

CMS Consultations on the National Academy for Mathematical Sciences and Connected Centres Network, feedback and next steps

Summary

In December 2021, the CMS launched a consultation on the proposals presented in the green papers for the National Academy for Mathematical Sciences and the Knowledge Exchange (KE) Connected Centres Network (CCN) for Mathematical Sciences, both of which closed on 21 January 2022¹. To complement the consultation, the ICMS hosted a Town Hall meeting and panel discussion on the 11 January 2022².

The INI/ICMS have financial support from the 2020 EPSRC Additional Mathematics Funding Programme until March 2025 to set up an incubator for a National Academy and initiate the CCN for KE to help scale up mathematical sciences activity in the UK.

Following the consultation, the CMS Chair, Alison Etheridge, convened a Task and Finish Group (TAFG)³, to consider the feedback received, and propose next steps bearing in mind the available funding. This paper briefly outlines the key topics arising in the consultation, the recommendations of the TAFG to date, and the latest developments.

Consultation Feedback

70 responses were submitted to the Academy consultation, and 21 for the CCN. 112 individuals attended the Townhall meeting, and a further 58 individuals registered to have the opportunity to watch the video afterwards. Notably, the majority of respondents and participants were based in Higher Education Institutions or learned societies. From the feedback, it is clear that many respondents had put in considerable effort to provide detailed, thoughtful, and constructive comments for which the CMS is particularly grateful.

There was widespread support among respondents for the creation of such an Academy and the initiation of a national network for knowledge exchange. There are a number of questions to be resolved before these initiatives can be successfully launched and thrive. The authors of both green papers have carefully read, themed, and responded to the feedback received in detail, what follows here is a brief summary of the most common and significant points raised.

National Academy

How will the fellowship model fit with equity, diversity, and inclusion?

¹ <https://www.cms.ac.uk/wp/national-academy/>

² The recording of which can be accessed here <https://www.icms.org.uk/events/2022/cms-town-hall-meeting-consultation-national-academy-and-connected-centres-network>

³ The TAFG comprises: Martine Barons (IMA), Gavin Blackett (ORS), Ken Brown (National Academy Green Paper co-author), Matt Butchers (KTN, CCN Green Paper co-author), Joanna Jordan (Independent, CCN Green Paper co-author), Rachel Norman (EMS), Andy Noyes (Chair of the Joint Mathematical Council, JMC, of the UK), and Stian Westlake (RSS).

Whilst recognising that “Fellow” may not be the final nomenclature used, the Academy’s success would depend upon active participation from committed individuals with the ability to command respect from within and beyond the mathematical sciences communities. This in turn must rest upon transparent and appropriate selection criteria, diversity (in terms of those from academia; non-tertiary education; business; industry; government; and charities) and inclusivity (with regard to age, gender, ethnicity and geographic location). In particular, selection criteria must focus on the skills and commitment to contribute to the work of the Academy, and recognise that individuals with those skills will be found in myriad settings.

How will practitioners and the non-tertiary education sector be involved?

Many respondents stressed the importance of an Academy truly incorporating practitioners, offering a home in which to engage with others in different business and industrial sectors, and to collaborate with academics and educators. The desirability of serious involvement and buy-in from all parts of mathematical sciences education sector was also highlighted, citing the significant economic and cultural benefits this would bring. It is recognised that there is substantial work to be done on reaching out to all relevant practitioners and properly involving the non-tertiary education sector. It is anticipated that broad engagement will be enshrined in the governance structures. This will be a priority in the next phase.

What is the vision for the Academy?

The Academy aims to foster the health of the discipline whilst championing advocacy, policy, and impact. This is best summarised in the green paper’s executive summary: *The creation of a **National Academy for Mathematical Sciences** is proposed with the mission to promote, and ensure the health of, the mathematical sciences across the UK. The primary focus of the National Academy will be external advocacy, enhancing connections across the broad mathematical sciences community in order to support and enhance its impact within the UK and beyond.*

What will be the relationship with the mathematical sciences learned societies?

In common with the models of other UK National Academies, the Academy would be independent of the existing learned societies. It is vital that clear, fast, and reliable communication channels are created between the Academy and mathematical sciences learned societies and indeed other bodies such as HoDoMS. It is anticipated that an evolution of the CMS would become an integral part of the Academic Affairs function and the CMS would cease to exist.

What happens if there are disagreements?

The Academy’s function is not to unify the community (and hence in particular not to unify the learned societies); rather, the aim is to unite the community behind certain positions. The internal structures of the Academy must allow room for a diversity of views and use this creative tension to its advantage.

What does the mathematical sciences domain include?

The Academy will aim to cover at least the areas spanned by the mathematical sciences learned societies, and to allow inclusion of all those who can reasonably self-identify as

mathematical scientists, and/or who are involved in an important aspect of the mathematical sciences such as its communication, promotion, or history.

What about an international dimension?

Whilst not an immediate priority in the set-up phase, international links are very desirable and will most likely develop naturally as the Academy grows.

Is the name fixed?

“A National Academy for the Mathematical Sciences” was the working title for the entity in the Bond Review and the Big Mathematics Initiative. The green paper authors strongly support the use of the word Academy, which suggests the distinctiveness and importance of the mathematical sciences discipline, and parity of recognition with other UK academies, and suggest leaving the final decision on its title to the set-up phase.

How will the set-up phase be managed?

Explicit milestones will be laid down for the set-up phase. These will be refined once an executive team has been appointed. The CMS will receive regular reports which will also be reviewed by a small oversight committee whose membership will include individuals with experience of governance of existing national academies.

CCN

How will the network be promoted to those who don't know they have a problem which can be addressed using mathematical sciences?

A key early activity of the CCN will be to design a detailed communications plan. Once the CCN is set up, special interest groups could be established responsively where there is demand and common interest.

How will strong-enough participation by non-academics be ensured?

Input from business, industry, and government is integral to the Practitioner and End-user Forum, and they will be consulted at an early stage about governance. The idea of setting up the forum in collaboration with the learned societies' existing professional forums is welcomed.

How will ED&I be embedded?

ED&I is vitally important to embed right from the start of the network. This is well covered in the National Academy proposal, which the CCN will seek to replicate.

How will success be measured?

Explicit and quantitative objectives are essential to measure and monitor success and impact, however they are proportional to the level of funding available. The Executive Team will set high-level targets, with refinement by the project leads once the project teams are in place.

How will mathematical sciences KE professionals be supported?

An early task of the CCN would be to find and connect these professionals (who may have different job titles) through the KE Professional Forum. The CCN will also be able to assist

developing a defined career path, and, in the longer term, will aim to secure grants to help fund appointments in smaller, or financially constrained, departments.

How will small departments be represented?

Every department, no matter their size or experience, will be represented by a KE champion, who has local knowledge of their own department's interests. For under-resourced departments, it is hoped that small amounts of funding might be made available for teaching buyout or follow-on projects, to incentivise participation.

What KE and outreach activities with schools are planned?

This important topic falls outside of the scope of the CCN (which focuses on KE with business, industry, and government).

What is the network's relationship with fundamental mathematics?

The CCN aims to maximise each department's potential to apply their expertise – whether that be in pure, applied, statistics, probability, or OR – to challenges from business, industry, and government. The 2014 REF Impact Case Studies database illustrates that excellent impact can emanate from any part of the discipline.

What are the intended relationships with existing entities such as CDTs, ATI, Catapults etc.?

There is great potential to share expertise from CDTs more widely across the UK, and encourage more collaboration and connectivity. The key is in the next call for CDTs, to find out what applicants would seek from a CCN. Engagement with the Catapults, and other important entities, can be significantly enhanced by the CCN, and this relationship should form a key part of the communications plan.

How will grand challenges be included in the CCN's activities?

The INI and ICMS have run several successful "top-down" grand challenge (i.e., high-risk, large-scale, high-reward projects) strategic workshops, and it is hoped that the CCN will support more of these initiatives where there is demand. Key areas could be identified by the Practitioner and End-user Forum's special interest groups.

What CPD will the CCN support?

The CCN, in consultation and collaboration with the learned societies, aims to promote existing training opportunities more widely **and** to enhance the offerings in areas not currently served, so as to provide a broader-based support.

How can companies commercialise or use the results of this precompetitive research?

It is vital that clear rules of engagement for all CCN activities are specified from the start, for example that Study Groups are open innovation. The community, through assistance from the KTN, has been working slowly towards trying to standardise and facilitate appropriate commercialisation/IP/sharing strategies, whose role will be continued by the CCN.

How will the transformation/change management of this programme be considered?

There is a large amount of work to be done in encouraging greater collaboration and connectivity in mathematical sciences KE. Promotion of the benefits and incentives are key,

and require strong scientific leadership from an individual or individuals who have a longstanding track record of successful mathematical sciences KE.

How will the CCN and the Academy work together?

A novel part of the CCN proposal is the creation of a central structure comprising the expertise and resource of the mathematical sciences infrastructure to support the end-to-end delivery of KE opportunities, whilst ensuring that all UK mathematical sciences departments have equal opportunity to engage in activities. A successful CCN could, in time, provide a critical element to an Academy, connecting academic and broad practitioner and end-user communities in a coherent and substantial way.

Recommendations of the TAFG

Academy

The Task and Finish Group met for the first time at the beginning of March. On the basis of the community's feedback and the time-limited funding, the TAFG's recommendation is for a pragmatic approach, in which existing and embryonic activity be developed to better suit the interests of the whole mathematical sciences community, in parallel with the development of an academy structure. The EPSRC funding can best be used to support a 2.5 year set-up phase for which the CMS will appoint a 'President' for the 'proto-academy and Executive Committee (with broad expertise), who will then, jointly with the CMS and with input from others with appropriate expertise including JMC/ACME⁴, appoint a larger Advisory Committee, all of whom will work on a voluntary basis. The advisory committee will provide a larger pool of expertise on which to draw for specific workstreams. The EPSRC funds will support a fixed term, full-time, salaried, 'Executive Director', who will be recruited as soon as possible, with an anticipated start date of late summer/early autumn.

CCN

The TAFG envisages that the CCN will provide a valuable vehicle through which an academy could engage with a diverse range of stakeholders.

Academy set-up phase 2022-25

The aim of this phase will be to develop a detailed, actionable plan for the Academy, secure sources of funding, set up a steady-state governance and fellowship structure (recognising that a term other than 'fellow' may better reflect the inclusivity of the organisation), and incorporate and register the organisation. During this phase, the 'President' of the proto-academy and Executive Committee will work closely with the CMS Chair and Board, with informal reviews and brief written reports every six months and a more formal report and review 2 years after inception. At the end of the period, a go/no-go decision will be taken by the CMS Board with input from the JMC/ACME based on whether the key design issues have been addressed, whether longer-term funding is in place, and whether a strong operational and business plan is ready. The Executive Committee will be appointed initially for the set-up phase, but it is anticipated that, should the decision be taken to proceed with the academy at the end of this phase, to ensure continuity, some members would become trustees of the new Academy in its first years of independent operation.

Next steps

⁴ Royal Society Advisory Committee on Mathematics Education

Academy

A short paper detailing the TAFG's proposed next steps for the Academy as described above, including outline job descriptions for the roles of 'President' of the proto-academy and Executive Director, was circulated to the CMS constituent societies in the middle of March for discussion with their councils. In parallel, as a priority, the Chair of the CMS will discuss with JMC/ACME Chairs how their activities dovetail with the aims of an academy. The TAFG will use this feedback to inform a proposal and outline budget for the next phase.

CCN

The INI and ICMS are progressing the proposals for coordinated KE activities. The network may change its name as CCN is too suggestive of a regional structure that was not pursued. The current working title is the "Office for Knowledge Exchange in the Mathematical Sciences (O-KEMS)", which builds on the successful Virtual Forum for Knowledge Exchange in Mathematical Sciences (V-KEMS), established at the start of the pandemic⁵. The INI job advert for a Knowledge Exchange Manager, to establish the CCN, went live in the middle of March, with a closing date of 10 April 2022⁶, and interviews are scheduled for early May.

⁵ <https://www.vkemsuk.org/>

⁶ <https://www.jobs.cam.ac.uk/job/34022/>