Response to House of Commons Science and Technology Committee consultation on

A New UK Research Funding Agency[1]

On behalf of the UK Computing Research Committee, UKCRC.

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The UK CRC is an Expert Panel of all three UK Professional Bodies in Computing: the British Computer Society (BCS), the Institution of Engineering and Technology (IET), and the Council of Professors and Heads of Computing (CPHC). It was formed in November 2000 as a policy committee for computing research in the UK. Members of UKCRC are leading researchers who each have an established international reputation in computing. Our response thus covers UK research in computing, which is internationally strong and vigorous, and a major national asset. This response has been prepared after a widespread consultation amongst the membership of UKCRC and, as such, is an independent response on behalf of UKCRC and does not necessarily reflect the official opinion or position of the BCS or the IET.

Response:

Q1. What gaps in the current UK research and development system might be addressed by an ARPA style approach?

[1.1] The current (UKRI/EPSRC) review system is slow and conservative.

[1.2] The first of these objections is hard to correct (typical time from starting to write a grant application to start of grant is a year). There have been initiatives to increase responsiveness but these have reduced the time between a call being issued and the proposal deadline. This increases pressure on researchers and reduces the opportunities for talented applicants from diverse backgrounds who may not be able to reschedule personal and other commitments to meet those deadlines. It also tends to encourage a "factory farming" approach to grant writing; where teams specialise in writing to deadlines rather than creating innovative proposals.

[1.3] The conservatism apparent in the existing peer review system limits the success of more adventurous ideas: there are numerous reports of proposals not being funded having received reviews with 3 top ratings (6) and one objection. UKRI staff are specifically selected to have expertise in areas other than their portfolio; panel members are essentially forbidden from "re-refereeing" proposals. This results in adventurous ideas failing because of even a single nay-saying referee.

[1.4] UKCRC and others have worked with UKRI to address these concerns through the transformative research programme. Many of our members chair panels, serve on the

[1] https://committees.parliament.uk/work/265/a-new-uk-research-funding-agency

review college and are on the Strategic Advisory Teams. However, we recognise that progress in the above two areas have been modest and, in turn, welcome the proposals to identify alternative mechanisms to encourage the dynamism and creativity needed to sustain world leading research.

[1.5] There are significant opportunities for a new funding agency to address some of the structural concerns that have particularly affected the UK position within computing research. There are particular barriers to the development of substantial software-based research projects, partly because of the gap between commercial salaries/prospects for software engineers and what we can offer to similar professionals within the universities. The proposed agency might provide the focussed support needed to attract and retain the best engineers who are needed if the UK is to challenge our international research competitors in this area.

[1.6] We foresee two different time scales that might form the focus for any future agency. Relative short and focussed initiatives can yield results against tight deadlines – as we are seeing in response to the COVID contingency. Equally important are more sustained initiatives that nurture strategic areas beyond the usual 2-3 year horizon that dominates existing funding; where it often takes up to half of the grant period to recruit appropriate talent to any project.

Q2. What are the implications of the new funding agency for existing funding bodies and their approach?

[2.1] There are opportunities and concerns for existing funding agencies and their approach from the creation of a new funding agency.

[2.2] Concerns include the possibility that the new agency may dilute the intellectual rigour and scientific merit of the work funded under more conventional routes; as teams focus their attention on the new agency. Attention would have to be paid that there were no unintended consequences of potential competition between the agencies – or confusion. In addition, the current model facilitates cross-council funding schemes which might not be aided by an additional funder operating under a different model.

[2.3] Further concerns arise from the potential that the same work might be funded twice under different routes leading to greater concentration without any necessary increase in the public or scientific good of the increased investment. Similarly, there is a finite number of committed and engaged scientists/engineers in key areas of UK research – both the proposed and existing agencies will draw on a limited panel of chairs and reviewers; who are critical to the success of UK research.

[2.4] There are opportunities – the ARPA model opens up the possibility for experts to be more involved in directing programmes. This creates tensions with the Nolan principles, although it does already happen within some, but not all, areas of UKRI. However, there were successful models in which the UK was able to gain an early strategic lead in core areas of information technology – in particular under the SERC/DTI Alvey programme, which has been lost in recent years especially to institutions in Singapore, the United States and to some extent in China.

Q3. What should be the focus be of the new research funding agency and how should it be structured?

[3.1] DARPA has been most successful in setting strategic challenges that capture the attention of the public and a wide range of scientific/engineering teams across both academia and industry.

[3.2] Although most of these challenges are applied, they draw on fundamental, basic research and accept that it may take some time for teams to achieve the intended goals; they provide a “forcing function” or accelerated path to large scale research that has the ability to create new industries.

[3.3] UKCRC would encourage the Committee to consider focussing the agency on rejuvenating the technological landscape for UK research with a particular focus on national infrastructures, in particular ensuring national sovereignty across our information and communications infrastructure within the context of an increasingly international supply chain.

[3.4] We would also direct the committee to consider ways of anticipating future opportunities, supporting pioneers, rather than reinforcing areas that already attract significant funds and in which the UK has long ago lost the lead.

[3.5] This implies looking beyond autonomous vehicles and conventional approaches to AI and to consider, for instance, radical means of ensuring that every member of the public has adequate access to high-speed digital communications in every part of the UK or on developing mechanisms to guarantee government software meets end-user needs on time and on budget, or to assure the resilience of all major infrastructures and complex systems on which the UK depends.

[3.6] There are significant opportunities for any new agency to break traditional silos and to fund interdisciplinary work, blending expertise in technological innovation with expertise in technology adoption, considering social and behavioural aspects; encouraging responsible innovation. This would build on major UK strengths throughout the creative industries.

Q4. What funding should ARPA receive, and how should it distribute this funding to maximise effectiveness?

[4.1] The recent focus on financial stringency has created a system where UKRI partially judges its performance on reducing the management costs per £ spent on research. While this is a laudable aim, it has had numerous ill effects. It creates a transient workforce of research managers who progress by continual movement both within and beyond UKRI. It also leads to the undue focussing of very large grants on a small number of institutions.

[4.2] The new agency should be well-funded not only in terms of the research money it disburses but also in terms of the delivery – so that the staff involved are scientifically credible and possess the vision needed to meet the expectations and ambitions set by the public; through government.

[4.3] It is important not to replicate some of the observed weaknesses within DARPA, although it was initially set up as a small and focussed organisation it has more recently been criticised for undue bureaucracy.

Q5. What can be learned from ARPA equivalents in other countries?

[5.1] UKCRC members have served on and chaired panels for funding agencies around the globe – including support for DARPA. There is arguably a greater sense of academic ownership of the technical focus in many of these overseas agencies.

[5.2] This involvement of UK academics in overseas funding agencies provides important insights for any new agency, especially where the UK seeks opportunities to regain scientific and engineering leadership in areas where others are now ahead. Likewise, UK blue skies research should be informed by involvement of leaders from outside the UK.

[5.2] One specific, relevant, example is the recent joint US-Dutch funding scheme intended to provide a "step change" in the cyber security research of Dutch national critical infrastructures. The scientific leadership for the US came from the Head of Research for the Department of Homeland Security while the Dutch used UKCRC members to steer their involvement; helping avoid the conflict of interest that might arise if leadership went to a Dutch academic.

[5.3] Canada's Tri-Council funding approach provides a further useful model. This has multiple tiers to support both the breadth and depth of their national research programme; it also focuses more on the development of a talent pipeline than on short-term topics or calls. It was based on a review of their national research strategy[2]. Discovery Grants provide breadth and encourage innovation. They support approximately 50% of applicants. Applications assessed as fundable are then ranked in order to be assigned to one of three amounts. In other words, the amount of the award if fixed for the buckets; all applicants in that bucket receive the same amount, regardless of budget[3]. The next level up is the Canada Research Chairs; which are awarded to universities based on their baseline funding rather than in response to particular proposals[4]. The top level is the Canada First Research Excellence Fund[5]; with large scale funding intended to develop world leading areas of strength through support for highly qualified personnel.

Q6. What benefits might be gained from basing UK ARPA outside of the 'Golden Triangle' (London, Oxford and Cambridge)?

[6.1] UKCRC represents the interests of UK Computing research both within and beyond the 'Golden Triangle'.

[2] http://www.sciencereview.ca/eic/site/059.nsf/vwapj/ExecSummary_April2017-EN.pdf/$file/ExecSummary_April2017-EN.pdf

[3] https://www.nserc-crsng.gc.ca/Professors-Professeurs/Grants-Subs/DGIGP-PSIGP_eng.asp

[4] https://www.chairs-chaires.gc.ca/program-programme/allocation-attribution-eng.aspx

[5] https://www.cfref-apogee.gc.ca/home-accueil-eng.aspx

[6.2] Our members within the London-Oxford-Cambridge area recognise the need for national strength and also the damage that can be done when they feel inhibited from participating in proposals because of perceived bias.

[6.3] Equally, we believe that it is essential UK research be diversified to deliver a healthy spread of talent across the UK. The Ivy League in the US is not so geographically concentrated as the UK – the differences of emphasis and approach between, for instance, the East and West coasts but also between the clusters of US Federal laboratories in the South and North-West of the US create their own eco-systems of excellence that over time are increasingly leaving the UK behind in areas of core technological innovation.