

Bond Review on Knowledge Exchange

What happened next? A personal perspective

Alan Champneys
Engineering Maths Dept, Bristol

Contents

1. The Bond Review on Knowledge Exchange (KE)
 - ▶ Its timeline
 - ▶ Its main recommendations
2. The good news and the bad news
3. What happened next?
4. What is about to happen?
5. What can we do? — 3 lessons from IMA KE conference
 - ▶ A national academy for impactful mathematics
 - ▶ Career structure for Maths KE professionals
 - ▶ What does a KE-engaged Mathematics Department
6. Discussion

Contents

1. The Bond Review on Knowledge Exchange (KE) “The Force Awakens”
 - ▶ Its timeline
 - ▶ Its main recommendations
2. The good news and the bad news “The Empire Strikes Back”
3. What happened next? “A Phantom Menace”
4. What is about to happen? “The Return of the Jedi”
5. What can we do? — 3 lessons from IMA KE conference “A New Hope”
 - ▶ A national academy for impactful mathematics
 - ▶ Career structure for Maths KE professionals
 - ▶ What does a KE-engaged Mathematics Department
6. Discussion

“The Force Awakens”

30 September – 01 October 2015 David Abrahams at ICMS organised:

Community Meeting on Knowledge Exchange

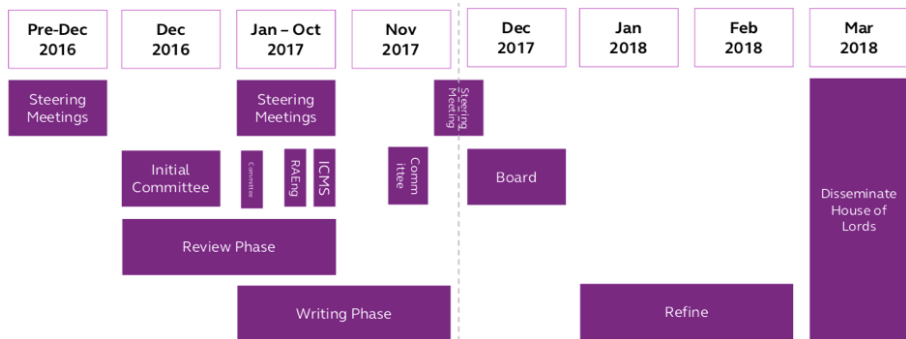
“The main suggestion to bridge the gap, would be a National Framework for Maths KE Report commissioned by Government, e.g. EPSRC that had high level government/learned society buy in – which would then provide a vision/road map to the community (and funding). For example, high level activity with a working party style launch at the House of Lords”

March 2016–June 2016 Beginnings of a **working group** to scope idea: Alan Champneys, Matt Butchers (KTN), Richard Pinch (GCHQ), Philippa Hemmings +team (EPSRC). idea shared widely

July-Sept 2016 Working group becomes **steering cttee** representing CMS, EPSRC etc.; terms of reference, names for chair, structure, call for committee shared with community and agreed.

Sept-Oct 2016 Philip Bond accepts to be chair, **committee** and **board** formed.

the review process itself



The Board

Professor Philip Bond BSc, DEA, FIMA, FInstP (Chair)

The Lord Stern of Brentford, Kt FRS FBA (Co-Chair)

Professor David Abrahams

Professor Dame Glynis Breakwell DBE, DL, FRSA, FAcSS

Professor Martin Bridson FRS

Dr Claire Craig CBE

Professor Jon Keating FRS

Professor Ursula Martin CBE FREng

,
FREng Dame Julia Slingo DBE, FRS

Mr Paul Stein, CTO Rolls Royce

The committee

Professor David Abrahams Professor Philip Aston Dr Colin Bleak Professor Alan Champneys Mr Joseph Connor Professor Rama Cont Dr Stephen Corson Professor Joerg Fliege Professor Paul Harper Professor Andrew Hogg Dr Joanna Jordan Professor Mark Kelmanson Professor Dick Lacey Ms Jane Leeks Professor David Leslie Professor Daniel Lesnic Professor Bill Lionheart Mr James Lofthouse Professor Gabriel Lord Mr Adrian Mardell Professor Jeremy Oakley Dr Richard Pinch Dr Matthew Revie Mr Edward Rothead Dr Sanjiv Sharma Dr Manuchehr Soleimani Dr Brendan Spillane Dr David Standingford

Selected recommendations

- ✦ 1. An Academy for the Mathematical Sciences should be established in order to facilitate links between academia, government and industry.
- ✦ 4. Need awareness within the maths sci community of GCRF and ICSF.
- ✦ 6. Government and universities should create, at a minimum, 100 additional PhD places per year dedicated to training mathematical scientists looking to generate impact with their work.
- ✦ 8. All mathematics students should acquire a working knowledge of at least one programming language.
- ✦ 13. UKRI should look to at least triple the funding going to Mathematical Sciences across multiple Research Councils.
- ✦ 14. A national centre in impactful mathematics
- ✦ 16. Resources for workshops with industry should be broadened
- ✦ 18. Funds should be made available for regional KE centres or networks.
- ✦ 19. Universities mathematics departments should have dedicated facilitators and KE translators.

“The Empire Strikes Back”

The good news a community driven review

“The Empire Strikes Back”

The good news a community driven review

- ✦ Set up by a “bunch of mavericks” interested in KE, with input from CMS, UKRI, etc.

“The Empire Strikes Back”

The good news **a community driven review**

- ✦ Set up by a “bunch of mavericks” interested in KE, with input from CMS, UKRI, etc.
- ✦ Mass of evidence collected bottom up

“The Empire Strikes Back”

The good news a community driven review

- ✦ Set up by a “bunch of mavericks” interested in KE, with input from CMS, UKRI, etc.
- ✦ Mass of evidence collected bottom up
- ✦ Evidenced based recommendations from Committee

“The Empire Strikes Back”

The good news a community driven review

- ✦ Set up by a “bunch of mavericks” interested in KE, with input from CMS, UKRI, etc.
- ✦ Mass of evidence collected bottom up
- ✦ Evidenced based recommendations from Committee

The bad news a community driven review

“The Empire Strikes Back”

The good news [a community driven review](#)

- ✦ Set up by a “bunch of mavericks” interested in KE, with input from CMS, UKRI, etc.
- ✦ Mass of evidence collected bottom up
- ✦ Evidenced based recommendations from Committee

The bad news [a community driven review](#)

- ✦ Bypassed all the usual avenues of commissioning from CMS etc.

“The Empire Strikes Back”

The good news **a community driven review**

- ✦ Set up by a “bunch of mavericks” interested in KE, with input from CMS, UKRI, etc.
- ✦ Mass of evidence collected bottom up
- ✦ Evidenced based recommendations from Committee

The bad news **a community driven review**

- ✦ Bypassed all the usual avenues of commissioning from CMS etc.
- ✦ Bold (not so evidenced) recommendations from Board

“The Empire Strikes Back”

The good news a community driven review

- ✦ Set up by a “bunch of mavericks” interested in KE, with input from CMS, UKRI, etc.
- ✦ Mass of evidence collected bottom up
- ✦ Evidenced based recommendations from Committee

The bad news a community driven review

- ✦ Bypassed all the usual avenues of commissioning from CMS etc.
- ✦ Bold (not so evidenced) recommendations from Board
- ✦ It was not **received** by a minister

“The Empire Strikes Back”

The good news a community driven review

- ✦ Set up by a “bunch of mavericks” interested in KE, with input from CMS, UKRI, etc.
- ✦ Mass of evidence collected bottom up
- ✦ Evidenced based recommendations from Committee

The bad news a community driven review

- ✦ Bypassed all the usual avenues of commissioning from CMS etc.
- ✦ Bold (not so evidenced) recommendations from Board
- ✦ It was not **received** by a minister
- ✦ Government has been pre-occupied by something else . . .

What is Maths Knowledge Exchange?

Definition 1: 10 rules from Chris Budd

1. KE should be exactly that. An exchange between mathematicians and end users with each contributing to the process.
2. Good KE should lead to advances both in the applications for which it is used, and in the mathematical knowledge it generates.
3. KE should involve a wide variety of mathematical research areas interacting with a wide variety of different types of 'industry'.
4. Mathematics KE almost always involves a mixture of analysis, modeling, data and computation.
5. To do KE well you need to think out of the box, work in teams, put in the hours, manage expectations and be prepared to listen.

- 6. As well as doing mathematics KE also involves dealing with IPR and confidentiality issues. We should always be prepared to engage with these.
- 7. Communication is a vital part of effective KE. Both communicating the effectiveness of maths to end users and the excitement of working on applications to mathematicians. Also both popular and academic routes of dissemination.
- 8. KE can happen at many different levels and in many different ways, from undergraduate placements, MSc projects, PhD projects, Post Doc, consultancy and long term academic collaborations. All feed into, and support, each other.
- 9. KE is not (necessarily) a money making exercise, but money is important. We should always explore a variety of funding mechanisms.
- 10. Study Groups with Industry (and their close relations) work as an effective means of solving problems, learning new mathematics, establishing collaborations, and encouraging (otherwise reluctant) colleagues to get stuck into KE.

What is maths KE? - Definition 2

A much broader, more inclusive definition

 Exam question!

What is maths KE? - Definition 2

A much broader, more inclusive definition

- ✦ Exam question!

- ✦ I don't have the specimen answers, but some thoughts

What is maths KE? - Definition 2

A much broader, more inclusive definition

✦ Exam question!

✦ I don't have the specimen answers, but some thoughts

- ▶ Bond talks about "Impactful Mathematics"

What is maths KE? - Definition 2

A much broader, more inclusive definition

✦ Exam question!

✦ I don't have the specimen answers, but some thoughts

- ▶ Bond talks about “**Impactful Mathematics**”
- ▶ Impact can come from long-term basic research

What is maths KE? - Definition 2

A much broader, more inclusive definition

🔥 Exam question!

🔥 I don't have the specimen answers, but some thoughts

- ▶ Bond talks about “**Impactful Mathematics**”
- ▶ Impact can come from long-term basic research
- ▶ Including collaboration between mathematicians and other disciplines

What is maths KE? - Definition 2

A much broader, more inclusive definition

🔥 Exam question!

🔥 I don't have the specimen answers, but some thoughts

- ▶ Bond talks about “**Impactful Mathematics**”
- ▶ Impact can come from long-term basic research
- ▶ Including collaboration between mathematicians and other disciplines
- ▶ Did the Bond Review go beyond its remit to propose restructuring of whole of maths research governance?

What is maths KE? - Definition 2

A much broader, more inclusive definition

🔥 Exam question!

🔥 I don't have the specimen answers, but some thoughts

- ▶ Bond talks about “**Impactful Mathematics**”
- ▶ Impact can come from long-term basic research
- ▶ Including collaboration between mathematicians and other disciplines
- ▶ Did the Bond Review go beyond its remit to propose restructuring of whole of maths research governance?
- ▶ Its not a zero sum game!!!

“A Phantom Menace”

What has happened in reponse to the Bond review — a first approximation



What actually happened

- ✦ April-May 2018 Review warmly received by whole UK maths community
- ✦ May-Oct 2018 Discussions in the various learned societies
 - ▶ IMA sets up a task and finish group for recommendations, chaired by [Alan Champneys](#)
 - ▶ A proposal for 2-tier implementation structure
 - ▶ CMS gets a new chair and momentum is lost
 - ▶ [Jon Keating](#) chairs an informal meeting between learned socs. to flesh out 2-tier implementation structure.
- ✦ Nov 2018 -March 2019 terms of reference and chairs established
 - ▶ LMS establishes a KE committee chaired by [Terry Lyons](#) (Oxford)

“The Return of the Jedi”

An agreed structure for implementation:

A Strategy Group chaired by **Dr Claire Craig** (Provost, Queen's College Oxford);
Head, Royal Soc policy unit; former head of Government Office of
Science
Contains **David Abrahams**, **Caroline Series**, + others TBA. First
meeting 30th April 2019.

An Implementation Group chaired by **Prof Sir Bernard Silverman**
(Oxford/Nottingham) former Chief Scientist at Home Office
made up of 12 members of the mathematical sciences community
...

The Silverman Committee

Christine Currie	Southampton	OR
Arne Strauss	Warwick/Turing	OR
David Leslie	Lancaster	Stats
Martine Barons	Warwick	Risk & Complexity
Alan Champneys	Bristol	Engineering Maths
Noel-Ann Bradshaw	Argos,	Senior Data Scientist
Terry Lyons	Oxford/Turing	Probability/Stochastics
Carola Bibiane-Schonlieb	Cambridge	Image Analysis
Edward Crane	Bristol/Heilbronn	Analysis
Chris Dent	Edinburgh/Turing	Energy Systems
Gareth Peters	Heriot-Watt	Statistics

“A New Hope”

What can we do now?

2 things from IMA Task and Finish Group:

- ✦ A bid to Institute of Coding for programming on Maths degrees led by [Stephen Lynch](#) (MMU)
 - ▶ The bid failed Jan 2019
 - ▶ What/who next? HoDMS?
- ✦ IMA Conference on KE - Aston Dec. 3 outcomes
 - ▶ National Centre for Impactful Mathematics - [David Abrahams](#) RCUK SPF fund bid.
 - ▶ Career support for Maths KE professionals - [Jo Jordan](#) & Aurora Praxis
 - ▶ What does KE-engaged Maths Dept look like - [Steve Langdon](#) etc.

Closing thoughts - Discussion points

How can HoDMS help?

- ✦ What is KE?
- ✦ How do we avoid infighting?
- ✦ How do we promote KE without losing the core of maths?
- ✦ Can the community unite around a bid for a national centre for impactful maths (hub and spoke)?
- ✦ Should we focus on the National Academy of Mathematics, or on KE?