Data Manifesto Briefing Note 7

Investment in research, science and innovation

Data: the driver of prosperity

Our wellbeing depends on economic prosperity, which in turn depends upon exploiting our investment in data, and on our skills as a society to understand and use data.

Investment in research, science and innovation

The UK needs to grow the funding available for a capable research base to make new discoveries with data, and to increase in real terms our investment in science as a leading scientific nation.

1. Summary

The UK's international standing in science and innovation is shaped by data and by our capability to work with, analyse and understand it. Our data manifesto, published in autumn 2014, called on the UK government to invest more highly for improvement in this. As we outline further below, to safeguard our capacity to innovate we believe firstly that the government should commit to a holistic 10 year budgetary framework for science, and that they should act to increase investment in real terms. Secondly, the UK's plans for science and research should support statistics, information and data as building blocks across our research base, by building in more practical support for research across disciplines. Finally, the public sharing of research data for wider analysis needs sustained commitment, and it is important to strengthen the data access initiatives that will support this.

2. Investment in science and research

The government's 2010 Comprehensive Spending Review ring-fenced, in flat cash terms, £4.6 billion per annum up to 2015 for science and research programmes. This has provided a relatively stable funding environment, which has been crucial for the confidence of others to invest in UK science. We need to maintain this stability, while stepping up from this level of investment as we move into the next parliament. For every year that the 'flat cash' nature of the settlement is maintained, the spending power of the budget in real terms diminishes due to inflation. For the UK to remain competitive, public investment in the science budget as a whole needs to increase in real terms. In the UK, overall R&D expenditure from government, business and charities declined from 1.8% of GDP in 2011 to 1.7% of GDP in 2012. This is out of step with the average for the European Union and in countries such as the USA and China (excluding Hong Kong), where investment is between 2% and 3% of GDP and increasing. The government should invest more highly to keep pace with other leading scientific nations, and should commit to increase investment in real terms to 3% of GDP. To support excellence, the science, research and innovation budget as a whole should be kept to a planned, ten year framework. The framework for investment should have cross-party agreement and, in keeping with the Haldane Principle, should be independent from the political cycle.

3. Statistics across our research base

Statistics as a discipline is crucial across our whole research base as a foundation for robust scientific discovery and analysis, and for new 'data science' applications. A sound basis in statistics is necessary to ensure that results produced by models and tools are not over-interpreted as important or decisive, or interpreted wrongly. We need statistical theory and methodology across a wide range of disciplines, for scientific discovery in its broadest sense. Science funding models at present include the creation of centres of excellence in designated Higher Education Institutes (HEIs), and concentrating investment there. Although this approach may work particularly well for other disciplines such as physics, the demand for statistical expertise to support UK science and research is broad-based and widely dispersed. Cross-disciplinary development of sound quantitative research methods needs to be fully supported in our government's strategy for science.

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To support science and research, the 2015 parliament's plan for science should include both capital and revenue spending in a single budget. Our framework for funding should then seek appropriately to balance revenue spending (for ongoing research needs such as training) and capital spending (on physical assets such as research equipment). In our view, growth in revenue spending will be crucial for future growth. For example, the relative lack of post-doctoral training and fellowship money is a serious concern in terms of bringing on the next generation of trained researchers for a wide range of disciplines and industries. UK investment in Eight Great Technologies, which includes £113 million for "big data" supercomputing and analytical capabilities at the Hartree Centre in Daresbury by 2015, sets us up to lead in fields including big data and data science.[1] We need to ensure that UK support for people researching and training in these fields matches up to the message of our technology investments.

To build in more practical support for research across disciplines, Research Councils should put approaches to statistics, information and data at the heart of what they do. Statisticians and mathematicians should be represented more widely on panels and boards to discuss relevant research proposals, and not just within the mathematical sciences. This and other practical approaches to interdisciplinary collaboration should be promoted across all research disciplines, subject to over-arching review across the Research Councils. There is much that can be built upon across the Research Councils. The Engineering and Physical Sciences Research Council (EPSRC) focuses on the development of statistical theory, methodology and innovative applications as part of its mathematical sciences portfolio, and in its reach across disciplines. Other Research Councils including for biological and biomedical sciences, economic and social research, medical research, and the natural environment each also fund statistical research, innovative use of data and methodological development, focusing more on the application of this in the disciplines they support. Individual Research Councils should support better data and better analysis more rather than less, with a shared agenda across Research Councils UK to strengthen this.

It is also important that our higher education system supports the mathematical science required in different disciplines. Statisticians need to be in a stronger position to work across disciplines, particularly in the life, medical and social sciences. To allow this to happen, it is crucial that those allocating resources in every university or higher education institution understand the importance of implementing this agenda. Those leading on research excellence should recognise the value of statistical support for new discoveries. This agenda may also benefit from more explicit recognition in the REF performance metrics that are shared across institutions.

Initiatives for the social sciences are a good example of how this agenda has begun to be addressed, with action taken by different universities, quite independently, toward a common goal. The need radically to improve quantitative skills for social science has become well recognised over the last ten years. Fifteen Q-Step centres, funded by the Nuffield Foundation, ESRC and HEFCE, have been resourced within universities to support quantitative skills in disciplines with a systematic shortfall. Through doctoral training centres, the ESRC also now allocates 10% of its studentships to students who use advanced quantitative methods, so that there is a pipeline of people progressing to higher levels. There is further to go however. We would recommend more resources for training centres to work across disciplines and collaborate with other universities. There have also been gaps in what doctoral training centres are attending to; we have recommended stronger support for social statistics, to develop more advanced social research methods and applications.[2]

4. Opening up access to research data

The public sharing of research data for wider analysis needs sustained commitment. As we achieve greater ease of access and the ability to find the right data, this will lead to efficiency and multiplier effects for our knowledge economy.[3] More open access publishing needs to be prioritised by the government and by our academic and research industries, especially access to research that is supported by public funding. It is also important to strengthen efforts to make linked administrative datasets available for research purposes. Data-sharing and data access projects are receiving greater attention across the European Union and should increasingly be eligible for funding.[4] As European data protection law is refreshed, we need also to ensure that this does not contain new, arduous requirements for personal consent that would constrain the production of open-access research and statistics in the public interest.

Where data access requires the implementation of new systems and new reporting standards, it is clear that risks arise, and that new data-sharing should not be implemented too hastily. The needs of data users across the research sector must be well considered, so that valuable data are not lost in the process and disruption to services is minimised. Research data projects require good governance to assess ethical concerns, such as any risks to privacy for research participants. Implementation must therefore be well considered so that the benefits of open access are widely seen to outweigh any risks.

Endnotes

[1] HM Treasury and the Department for Business, Innovation & Skills (2014) *Our plan for growth: science and innovation*. December 2014.

[2] RSS Academic Affairs Advisory Group (2014) *Consultation Response: to the Economic and Social Research Council for a demographic review of the UK Social Sciences*, 30 October 2014. Available at www.rss.org.uk/higher-education-policy

[3] Research Data Alliance Europe (2014) *The Data Harvest: How sharing research data can yield knowledge, jobs and growth*. European Union.

[4] High Level Expert Group on Scientific Data (2010) *Riding the wave: How Europe can gain from the rising tide of scientific data* [PDF]. European Commission.

This document is one of a series of policy notes to support our policy positions as summarised in the RSS Data Manifesto.

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