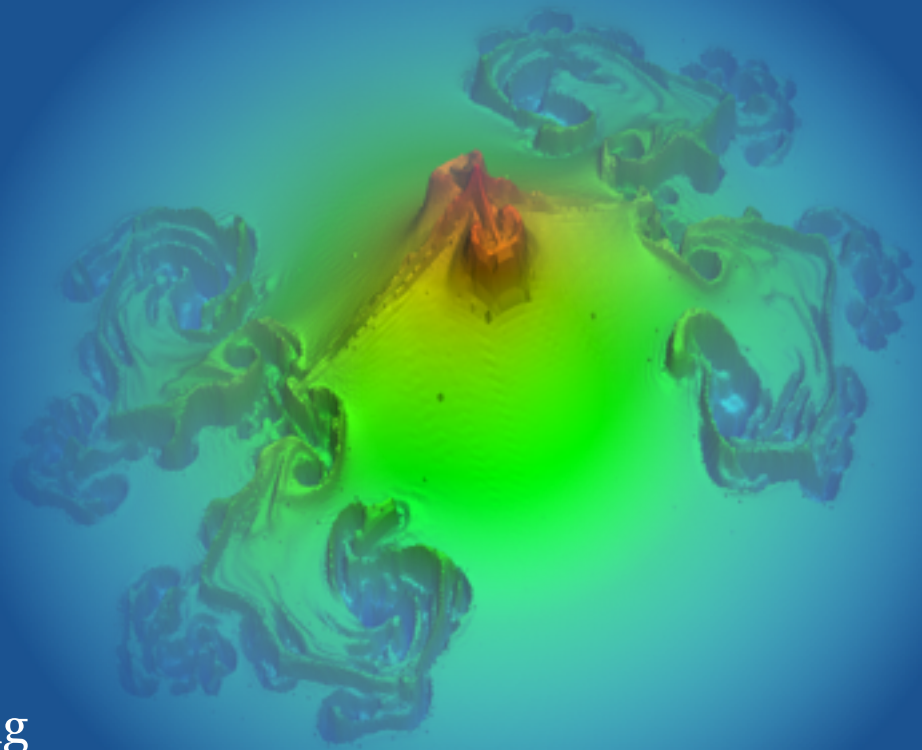
CDT in Next Generation Computational Modelling

EPSRC
Engineering and Physical Sciences Research Council

UNIVERSITY OF Southampton

CDT in Next Generation Computational Modelling



Hans Fangohr, Ian Hawke
EPSRC Centre for Doctoral Training
07 May 2014

Outline

- Why Doctoral Training (why do a PhD?)
- Centre for Doctoral Training (CDT)
- What is Next Generation Computational Modelling?
- Facilities
- People
- How to apply?
- Today

What is a PhD degree?

- PhD degree: three or four years of study, leading to award of research degree “Doctor of Philosophy” (“PhD”)
- NGCM CDT offers 4-year PhD (1 year taught+3 year research)
- Higher degrees include MSc, MRes, MPhil, PhD and EngD.

Why do a PhD?

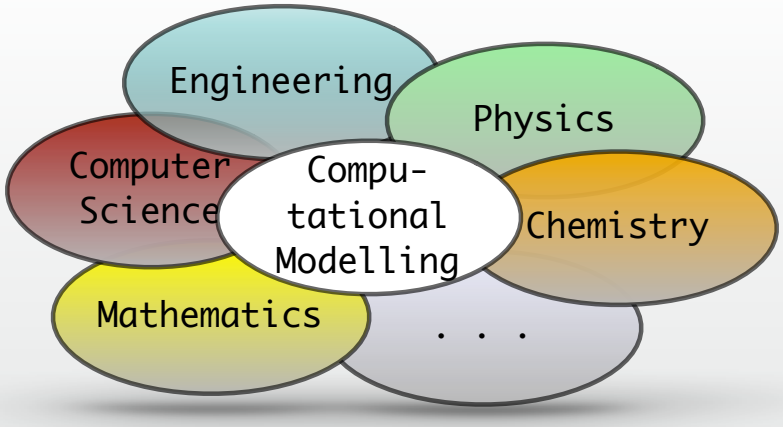
- Specialist knowledge at an advanced level (you should become a subject expert - contribution to new knowledge is a condition of PhD)
- Transferable/key skills in: technical literacy (ability to absorb new technical subjects) advanced presentation skills (oral and written), project management, high levels of motivation, teaching, numeracy, teamwork (informal teams)
- Careers in R&D generally (industrial and academic)
- PhD graduates generally rise to positions of greater responsibility faster.
- A PhD is a pre-requisite for a research career in academia or industry.
- ...and there is no substitute for the satisfaction of producing new knowledge.

Centre for Doctoral Training (CDT)

- New(-ish) initiative of UK research councils to improve doctoral training
- Training in cohorts of 10 – 20 students per year
- Usually
  - first year dominated by taught modules (a bit like an MSc), followed by
  - full-time research in years two to four
- Typically leading to PhD degree at the end of 4 years

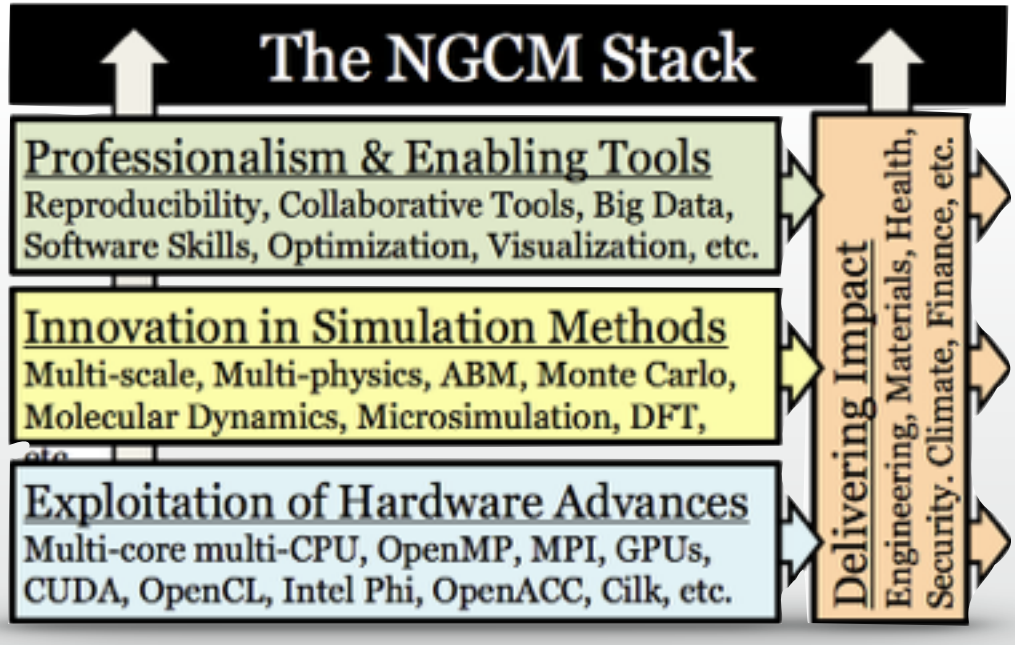
CDT in Next Generation Computational Modelling (NGCM) – why?

- Computer simulation underpins research and development in science and engineering in academia and industry, for example:
  - Understanding measurements
  - Predicting measurements and performance
  - Improving materials, designs, treatment, policies.



CDT in Next Generation Computational Modelling (NGCM) – what?

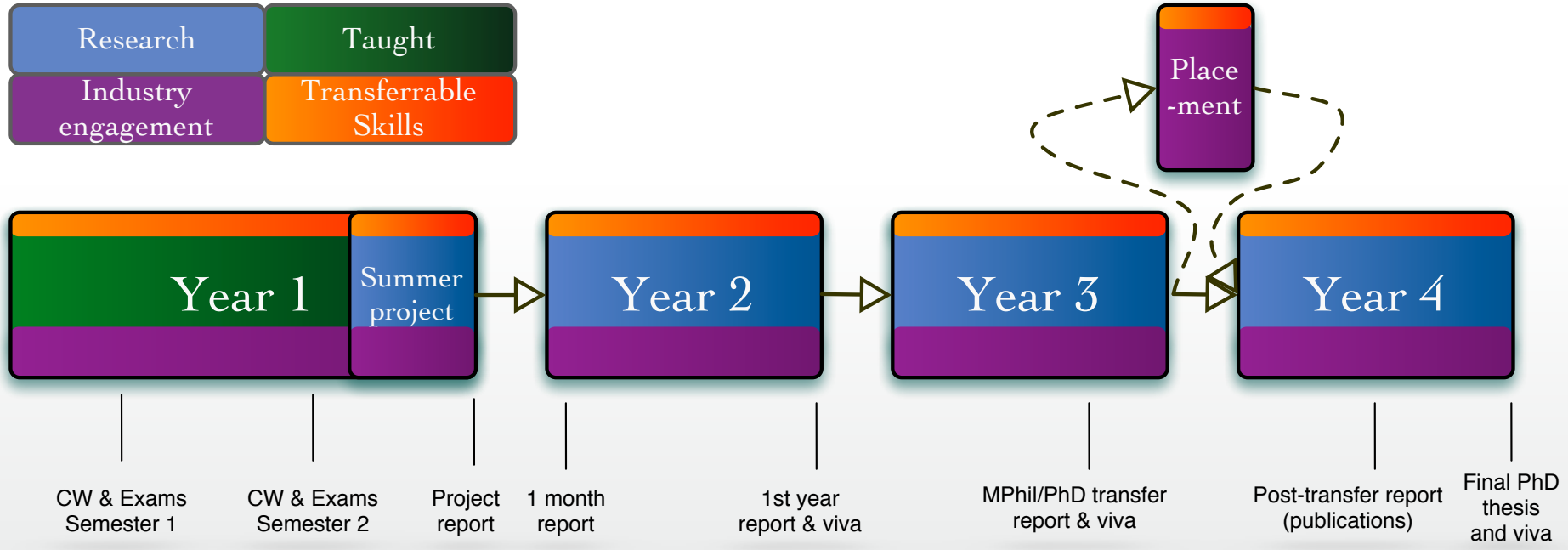
- Training and research addressing
  - professionalism
  - simulation methods
  - exploitation of latest hardware



Next Generation Computational Modelling CDT

- Funded by the Engineering and Physical Science Research Council (EPSRC), with contributions from industry and University of Southampton, total ~ £10 million
- 15 studentships for UK/ EU students to start every year (from 2014 to 2018)

4-year programme, overview



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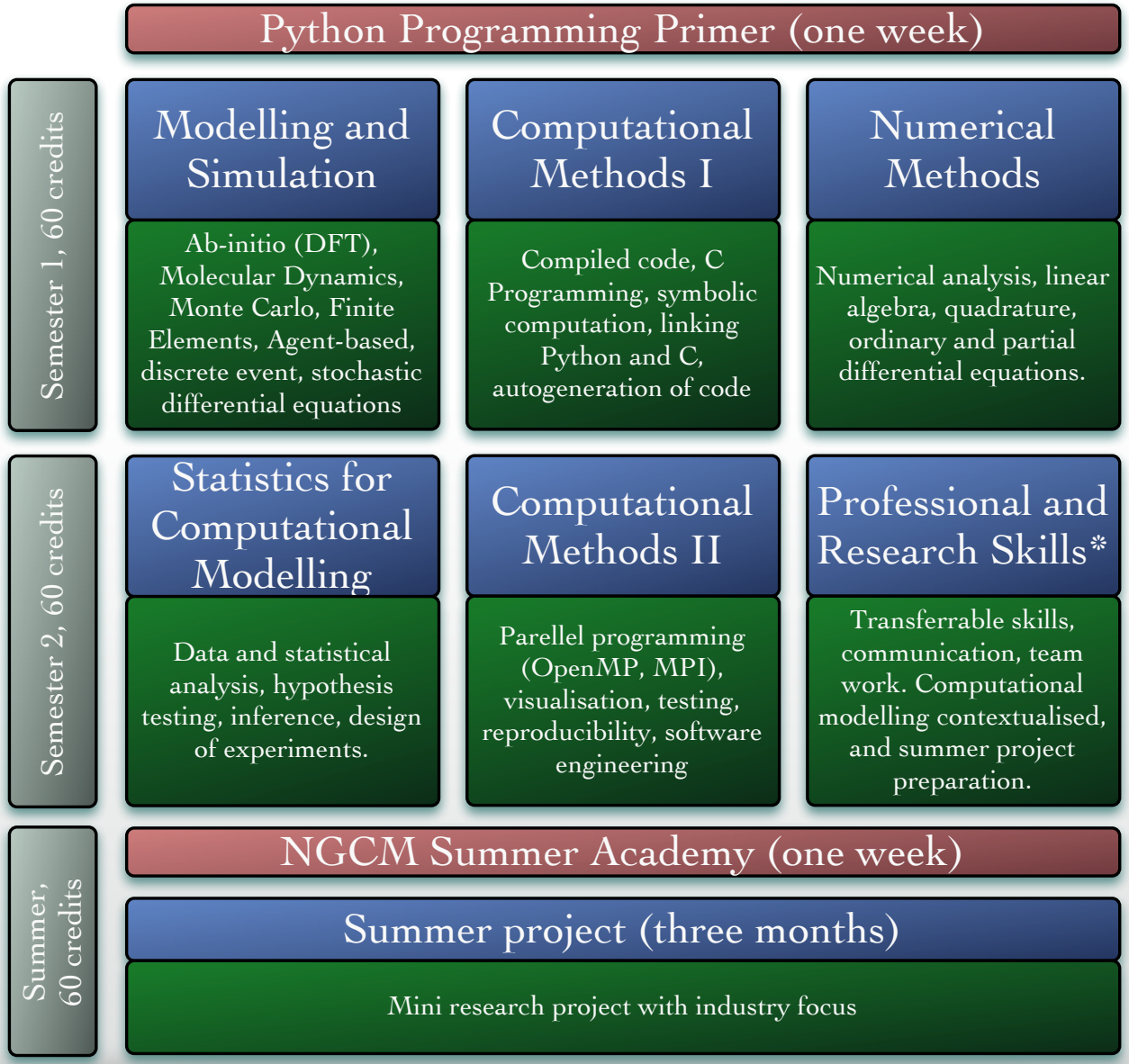
First year training programme

- 6 compulsory modules (90 credits)
- 2 optional modules (30 credits)
- Summer project (60 credits)

- Required pass mark for funding at end of year 1: 60%, 65% in summer project



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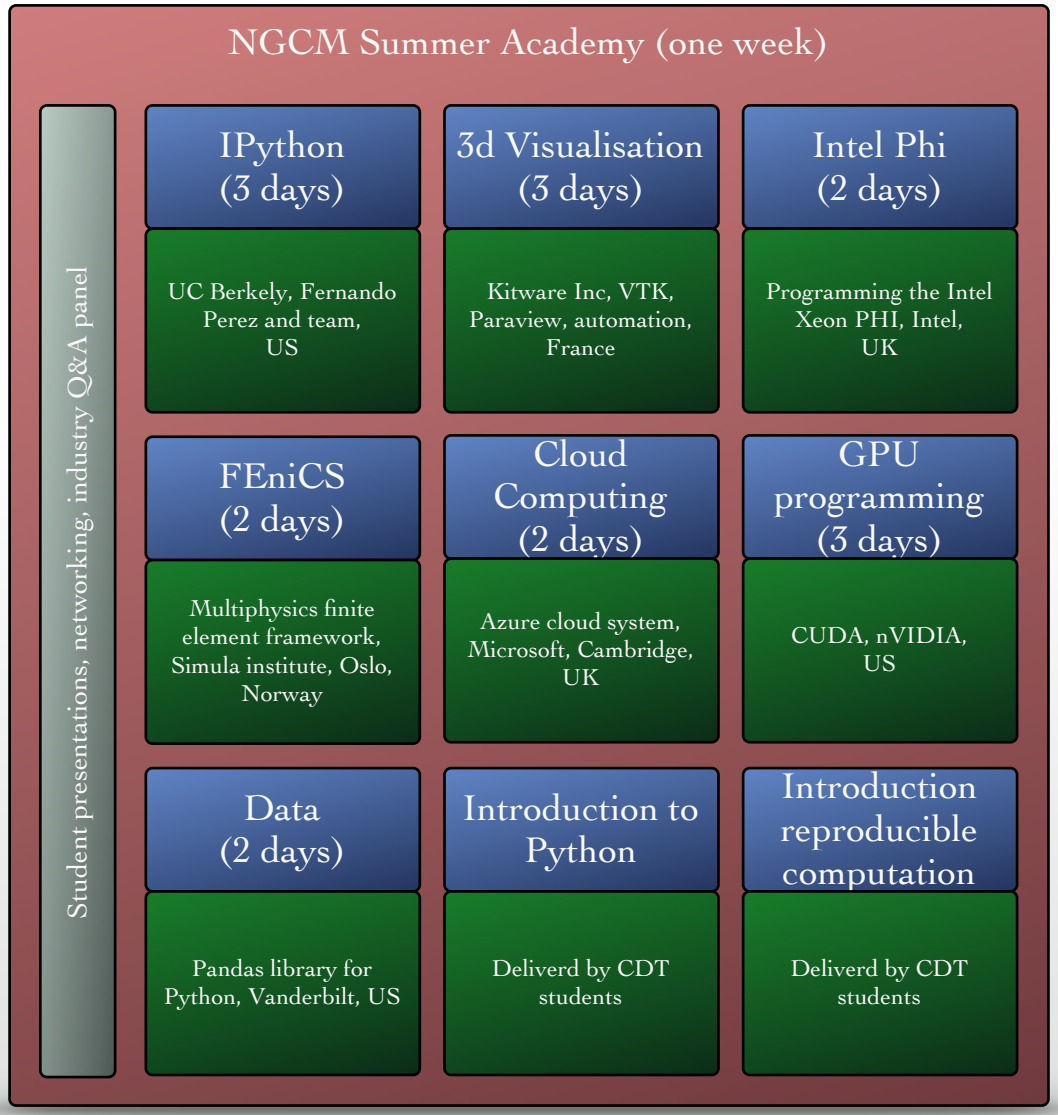
Summer Academy

- Annual meeting from summer 2015 onwards
- Open for participation from outside Southampton
- Parallel training sessions (examples on the right)
- High profile trainers
- Networking opportunity for UK computational modelling community



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Facilities

Southampton Supercomputer Iridis

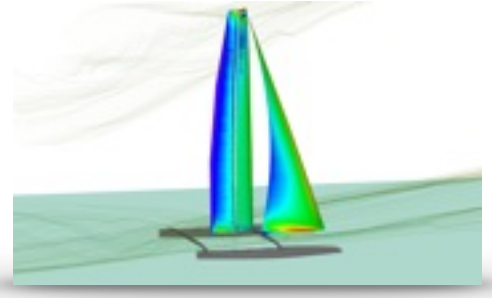
- £3.2 million investment in 2013
- hardware refresh cycle of 3 years
- part of 10-year strategy plan for High Performance Computing (HPC)

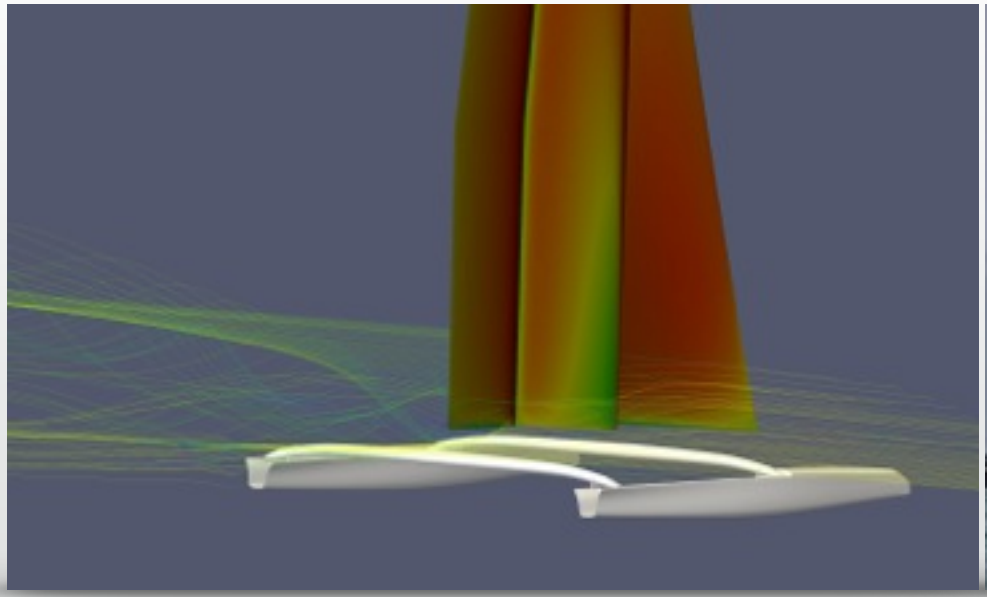
Iridis 4

- Biggest university owned computer in England
- 12200 Cores (250 TFlops);
- 16*2.6 GHz cores per node;
- 4 GB of memory per core; 64GB per node; total 49TB RAM
- 4 high-memory nodes with 256 GB of RAM;
- 24 Intel Xeon Phi Accelerators (25 TFlops);
- 1.04 PB of storage with Parallel File System;
- Infiniband network for interprocess communication

GPU cluster Emerald

- 372 NVIDIA GPUs
- 114 TF compute power
- Jointly used with Oxford, Bristol, and UCL





National supercomputer ARCHER

- ARCHER (Advanced Research Computing High End Resource)
- 72,192 cores Cray XC30
- 1,367.5 TFlop/s
- 12-core 2.7GHz Intel E5-2697 v2 (Ivy Bridge)
- Network is the new Cray Aries interconnect
- Rank 19 in top 500

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Boldrewood campus

Boldrewood campus complex

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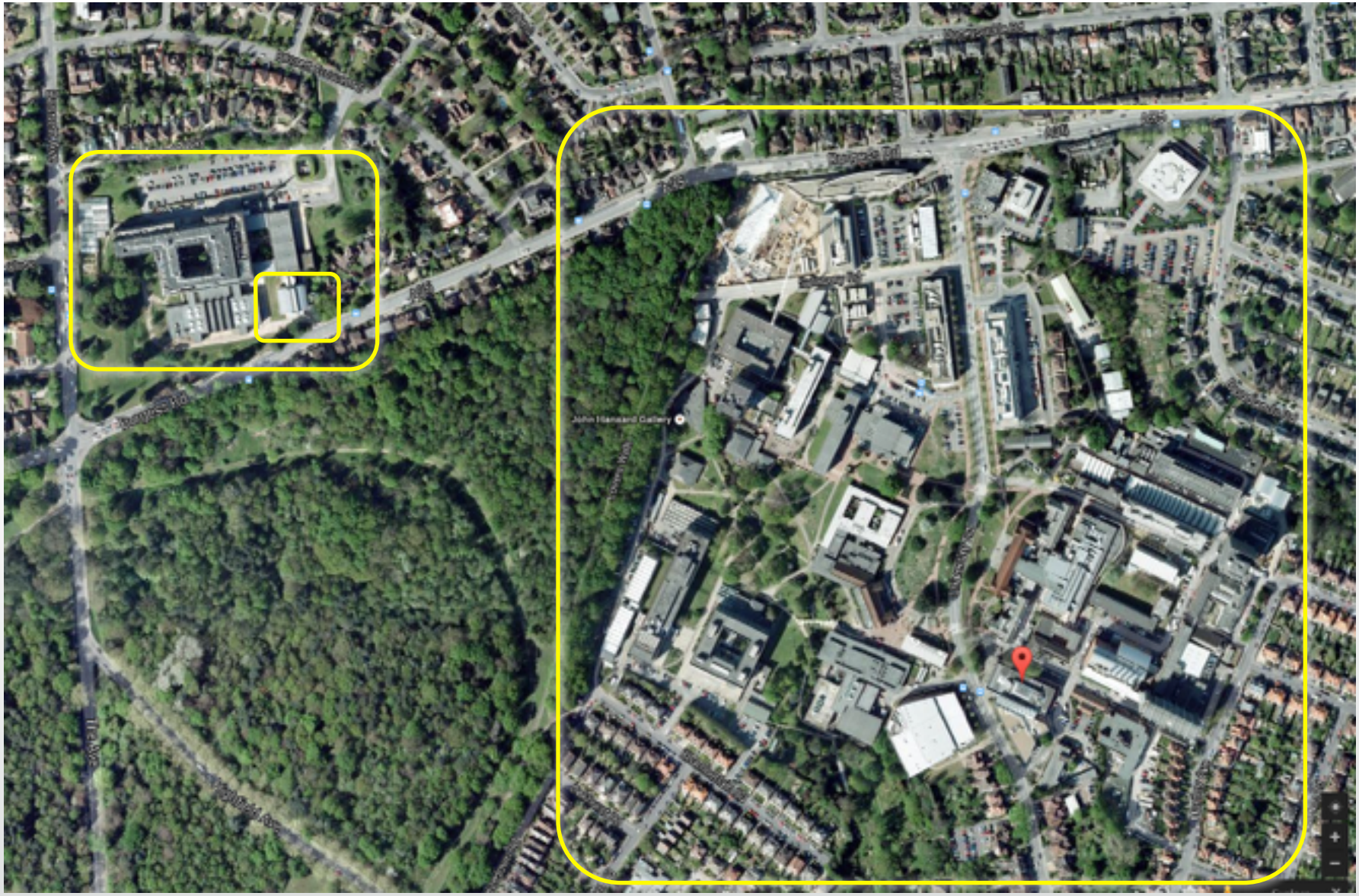

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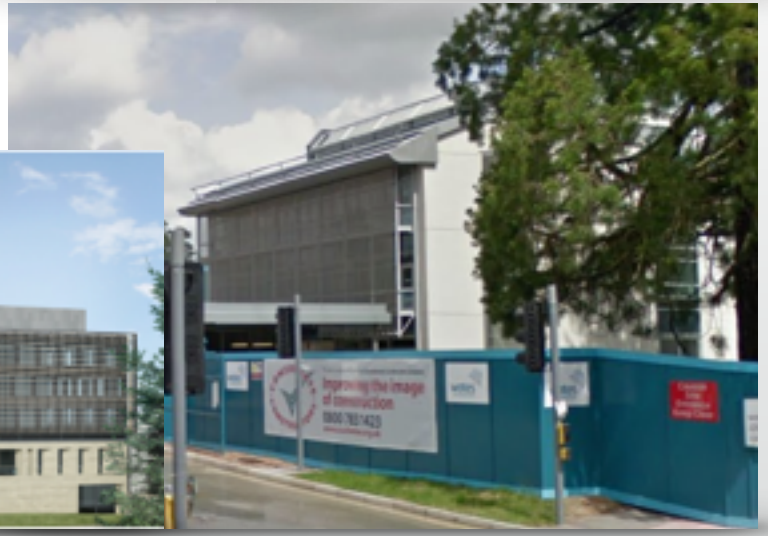

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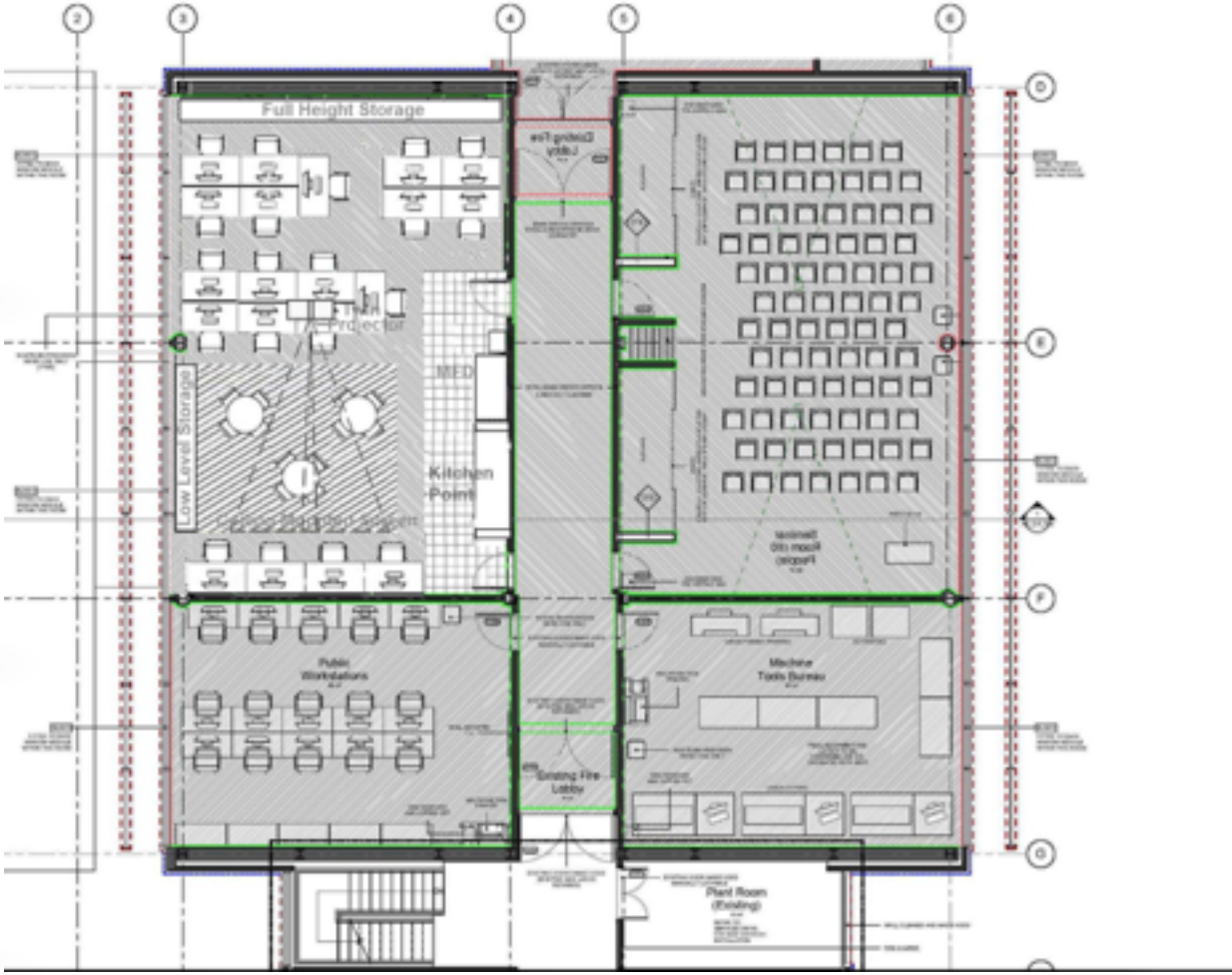

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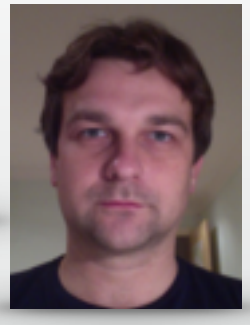
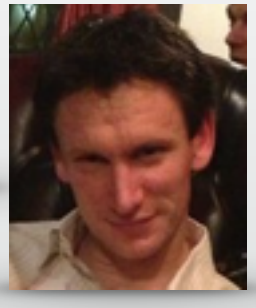
People

CDT Core staff

- Directors:
  - Hans Fangohr
  - Ian Hawke
  - Seth Bullock
- Tutors
  - Andras Sobester
  - Ondrej Hovorka
  - Dave Angland
- Manager (to be recruited)
- Supervisors from Computational Modelling Group

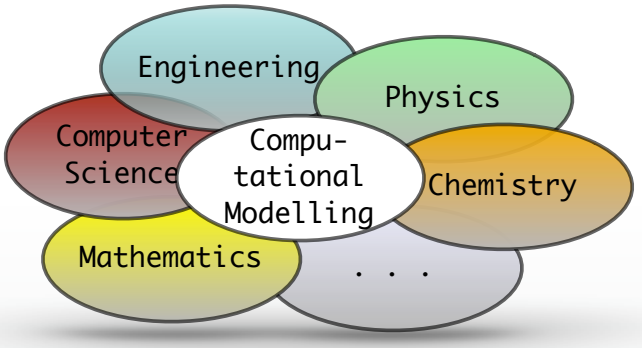




Computational Modelling Group

- > 170 academic staff
- > 600 post-docs and PhD
- use computer simulation to advance research and engineering
- joint seminars, training
- interdisciplinary networking
- Details: http://cmg.soton.ac.uk



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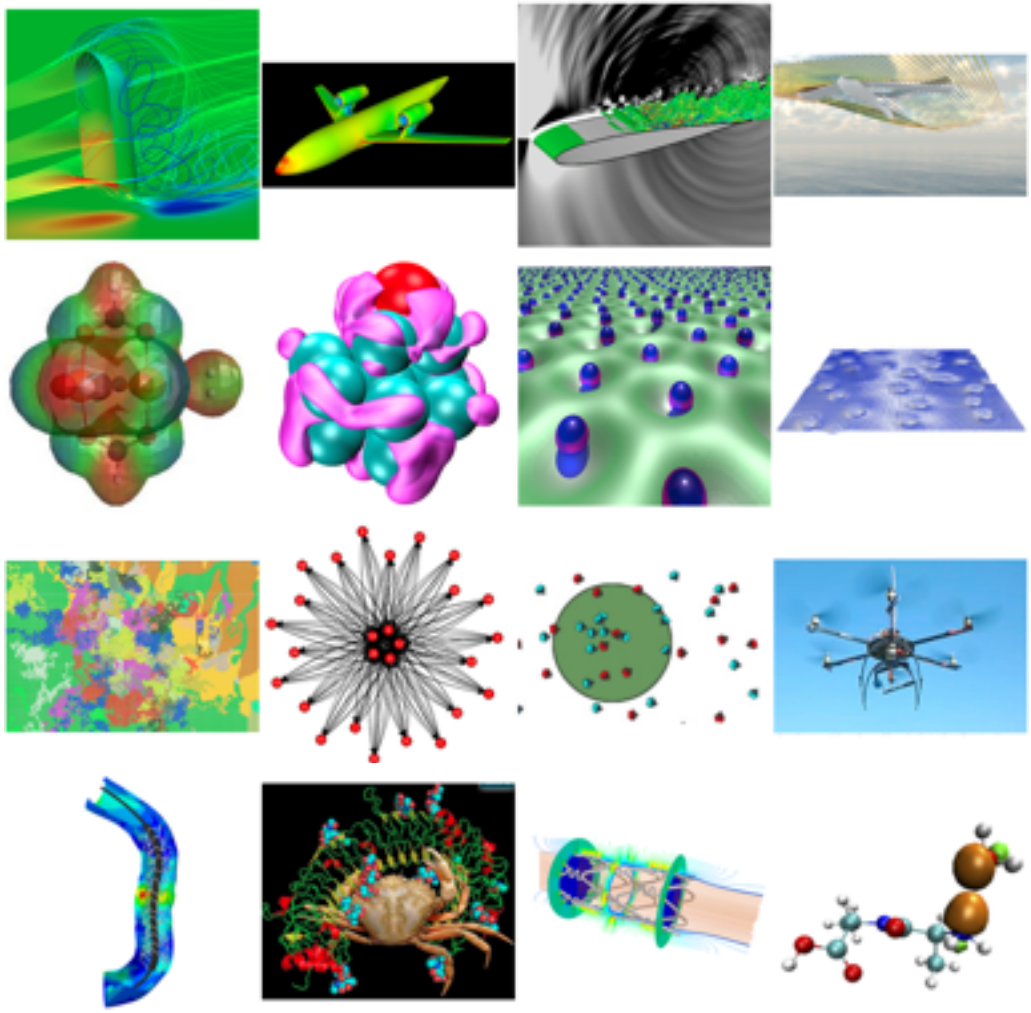
NGCM Research

NGCM Research focus areas

- Computational Engineering
- Advanced Materials
- Autonomous Systems
- Biomedicine and Healthcare



PhD projects

- will have novelty in computational method
- will have novelty in application of method

- Growing list of available projects at http://ngcm.soton.ac.uk/projects

- Check out posters at lunch time today

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Application process

How to apply

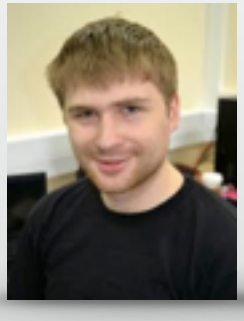
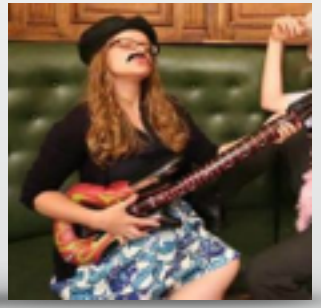
- Read through http://ngcm.soton.ac.uk and follow instructions
- Submit CV, including references, and research statement, and desired PhD project(s)
- If shortlisted, you will be invited to an interview.
- Fine-tune project selection, iteratively
- If successful, studentship and studies will start Sept 2014

Programme today

Programme today


- 14:30 Q&A for CDT Directors

- 14:45 Coffe and refreshments
- 15:00 Q&A Rebecca Carey and Chris Cave-Ayland
  - students of related Doctoral Training Centre in Complex Systems Simulations
- 15:30 Close

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Thank you

– Questions?

- http://ngcm.soton.ac.uk
- Twitter: @ngcm_soton
- Queries: ngcm@soton.ac.uk