CDT → MRes + PhD
CDT (4 years) = MRes (1 year at Imperial) + PhD (3 years at either Imperial, Cambridge or Open)

£4M funding from EPSRC
Training 62 PhD students in 5 cohorts
Fully supported by nuclear industry and international partners

ICO Student Conference
Imperial College 15 July 2015

http://www.imperial.ac.uk/nuclearcdt
Leadership & Aims

- **Leadership**
  - Director: Bill Lee (Luc Vandeperre)
  - Co Directors: Ian Farnan (Cambridge), Bill Nuttall (Open)
  - Deputy Director: Mike Bluck
  - Manager: Emma Warris
  - Administrator: Jonathan Tate

- **Aims**
  - The overarching aim of the ICO CDT is to train a **cohort** of ~60 PhD students of international quality prepared to operate in the global nuclear business, technology and regulation arena and capable of delivering high-impact research during and after their PhD.

  - **National collaborations**: Projects are underway with eg Rolls-Royce, NNL, AWE…

  - **International collaborations**: Projects with support from eg ANSTO, EDF and HITACHI…
Year 1: MRes in Nuclear Engineering @ Imperial

5/6 Core Modules
- Nuclear Safety Management
- Nuclear Materials
- Nuclear Waste Management
- Intro to Nuclear Energy
- Modelling for Nuclear Engineering
- Reactor Physics

1/2 Short Courses
- 10-Month Research Project
- Skills Development
- Nuclear Policy
- Engineer in Industry
- Student conference
- Reactor visits
- Winter school

Cohort activities

EPSRC
Engineering and Physical Sciences Research Council

Imperial College London

The Open University

UNIVERSITY OF CAMBRIDGE
Year 2-4: PhD

- 30+ Projects Listed @ http://www.imperial.ac.uk/nuclearcdt/projects

- Significant industry support (18+ projects):
  - Rolls-Royce, Hitachi, AWE, NNL, Sellafield, NDA, Tokamak Solutions, EdF

- 30+ Academics involved in many areas of civil nuclear energy

- Working at Imperial and/or Open and/or Cambridge
Cohort activities

**CONSORT Reactor Centre Visit**  
Silwood Park 16 December 2014

A joint visit for all MSc and CDT students

**Institute for Nuclear Research**  
Romania May 18-21 2015

The Institute for Nuclear Research Pitesti was founded in 1971 as a unit of strategic importance, having as field of activity the scientific research, design, technological development and scientific and technical responsibility for the development of nuclear energy in Romania.

**The Halden Reactor**  
Norway May 26-28 2015

The Halden Reactor is a 25MW nuclear reactor located in Halden, Norway and dedicated for research. The reactor became operative in 1958, and is operated by the Institute for Energy Technology.

**ICO Student Conference**  
Imperial College 15 July 2015

Student led and organised. Attended by ~60 academics, students, government reps and industry partners. Speakers from across the UK nuclear spectrum. Hailed a great success from attendee feedback.
Cohort activities

Cohort Building / Extra Curriculum Activities
Winter School
Manchester 6-8 January 2015
Birmingham 6-8 January 2016

Joint Winter School organised by Manchester CDT Next Generation Nuclear and ICO CDT to create a forum for discussion and interaction for all Nuclear CDT students and staff in the UK

Nuclear Energy Policy Course
Cambridge 13-15 January 2015

Explores energy policy issues facing the future of nuclear energy. Emphasis given to considerations affecting nuclear new build. The main context considered was the UK within the European Union although many lessons will be relevant to other energy markets.
# Projects

## Cohort 1

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<td>Sophie Morrison</td>
<td>The Use of Thorium Fuelled Light Water Reactors to manage UK’s Plutonium Stockpile</td>
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<td>Alexandros Kenich</td>
<td>Atomistic Simulations of Pellet-Cladding Interactions</td>
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## Cohort 2

| Chris Best | Safety case for BWR cores operating in self-sustainable Th-U233 fuel cycle. |
| Nathaniel Read | Modelling Thermo Mechanical Reactivity Feedback in Fast Reactors |
| Peilong Dong | Additive manufacturing of metallic components |
| Thomas Whiting | Experimental set-up of an irradiation programme for reactor pressure vessel steels at ANSTO |
| Dhan-Sham Rana | Development of layered zirconium carbide materials for accident tolerant nuclear fuels using element specific spectroscopy |
| Lloyd Jones | Peridynamics Modelling of Oxide Failure on Nuclear Fuel Cladding |
| Giles Rought-Witta | Chemical and Radiolytic ageing of UO2 and PuO2 |
| Said El Chamaa | New Routes to Multi-metallic Nano- and Bulk-Materials Containing f-block Elements |
| Elizabeth Yates | An Investigation of He Mobility and Bubble Formation in FCC Metals |
| Robby Lyons | SMR reactor supply chain design |
Funding

- **Total Costs**
  - 60 studentships @$\text{£}100k$ per student = $\sim\text{£}6M$
  - + additional activities & overhead

- **EPSRC Funding**
  - $\text{£}4M$ for $\sim60$ students over five cohorts (12 per year)

- **Industrial support has to make up the shortfall**

- **Model:**
  - Expect industry funding @50% ($\sim\text{£}50k$ per student)
  - CDT can take some risk to deal with financial uncertainty for an industrial partner
  - We will need to focus on recovering costs in future years
Challenges

- Future research areas:
  - Accident tolerant fuels
  - Wasteforms for Fukushima wastes
  - Small, Modular Reactors (SMRs)
  - Fast reactors
  - Thermal hydraulics – modelling of boiling, prediction of CHF
  - Radiation transport & reactor physics
  - Fusion technology

- Student recruitment
- Expansion of industry support
- Mid-term review
- Next CDT round