

# National e-Infrastructure Vision

It's not going to be easy!

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# Why an Nel?

- Computational Science ‘third leg’ of scientific enquiry, alongside experiment and theory;
- Expert users need access to competitive infrastructure to tackle increasingly complex problems: complex simulations and calculations, multi-scale modelling;
- Large experiments (e.g. CERN, telescopes, genomics) – need to analyse all the data
- Social, medical, health data – analytics plus secure access
- New fields now using computational techniques for the first time – large numbers of ‘non-experts’;

# E-Infrastructure as a Research Tool (not a IT system)

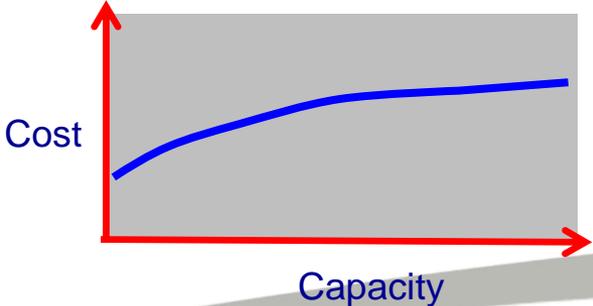
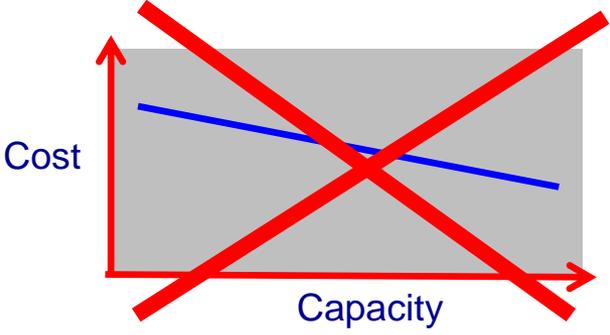
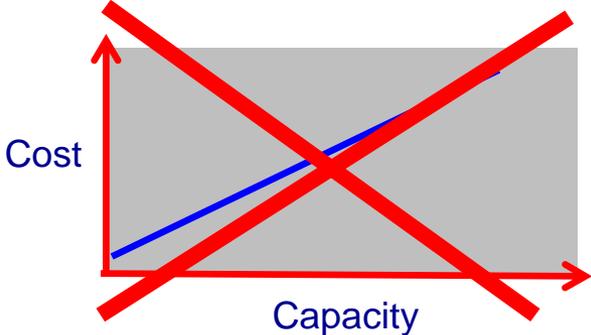
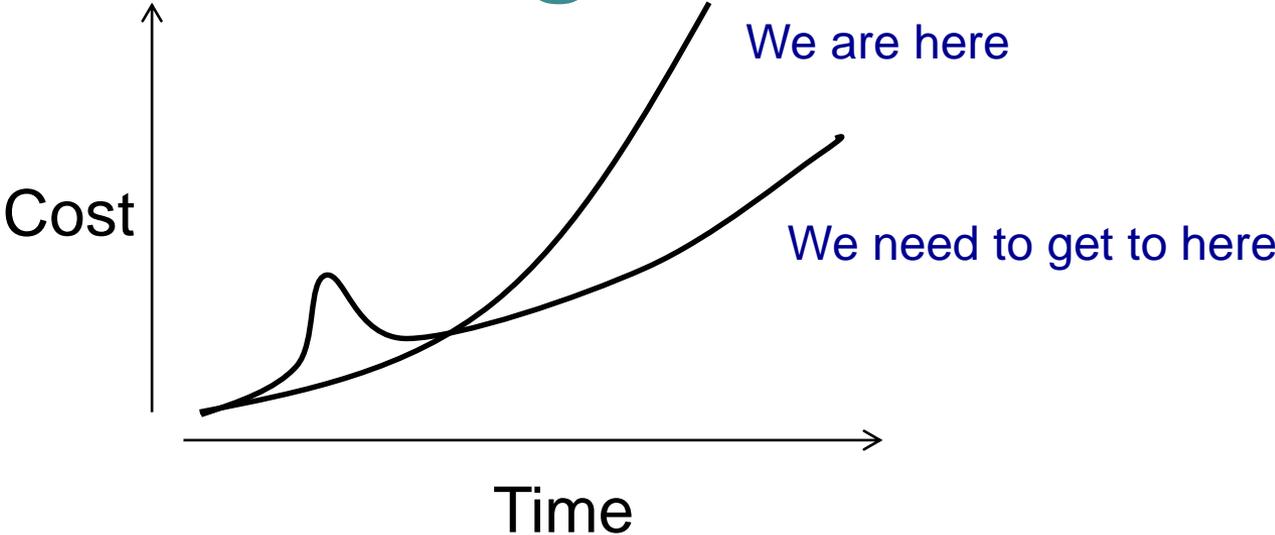
- E-Infrastructure is essential for carrying out research in a very wide range of areas
  - Optimisation, modelling, simulation, data analysis
  - Ubiquitous
  - Promoting its use to new research users – better, more cost-effective research
  - Underpins other research facilities (e.g. Diamond)
  - Underpins most industrial sectors
- E-Infrastructure needs regular updating and replacing as technology develops
  - Need long-term financial planning

# What is an Nel?

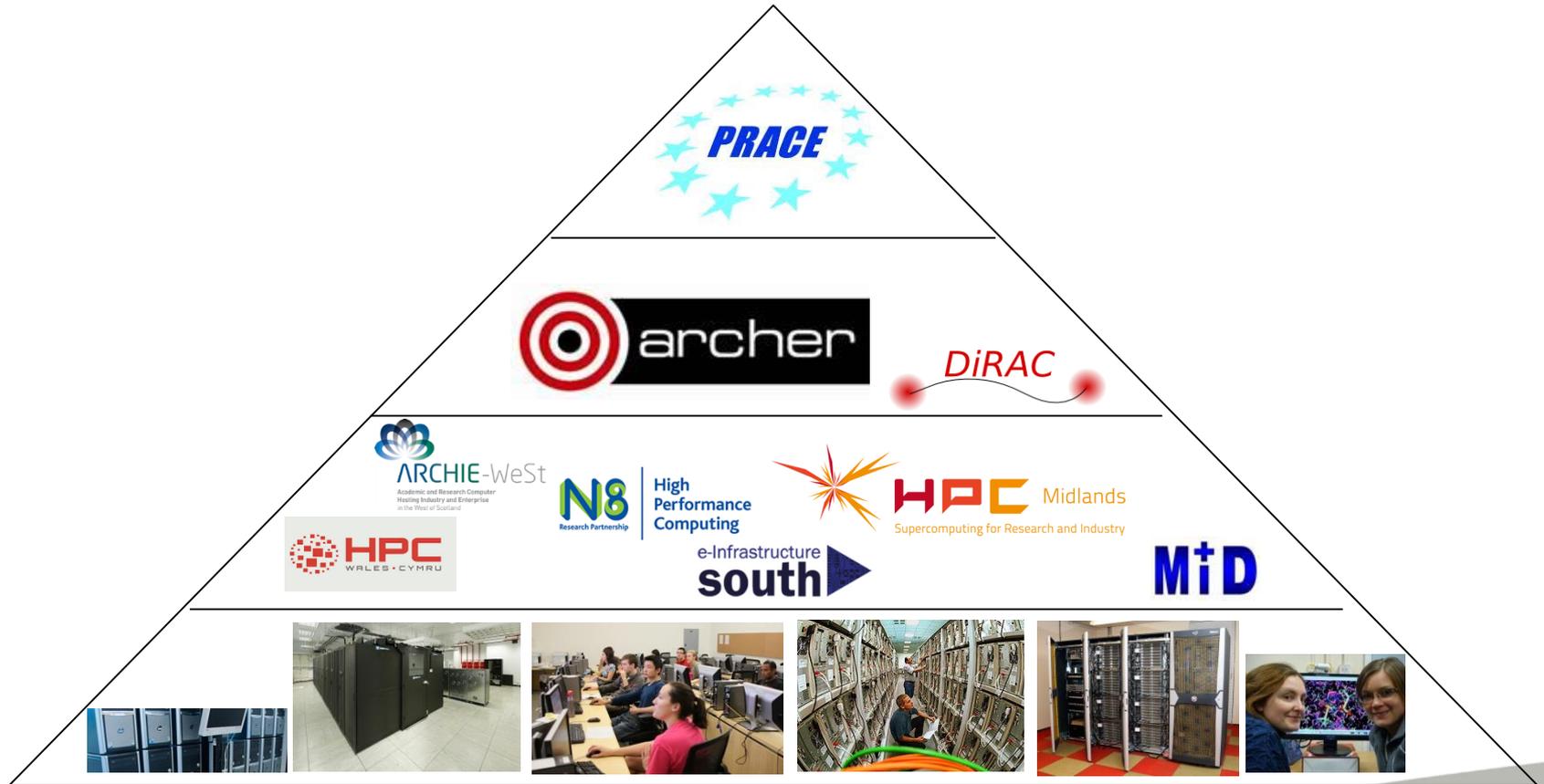
- Computers
- Data storage systems
  - Infrastructure and tools to manage large-scale research data
- Software
  - operating systems
  - applications codes
- Networks – Janet and university/institute networks
- Digital services, policies and processes:
  - Information assurance and governance
  - Security
  - Allocations, authentication and access
- Cloud
  - Commercial cloud services
  - Academic clouds
  - International: EU Open Science Cloud
- People – researchers, managers, developers
  - Skills and training

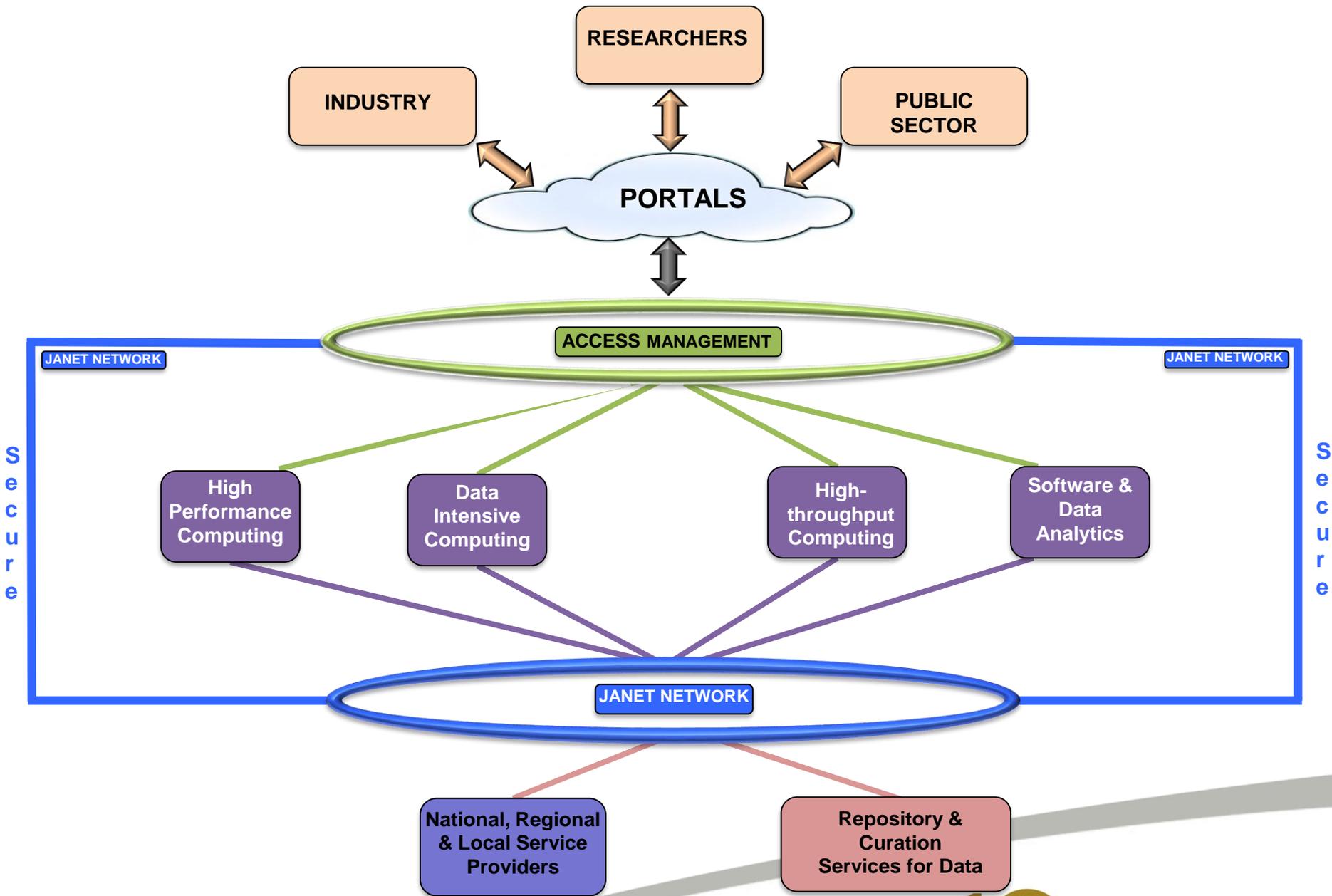
**NOT JUST HARDWARE**

# The Long term



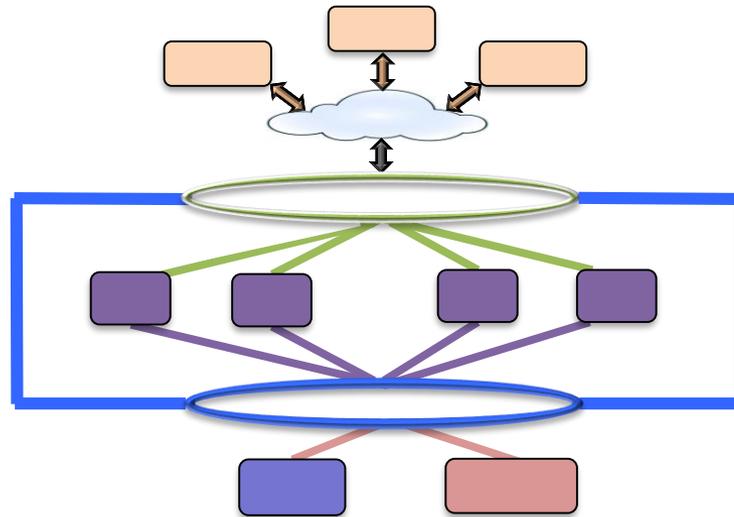
# Traditional Tiered Structure





# Enablers & Services

- Industry Interactions
  - Suppliers
  - Users
  - Collaborators
- Cross RC collaboration



- Research Software Engineers
- Network
- Data Curation
- AAI
- Data Storage

# Collaboration, Coordination & Interoperability - Benefits

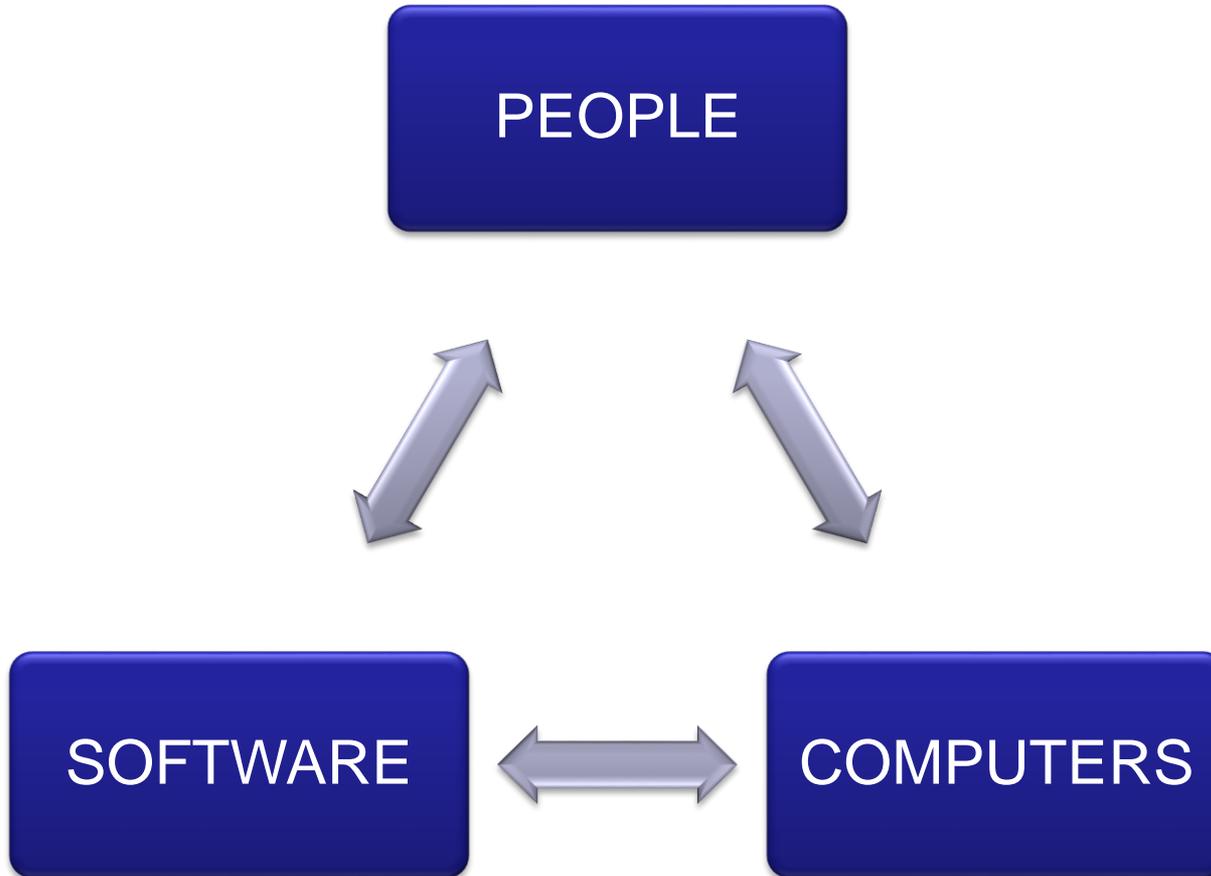
- Better and more science: increased productivity, interdisciplinary research and collaborative working
- Single Sign on: removes a major barrier to access for users
- Enables hardware to be shared across domains
- From a service provider perspective, encourages aggregation and pooling of resources, co-localisation of resources in centres – energy efficient, cost effectiveness
- Allows cloud and data services to work effectively, efficiency and appropriately
  - You know who I am, what I can do, how I'll be measured, and where I live
- Enabling international integration with similar services in other countries.

# Software

- Software is fundamental to research
- It has a longer life than the computers it runs on
- It contains the `intellectual property`
- It can be:
  - Commercial code
  - Enabling Middleware / Firmware
  - Community code that everyone in a field uses
  - Open source
  - Something hacked together by an individual
  - Etc.
- Given its importance, it needs to be sustainable
- Best practice!

**Better software, better research**

# Not Just Computers



# Cloud Computing

- Commercial cloud good for those who don't use it all the time - `use what you pay for`
- Technology does not support applications at the leading edge of research:
  - Computing:
    - Operating systems
    - Interconnect – poor time to solution
    - Scale (number of cores over long time periods)
  - Data: volumes and movement
- Privacy/traceability/regulatory:
  - not permitted in UK to store identifiable, unconsented patient data in the cloud. For research, turned into pseudoanonymised data

# RCUK e-Infrastructure group

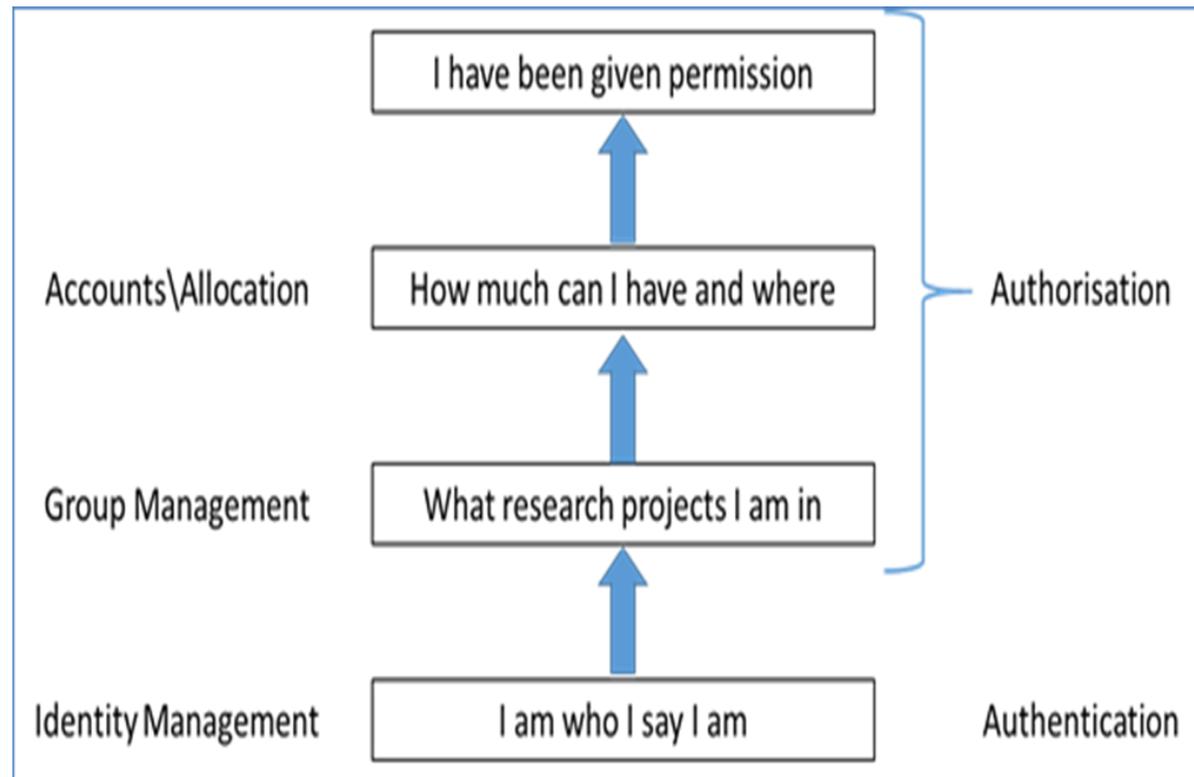
- Small group of research council staff who manage computing programmes
- Lead by Susan Morrell, EPSRC
- Provide policy and funding advise to RCUK
- Receives input from RC community base

# Interactions with BEIS

- 2015 - Initial discussions with the RC and community leads
- Early 2016 – Initial discussions with BEIS through RCUK eIWG
- Mid 2016 – Completed a draft Business Case
- Late 2016 – Received feedback from BIES

# Integrated AAAI

- Pilot projects for proof of concept: can we develop a common AAAI system so that users can have a single sign-on?
- Interoperability and integration of existing tools



# STFC towards the Nel

- Recognises the need for an Nel
- Is in the strongest position of all the RC's
- Wants to lead the way, collaborating with the other RC's
- Recently opened a call 'Towards a UK Nel'

# Round 2 with BIES

- Taking on board the BEIS Feedback
- Shorter and at a higher level
- Non-RC focused
- Draft created

# Summary

- Cross Community work is seen as very important
- We understand the constraints on funding and are trying to help where we can
- The Nel is a vision towards the future, but will not be easy or quick
- All the RC's are working hard on understanding the needs of the UK research base, and translating it to BEIS