theme

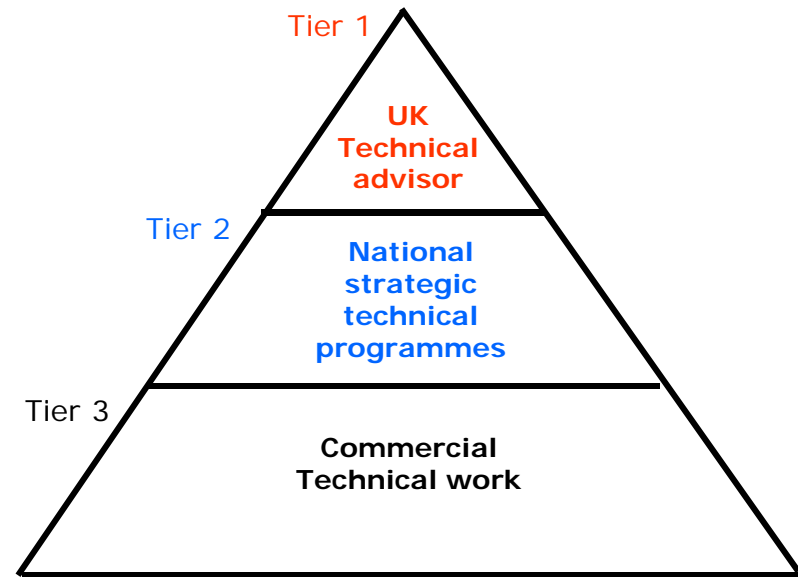


NNL Role and Governance



- National Laboratory for both UK Government and Industry
- Support national R&D programmes
- Ensure R&D capability
- Host and lead NIRO
- Creating partnerships

By 2013/2014



NNL range of nuclear R&D programmes

- Continued operation of existing reactors & fuel cycle facilities (fuel fabrication, reprocessing)
- Legacy waste management / decommissioning
- New nuclear build
- Geological disposal
- Plutonium stockpile disposition
- Naval propulsion support
- Advanced reactor & fuel cycles
- Space propulsion systems
- Security, non-proliferation & safeguards



NNL Science to Solutions



Universities

NNL

Industry

Basic Science

Research, Development and Testing

Technology Deployment

1

Technology Readiness Level's

9

Small scale, low rad

Full scale, high rad

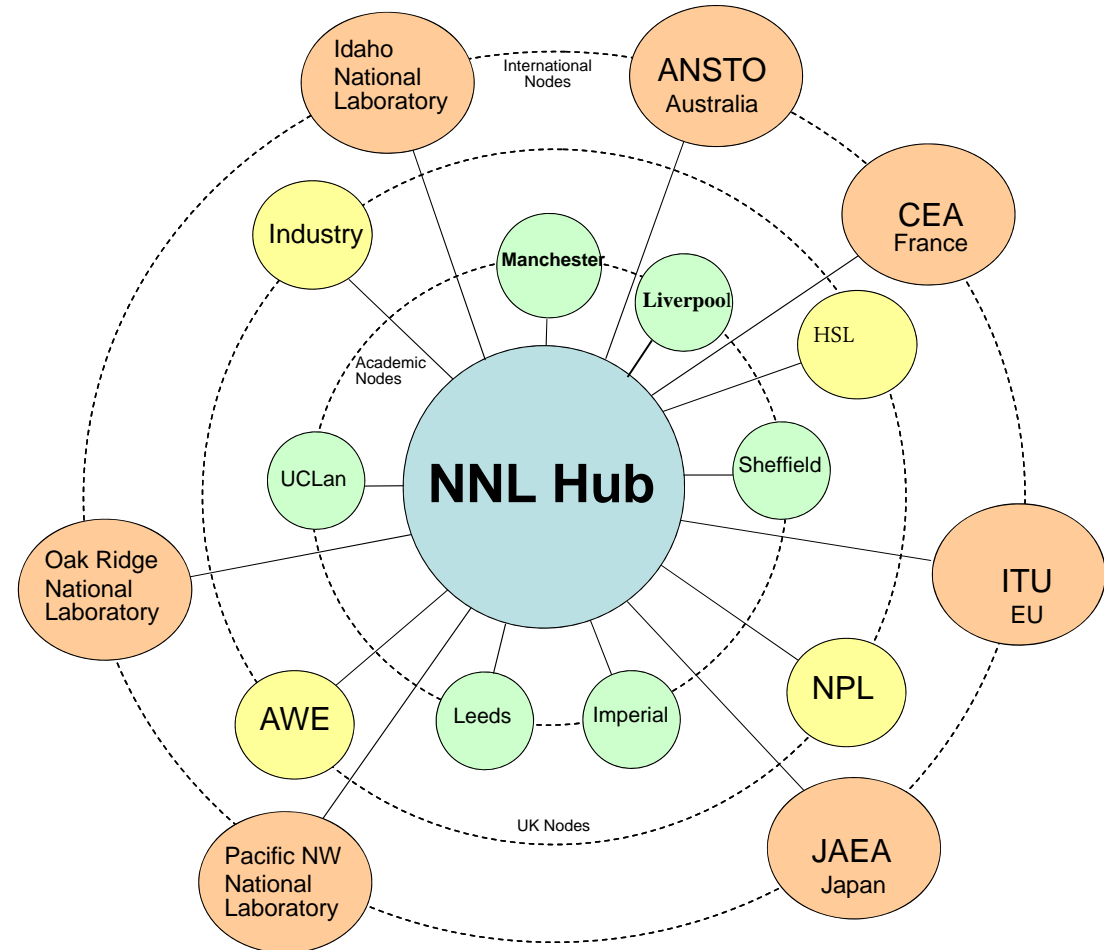
Independent, Authoritative,
Subject Matter Experts



NNL Collaborations

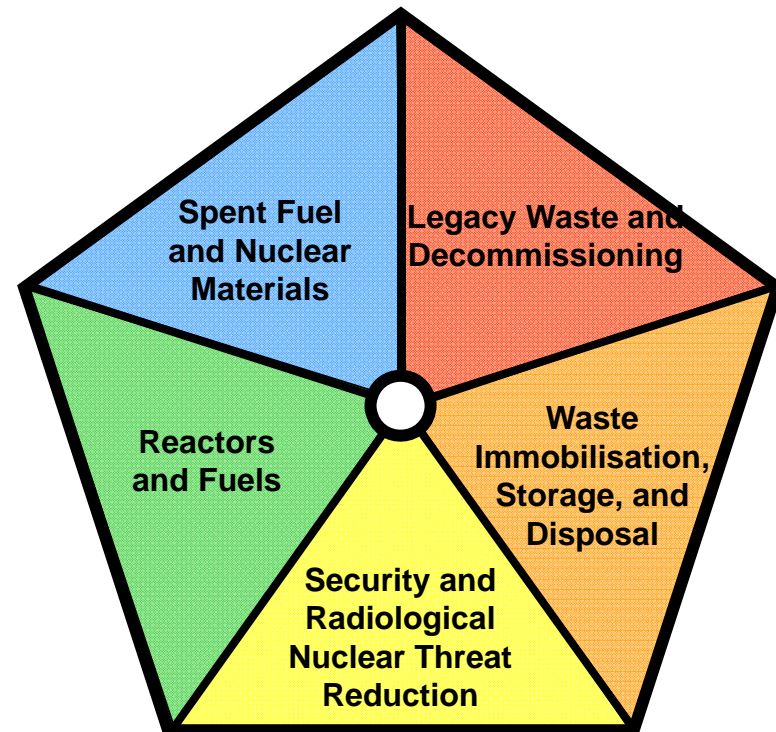
Agreements

- UK Universities and R&D organisations
- International national Laboratories



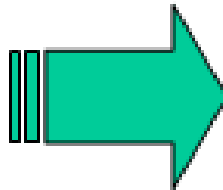
NNL Self Funded R&D Programmes

- Five "*Signature*" Research Areas align with UK Strategic issues / needs
- Medium to long term research programmes
- Entrepreneurial investment in technology development
- Technology Transfer
- Collaborations



- Subject Matter Experts (SME) across the civil nuclear fission sector from past programmes
- R&D critical to develop future SME

Work focus
Short term projects
Age profile



Loss of SME in
5-10 years

*“within a decade
50% of the
existing nuclear
workforce and
around 75% of
senior managers
and leaders will
retire”*

Cogent – Power
People

The NNL challenge:

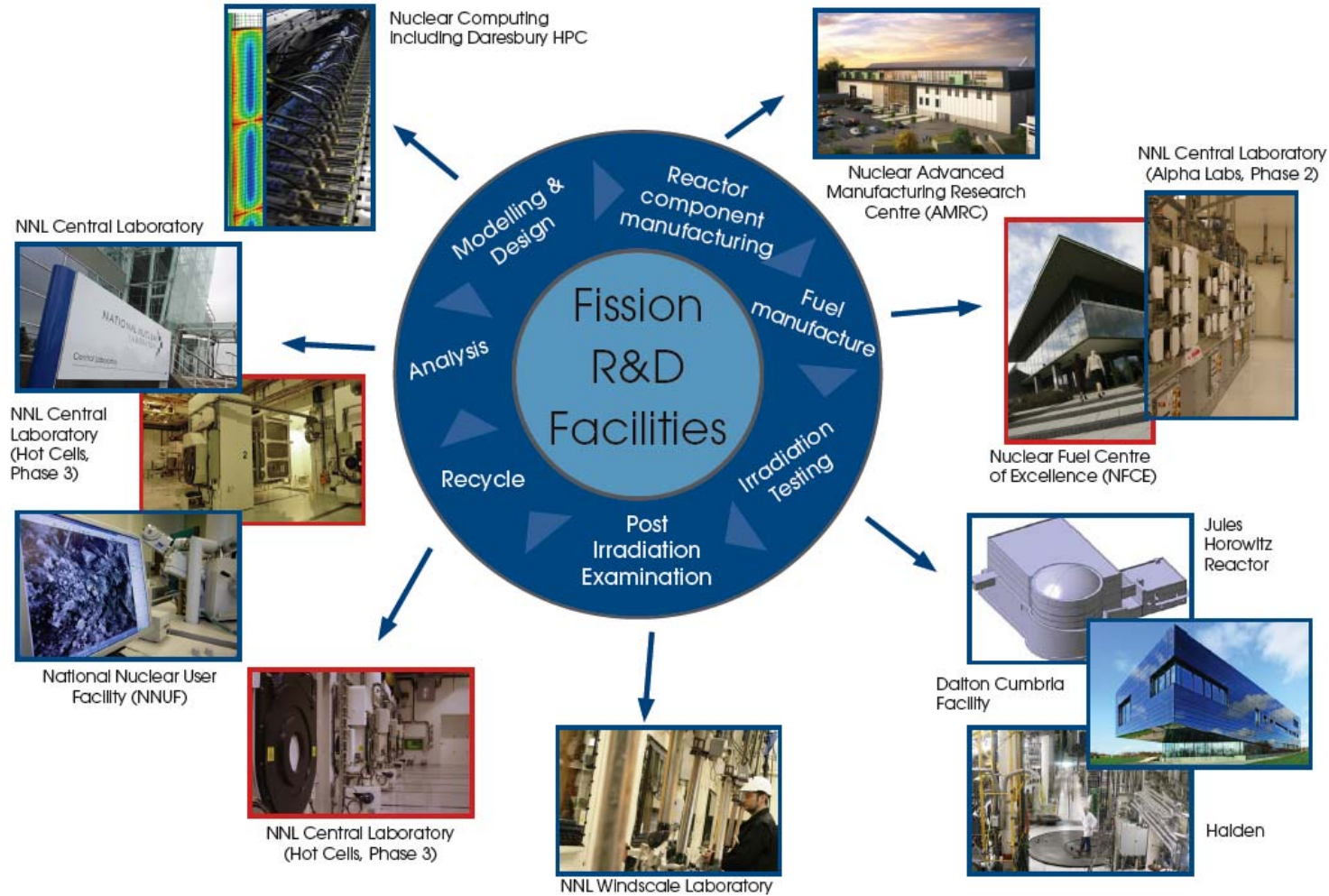
- **20% retirements**
- **200 additional scientists & engineers**

R&D Capabilities and Strategic UK Programme Areas - Post THORP Closure

Core Capability	Programme Areas								
	Legacy Waste & Decommission	Reactor operations/ new build	Current fuel fabrication (UO ₂ , MOX)	Current spent fuel reprocessing	Plutonium Disposition	Security & Non-proliferation	Future Reactors (Gen IV)	Future Fuel Cycle	Waste Disposal (GDF)
Reactor and nuclear physics	Supporting	Leading	Leading	Leading	Supporting	Leading	Leading	Leading	Supporting
Fuel technology	Supporting	Supporting	Leading	Supporting	Supporting	Supporting	Leading	Leading	Supporting
Radiation & reactor science	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Leading	Supporting	Supporting
Graphite technology	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Post Irradiation Examination	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Safeguards	Supporting	Supporting	Supporting	Supporting	Supporting	Leading	Supporting	Supporting	Supporting
Actinide science	Supporting	Supporting	Leading	Supporting	Supporting	Supporting	Supporting	Leading	Supporting
Process and Waste science	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Chemical and process modelling	Supporting	Supporting	Supporting	Leading	Supporting	Supporting	Supporting	Supporting	Supporting
Engineering simulation/modelling	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Highly active waste processing	Supporting	Supporting	Supporting	Leading	Supporting	Supporting	Supporting	Leading	Supporting
Materials & corrosion science	Supporting	Supporting	Supporting	Leading	Supporting	Supporting	Leading	Supporting	Supporting
Waste characterisation	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Waste immobilisation	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Leading	Supporting
Plant inspection & deployment	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Systems & front end engineering	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Remote engineering technology	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Safety assessments	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Environmental technology	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Measurement and analysis	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting
Advanced Manufacturing	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting	Supporting

Key	Leading capability Existing programmes	Supporting capability Existing programmes	Leading capability Limited / no programmes	Supporting capability Limited / no programmes

Nuclear Fission Facilities – Current and Planned



Why we work with Academia

- Create skills pipeline for NNL / industry
- Builds scientific reputation and profile (publications, quality of science, working with renowned researchers)
- Broaden scope of R&D
- Enhance / compliment NNL capability
- Increase funding opportunities
- Development of NNL staff
- Aligns with UK national drivers – international top table of nuclear R&D



Working with academia

- Extensive interactions with over 25 Universities
 - Over 50 NNL staff with visiting roles
 - Involvement in >70 PhDs
- Engaging Universities on joint research and access to NNL facilities
- Propose hosting a workshop on research with active materials
- Relationships
 - Research / education projects
 - Strategic (research, education, visiting roles ...)
 - Partnership (research, education, visiting roles, joint appointments and teams, both contribute ..)
- Want to build and enhance interactions

