E-infrastructure Leadership Council

Thursday 8th March 10am to 1pm
BIS Conference Centre, 1 Victoria Street, London SW1H 0ET

Attendees

Joint Chairs:

Rt Hon David Willetts MP	Minister of State for Universities and Science
Dominic Tildesley	Unilever

Industry Members:

Paul Best	Frazer-Nash/CFMS
Ian Dix	AstraZeneca
David Docherty	Digital TV Group
Andy Grant	IBM
Darren Green	GlaxoSmithKline
Prof Tony Hey	Microsoft
Sean McGuire	Intel
Andy Searle	Jaguar Land Rover
Kaitlin Thaney	Digital Science

Academic Members:

Prof Peter Coveney	University College London
Prof Robert Glen	University of Cambridge
Prof Richard Kenway	University of Edinburgh
Dr Oz Parchment	University of Southampton
Prof Mike Payne	University of Cambridge

Public Sector Members:

Prof John Bancroft	STFC
Dr Stuart Bell	Met Office
David Bott	TSB
Dr Bob Day	JANET(UK)
Prof Douglas Kell	BBSRC
Dr Susan Morrell	EPSRC (for Dr Lesley Thompson)

Secretariat/Observers:

Dr Graeme Reid	BIS
Dr Martin Ridge	BIS
Robert Downes	BIS
Paul Lewis	BIS
Dr Anne-Marie Coriat	RCUK
Sapna Chadha	UKTI
Alan Rhydderch	Technology and Innovation Futures
Oliver Grant	Foresight Horizon Scanning Centre

Draft Meeting Note

1. **Welcome and introductions**

Dominic Tildesley took the Chair, and welcomed everyone to the first meeting of the E-infrastructure Leadership Council. He introduced two secondees to the ELC Secretariat to support Martin Ridge: Paul Lewis from JANET (UK) and Robert Downes, UCL.

The agenda was accepted.

2. **Mission and Terms of Reference** - ELC(2012) 01

The Chair confirmed that the ELC was an advisory body tasked with the creation of a ten year road map for e-science infrastructure, suitable for academe, industry and government. This infrastructure will support economic growth in the UK. The intention is for the Council to adopt a wide-ranging, flexible remit to offer advice to Ministers on all aspects on the development of the UK e-infrastructure. The first two bullets in the ToR capture this mission.

Written comments on the Terms of Reference were invited by the end of April and should be sent to the Secretariat.

3. **Declarations of Interest**

The ELC Secretariat is developing a Register of Interests of Council Members' primary affiliations. This will go onto the ELC section of the BIS web site. Members were requested to keep it up to date via the Secretariat.

Members were expected to declare any secondary interests at relevant points in meetings.

Dominic Tildesley declared that Unilever is working with the ICE-CSE at Daresbury.

4. **Building Hi-Tech Britain: e-infrastructure requirements** - ELC(2012) 02, ELC(2012) 03

Alan Rhydderch (BIS) provide an overview of the Technology and Innovation Futures Foresight Report (2010). The ELC made the following observations:

- the Report had not identified all opportunities for growth; for example biotechnology was an important growth area where the UK was internationally competitive and had not been covered well. It was noted that the ELC had no representation in E-health. The Council agreed that additional membership would be sought in this area.
- it was important to be clear, area by area, what investment approach should be adopted: either investment to 'catch up'; or investment to maintain a UK lead.

Following individual table discussions, the Council made the following general points:

- e-infrastructure should be viewed as a critical national infrastructure for UK growth: a well balanced e-infrastructure would facilitate progress in most of the areas outlined in the report. The e-infrastructure should be seen as a service to

competitiveness and be constantly refreshed to meet users' needs: hardware is perishable; people and software are durable.

- the management and exploitation of massive data sets is rapidly emerging as the biggest challenge. Data driven computing and the provision of appropriate HPC capability need to be properly integrated: software development was critical to this.
- a clear definition of HPC needs to be developed and communicated. There is a misunderstanding around the differing compute options, specifically around cloud offerings, high throughput computing (HTC) and high performance computing (HPC). This is particularly acute in deciding which solution should be applied to a given problem. A creative communications strategy combined with a 'catalogue' of available solutions would be helpful. Alongside access to experts, this would aid discussion and transmission of relevant advice.
- an investment plan for e-infrastructure must be dynamic and able to respond rapidly as opportunities arise. Flexibility and adaptability in all areas was essential. This is particularly true in the development of people and skills. A 'static' 10-year roadmap was inappropriate, although a 10-year horizon was important. Developing a view of what the UK e-infrastructure should look like in 3 to 5 years time with an investment of £x or with £10x million investment might be a better approach.
- it is critically important to ensure investment decisions were balanced and evaluated in terms of value for money. If faced with a choice, investment in multi-petaflop machines was at present a higher priority than a single investment in an exaflop capability (that had no further market beyond itself, although it would help drive development of mass-market low-power component technologies).

The following ideas were recorded from the four topic areas that table discussions focussed on:

Key scientific and business opportunities for the UK in e-infrastructure (with high scientific, economic and societal impact)

The groups noted:

- the phenomenal financial success of humanised monoclonal antibody technology (the top 6 applications generate ~ $30Bn/yr), and suggested that an understanding the relationships between systems and integrating data combinatorially would significantly advance in our understanding of biological processes. It was suggested that $bn improvements in business could be derived from an ability to integrate data and understand the interplay between consumers and bacteria and to create new bioactives. Personalised medicine was recognised as a significant growth area for the future;
- that broadcasting, distribution and digital media applications offered significant opportunities for growth.

The e-infrastructure required for future growth

Groups highlighted:

- the development of software skills in the postgraduate community
- the development of data scientists as a core areas for growth;
- the developments in machine learning and artificial intelligence;

- the ease of access to distributed large data sets, and the required network capacity. Improved data sharing will require useable, common protocols.
- ease of access to the infrastructure for non experts
- smart software, tools and technologies for data analysis including applied statistics, data analytics and machine learning (as a service).
- algorithms for multiscale simulation and modelling
- test sites for leading edge hardware and software
- access to occasional expertise in analysis, data mining, simulation for SME's. Often it is not high end HPC that is required, rather a breadth of skills and tools at mid-range.

The obstacles to progress

The Groups identified that:

- tools are not generically applicable. Important that e-infrastructure development is driven by the needs of those sectors using the technology, rather than envisaged by providers.
- ease of access to HPC is important for the industrial sector. Difficulties in access can hold back large UK industry if they are unable to use methods to their full potential. Computing will only be invested in by companies once they have experience of the benefits. Access to both leading edge tools (algorithms and skills) and hardware is key.
- digital media challenges exist in distribution, hybrid TV, rendering in real time etc. E-infrastructure will be essential in helping to provide solutions.
- there is an urgent need for skilled people who can combine an ability to work with both sector specific knowledge and computational expertise – data scientists.
- the current decoupled nature of support (capital and resource) is problematic. An approach in which these two types of funding are awarded together is essential Ad hoc investments are inefficient: a longer term planned approach to investment would yield significant benefits.
- further investment is required to improve the usability and robustness of academic software (greater use could of these tools by industry and government would result).
- lack of skills in software redesign for more advanced and complicated computational systems.
- access to advice on which system is best for a particular problem. A creative communications strategy combined with a 'catalogue' of opportunities of what is available combined with access to experts to discuss and advise would be very helpful. SMEs need help in understanding the power and the importance multiscale modelling. The development of 'plug and play' software demonstrators and tools would help bridge this gap.
- for industrial users there is a need to ensure genuinely secure systems. Concern was expressed around the current provision of information assurance in future e-Infrastructure. New models for authentication and security of intellectual property were required.
- development of ways of working effectively with ISVs (independent software vendors). The availability of ISV software can be restrictive due to licence costs. Need to develop an on demand licensing model.
- one type of software may not fit all – the development of bioinformatics software, mainly open source, has gone in a very different way from that for cheminformatics, mainly commercial.

The Secretariat was asked to:

- urgently work with RCUK on the training and skills agenda, including exploration of the concept of data scientists and how they might best be developed and supported. [Post-meeting note: EPSRC have work underway in this area.]
- develop proposals for raising awareness within Government Departments of the importance of HPC for public policy development and delivery. [Post-meeting note: Ed Vaizey MP, Minister for Culture, Communications and Creative Industries (jointly with the Department for Culture, Media and Sport) has been invited to be a Member of the Council.]
- suggest ways of securing academic software developments in a robust and user friendly format that could be more widely used.

5. **Building partnerships: academe, industry, Government** - ELC(2012) 04

The Chair thanked John Bancroft and Richard Kenway for the paper. In discussion the following points were made:

- to embed HPC it is important to pursue:
  - collaborative HPC-based sotware and application development;
  - and to promote the use of shared use of capabilities

  Both of these approaches are important if the UK is to realise the full potential of HPC as systems become more powerful, more expensive, and more costly to run.
- users not suppliers should define priorities, so mechanisms need to be put in place to determine user requirements (although one would hope the marketplace would correct any misalignment by suppliers).
- there is a tension between income generation and impact: income generation has the potential to drive short term behaviour and may adversely affect overall impact. The public funding element helps drive wider innovation.
- large companies have in-house HPC resources because currently there is little alternative. However, the perishable nature of HPC hardware and increasing cost of replacement will increasingly point to a degree of outsourcing. Firms are increasingly prepared to pay a premium for short term access to additional HPC capacity: this trend is affected by prices, security and ease of access.
- business has access to pre-competitive HPC-based R&D via sponsored PhD studentships and postdocs. This is a valuable resource and some value should be attached to it.
- need a business model for recycling centres' income into the UK's e-infrastructure.
- business, in particular SMEs need help to engage in e-science and partnerships with academia should be fostered. Large firms can help SMEs in their supply chains. SMEs have low awareness of the potential of e-infrastructure and need to be transformed into data-driven organisations.
- need to provide generic expertise at HPC software centres drawing in domain expertise where required, always asking which technology is the most appropriate to meet the user's needs.
- novel opportunities for industry and academia to interact should also be explored including sabbaticals etc. (This would build on the schemes currently available through the Royal Society). Robust, multiuser, interoperable, software would facilitate such interactions.

in Germany there is much more use made by industry of academic computing resources and vice versa. We need to understand why this is.

Noting that each sectors' needs for e-infrastructure were potentially different, the Council agree to establish the following Working Groups to report to the ELC in July on the needs in business (including SMEs) for e-infrastructure:

- Engineering and manufacturing: Andy Searle, Paul Best, Mike Payne
- Digital media post production: David Docherty, David Bott
- The "missing middle" and supporting academics with industry interactions/spin outs: Kaitlin Thaney, John Bancroft
- Life sciences: Darren Green, Doug Kell, Robert Glen and Ian Dix

The Secretariat was asked to:

- provide working briefs for the four Working Groups.
- establish contact with UK industrial and Government partners within the e-infrastructure information assurance and security community to support the work of these groups.

6. **International positioning** - ELC(2012) 05

The Chair thanked Richard Kenway for contributing to this paper. Richard Kenway declared an interest as Chair of the PRACE Steering Committee. In the brief discussion it was noted that there was no natural user community to lead European HPC exploitation (unlike CERN for particle physics) and hence PRACE was supplier driven.

The Council agreed to establish a Working Group on the development of the European Commission Communication on HPC Action Plan: Richard Kenway, Sean McGuire, Oz Parchment.

The Secretariat was asked to provide a working brief for the Working Group.

7. **AoB**

The Minister commented on the high quality of the discussions. Credible roadmaps showing what business needs, and will contribute to, will be an essential element of the case for future public funding. He was keen to see low energy e-infrastructure development a part of the Council's remit.

Next meetings: 4th July and 6th November, 2pm to 5pm.

Summary of Actions

Action	Who	By when
Written comments on the Terms of Reference	Council Members to the Secretariat	End-April
Develop Council pages on BIS web site	Secretariat	End-April
Contribute to the Members' Register of Interests	Council Members to the Secretariat	On-going
Work with RCUK on training and skills	Secretariat	Report to July meeting
Develop proposals for raising Departmental awareness	Secretariat	Report to July meeting
Proposals for robust, user-friendly academic software development	Secretariat	Report to July meeting
Provide working briefs to establish the five Working Groups	Secretariat	Mid-April
Make contact with IT information assurance and security interests in industry and Government to support the Working Groups	Secretariat	Report to July meeting
Submit written comments on these draft Minutes	Council Members to the Secretariat	End-May