



Academy for the
Mathematical Sciences

Progress towards a (national) Academy for the Mathematical Sciences – and Consultation

27 APRIL 2023

PRESENTATION TO HODOMS

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Contents

- A reminder of progress to date
- Summary of “Progress update and consultation” document
- Issues under discussion
- Timings and next steps – and Requests of you. Please attend a Consultation Event and respond to the Consultation Questions. Please get involved in the Academy. ... Please encourage colleagues to do so too.

Progress to Date (April 2023)

- The creation of a national Academy for the Mathematical Sciences to facilitate links between academia, government and industry and education, and to act as the coordinating focal point for the community was a key recommendation of the **2018 Bond Review, The Era of Mathematics**.
- The Council for the Mathematical Sciences (CMS) [consisting of EMS, IMA, LMS, ORS, RSS] welcomed the review and commissioned a **Green Paper in December 2021** for consultation
- Following that consultation, a **“proto-Academy”** was established in **October 2022** to put in place everything necessary for a **Spring 2025 launch** of the full national Academy, subject to a **Go:No-Go decision** to be taken by CMS by **October 2024**
- In **October 2022**, an Executive Committee - and Executive Director Christie Marr - was hired for the proto-Academy
- **Consultation document published yesterday (26 April 2023).**
<https://www.acadmthsci.org.uk/about/consultation/>
- **Now is the time for us to consult the community again to ensure that you have the opportunity**

Sections of the Consultation Document

1.

Summary (also published as a separate document)

2. Policy

3. Advocacy

4. Education

5. Implementation of Mathematical Sciences

6. Academies and Societies

7. Equality, Diversity and Inclusion

8. Early Career Mathematical Scientists

9. Governance

10. Fellowship

11. Finance

12. Full List of Consultation Questions

Publications:

a. Summary Document

b. Entire Document

c. Individual Sections as separate webpages

d. Online form for consultation responses

e. Invite for 4 consultation events in May

All found at:

<https://www.acadmthsci.org.uk/about/consultation/>

Individual Sections

1.

1. Vision

- The new Academy for the Mathematical Sciences (AcadMathSci) will be an authoritative and persuasive voice for the whole of the mathematical sciences.
- We will work with learned societies, other organisations, and people in the community who develop, teach, research, communicate, and use mathematical sciences.
- The Academy's focus will include teaching and education, academic research pushing the frontiers of what is known, and the implementation of mathematics in practice in industry, commerce, government and elsewhere.
- The Academy will support the advancement of the field by bringing together those in the community and more broadly to take action to nurture the people pipeline, increase societal engagement and improve the recognition of the power, value and beauty of mathematical science.
- Our ambition is that our field delivers on its full potential to improve lives, help people, strengthen society, enhance economic productivity, and benefit and enrich our world.

Q1. Do you find this vision attractive? Which elements of the vision do you like? Which elements do you dislike?

2. Policy

- An important part of the development of the Academy is to consider the feasibility and develop the operation of a professionally staffed Policy Unit for the Academy.
- The Policy Unit will focus on the following areas:
 - Mathematical sciences for policy – which might, for example, include things like pandemic disease modelling, Net Zero, or the regulation and growth of Artificial Intelligence.
 - Policy for mathematical sciences – which might include supporting the case for more funding for mathematical sciences research, practical approaches to mathematics teacher recruitment and retention, or gathering data to understand the diversity of mathematical scientists.
- It is clear that to be effective there must be an element of advocacy within a Policy Unit. This means that decisions need to be made as to whether the Academy wishes, for example, to be a ‘trusted advisor’ to government, or more of an activist, campaigning organisation.
- Our aim is to be authoritative, compelling and persuasive, bringing the weight of views from across the mathematical sciences community and to make a difference to policy and funding decisions.

3. Advocacy

- By advocacy, the Academy means, ‘any attempt to influence the decisions of an institutional elite on behalf of a collective interest’
- The Academy sees advocacy as including, but not limited to, influencing proposed legislation and policy proposals (and funding decisions) by directly communicating with government officials and elected decision makers, or encouraging others to communicate on that basis.
- We want to be ambitious for our level of engagement and our advocacy goals for the Academy. We would like to see changes measured both that benefit the discipline, and to improve public policy, and actions made by decision makers, through the greater expertise contributed by the mathematical sciences community.
- We propose that the focus of the Academy’s agenda should be on both what we term ‘mathematical sciences for policy’ and ‘policy for mathematical sciences’.

3. Advocacy

We think there are five tests to determine issues on which the Academy speaks or engages in broader policy and advocacy, plus a sixth (internal) test of internal coordination. These proposed tests are:

An “expertise” test	Does the Academy, or the mathematical science community, have unique or leading expertise in this area which would contribute to betterment of public policy and / or decisions made by decision makers in this area?
A “topicality and balance” test	The aim is for the Academy to have a ‘balanced portfolio’ of issues which are topical, and ones which are note. To determine topicality, is this issue one on which decisions are being made now, or being framed, such that there is an opportunity to add expertise for immediate benefit to decision makers (and hence to public policy)? And whether it is topical or not, does it support an overall balance of the Academy’s work?
An “importance” test	Given the opportunity costs, is this issue one which – in the judgement of the Academy – it is sufficiently important that the mathematical science community engages (either important in general, or to the community specifically)?
A “substantive” test	Is the contribution that the Academy and the mathematical science community can make, significant or material or substantive to the decisions that may be made?
A “value added” test	Would a contribution from the Academy add value to other existing or planned engagements and inputs (from the mathematical science community more broadly, or other learned societies, or other third parties generally)? And is that value add demonstrable with the community, and can it have impact quickly?
A “consistency” test	Does this work build on – and does it not contradict – other workstreams within the Academy (especially on education, practitioner affairs, and knowledge exchange)?

6. Academies & Societies

- The Academy has considered how best it can work with the CMS learned societies, in order to determine how the Academy can most effectively complement and act additively with existing organisations.
- Goals for the Academy include:
 - Fostering vibrant and dynamic engagement between mathematical scientists and policymakers, scientists, technologists and engineers.
 - Building deep support for the abstract innovation and excellence that underpins the mathematics, science, and technologies of the future.
 - Creating broad awareness of the role and power of mathematical innovation in tackling new and emerging societal challenges.
 - Obtaining a substantial increase in research funding for the mathematical sciences, commensurate with the great importance of our field to economic productivity and societal wellbeing in the UK.
- Since flourishing learned societies and membership organisations will be essential to the success of the Academy, the Academy will not seek to become a mass membership organisation, nor will it publish mathematical or scientific journals.
- The Academy will however have Fellows, as other national Academies have.

Next Steps – and Requests of you, please

- **Please join, respond, and encourage colleagues to do so.** The Consultation Period will run from 26 April until 30 June.
- There will **four online Consultation Events**, kindly hosted by the International Centre for Mathematical Sciences (ICMS), as follows:
 - Consultation Event 1: Thursday 4 May, 10am - 12 midday
 - Consultation Event 2: Tuesday 16 May, 4pm - 5pm
 - Consultation Event 3: Wednesday 17 May, 2pm - 4pm
 - Consultation Event 4: Thursday 24 May, 4pm - 5pm
- We welcome your feedback on some or all of the consultation questions available here: <https://form.jotform.com/231106276813350>.
- We also welcome wider feedback on the plans for the Academy, and you can get in touch more generally at contact@AcadMathSci.org.uk - and nigel.nams@gmail.com



7. Equality, Diversity and Inclusion (EDI)

- Despite many efforts and initiatives, the demographics of the UK mathematical sciences community differ sharply from the demographics of the country as a whole. This deprives the mathematical sciences community of many talents, and negatively affects the experiences of many mathematical scientists.
- Underrepresentation is due both to systemic barriers that disproportionately affect underrepresented groups, and to the complex messages and prejudices that young people receive about mathematical sciences.
- The Academy will be a strong voice advocating for a diverse, welcoming and open community. It will play a fundamental role to ensure:
 - Wider access and participation, including improved mathematical literacy for all.
 - Fairer career progression for all mathematical scientists in all career stages and across all communities.
 - A culture change that challenges the misconception and stereotype of mathematical sciences as hard and exclusively solitary activity, and instead promotes mathematics as a collaborative and social endeavour, accessible to all of those who are curious, find it fulfilling and have an interest in it.
- Our key priorities are intended to be: tackling misconceptions, encouraging more students to study mathematical sciences at every level and supporting under-represented groups to flourish in mathematical sciences careers.

10. Fellowship

- We envisage that the Fellowship of the Academy for the Mathematical Sciences would comprise people who demonstrate excellence in their field, are respected by their peers for their contributions towards the flourishing and support of mathematical sciences in the UK and its territories, and who support the aims of the Academy.
- We expect Fellows to be elected from all parts of the mathematical sciences community, including teachers, other educators, academics, and innovators and practitioners in industry, commerce, government and elsewhere.
- We want a Fellowship that is active and engaged, but we propose to be flexible in specifying the form this activity should take.
- Fellows' contributions could take many forms, including being vocal about their Fellowship and the work of the Academy, being willing to engage in Academy committee work or proposing/helping to design initiatives; responding to consultations.

10. Fellowship

- We want Fellowship to be seen as an honour which prospective Fellows are pleased to accept. We see the benefits for prospective Fellows as:
 - Recognition by people whose opinion they care about, and status in that community
 - Feeling that they're influencing and contributing to the health of a discipline they are passionate about across the entire breadth of the mathematical science eco-system, beyond their own specific field
 - Opportunities to mix with other Fellows, providing inspiration, interest, networking, personal and professional satisfaction, helping to keep skills and interests up to date
 - Building an understanding of the full diversity of mathematical sciences community
- No decisions have been made on fees to be paid by Fellows.
- Fellowship will not, however, be the only source of how the community can engage with the Academy. We expect, and very much want to encourage, that the Academy finds ways in which both Fellows and non-Fellows can contribute to the advancement of the mathematical sciences.

11. Finance

- As part of discussions so far, an illustrative organisation structure and staffing model have been developed that will enable the Academy to carry out its proposed activities. We have considered three scenarios:
 - A minimum viable structure which represents broadly the minimum staffing level that the Academy would realistically need to have in order to be able to operate with sufficient impact; and
 - A fully-fledged structure, the structure the Academy might aim towards a few years following launch.
 - A full structure which assumes greater availability of funding and where increased funding and activity is expected to yield still significantly greater benefits
- We have modelled the likely costs of running the Academy based on these structures. This suggests an annual budget of at least £2m would be required for the minimum viable structure. A budget of £4m per annum would enable the Academy to operate the full structure.
- Funds will need to be raised to pay for these - and the availability of funds will determine the extent of what the Academy can do.

Spare Slides

1.

Consultation Questions

1. Vision

Q1. Do you find this vision attractive? Which elements of the vision do you like?
Which elements do you dislike?

2. Policy

Q2. Are there other areas that you would like the Academy to focus on in its policy and advocacy portfolio, beyond those listed above?

Q3. What prioritisation would you place on items in the list above, and any other areas you have in mind?

3. Advocacy

Q4. Do you agree with our broad approach towards advocacy?

Q5. Do you agree with the proposed principles for the Academy's advocacy work?

Q6. What do you see as the best communications avenues to reach you and the other mathematical scientists in your field/sector/community?

4. Education

Q7. Priorities will arise over time - are our priorities the right ones to begin the work of the education workstream?

Q8. Are there other areas you would like to see prioritised instead?

Consultation Questions

5. Implementation of Mathematical Sciences

Q9. What can we do now, as a proto-Academy, to increase awareness of the Academy amongst mathematical scientists working in all sectors of the community and encourage them to engage with the Academy and influence its activities and direction?

Q10. One of the attractions of an Academy is it can facilitate the education, academic and practice sectors working together. What do you see as the most effective model for sharing expertise between these different sectors to improve the implementation of mathematical sciences in all areas of the economy?

6. Academies & Societies

Q11. What areas of engagement would benefit from an Academic Affairs committee of the Academy which was able to speak for Mathematical Sciences as a whole?

Q12. How can the Academy best work with existing learned societies in the mathematical sciences?

Q13. How should the Academy foster constructive relationships with existing National Academies? This includes geographic national academies such as the Royal Society of Edinburgh and the Learned Society of Wales, and discipline-specific academies such as the Royal Society and the British Academy.

7. Equality, Diversity and Inclusion (EDI)

Q14. What are in your opinion the three highest priorities concerning EDI in the mathematical sciences community in the UK?

Q15. The EDI workstream is eager to engage with groups active in EDI across the mathematical sciences community to seek input from these on a regular basis. Which types of engagement do you think would work best?

Q16. What activities and relationships should the Academy develop to promote a more diverse and inclusive mathematical sciences community in the UK?

Consultation Questions

8. Early Career Mathematical Scientists

Q17. How do we ensure that all people who enter the workforce outside academia, with bachelors' or masters' degrees or doctorates in mathematical sciences, continue to engage actively with mathematical sciences, and consider themselves to be, mathematical scientists"?

Q18. How do we make sure that the full community of early career mathematical scientists is represented and heard by the Academy – including early career researchers, teachers, and people working in industry, commerce, and government?

Q19. What actions and activities should the Academy take on to support and build the early career community?

Q20. What should be our three highest priorities for the early career community?

9. Governance

Q21. Do you have any comments on the Academy's plans for charitable status?

Q22. Do you agree that our proposed structure, including the Trustees, is suitable to keep the Academy constructively and appropriately working towards the flourishing and support of the mathematical sciences and their impact?

Q23. Do you have any other comments on this section?

Consultation Questions

10. Fellowship

Q24. Do you have any comments on the proposed model of Fellowship?

Q25. “Excellence” is seen in many places in the mathematical sciences: in classrooms, elsewhere in education, in research, industry, government, finance, charities and more. What does “excellence” look like in your field/sector/community?

Q26. We are determined that the Academy will have Fellows from all parts of the mathematical sciences community, including teachers and other educators, research, academia, and innovators and practitioners of the mathematical sciences in industry, commerce, government and elsewhere. We will also have Fellows from all fields of mathematical sciences - and a diverse and inclusive Fellowship. How do we best ensure equity, diversity and inclusiveness amongst our Fellows?

Q27. Do you have any suggestions for the criteria that might be suitable for selecting Fellows working in your area of mathematical sciences?

Q28. Do you have any other comments on these proposals?

11. Finance

Q29. The Finance section sets out expected activities (in terms of what people hired do in similar organisations); a range of costings; and possible sources of funds. Do you have any comments on whether we are missing any activities that the Academy should pursue; or activities in the list that you think the Academy should not carry out? Are we right to look at all these sources of funds?

Conclusion:

Q30. Are there any other comments that you want to provide?

4. Education

- The term 'maths' in an education context covers all elements of the mathematical sciences discipline, including mathematics, statistics, operational research and data science.
- The remit in terms of stages of education encompasses:
 - Early years - pre-school education.
 - Compulsory education 5-16.
 - Education in the post-16 phase.
 - Undergraduate mathematical sciences degrees, and other undergraduate degrees with a high proportion of mathematical sciences in the programme of study. (Postgraduate degrees and research are covered under Academies and Societies.)
 - Numeracy in the general populace.

4. Education

- To date the Academy has four suggested priorities:
 - Securing adequate recruitment, supply and retention of knowledgeable and effective teachers.
 - Ensure the coherence of the mathematical sciences/stats/data curriculum across those subjects, and develop a programme of work to identify synergies and support non-maths teachers in both secondary and primary schools.
 - Reverse the perception that degree mathematics is not viable for applicants who do not achieve the very highest A Level grades in order to create a more diverse cohort of graduates.
 - Address the overwhelmingly negative attitude of the populace to mathematics.

5. Implementation of Mathematical Sciences

Our overarching goal within this part of the Academy is to improve the implementation of mathematical sciences in practice, whether that is in business, industry and finance, charities or the public sector. There are several strands to this:

- Promoting and supporting the mathematical scientists who work outside of academia and education.
- Improving the demand for - and supply of - mathematical scientists to increase the application of mathematical sciences in practice.
- Supporting a balanced two-way exchange of knowledge between practitioners and academics
- Enabling practitioners to actively participate in discussions on mathematical education (in schools, universities and the workplace) to ensure their perspectives on skills needed in the workplace and for life are heard.
- Providing a forum for innovators and practitioners to raise their voices so they are equally heard on policy relating to the mathematical sciences.

5. Implementation of Mathematical Sciences

- Our initial set of priorities are:
 - To support the Policy Unit in showcasing the economic and social value of mathematical sciences to UK society.
 - Identifying the training and support needs of mathematical scientists, as well as skills gaps in the general population and working with fellows from education and academia to suggest solutions.
 - Raising the profile and attractiveness of careers in the mathematical sciences, particularly to under-represented groups who may not see the opportunities of a career in this area.
- The Academy will work in combination with the new UK Knowledge Exchange Hub for Mathematical Sciences (KE Hub) to support those working across the inside-outside academia interface, with the aim of increasing the number, breadth and effectiveness of collaborations

8. Early Career Mathematical Scientists

- The Academy will reach out to, advocate for, and represent Early Career mathematical scientists in education, academia, and the practice of the mathematical sciences.
- Working in collaboration with other organisations in the space, we will bring Early Career mathematical scientists together, determine concrete actions that will improve the lives and careers of people in this group, secure funding for these actions where necessary, and take these actions forward.
- Priorities identified by the Early Career workstream to date include a cross-community mentoring scheme, and events and on-line resources focussed on job applications and career progression in the different parts of the mathematical sciences community.
- We will organise events – locally, regionally, nationally, and online – for Early Career mathematical scientists, helping to build networks, improve career prospects, and build connections within and between different parts of the community.

9. Governance

- Work so far has focused on the features necessary to establish the Academy as an incorporated organisation, with a constitution that sets the scene for a well-run organisation properly accountable to its stakeholders.
- We are in the process of establishing the Academy as an ‘Association Charitable Incorporated Organisation (CIO)’. This is a charity structure where the trustees (who are the people legally responsible for the running of the charity) are elected by, and accountable to, a wider body of members.
- All CIOs must specify one or more Objects. The AcadMathSci has the single object “to promote and support the mathematical sciences for the public benefit.”
- The Academy is not a membership organisation like the learned societies or other professional associations. Instead, it will have Fellows. However, for the purposes of governance, it will have people legally categorised as “members”, whose role is to hold the trustees to account (including by election and deselection).