UKRI ENGINEERING AND PHYSICAL SCIENCES RESEARCH COUNCIL

EDITED MINUTES OF THE COUNCIL MEETING HELD ON 10 AND 11 MARCH 2020 AT THE WESLEY EUSTON HOTEL, LONDON

Council Members:	Professor M E Smith (Chair)
	Professor L Gladden
	Ms B Dean
	Professor A Etheridge
	Professor N Jennings
	Professor S Sharples
	Professor J de Sousa
	Professor T Whitley
	Dr P Williams
	Professor A Wright (Day 2 only)
	Professor S Belcher
Executive:	Dr A Bourne
	Professor C Deane
	Ms J Nicholson
	Dr K Pandya
	Dr A Chmura
	Ms S Francis
Others:	Mr M Blackburn
Secretary:	Dr N Goldberg

1.   Introductory Remarks

1.1   Professor Smith welcomed everyone to the meeting.

1.2   Professor Smith formally opened the meeting.

1.3   Apologies had been received from Professor Calder and Professor Walmsley.

1.4   There were no new declarations of interest from Council members at this meeting.

1.5   Professor Smith said it was hoped to make ED&I aspects a more explicit consideration as part of Council decision making. He encouraged Council members to think about either the positive or negative impacts, if any, on ED&I for each major business item and to raise this as appropriate. Council agreed that this was an important consideration and agreed that this, together with sustainability issues, should be included as prompts in the implications section of each paper.

2.   Draft Minutes of the Meeting on 01 October 2019

2.1   Council **agreed** the record of the last meeting.

3.   Actions and Matters Arising

3.1   There were four actions from the last meeting. With the exception of action 7.2 all were complete or ongoing. In response to a discussion at the last meeting Dr Bourne provided a brief update on some of the highlights arising from past IAA investments.

3.2   Dr Pandya followed by providing Council with a brief update on the forthcoming COP26 event and UKRI's involvement. He also briefly reported on the Energy Deep Dive paper which had been presented to the UKRI Board. This had been extremely well received. The agreed next steps were to focus on the forward strategy for the UKRI Energy Programme in the context of the UK's Net Zero target. This in turn should address some of the critical features that are needed to achieve decarbonisation of the energy system including the need to increase the level of industry involvement to enable widerspread deployment. The Board have asked for EPSRC to revert to the Board in due course with a paper presenting the forward strategy for the UKRI Energy Programme. Professor Gladden said EPSRC would work in conjunction with the Energy Strategic Advisory Committee through the spring and summer 2020 targeting a UKRI Board at the July meeting. The Board had emphasised that business, government (including CSAs) and UKRI needed to be working together and that BEIS had a coordinating role in that respect. Professor Gladden would be meeting with BEIS colleagues and also taking this forward with Patrick Vallance and business stakeholders.

4.   Reflections on the Outputs from the Council Awayday (EPSRC 01-20)

4.1   Dr Goldberg took this opportunity to reprise the outputs from the awayday that took place on 21 January. She said these outputs would provide the basis for future Council business items and had also helped to shape and develop input to the SR.

4.2   Council **noted** the outputs and concluded that the awayday had been successful and that the format had worked well. It was therefore **agreed** that the Office should find a suitable date in the next 12 months to convene another awayday preferably in the margins of an existing formal Council meeting.

4.3   Professor Smith said that he had attended a meeting of all Council SIMs on 04 February. This had been chaired by Sir John Kingman. This was the first time such a meeting had been convened. Part of the discussions centred on the role of Councils and the responsibility of the SIMs. It was widely agreed that the preferred operating model for Council meetings was for the SIM to chair such meetings, so that those Council not using this approach were strongly encouraged to do so. The SIMs also took the opportunity to discuss the emerging 2025 Vision and plans for the next all-Council event scheduled for June 2020. Overall the meeting had provided a useful forum for discussion and there was an appetite to make such meetings a regular, six-monthly event.

4.4   Professor Smith said that, following a discussion at the last Council meeting, some industry members had met with UKRI colleagues involved in the development of the 2025 Vision. He invited those who had attended the meeting on 13 February to provide any feedback. Those that had attended agreed that the engagement had been both positive and open, providing a welcome opportunity to begin to improve and shape strategy. However, it was apparent that this was very much the start of a process and there was an expectation that UKRI colleagues would convene a further meeting. Professor Gladden said that she would follow this up with UKRI colleagues.

5.   BBSRC/MRC Session – Planning (EPSRC 02-20)

5.1   Dr Pandya introduced this item which set the scene for the forthcoming discussion with BBSRC and MRC Council representatives. The paper, which had also been circulated to the other Councils, provided context and outlined key collaborations and activities as background to the session.

5.2   In the ensuing discussion Council identified those areas which they would like to explore further in discussion should the opportunity arise.

5.3   Council thanked Dr Pandya and Ms Francis for all of their efforts in preparing and setting the context for the forthcoming discussion.

6.   BBSRC/MRC Roundtable Discussion

6.1   Professor Smith formally welcomed representatives from BBSRC and MRC Councils. He said that this was one of a series of cross-Council discussions that EPSRC was convening.

6.2   Before the session began Mr Blackburn took the opportunity to appraise the Councils on the UKRI response to Covid-19. He said that the response was being managed centrally within UKRI. A business continuity structure was in place, with Mark Walport leading a 'Gold' team comprising the Executive Chairs and Chief Finance Officer. A 'Silver' team, led by the Chief Finance Officer, comprising functional leads was managing the operational planning. 'Bronze' teams, including a business continuity lead within each Council, manages locally. The Gold team currently met weekly, and the Silver team meet twice weekly, once with all of the business continuity leads. Mr Blackburn emphasised that UKRI was being led by the guidance from government and working within the framework set out in the government's action plan. He said while there was currently no policy to stop normal business UKRI was however planning its preparedness and contingency actions. He said that scenario-planning was therefore underway, including how to manage our business remotely and prioritise functions. He added that he anticipated that it would probably be necessary to extend projects and grant deadlines.

6.3   Professor Smith then invited Dr Pandya, Dr Rob Buckle (MRC Chief Science Officer) and Professor Melanie Welham (BBSRC Executive Chair) to say a few words of introduction. Each set out the challenges, the drivers and potential opportunities for possible future collaborations from their own perspectives.

6.4   Ms Francis then described the format for the rest of the session. Attendees were invited to break out into groups to discuss some broad areas which were framed around a set of questions. The full summary of these discussions can be found in Annex 1.

6.5   Professor Smith closed this session by thanking everybody for their positive contributions and added that he hoped that this would provide the basis for fruitful future collaborations as part of the shared UKRI endeavour. He added that it was intended that the following dinner would also provide the opportunity for further informal conversations and networking.

7.   Presentation by Professor Kev Dhaliwal

7.1   Professor Smith welcomed Professor Dhaliwal who had agreed to provide a presentation entitled "***Fusing and Translating Across Disciplines"*** showcasing his research that spanned both the EPSRC and MRC portfolios.

7.2   Professor Smith formally closed the first day of the Council meeting by thanking Professor Dhaliwal for his informative and engaging presentation.

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8.   Reflection on the Discussion with BBSRC and MRC

8.1   Professor Smith began by saying that the engagement with the other Councils had proved stimulating and positive.

8.2 Each of the facilitators for the breakout sessions reprised the main topics/opportunities emerging from the deliberations. These are summarised and grouped below:

Health, Technology and Society
- Pandemic preparedness – diagnostics and sensors, plug and play approach for vaccine production;
- Saving the NHS with technology to help the transition to becoming more patient-centric;
- Optics, chemistry and biology – new ways for measuring and imaging.

Computing, Modelling and Digitalisation
- Quantum computing in modelling biology and drug discovery;
- Next generation computing beyond exascale;
- Digital twins and digital humans;
- Digitalising healthcare through the supply chain, drawing parallels with the Manufacturing Made Smarter ISCF Challenge.

Agriculture, Technology and Society
- Food and sustainability;
- Decarbonising agriculture;
- Healthy diet (plant based) and how to deliver it.

Synthetic Biology
- Synthetic biology for net zero;
- Develop synthetic biology – expanding tools and techniques.

Advanced Materials
- Zero embodied carbon materials from biosources;
- Medical Materials.

8.3 Council reflected on the importance of working together across BBSRC and MRC to co-construct these areas whilst being clear on the EPS contribution within a multidisciplinary context. The importance of commonality of language, thinking holistically about the ecosystem and working together to horizon scan for UKRI was also recognised.

8.4 Dr Pandya concluded that this gave a clear steer on topic areas to be developed further with BBSRC and MRC, noting the importance of working together to develop them further. Dr Pandya confirmed that the Executive would start conversations across the Councils with a view to feeding into Spending Review deliberations.

ACTION: Dr Pandya

9. Executive Update (EPSRC 03-20)

9.1 Council were appraised of developments associated with the EPSRC Spending Review bids. **Minute not included as contains exempt material, at the time of publication, under the terms of the Freedom of Information Act 2000.**

ACTION: Dr Chmura

9.2 Ms Nicholson reminded Council of the recent Government announcement of additional funding for mathematical sciences which would be delivered by EPSRC. This additional funding of up to £300m would span the breadth of the EPSRC Mathematical Sciences Programme.

9.3 Ms Nicholson informed Council that an advisory group was being set up and that Professor Etheridge had kindly agreed to chair that group. A total of 12 people had agreed to join and

the first meeting was scheduled for 23 March. She said that further work was required to develop a business case for BEIS, but it was anticipated that all funding will be signed off by September 2020 when work will begin in earnest to commit the funding. Professor Etheridge said that EPSRC staff had played a huge part in securing this new funding and thanked them for all of their efforts. Ms Nicholson undertook to keep Council informed as further precise details emerged.

9.4 Ms Nicholson then provided Council with an update on the current financial position. She reported that EPSRC was on course to meet its financial targets for 2019/20.

9.5 Dr Chmura reminded Council that the UKRI Executive Committee had agreed to remove the requirement for the Pathways to Impact attachment and the associated summary Impact Statement for funding applications from 01 March 2020. She said that while there is no longer a requirement to capture this in a separate section decisions on how to assess impact from 01 March onwards are at the discretion of individual Councils. Reflecting EPSRC's view that impact-enhancing activities are an integral part of high-quality research programmes, EPSRC had removed the 'Impact' assessment criterion and had merged the assessment of impact into the overall 'Quality' assessment criterion. Guidance had been provided to all staff and university colleagues on the details surrounding these changes, as well as plans for managing the transition period. Dr Chmura said that Councils had treated impact differently across UKRI so the effect is greater for some. She closed by saying that she hoped that the new funding service would drive a more harmonised approach.

9.6 Professor Deane reported that since the last Council meeting she, Lynn Gladden and Neil Viner had continued with the series of visits to EPSRC's framework and strategic university partners. This had provided an opportunity to provide an update on developments in the UKRI/EPSRC landscape and to elaborate on EPSRC's 2019 Delivery Plan. She briefly reported on the main themes discussed. She concluded by saying that the engagements had proved to be extremely positive and proactive. Dr Wright said that he had attended one of these visits and this had proved very worthwhile and encouraged other Council members to get involved in the future.

9.7 Finally, Professor Deane reported that the exercise to recruit members to the recently established Science, Engineering and Technology Board (SETB) had now been completed. A total of 12 members had been appointed and both Dr de Sousa and Professor Jennings had kindly agreed to represent Council on the Board for the first year. She said that the size of the Board was larger than originally anticipated, but this was due to the large number of high-quality applications and the desire to have adequate coverage across UK regions.

9.8 Council **noted** the update.

10.   Spring Budget 2020 Update

10.1 Professor Smith welcomed Emma Lindsell (Executive Director UKRI Strategy and Governance) who had agreed to provide an update on the forthcoming Spring Budget. She summarised by saying that the Budget was expected to be extremely positive about the path to 2.4% and would provide an excellent stimulus in that regard. She said that she anticipated an investment of £22bn of R&D public investment over 5 years. She closed by saying that the SR negotiations between now and July will determine how the funding will be allocated across the relevant public sector bodies.

10.2 Council **noted** and **welcomed** the update and thanked Emma and her team for their work on this.

11.   Evolving the Way EPSRC Manages its Portfolio (EPSRC 04-20)

11.1   Ms Francis introduced this paper which presented the findings of a Council/Strategic Advisory Network workstream that has been considering the evolution of the balancing capability strategy used to manage EPSRC's portfolio. Council members Professor Whitley and Professor Etheridge both participated in the workstream.

11.2   Ms Francis said that the working group had acknowledged that the research funding ecosystem had moved on considerably since the inception of this strategy and indicated that it was likely that further change would follow in the current research funding environment. It concluded that EPSRC therefore needed to be able to react/respond to opportunities with greater speed and agility. This would change the focus of portfolio management to be more based on the future outcomes that it wanted to achieve. This intelligence should be informed through a more coherent approach to horizon scanning to spot emerging ideas and finding mechanisms to support them e.g. through the big ideas pipeline. This could be done through multiple routes and the use of a dynamic taxonomy to gain greater understanding of the EPSRC portfolio.

11.3   Council thanked the work stream members for their insightful report and endorsed the emerging principles and recommendations. It particularly agreed that EPSRC should no longer assert an aspiration to "grow, maintain or reduce" the size of an individual research area, but rather move to towards an approach that was more geared to managing the whole portfolio. Council discussed at length the need for new tools, greater agility, the ability to spot trends. This probably needed ramping up both the dialogue and engagement mechanisms in order to facilitate a new approach. It was agreed that overall a more dynamic taxonomy was required for all of this to happen. It asked the Executive to keep Council informed of progress with development of portfolio management tools.

12.   Responsible Innovation (RI) (EPSRC 05-20)

12.1   Dr Chmura introduced this paper which set out EPSRC's current approach to RI. It also presented the outcome of a Council/Strategic Advisory Network workstream that had been tasked with reviewing EPSRC's current approach and to suggest ways to better embed a culture of RI within the wider EPS community.

12.2   Council discussed this at length and recognised that this was an important, but potentially sensitive area and that there was a balance to be struck between appropriate intervention and increased bureaucracy. This was particularly important in the current environment, given the strain on resources and the drive to reduce bureaucracy. Professor Sharples made the point that the key question for EPSRC and researchers was how do we do this research responsibly, not should we do it or not. Council also agreed that it would be helpful to be able to cite some examples of where failure to adopt a responsible innovation approach had had detrimental results as this would help to make a more compelling case. Dr Chmura agreed to source such examples.

12.3   Professor Smith summarised by saying that this was clearly a complex area and it was important for EPS researchers to have the tools to better understand what their responsibilities are in respect of responsible innovation and to be able to address these. He added that training for new researchers and better visibility of the approaches and mechanisms appeared to be the main priorities in moving this forward. He concluded by saying that it would be useful for Council to revisit this issue at a future meeting and also to understand the UKRI wide position.

13.   Any Other Business

13.1   Council **noted** the risk paper included in the information papers, but **agreed** that at the October meeting the risk paper should be scheduled as a main agenda item to allow a detailed discussion.

13.2   Council **agreed** the messages that should be conveyed from today's meeting in its report to the UKRI Board.

13.3   Council **noted** that Professor Whitley's tenure on Council which was due to end on 31 March 2020 had been extended for a further 3 years. In addition the tenures of Professor Smith, Professor Jennings and Dr Williams whose terms were due to end in March 2021 had also been extended until March 2024. Council noted that EPSRC would be seeking to appoint 3 new Council members in the recruitment round that would commence shortly. Dr Goldberg agreed to circulate the advert once it went live.

13.4   Finally, Professor Smith informed Council that today was Ms Dean's last meeting. On behalf of Council and the Executive he thanked her for all of her contributions and her outstanding commitment to Council. Her insightful contributions especially in the innovation space had been much appreciated in addition to her timely interventions and her collegiate approach. He wished her well for the future and said that he hoped he and Council would continue to engage with her.

14.   Next Meeting

14.1   Council **noted** that the next meeting was scheduled for the 12 and 13 May 2020.

Short Summary	The Current Situation	The Problem	The Domain Requirements
COMPUTING, MODELLING AND DIGITALISATION			
Quantum computing – e.g. in drug discovery	Not yet been considered	How do we exploit quantum computing to approach modelling differently in bio	Bring people together
Expanding on tools and techniques that meet our collective needs Common to all			Skills a key part of this
	Next gen computing beyond exascale Neuromorphic Quantum Analogue? Computing underpins all research Unlock previously unfeasible research	Energy demand Responsible collection and compression – storage of vast amounts of data Infrastructure Research ethos re. data Quantum – practicality New architectures UK is behind internationally in supercomputing power / ability / capability	Infrastructure networks – computing energy Standardised processes Cross-fertilisation of ideas from experienced fields – DNA/Physics
Large data sets from different perspectives in a systemic way including digital health	AI in data sets DE – data as a predictor of diseases Links to the gaming industry Interface with MRC and BBSRC – role for psychology An opportunity Ethical, RI, legal frameworks, wearable tech	Overcoming computer sci being a service industry Using data resources from other agencies Trying to focus this Creative industry links to the portfolio – need AHRC involved	
	Digital human Some really good digital twins already Could make exciting case	Need a good understanding of systems to begin with right now Feasibility / trustworthiness	Links to computing (beyond exascale) infrastructure

Short Summary	The Current Situation	The Problem	The Domain Requirements
AGRICULTURE, TECHNOLOGY AND SOCIETY			
Food as on integrating theme	Food for healthier people and planet is more important than ever	Industry needs to produce healthier food, more sustainability and people need to eat it	Agri-tech and engineering, social science to understand societal change and what is needed to inspire it from UKRI perspective
Green ammonia decarbonising agriculture with precision approaches of nitrogen application		Current carbon production of agriculture	AI, robotics, automation, global monitoring (?) with satellites
What does a healthy diet look like		Current dietary risk to cancer	BBSRC/MRC to understand the problem BBSRC/EPSRC to deliver technology solutions

Short Summary	The Current Situation	The Problem	The Domain Requirements
SYNTHETIC BIOLOGY			
Synthetic biology for Net-Zero – innovate around deadline	Strong Syn Bio investment in UK, include materials What does biology have to offer for materials - Biobased materials = industrial biotech What are low hanging fruit?	Working towards effective production platform	Translators – understand different disciplines – language – fundamental ability to communicate Do need to think about what needs to be different from current centres
Synthetic Biology – go large	We do things together but could scale up for quicker / bigger / more impact	Not enough cash at moment	Research scale up and more translation

Short Summary	The Current Situation	The Problem	The Domain Requirements
ADVANCED MATERIALS			
Advanced materials – cross-over into other councils Med tech and data tech area	Use links to specific companies from each council Current activity – - Advanced therapeutics - Health tech and diagnostics - Food systems and diet Co-Design and manufacturing Right through is an opportunity SME – biotech work in this space End to end approach: SMEs, Patients, Clinicians	Regulatory requirements Local production challenges Overcoming testing and validation challenges Coordinated approach to med tech investments including apps for healthcare Med tech companies – listening to user needs NIHR	Invest in hubs to bring all these aspects together in med tech / digital tech

Short Summary	The Current Situation	The Problem	The Domain Requirements
CROSS-CUTTING			
Communication Holistic package Skills Put people with the problem	Ecosystem creation – changing how we think about cross-disc	Translators – people can communicate across disc	People FLFs is good – time is good (more than 3)
Multidisciplinary approaches	Lack of risk / appetite to apply at the interface	Where do FLFs, SPF, ISCF applicants apply in future	Joint panels? Better website and language on documents Experiments with high future rate Anonymous peer review / new horizons MRC units being dynamic, competitive and more cross-disciplinary after review
Need a structure / process and challenge on: What are the big new things	No collective UKRI process for identifying big ideas and challenging if they are the right areas	How do we horizon scan as UKRI in a more structured fashion	System and process within UKRI to help a structured cross council debate on large scale ambitious programmes

OUTPUTS OF DISCUSSION CAPTURED OVER DINNER

	What specific actions should we take to continue the momentum we have created today?	Contributors
Realising the Vison	Form a small sub-group (2 from each) and ask them to work like a workstream so can rapidly respond to opportunities – share thinking	p.p. Mark Smith by Jane
	Two or three specific actions need to move forward, to do well and build confidence Disseminate outputs to those not present at discussion Focus on vision not process!	Lynn / Belinda / Andrew
	Executive should sit down, discuss ideas, prioritise ideas and work them in to asks for money Good to come back at MRC Council in May to involve wider MRC Council members for their input	Richard Murley
	This shouldn't be a one off – need more face time – could we use big ideas to help facilitate this? How can we help people to think bigger for big ideas?	Sam Francis
	It would have been beneficial to have had more time for discussion and for tables to feedback	Sam Francis
Agri-tech	Explore the potential for EPSRC/BBSRC (+ building on existing links with ESRC) to accelerate new agri-tech enabling technologies into commercial reality. Move beyond 1994! ASAP!!!	Lynn / Kedar / Belinda / Amanda / Laura
Connecting Core Disciplines	Maintain our core disciplines Co-design research programmes - Communities talking across the disciplines (UKRI facilitate this) Virtual cell – machine learning and AI have a lot to offer biology – how to operationalise that? Mathematical population science research	
Impact	Find ways to bring fundraising and entrepreneurship into interdisciplinary projects between the councils (e.g. BBSRC Young Fundraising Scheme)	John Bloomer
Politics	UKRI political response needed to secure funding	