Assessment of UK Participation in the ELIPS-4 Programme

Executive Summary

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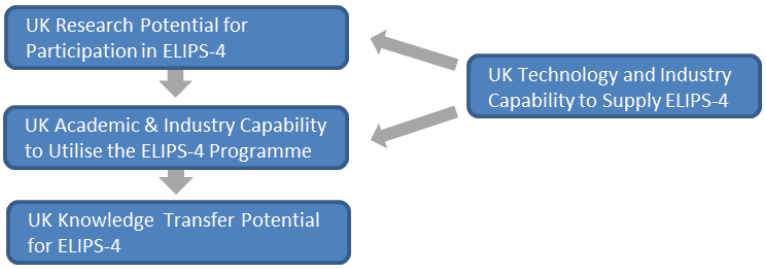
In the 90's, the UK was involved in ESA's Microgravity Research programme, but decided not to participate in the subsequent ISS Development Programme. Nor is it participating in the ISS Exploitation Programme. The UK is now revisiting this decision and is currently assessing joining the ESA European Life and Physical Science Programme (ELIPS), the ESA programme for the Utilisation of ISS.

After a decade of being only loosely connected to the ELIPS programme, the newly formed UK Space Agency (UKSA) does not have a comprehensive picture of either the full UK potential for participating in the 'scientific research in space programme' of ESA, or of the UK industrial capability to support the ELIPS programme if the UK became a participant. This report investigates the full scientific and industrial potential for UK participation. Four component strands of potential UK participation have been investigated, before synthesising the overall conclusions.



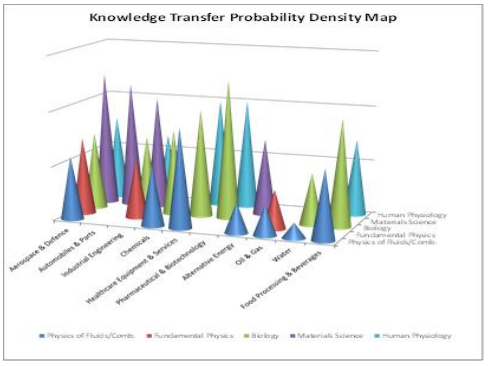
The UK's research capability was surveyed across the 7 science themes of ELIPS-4 to identify particular UK strengths in research and infrastructure, and to map these themes to the national priorities of the funding agencies. The survey involved direct interviews of representatives from the Research Councils, interrogation of the Research Council databases of funded projects, and analysis of published reports on the capabilities held within the UK academic sector and Strategic Plans of the Councils. The seven science themes analysed were: Fundamental physics, Fluid physics, Materials science, Astrobiology, Atmospheric and environment, Biology and Human Physiology. The overall conclusions on UK research potential for ELIPS-4 participation are:

- The UK has breadth of relevant academic capability, with particular strengths in fundamental physics, biology and human physiology
- Academic capability is led by the Research Council institutes and the Russell Group of Universities; with supporting facilities available in other institutions
- The ELIPS science themes are well aligned to the Research Council priorities / Strategic Plans
- Research funding for scientists involved with the ELIPS-4 programme is available through responsive mode grant applications, but the Research Councils have not expressed a strong interest in funding ELIPS-4 as a separate programme

The potential for exploitation of ELIPS-4 research by different UK industrial sectors was analysed by using their attitude to innovation as a proxy to predict the likelihood of a sector engaging with ELIPS-4. The attitude to innovation was determined by evaluating R&D intensity (expenditure) and R&D breadth (number of companies), using the "BIS 2010 UK R&D Scoreboard".

The analysis concludes that the pharmaceutical/biotech and aerospace/defence sectors have the highest research intensity and are the most likely to adopt external innovations, for example, from programmes such as ELIPS-4. Sectors with a lower, but still significant likelihood of engaging with the ELIPS-4 programme are the automotive, industrial engineering, chemicals, healthcare equipment, and food processing industries.

Potential opportunities for Knowledge Transfer as a result of participation in ELIPS-4 were mapped across industry sectors, including examples of successful knowledge transfer from previous ELIPS programmes. Scoring these Knowledge Transfer opportunities by UK Strength (its ability to deliver innovation to ELIPs) and UK Opportunity (dependant on the market opportunity and the industrial research intensity) gives rise to a probability density map showing potential areas for Knowledge Transfer.



The resulting probability density map, based on combined analysis of the strength and opportunity, highlights the following areas for highest probability of knowledge transfer:

- From Biology to Pharma & Biotechnology, Healthcare Equipment & Services and Food processing
- From Materials Science to Aerospace & Defence, Automotive & Parts and Industrial Engineering
- From Human Physiology to Pharmaceuticals & Biotechnology and Healthcare Equipment & Services

In addition to Knowledge Transfer to Industry, participation in ELIPS-4 may benefit the wider UK Science Community. Opportunities for interdisciplinary knowledge exchange in clinical medical and other science have also been identified, but the economic impact has not been assessed.

Projects in the ELIPS-4 programme were also assessed for opportunities for UK companies to supply programme needs. The types of opportunity available are:

Pre-Phase A Feasibility Studies and Phase A/B Development Studies

- Variety of engineering disciplines
- Engineering design and analysis work
- Design of optical instruments
- Design of analyser techniques
- Design of liquid handling and manipulation subsystems

Phase C/D/E New Payloads

- EDR LIFT FASTER
- COLIS
- On-Orbit Sample Analysis Instrumentation
- Biology Experiments
- Rodent Research

If UK industry capitalises on all these commercial opportunities, we predict a Geo-return of 47% against a maximum of 68% available. Companies most likely to capitalise on these commercial opportunities are those already supplying the space sector, as they have the necessary sector knowledge.

Item	
UK Grand Total (ELIPS Projects)	€7.25m +/- 15%
Proposed UK Investment in ELIPS-4	€15.4m
UK Geo-Return Range	40 - 54%
Nominal UK Geo-Return (on Total Investment)	47%
Potential UK Geo-Return (on Total Investment)	68%
Available Geo-Return (€15.4 – 22% ESA Overhead – 10% External Purchases)	€10.5m
Potential UK Share of Available Geo-Return	69%

Conclusions

There is a strong alignment between the ELIPS-4 science themes and UK academic research strategies and strengths. ELIPS-4 science themes also map well to UK industrial sectors with a high propensity for innovation. With a likely return to the UK of 69% of the available geo-return, there are opportunities that can already be identified for UK industry engagement in ELIPS-4. In joining an ongoing programme a low geo-return is to be expected, but this should be seen in the overall context of the strength of the UK and by the end of ELIPS-4 the contracts won will give a strong indication whether a full geo-return will be gained in ELIPS-5.