Newton Gateway to Mathematics

# From Turing Gateway to Newton Gateway – a Journey

...extending the reach of the mathematical sciences to the users of mathematics...

**Jane Leeks,** *Manager*

Newton Gateway to Mathematics

Isaac Newton Institute for Mathematical Sciences

# In the beginning ….

Launched at the end of March 2013 with four Open for Business workshops:

- Industrial Statistics
- Policy Support in Communities and Local Government
- Stochastic and Statistical Models at the Interface of Modern Industry and the Mathematical Sciences
- Mathematics of Liquid Crystals: Industrially Inspire Problems

An idea conceived by Professor John Toland

- inspired by the 2012 six month research programme on "Semantics and Syntax: A Legacy of Alan Turing", which coincided with the 100th anniversary of the birth of Turing
- Using the Turing name because of his exceptionally wide influence across many fronts – mathematician, cryptographer, computer science, mathematical biology
- Linked to the INI grant proposal and a recognition of the importance of formal mechanisms for delivering impact
- An initiative to help stimulate the interchange of knowledge and ideas between mathematicians and users from industry, business, public sector and other academic disciplines

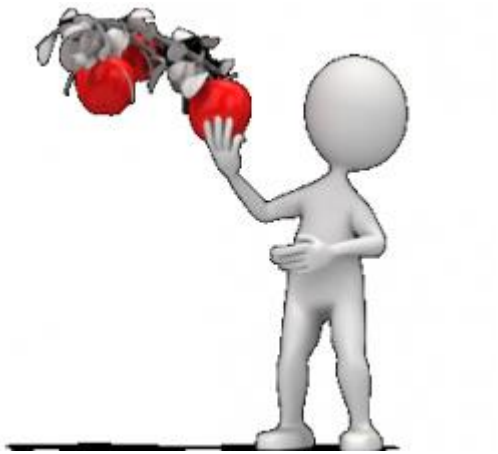
INI Newton Gateway to Mathematics

INI Isaac Newton Institute for Mathematical Sciences

# Where to start?

Mathematics is so diverse and underpins so many areas:

- Mathematics KE is challenging and requires highly effective communication and translation
- There are so many potential users and relevant communities
- How to choose which areas/projects to work on?



A good place to start - some great INI programmes and lots of contacts:

- Mathematical Challenges in Quantum Information
- Polynomial Optimisation
- Talking to INI participants, friends of the INI, utilising own contacts and building a database

INI Newton Gateway to Mathematics

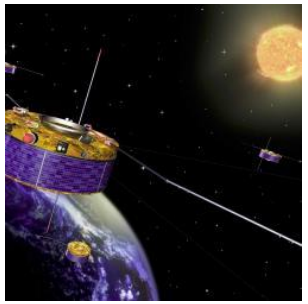
INI Isaac Newton Institute for Mathematical Sciences

# Aspiring to be a Knowledge Intermediary for UK Mathematics

**Isaac Newton Institute Research Programmes**

- Helping create impact for INI programmes - *Open for Business/KE* events
- Strong legacy to build on – Open for Business events running since 2008
- As part of the INI - access to world-leading academics on Institute programmes

Spinning out activity from programmes:



- Polynomial Optimisation - Optimisation for Space Engineering initiative (ESA, Airbus, other UK/European universities)
  - Three workshops over two years
  - Expansion from the UK to include Europe
- Quantum Information programme - post-quantum computing (GCHQ, UK universities)
  - Two workshops in 2014 to identify future challenges and research directions
  - Helping to develop the community and build capacity in the UK

Newton Gateway to Mathematics

Isaac Newton Institute for Mathematical Sciences

# Examples of Types of Activities

## Research Scoping Workshops

- **Novel Computational Paradigms, 30th-31st Oct 2018** - partnership project with GCHQ and others. Horizon scanning bringing together experts from multiple disciplines to investigate novel technologies beyond quantum computing. (Computer science, AI, materials, biological informatics, computational neuroscience, synthetic biology).

- **Evidence Based Decisions for UK Landscapes, 17th-18th September 2018 –** part of a programme of work with NERC and Defra incorporating research, community building, an end-user stakeholder survey, linked funding calls and an INI one month research programme in July 2019. Linked to UKRI future strategies in this area.

## Study Groups

- National Centre for the Replacement Refinement & reduction of Animals in Research (NC3Rs), Maths Foresees Network – environmental modelling, European Study Groups with Industry (ESGI)

## Knowledge Exchange/Dissemination Events

- **Taming Uncertainty in Mathematical Models used in the Private & Public Sectors, 1st Feb 2018 -** INI Programme on UQ for Complex Systems: Theory & Methodologies. 52% of attendees were non-academics. Highlighted how uncertainty is currently managed across different types of organisations, new state-of-the art approaches, future challenges and research directions.

INI Newton Gateway to Mathematics

INI Isaac Newton Institute for Mathematical Sciences

# Some of our Partners and Collaborators















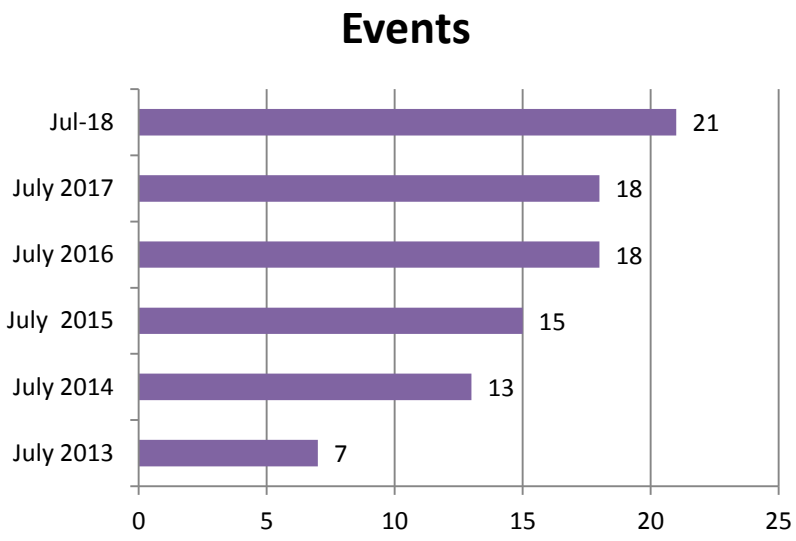


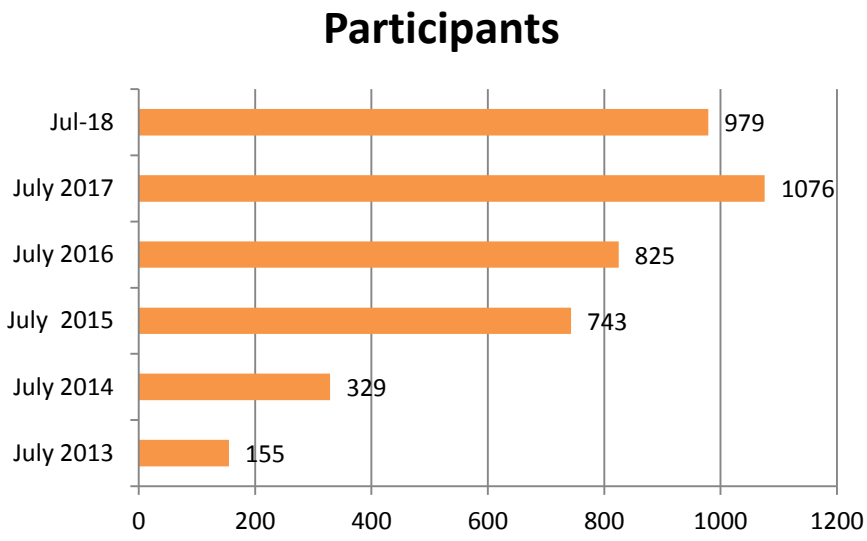






# A Stats Snapshot




Strong growth in numbers of activities and participation:

- Year-on-year increase in activities and numbers of participants
- Academic participants from multiple disciplines, including social sciences
- Events average between 40-50% non-academic attendees – therefore highlighting appeal to end-users and stakeholders
- Interactions with around 750 different organisations – partners, collaborators, participants, speakers, etc.

Newton Gateway to Mathematics

Isaac Newton Institute for Mathematical Sciences

# The Future

- The Newton Gateway is now well established as the impact initiative of the Isaac Newton Institute
- Plays an active role in the UK mathematical sciences community, such as with the Bond Review – this will be continued
- Most of what we do is in partnership with others – this will be expanded
- Governance –
  - Advisory Board - members from industry and public bodies to advise on overall development of the Newton Gateway
  - Programmes Committee – academics who provide guidance on scientific/research matters
  - Constantly evolving governance to be in touch with end user needs and expert peer reviewed feedback on appropriate scientific directions for activities
- Activities covering wide range of areas – policy, environment, healthcare, security, big data, engineering, financial, economics, space, materials, computation, instrumentation +++
- Future directions – more horizon scanning, research scoping, linking and building communities, maximising outreach and user engagement for INI research programmes

INI Newton Gateway to Mathematics

INI Isaac Newton Institute for Mathematical Sciences