UK Research and Innovation



STFC Update – Particle Physics Advisory Panel meeting

Mark Thomson

12 September 2019

(Non-HEP) STFC Programme Highlights: Science with Broader Impact

Anthony Milman/STFC

Event Horizon Telescope

High Visibility Science

- Difficult and high-risk science
- Took a long time, needing global cooperation with multiple instruments
- Accessed a range of UK supported facilities
- Captured the public imagination
- Important that we continue to demonstrate the excitement of our science and scientific discoveries





Higgs Innovation Centre

Razorbill Instruments: first start-up at the Higgs Centre, is a hardware company specialising in high quality research tools for cryogenic testing Earthwave: an Earth Observation start-up working on everything from monitoring the melt of mountain glaciers to creating Earth Observation data analytics platforms

Orbital Cargo Drone: first ESA BIC UK startup in Edinburgh, designs, builds and operates small orbital launchers for the satellite market

Craft Prospect: is a "New Space" R&D and consultancy, space-based intelligence, encryption and optimisation start up.

Touchlab: is a robotics start-up joining us in July

...and more to follow









Hartree Centre





First NVIDIA AI Technology Centre

- The Hartree Centre, University of Reading and EPCC have become partners of the NVIDIA AI Technology Centre for the UK.
- Will work with UK universities and technology centres to help create new methods of using AI and machine learning for use in UK industries

Accelerating UK data science and artificial intelligence

• The Hartree Centre in partnership with Siemens Digital Industries and Atos launched the Industrial Digitalisation Accelerator (IDA); a collaborative space to explore Industry 4.0 technologies

The Wonder Initiative







We make a bigger difference by working with new people:

- Target our work at people who don't commonly engage with STEM
- Focus on the 40% most socio-economically deprived communities in the UK



Strengthening new approaches across the programme



Radiotherapy in Africa

STFC and CERN aim to address the global shortage of radiotherapy facilities in low to middle income countries



- Develop rational and affordable radiotherapy cancer treatment technology for deployment in challenging environments, such as in Africa
- Workshop in Gaborone, Botswana participants in March
- with over 60 oncologists, medical physicists and accelerator experts from seven African countries, Nepal, ICEC, CERN and UK institutes



Delivery Plan 2019

Dave Hughes/STFC

UK Research and Innovation

UK Research and Innovation (UKRI), formed on 1 April 2018, is the funding organisation for research and innovation in the UK

- Brought together the seven UK Research Councils (including STFC), Innovate UK and Research England
- Strengthens the connections between research disciplines
- Provides a strong and unified voice for UK Research and Innovation
- STFC delegated budget remains unchanged
- Also access to new central resources in "cross-cutting" funds



STFC's Delivery Plan

STFC's first "Delivery Plan" as part of UKRI

- Published on 10 June 2019
- New format: priority areas and broad strategy for the next 10 years
- Includes delivery plan for FY19/20

Long-term strategy presents an ambitious forward-looking vision

• A lot of change around us, including additional resources associated with formation of UKRI and the Industrial Strategy





Delivery Plan Priorities

Some key priorities:

- Fully engage with new frontier science opportunities and drive development of novel technologies
- Use our inspiring high-tech facilities (in UK and overseas) as a training ground for skills in engineering, technology and computing for the UK
- Create a strategic pipeline for developing our world-leading National facilities and to keep them world class
- Grow our stewardship of the R&I ecosystem at the Harwell and DL Campuses
- Strengthen strategic partnerships with other councils, e.g. EPSRC



Funding Opportunities

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UKRI Cross-Cutting Funds



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UKRI Cross-Cutting Funds



Talent

Budget '17 announced £300m, building on initial spend in '17/18:

- PhD Studentships
- ٠ Innovation Schola
- Future Lea ps Rutherfor Leaders





Overall timeline May 2018

UKRI High Level

Strategy published

Strength in Places Fund

Research and Innovation-led proposals for regional economic growth:

emerging capacity

Collaborati Fpg

Areas with genuine potentic and

In Progress

Criteria: Quality of research Commitme TCIOFA par

Add Watchman Align Wav (Summer '18) Total: £108m Com 100 HEIF 50 ICURe 0

activity ongoing 18/19 19/20 20/21





Total: £300m

50

Summer 2018

allocations

10

0



18/19 19/20 20/21



- Review of commercialisation

tion

- 20 20/21
- Total: £110m tional 100
- Fund for International Collaboration

Wave 4

ation

UKRI Future Leaders Fellowships

UKRI FLFs supporting early career researchers and innovators with outstanding potential across the whole of the UKRI:

- Develop, retain, attract and sustain talent in the UK
- Foster new research and innovation career paths including those at the academic/business and interdisciplinary boundaries and facilitate movement of people between sectors
- Provide sustained funding and resources for the best early career researchers and innovators
- Provide long-term, flexible funding to tackle difficult and novel challenges and support adventurous, ambitious programmes.

Visit the UKRI FLF webpage for more information



UKRI Future Leaders Fellows

UKRI FLFs supporting early career researchers

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Stephen Hawking Fellowships (STFC/EPSRC)

Designed to support and develop the next generation in theoretical physics, and areas of mathematics and computer sciences which underpin the development of theoretical physics

- Up to five annual calls (2019-2024) with up to 10 fellows per call
- Up to 4 years' funding for fellows
- Round 1 closed keep watching for Round 2

Scheme objectives are:

- To fund new high quality research and support the development and training of postdoctoral researchers in the field of theoretical physics
- To train a cohort of researchers with the skills to continue a legacy of public engagement in the field of theoretical physics
- Details in ukri.org





SPENDING ROUND 2019

Why we need a Spending Review

The last full spending review in 2015 set departmental resource budgets for 16/17, 17/18, 18/19 and 19/20. Health and Defence set for 20/21.

Capital budgets set to 20/21.

So, BEIS has a firm budget to end March 2020 for resource, and to end March 2021 for capital.



- Large increase to science budget in Autumn Statement 2016 £4.7Bn over 2017/18 - 20/21, adding £2 billion pa by 2020/21.
- Autumn Budget 2017 added a further £2.3 billion for 2021/22, effectively 'baselining' this uplift.



Spending Review 2019: What we know

Current Status:

- Government announced a 'spending round', not spending review, on 4th September
- Promised increased departmental spending widely across government
- Impact of funding settlement on UKRI not yet clear UKRI team working closely with BEIS to get clarity
- A one-year roll forward of existing budgets is a possible scenario for 2020/21
- BEIS statement: "In the Autumn, the government will set out plans to significantly boost public R&D funding, provide greater long term certainty to the scientific community, and accelerate our ambition to reach 2.4% of GDP"



Spending Review input

STFC working with UKRI on the priorities within a flat real and an increased budget scenarios towards 2.4% of GDP spent on R&D.

The increased budget scenario focussed on 5 priority areas:

- Sustaining UK Research and Innovation Leadership
- Investing in the Talent of the Future
- Attracting Inward Investment with state of the art laboratories and infrastructure

UK Researc

- Inspiring Innovation
- Technology and Innovation for UKRI

Particle Physics Programme Update

Programme Evaluation

Currently finalising the Particle Physics Programme Evaluation via panel led by Ofer Lahav (as Science Board member)

- Recognises the strength of UK programme, and its diversity but highlights growing impact of 'flat-cash'.
- Healthy funding of exploitation grant lines, including international M&O commitments, is a high priority regardless of financial scenario.
- Investments in current construction projects are high priority, but there are many opportunities that we are not able to pursue.
- Stresses the importance of addressing future computing needs and maintaining skills and capability.

• Programme is currently well balanced, but breadth is likely to be eroded in future if flat cash funding continues.



Status of Programme

Particle Physics Experiment CG announced April 2019

- Resulted in a smaller programme , but relatively balanced between groups and experiments.
- Significant risks to UK deliverables and physics. Withdrawal from SuperNEMO M&O commitments, and future funding for HEPData to be reviewed.

2019 Particle Physics Theory CG grants round underway.

- Grant announcement is imminent.
- Similar financial pressures to experiment, increase in overheads. Flat cash funding is no longer sufficient to maintain minimal programme.

ATLAS and CMS Phase II upgrades underway.

• Increased emphasise on assurance and project management best practice

DUNE grant announcement is imminent



CERN Update

European Strategy for Particle Physics Update underway

- Open Symposium 13-16 May, Granada, Spain
- UK Community Meeting 1 July, London
- Drafting session 20-24 January, Bad Honnef, Germany

Next CERN Council Meeting

• DG candidates ...

The impact evaluation of CERN to the UK, to be published later this year

- Intended to highlight the myriad, and often overlooked, benefits of CERN to the UK and provide a baseline for future monitoring
- Thank you to everyone who participated in interviews (~50) and completed the CERN supplier and researcher survey (200+)



UKRI Board visit to CERN





UKRI Board visited CERN on 04 July

- Everyone was very positive
- Essential to convey the scope and scale of one of STFC's major scientific investments



Grid/Computing Update

GridPP6 (2020-24) review is now complete

- Resource and hardware to support LHC experiments during Run 3
- *Incredibly challenging* capital request vs available budget
- The review report will be considered by Science Board in October 2019
- HL-LHC Run 4 will present an increased scale of funding challenges
- DiRAC (helps to underpin STFC's frontier science programme)
 - Core component, together with GridPP, of National e-Infrastructure provision
 - DiRAC-3 Operations proposal submitted and reviewed by PPRP in December 2018 and March 2019
 - £7.2M resource and £0.6M capital awarded October 2019 September 2022



Challenges and

Opportunities



Challenges

Flat-cash - biggest hit for exploitation grants

• Programme evaluations support endeavours to secure an uplift to the core programme funding in the CSR



Difficult to find resources for new projects – v. difficult to be agile with funding

• Important to keep PPAP informed of new opportunities to be included in updated PPAP Roadmap

EU Exit: need to ensure the UK remains a key global player

Technology: how do we ensure vitality and future proofing?

Computing: DiRAC and other big data needs not on firm footing; GridPP under pressure



Opportunities

PP and PA communities are pro-active and respond to funding opportunities, but we need to strive to do more

• Newton, GCRF, SPF, FIC, Fellowships

'Opportunities' call recently closed

- Significant number of PP and PA proposals outcome has been announced
- STFC plan to announce a funding call for
 - 'Quantum Technologies for Fundamental Physics'

Just refreshing our Priority Project list via Advisory Panels.

• Growing importance of working in partnership and across disciplines

Spending review/round...



Questions?

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