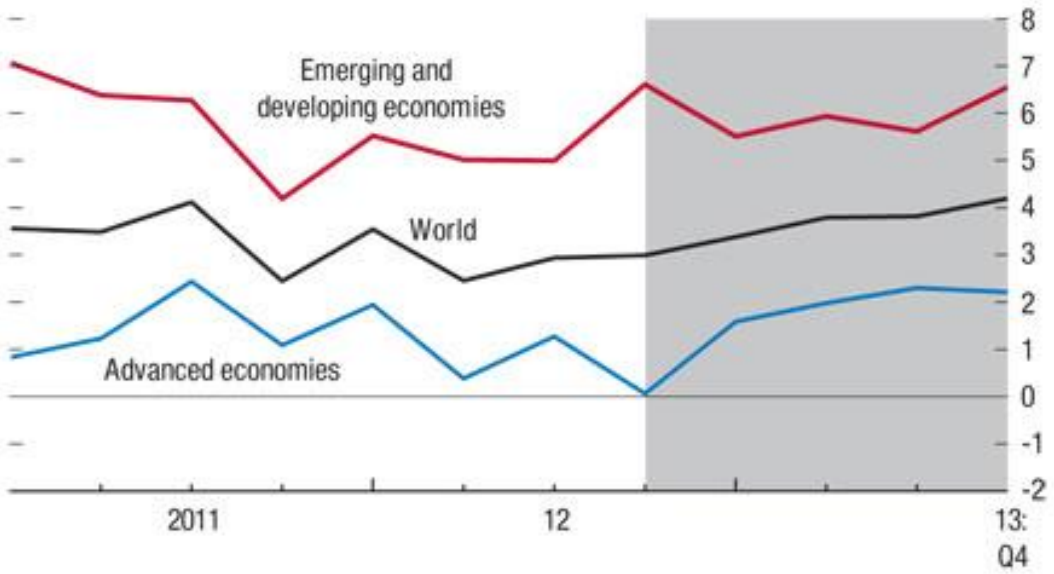
An innovation led partnership

Keith Attwood
17th April 2013

The macroeconomic landscape

Figure 1. Global GDP Growth
(Percent; quarter over quarter, annualized)



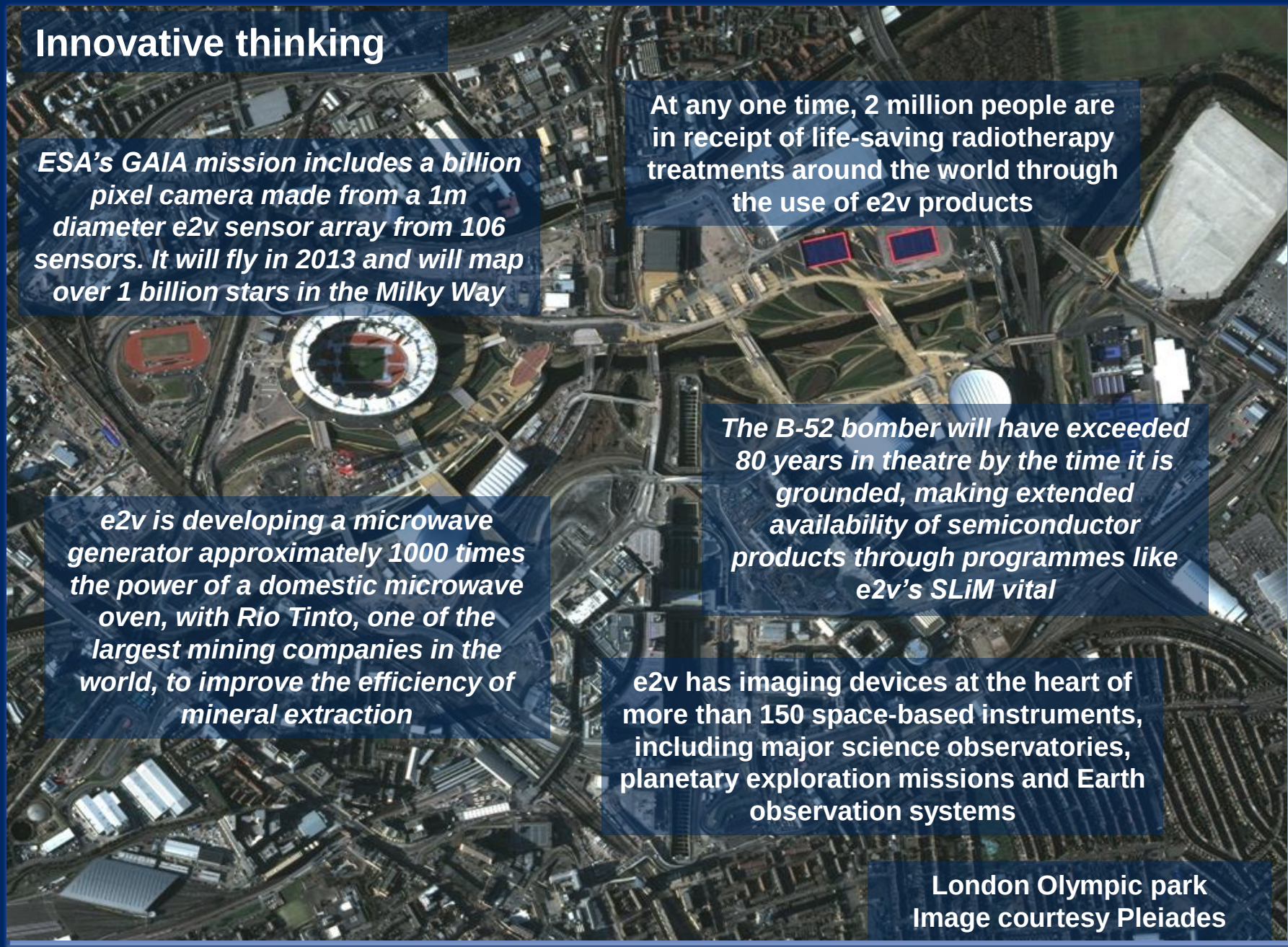
Source: IMF staff estimates.

- At the end of 2012 the UK economy was still c.3% smaller than in 2008
- In March the ONS reduced its forecast for 2013 UK growth from 1.3 to 0.6%
- The fastest growth in technical talent is occurring in key emerging markets

The cost of innovation

- The US accounts for 40% of investment in all research and development (R&D) in the industrial world. In 2011, this was close to $400bn
- The US spends almost twice as much as Europe
- China has increased R&D investment by 10% annually over the last 10 years, close to $150bn in 2011, passing Japan's $140bn
- Innovation – more than a question of money to fund developments, it's about business models too

Innovative thinking



ESA's GAIA mission includes a billion pixel camera made from a 1m diameter e2v sensor array from 106 sensors. It will fly in 2013 and will map over 1 billion stars in the Milky Way

At any one time, 2 million people are in receipt of life-saving radiotherapy treatments around the world through the use of e2v products

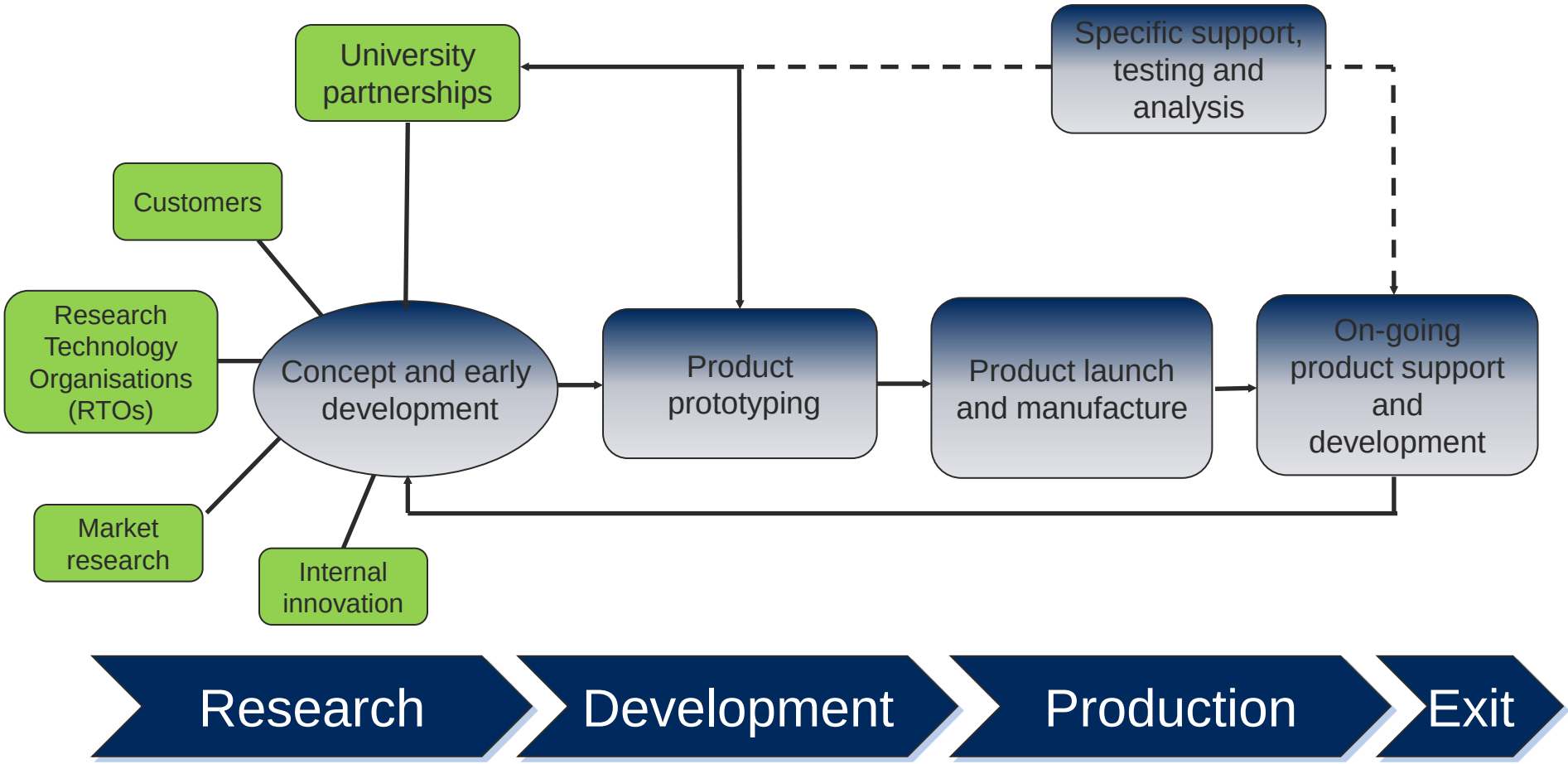
The B-52 bomber will have exceeded 80 years in theatre by the time it is grounded, making extended availability of semiconductor products through programmes like e2v's SLiM vital

e2v is developing a microwave generator approximately 1000 times the power of a domestic microwave oven, with Rio Tinto, one of the largest mining companies in the world, to improve the efficiency of mineral extraction

e2v has imaging devices at the heart of more than 150 space-based instruments, including major science observatories, planetary exploration missions and Earth observation systems

London Olympic park
Image courtesy Pleiades

The innovation value chain



Note: RTOs include Commercial (e.g. Cambridge consultants, QinetiQ, Sagentia) and Govt funded labs e.g. Rutherford Appleton Labs, Cockcroft Institute and Astronomy Technology Centre)

e2v's major academic relationships

Business area	Academic partner	
Microwave industrial processing systems and power conversion	University of Nottingham- Prof. Sam Kingman (Nottingham eCIMP) and Prof. Jon Clare	5 year rolling agreement with eCIMP. Growing with potential for a step function increase in scale. Multiple projects
Space / high performance imaging	The Open University – Prof. Andrew Holland (e2v CEI)	5 year rolling commitment. Staffing running at 17 people (incl.7 PhDs) – expanding to 20. We combine efforts to leverage access to funding and science programmes
High power RF / defence and commercial	Strathclyde University – Prof. Alan Phelps, Dr. Adrian Cross	Several 'world firsts'. Defence related high power RF collaborative funded R&D projects

- Additional support through research technology organisations and sitting on a number of boards incl KTNs, Science and Technology Facilities Council
- Funding also available through UK (Regional Growth Fund) and France, through public investment programme (PIA)

RF power: UoN mineral processing

Development agreement signed with Rio Tinto, the leading international mining group, to develop large-scale ProWave™ microwave and radio frequency generators for use in world-leading mineral recovery

- Large scale generator development
  - Circa 1MW per unit
  - Based on proprietary technology

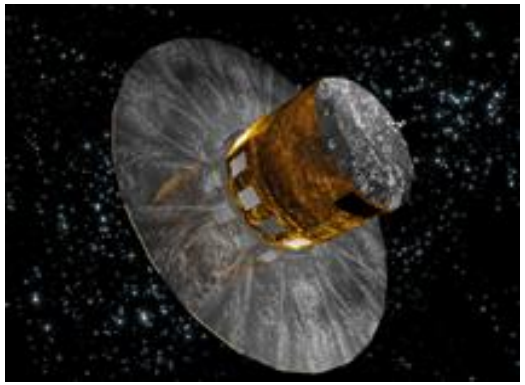
- Backed by Regional Growth Fund award

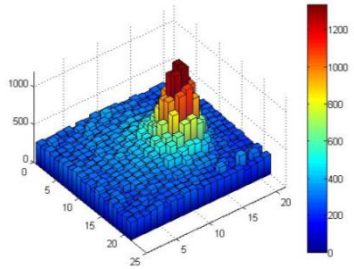
High performance imaging: Open University

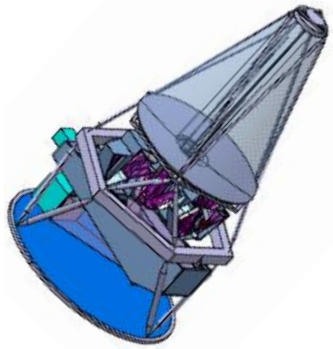
- The e2v Centre for Electronic imaging is a collaborative research centre based at the OU
- 5 year £3M agreement signed in 2008
- Sponsorship of a research chair by e2v
- Currently 17 people involved including 7 PhD CASE students, with a desire to grow to a rolling 12 students and approx. 20 people covering a broad agenda in science, knowledge exchange and exploitation

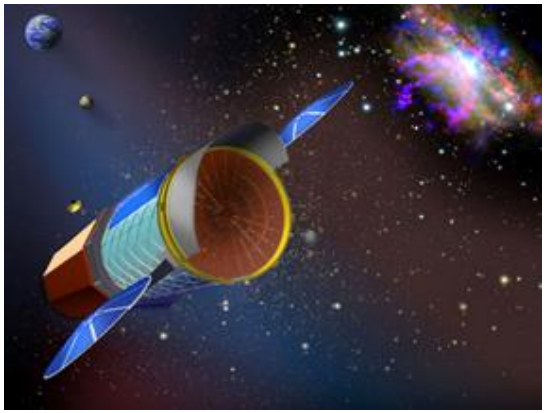
High performance imaging: Open University major space projects

- Gaia - launch 2013 (optical CCDs)
  - Contributing to radiation damage knowledge through device modelling and data analysis
- Euclid - planned launch 2020 (optical CCDs)
  - Leading the CCD radiation damage evaluation & evaluating CCD technology
- Juice – planned launch 2022 (optical CMOS + CCDs)
  - Researching detectors for the extreme electron environment
- ATHENA (Advanced Telescope for High Energy Astrophysics)– planned launch 2022 (x-ray CCDs)
  - Leading specific CCD camera operational analysis









Delivering the necessary skills

- Employers need to feed their own unique skills pipeline
- The education system and employers must work together to ensure that students are studying courses which make them employable
- Not everyone needs a degree
- That's why we have
  - c.40 apprentices, typically with GCSEs across our UK and France facilities
  - c.20 graduates, in our UK training scheme
  - C.25 interns across our US and French facilities
  - A programme of work experience to engage pre-school leavers in STEM subjects
  - In house training where, in the last year, 70% of our people have received some form of training

In summary

- World economic growth is driving attention towards emerging markets
- Innovation and international business development is at the heart of UK plc. achieving growth
- The academic community, from schools to universities ,has a vital role to play in training young people in the skills needed by employers
- Universities are integral to R&D, delivering *research* capabilities in collaboration with companies *development* of commercially exploitable opportunities
- The earlier this work starts the better……..