COUNCIL FOR SCIENCE AND TECHNOLOGY

Science Landscape Seminar Reports: Life Sciences and Medical (LSM)

Background to the meeting

This seminar is one of a series convened by the Council for Science and Technology (CST), which is working to provide a map of the UK Knowledge Landscape as a whole. This mapping includes all areas of research carried out by academia, industry, charities and others.

The seminar series has brought together diverse sets of experts to discuss eight parts of the research landscape in depth; these areas are roughly aligned with the UK government's eight great technologies.

The aim of this work is to provide decision makers with a clearer picture of the whole landscape and enable better strategic decisions to be made. We would also like the reports to prompt communities to think more about what they can do to ensure their areas continue to make the best case for themselves and operate in a coherent way. The seminar series is limited in scope, but has revealed the importance of a clear articulation of the strengths and requirements of different parts of the UK research landscape. Specific research communities may wish to hold further sessions of their own.

The discussion took place under the Chatham House rule. This document represents the views of this group and is published alongside an infrastructure document (see below) which reflects the seminar's view of the life sciences and medical landscape

This meeting addressed life sciences and medical research and development, and was asked to consider:

- Strengths and weaknesses of life sciences and medical research in the UK;
- How the UK compares internationally; and
- What future concerns exist for the discipline.

1. Infrastructure list

To seed discussion, attendees were provided with a draft list of infrastructure relevant to life sciences and medical. The list is not exhaustive but does provide a summary of some of the key facilities for life sciences and medical research in the UK. It was updated in the light of discussion at the seminar to include, for instance, more learned societies, contract research organisations, contract manufacturing organisations and SMEs. The infrastructure list is available at: www.gov.uk/government/publications/science-landscape-seminar-life-sciences-and-medical.

2. Strengths and weaknesses in UK life sciences and medical research

Seminar participants identified the following areas of strength:

- UK research (including citations) in this area is of outstanding quality and researchers have excellent access to facilities. UK research is also cost effective by international standards.
- The UK's outstanding asset is its wealth of life science and medical data including NHS data, UK Biobank and the 100,000 Genome Project. This is a major asset by international standards. Access to such a comprehensive source of health information and the NHS in particular represents a "cradle-to-grave" data set on public health which is a rare commodity.
- Genomics England has the potential to provide a cross-cutting platform. There is great potential for the emerging data if combined with (e.g.) a programme of research on stratified healthcare. Participants in the discussion were invited to consider how they might work with it as a major strategic resource for the future.
- Initiatives around specific diseases are impacting positively on research outcomes: participants highlighted dementia and the MRC Dementias Platform UK as an example. The UK needs to build upon these initiatives, and continue to build the right links between them.

Despite these strengths, attendees felt that there were some key weaknesses and some underexplored areas which need to be addressed, some of which may represent excellent opportunities for the life sciences and medical sector. Participants raised the following issues:

- Research themes will always change, and will continue to do so rapidly. The UK needs to retain and develop strong and adaptable capability in current and developing technologies.
- Building the infrastructure for a fully informatics-led approach is a critical challenge. The creation of platforms to connect data, both across clinical and research priorities and between institutions needs to be a priority.
- While much more could be done to realise the potential of NHS data, there remain challenges around the public perception of how this data will be used. To begin to resolve this, there needs to be an open public dialogue on why this data is important and the potential benefits that it might serve.
- There is still some fragmentation across research disciplines and clinical work. There are good initiatives in London and the South East, and Scotland, but more needs to be done nationally and regionally.
- The UK sometimes struggles to commercialise the excellent science we do and transform it into spin-off companies, particularly in comparison to the US and China. The UK should aspire to be as productive in terms of start-ups as the US. Universities have a role in setting a lead for commercial focus.
- UK capital markets are also a factor: our science is competitive with anything in the US, but start-ups struggle to attract UK investment to take them to the next stage.

- There also needs to be clearer external messaging about the excellence of UK research and the UK as a location for investment; this not always well understood internationally.

3. Skills and capability

The technologies underpinning research are constantly changing. Identifying and nurturing the right skills within the life sciences and medical research community is therefore a necessity.

The importance of working across disciplines (and finding the right career structures, incentives, and funding programmes to promote this) was a major theme throughout the discussion. Participants made a number of observations:

- Big data is continuing to transform the fundamental character of research very rapidly. To keep at the forefront, the UK needs to increase the number of life sciences and medical researchers with mathematical and statistical backgrounds. All funders recognise the importance of investing in quantitative skills, but cross-disciplinary training is still not commonly available. Better integration of computational and biological training at Masters level and elsewhere ought to be developed further.
- It is generally more effective to bring together experts from a range of subjects in collaboration rather than expecting individual researchers (unrealistically) to develop deep expertise in more than one field. This means that better incentives and frameworks need to be in place for collaboration.
- Wider science skills, from physics and elsewhere, become increasingly important as life sciences and medical research continues to advance. The community need to do better at drawing in specialists from other disciplines at the same time as retaining sufficient high quality subject specialists.
- The NHS has a competitive recruitment process for non-medical scientists (with over 8000 applications for 400 places); developing those individuals further in terms of their research capacity remains a challenge.
- Career pathways for those spanning sectors, as well as disciplines, sometimes remain unclear, but there are some emerging approaches which may have wider application. The AstraZeneca “chief scientists” programme (for individuals working half-time for AZ and half-time in a full academic role) may offer one way forward. Cancer Research UK is running a joint doctoral programme with King’s.
- Universities and Institutes such as the Crick Institute can encourage cross-subject working by concentrating a wide range of disciplines in one place. University research remains critical: the way in which the Crick is deeply embedded in the work of three universities is helpful in maintaining the right links.
- Soft skills such as networking capability, communications, team working and leadership skills are also vital, and the life sciences and medical research community should consider how best to develop people with these attributes. Industry, generally, puts a higher premium on team working; within academia, the incentives and recognition for collaborative work, particularly its impact on the likelihood of promotion, are not so well aligned.

Participants raised a number of issues relating to attracting people to pursue life sciences and medical careers:

- School-age children need to be given a clearer idea of the shapes that a career in life sciences and medical might take. It is also important that older pupils should be given very clear information on how their subject choices may affect future career options.
- Good links between universities and industry are essential, in order to provide the right academic background and experience during degree studies in many sectors. Improving industry-academia links is likely to result in a stronger graduate recruitment pool for industrial research.
- At present the overwhelming perception in both medicine and veterinary sciences is that graduates will ultimately work as a medic or vet. It is important that graduates understand the other career paths available in these subjects and have good role models and clear progression routes for those who want to focus on research.
- In other disciplines, such as medical physics, there may not be time to pursue a research career; joint NHS-university posts may help support this particular pathway.

4. International considerations

The attendees were then invited to consider the UK in an international context. A number of points were raised:

- While the UK tends to do well in access to European funding, more could be done. Perceptions of bureaucracy (and some frustration with the speed of processes in getting projects up and running in particular) can deter applicants. Improving awareness of, and access to, Horizon 2020 funding represents an opportunity for UK researchers – particularly where this might provide leverage for other funds which might otherwise be missed.
- The UK pays expensive subscription fees for access to a wide range of large science equipment, but could make better use of these. RCUK has created a roadmap of facilities in the UK and is expanding this to international resources. Increasing the use of existing infrastructure should be a priority.
- As in other sectors, technology transfer seems more problematic in the UK than in the US.

5. Horizon scanning and future concerns

The seminar considered the future of life sciences and medical research, and horizon scanning capability. A number of points were made:

- The UK needs to ensure that it is making other countries aware of the facilities and equipment available here to drive further investment from overseas.
- Horizon scanning within the UK life sciences and medical community is often siloed; each of the actors (industry, academia, the research councils and others) has their own way of doing it and there could be more joint working on this. Those groups attending the seminar might set a lead here.

This publication available from www.gov.uk/cst

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