Science & Technology Facilities Council

Stakeholder Engagement in Big Science

John Womersley

Chief Executive
Science and Technology Facilities Council
United Kingdom

Outline

- Why do we need to worry about this?
- Current best practice
- Taking things to the next level

Department for Business Innovation & Skills

Public trust and involvement in science

Findings from Public Attitudes to Science 2014

Ipsos MORI

Social Research institute

Some very positive messages

- Science is such a big part of our lives that we should all take an interest – **84% agree**
- Scientific Research makes a direct contribution to economic growth in the UK – **76% agree**
- Even if it brings no immediate benefits, scientific research which advances knowledge should be funded by government – **79% agree**
- Government funding for science should be cut because the money can be better spent elsewhere – **65% disagree**
- I don't understand the point of all the science being done today: **71% disagree**
- Amount I hear and see about science – **7% say too much / 40% say right amount / 51% say too little**

but

- Science and technology are too specialised for most people to understand them – **55% agree**
- Are electrons smaller than atoms?– **51% yes / 24% no / 24% not sure**
- Scientists seen as: **interesting, open minded, creative, honest, ethical, but secretive**

"Those who ignore history are condemned to repeat it."

Outline

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Le Matin
CERN
Le boson de Higgs fêté comme une rock-star
EUREKA! BOFFINS
ND 'GOD'S GLU
HOMOPHOBIC HIP-HOP AND THE STAR WHO CAME OUT
the guardian
Stuart Jeffries Lucy Mangan Martin Kettle Zoe Williams Richard Sennett
as right Picture that changes the way we see the universe for ever
Osborne accuses Labour
One of the greatest discoveries in history of science
It may sound nuts, but it's like a bolt...
COMMENT
The Economist
JULY 7TH–13TH 2012
Economist.com
In praise of charter schools
Britain's banking scandal spreads
Volkswagen overtakes the rest
A power struggle at the Vatican
When Lonesome George met Nora
A giant leap for science

Communication, Education and Outreach should be part of every scientific project

- but - historically, particle physics was often seen as “hard to communicate”
- Conscious decision to treat the LHC differently
- In the UK, funded and organised as a formal project starting in 2004

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Big Bang exhibition at the Science Museum

All images of Big Bang exhbiion: GridPP

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Particle physics masterclasses

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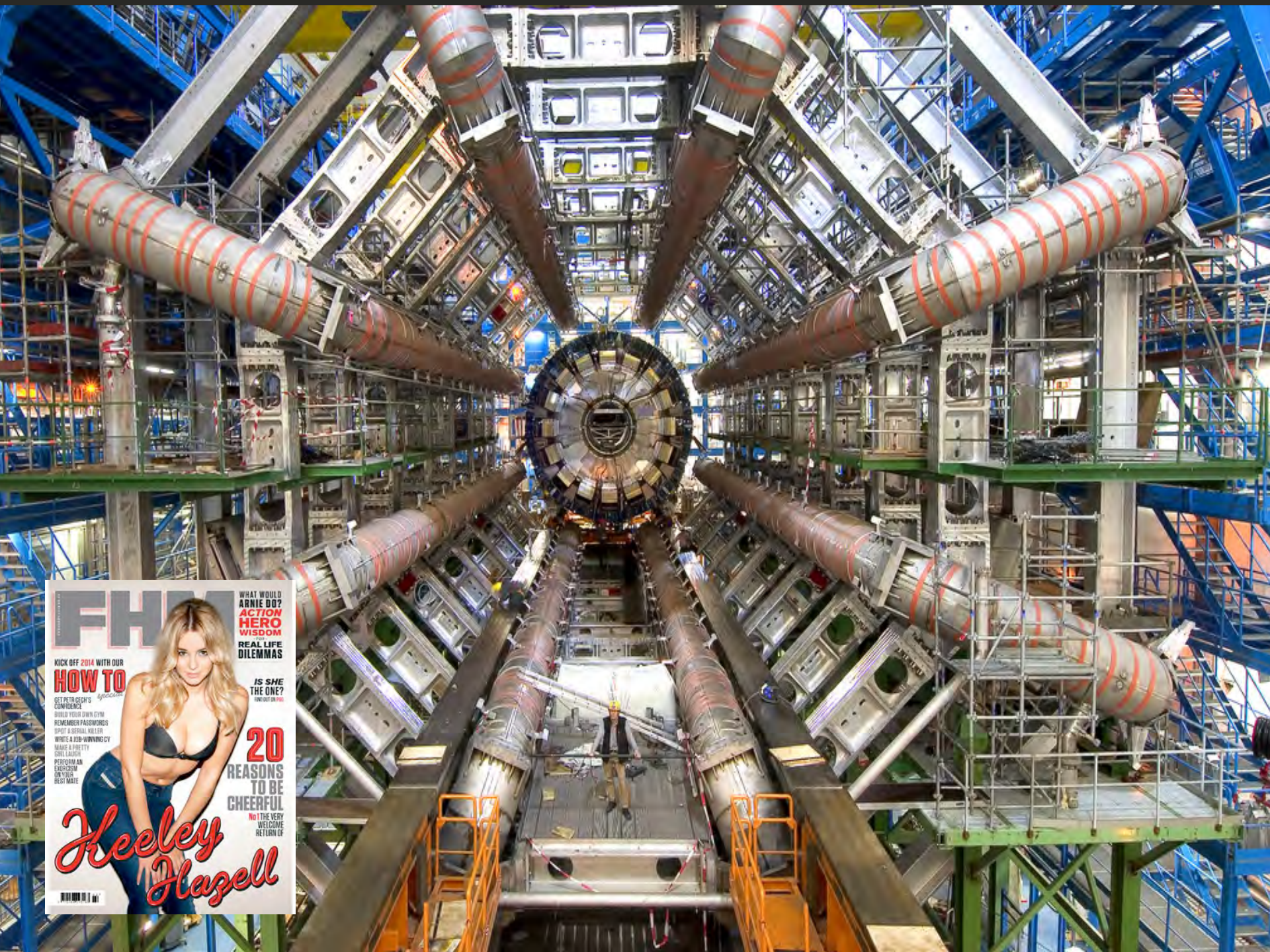
Images: Stephen Kill


FHM
WHAT WOULD ARNIE DO?
ACTION HERO WISDOM
FOR REAL LIFE DILEMMAS
KICK OFF 2014 WITH OUR
HOW TO special
GET PETR CECH'S CONFIDENCE
BUILD YOUR OWN GYM
REMEMBER PASSWORDS
SPOT A SERIAL KILLER
WRITE A JOB-WINNING CV
MAKE A PRETTY GIRL LAUGH
PERFORM AN EXORCISM ON YOUR BEST MATE
IS SHE THE ONE?
FIND OUT ON P90
20 REASONS TO BE CHEERFUL
No1 THE VERY WELCOME RETURN OF
Keeley Hazell

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July 2012

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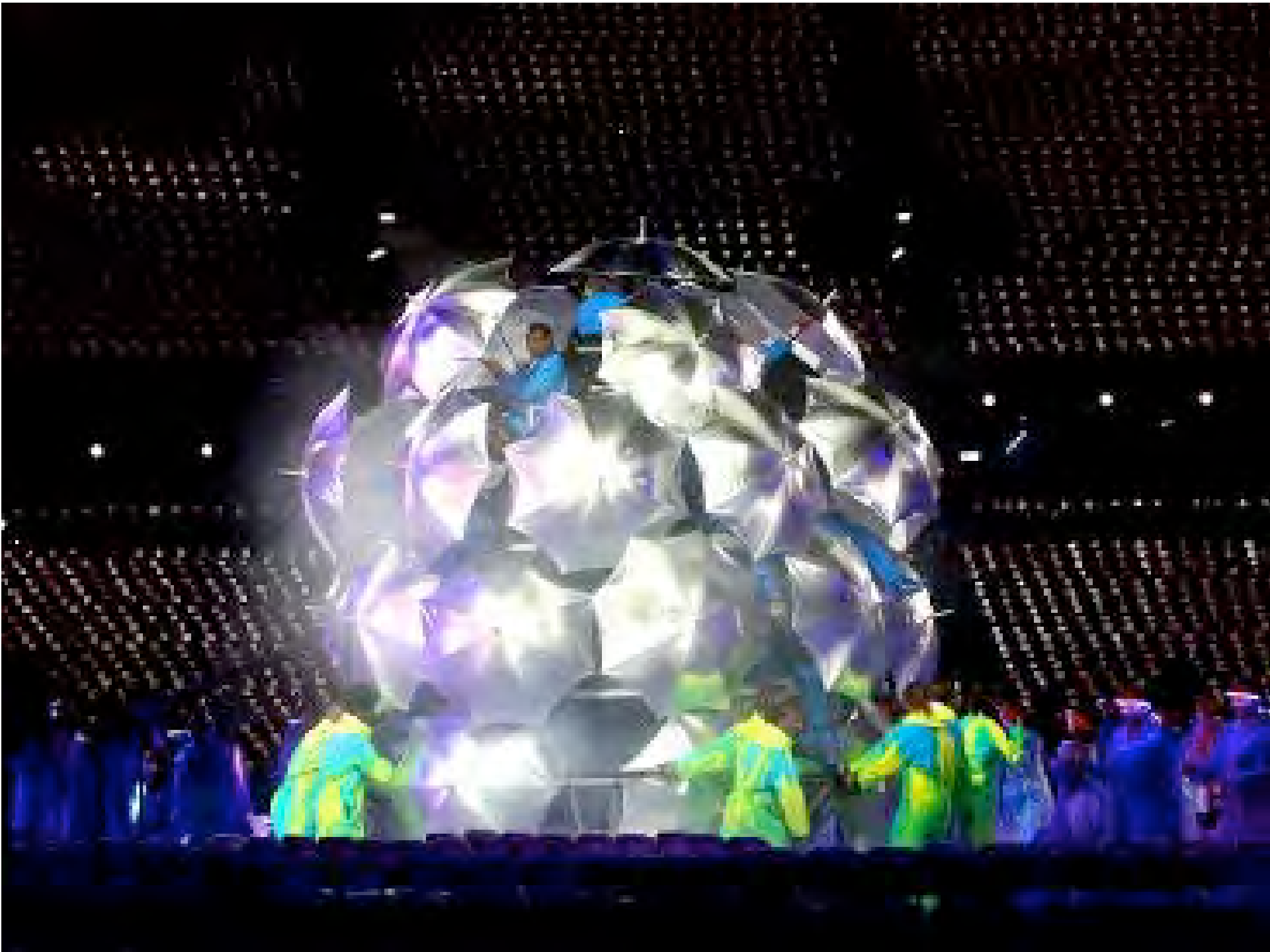
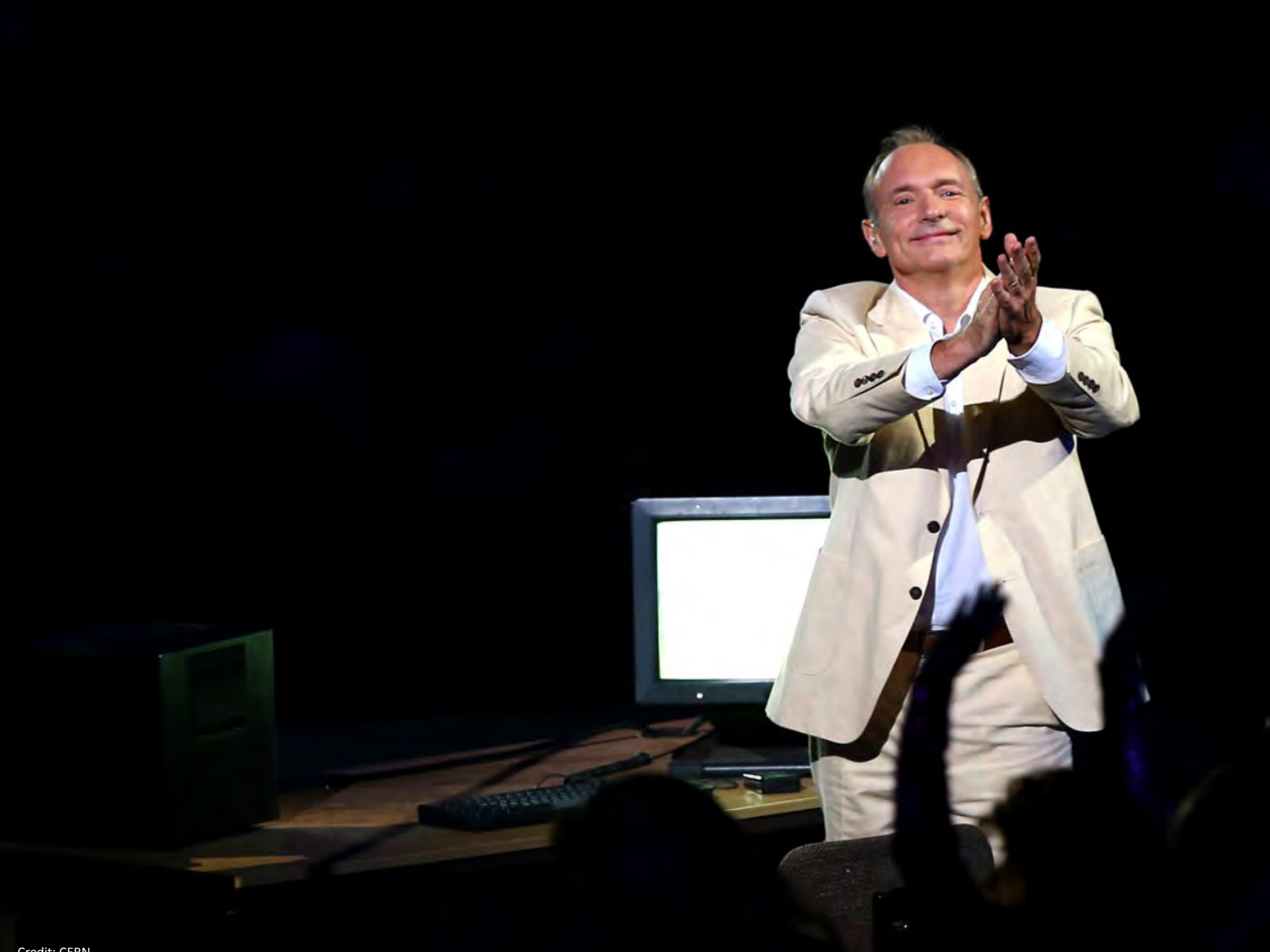
Credit: STFC

Credit: STFC


The Large Hadron Collider comes to Northern Ireland
Queen's University Belfast 4-10 May 2013
Science & Technology Facilities Council
Queen's University Belfast
THE SIR WILLIAM WHITLA HALL


The UK is playing a leading role in the world's biggest scientific experiment, the Large Hadron Collider at CERN in Geneva - recreating the conditions that existed a trillionth of a second after the beginning of the Universe.





Credit: CERN

2013 NOBEL PRIZE IN PHYSICS

François Englert
Peter W. Higgs

Over **25 million** people in the UK read this story in the press or saw it on television news

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Collider exhibition, The Science Museum

Credit: sciencemuseum.org.uk

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“The achingly glamorous world of big science”

George Osborne
UK Finance Minister

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Exam chiefs hail 'Brian Cox effect' as students turn to maths and sciences

Anna Davis
Education Correspondent

A "BRIAN COX" effect has led to a huge rise in the number of students taking maths and science A-levels, today's results show.

Maths entries have risen by 40 per cent in the past five years, with 82,995 taking the subject this year. The numbers taking chemistry and physics have risen by almost 20 per cent in five years, while biology has seen a 13 per cent increase in the same period.

Exam chiefs also put the rise down to students choosing subjects that will give them more chance of getting a job.

Andrew Hall, chief executive of exam awarding body AQA, said: "The stonking increase in maths and science over the past five years is the most significant thing we have seen in this set of results." Ziggy Liaquat, managing director of Edexcel, said: "It could be the Brian Cox effect. It could be as simple as that." Physicist Professor Brian Cox, presenter of Wonders of the Universe, said today he believed there had been a "step-change" in the public's opinion of science. He said: "I go to schools and I see and hear there are a lot of kids, girls as well as boys, interested in science and engineering.

"These subjects are great things to do – for the individual it's great because there is a shortage of scientists and engineers, but it's also great for the country, because we need these people to improve our economy."

Mr Liaquat said students decided to study science and maths at the beginning of the financial downturn.

He said: "When these students would have made their choices two years ago, businesses were crying out for students and young people to have skills in science, engineering and maths.

"What we are seeing today is the outcome of those choices. Students are making far more informed choices on what's going to give them success in terms of jobs, university and meeting the needs of the economy. That's a really positive message from today."

Meanwhile the numbers taking foreign language A-level have fallen.

Christine Blower, general secretary of the National Union of Teachers, said: "The NUT welcomes the overall high results in the sciences and mathematics but continues to have grave concerns about the declining entry for modern foreign languages. I urge the Government to come up with a coherent policy for ensuring that all young people acquire at least one modern foreign language."

A-LEVEL SUCCESS STORIES

■ ST JOHN Ambulance volunteer **Lady-Namera Ejaimike**, 18, won a place to study medicine at University College London.

Lady-Namera, a student at Our Lady's Convent High School in Hackney, said: "Working at events such as the London Marathon where I'm part of a team

Credit: Steve Berry, FlickR

Credit: BAFTA

Some key lessons

- Needs a spirit of cooperation and collaboration
- Long, slow campaign
  - lots of milestones to keep up interest and to keep bringing the LHC back into the public eye
- Needs a strategy, with key events planned – and practised
  - By the time we were scientifically ready to announce the discovery of the Higgs boson, we had everything in place for a coordinated media ‘event’.
- Invest in media and public engagement training for the scientists involved
  - give them safe opportunities to practice and build skills
  - make it easy for people to get involved

- Build long-term relationships with journalists and media outlets
- Break down the science into understandable language that's suitable for each audience, and remember that engagement has to start at the local level
- Involve celebrity scientists
  - and allow new ones (such as Brian Cox) to emerge
- Show people how this project in particular, and fundamental science in general, makes a difference in their day-to-day lives
- Involve the public in the process of science
  - discussions, decisions, theories and experiments

Outline

- Why do we need to worry about this
- Current best practice
- Taking things to the next level

from

Public engagement about our science

to

Stakeholder engagement about our impact

Stakeholders *includes* the public

Impact *includes* the science

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DON'T SELL
THE STEAK
Sell the
SIZZLE!

There are many ‘publics’

- The General Public
- Media, opinion formers
- Students
- Educators
  (STEM skills pipeline)
- University bosses
- Other science areas
- Ministers
- Parliamentarians
- Future ministers
  (other political parties)
- Local and regional
  politicians
- Civil Servants
- Economists
- …

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Challenges facing European Science

Paul Boyle, President of Science Europe:

1. The link between science and economic growth
2. The balance between blue-skies, or curiosity driven, research and more applied work
3. Global competition in the science enterprise

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Our message needs to be

- Basic research like particle physics and astronomy is not a luxury
- In fact it is **key to our future economic competitiveness** in a globalising, knowledge based economy

Why?

- Because
  - **It attracts young people into science and trains them for the 21st century**
  - **It drives technological innovation**

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STFC Impact Report 2013

- Two million people reached face-to-face last year including 346,000 school children and 17,500 teachers
- How CERN technology benefits the UK economy
- New vaccine for foot and mouth disease
- New method for breast cancer biopsies
- Supporting UK space industry (worth £40 billion by 2030)
- Tenant companies at Sci-Tech Daresbury, delivered £35 million sales, £63 million of investment and 147 new products

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Annual Report and Accounts 2012-2013

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Department
for Business
Innovation & Skills
Science & Technology Facilities Council
www.stfc.ac.uk
SCIENCE & ENGINEERING WEEK
is playing a leading role in the world's biggest scientific experiment
the Large Hadron Coll
CERN in Geneva - recre
the conditions tha
existed a trillionth of a second after the beginning of the Universe.

To make this work

- Sufficient resources
- Sufficient management attention
- Evidence
  - Telling our story better

and even

- Changing our approach to future projects
  - are we ready for this?

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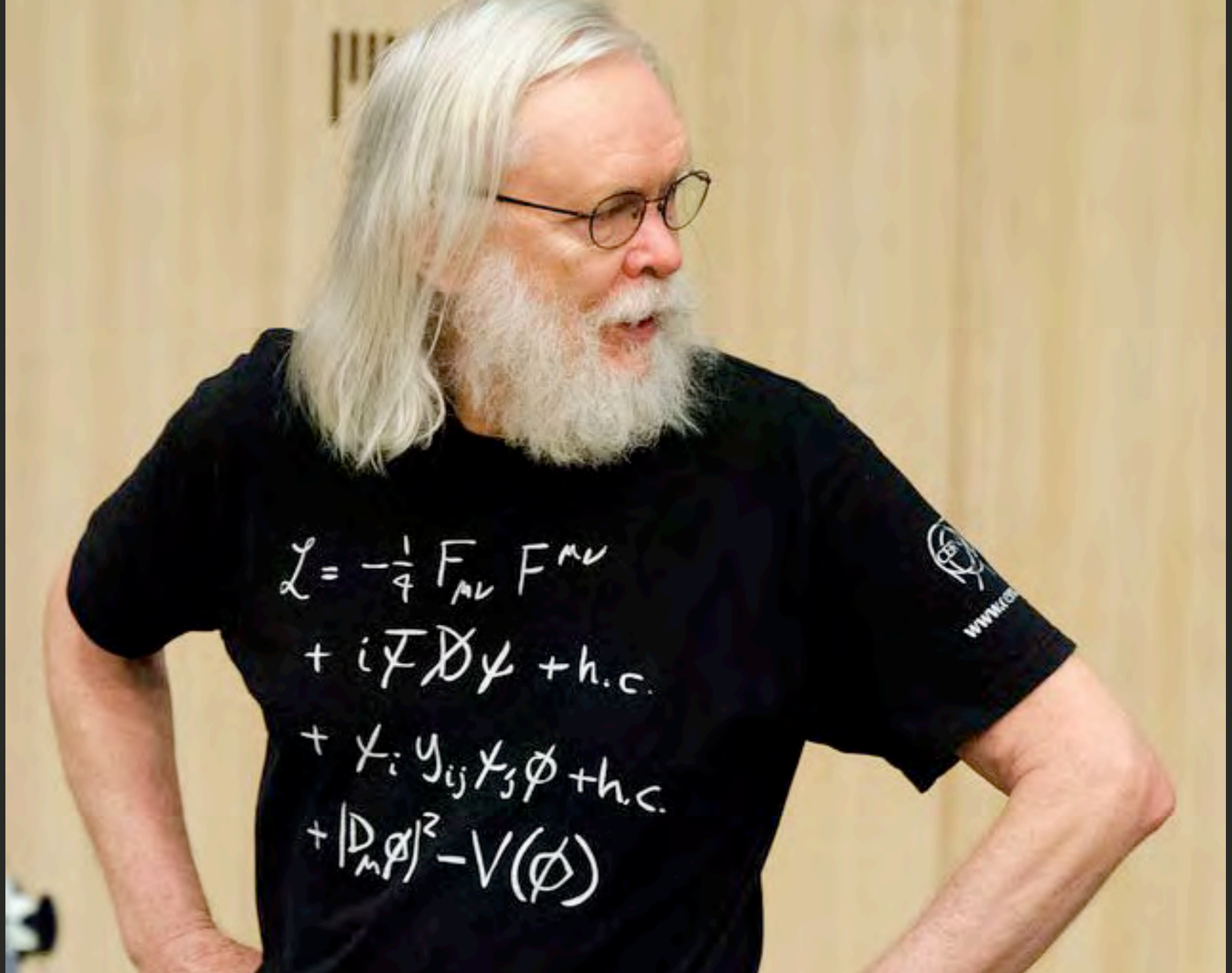
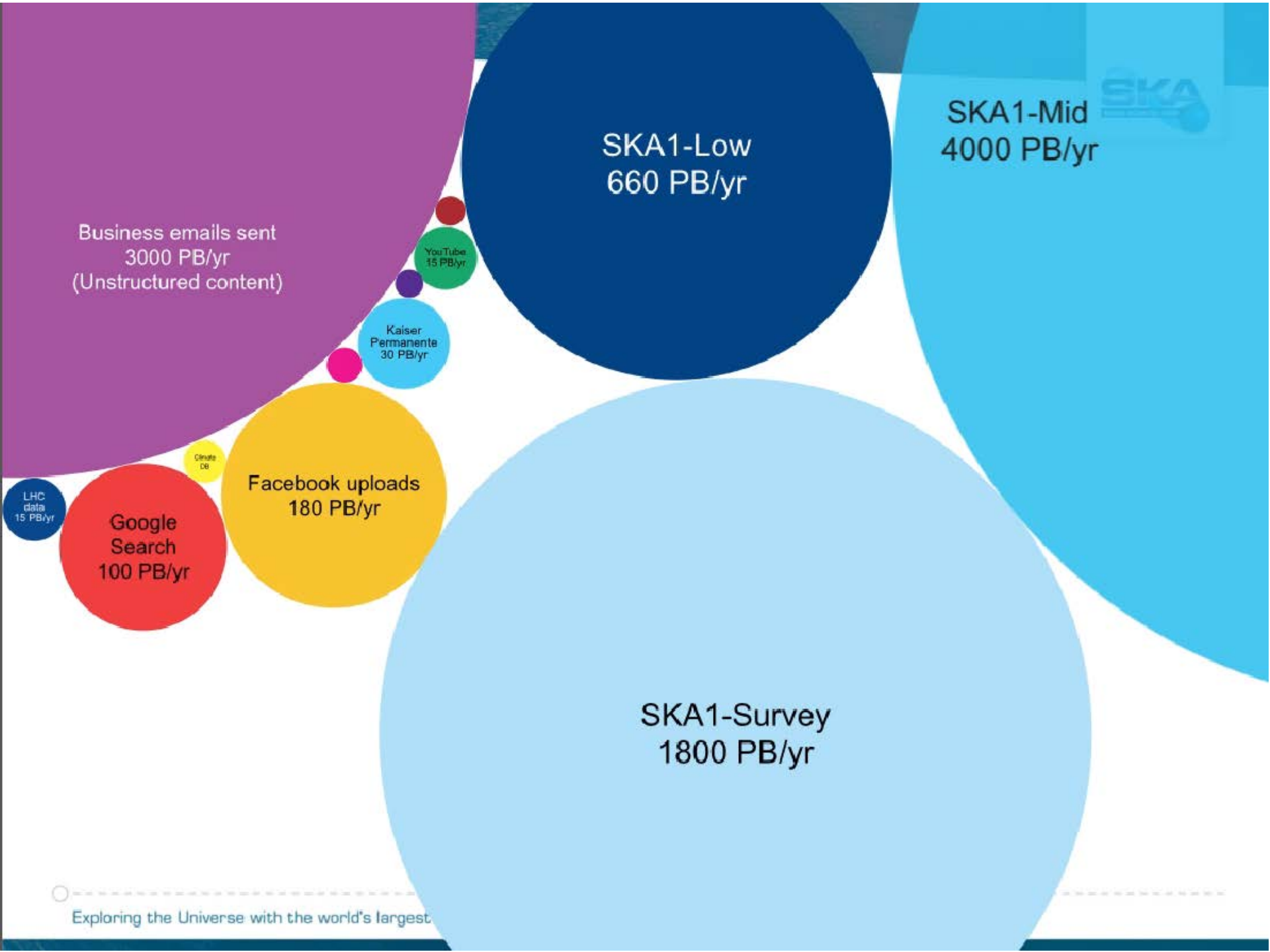
NEXT
BIG THING
AHEAD

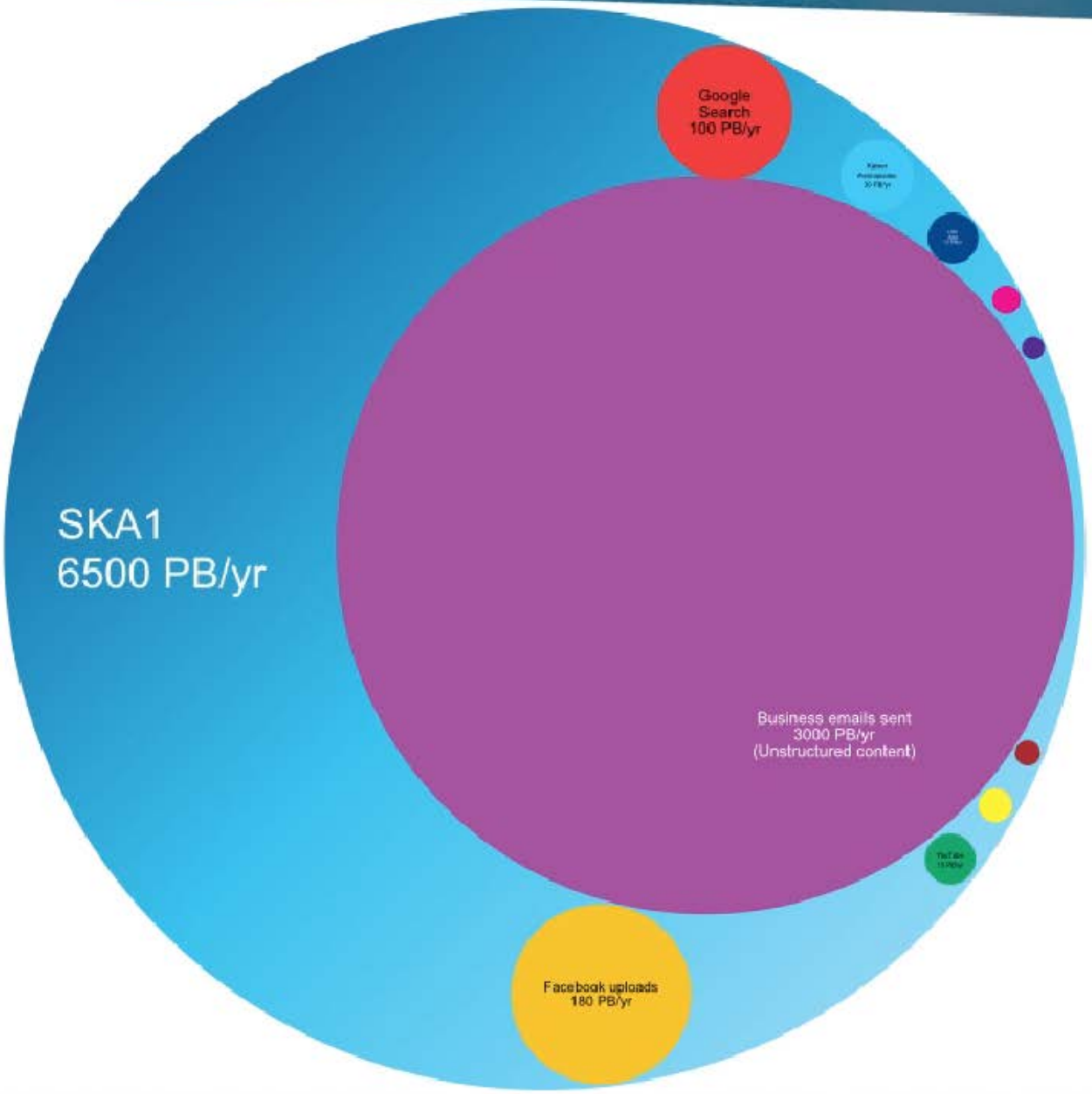

SKA
SQUARE KILOMETRE ARRAY


$\mathcal{L} = -\frac{1}{4} F_{\mu\nu} F^{\mu\nu}$
$+ i\bar{\psi} \not{D} \psi + h.c.$
$+ \psi_i y_{ij} \psi_j \phi + h.c.$
$+ |D_\mu \phi|^2 - V(\phi)$

The SKA1 in Big Data Terms

Inspired by Torre Wenaus (2013) and Wired's Infographic on Big Data (2012)


Business emails sent
3000 PB/yr
(Unstructured content)
SKA1-Low
660 PB/yr
SKA1-Mid
4000 PB/yr
YouTube
15 PB/yr
Kaiser
Permanente
30 PB/yr
Climate
DB
LHC
data
15 PB/yr
Google
Search
100 PB/yr
Facebook uploads
180 PB/yr
SKA1-Survey
1800 PB/yr
Exploring the Universe with the world's largest


SKA1
6500 PB/yr
Google
Search
100 PB/yr
Business emails sent
3000 PB/yr
(Unstructured content)
Facebook uploads
180 PB/yr

SKA1 Average
Correlator Output
268000 PB/yr

SKA Project Engineering Consortium members include

Basic science driving technology innovation

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Big Data


TECHNOLOGY
IS
GREAT
BRITAIN
Hartree Centre,
IBM BlueWonder iDataplex
STFC Daresbury Laboratory
British companies have developed innovative ways of getting maximum performance out of Big Data analytics. For faster, more energy efficient processing solutions, choose the UK.
gov.uk/ukti


Hartree Centre
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Unilever


Victoria line
Northbound platform 1
CATAPULT
Transport Systems
Transport for London

- Rightly or wrongly, big science is widely seen as the domain that started it all, and that ‘knows how to do data-intensive science’

- **Let’s build on that!**

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"All politics is local" – US House Speaker Tip O'Neill

Science and Innovation Campuses

Conclusions

- Yes, we need to worry about this
- We know how to do current best practice
- We can see how to take things to the next level

At least in the UK, this approach is working

But remember, it's all local

  - **Over to you!**

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Thank you!
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@johnwomersley