



Annual

Report

2016-17

Mission Statement

“The Turing Gateway to Mathematics (TGM) acts as a vehicle for knowledge exchange between the mathematical sciences and potential users of mathematics, including industry, government, business and other academic disciplines, both in the UK and internationally. It does this by facilitating interactions and activities such as programmes of work, research and training events, as well as bespoke projects. The TGM aims at widening access to mathematics generally, to shorten pathways to impacts for academic research, and to support education and training in areas where mathematical skills are needed”

What makes TGM different?

The Turing Gateway to Mathematics is a knowledge intermediary for the mathematical sciences. Based at the Isaac Newton Institute for Mathematical Sciences and supported by the University of Cambridge, the TGM reaches out to and engages with the users of maths – in industry, business, public sector and other scientific disciplines. With extensive access to multiple communities across the UK and globally, the TGM can respond in an agile and flexible manner. The TGM works as a delivery partner to facilitate the exchange, translation and dissemination of knowledge. Using effective communications and proven methodologies, the TGM develops and runs activities such as events, bringing people and organisations together in order to share knowledge and stimulate further research and collaboration.

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The Turing Gateway to Mathematics (TGM) is the impact initiative of the Isaac Newton Institute (INI) based at the University of Cambridge.

It acts as a vehicle for knowledge exchange between the mathematical sciences and potential users of mathematics, such as industry and other academic disciplines in the UK as well as internationally. The TGM also helps to bridge the gap between those engaged in frontier mathematical research and those working in more applied areas, by stimulating the interchange of knowledge and ideas between academics from different disciplines and users of modern mathematics, such as industry and policy makers.

The TGM was established in 2013 and since then has consolidated its presence, delivering a range of activities across a number of different themes and sectors including biology and healthcare systems, environment and energy, financial risk, security sectors, Big Data and public policy.

A number of programmes of work were delivered during this report period, including activity with the EPSRC Centre for Mathematical Imaging in Healthcare (CMIH), the Cantab Capital Institute for the Mathematics of Information (CCIMI), the Maths Foresees Network and the Alan Turing Institute.

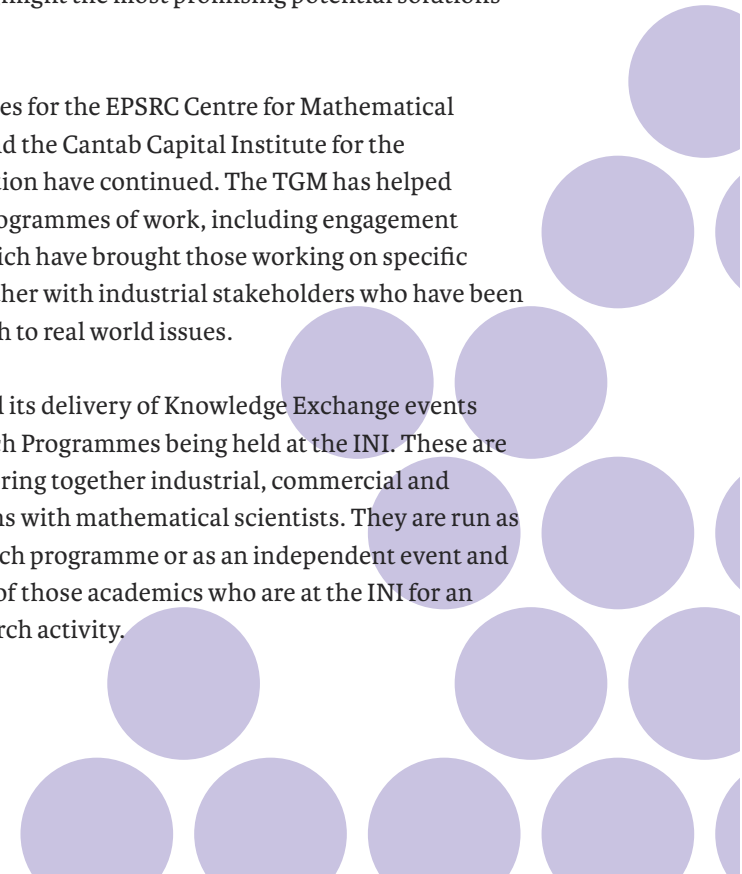
Working with partners from across the University of Cambridge and the EPSRC Centre for Doctoral Training in Soft Matter and Functional Interfaces at Durham, the TGM delivered Soft Matter - Theoretical and Industrial Challenges in September 2016. This event was held to celebrate the life of Sir Sam Edwards, who was a pivotal figure in soft matter physics. It highlighted developments in theoretical physics and

mathematical frameworks for the modelling and simulation of soft matter systems, with particular emphasis on how these models can inform industrial processes, materials, and design. Following this successful inaugural event, partners are working together on the *Edwards Symposia Series* which will run annually for the next five years, with the support of Unilever.

Funded by Maths Foresees, an EPSRC network under the Living with Environmental Change (LWEC) umbrella, the TGM delivered a four day Environmental Modelling in Industry Study Group in April 2017. Five industrial challenges were presented and potential solutions were discussed and developed. A number of collaborations between the end users who set the challenges and the academics have continued and peer reviewed reports that highlight the most promising potential solutions are being developed.

User engagement activities for the EPSRC Centre for Mathematical Imaging in Healthcare and the Cantab Capital Institute for the Mathematics of Information have continued. The TGM has helped develop some specific programmes of work, including engagement events with industry, which have brought those working on specific streams of research together with industrial stakeholders who have been able to apply this research to real world issues.

The TGM has maintained its delivery of Knowledge Exchange events that are linked to Research Programmes being held at the INI. These are specifically designed to bring together industrial, commercial and government organisations with mathematical scientists. They are run as part of an ongoing research programme or as an independent event and help to extend the reach of those academics who are at the INI for an extended period of research activity.



In October 2016, David Abrahams succeeded John Toland as Director of the Isaac Newton Institute for Mathematical Sciences and NM Rothschild and Sons Professor of Mathematical Sciences. David is the sixth Director of the Isaac Newton Institute and has responsibility for the TGM. He has devoted research effort to the broad area of applied mathematics, and is an advocate for knowledge exchange and industrial mathematics, which are key remits of the TGM.

Over the past year, the TGM has reviewed its Governance - as the existing structure had been in place for over three years. With the arrival of a new Director at the INI, the submission to the EPSRC for continued funding, and the ever increasing demands on the TGM through its evolving activity, it was felt it was the right time to conduct a review of the existing Governance structures. In keeping with standard governance practice, it was agreed that Advisory Board Members be appointed for a limited tenure of four years to help ensure that there are opportunities to refresh the knowledge and expertise that the TGM is exposed to. It was also agreed that a Chair be appointed to the TGM Programmes Committee to be responsible for ensuring that appropriate technical feedback is provided to the TGM where needed. The Chair would be invited to attend TGM Advisory Board meetings to share information and ensure that any opportunities for academic interaction are highlighted. The full Programmes Committee will be invited to meet with the Advisory Board every 18 months to ensure that they are able to engage in a more proactive way, and have the opportunity to input more strategically to growth of the TGM.

Both the TGM and the INI have contributed significantly to the Independent Review of Knowledge Exchange in UK Mathematical Sciences, chaired by Council for Science and Technology member Professor Philip Bond, which was launched with support from EPSRC and Innovate UK's Knowledge Transfer Network (KTN). The need for the UK mathematical sciences research community to engage more widely and deeply with end users (industry, Government and other academic disciplines) is paramount. Over the course of 2017, the Review has been collecting evidence from stakeholders; seeking examples of best practice for mathematical sciences knowledge exchange; reviewing models for support; and disseminating these findings. This information will be developed into a public report that is expected to be disseminated in early 2018.

Through its engagement activity, the TGM has continued to extend its reach across different sectors, working with well over 700 different organisations since its inception. Year on year there has been an increase in the delegates who attend TGM events, which has ensured greater opportunities for interaction between those in industry, the public sector and academia, often for individuals who have not worked together previously. Over the past year, most activities have been delivered in partnership with other organisations, as detailed above, which has ensured further collaborative opportunities with delivery across a breadth of sectors and subjects.



The **TGM Advisory Board** has Members from industry and public bodies to help advise on strategic matters and on the overall development of the TGM. The Board meets twice a year in Cambridge. Membership has been reviewed and expanded over the past year and, in keeping with standard governance practice, Advisory Board Members will be appointed for a limited length of tenure of four years. This change in length of tenure will be phased in over the coming year.

Membership:

Name	Organisation
Matt Butchers	Knowledge Transfer Network
Nick Easton	BAE Systems Applied Intelligence
Dougal Goodman	The Foundation for Science & Technology
Peter Grindrod	University of Oxford
Graham Keniston-Cooper	Investor and Entrepreneur
Peter Landrock	Cryptomathic (Advisory Board Chair)
Natasa Milic-Frayling	University of Nottingham & Intact Digital Ltd.
Richard Pinch	Institute of Mathematics and its Applications
Sir Bernard Silverman	Freelance Research & Consultancy
Sian Thomas	Food Standards Agency

The **TGM Programmes Committee** provides input and guidance on specific scientific or research matters related to TGM activities. The Committee Members are all academics and operate largely in a virtual way via email and telephone and are responsive to ad-hoc questions and requests for guidance from the TGM. As part of the review of TGM Governance, a Chair has been appointed to the TGM Programmes Committee, who will be invited to attend TGM Advisory Board meetings. Members of the Programmes Committee will meet with the Advisory Board every 18 months to ensure they have opportunity to input more strategically to the growth of TGM activities.

Membership:

Name	Organisation
Peter Challenor	University of Exeter
Alan Champneys	University of Bristol (Programmes Committee Chair)
Jacek Gondzio	University of Edinburgh
Des Higham	University of Strathclyde
Jane Hutton	University of Warwick
Arieh Iserles	University of Cambridge
Robert Leese	Smith Institute
Nigel Smart	University of Bristol
Adrian Weller	University of Cambridge



Staff and Management

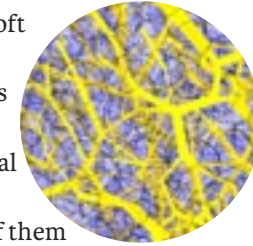
The TGM Manager has overall responsibility for managing the TGM and for developing contacts with non mathematical academics, with industry and business. This role is pivotal in identifying potential research opportunities of mutual benefit to mathematicians and industry.

The Knowledge Exchange Coordinator supports diversification of the TGM, coordinates events and marketing activity with industry and businesses, and leads some specific programmes of work, including user engagement on behalf of TGM Partners.

The Events and Marketing Coordinator provides administrative support to TGM events and marketing activities, as well as inputting to financial administration.

Activities from August 2016 - July 2017

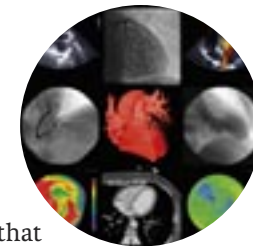
Sir Sam Edwards was a pivotal figure in soft matter physics. Taking forward the work of earlier theorists working in other areas such as quantum field theory, he had the vision to harness the power of mathematical modelling to study this new class of materials, and base our understanding of them on a more rigorous foundation. Sir Sam combined his deep theoretical knowledge with a clear view of the way that theoretical science can help resolve practical engineering and industrial problems and managed on many occasions to bring theoreticians and industrialists together to work collaboratively.



Soft Matter - Theoretical and Industrial Challenges,
7 - 9 Sept 2016

This conference was partly a celebration of Sir Sam's contribution to soft matter science, but also highlighted developments in theoretical physics and mathematical frameworks for the modelling and simulation of soft matter systems. The particular emphasis was on how these models can inform industrial processes, materials, and design. This event was supported by the University of Cambridge, the Durham Centre for Soft Matter, Croda, Mars Chocolate, Saint-Gobain, Schlumberger and Unilever.

This event was the first annual user engagement conference of the EPSRC Centre for Mathematical Imaging in Healthcare. The Centre aims to achieve synergies between applied mathematics and statistics through the focus on the analysis of clinical imaging, particularly that arising in neurological, cardiovascular and oncology imaging. It plays a significant role in enabling mathematicians and statisticians to help overcome some of the big challenges facing the NHS.



Developments in Healthcare Imaging - Connecting with Industry
19 Oct 2016

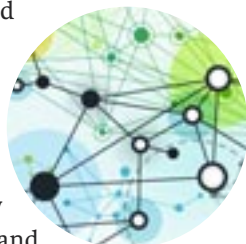
The event provided an update on research projects and collaborations, as well as highlighting potential new areas of investigation, and featured a number of industry challenges and new collaborations which were highlighted in short talks.

CCIMI New Directions in the Mathematics of Information
10 Nov 2016

This event showcased projects being carried out by the Cantab Capital Institute for the Mathematics of Information (CCIMI) which was launched in May 2016.

The advance of data science and the solution of big data questions relies heavily on fundamental mathematical techniques and in particular, their intra-disciplinary engagement. This is at the heart of the Institute, involving mathematical expertise ranging from statistics, applied and computational analysis, to topology and discrete geometry - all with the common goal of advancing data science questions.

This event provided an opportunity for a more detailed update on current research taking place at the Institute, associated challenges and other potential collaborative opportunities.



Statistical Scalability for Streaming Data - Programme Launch
15 November 2016

The StatScale programme is a collaboration between researchers at Lancaster University and the University of Cambridge, two of the UK's leading universities in Statistics. The programme tackles the important inference challenges arising from streaming data. This £3.4M initiative is funded by the Engineering and Physical Sciences Research Council (EPSRC), the two participating institutions and a number of committed project partners for six years (2016-2022).

This event introduced the StatScale Programme, highlighting opportunities for both companies and early career researchers to engage with its activities at an early stage. Talks included research projects being undertaken under the programme's main research challenge areas and their connection to a variety of motivating applications.



New technologies and the advent of computerised trading have changed the landscape of financial markets in recent years. Algorithmic trading, automated trade execution and high frequency trading (HFT) at the millisecond time scale are now a prominent component of all major financial exchanges. Hailed by some as a source of market liquidity, algorithmic trading has been criticised by others as a source of market instability and volatility.



This workshop disseminated the latest advances in quantitative modelling and empirical studies on the impact of HFT and algorithmic trading on markets, with an emphasis on emerging phenomena and implications for risk management and policy. Additionally, the talks and discussion session highlighted potential strategies which could mitigate against negative effects and risks of algorithmic trading in the future.

Joe Keller was one of the most influential applied mathematicians residing in the West over the second half of the 20th Century. He published over 400 articles and his originality, creativity, mathematical dexterity and physical insight shine through in all of these works.



The aim of this informal meeting was to bring together his friends, colleagues, associates and other interested researchers, to honour his memory and to acknowledge his legacy and the support he offered all applied mathematicians stretching over many decades. The event was entertaining, informal and included as wide a range of topics as possible to span Joe's vast research output. It was an opportunity to pay fitting tribute to Joe and his mathematics.

Algorithmic Trading: Perspectives from Mathematical Modelling
1 March 2017

Mathematics in the Spirit of Joseph Keller
2 - 3 March 2017

Environmental Modelling in Industry Study Group

3 - 6 April 2017

In partnership with Maths Foresees, an EPSRC network funded under the Living With Environmental Change (LWEC) umbrella, the TGM hosted the second Environmental Modelling in Industry study group. This followed a successful first study group held in September 2015, where potential solutions to five industry challenges were explored.



It is widely recognised that the mitigation of severe environmental events and natural hazards is of increasing importance. Mathematical modelling and analysis has the potential to help address challenges identified in this area.

Five industrial challenges were posed by three organisations: the Environment Agency, JBA Trust and Sweco. These challenges involved both broad and specific issues relating to the application of models to predict and analyse environmental events. Over the study group days, 55 mathematicians and environmental scientists worked to develop solutions (or partial solutions) to these challenges and regular updates were posted as the challenges were presented and the solutions were worked on.

Developments in Healthcare Imaging - Connecting with Academia

19 April 2017

Following its successful launch in March 2016, the EPSRC Centre for Mathematical Imaging in Healthcare (CMIH) held its first annual academic conference. This was delivered by the TGM, in partnership with the Liverpool Centre for Mathematical Sciences in Healthcare (LCMH). This one day conference brought together those academics working on advances in imaging technology with researchers who investigate new image analysis methods, to help address current challenges. It presented an opportunity to hear in detail about some of the current project collaborations, and focused on the academic interactions taking place in the field of medical imaging and especially across the EPSRC Centres for Mathematical Sciences in Healthcare.

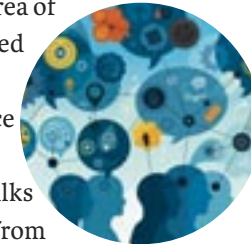


Following its launch in May 2016 and now firmly established, the Cantab Capital Institute for the Mathematics of Information (CCIMI) held its first annual academic conference, delivered by the TGM.



The Institute accommodates research activity on fundamental mathematical problems and methodology for understanding, analysing, processing and simulating data. This event brought together those academics working to advance data science and provided an update on research and collaborations taking place at CCIMI, associated challenges and other potential collaborative opportunities, as well as highlighting projects being developed elsewhere. Next generation researchers presented short talks, which were explored in greater depth in a poster session.

This afternoon workshop explored the area of big data and data sharing. It was embedded within the UCL Theory of Big Data Conference and targeted a broad audience of users who deal with personal data and are looking for ways to share this data. Talks highlighted experiences and challenges from collaborative research and data sharing, such as effective practices for inter-agency working which can lead to effective interventions. It brought together perspectives from both researchers and end-users, with opportunities for discussion about common challenges, future research directions and possible data sharing collaborations.



High Dimensional Mathematics

25 May 2017

Data Sharing and Governance

27 June 2017

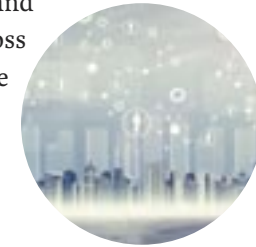
Knowledge Exchange Activities for INI Research Programmes

The Isaac Newton Institute sponsors Knowledge Exchange activity, currently referred to as 'Open for Business' (OfB) events, as a part of its continuing objective of bringing academic researchers involved with its Research Programmes, into contact with industrial, commercial and government organisations and individuals.

These activities, which are delivered by the TGM, provide opportunities, at senior level, for cross-fertilisation between the business-facing activities of users from industry and the public sector, and the research focus of the Institute. OfB events are structured to enable the formation of new public-private partnerships, collaborative research and to assist in identifying the common challenges that have greatest potential for research, knowledge exchange, public policy and commercial impact.

Six OfB events were hosted over the past year.

Data linkage is the process of identifying and linking records about the same entity across one or more databases. However, there are challenges, as well as benefits associated with data linkage. The aim of this workshop was therefore to encourage interaction between participants from different disciplines and to facilitate cross-disciplinary learning around these issues. It was held as part of the INI Research Programme on Data Linkage and Anonymisation. The topics discussed ranged from computational and statistical aspects of data linkage, to privacy and confidentiality with application case-studies and examples. It investigated challenges in the context of various applications, perspectives from both researchers and end-users, which highlighted methodologies and techniques, software and systems used and what does or doesn't work.



Perspectives on Data Linkage - Techniques, Challenges and Applications
16 September 2016

This workshop, part of the INI Research Programme on Theoretical Foundations for Statistical Network Analysis, brought together experts and stakeholders to discuss network problems faced in industry and the public sector and to facilitate interactions to identify future activities.



Theoretical Foundations for Statistical Network Analysis
1 November 2016

Networks are ubiquitous in modern science and society and policy decisions and much scientific research hinge on accurate and comprehensive evidence and data. Those making these decisions need access to statistical modelling techniques, through new approaches that can accommodate randomness and dependencies observed in network analysis.

The workshop explored some of these challenges and highlighted recent developments in the field and applications within industry, to help catalyse joint projects.

Knowledge Exchange Activities for INI Research Programmes

Probability and Statistics in Forensic Science - Dissemination Workshop

1 December 2016

This workshop was part of the INI Research Programme on Probability and Statistics in Forensic Science. It followed an earlier consultation in London, that involved discussion with members of the legal community and senior academics, to better understand the difficulties and concerns that the profession faces. While there have been dramatic advances in the range and scale of forensic techniques used to help solve legal cases, the way that the probative value of forensic evidence is presented in Courts is rudimentary and often flawed, leading to instances of misunderstanding and to miscarriages of justice.



This event brought together experts and stakeholders, such as top end-users from the legal profession, including Lord Justices of Appeal, to highlight the key outputs from the Research Programme. It presented opportunities for practitioners to discuss barriers and key challenges with leading researchers in the field. It was delivered with support from the Criminal Bar Association.

New Approaches to Anonymisation

5 December 2016

Data confidentiality and privacy are increasingly challenging topics in the big data environment where there are growing numbers of large databases describing people, their characteristics and their behaviours. This event was part of a workshop on New Developments in Data Privacy, linked to the INI Research Programme on Data Linkage and Anonymisation. It highlighted new approaches to anonymisation and brought together leading experts, data users and 'data holders' with the aim of disseminating the latest advances in the area. There were a significant number of leading scientists from the INI programme present, but talks were explicitly targeted at a broad audience of users who deal with personal data and were looking for ways to share the data. The event was supported by GCHQ.



This one day workshop explored new ways in which data subjects can take an active part in how their data is shared. People generally recognise that there are many social benefits to be derived from big data analytics, in scientific and medical research, evidence based policy and decision making and improved consumer products and services. Against this are the issues of privacy; evidence suggests that even though the general public are concerned about how their personal data is used, managing the privacy of this data isn't something individuals put much thought or effort into. This event was part of a week-long workshop on New Developments in Data Privacy, linked to the INI Research Programme on Data Linkage and Anonymisation. It was supported by GCHQ.



Engaging People in Data Privacy

6 December 2017

Formal proof systems have been used as constructive demonstrations of mathematical validity for millennia. The aim of the workshop was to promote discussion around the area of big proof and formal verification, and the challenges from academic and industry perspectives. For example, academic challenges are presented by the problem of scaling mathematical proof on machines, including issues such as search, representation and reasoning in ways that are more natural to working mathematicians than current systems offer. Conversely, industry challenges may be posed around the limits of automation and the efficiency of current logics and algorithms. It took place as part of the INI Research Programme on Big Proof and brought together mathematicians, computer scientists and logicians with those from relevant application areas.



Big Proof - Challenges in Industry and Research

19 July 2017

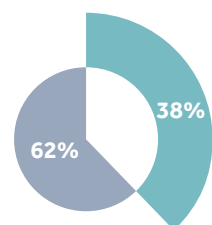
Participation

The TGM has continued to engage across a wide range of sectors and participation rates have grown again this year, with 1076 delegates attending the 16 events that the TGM coordinated between August 2016 and July 2017.

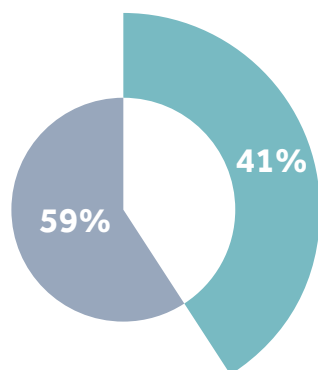
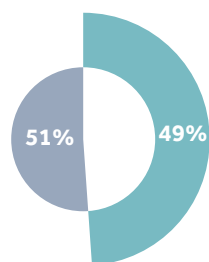
The TGM has been successful in facilitating links between industry and academics, ensuring participation from a significant number of researchers in disciplines other than mathematics. The diversity of sectors has again grown and includes aerospace, analytics, biotechnology, communication, defence, energy, engineering, environment, finance, healthcare, information technology, security, space, technology and transport.

The pie charts below show attendance at TGM delivered events, divided by affiliation.

TGM Events



Open for Business Events



Open for Business & TGM Events Combined

Accounts for August 2016 to July 2017

	Actual 2015 - 2016 £,000	Actual 2016 - 2017 £,000	Budget 2017 - 2018 £,000
Income			
University of Cambridge Funding ¹	70	55	55
University of Cambridge Funding for OfB ²	6	-	-
Sponsorship ³	94	20	30
Partnership ⁴	23	20	46
Isaac Newton Institute ⁵			60
Registration Fees ⁶	18	38	15
Total Income	210	133	206
Expenditure			
Staff Costs	116	138	146
Event Expenditure	43	48	48
OFB Event Expenditure ⁷	6	-	-
Overheads & Administration ⁸	1	5	4
Total Expenditure	168	191	198
Surplus / (Deficit)⁹	42	(59)	8
Brought Forward	68	110	
Deferred income		24	
In Year	42	(59)	
TOTAL SURPLUS/(DEFICIT)	110	76	

¹ This funding is provided by the University of Cambridge's Higher Education Innovation Funding stream.

² INI contributes towards such events as required.

³ Eleven sponsorship amounts were received in the year 2016-2017, as contributions towards specific delivery projects/events.

⁴ Funds received/projected for Retained and Corporate Partnerships.

⁵ INI has agreed to contribute to staff costs.

⁶ These are fees charged to delegates to cover registration and accommodation costs at some events.

⁷ The TGM delivers Open for Business events on behalf of the Isaac Newton Institute, so these are itemised as separate income and expenditure.

⁸ The TGM is supported by the INI in order to cover costs for facilities and administration.

⁹ The deficit relates to the challenge to get sponsors to fund indirect costs associated with activities.

The University of Cambridge has contributed to the funding of the TGM through the Higher Education Innovation Funding scheme, which has partially covered administrative costs but not expenses for specific TGM activities. The latter are funded through partnerships with stakeholders including from industry and the public sector as well as philanthropy and participant registration fees.

The TGM is an integral component of the Newton Institute and it is therefore intended that partial support will be provided by INI to enable TGM to continue its current service to the community and its future development.

Partnership

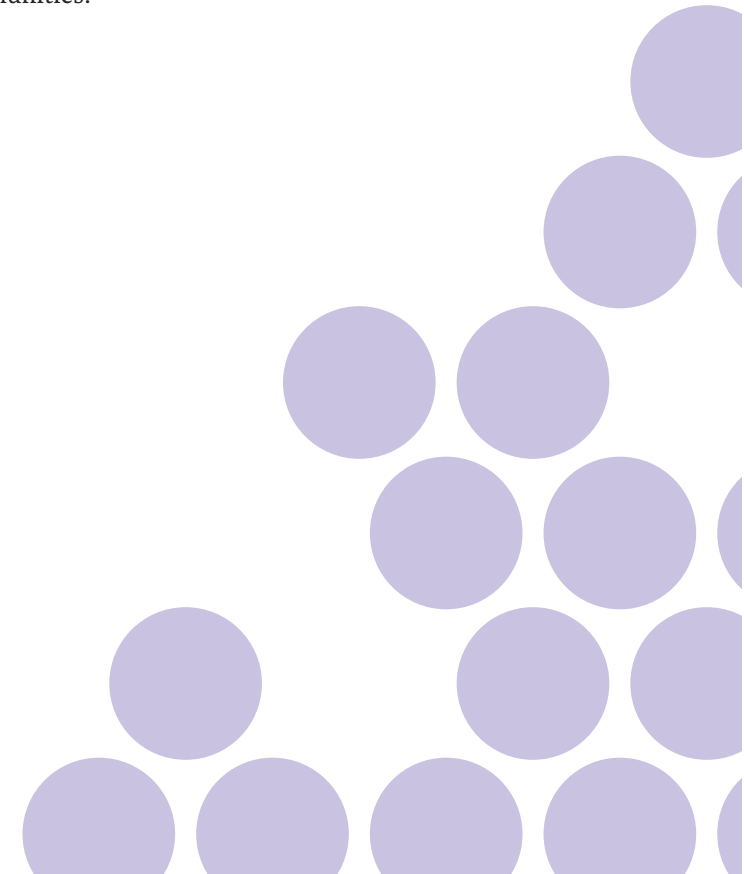
Through its Partnership Scheme, the TGM continues to build relationships with organisations from industry and the public sector, who seek deeper engagement with the mathematical sciences community. By becoming a Partner, an organisation can gain targeted contact with experts from mathematics and across the multiple disciplines it underpins, and will benefit from enhanced opportunities to develop and gain access to ground-breaking research and meet other relevant stakeholders. It is also an effective way to increase an organisation's visibility to other communities, such as Government, business, industry and technology, and presents opportunities for networking, knowledge exchange and collaboration.

Because organisations have different requirements, the TGM offers bespoke Partnerships, which can fit a specific vision and strategy. This could be to increase visibility to talented early career researchers, exposure to an appropriate audience at events or a tailored project to identify and engage with a specific community. Organisations can also be specifically associated with a TGM Thematic Programme of Work, such as healthcare, big data, security, the environment and financial services, which are specifically designed to stimulate mathematical science knowledge exchange.

GCHQ and CRYPTOMATHIC are TGM Partners and discussion with other organisations that are progressing towards Partnership, is ongoing.

TGM activities are increasing, with greater emphasis on partnership and collaboration with other organisations, which is a more effective way of engaging with a wider group of stakeholders, helping to reduce duplication.

Since 2016, the TGM has been the user engagement partner for two initiatives to help enhance end-user engagement and interaction. These are the Cantab Capital Institute for the Mathematics of Information (CCIMI) and the EPSRC Centre for Mathematical Imaging in Healthcare (CMIH). As part of these collaborations, the TGM develops programmes of work, communicates activity and develops strategic relationships, to ensure effective translation from science to user. This is helping partners to understand and gain consensus on the challenges that need to be overcome and facilitate other interdisciplinary collaborations to enrich the existing communities.



Future Development

The TGM aims to respond in a speedy and focused way to new ideas and approaches, but recognises the need for a targeted and continuous approach to the delivery of longer term knowledge exchange activities in the mathematical sciences. In appreciation of this, its series of thematic knowledge exchange programmes are designed to stimulate and support

research activities and include workshops, consultations and project meetings. These include Mathematics for Financial Services, Mathematics for Biology and Healthcare Systems, Mathematics for the Space and Security Sectors, Mathematics for the Environment and Energy, and Mathematics of Big Data.

Activity in 2016-2017

With its aspiration of playing a key national role in mathematical sciences knowledge exchange, the TGM has developed the following activities in partnership with stakeholders.

Computational Challenges in Image Processing
(5 September 2017)

2nd Edwards Symposium. Challenges and Opportunities in Soft Matter
(6 – 8 September 2017)

Mathematics of Sea Ice Phenomena - British Antarctic Survey Day
(18 September 2017)

IMA Conference on Inverse Problems from Theory to Application
(19 – 21 September 2017)

Future Developments in Climate Sea Ice Modelling
(25 September 2017)

Developments in Healthcare Imaging - Connecting with Industry
(18 October 2017)

Cantab Capital Institute for the Mathematics of Information - Industry Engagement
(22 November 2017)

Form & Deformation in Art, Toys and Games
(1 December 2017)

Variational Methods, New Optimisation Techniques
(6 December 2017)