

# CANTAB CAPITAL INSTITUTE FOR THE MATHEMATICS OF INFORMATION

Department of Applied Mathematics and Theoretical Physics  
and  
Department of Pure Mathematics and Mathematical Statistics



UNIVERSITY OF  
CAMBRIDGE



**CCIMI**  
CANTAB CAPITAL INSTITUTE FOR THE  
MATHEMATICS OF INFORMATION



**CANTAB**  
CAPITAL PARTNERS

# The scientific revolution of the early 18<sup>th</sup> century

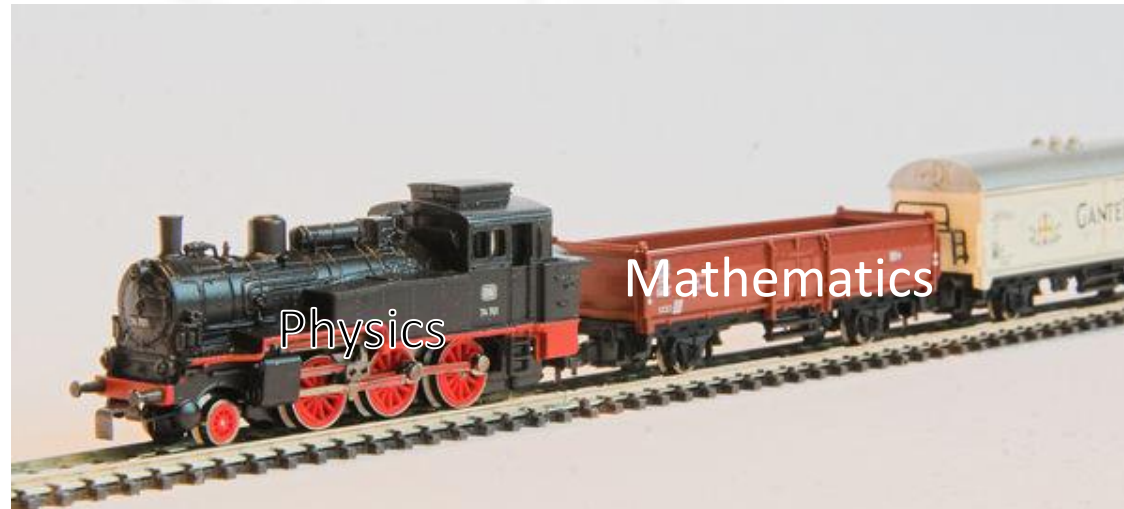
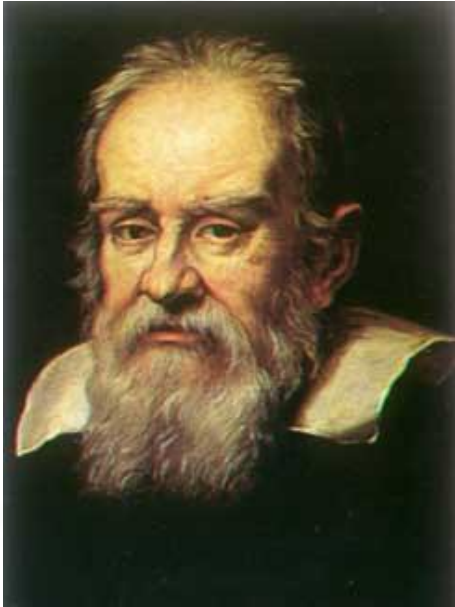
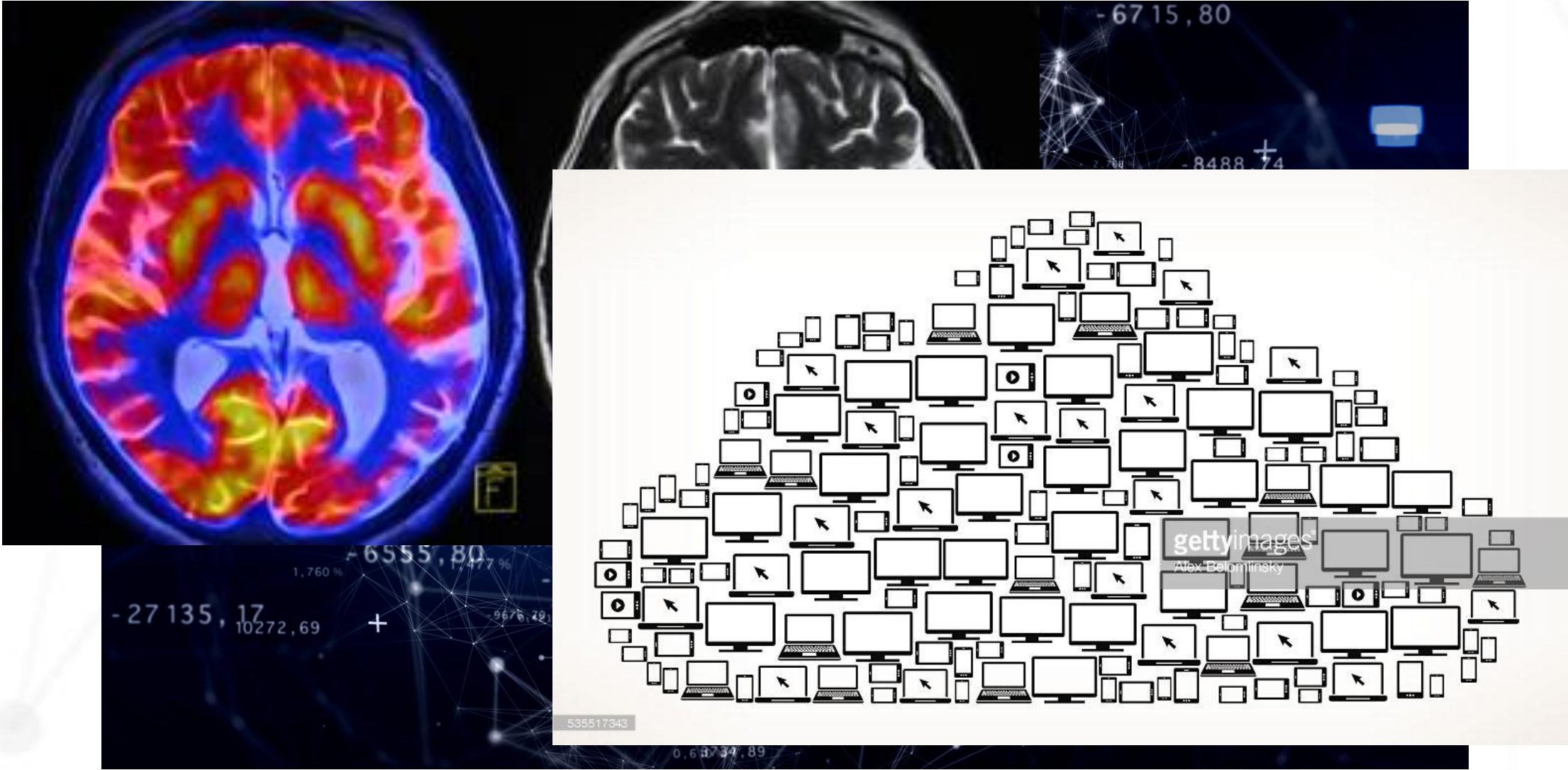


Illustration courtesy of A. Iserles

# The information revolution

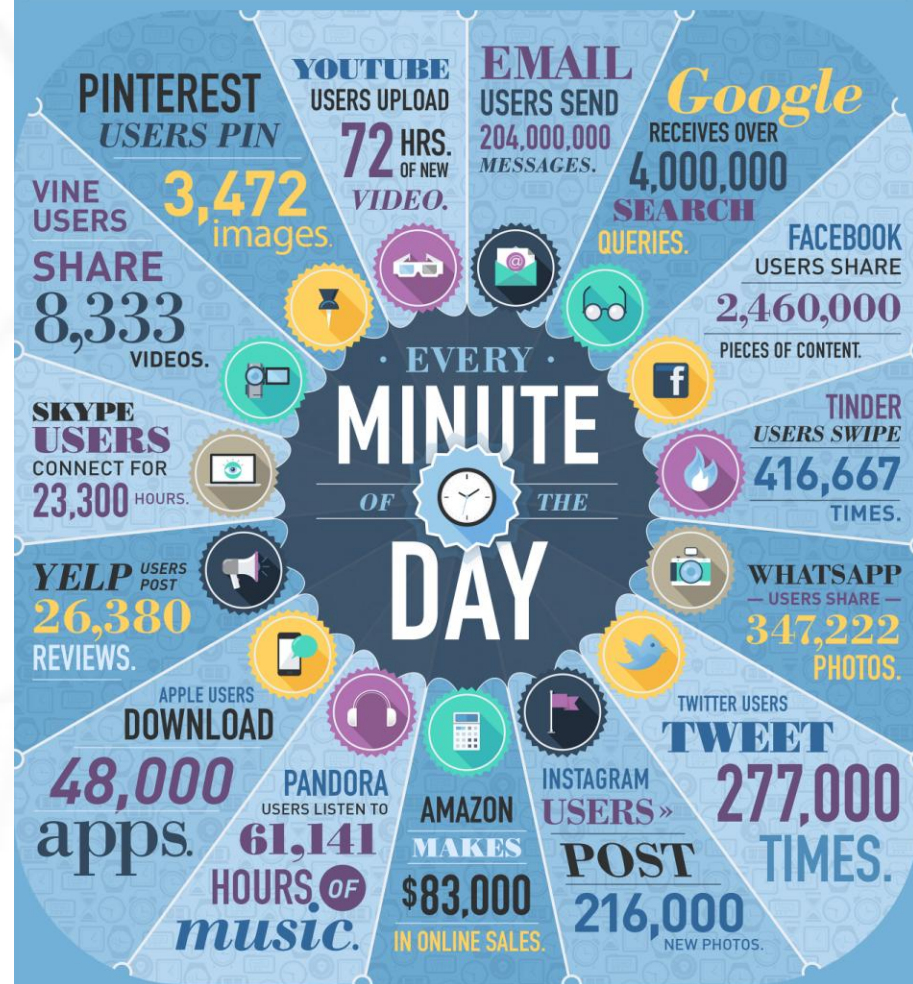




# DATA NEVER SLEEPS 2.0

How Much Data is Generated Every Minute?

Data is being created every minute of every day without us even noticing it. Given how much information is floating around these days, it's tempting to talk about big data only in terms of size. Big data describes the massive avalanche of digital activity pulsating through cables and airwaves, but it also describes all the things we were never able to measure before. With every status we share, every article we read or every photo we upload, we are creating a digital trail that tells a story. Below, we explore how much data is generated in one minute.



THE GLOBAL INTERNET POPULATION GREW **14.3%** FROM 2011 - 2013 AND NOW REPRESENTS

## 2.4 BILLION PEOPLE.

With each click, share and like, the world's data pool is expanding faster than we can comprehend. Businesses today are paying attention to scores of data sources to make crucial decisions about the future. The team at Domo can help your business make sense of this endless stream of data by providing executives with all their critical information in one intuitive platform. Domo delivers the insights you need to transform the way you run your business. Learn more at [www.domo.com](http://www.domo.com).



**SOURCES:**

[BITS.BLOGS.NYTIMES.COM](http://BITS.BLOGS.NYTIMES.COM), [INTEL.COM](http://INTEL.COM), [APPLE.COM](http://APPLE.COM), [TIME.COM](http://TIME.COM), [DAILYMAIL.CO.UK](http://DAILYMAIL.CO.UK), [SKYPE.COM](http://SKYPE.COM), [STATISTICBRAIN.COM](http://STATISTICBRAIN.COM)

# The information revolution



Mathematics of Information

**Mathematics**

**Data**

Information

**Statistics**

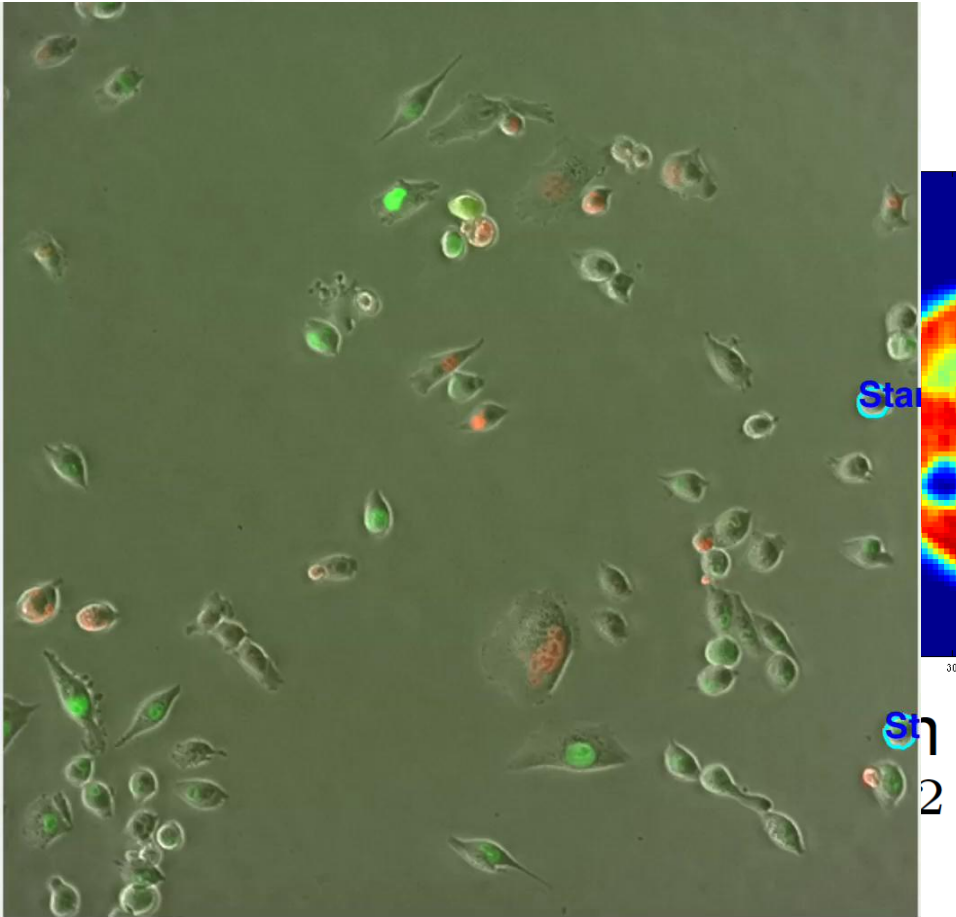
# CCIMI in numbers

- GBP 5 Mill donation from Cantab Capital Partners for initial 5 years
- Building on about 25 Faculty in Mathematics of Information
- 2 new lectureships: Welcome Hamza Fawzi!
- 3 PostDocs
- 6 PhD studentships per year: Welcome Edward Ayers, James Urquhart, Eric Hanson, Ferdia Sherry, Sven Wang, Samuel Power!

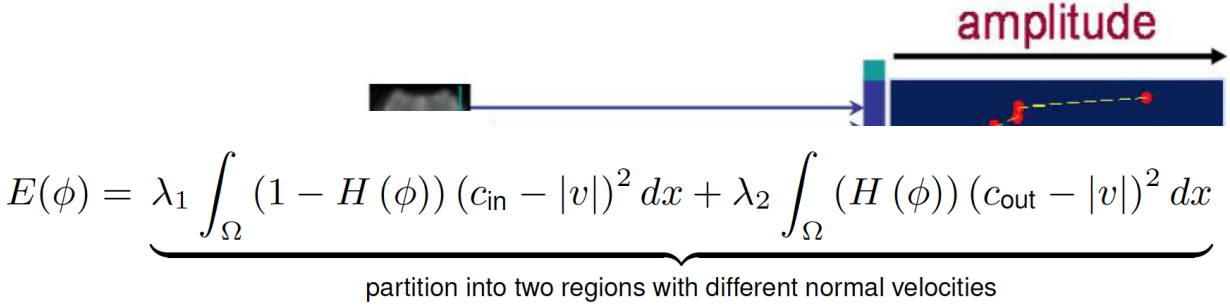
# CCIMI in numbers

- Internal board: John Aston (DPMMS), Matt Killea (Cantab), Gabriel Paternain (DPMMS), Nigel Peake (DAMTP), Carola-B. Schönlieb (DAMTP)
- Supported by strong international advisory board: Andrea Bertozzi (UCLA), Robert Calderbank (Duke University), David Hand (Imperial College London), Chris Rogers (University of Cambridge), Ulrike Tillmann (University of Oxford)
- And about 25 affiliated Faculty from DAMTP & DPMMS

# Mathematics of Information



DPMMS, Cambridge



$$E(\phi) = \underbrace{\lambda_1 \int_{\Omega} (1 - H(\phi)) (c_{in} - |v|)^2 dx + \lambda_2 \int_{\Omega} (H(\phi)) (c_{out} - |v|)^2 dx}_{\text{partition into two regions with different normal velocities}}$$

$$+ \underbrace{\lambda_3 \int_{\Omega} g_{grad} (|\nabla f_{\sigma}(x)|) \delta(\phi(x)) |\nabla \phi(x)| dx}_{\text{stop contour at edges based on the gradient}}$$

$$+ \underbrace{\lambda_4 \int_{\Omega} g_{\sigma_{loc}} (f_{\sigma}(x)) \delta(\phi(x)) |\nabla \phi(x)| dx}_{\text{stop contour at edges based on the local std}}$$

$$+ \underbrace{\mu \int_{\Omega} \delta(\phi(x)) |\nabla \phi(x)| dx}_{\text{small contour length}}$$

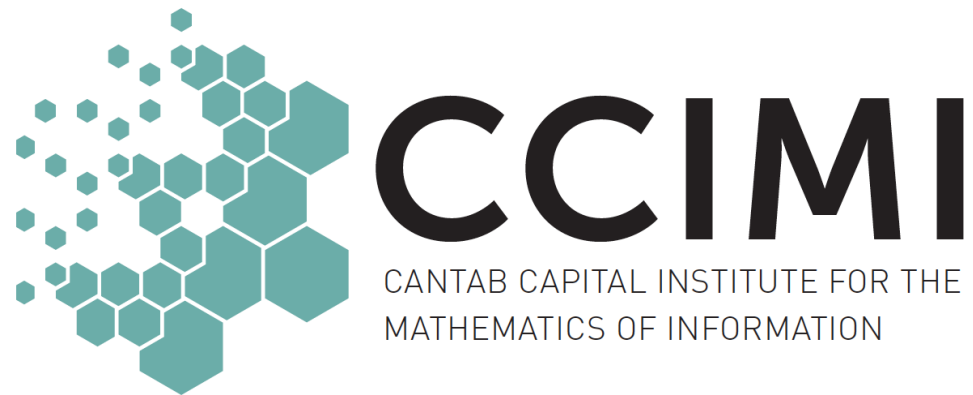


One voxel = One time series

DAMTP, Cambridge



Thank you very much for your attention!



- For more information visit: [www.ccimi.maths.cam.ac.uk](http://www.ccimi.maths.cam.ac.uk)
- A. Iserles, C.-B. Schönlieb, Mathematics of Information - The Second Industrial Revolution, Mathematics Today, IMA@50 special issue, Vol. 50, No. 1, pp. 53-58, February 2013.