The Engineering Doctorate (EngD)

Developing Leaders for Tomorrow with Industry

Prof Patrick Godfrey

What is a Doctorate - A little history

- Doctorates originated in Middle Ages
- Apprenticeship model
  - Working for a Master, Doctor etc
  - Master piece
  - Tested by Peer examination.
- EngD introduced by Parnaby report (1990)
- Each University has its own requirements and registration process
- All UK doctorates require the main focus of the candidate's work to **be their contribution to knowledge in their discipline, usually through original research, or the original application of existing knowledge or understanding.** QAA (2011)

Doctoral degrees are awarded to students who have demonstrated:

- **the creation and interpretation of new knowledge, through original research or other advanced scholarship, of a quality to satisfy peer review, extend the forefront of the discipline, and merit publication**
- a systematic acquisition and understanding of a substantial body of knowledge which is at the forefront of an academic discipline or area of professional practice
- the general ability to conceptualise, design and implement a project for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the project design in the light of unforeseen problems
- a detailed understanding of applicable techniques for research and advanced academic enquiry.

QAA (2011)

Parnaby Report 1990 - Recommended

- EngD should be "*distinct from, and complementary to, the traditional existing PhD, which has been criticised for its lack of industrial relevance.*"
- It recognised that there "*is a place in industry for PhDs but, companies which research, develop, design and manufacture plant equipment and systems*" .... "*as well as IT based firms*" ..... viewed "*the PhD as both too narrow and academic for the industry's needs and that its standard is declining*"!

Parnaby Report 1990 – Also recommended EngD should include:

- **Broader range of training** be established
  - Flexible to respond to **the needs of industry and doctoral** candidates
  - **Taught coursework** to complement and enhance the experience of the individual in both technical and non technical areas
- **Significant, challenging and original** engineering problem or set of problems **in partnership** with Industry and Academia

Parnaby Report (1990)

What is an EngD Thesis

Clause 5

- .....The Engineering Doctorate (EngD) should be at least equivalent to the intellectual challenge of a PhD, but enhanced by the provision of taught material in both management and technical areas.

Clause 6

- The test of intellectual contribution for the award of an Engineering Doctorate (EngD) shall be at least equivalent of that for the PhD degree (i.e. a distinct 'contribution to knowledge' or similar).
- Where the research work for the EngD consists of a series of linked projects these must be brought together by an overarching document that establishes the overall theme(s) and **synergistic** links in the work that lead to the contribution(s) to knowledge claimed. *EPSRC Good Practice (2011)*

What an EngD thesis is not!

- A diary or chronological record of what was done. Although that may also be required by some universities
- Multiple MSc thesis.

6 Key words

1. **Original**
2. **Significant,**
3. **Challenging**
4. **Synergistic**
5. **Publishable**
6. **Defendable**

HOW?
Innovation and Leadership by RE

Abstracted from a programme of research in industry

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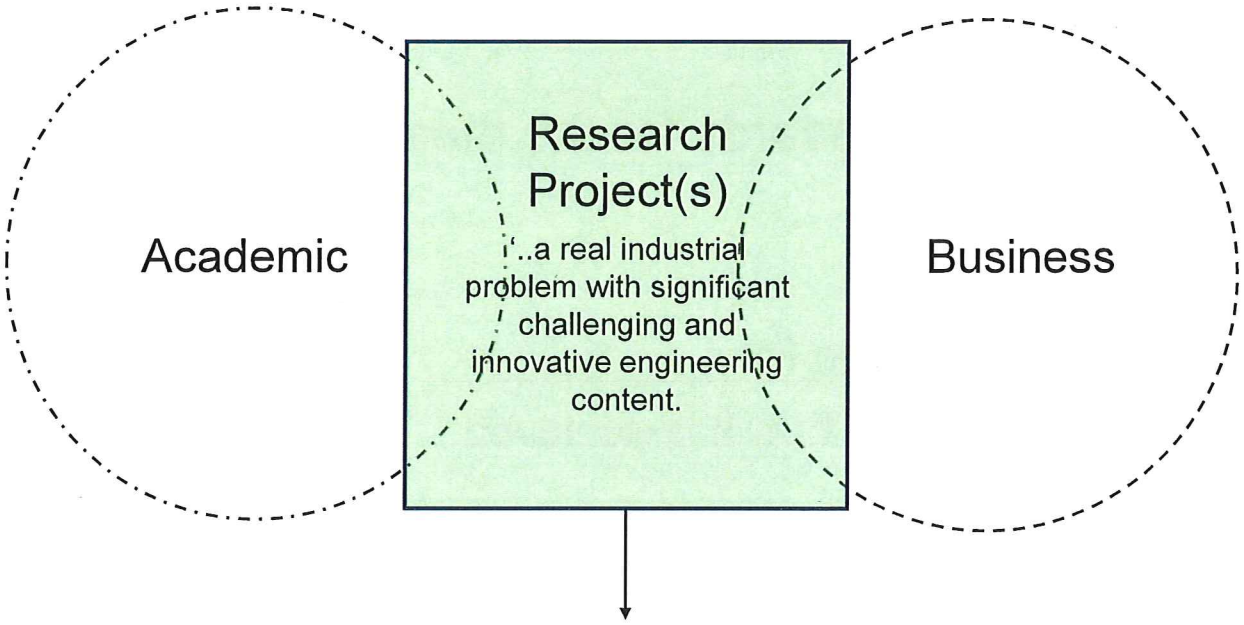
EPSRC Engineering and Physical Sciences Research Council

Aligning stakeholder needs

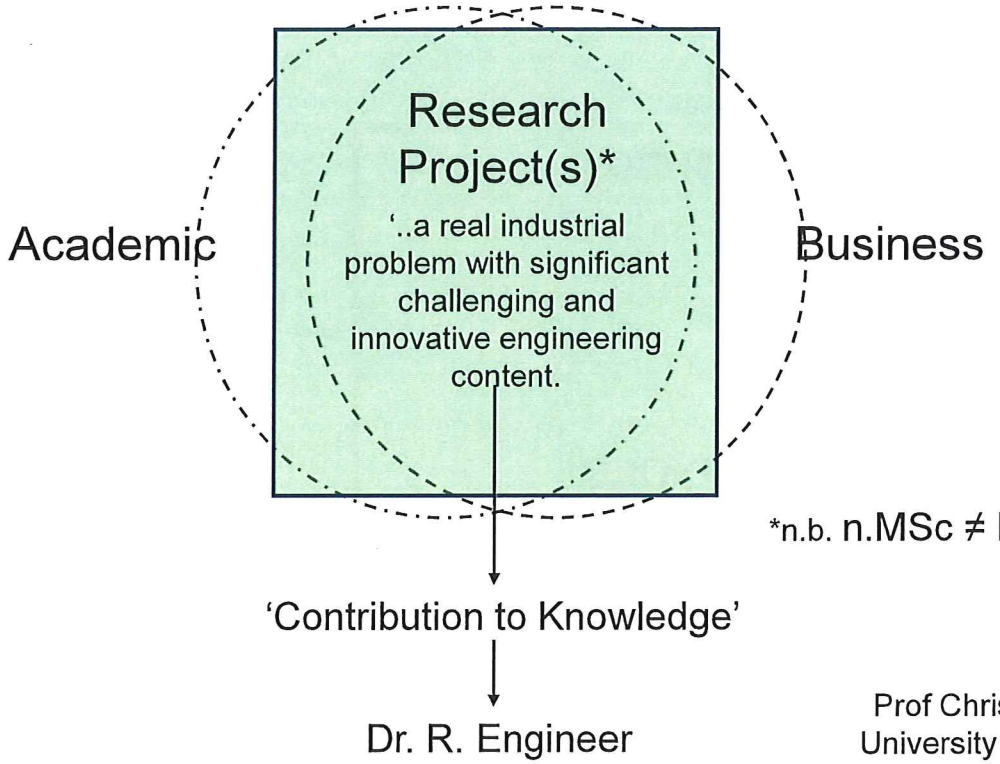
- Industrial Sponsor
- University
- Supervisors
- Research Engineer

What is an EngD?



Prof Chris France
University of Surrey

How to deliver an EngD?



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Comparison with a PhD

The quality standards for the thesis are the same

The difference is in

why, what and how it is achieved.

Typical Industrial Doctorate Centre

- A Research Centre
- Multi-discipline theme at boundary of knowledge
- Critical mass of 60 Doctorates
  - 25% Employed Mid-career 75% Stipend
  - All have a 2.1 or better "Tier 1" Qualification
  - Most have a "Tier 2" qualification already
- Teaching designed to
  - support theme
  - enhance business and transferable skills
- Knowledge Network for industry and academia

Industry needs

- Stimulating innovation through collaborative research
- Recruiting and retaining talented people
- Developing technical, business and personal leadership skills in staff
- Value for money

Example

"As a leading UK-based engineering design consultancy (7000 staff), ...

..... the complex, real-world problems and issues that confront us cannot be properly addressed using mono-discipline approaches alone.

Our Research Engineers ....contributing strongly to our strategic thinking.....

They are already quite literally changing the way the company thinks."

Government and academia

- Investing in EngDs to contribute to:
  - the **economic competitiveness** of the UK
  - the **quality of life** of its people

EPSRC

- Synergy between research and teaching programmes

- Creating: Engineering leadership skills, innovation and public engagement

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A few of the 27 centres

- Bioprocessing Engineering Leadership
- Transport and the Environment
- Digital Media, Special Effects and Animation
- IDC in Systems
- Sustainability for Engineering and Energy Systems
- Molecular Modelling & Materials Science
- Systems Approaches to Biomedical Science
- Innovative and Collaborative Construction Engineering
- Micro and Nano technologies
- Machining Science

Being a Chartered Engineer

- Competences defined by the Engineering Council in UK- SPEC Standard for Professional Engineering Competence*
- Examined by one of the 35 Engineering Institutions who need
  - an accredited Bologna Tier 1 and 2 qualification
  + Initial Professional Development Experience (IPD)

*Shearman R, "A professional competence approach to engineering formation, assessment and registration." CLAIU-EU Conference 2010.

EngD - Integrated education and professional development (training) package

"....In the meantime, institutions should consider the EngD as 'appropriate further learning to masters level', and consider an EngD holder as being in a broadly comparable position to someone who has completed an accredited Initial Professional Development (IPD) scheme."

Registrations Standards Committee of the Engineering Council

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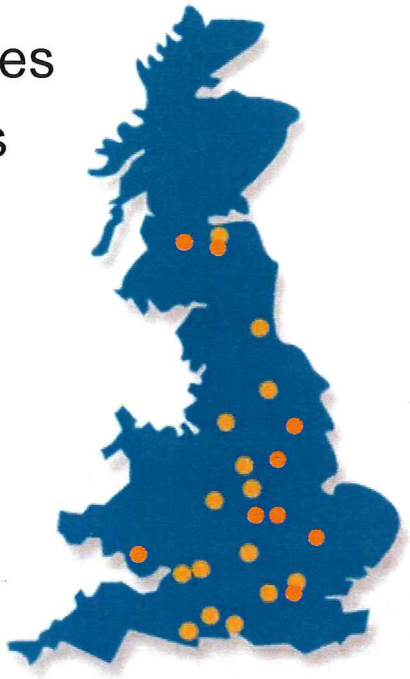
27 Industrial Doctorate Centres

~ 270 Sponsoring companies

~ 1000 Innovation Projects

http://www.aengd.org.uk/



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Research Engineer - experience led rigour

*"I benefit immensely from **academic knowledge that I apply directly** to my everyday work experience. It is unique in that I am solving a **real industry** problem that hasn't been solved before, and the **results could be applied** across the industry."*

A Research Engineer

A leader for tomorrow