STFC Town Meetings

Programmatic Review

Science Board Summary

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(Outgoing) Chair, Science Board

Programmatic Review: Objectives

- **Assess quality of all STFC's programmes in terms of**
  - **Scientific excellence**
  - **Operational effectiveness**
  - **Impact**
  - **Alignment to STFC's science strategy**

- **Consider how to take forward future opportunities**

- **Recommend a balanced programme of excellent science and impact within a realistic financial envelope**

  - **Indicative scenarios: flat cash and ±10%**

    (apart from Large Facilities)

Decision-making Criteria

Excellence

- Scientific/technical importance
- International relevance
- Timeliness
- Strategic importance to stakeholders
- Risks
- Scale of the investment

Impact (economic and social)

- New business, products etc.
- Industrial engagement
- Influence on public policy
- Skilled people
- Outreach/inspiration
- Publicity/media exposure

Decision-making Criteria

Leadership

- UK leadership and track record
- Prospects for UK-led research outputs
- Influence over long-term development of the field

Synergies

- Alignment with STFC Science and Corporate strategies
- Coherence with other programmes
- Match to international subscriptions
- Relevance to Campus strategies

Programmatic Review: Process

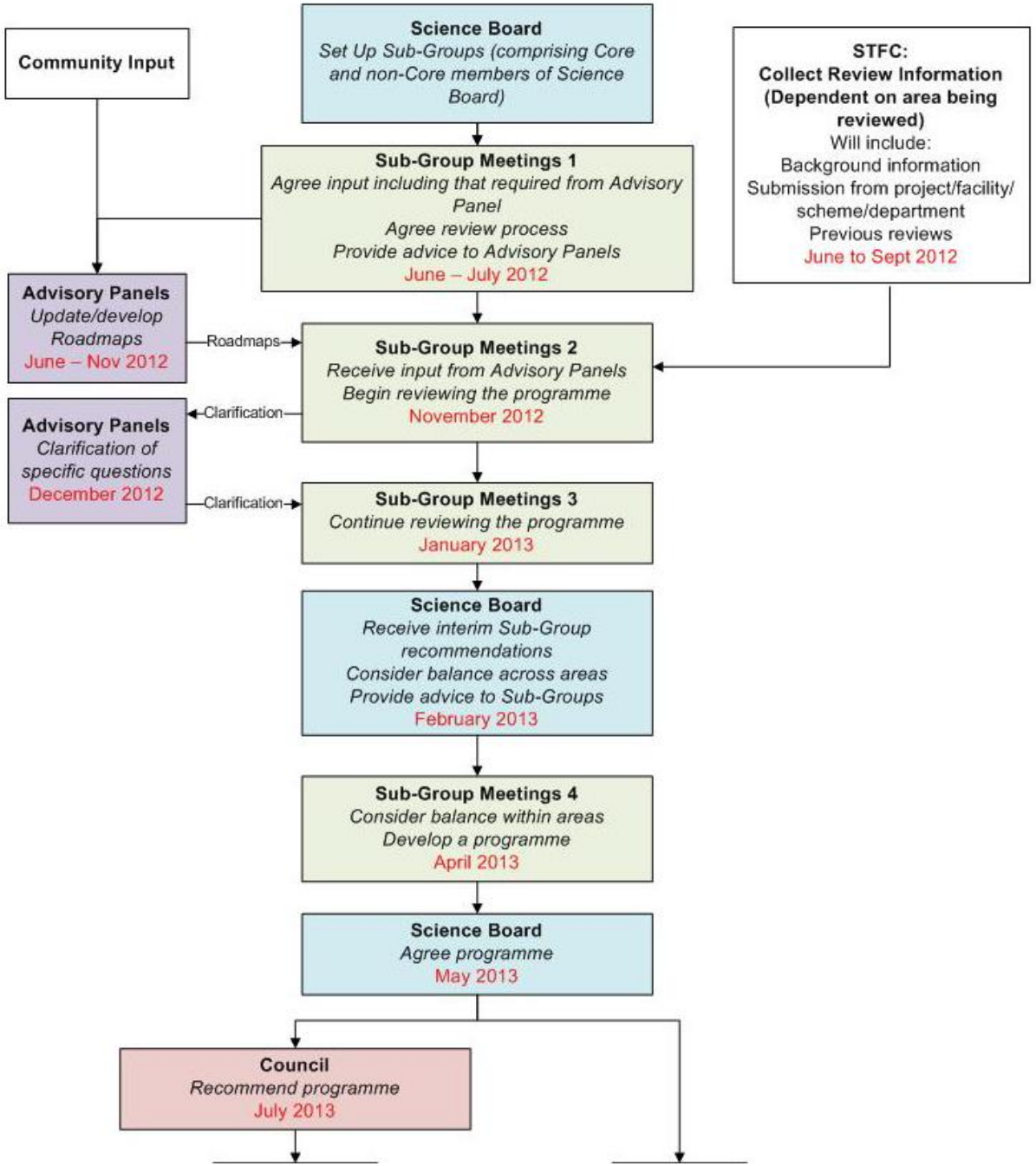
- **July 2012 – July 2013**
- **Detailed review by four Science Board Sub-Groups**
  - **PPAN**
  - **Large Facilities**
  - **Technology (for the first time)**
  - **Dedicated Impact Programmes (for the first time)**
- **Sub-Group membership:**
  - **Chaired by SB members**
    - **Core and non-core SB members**
    - **Additional membership from industry on Dedicated Impact and Technology Sub-Groups**
- **Overall recommendations formulated by SB**

Input

- **Proformas from project PIs, facility directors, department heads, programme leaders**
- **Interaction between Technology Sub-Group and others**
- **Community engagement via Advisory Panels**
  - **Particle Physics**
  - **Nuclear Physics**
  - **Astronomy**
  - **Solar System**
  - **Particle Astrophysics**
  - **Life Sciences and Soft Materials**
  - **Physical Sciences and Engineering**
- **Participation of STFC EIAB member in last two SB meetings**

Timeline

July 2012



July 2013

PR Report

- **Report presented to STFC Council in July 2013**
  - **Main report with 43 specific recommendations**
  - **Sub-group reports and other information in annexes**

- **Balanced programmes formulated for indicative financial scenarios: flat cash and ±10%**

  - **PPAN Sub-Group also considered an "optimal" programme for continuing vibrancy**

- **Publication deferred pending finalisation of Government budget allocations for FY15-16**

Some Key Points

- **All scenarios except optimal mean loss of volume**
  - **Continuing flat cash means continuing budget reduction in real terms**
    - **Less science and technology development**
    - **Less UK leadership**
    - **Less impact**

- **Heavily constrained programme now at a critical point**
  - **UK leadership and credibility becoming seriously eroded**

- **Programmatic Review provides a mechanism to keep the programme focussed on highest priorities**

Some Key Points

- **Including all parts of the STFC programme has been beneficial and should continue**
  - **Culture of rigorous and independent peer review should be further extended across all STFC activity**

- **Advisory Panels should remain active in informing and advising Science Board**

- **Continuing flat cash funding in the coming years will be damaging and difficult to manage**
  - **STFC's main priority should be to maintain capability to minimise long-term damage**
  - **Investment should be focussed on highest priorities and maintaining breadth**
  - **Work to maintain UK status as a reliable partner in international facilities**

PPAN

PPAN Sub-Group

- **Projects under development: alpha ratings 1 – 5**

- **Projects in exploitation phase**
  - **Guidance for grants panels**
    - **g1: high strategic importance**
    - **g2: high potential**
    - **g3: not well-matched to strategy**
    - **Strict peer review needed in all cases**

- **Space projects not alpha rated but g-ratings defined for exploitation funding**

PPAN Programme

- **Approx. 75% of the Core Programme**
- **Current UK programme is world leading in many respects based on past investments, but has shrunk markedly in recent years – very limited future developments**
- **Highest priorities**
  - **Maintain vigour through protecting grants line**
  - **Studentships should be scaled with the programme size**
  - **Postdoctoral fellowship scheme should be re-introduced if possible**
  - **LHC experiments remain the highest priorities for particle physics**
  - **E-ELT , SKA, and ESA space missions remain the highest priorities for astronomy**
  - **Maintain involvement in gravitational wave, dark matter, and high energy gamma ray experiments**
  - **Maintain a balanced Nuclear Physics programme including new projects**

Particle Physics

- **Energy Frontier Physics**
  - **ATLAS and CMS remain highest priorities**
    - **Exploitation g1 and upgrades α5**
    - **Continued involvement in both is crucial**
  - **Other future opportunities (e.g. R&D for Higgs factory) will need to be tensioned against LHC upgrades**
- **Quark Flavour Physics**
  - **LHCb exploitation highest priority**
    - **Exploitation g1 and upgrade α5**
- **ATLAS, CMS and LHCb upgrades must be tensioned against each other**
- **EDM experiments**
  - **eEDM g2**
  - **nEDM α3**

Particle Physics

- **Neutrino Physics**
  - **Neutrinoless double β decay**
    - **SNO+ and SuperNEMO both α-4**
    - **Future funding following peer review**
  - **Precision muon experiments**
  - **Long-baseline neutrino experiments**
- **PP Theory**
  - **Important across the programme**
  - **IPPP α5**
- **RAL Particle Physics Department**
  - **Important support for the UK Particle Physics programme**

Particle Astrophysics

- **Gravitational Waves**
  - **Advanced LIGO (α5)**
  - **Einstein Telescope preparation (α4)**

- **High Energy Gamma Rays**
  - **Main opportunity for the future is the CTA (α4)**

- **Dark Matter**
  - **Coordinated UK community**
  - **Future opportunity for significant UK participation in future direct dark matter searches**

- **Unlikely to be possible to retain a leading UK involvement in both CTA and direct dark matter searches: tensioning needed**

Astronomy
Nuclear Physics
Technology
Facilities
Dedicated Impact Programmes

Astronomy and Solar System Science

- **Solar System Science and Space Based Astronomy**
  - **Construction and operation funded through UKSA**
  - **Priorities for exploitation defined for AGP**
  - **Highest (g1): Rosetta, JUICE, Solar Orbiter, JWST, Euclid, Planck, Herschel, Gaia**
- **Ground-based**
  - **ESO facilities (g1)**
  - **E-ELT, SKA (α5)**
  - **LOFAR, e-Merlin, UK ARC, WHT/WEAVE, NGTS (α4)**
  - **Planning line for LSST**
  - **Concern over northern hemisphere access**
- **Astronomy instrumentation/techniques**
  - **Opportunities for and importance of continuing development**
- **Theory – g1**

Nuclear Physics

- **Balance needs to be struck across the two themes**
  - **Nuclear structure and astrophysics**
  - **Hadronic physics**

- **New development projects needed**
  - **NuSTAR (α4) is the only project currently being built**

- **Five SOIs invited and submitted in Spring 2012**
  - **NuSTAR2, AGATA upgrade, ALICE, ISOL-SRS, Jlab**
  - **SB subgroup considered and invited some proposals**
  - **Projects currently under review**

- **Participation in NuSTAR implies an ongoing associate membership subscription to FAIR**

- **LHeC: not currently a high priority for UK or CERN**

Facilities

Facilities Programme

- **Abroad: ESRF, ILL**

- **UK: Diamond, ISIS, CLF**
  - **Financial scenarios are considered as part of the Large Facilities Funding Model (LFFM) process**
  - **STFC is managing agent (operations, future development)**

- **Diverse and world class science at current facilities, but limited by sub-optimal operation**

- **LFFM process is not fit for purpose and needs to be reformed**

Facilities Programme

- **Sub-group advice on the future priorities for facilities development and provision**
- **Opportunities for engagement in new facilities (ESS, FELs) require further investment**
- **Access to existing facilities (ESRF, ILL) should not be reduced**
- **Investment needed in high-power lasers**
- **International landscape for neutron and laser facilities continues to evolve – strategic reviews needed**

Neutrons

- **UK should lead the development of a European short-pulse spallation source, which could be sited at ISIS**
  - **Together with technology development at ISIS, providing in-kind contributions to ESS**
- **ISIS should be run for at least 180 days per year**
- **ISIS linac and TS1 should be upgraded**
- **UK support of ILL should continue until at least 2024**
- **Programmatic Review recommendations have been overtaken by events (but consistent with PR advice)**
  - **UK participation in ESS and associated internationalisation of ISIS**

Technology

Technology Programme

- **Included in the Programmatic Review for the first time**
- **Underpins the whole STFC programme**
- **Dedicated Technology funding ≈ 10% of STFC's Core Programme**
- **Substantial additional activity in the PPAN programme**
- **Investment for STFC's future scientific competitiveness and economic impact**
- **Technology development must be driven by the needs of science and the facilities**
- **Technology Framework needed to define and organise the programme**

Technology Programme

- **Key technologies – to be reviewed and used to focus attention and investment**
  - **Accelerators**
  - **E-Infrastructure**
  - **Specialist Engineering**
  - **Detectors and Instrumentation**
  - **Optics**
- **PRD and CfI schemes should be rationalised under single scheme with rigorous peer review**
- **STFC departments should attract external work, where compatible with their role to support STFC science and technology**
- **Science-drive strategy needed for the accelerator programme**

Impact

Dedicated Impact Programmes

- **Approx.13% of Core Programme**
- **Included in the Programmatic Review for the first time**
- **Reviewed by mix of Science Board and industrialists**
- **Generally fit for purpose and a clear strength of the organisation**
- **Well-matched to grand challenges**
- **Organisation and implementation is spread across several STFC Directorates**

Dedicated Impact Programmes

- **Maintaining strong coupling to the science programmes is important to maximise future impact opportunities**
- **Public Engagement programme noted as very effective**
- **Scope and need for improved oversight and clarity in some parts of the programme**
- **Substantial additional impact comes from STFC's technology and science programmes**

Particle Physics, Astronomy and Nuclear Physics Sub-group

Professor Jon Butterworth – University College London (Chair)
Professor Yvonne Elsworth – University of Birmingham
Dr Ian Franchi – Open University
Professor Valerie Gibson – University of Cambridge
Professor Alan Heavens – University of Edinburgh
Professor Melvin Hoare – University of Leeds
Professor David Ireland– University of Glasgow
Dr Peter Jones – University of Birmingham
Professor Valya Khoze – University of Durham
Professor Anthony Lasenby – University of Cambridge
Dr Francesca Di Lodovico – Queen Mary, University of London
Professor Tom Millar – Queen's University Belfast
Dr Alex Murphy – University of Edinburgh
Professor Róbert von Fáy-Siebenbürgen – University of Sheffield
Professor Gillian Wright– UKATC

Large Facilities Sub-group

Dr Olwyn Byron - University of Glasgow (Chair)
Professor Leo Brady – University of Bristol
Professor Jon Goff – Royal Holloway University of London
Professor Chris Hawes – Oxford Brookes University
Professor Des McMorrow – University College London
Professor Brian Mitchell - Université de Rennes 1
Professor Bob Newport – University of Kent
Professor Simon Redfern – University of Cambridge
Professor Matt Zepf – Queen's University Belfast

Technology Sub-group

Professor Ken Long – Imperial College (Chair)
Professor Paul Beasley – Siemens Technology and Concepts
Dr Nick Cox – UK Space Agency
Professor Mike Fitzpatrick – Open University
Professor Peter Hobson – Brunel University
Professor Dino Jaroszynski – University of Strathclyde
Professor Don Paul – University of Warwick
Professor Alberto Vecchio – University of Birmingham

Dedicated Impact Programme Sub-group

Professor Bob Warwick – University of Leicester (Chair)
Professor David Britton – University of Glasgow
Dr Karen Bultitude – UCL
Dr Trevor Cross – E2V Technologies
Professor Martin Dove – Queen Mary, University of London
Mr Gordon McGregor – Scottish Power
Professor Val O'Shea – University of Glasgow
Dr Andy Sowerby – Oxford Instruments