Mapping and Analysis of Research and KE funding sources for Operational Research in the UK

Report for the OR Society's Charitable Project Fund

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1 Introduction

This project came about in 2013 after a discussion with the Chair of the Education and Research Committee of the Operational Research Society (ORS) about obtaining a clearer idea of the range and characteristics of sources of funding for research in OR. There are well-known funders such as EPSRC and the European Commission about which it would be useful to collate experiences and perceptions, but more helpful would be to identify and learn about less-known sources of funding.

The resulting analysis and insights may help members of the OR academic community to more successfully apply for research funds, and thus fulfil ORS's strategic charitable aim of advancing knowledge and education through fostering OR.

The author would like to thank Martin Kunc for mentoring this project and the OR Society's Charitable Funds and UWE for financing it. The ORS Charitable Project Fund paid the direct costs of the author's time over 20 days, with the balance of the full economic cost financed by the University of the West of England (UWE).

2 Methodology

The research and mapping involved proactively collecting information in a semi- structured manner by telephone-interviewing OR academics. This approach produces good qualitative data, but is less appropriate for collecting quantitative information about bid success rates, etc. For the latter, an online survey of OR academics was considered and many Survey-Monkey type websites investigated, but none proved to be appropriate for the semi-structured nature of the information to be gathered. For reasons internal to ORS, it was not possible, as originally planned, to send out an email to all ORS members asking for volunteers to be interviewed. Some non-obvious sources of finances were also identified by searching the web.

The small sample size collected in the 20 days allocated to the project meant that the information gathered could only scratch the surface of an extensive and deep pool of knowledge and experience. Thus the result below should be viewed as a pilot survey to point to promising sources and possible issues.

3 Telephone Interviews

Telephone interviews were conducted with OR academics, but not with practitioners. The interviewees were initially chosen from ORS contacts, and then expanded via interviewee suggestions. They were contacted by email asking to conduct a telephone interview and containing the participant information as agreed via UWE research ethics procedures (Appendix 1). Twelve of the academics emailed agreed, some did not reply, and none explicitly refused. With those who agreed, a mutually convenient telephone interview time was arranged, along with emailed information reminding them of their right to withdraw as an interviewee participant at any stage, even after the telephone interview, without having to give any reason. No interviewee has withdrawn. Each of the 12 interviews lasted for between 30 and 60 minutes, providing a mix of general insights and the interviewees particular experiences with a variety of sources of research funding.

The interviews were guided by the questions in the sheet presented in Appendix 2. As with so much semi-structured research, this list was initially useful, but quickly became a rough guide only, with the interviews providing their own dynamic of questioning and the research coming to focus on (i) *where does your funding come from?*, and (ii) *what is your experience of funder X*? Thus not all the questions were asked, nor necessarily in the order presented, with some others added as an interview flowed according to its own momentum.

4 Funding Sources

This report is not going to present generally available information about each of the funders below, nor provide contact information which is easily found on the web. Rather it will report on views and experiences collated from the interviews.

4.1 EPSRC

The *Engineering and Physical Sciences Research Council* is the obvious starting point when discussing the range of funding for OR research.

Almost all the interviewees had applied to the EPSRC, with varying degrees of grant size, success and views, in both responsive and special call modes, in all three of the Maths, ICT and Engineering programmes including First Grant Scheme, CASE PhD studentships, Doctoral Training Centres (DTCs), Manufacturing Centres, Innovative Manufacturing, and Maths for Manufacturing. Interviewees provided several perceptions and insights as follows:

Many excellent bids appear not to be funded, so several interviewees have given up applying to EPSRC altogether. However, others advise persistence and learning from the experience. An interviewee, with a long track record of EPSRC funding, emphasized that to be successful, a bidder must become involved in the EPSRC, reviewing bids (no matter how busy they are) and getting onto a panel in order to build up insight. The interviewee strongly recommended that the OR academic community in general needs to properly engage with EPSRC and understood how it works.

As funding for responsive mode bids has been reduced, several interviewees perceived that collaborative/consortium large bids via special calls had a greater chance of success. One university used EPSRC funding to set up a Doctoral Training Centre in collaboration with high-profile companies with CASE-like projects and many strong PhD students. Collaboration with engineers with track-records can help to get large multidisciplinary projects, for example, manufacturing centres.

The EPSRC review of OR in 2004 was followed by a renewed appreciation of OR within the EPSRC and increased funding successes. However, following its 2010 review of Mathematics, the EPSRC subsumed OR into Mathematics where it may have less some visibility compared to traditional or "purer" mathematics. Interdisciplinary proposals are be perceived by some interviewees as being less valued by discipline-specific panels. The Mathematics panel has no OR representative and is seen by some to value novel mathematics *per se* rather than OR's use of it. The ICT panel is regarded as more understanding of OR (though not always). The First Grant Scheme is more competitive than previously, but still considered worthwhile if you qualify to apply.

High quality applications require critical internal scrutiny with the applicant's own university before submission. One experienced researcher leader's advice was to download the reviewer's form to see what is required before writing the proposal, to be consistent and very clear on detail (and to purge the typos to not lose credibility!)

4.2 ESRC

The *Economic and Social Research Council* was mentioned by several interviewees as appropriate and receptive for OR academics based in Business Schools or Management departments. However, one interviewees had made an unsuccessful multinational bid, while another cited its very low success rate (even though they had had an OR project funded by ESRC). A third interviewee had obtained funding not as OR but within a Business School project involving analysis of data. A fourth interview saw ESRC as a good fit for OR, but too traditional in attitude.

4.3 European Commission

Half the interviewees had applied to the European Commission's *FP7* programme or its successor *Horizon 2020*. It was perceived as impact-oriented, requiring partners and collaborators

One interviewee had participated as a partner in a successful bid and project, but has avoided its perceived bureaucratic burden by not being the project coordinator, leaving this to an EU partner with significant resources. The interviewee intend to bid again within *Horizon 2020*.

Another interviewee had been the coordinator in an FP7 project and participated in a 2nd with both academics and businesses. The challenge was to integrate with interdisciplinary partners, and to cope with its very demanding reporting requirements, both overall and work-package coordination, reporting every 3 months.

A third interviewee had applied twice unsuccessfully to the FP7 programme, but intends to apply again as Horizon 2020 is a significant source of funds.

A fourth interviewee was participating in a multi-million bid with strong European universities, but was not optimistic as EC funding is now very competitive.

A fifth interviewee observed that, although Horizon 2020 offers substantial opportunities that OR cannot ignore, the challenge is to balance it as a source of good funding against its bureaucratic demands. Again, the advice was to be a partner, not a coordinator (advice which this author endorses having coordinated a relatively small project with just 5 partners)

The advice of a sixth interviewee was to leverage the conferences and working groups of EURO, the *Association of European OR Societies*, to make the contacts needed to find partners

for a bid.

4.4 Health Sector

About a third of the interviewees had obtained funding from sources in the health sector.

A major source is the *National Institute for Health Research* (NIHR), a UK government body that coordinates and funds research for the NHS. One interviewee mentioned the NIHR as a non-obvious source, while another had accessed its funding via a collaboration with their university's School of Medicine. A third interviewee had submitted an outline bid which was not successful and had received no feedback (as outline bids are not refereed).

The NIHR requires substantial prior research and problem audit, that is, you must provide good evidence that your proposed project is actually tacking a real problem rather than a perceived or theoretical one. This author himself made use of the *Research Design Service* which provides design and methodological support to researchers to develop grant applications to the NIHR and other national peer-reviewed funding programmes.

The *Health Foundation* is a charity for improve the quality of UK healthcare. It provided a 15-month post-doc *Shine* award to one interviewee, in conjunction with the NHS, leading on to a 2nd *Shine* award of a 5-year fellowship. *Shine* awards assess small-scale innovative interventions to improve healthcare services.

The NHS itself does provide direct research funding (rather solely than via NIHR). One interviewee's university was part of a regional Health Science Partnership between the NHS and academic organisations, financed with £1m from a local NHS board to improve health care in the region. It was only successful after a lot of effort and canvassing, showing examples, demonstrating impact , with small grants to start, then larger ones accompanied by a culture change.

The NHS also provided an excellent PhD collaboration at another interviewee's university.

4.5 Technology Strategy Board

The *Technology Strategy Board* (TSB) is a public funder that reports to the Department for Business, Innovation and Skills (BIS).

One interviewee used the TSB to fund a fruitful collaboration between OR and Engineering, responding to a manufacturing call. The application was challenging to write as its main focus was on Impact (with a similar view to EPSRC's). An advantage was its two-stage application process: (1) Expression of interest with a perceived 50% success rate, and then (2) Full proposal. The interviewee was not the PI but attended meetings every 4 months, which was demanding, having to travel to the Principal Investigator's own university for meetings that included the TSB contact.

Another interviewee applied to the TSB, but was not successful as their project was not viewed as close enough to the market

The TSB also funds *Knowledge Transfer Partnerships* that have good potential for OR, as now discussed.

4.5.1 Knowledge Transfer Partnerships

Knowledge Transfer Partnerships (KTPs) were used by several interviewees to collaborate in research with external organisations, resulting in publications and also impact due their practical focus. However, they are not usually a vehicle for funding PhDs due to their

typical 2-year duration, or even for an MPhil. If funding can be found for a 3rd year, then it was possible for the research associate to obtain a PhD.

KTPs are seen as straightforward and to have a high application success rate so long as the regional coordinator is consulted, brought on board and their advice followed. It can be difficult to find an external partner, as even 2 years is too long for some companies, but university central research services can help find one.

One interviewee, a very experienced research leader, saw KTPs as having a role in a varied portfolio of funders, so as not to become over dependent on the research councils. Their 'real world' focus can contribute to a healthy balance of research, but only if they present a genuine research challenge, was the view.

4.6 Non-KTP Knowledge Exchange

One interviewee leveraged contacts to obtain KE funding from local organisations, including Scottish Enterprise, the Scottish Manufacturing Association, and the National Audit Office.

4.7 Consultancy

Consultancy can provide contact with new problems and organisations willing to input some funding for research, either directly or in kind. The contact could come about via the researcher's university (research/KE units, student projects, MBA or past MSc/UG students) or directly via personal meetings, word-of-mouth or professional experience.

Quality research could result, but funding organisations often wanted it to be confidential, and not to be published. More than one interviewee saw consultancy as throwing up interesting issues for more general research outside the commercial interest to a sponsoring organisation and hence publishable in academic journals.

4.8 Royal Society

The *Royal Society* was used by one interviewee to build links with China via a modest grant.

4.9 Leverhulme Trust

The *Leverhulme Trust* was identified by just one interviewee who viewed it as difficult to get funding from and as providing poor feedback following a not-successful application.

4.10 British Academy

One interviewee mentioned the *British Academy*, and had obtained a grant of less than £10k. They viewed it as having a reasonable success rate, with a social science orientation, and so possibly more suited to soft OR.

4.11 Academic's own university

Only two interviewees mentioned their own university as a source of direct research project funding. In both cases, the grant was relatively small, in the £ tens of thousands.

4.12 OR Society

Only one interviewee mentioned the *OR Society* itself, having obtained a small grant in the £ tens of thousands.

4.13 Other External Organisations

The majority of interviewees had obtained research-related funding from external organisations who will not necessarily be identified here so as to respect confidentiality. Nevertheless, some insights can be shared as follows.

Many companies want to fund only short-term projects rather than the typical 3 years of a research project.

The Glasgow-based simulation-software company *Simul8* has always has close links with UK OR community, both practitioner and academic. It has sponsored PhDs at several universities, including in collaboration with the *Beatson Institute* of *Cancer Research UK*

Some UK police forces fund long term research, including one that provided initial funding for an RA post that was later continued by EPSRC.

The *Centre for Defence Expertise* of the *Defence Science and Technology Laboratory* (DSTL) has regular calls and is open to new ideas. One interviewee attended a DSTL info days and subsequently submitted a grant. It finances many short-term 3-month feasibility studies with £50k being a typical project value. It is seen as preferring multiple short projects rather than long term projects.

For pedagogic research, one interviewee observed that many organisation will provide access to small grants if time is invested to cultivate relationships with them, for example: the *Higher Education Academy*, the *National Union of Students*, the *Leadership Foundation for Higher Education* (who provide good funding).

Regional Development Agencies can help fund spin-out companies based on OR research, usually with small grants.

The *Office for National Statistics* (ONS) collaborated with one interviewee's university to create a ioint MSc programme, and with this author's research group in providing joint funding for an EPSRC CASE award to support a PhD student, with continuing support that has resulted in a REF Impact case study.

5 Non-obvious sources of research funding

A particular concern of this project was to obtain information and insights about non-obvious sources of research funding for the OR commuunity. Many interviewees obtained all their funding from established sources, but several had identified funding in unexpected or unusual places and shared the following insights and sources:

Non-obvious sources change over time as the market changes, so subscribing to mailing lists and funding alerts helps with keep up with changes and new funders.

University central research offices are very important to scout for funding, keep academics up to date (esp Horizon 2020), handle IP and contracts, and not least contacts at local, regional, and national level.

The *Royal Academy of Engineering* is a source that no interviewee mentioned, but from which this author has received two grants, one small, the other medium-sized, both related to the

application of OR in industrial/production engineering and collaboration with overseas universities.

The *Welsh Government* provided a Fellowship to an interviewee's university to finance a secondment for a year.

Another interviewee identified *Frazer-Nash* consultancy's *Radical Train* project as a potential source of collaboration and funding.

The *Research Council of Norway* provides grants to foreign universities of up to £60k and through which one interviewee is working with *SINTEF*, "the largest independent research organisation in Scandinavia.".

The *Brazilian government*'s two federal research councils, CNPq and CAPES, both have schemes through which to finance joint research with Brazilian universities, including PhD study and post-doctoral research in the UK as part of the *Science without Borders* programme. FAPESP, the research agency of the state of São Paulo, has a joint-funding agreement with *Research Councils UK*, which the ESRC has implemented, though not the EPSRC.

The *Lachesis* Fund provides early-stage seed-funding for investing in technologies arising from research undertaken at universities in the East Midlands region to transform research into commercial reality.

The *Bill and Melinda Gates Foundation* has funded OR research, for example,

1. The *Schistosomiasis Consortium for Operational Research and Evaluation* (SCORE) via a five-year grant to the University of Georgia Research Foundation. Imperial College London has tapped into SCORE funding.

2. The *Task Force for Global Health* received a five-year grant of over $28M for their project "Filling the Gaps Operational Research to Ensure the Success of the Neglected Tropical Disease Control and Elimination Programs".

The *Nuffield Foundation*'s criteria exclude research that could be considered by a government department, a Research Council or a more appropriate charity, but their *Open Door* programme did fund:

1. The Royal Statistical Society (RSS) statistical literacy campaign "getstats" with a £250k grant over 2 years from 2011 to 2013.

2. *Full Fact*, a non-partisan project to promote the facts for their own sake in political debate, as "bad facts lead to bad decisions".

3. Setting up a website for the pressure group *Straight Statistics* whose aim wass to detect and expose the distortion and misuse of statistical information, and identify those responsible. [The group's work is now carried on by *Full Fact*].

4. A £150k grant is to support the *Campaign for Real Statistics* in its first two years in 2008. The campaign seems to no longer exist and may have been replaced by *Full Fact*.

OR has similar aims and could tap into this source.

The *Malaria Eradication Scientific Alliance* (MESA) recently funded OR projects in malaria elimination, following OR priorities agreed through the *Global Malaria Programme* of the *World Health Organisation*.

6 Discussion and Conclusions

Although the sample was small, useful insights and pointers did emerge from the interviews, as detailed in the previous sections. A wide variety of research funding sources emerged over all the interviewees.

However, the sources from a given interviewee were sometimes narrow, maybe because a potential funder was not interested in the interviewee's research area or topic. Alternatively, the reason could be a lack of awareness of other or new sources of funding.

The research councils, particularly the EPSRC, are viewed as very competitive from which to obtain funding. The EPSRC involves significant input not just in preparing and writing the proposal, but also in becoming involved in refereeing and participating in panels.

European Commission funding is seen as available and generous, but it does require gathering many partners and a coordinator with the resources and will to deal with the extensive reporting required by the funder. Hence, the advice of several interviewees was to be a partner rather than a coordinator.

Looking to the long term, one interviewee asked the question: Is OR under-selling itself with respect to the Impact agenda that is now a major feature of the *Research Excellence Framework* (REF) and so many funders' requirements? In other words, is the OR academic community missing out on sources of funding where its analytical and quantitative modelling strengths would be valued. Note in section 5 above how OR's sister discipline of Statistics has successfully drawn upon the socially-oriented funding available from the Nuffield and (huge) Gates Foundations.

It was clear from the interviewees that OR is struggling with traditional funders. The academic OR community needs to look further afield and collaborate with users to bid to new sources in order to maintain and increase its level of research funding. This project's aim has been an initial attempt to do just that.

7 Future Research

This research, resourced by 20 days of research time, has only scratched the surface of the characteristics of the research funding available to ORS members, including some discussion of non-obvious sources. It is these latter sources that need to be further researched, characterised and exploited, particularly in collaboration with other disciplines and non-academic sectors that could benefit from the OR approach.

Appendix 1: **UWE Research Ethics Approval**

University of the
West of England
BRISTOL

Alistair Clark, Room 3Q73
University of the West of England

UWE REC REF No: FETREC13-14/08

Date: 6th January 2014

Dear Alistair

Application title: Mapping and Analysis of Research and KE funding sources of ORS members and other OR academics.

Your ethics application was considered by the University/Faculty Research Ethics Committee and, based on the information provided, has been given ethical approval to proceed.

Please note that any information sheets and consent forms should have the UWE logo. Further guidance is available on the web:
http://www1.uwe.ac.uk/aboutus/departmentsandservices/professionalservices/marketingandcommunications/resources.aspx

The following standards conditions also apply to all research given ethical approval by a UWE Research Ethics Committee:

1. You must notify the relevant UWE Research Ethics Committee in advance if you wish to make significant amendments to the original application: these include any changes to the study protocol which have an ethical dimension. Please note that any changes approved by an external research ethics committee must also be communicated to the relevant UWE committee.
2. You must notify the University Research Ethics Committee if you terminate your research before completion;
3. You must notify the University Research Ethics Committee if there are any serious events or developments in the research that have an ethical dimension;
4. Any changes to the study protocol, which have an ethical dimension, will need to be approved by the research ethics committee. You should send details of any such amendments to the relevant committee with an explanation of the reason for the proposed changes. Any changes approved by an external research ethics committee must also be communicated to the relevant UWE committee.

Please note: The UREC is required to monitor and audit the ethical conduct of research involving human participants, data and tissue conducted by academic staff, students and researchers. Your project may be selected for audit from the research projects submitted to and approved by the UREC and its committees.

We wish you well with your research.

Yours sincerely

Larry Bull

Chair, FET Research Ethics Committee

Appendix 2: **Guiding questions for the telephone interviews**.

The questions below refer to your funding over the last five years, but do go further back in time if you feel you have useful information or insights to share.

Reminder of possible funders:

- UK Research Councils: EPSRC, ESRC, BBSRC, AHRC, MRC, NERC, STFC
- Science NGOs/Charities: Royal Academy of Engineering, Leverhulme Trust, Royal Society, London Math. Soc.
- Non-Science Charity (please state)
- UK Governments: DEFRA, DSTL, DfTrans, Scottish Government, Welsh Assembly
- EU FP7: Cooperation (collaborative research), Ideas (European Research Council), People (Marie Curie Actions), Capacities (Research Infrastructures and other capacity-building initiatives)
- Non-UK Non-EU government agencies
- Health: NIHR, Non-NIHR NHS, USA National Institutes of Health
- Technology Strategy Board: Knowledge Transfer Partnerships (KTP), Non-KTP
- Non-KTP Commercial: QinetiQ
- Internal from your university or organisation

Questions:

1. Recall the main bids you submitted for research funding. Who was the funder? How much did you bid for? Were you funded?

2. Were there funders you could have applied to, but did not? Tell us which and why you not apply.

3. If you have not done so above, please tell us of non-obvious funders for OR-related research, possibly bid for in collaboration with non-OR researchers or practitioners.

4. Reflecting on your bidding experience, which funders are the most receptive?

5. Which funders are the most time-consuming to apply to?

6. After a successful bid, which funders are the most straightforward to deal with?