Manycore Grand Challenges Workshop

Belfast, 5th April 2018

MaRIONet

The UK Manycore Network

Agenda for the Day

1000-1100: What is a Grand Challenge?

1100-1200: Identifying Grand Challenges for Manycore Research

1200-1230: Possible Activities

--- *lunch* ---

1330-1400: Interactive Voting Exercise

1400-1500: Next Steps

Motivation

- Manycore (MACDES) was a cross-ICT priority until 2015
- Our network (MaRIONet) has funding till 2019
- We promised to deliver a Grand Challenges document
- We want to keep our research agenda on the funding landscape
- We need to engage the wider community

Motivati

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Publications

We intend to publish the **summer school lec-ture notes** as a volume in the *Lecture Notes in Computer Science* series (now under discussion with a Senior Editor at Springer). At end of three years, we will produce a **roadmap document** covering *Future Manycore Research Challenges*. This will outline major research opportunities and directions, informed by the experience of network members. We anticipate the roadmap will be framed in terms of **grand challenges** facing the community, over various periods from 5–25 years. The roadmap will be actively communicated to partners and key policy makers (e.g. EPSRC ICT Lead, H2020 project officers, HiPEAC Steering Committee). Itwill be published under open access. We intend to write this document third annual workshop and complete the following three months. The similar approach as exist- [6].

What is a grand challenge?

“we want to keep on exciting and mobilising our community.”

- Wendy Hall

“a significant societal or economic problem that requires the application of research”

- EPSRC

A Grand Challenge is a unifying theme that is

Politically comprehensible
Publicly comprehensible
Unarguably challenging
Universally engaging
Interesting on a 10-20 year timescal

Clearest Definition I found

From the ‘Grand Challenges in Microelectronic Design’ document – supported by an EPSRC network grant, delivered in 2006

Historical Grand Challenge #1

The **Longitude Prize** was a 17th Century scheme set up by the British Government to determine longitude at sea.

£20K reward (£4.2M equivalent in 2018)

A range of solutions, of which John Harrison's was the perceived winner

John Harrison [public domain image from Wikipedia]

Historical Grand Challenge #2

I believe that this nation should commit itself to achieving the goal, before this decade is out, **of landing a man on the moon** and returning him safely to the Earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish.

JFK [public domain image from Wikipedia]

Historical Grand Challenge #2

Transferable benefits of the space race

- Microwave tech
- Materials tech
- Tang (drink)
- Rocket tech

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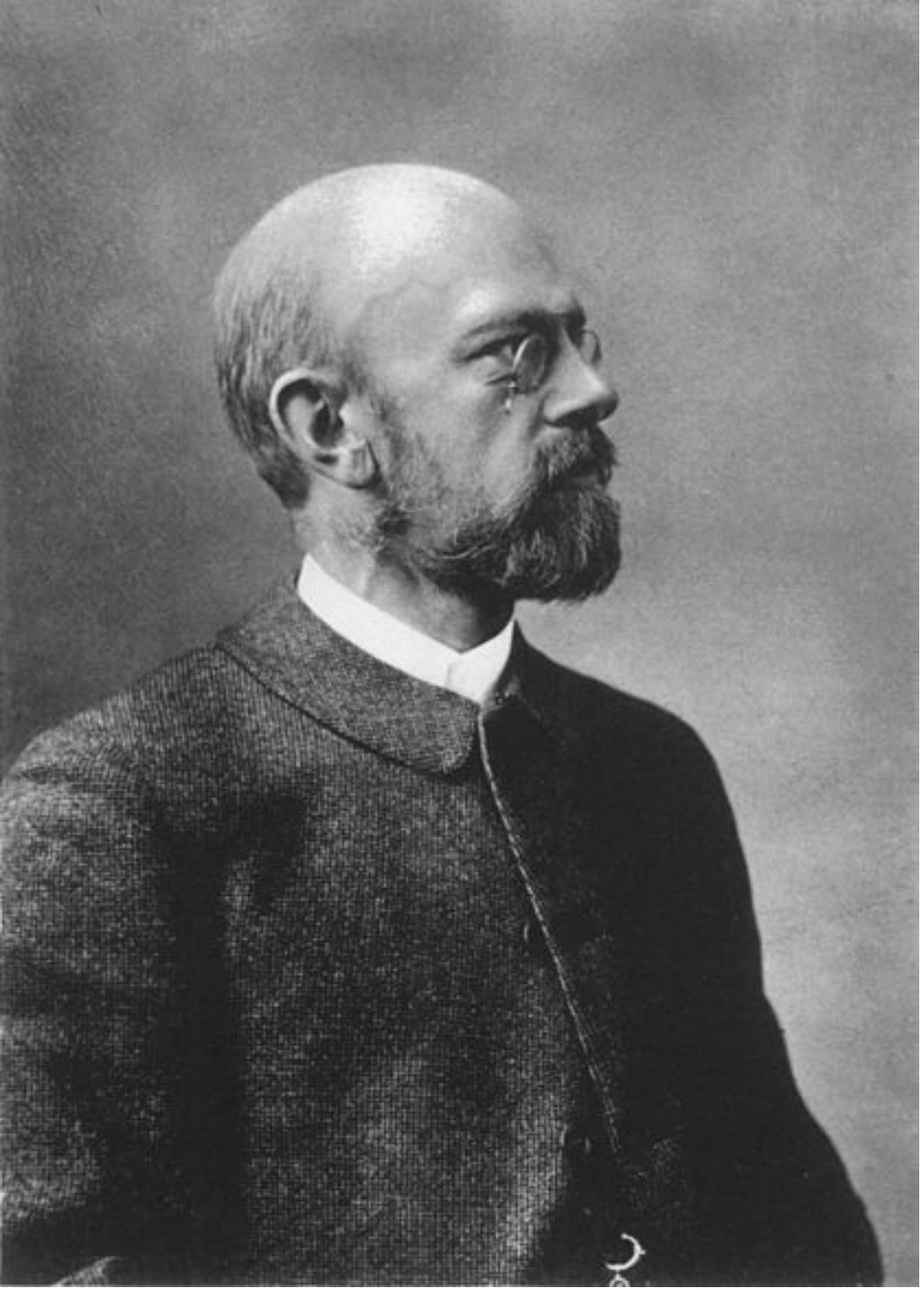
- Cost – around $25bn

Saturn V Rocket [public domain image from Wikipedia]



Hilbert [public domain image from Wikipedia]

Historical Grand Challenge #3

- 23 Unsolved Mathematical Problems
- Proposed by David Hilbert in 1900
- Some still unsolved today

Modern-day Grand Challenges

- Longitude Prize (antibiotics)
- Millennium Prize (Clay Math Institute)
- Cancer Challenge (Scottish Gov)
- UKCRC Computing Grand Challenges
- Microelectronics Grand Challenges

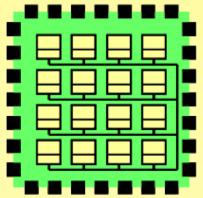
UKCRC Computing Challenges

- **GC1: In Vivo - In Silico: A 2020 Vision on Modelling Living Processes**
- **GC2/4: Ubiquitous Computing: Experience, Design and Science**
- **GC3: Memories for Life**
- **GC5: The Architecture of Brain and Mind**
- **GC6: Dependable Systems Evolution**
- **GC7: Journeys into Non-Classical Computation**
- **GC8: Learning for Life**
- **GC9: Bringing the Past to Life**

µElectronics Grand Challenges

µGC1: Batteries Not Included:
Minimizing the energy demands of electronics

µGC2: Silicon meets Life:
Interfacing electronics to biology



µGC3: Moore for Less:
Performance-driven design for next-generation chip technology

µGC4: Building Brains:
Neurologically-inspired electronic systems

What do we want?

- A handful of eyecatching, engaging challenge candidates
- Outreach and community building exercises
- Appeal to funding agencies
- (ultimately) a glossy report doc
- (hopefully) years of collaborative research projects