Science & Technology Facilities Council

The Detector Systems Technology Gateway Centre

Oxford University Seminar

10 Feb 2010

Project leader:
Marcus French,
Technology Department
marcus.french@stfc.ac.uk

Science & Technology Facilities Council

STFC

1 Rutherford Appleton Laboratory, Oxfordshire

3 Chilbolton Observatory, Hampshire

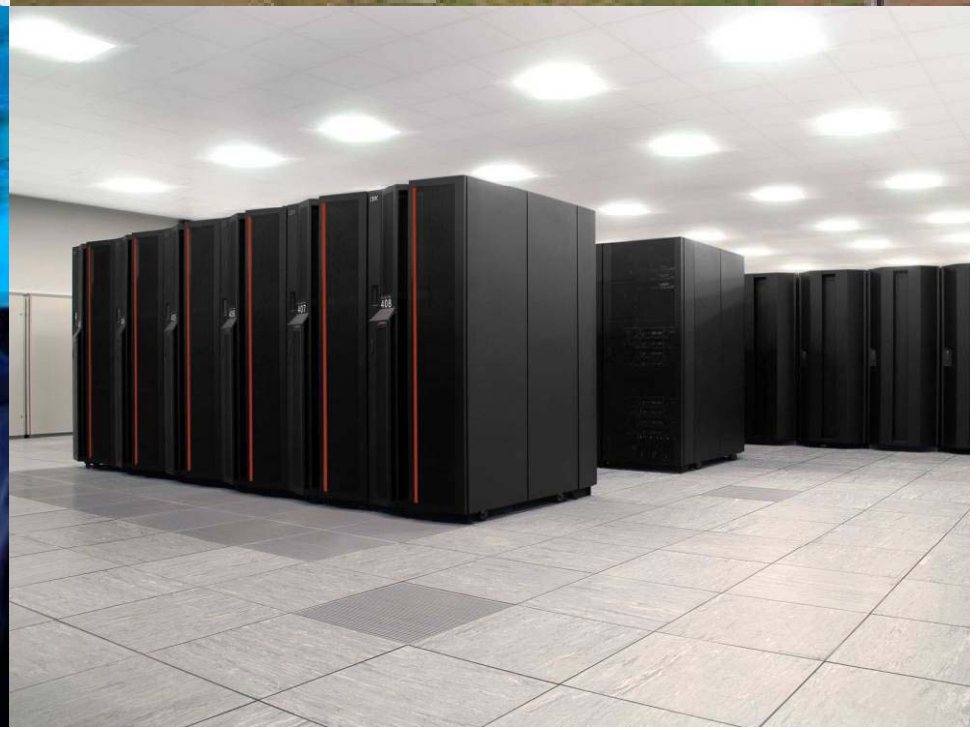
2 Daresbury Laboratory, Cheshire

5 Polaris House, Swindon

4 UK Astronomy Technology Centre, Edinburgh

Science & Technology Facilities Council

Facilities



Science & Technology Facilities Council

Overview

- Introduction to the Campuses
- STFC – Gateways
- Detector Technology
  - History and future needs
- DSC Key Objectives and Drivers
- Organisation
- Estates Plans
- Project Examples
- Summary and Questions

Science & Technology Facilities Council

Where it began

Science and Innovation Framework 2004 – 2014, Next Steps

Creating "Science and Innovation Campuses"

'….In support of these objectives, the Government has decided that the Harwell site, which includes RAL, and the Daresbury site should become the Harwell and Daresbury Science and Innovation Campuses respectively. The Government will look to develop these campuses so as to ensure that the facilities located there are internationally competitive, support world-class science, and maximise opportunities for knowledge transfer.'

Science & Technology Facilities Council

Campus Overview

Harwell SIC

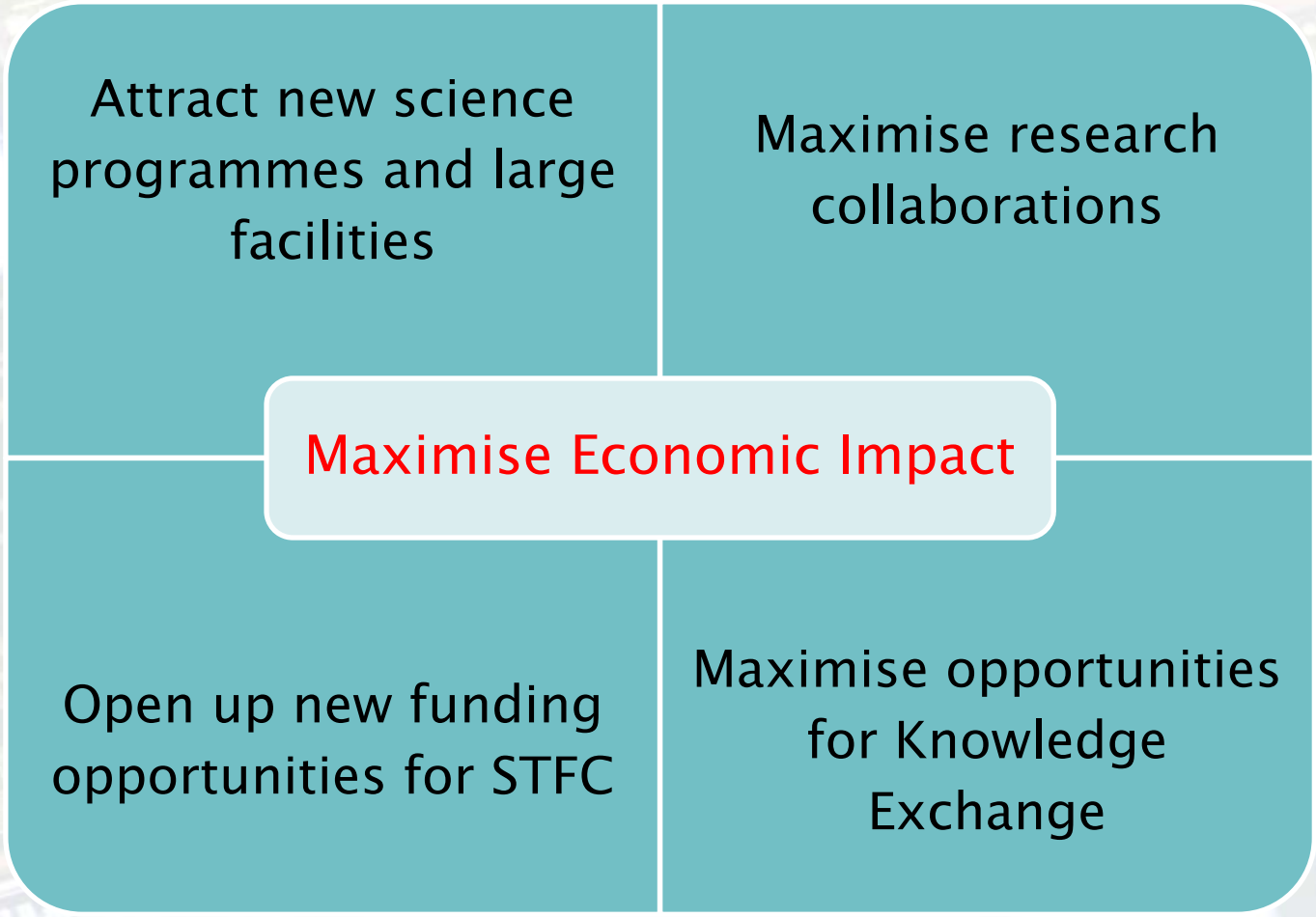
- 734 acres
- 4,500 people and over 100 companies on site
- STFC Rutherford Appleton Laboratory
- Diamond Light Source
- Two Innovation Centres - START & Harwell Innovation Centre
- MRC, HPA, AEA Technology

Daresbury SIC

- 100 acres
- 77 Companies with over 900 employees
- Part of a wider "Daresbury Framework" completed in March 2008 of 614 acres
- Cockcroft Institute
- Daresbury Innovation Centre
- STFC Daresbury Laboratory

Science & Technology Facilities Council

STFC Strategic Drivers



Science & Technology Facilities Council

The STFC Campus Vision

To become world-leading centres for science and Innovation

1) STFC Expertise

- Access the STFC's advanced facilities and scientific

2) Collaboration & Innovation

- Promotion of Open Innovation and Collaboration

3) Training

- Access a unique training ground with a highly

4) Physical Environment

- An amenity rich and collaborative environment

5) Competitive Critical Mass

- High-tech industry, HEIs, other RCs, PSREs

The Vision

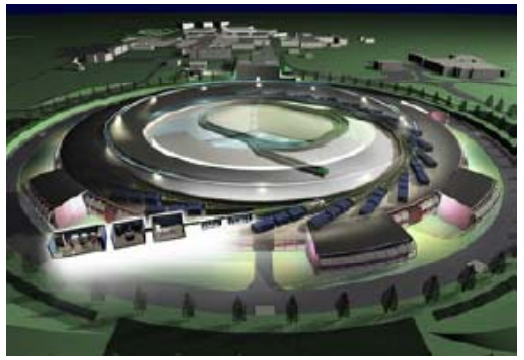
+ Prime location for the international R&D sector
  - home to some of the world's most prestigious research facilities.

+ To support Government's Science and Innovation Investment Framework
  - focus on science research, innovation and learning

+ Major contributor to the UK's scientific and high-technology skills base

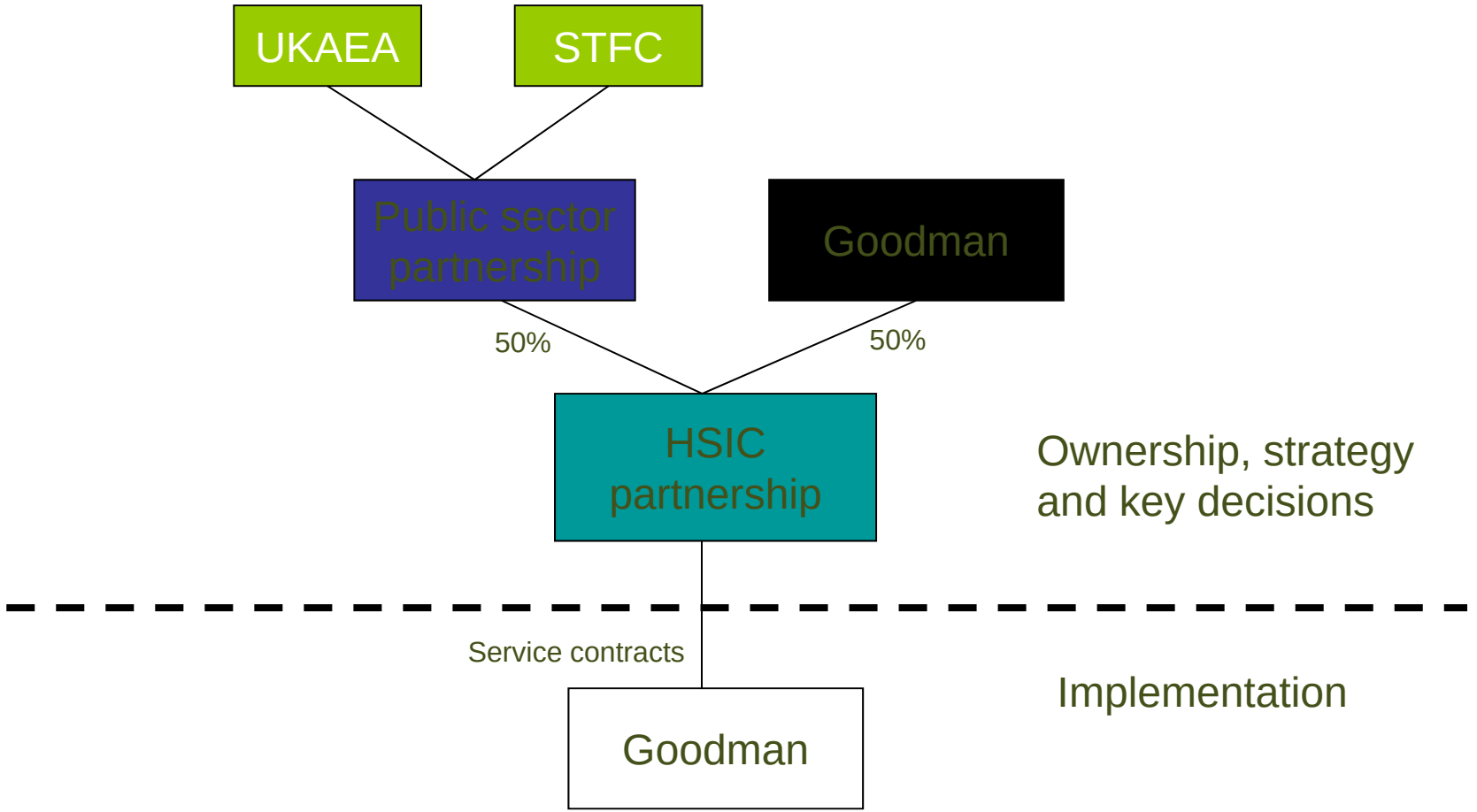
+ Create an interactive community of leading scientists and innovators
  - amenities and facilities to encourage collaboration

+ High quality sustainable environment

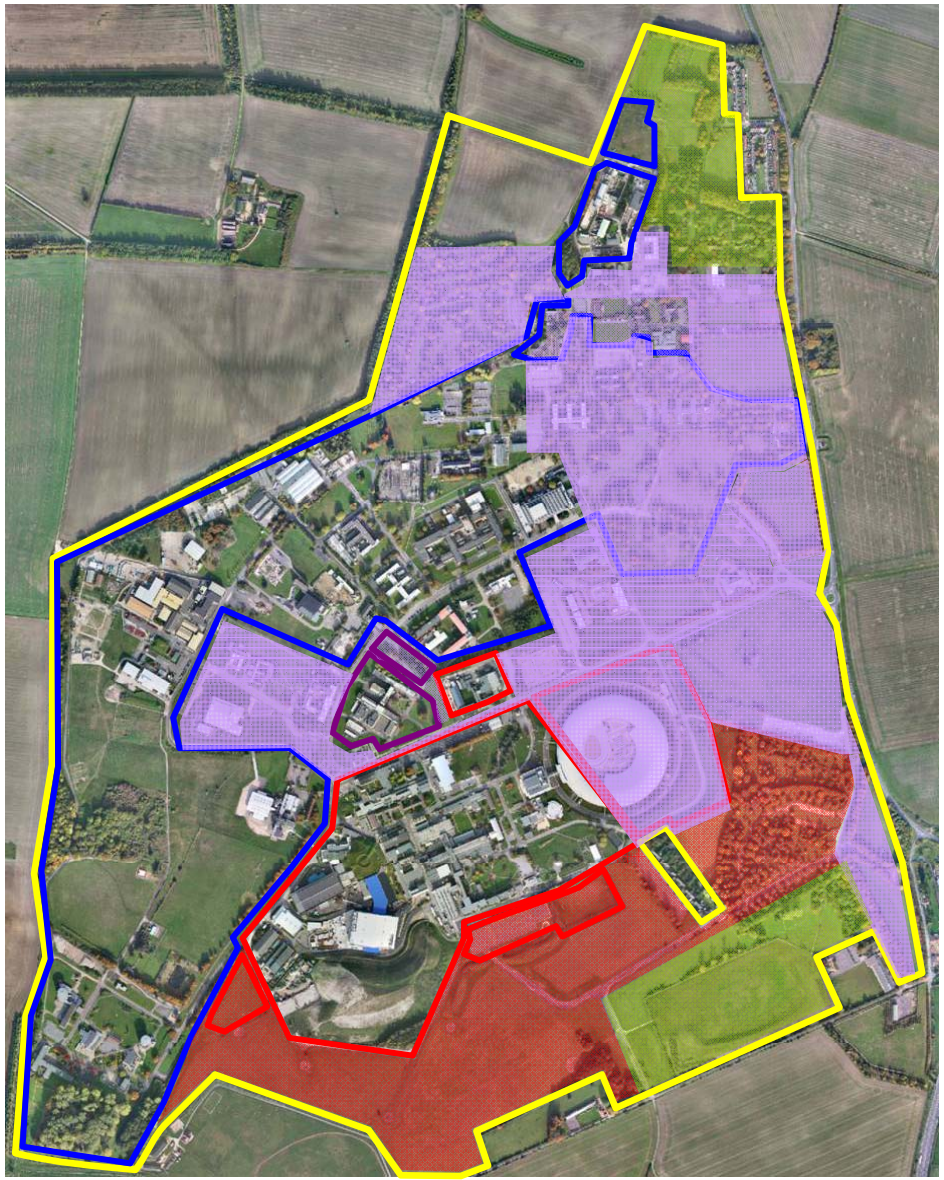


Goodman

Founding Principles - joint venture structure



Harwell Science and Innovation Campus



UKAEA freehold ownership

STFC freehold/leasehold

HPA freehold ownership

Land leased to NDA for 150 years. Land will be surrendered when cleaned-up

Land to be leased to HSIC JV

Land reserved for future major science facilities

Land to be sold for residential development

Goodman

Science & Technology Facilities Council

Gateway Centres

We are establishing Gateway Centres to focus our technological capabilities and orient them towards a more outward facing collaborative role

Linked to STFC strategic/EI drivers

- Maximise research with HEIs, RCs, PSREs and industry
- Maximise opportunities for knowledge exchange through training, technology transfer and partnerships
- Open new funding opportunities for STFC
- Create an environment to attract new science programmes and facilities

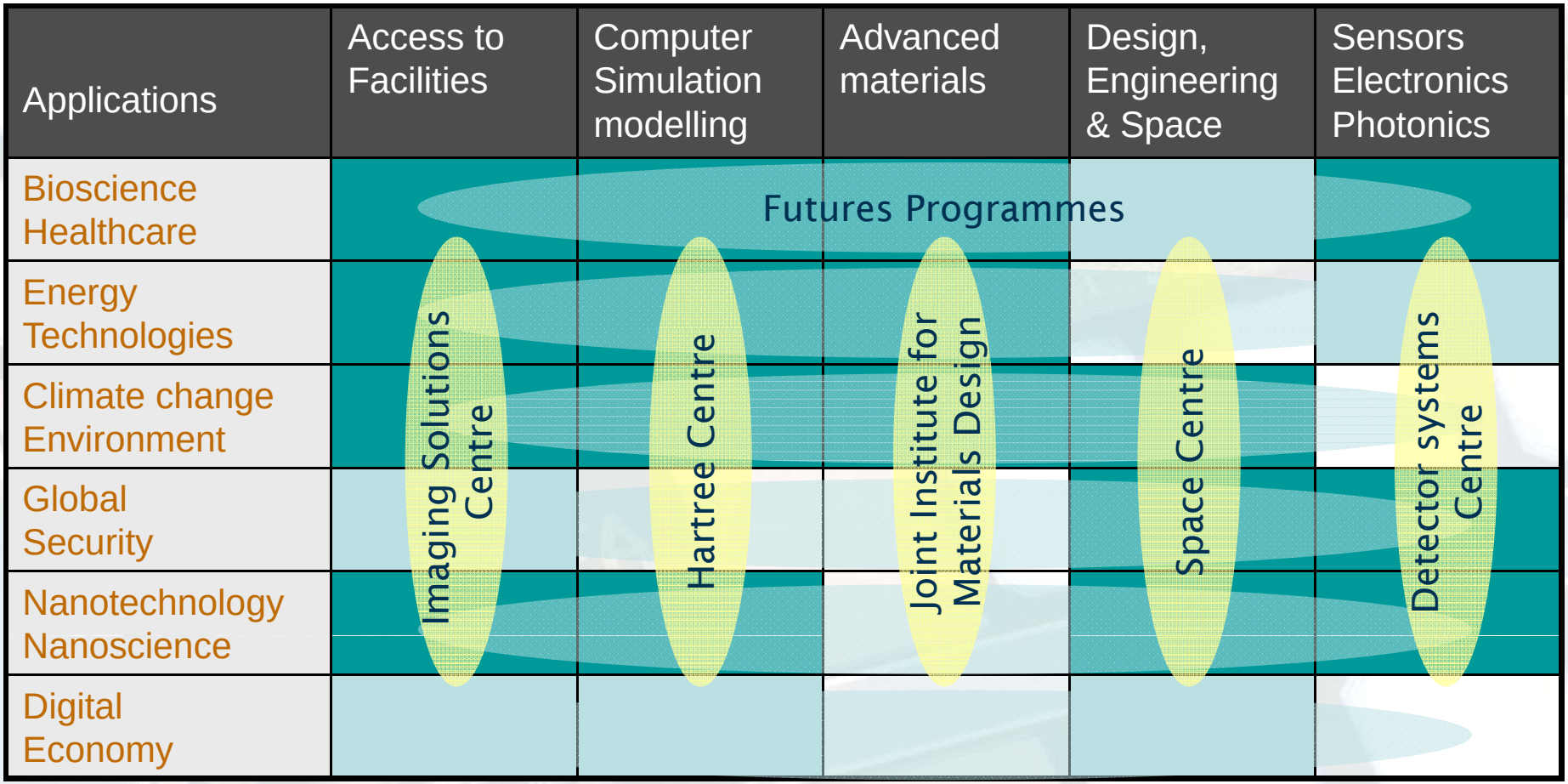
Science & Technology Facilities Council

Access to STFC Expertise

Applications	Access to Facilities	Computer Simulation modelling	Advanced materials	Design, Engineering & Space	Sensors Electronics Photonics
Bioscience Healthcare					
Energy Technologies					
Climate change Environment					
Global Security					
Nanotechnology Nanoscience					
Digital Economy					

Science & Technology Facilities Council

Access to STFC Expertise



Science & Technology Facilities Council

Gateway Centres

Based on our core technical competencies

- *Detector Systems Centre* – advanced detector technology
- *Space Centre* – a new space centre for the UK
- *Hartree Centre* – a step-change in modelling capabilities
- *Imaging Solutions Centre* – transforming "facilities access" into "solutions access"
- *Joint Institute for Materials Design* – integrating materials innovation with advanced characterization

Science & Technology Facilities Council

Detector Systems Centre

The STFC delivers world leading detector systems to large scale scientific facilities world-wide, but change is coming…

- The cost and complexity of this capability has increased dramatically
- The scientific landscape is rapidly evolving
- HSIC and DSIC offer enormous potential for future commercial activity

The *Detector Systems Centre* will exploit this opportunity

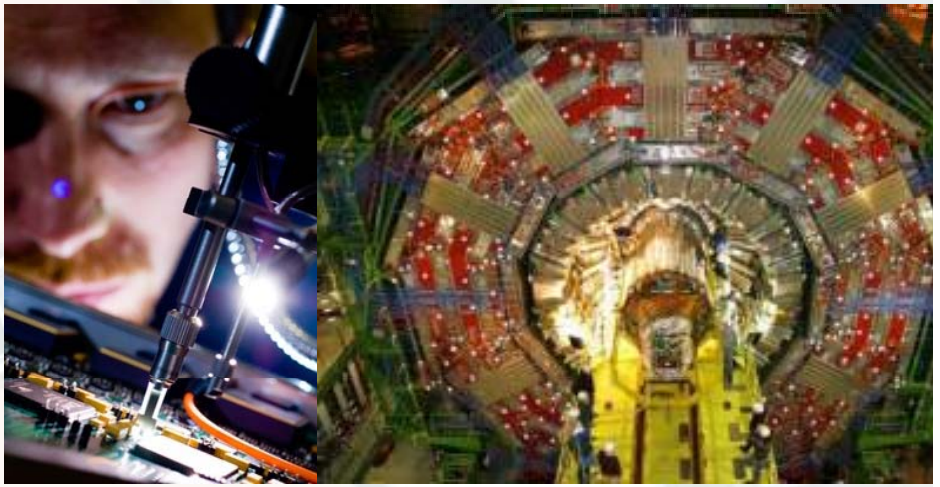
- Allows consistent approach to significant commercial interest
- Dual-site model (HSIC & DSIC)

Planned Centre areas of strength

- Training
- Interconnect Technology
- Microelectronics
- Systems Design
- Sensor Technology access

Status and Timetable

- £30m earmarked from LFCF
- Consultation and Science and Business cases



Science & Technology Facilities Council

Hartree CSE Centre

World-class expertise in Computational Science

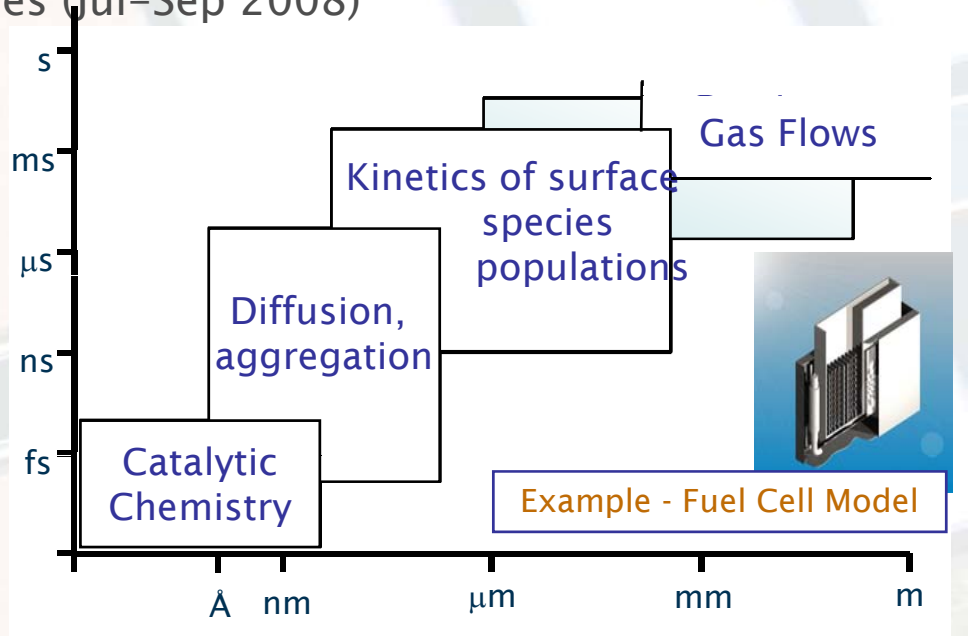
- New kind of CSE institute for the UK, brings together academic, government and industry communities to focus on multi-disciplinary and multi-scale challenges
- The goal is a step-change in modelling capabilities for strategic themes including energy, life sciences, the environment and materials

Wide range of planned and potential activities

- Consultation with many research fields; Materials, Environmental Sciences, Engineering, Biological/Medical, Facilities (Jul-Sep 2008)
- Commercial, International, RCs and KE/Industrial consultation

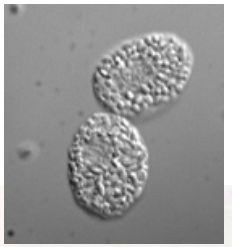
Status and Timetable

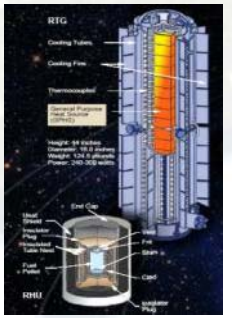
- £50m earmarked from LFCF
- Detailed Science and Business case, consultation (Nov-Jan 2000)
- OGC Gateway Process and Public launch (Jan-Mar 2010)



Science & Technology Facilities Council

Space Centre





Great opportunity to exploit world-leading science base with academia and research labs at/near HSIC

- Positions the UK academic and industrial interests to connect with global initiatives (exploration, climate change, security)
- Public engagement, encourage study of science/engineering
- Activities aligned with ESA and UK needs; no ESA centre in UK

Centre activities to include:

- Exploration: Planetary Protection, Novel Power Sources, Autonomous Robotics
- Climate Change: a focal point for Earth Observation (EO) data in climate/global change and use of data for sustainable management of the environment
- Integrated Applications: new applications through integrated use of space assets (EO, navigation, communication); tailored solutions

Ministerial Commitment for ESA programme currently sought

Science & Technology Facilities Council

Imaging Centre

Our ability to image and understand our data has not kept up with our ability to generate it…

The *Imaging Centre* will enhance both the quality and quantity of our output

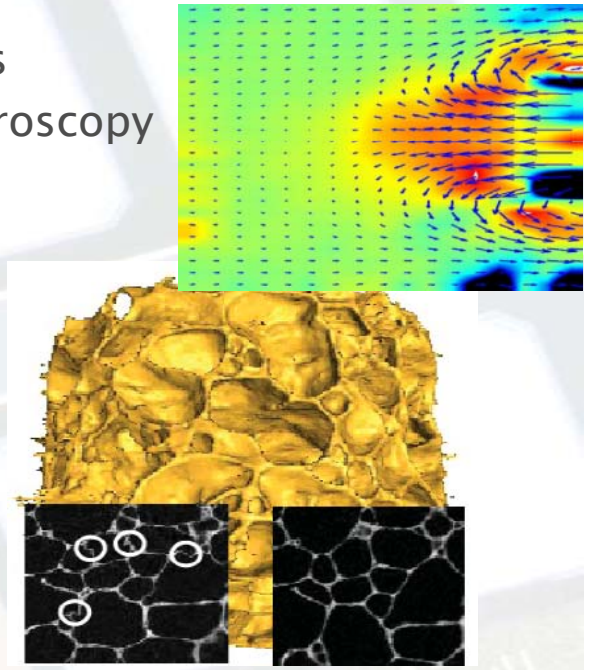
- Enhancing access to major facilities (Diamond, ISIS & Lasers) and support pre and post-experiment
- Multidisciplinary expertise to solve imaging problems, with the right hardware, software and data analysis tools
- Supporting development of new imaging technologies
- Possibility to support national centre for electron microscopy

Challenges

- To open up the subject across the disciplines
- From the living cell – to the turbine blade
- Imaging function and dynamics; tomography

Status and Timetable

- £24m earmarked from LFCF
- Consultation beginning now – Science and Business Cases (Feb-Apr 2010)



Science & Technology Facilities Council

Joint Institute for Materials Design

Significant investment in STFC facilities such as Diamond and ISIS, where ~40% of the research will be materials-related…

Traditional facilities interactions have been characterised by

- A clear distinction between "facilities" and "users",
- a "contact time" limited to the duration of the experiments and
- a "one size fit all" access mechanism.

JIMD: maximise our investment in the facilities and enable the UK to address more adventurous large-scale challenges by

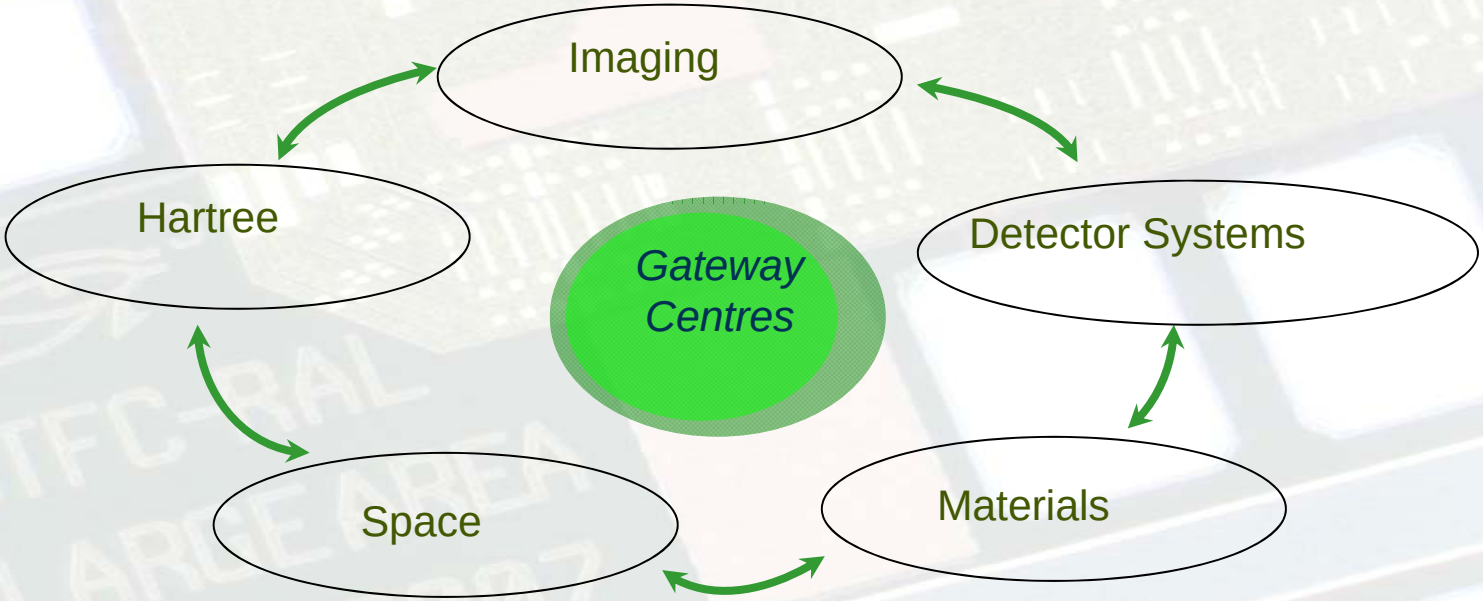
- growth of samples and materials specifically designed for facility-based measurements
- design and operation of on-beam facilities to study materials in operating conditions (in operando), and
- design of hardware and software to enable accelerated materials discovery guided by photon or neutron beams

"Recommended for further funding" by DIUS (DBIS)

Science & Technology Facilities Council

Gateway Centre Synergies

The Gateway Centres are based on STFC's core capabilities which work together to underpin our delivery of facilities and science



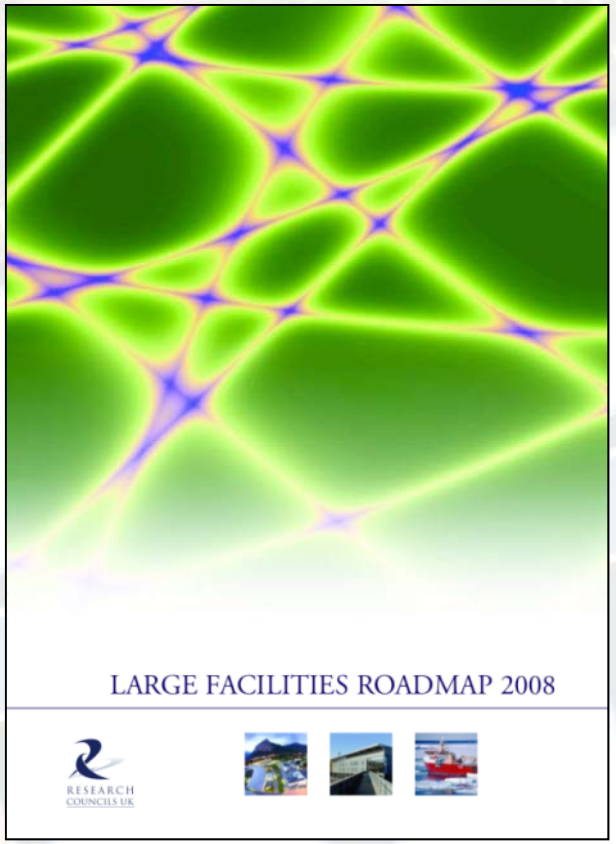
We expect these synergies to be enhanced by the Centres, and for this "team effort" to be made available to a wider community

Science & Technology Facilities Council

Facilities for the Future of Science

Large Facilities Approval Stages

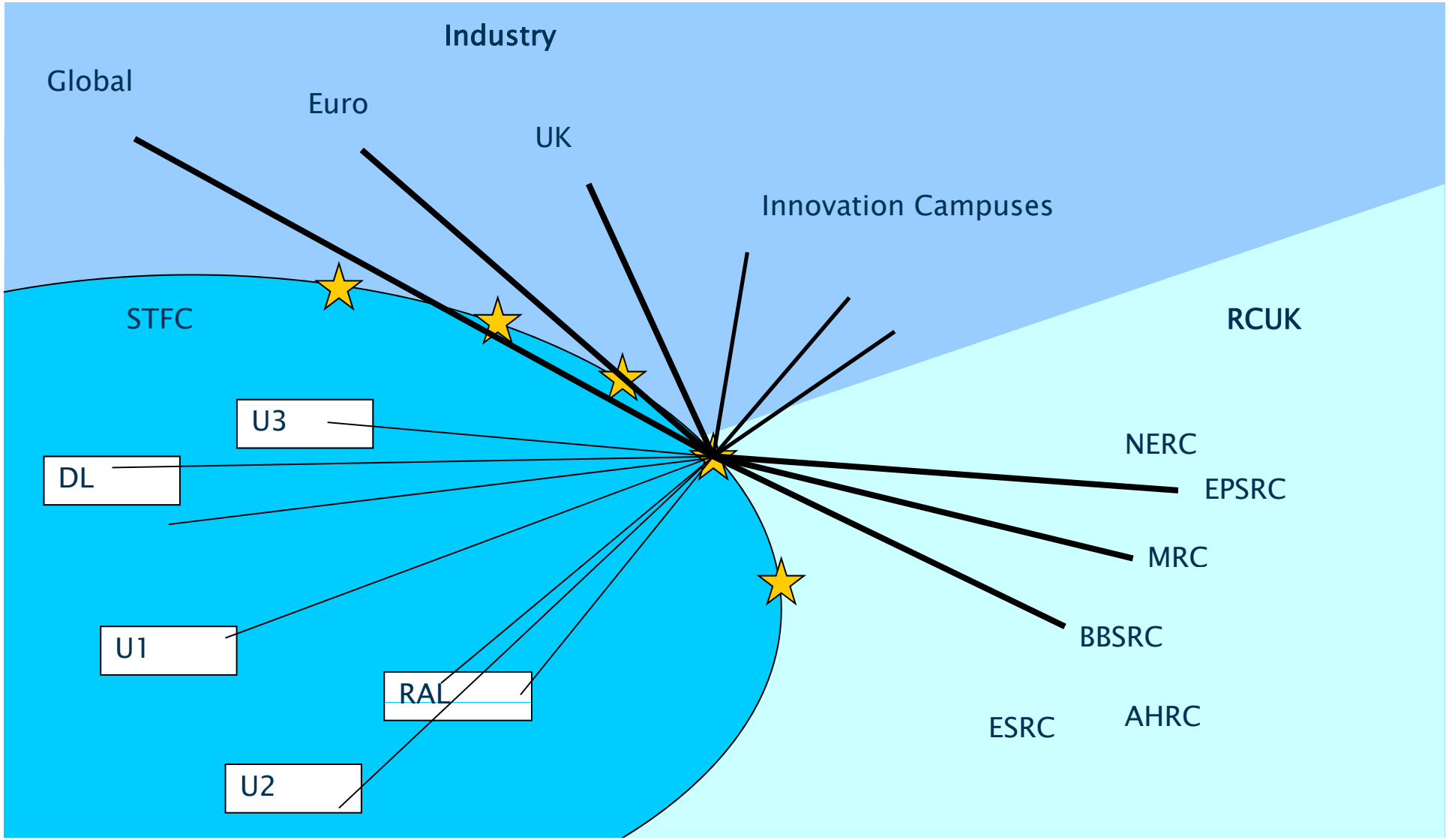
- Selection of facilities for inclusion in the Large Facilities Roadmap
- Short-listing of facilities eligible for LFCF
- Prioritisation of facilities for LFCF
- Allocation of resource through the LFCF
- Preparation of the Science Case
- Preparation of the Business Case – OGC Gateway1
- Procurement Strategy – OGC Gateway2
- Consideration by DBIS of the Business Case and submission to Ministers for approval of the commitment of funds



http://www.rcuk.ac.uk/research/resinfra/lfroadmap.htm

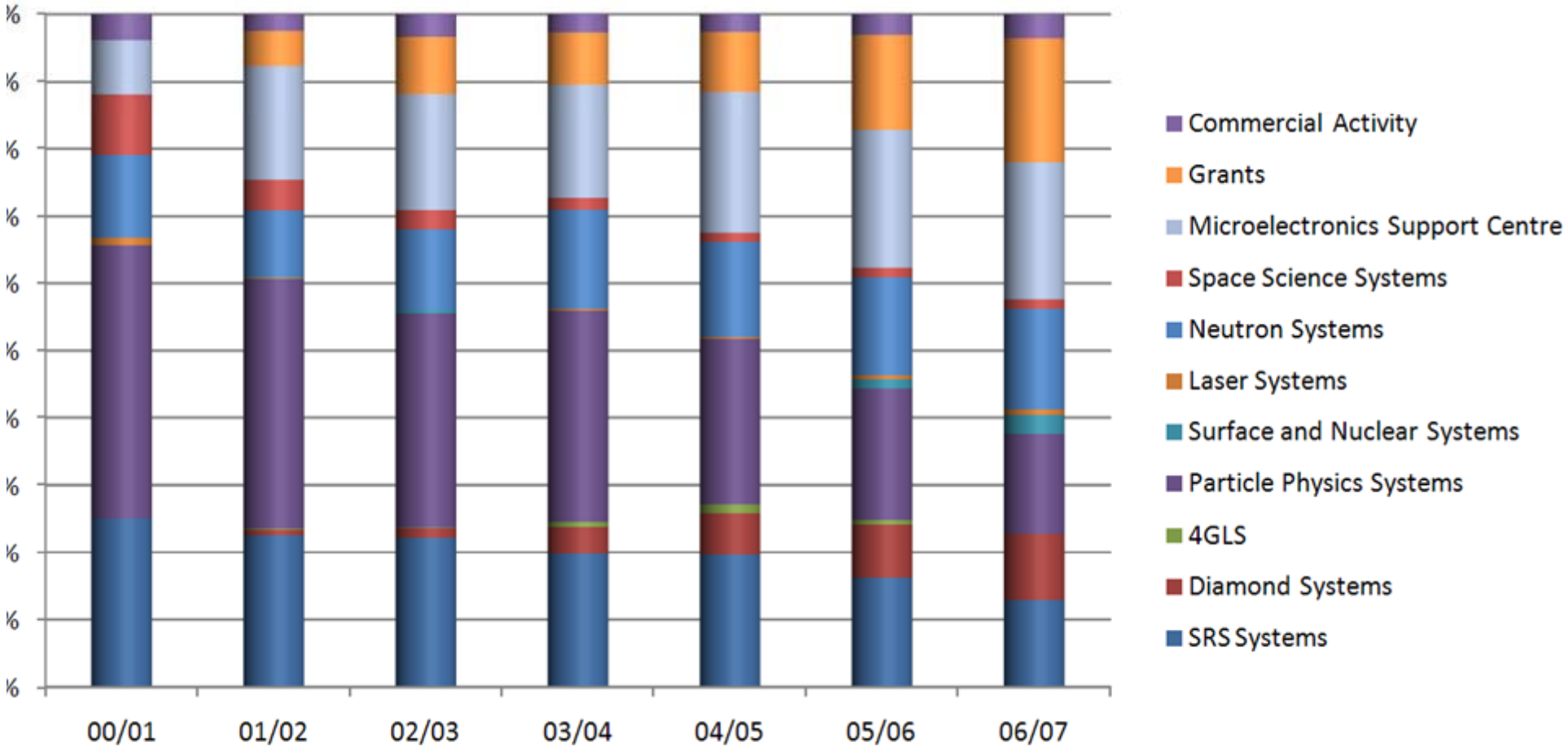
Science & Technology Facilities Council

A Focus for Engagement



Science & Technology Facilities Council

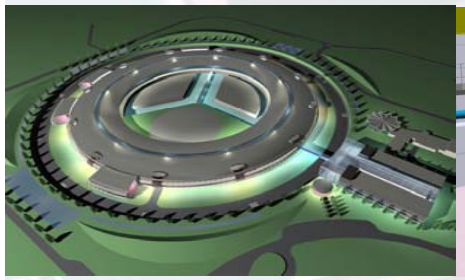
Technology Looking Back

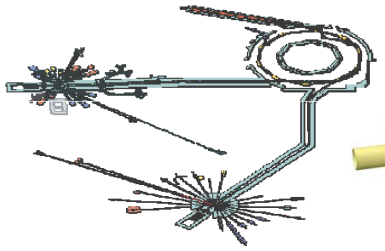
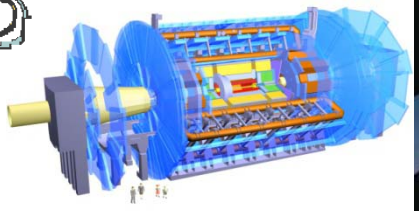
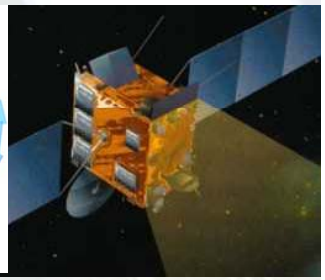


Science & Technology Facilities Council

Benefits

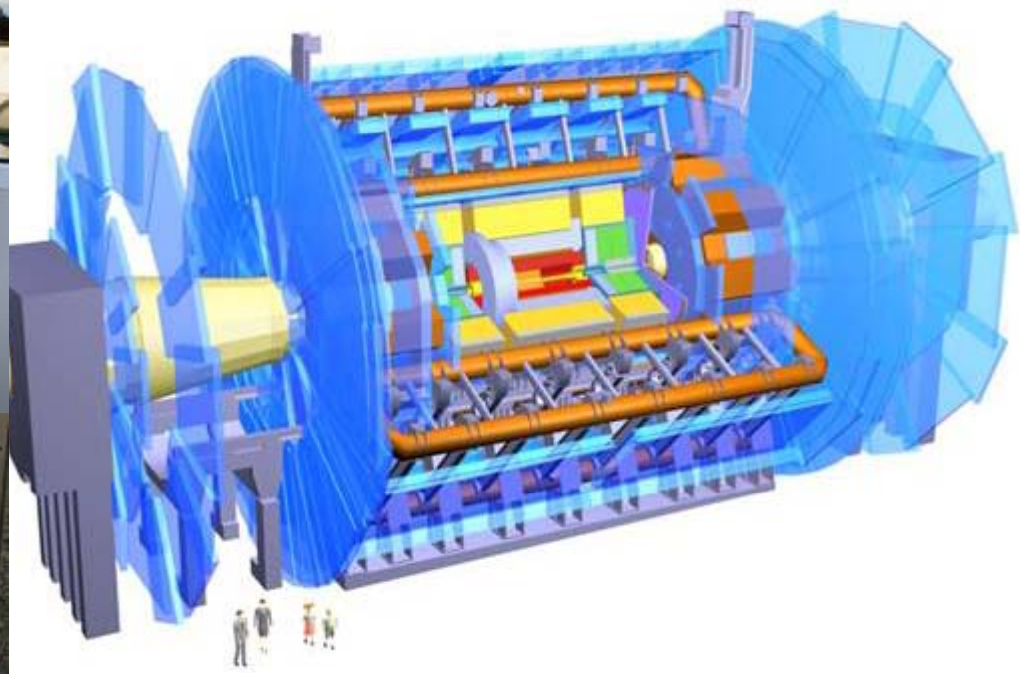
- How will other Research Council's benefit from the new Centre?
  - The Centre will provide the Research Councils with a facility to develop emerging technologies and detector systems in a collaborative environment created to maximise the exchange of *ideas*, *technologies* and *experience* throughout the Research Councils research communities
  - Partner International Research Centres, industry and Campus SMEs in the development of new innovative systems and technologies



Science & Technology Facilities Council

Large Hadron Collider



Atlas Silicon Tracker
Barrel Module Production at RAL

Better than 5micon accuracy

1536 channels per module

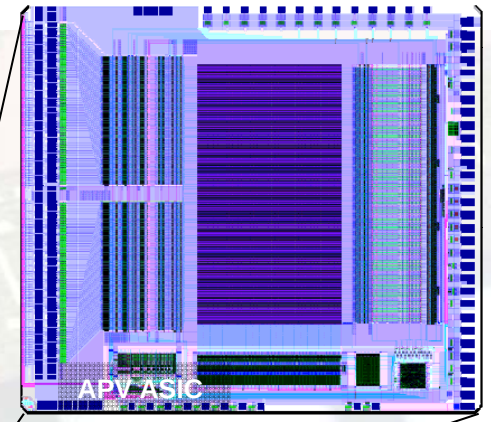
720 modules

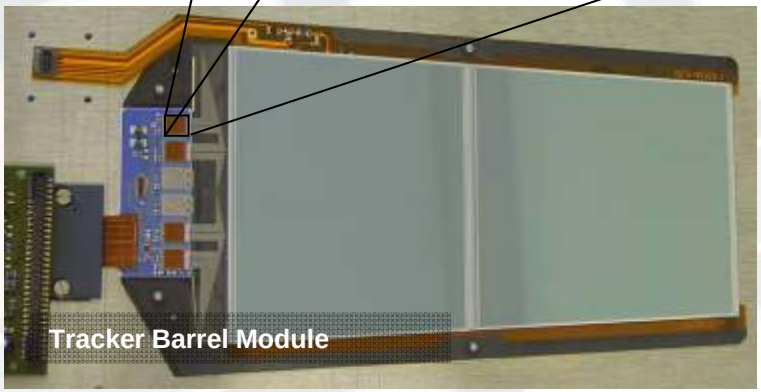
Science & Technology Facilities Council

The Compact Muon Solenoid

Particle Physics: CMS

- ~210 m2 of silicon, 10M channels
- 75000 FE chips, 40000 optical links



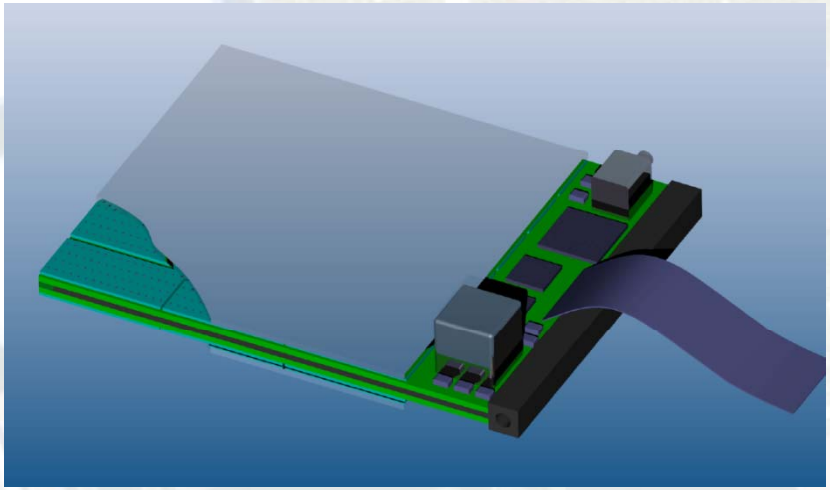


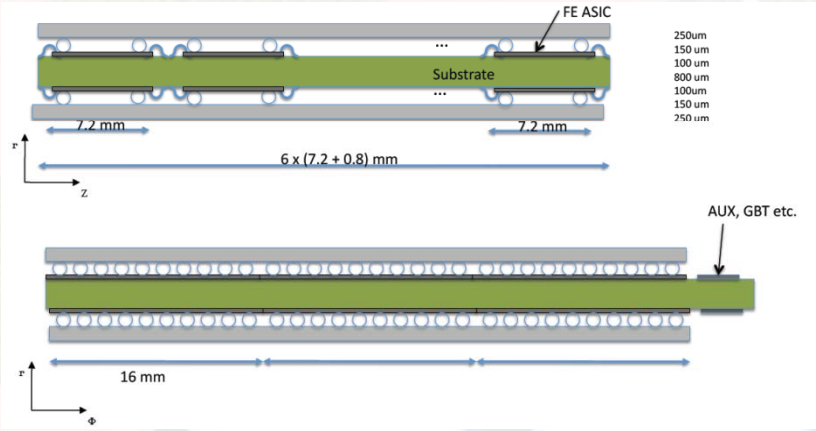
Collaboration: STFC, Imperial College, CERN …

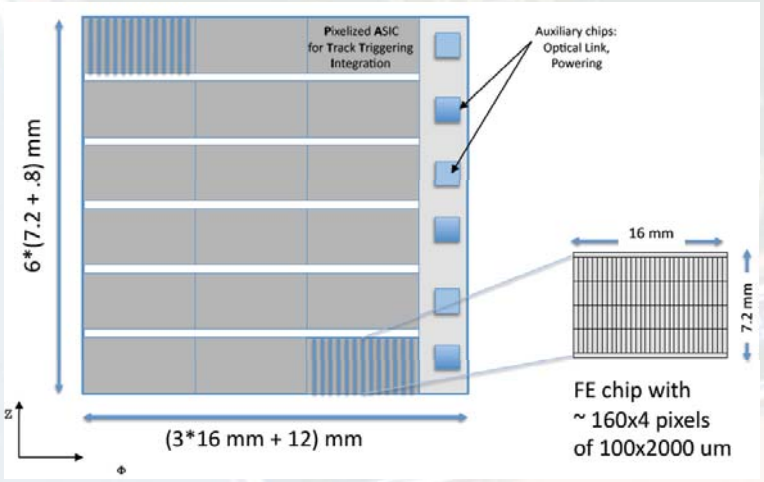
Radiation environment

~10^{14} hadrons.cm^{-2}

Technology Looking Forward?







Courtesy A. Marchioro - CERN

Issues:

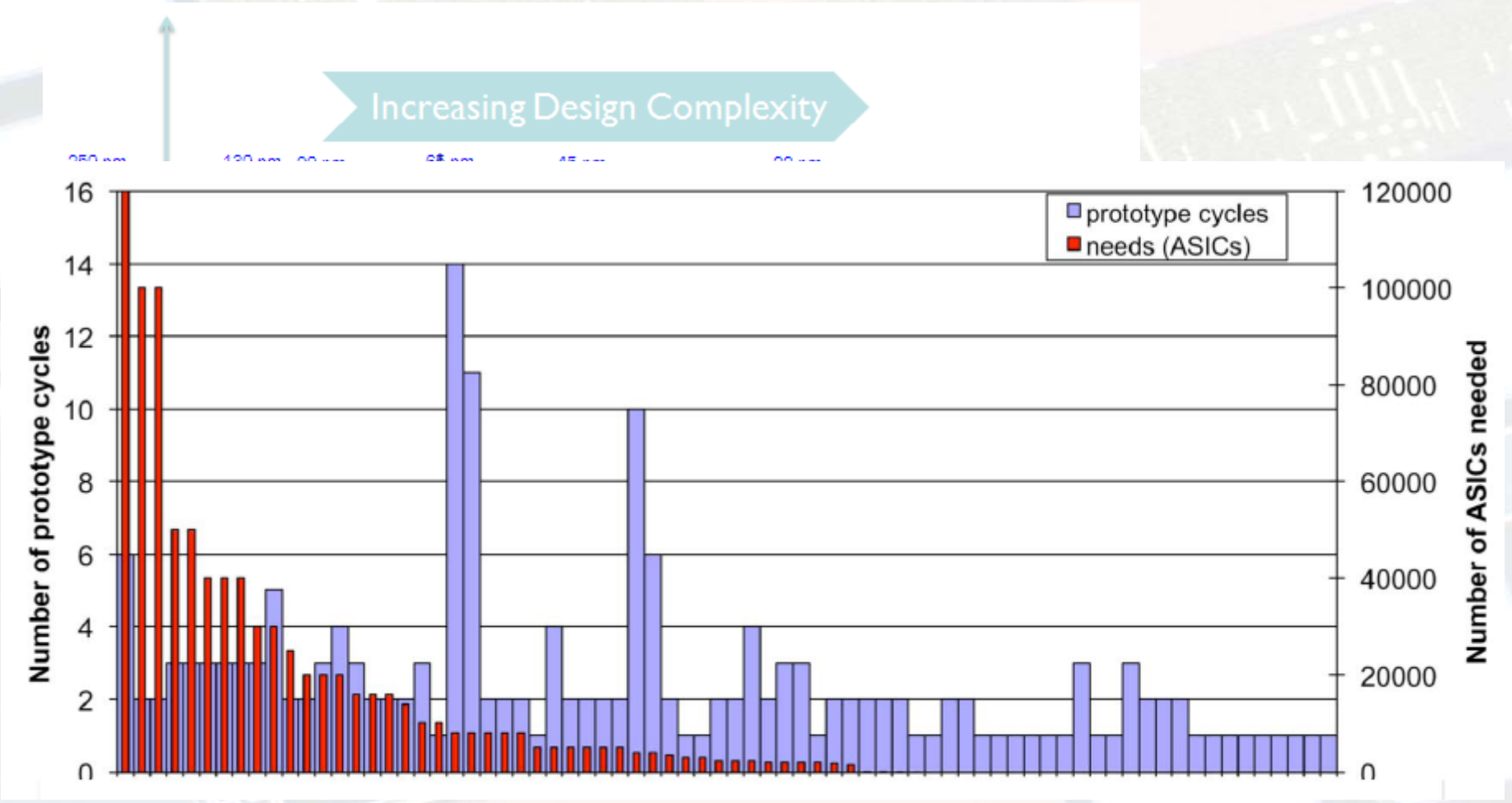
ASIC development – 0.65nm?

Hybridisation – industry?

Test, Cooling, Materials, Powers....

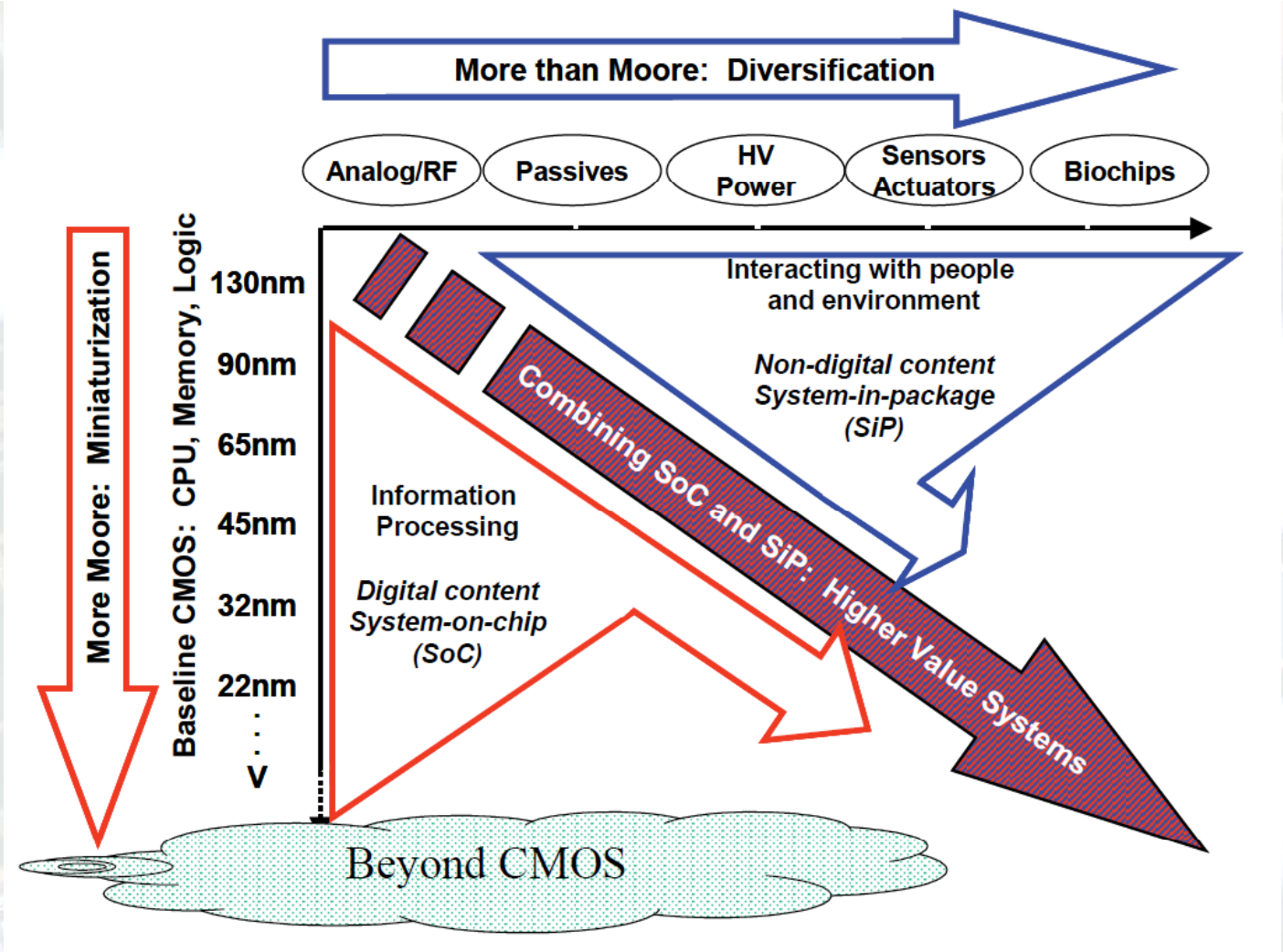
Science & Technology Facilities Council

LHC Experience



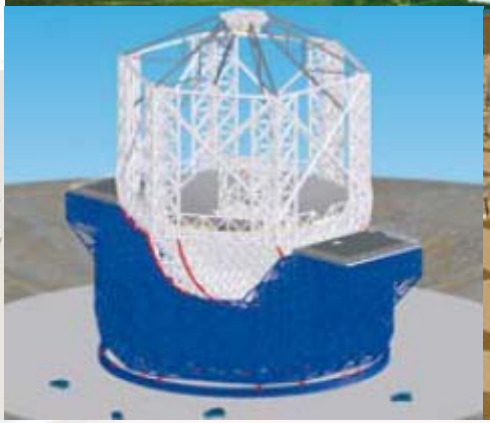
Science & Technology Facilities Council

ITRS Roadmap



Science & Technology Facilities Council

ESFRI Roadmap



Science & Technology Facilities Council

Key Objectives

1) Substantially increase our UK capability to develop innovative detector systems.

2) Provide industry, the universities, and the science and technology research disciplines with improved access to world class detector systems and sensor technology.

3) Engage over 100 of STFC's best scientists and engineers and key senior managers.

4) Become the UK focus for access to an extensive range of advanced detector technologies and training in their development and application.

Science & Technology Facilities Council

Key Objectives

5) Education, training and knowledge exchange activities will be provided at the Centre.

6) Facilitate the co-location of STFC, university and industry teams and with the Innovation Campuses to establish start up companies in close proximity to the Centre, and

7) Include a dedicated marketing team to ensure that the growth potential and economic impact of the Centre are maximised.

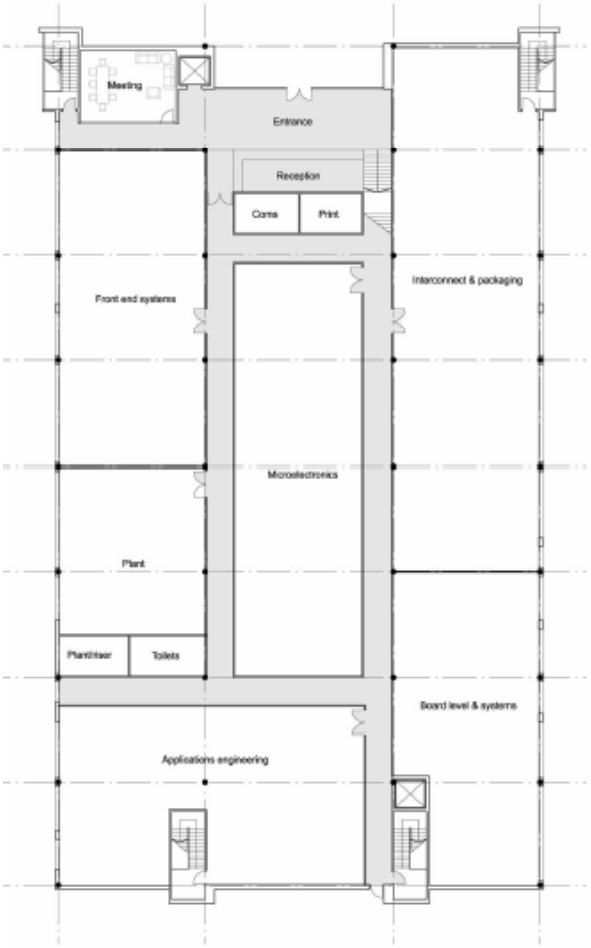
Science & Technology Facilities Council

Campus Presence

- An ‘Open’ presence in Detector Systems Technology
- Backed up with E-Resources and Online Collaboration tools
- Looking at various siting options within the Labs and SICs

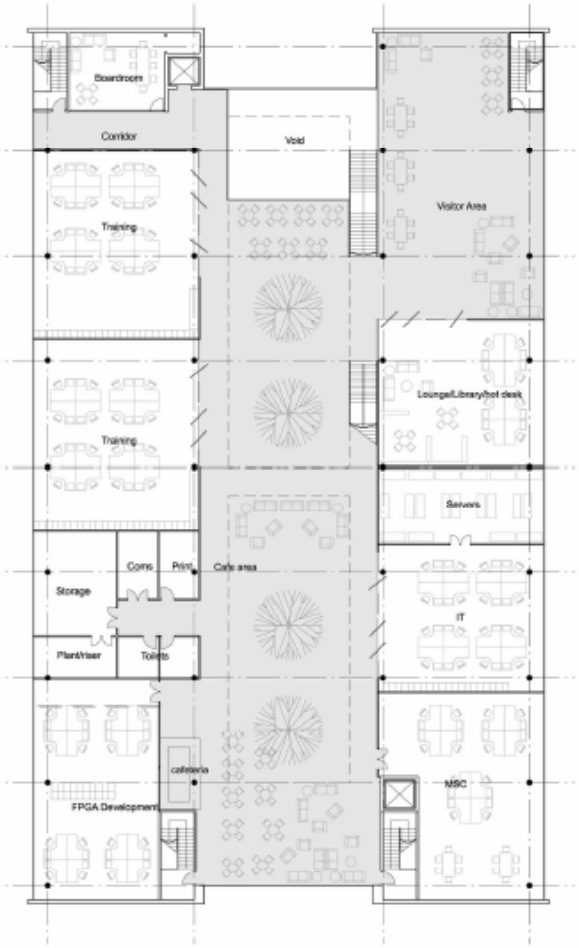
Science & Technology Facilities Council

General Layout



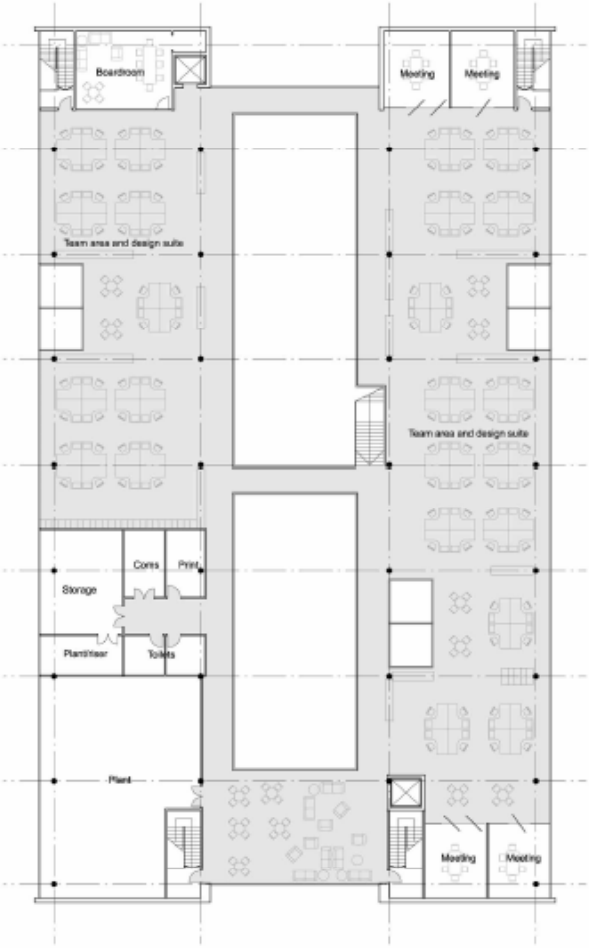
Development Laboratories

Ground Floor Plan



Visitor and Networking

First Floor Plan

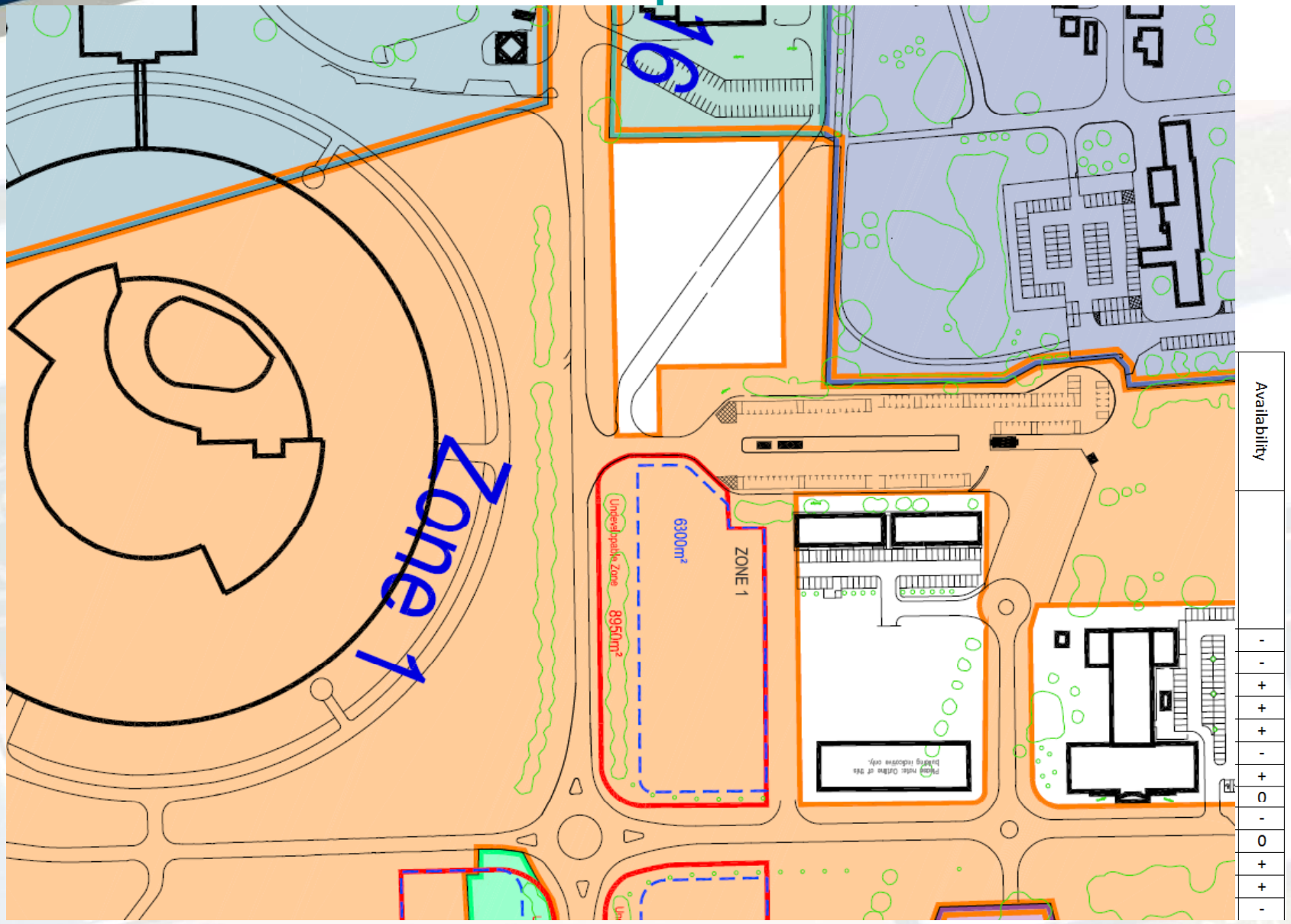


Design Teams and Management

Second Floor Plan

Science & Technology Facilities Council

Site Options – Where?



Science & Technology Facilities Council

Delivering the Vision

- **Science and technology**
  - **National Facilities**
  - **Engineering &Technology**
  - **Technology Gateway Centres**
  - **Co-location of HEIs, industry, etc**

Embedded critical mass of world leading science and technology programmes

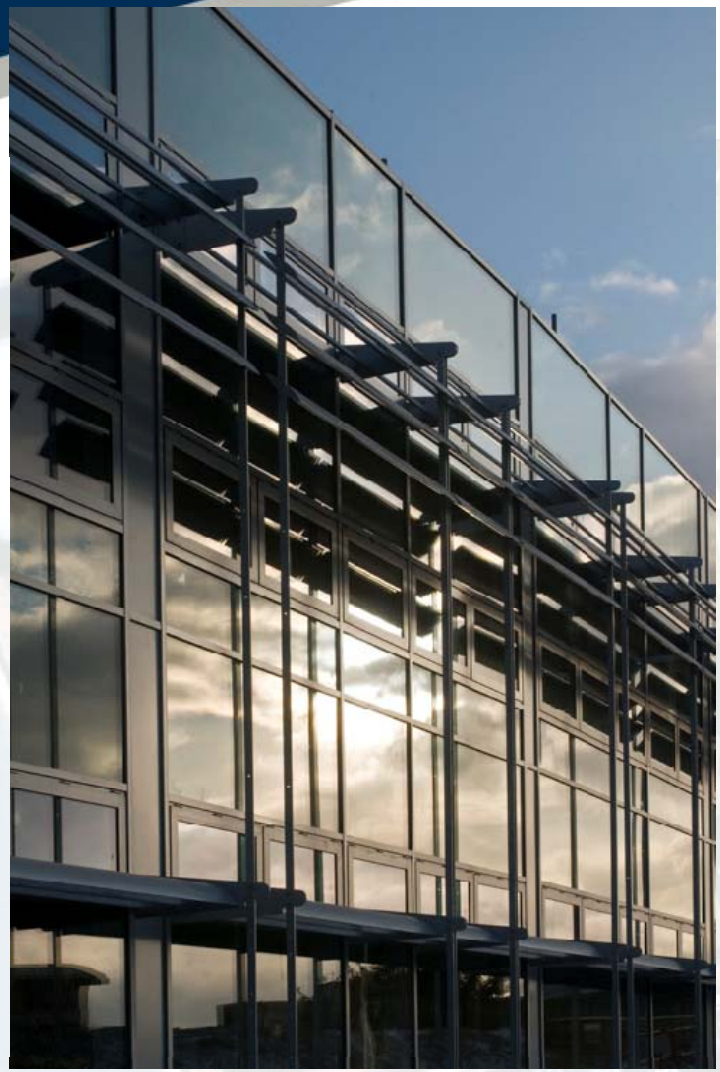
- **Innovation**
  - **Funding opportunities**
  - **Investment networks**
  - **Innovation networks**
  - **Knowledge & Property Portfolio**

Knowledge Exchange & Economic Impact

Science & Technology Facilities Council

Research Complex at Harwell 2010

Science & Technology Facilities Council



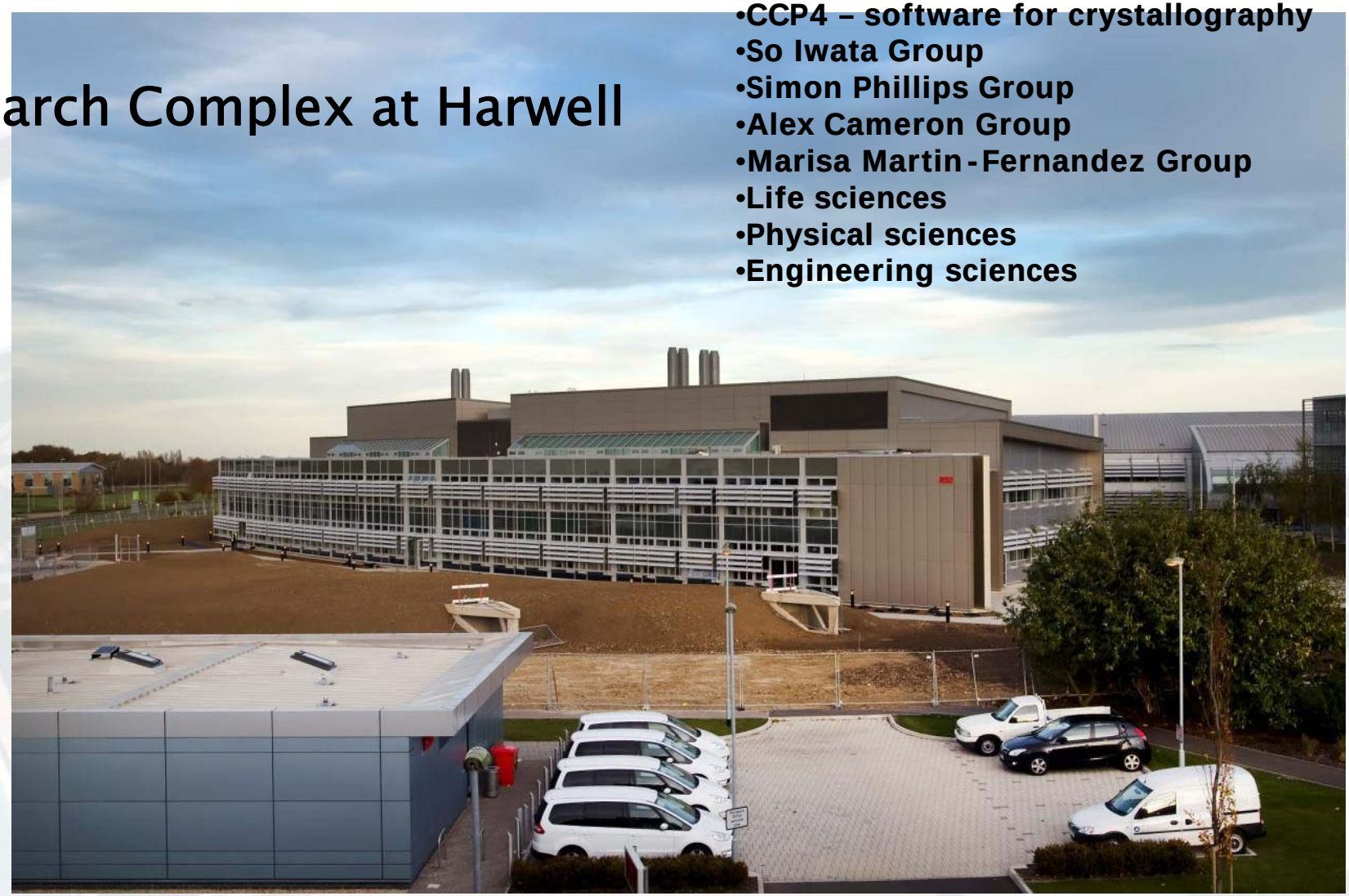
Research Complex at Harwell

Science & Technology Facilities Council

Research groups

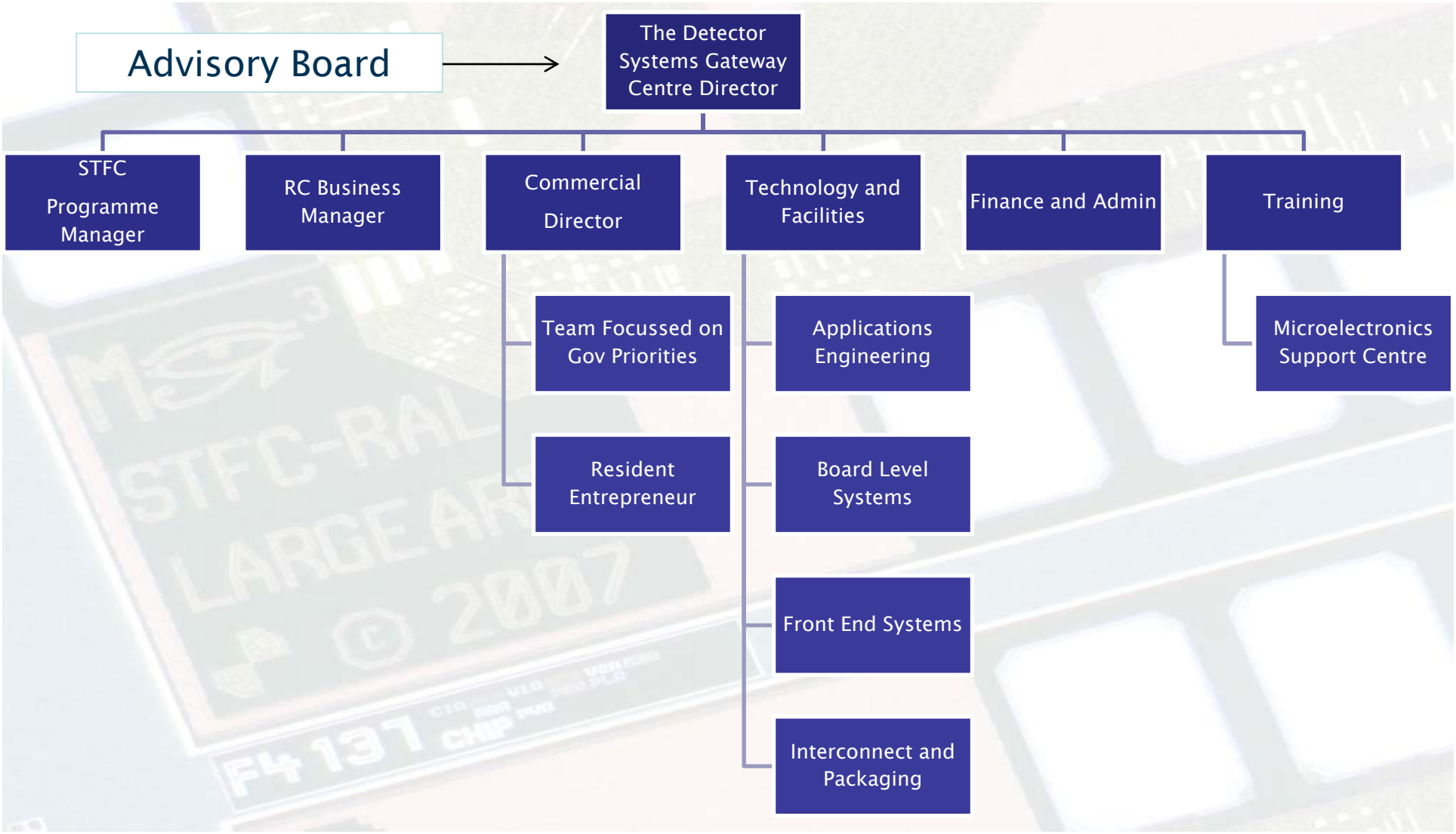
- Oxford protein production facility
- Lasers for science
- CCP4 – software for crystallography
- So Iwata Group
- Simon Phillips Group
- Alex Cameron Group
- Marisa Martin-Fernandez Group
- Life sciences
- Physical sciences
- Engineering sciences

Research Complex at Harwell



Science & Technology Facilities Council

Centre Structure



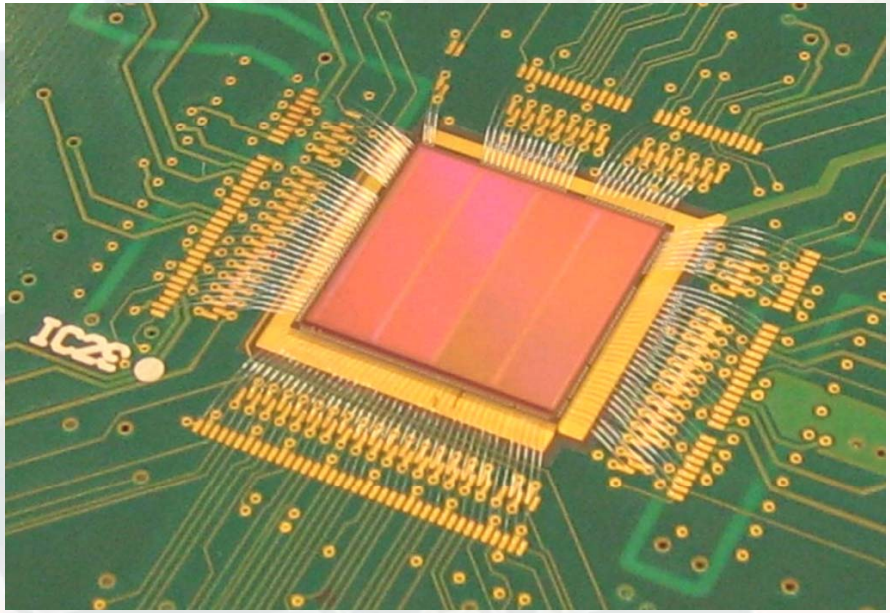
Science & Technology Facilities Council

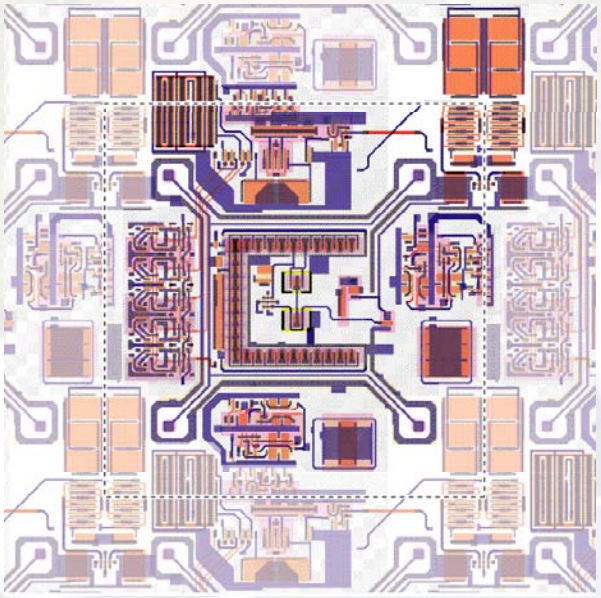
Centre Model

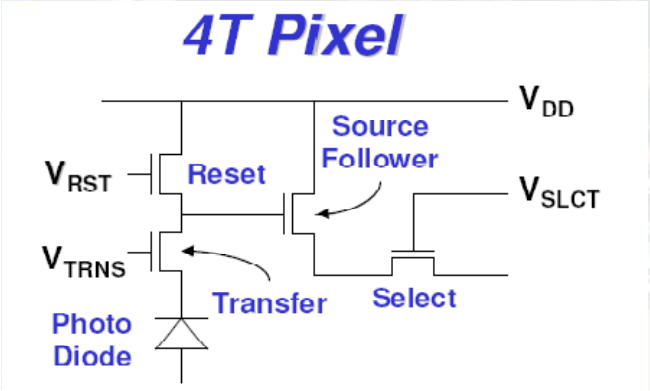
- Advisory Board
  - Technologies to support
- Projects in partnership with industry and HEIs
  - Examples such as Basic Technology and Instrumentation calls
- Summer schools and Topical Workshops
  - Matched to RC and Government Themes
- Doctoral training with HEIs
  - Doctoral Training Centres, CASE Students etc.
- Commercial engagement
  - KTPs and Knowledge Networks

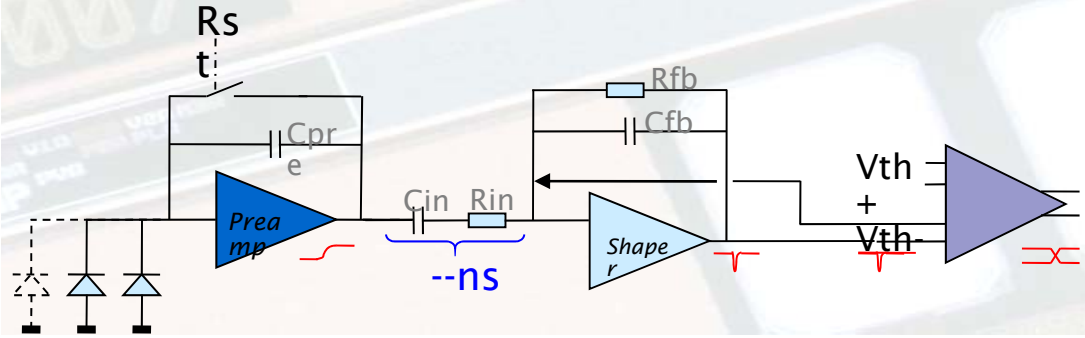
Science & Technology Facilities Council

Novel INMAPs Technology now Applied to PP Applications





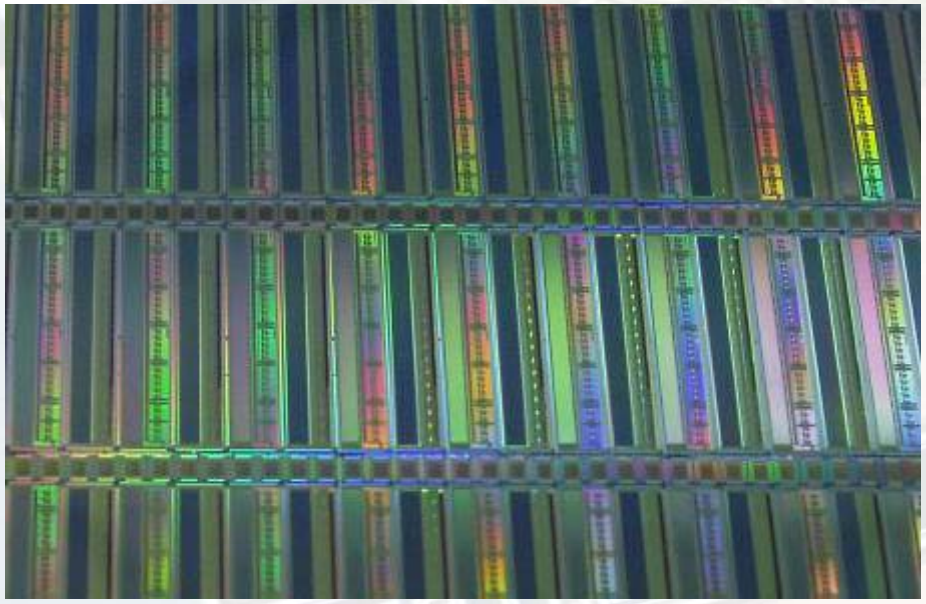


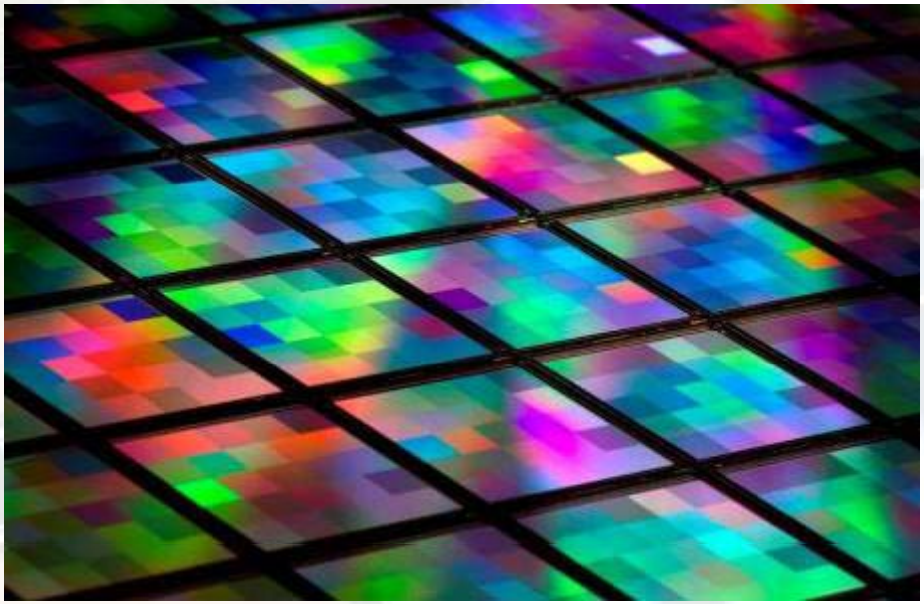


Science & Technology Facilities Council

Examples

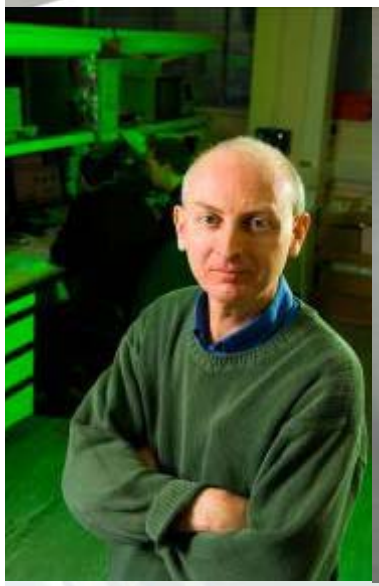
- Examples of innovative Detector projects
- Examples of current projects
- Examples of Capabilities

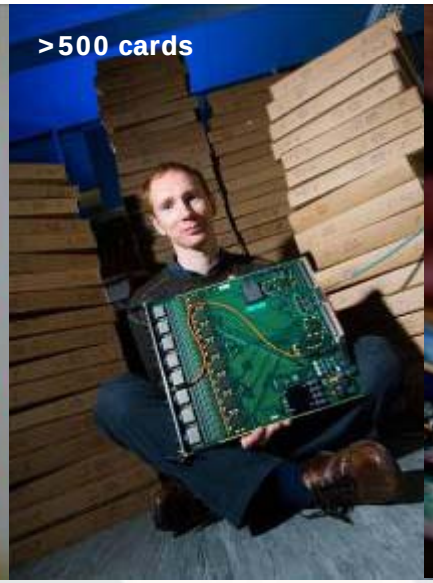




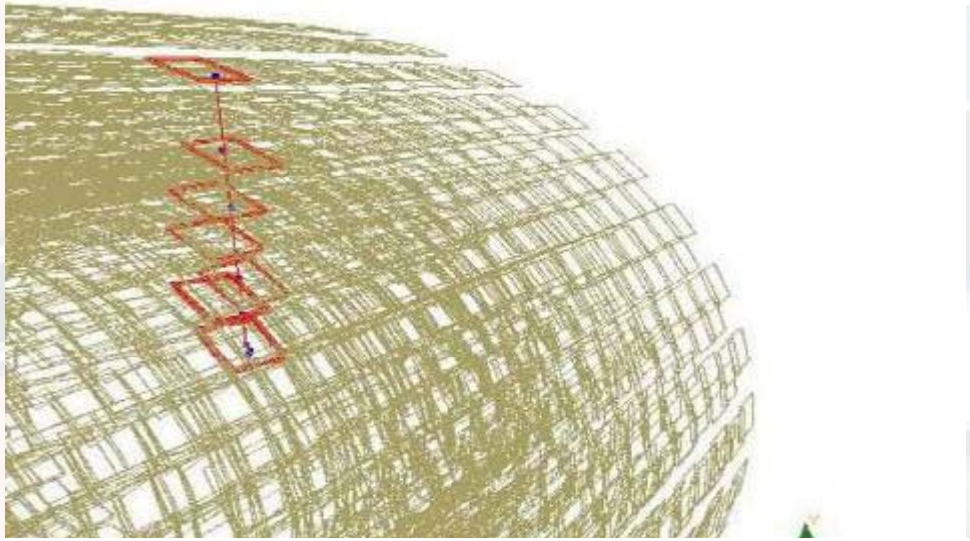
Science & Technology Facilities Council

Data Acquisition Delivery



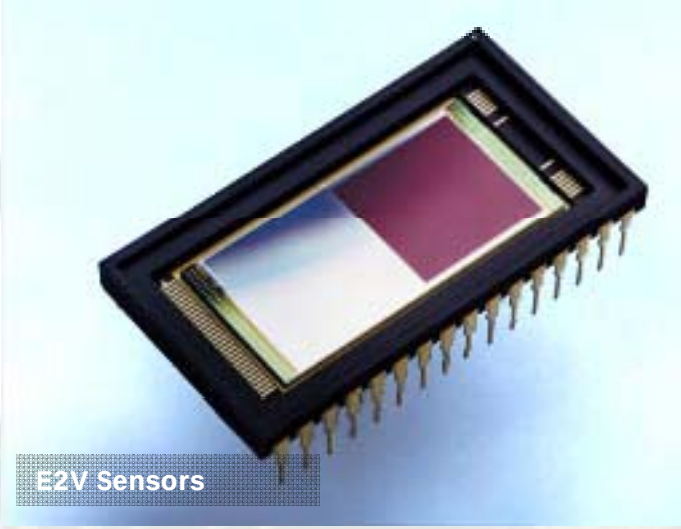


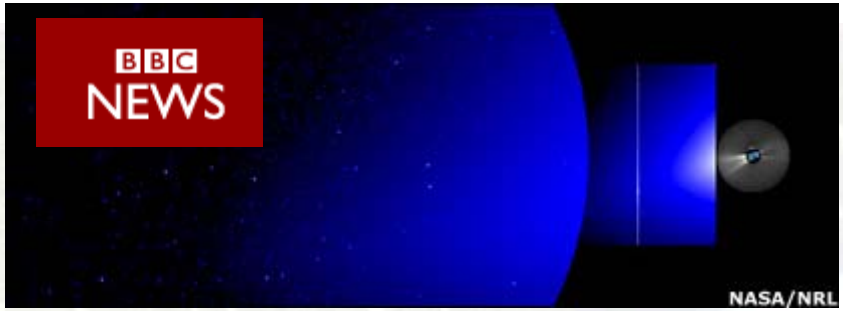
- Collaboration with PPD Imperial College and CERN
- Massively Parallel Processing 10 Tera-bits / sec (~2,000 CDROMs/sec)
- 15 Exa-Bytes of raw input per year!

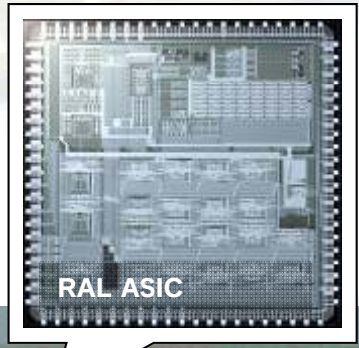


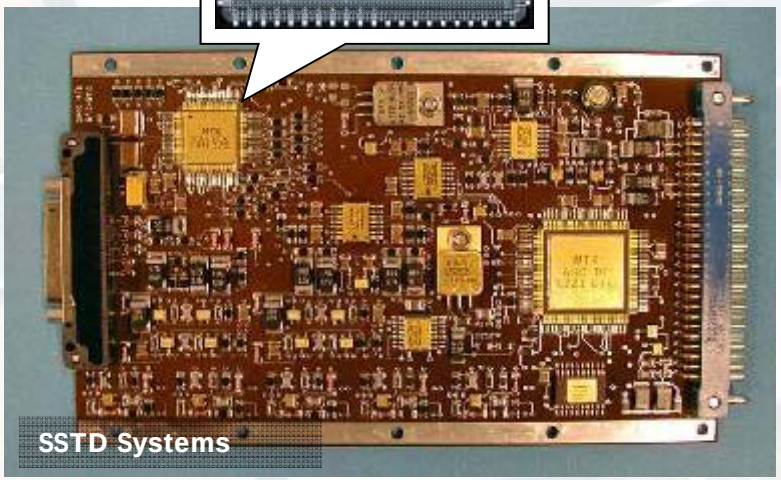
Science & Technology Facilities Council

CCD Imagers









Spacecraft return Sun panoramas

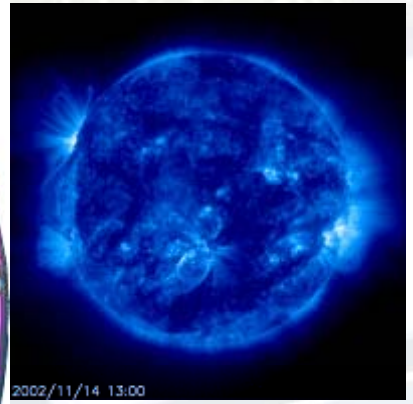
Here we see the entire Stereo panorama from the Sun to the Earth

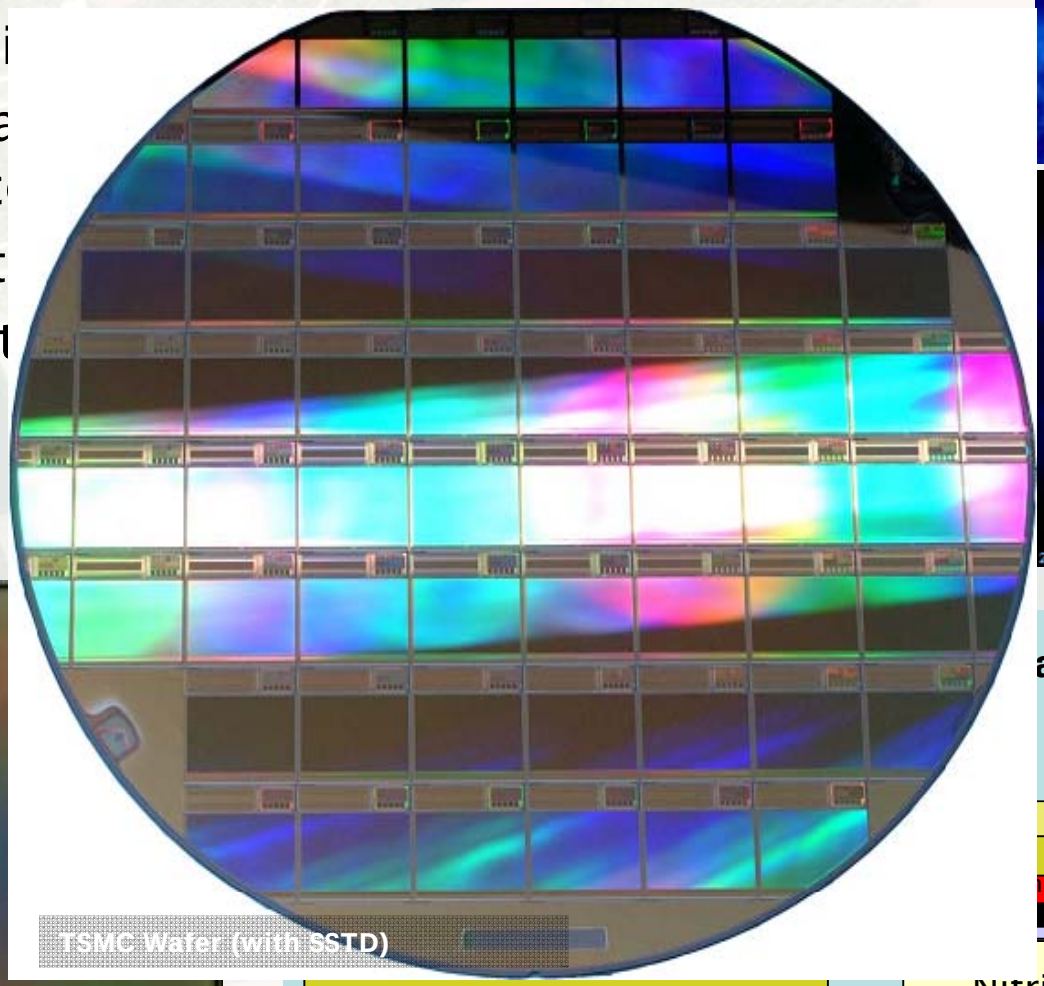
Twin Nasa spacecraft have returned panoramic images that will help scientists to study solar explosions capable of causing havoc on Earth.
The Stereo orbiters, which are nearing their final positions, will study violent solar eruptions known as Coronal Mass Ejections (CMEs). CMEs hurl energetic particles at Earth that can disrupt power grids and satellite communications.
.....

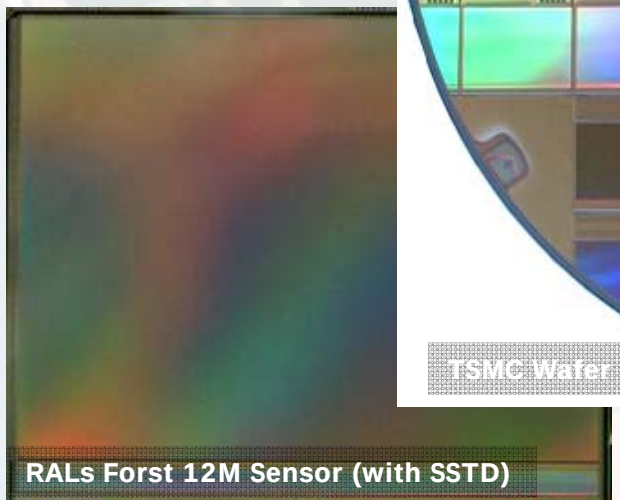
Science & Technology Facilities Council

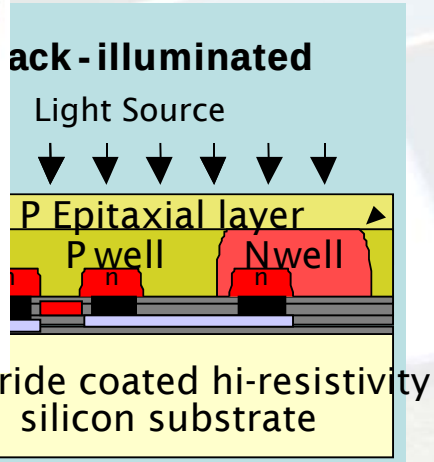
… CCDs Have Limitations

- Solar Orbiter Mission
- 40 solar radii
  - close up a
    spectrosc
- Extreme part
  - preclude t
    detectors




TSMC Wafer (with SSTD)


RALs Forst 12M Sensor (with SSTD)

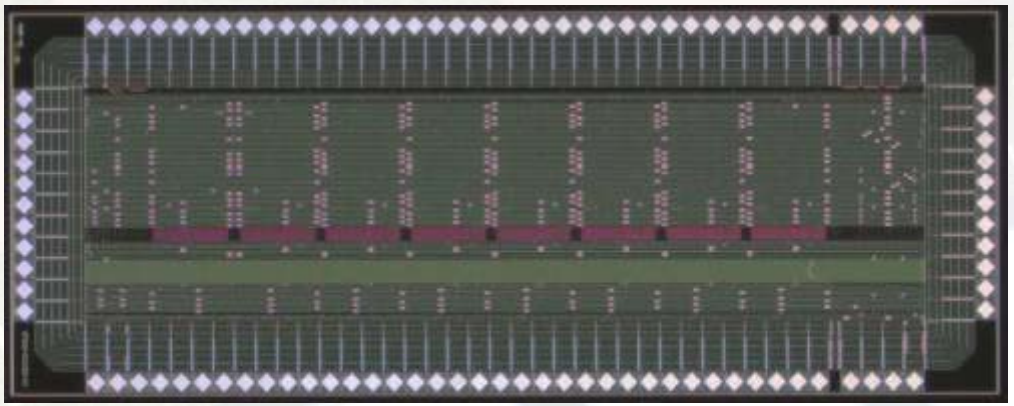


Science & Technology Facilities Council

Space Spectroscopic Imaging

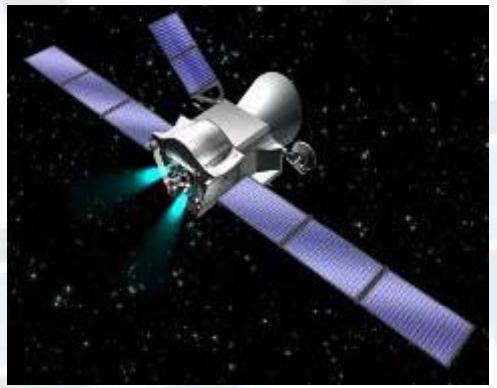
Space ESA Project:

Solar X-ray and Particle incidence spectrometer



- Features
  - Low noise FE
  - Peakhold and comparators
  - 12-bit SAR ADC
  - RAD Hard design
  - SEL and SEU tolerant

ESA Bepi-Columnbo



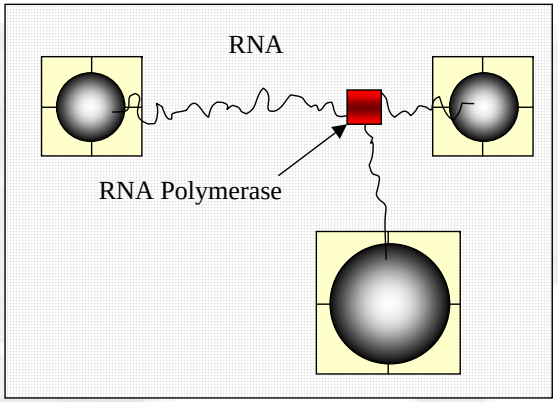
Current NASA Messenger

Science & Technology Facilities Council

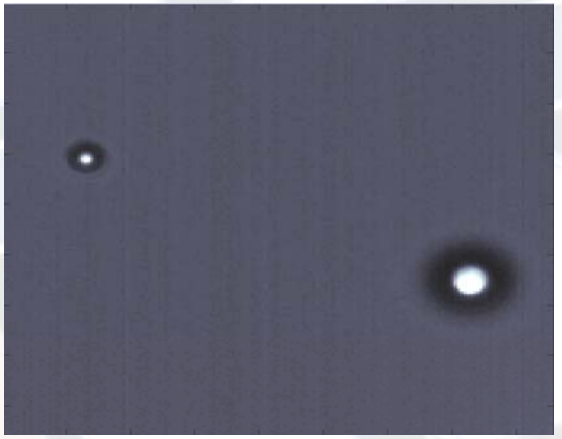
New Applications: Laser Tweezers

Monolithic CMOS imagers (MAPS) combine integrated circuit complexity with imaging pixels. This permits complex sensor functions to be integrated opening many novel application areas:

- Optical traps to capture, manipulate and measure forces on microscopic particles
  - living cells, plastic beads and oil droplets
- Goal:
  - six objects, position measurement and feedback control



One possible use of this technology. RNA is suspended between 2 latex beads held in force feedback. A "repair" enzyme is attached by a polymer to a 3rd bead. The repair forces and transcription can then be followed at sub nanometer level along the length of the RNA by tracking the 3rd bead.

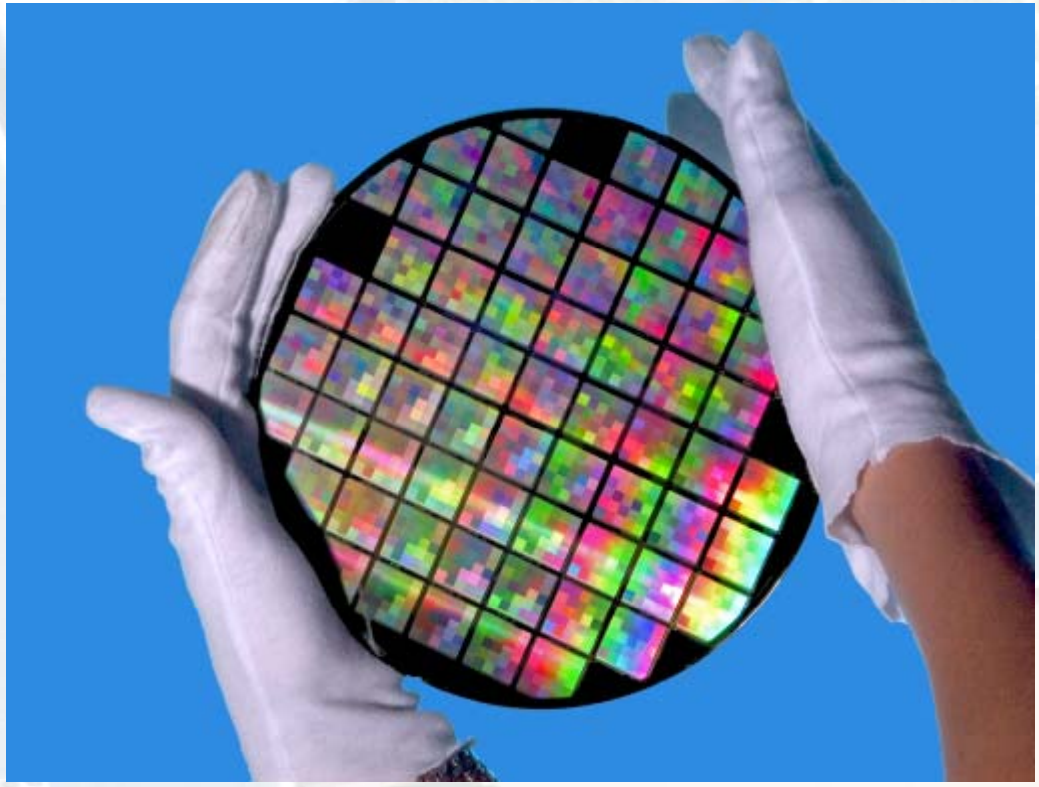


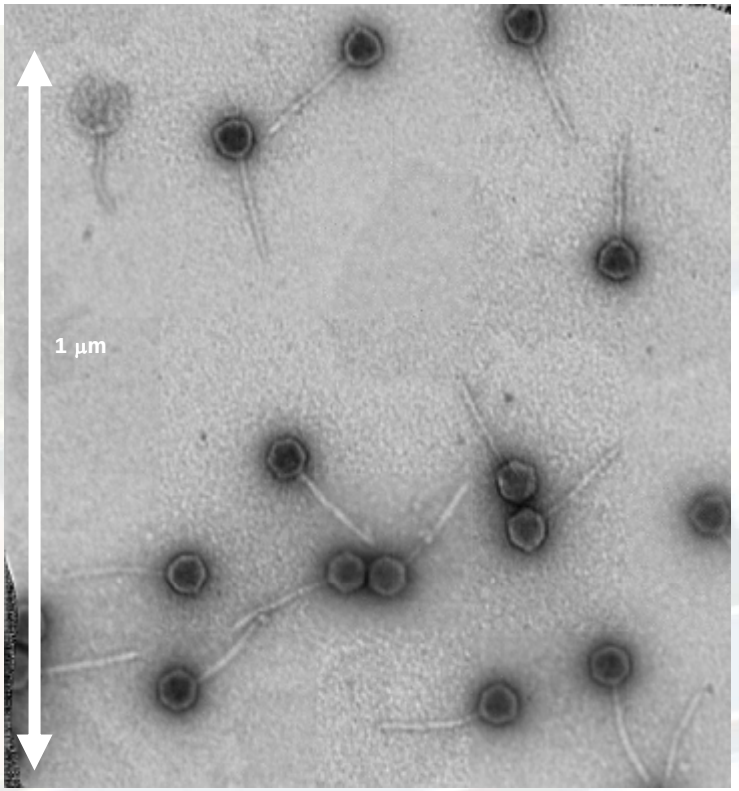
Zoomed Image of 5μm & 2.7μm beads obtained using 512x512 Sensor mounted on microscope.

Science & Technology Facilities Council

Transmission Electron Microscopy

Improved radiation hardness allow direct sensing in applications where CCDs would not survive





One of the first images of a virus (beginning 2007)

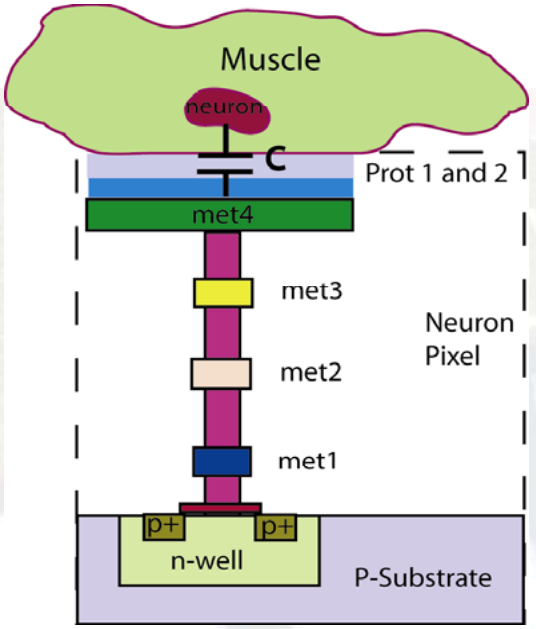
Commercial programme with MRC LMB Cambridge, European suppliers and UK Foundry...

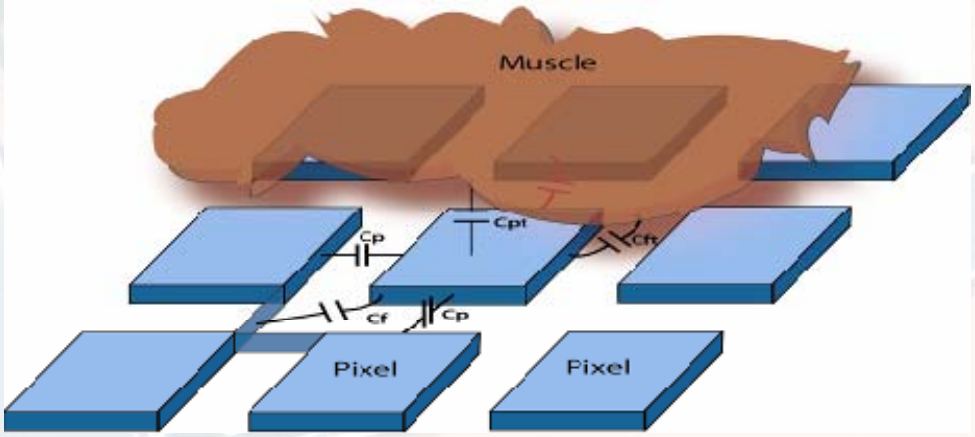
Science & Technology Facilities Council

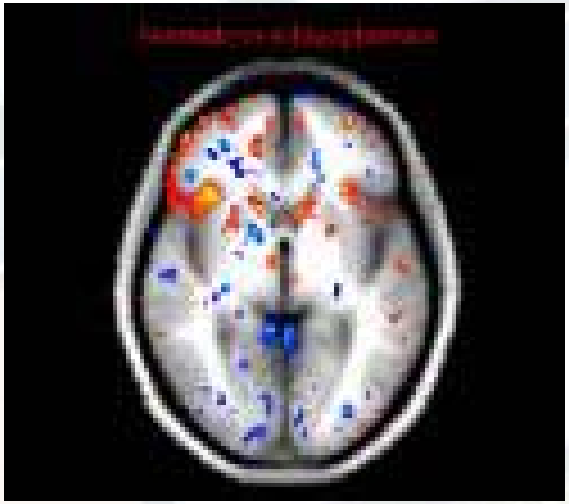
Neural Imaging

- **Neuron APS**

  To study the spiking rate of a large number of neurons in parallel, each neuron being located with good spatial resolution across the surface of the visual cortex and with some depth discrimination.



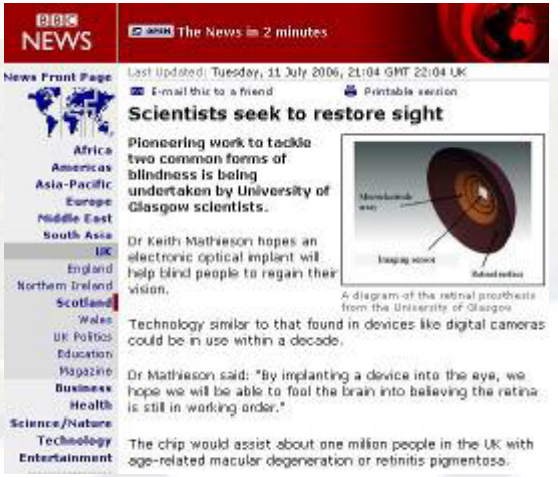




Science & Technology Facilities Council

Retinal Implant

- Artificial retina chip
  - to repair certain types of blindness is now a realistic prospect
- RAL and Glasgow Project
  - to develop a prototype retinal implant APS
- Study in-vivo measurements of retinal activity with APS technology
- First implementation of 'smart' neural encoding
  - With on chip neural network


BBC NEWS

The News in 2 minutes

Last Updated: Tuesday, 11 July 2006, 21:04 GMT 22:04 UK

E-mail this to a friend Printable version

Scientists seek to restore sight

Pioneering work to tackle two common forms of blindness is being undertaken by University of Glasgow scientists.

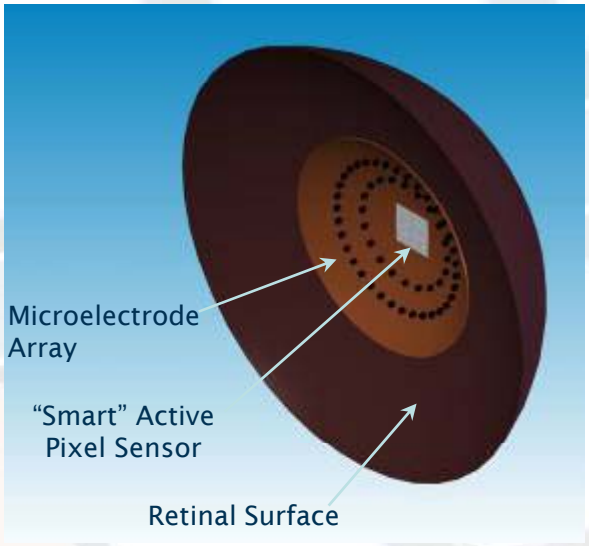
Dr Keith Mathieson hopes an electronic optical implant will help blind people to regain their vision.

A diagram of the retinal prosthesis from the University of Glasgow

Technology similar to that found in devices like digital cameras could be in use within a decade.

Dr Mathieson said: "By implanting a device into the eye, we hope we will be able to fool the brain into believing the retina is still in working order."

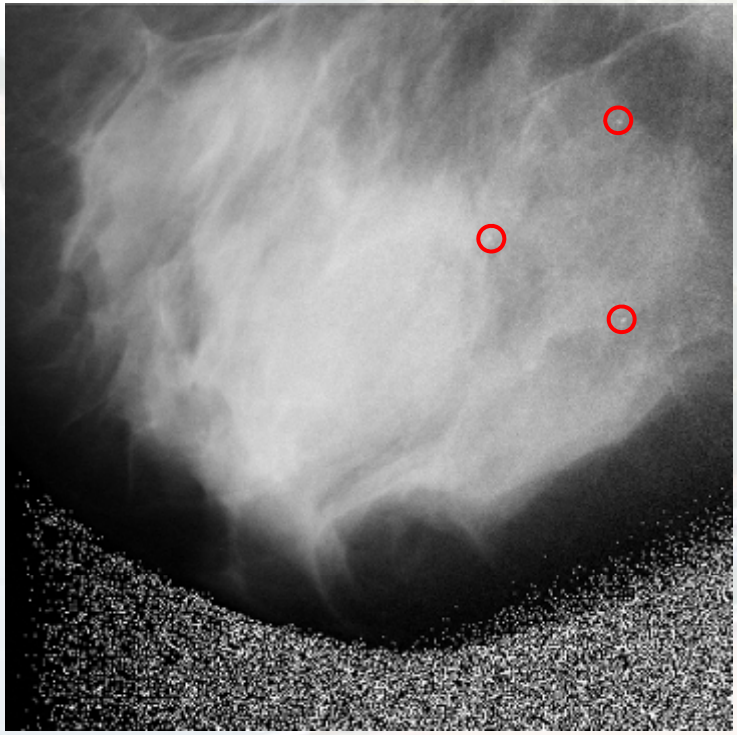
The chip would assist about one million people in the UK with age-related macular degeneration or retinitis pigmentosa.

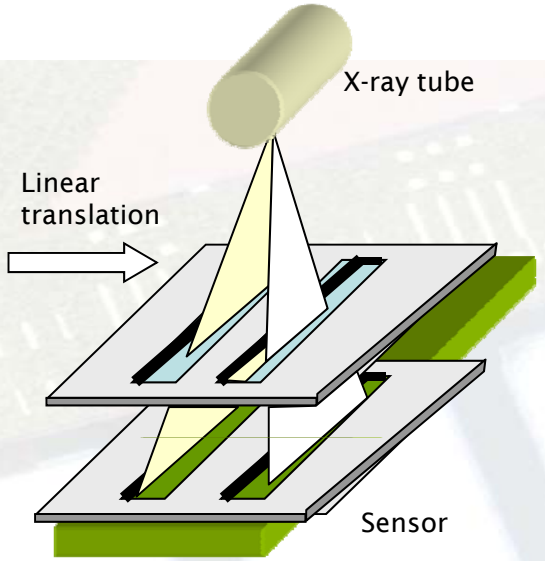


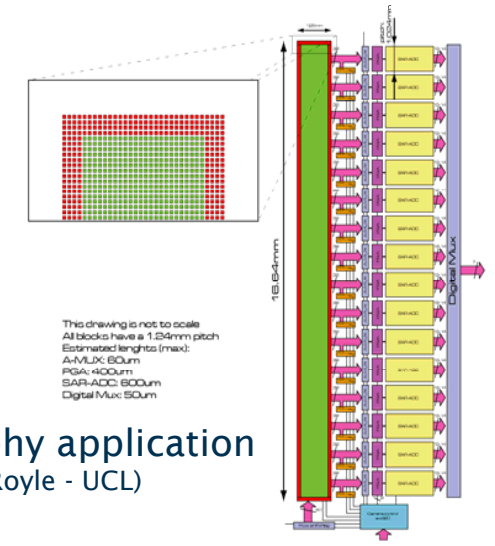
An artistic impression of an in-situ retinal implant APS

I-Imas – Intelligent Medical Imaging

- Intelligent X-ray screening scans
- European collaboration
- Industrial and university partners







Example of mammography application
(image courtesy of Gary Royle - UCL)

Science & Technology Facilities Council

MAPs and Basic Technology

M3

Nigel M Allinson
University of Sheffield, UK

Multidimensional Integrated Intelligent Imaging (MI-3)

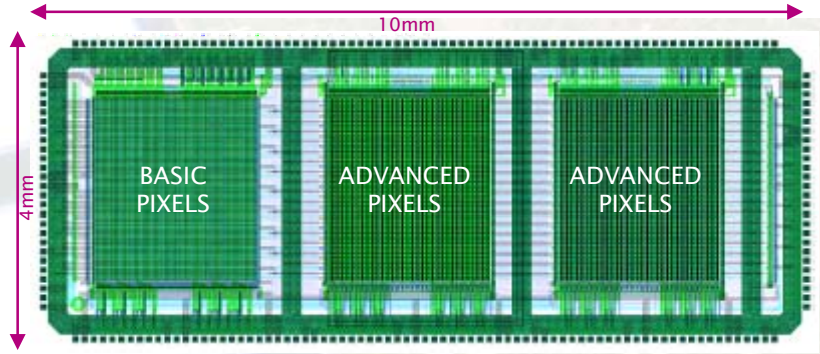
Giving Science a New Image

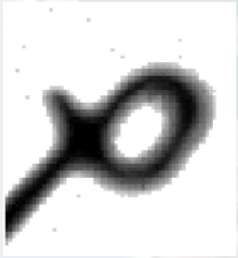
- RC-UK Basic Technology programme
- £4.4m (6.5 mecu) budget over 4 years
- 11 partner consortium
  - University of Sheffield (Laboratory for Image and Video Engineering)
  - CCLRC (Microelectronics Design)
  - Brunel University (Centre for Electronic Imaging)
  - University of Glasgow (Particle Physics Experimental Group)
  - University of Liverpool (Liverpool Semiconductor Detector Centre *and* Laboratory for Environmental Gene Regulation)
  - University College London (Radiation Physics Group)
  - University of Surrey (Centre for Vision, Speech and Signal Processing)
  - University of York (Applied Electromagnetics and Electron Optics Group)
  - Institute of Cancer Research, Royal Marsden Hospital
  - MRC Laboratory of Molecular Biology, Cambridge

The University Of Sheffield.

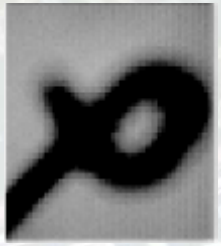
MI3 Sensor Developments

- In Pixel Intelligence: OPIC



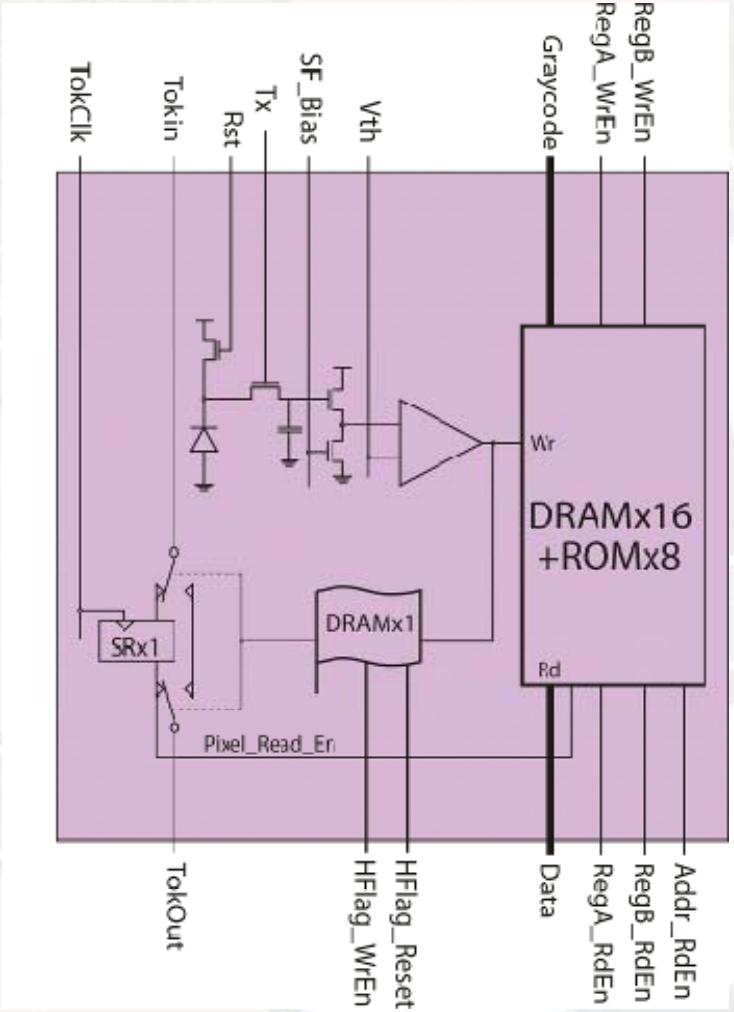


In-pixel ADC



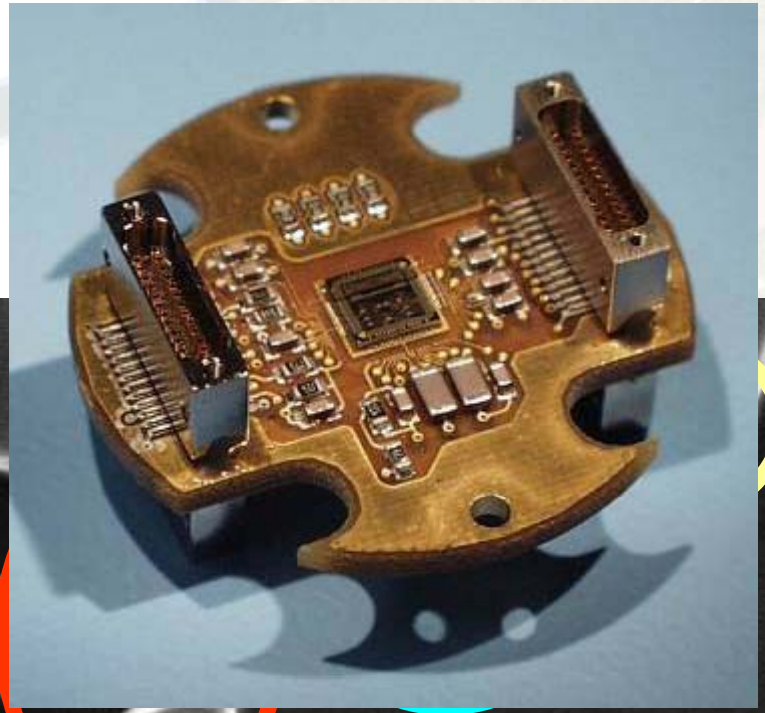
Timing mode capture

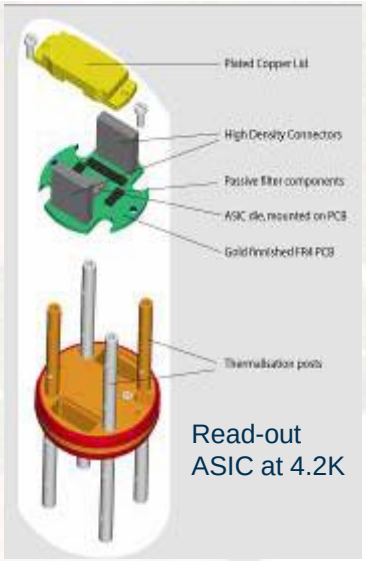
In-pixel thresholding



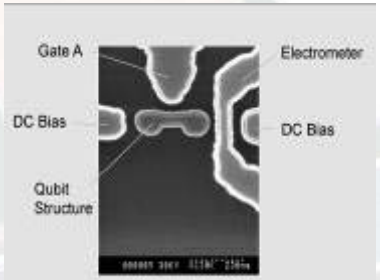
Science & Technology Facilities Council

To Electronics Research





Read-out ASIC at 4.2K



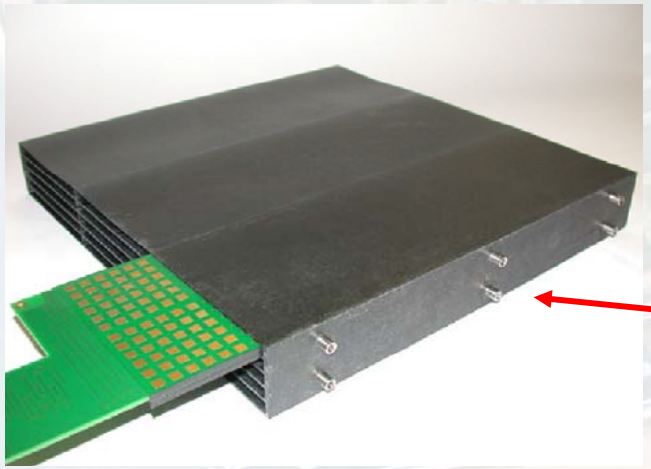
Nanostructure at <50mK

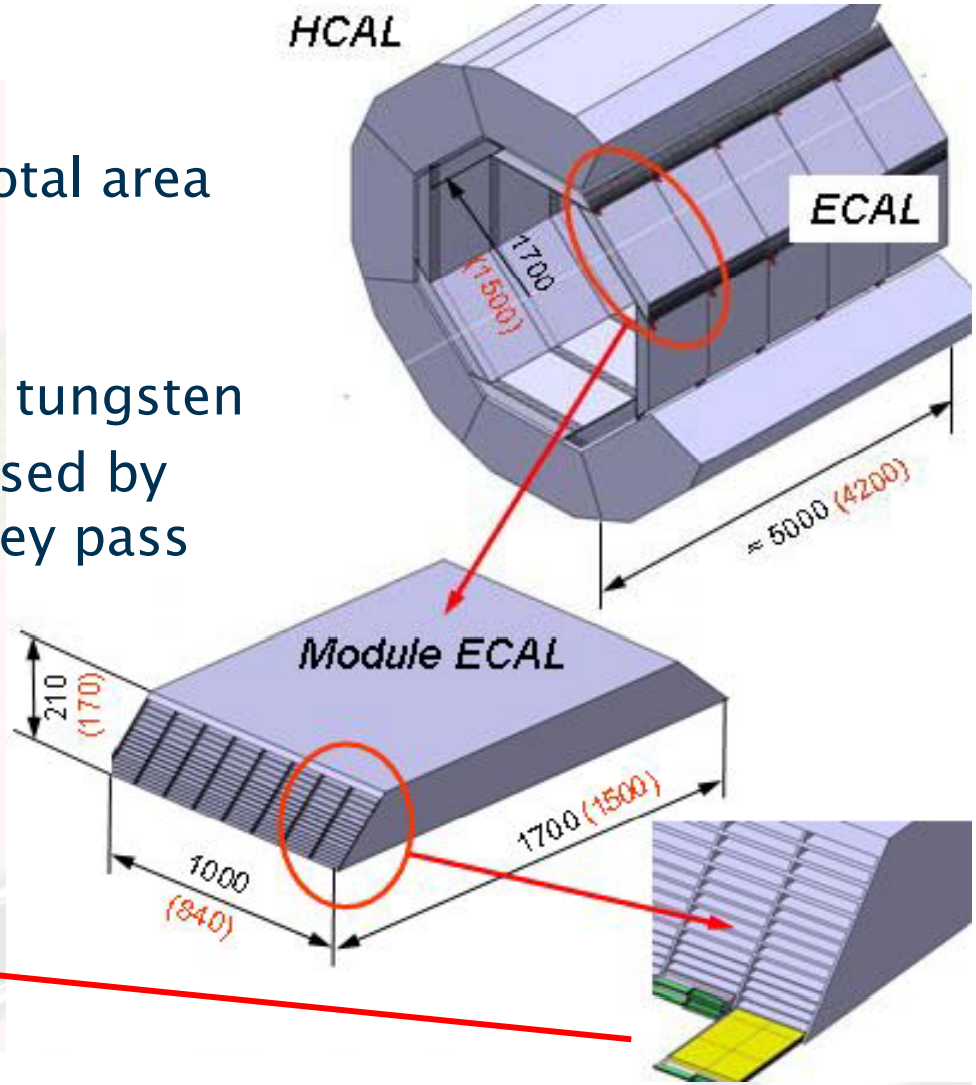
University of Oxford · UNIVERSITY OF CAMBRIDGE · HITACHI Inspire the Next · Science & Technology Facilities Council · OXFORD INSTRUMENTS · EPSRC

Science & Technology Facilities Council

A Return to Particle Physics?

- **MAPS for the Linear Collider**
  - Large "stitched" sensors, total area ~2000m^2
  - 30 layers of silicon
  - Layered between sheets of tungsten
  - Detect and store "hits" caused by high energy particles as they pass through the metal



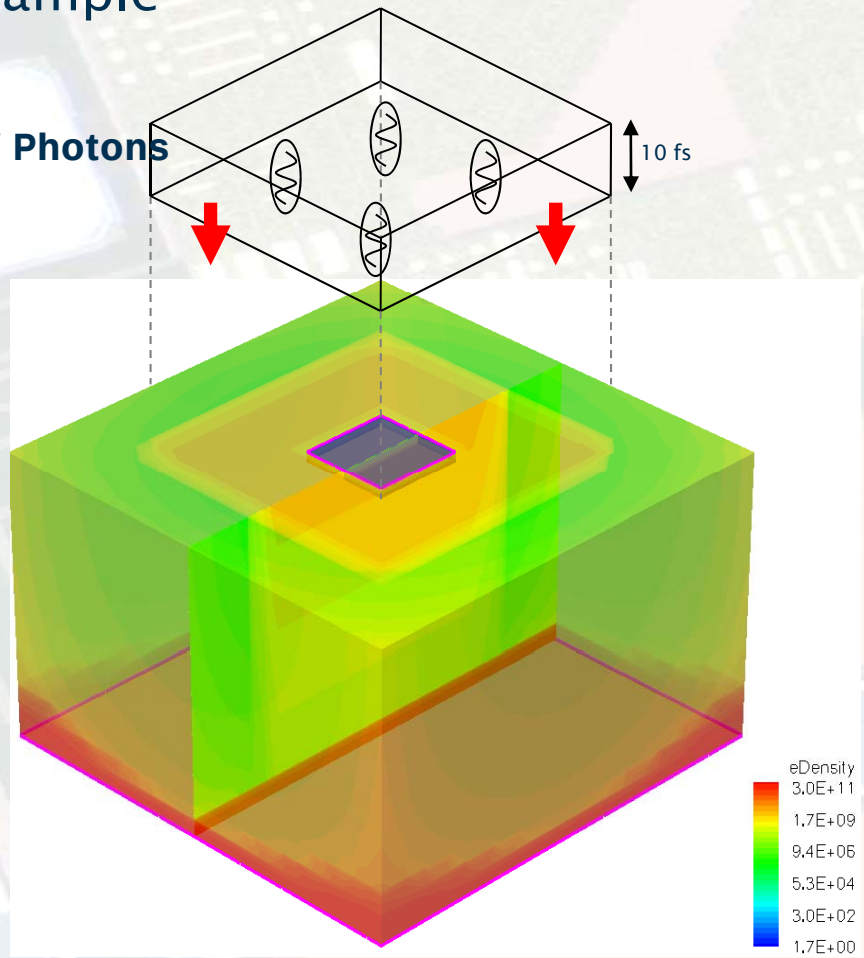


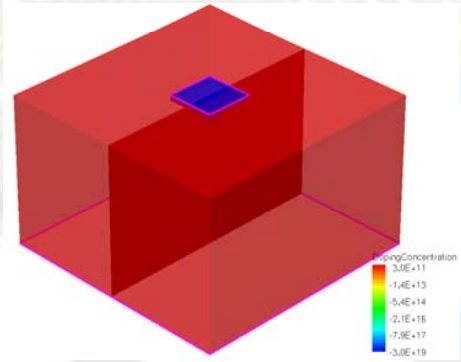
Science & Technology Facilities Council

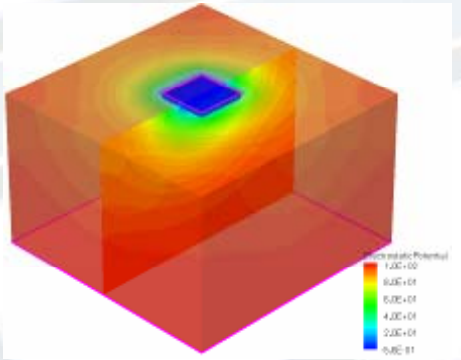
Sensor Device Modelling (Link to Hartree)

XFEL example

10^5 12KeV Photons





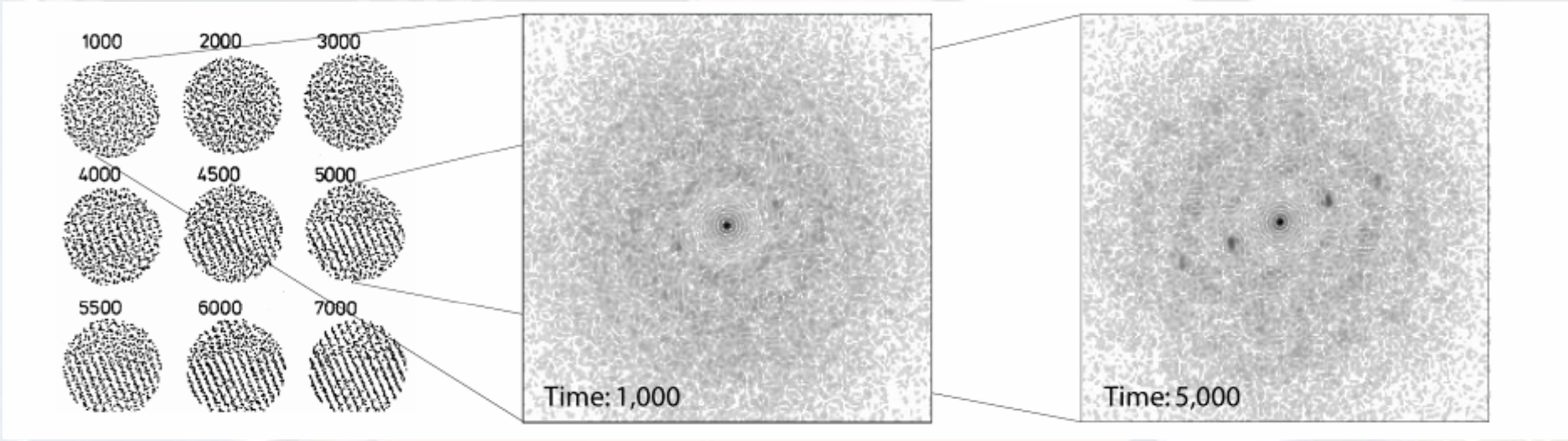


Science & Technology Facilities Council

One Future Challenge:

- FEL sources deliver bright short pulses of radiation

Scientists want to 'Film' fast materials process, e.g. the freezing of liquids in real time



Science & Technology Facilities Council

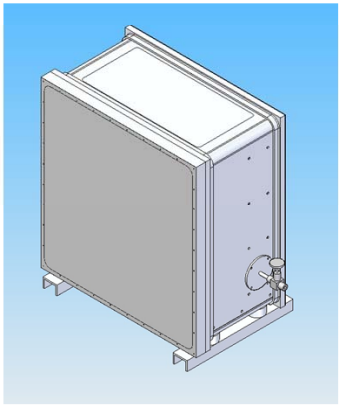
XFEL Pixel Detector

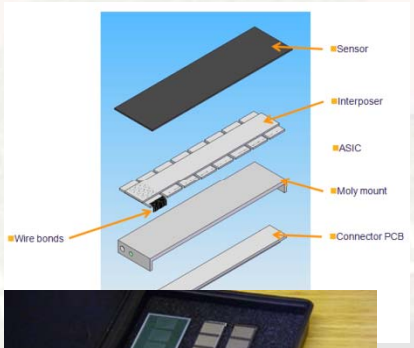
LPD Mechanical Design: Detector head sketches (13/March/09)

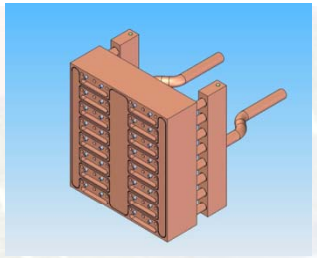
European XFEL

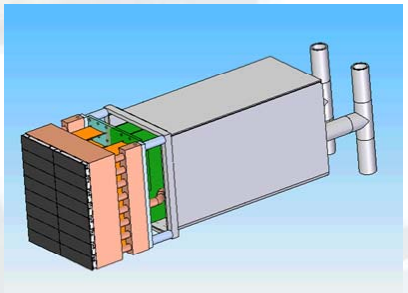
The Mega Pixel Arrangement

- 0.528m x 0.576m sensor surface
- 1,024 x 1,024 - 500um pixels
- Nominal 300um between sensors
- Target sensor operating temperature -20 ºC
- Total Power dissipation 3 to 5 kW
- Divided into 16 supermodules
- Supermodule has 16 sensors
- Aluminised Rhocell window









Similar Issues:

ASIC development – 0.13 um?

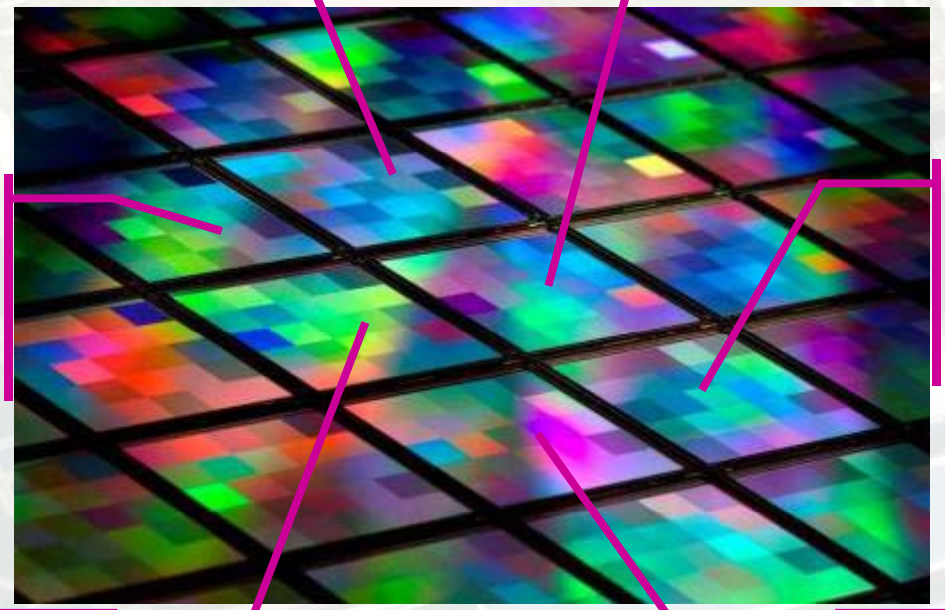
Hybridisation, Test, Cooling, Materials, Radiation hardness, Power....

Science & Technology Facilities Council

Future Imaging

Spectral Range
- Low energy HgCdTe
- High energy CdZnTe, HgI

Complexity
- Pixel Density
- Novel functions: ADC, memories etc.



Dynamic Range
- Fast pulsed sources
- Combined count and integration

Timing
- Ultra-fast framing
- Deep in pixel storage

Nano-Technology
- Novel sensors
- Active surfaces

Materials
- Advanced interconnect
- Bio compatibility
- Scintillators

Science & Technology Facilities Council

Centre Mission

a) Champion the UK development and delivery of world-leading instrumentation systems

b) Maximise the knowledge exchange of sensor technology with UK industry

c) Focus the engagement of the UK university and STFC research groups on a portfolio of sensor development programmes

d) Provide a centre for STFC and HEI collaborations, training, european and world-wide projects

e) Strengthen the contribution of UK industry in large science programmes world-wide and

f) Enable early adoption of new sensor technology in the UK

Science & Technology Facilities Council

Business Objectives

- Deliver gearing of STFC investment in EI programmes
  - Tightly linked into STFC's programmes
  - Undertake road mapping of technology for future programmes
- Provide an expert systems service for:
  - Students
  - Academic Users
  - Industrial Researchers, particularly Campus ones
  - STFC's scientific programmes
- Complimentary to University Groups and industry
  - Not in 'competition'
  - Linked to key technologies available in Uni Groups

Science & Technology Facilities Council

STFC Project Team

- Marcus French – Team Lead
- Roger Eccleston – TBU Lead
- Steve Worm – Leads the Centres
- John McLean – Microelectronics (and the MSC)
- Barry Dobson – Science input
- Richard Farrow – KE lead, Technology Department
- Kate Ronyane – CLIK support
- Dave Bogg – Estates issues,DL
- Vraj Perera – Estates issues, RAL
- Linda Baines – Legal advice

- An Advisory Board has also been formed…

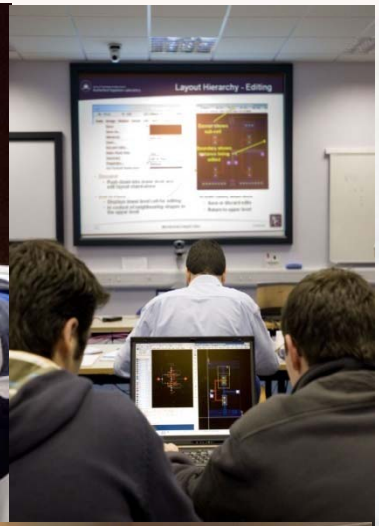
Science & Technology Facilities Council

Advisory Board

- Prof. Nigel Allinson Sheffield University
- Prof. Phil Allport Liverpool University
- Dr. Trevor Cross CTO e2v technologies
- Prof. Jim Dunlop Edinburgh University
- Dr. Heinz Graafsma DESY/XFEL
- Prof. Geoff Hall Imperial College
- Dr. Val Oshea Glasgow University
- Prof. Trevor Rayment Diamond Light Source
- Dr. Paul Sellin Surrey University
- Dr. Peter Sharp (chair) CERN/Imperial College
- Prof. Steve Watts Manchester University

Science & Technology Facilities Council

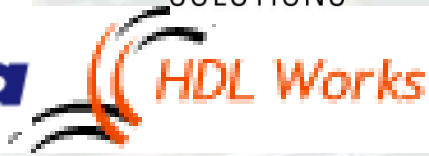
Microelectronics Support Centre



Over 25 year history supporting UK Academic Institutions with microelectronics design methodologies, tools and routes to implementation

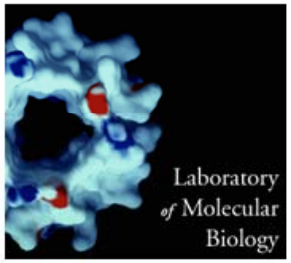
Science & Technology Facilities Council

Microelectronics Strategic Partnerships



Science & Technology Facilities Council

CMOS Imaging Strategic Partnerships



UNIVERSITY OF CAMBRIDGE
UNIVERSITY OF OXFORD
Imperial College London
UNIVERSITY OF BIRMINGHAM
UNIVERSITY OF LIVERPOOL
The University Of Sheffield.
Brunel UNIVERSITY WEST LONDON
UCL
University of Glasgow
UniS University of Surrey Guildford
Science & Technology Facilities Council Technology
SINTEF
The Institute of Cancer Research
MAX-PLANCK-GESELLSCHAFT
Università degli Studi di Trieste
e2v
ΕΘΝΙΚΟΝ & ΚΑΠΟΔΙΣΤΡΙΑΚΟΝ ΠΑΝΕΠΙΣΤΗΜΙΟΝ ΑΘΗΝΩΝ
INFN
aspect systems
Image Scan
APPLIED SCINTILLATION TECHNOLOGIES
ACTA
austriamicrosystems
3DX-RAY
XFAB
tsmc
IBM
TSL TOWER SEMICONDUCTOR LTD.

Science & Technology Facilities Council

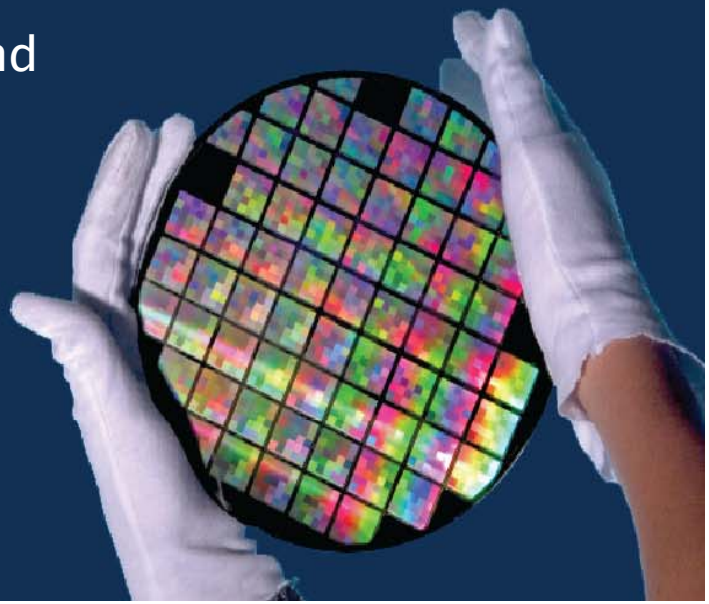
The Detector Systems Centre

An open innovation Centre dedicated to the development of new innovative detector systems

Providing industry, the universities, and the science and technology research disciplines with improved access to world class detector systems and sensor technology

Engaging over 100 of STFC's leading scientists and engineers in a new innovation environment

The UK focus for access to an extensive range of advanced detector technologies and training in their development and application



Science & Technology Facilities Council

The Detector Systems Centre

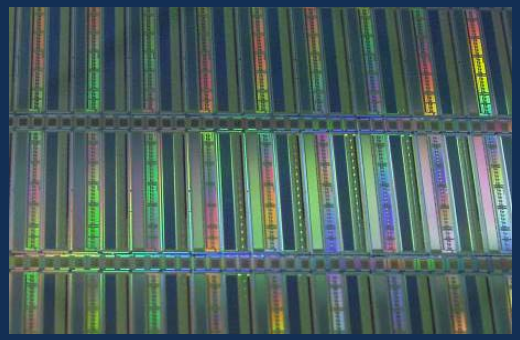
Education, training and knowledge exchange activities will be provided at the Centre.

Facilitate the co-location of STFC, university and industry teams and with the Innovation Campuses to establish start up companies in close proximity to the Centre, and

Include a dedicated marketing team to ensure that the growth potential and economic impact of the Centre are maximised.

Science & Technology Facilities Council

Centre Strengths



Microelectronics

Training

Interconnect Technology

Systems Design

Science & Technology Facilities Council

DSC Summary

- An open innovation environment in detector technology
- Linked to Government priorities:
  - Bioscience, Healthcare, Security etc
- Building headroom to maximise STFC economic impact
- Engag
- Drivin RCUK

This is evolving:

Input and Ideas welcome!

See http://www.stfc.ac.uk/dsc

http://www.stfc.ac.uk/dsc

Questions Please