Centre for Instrumentation

An Introduction

7th September 2011

Mick Johnson, CEOI Director

What is the CEOI?

- UK Space Agency initiative to boost UK capability and remain at the forefront of EO technology for space.
- Launched in 2007 (NERC and DIUS/TSB)
  - parallel industry investment, total approx £1.5M pa
- Programme focus on:
  - development of new EO instrumentation and technologies
  - horizon scanning and knowledge exchange
  - building highly capable academia/industry partnerships
  - training for next generation scientists and technologists
- Partnership led by Astrium with QinetiQ, STFC/RAL and University of Leicester

Objectives of CEOI

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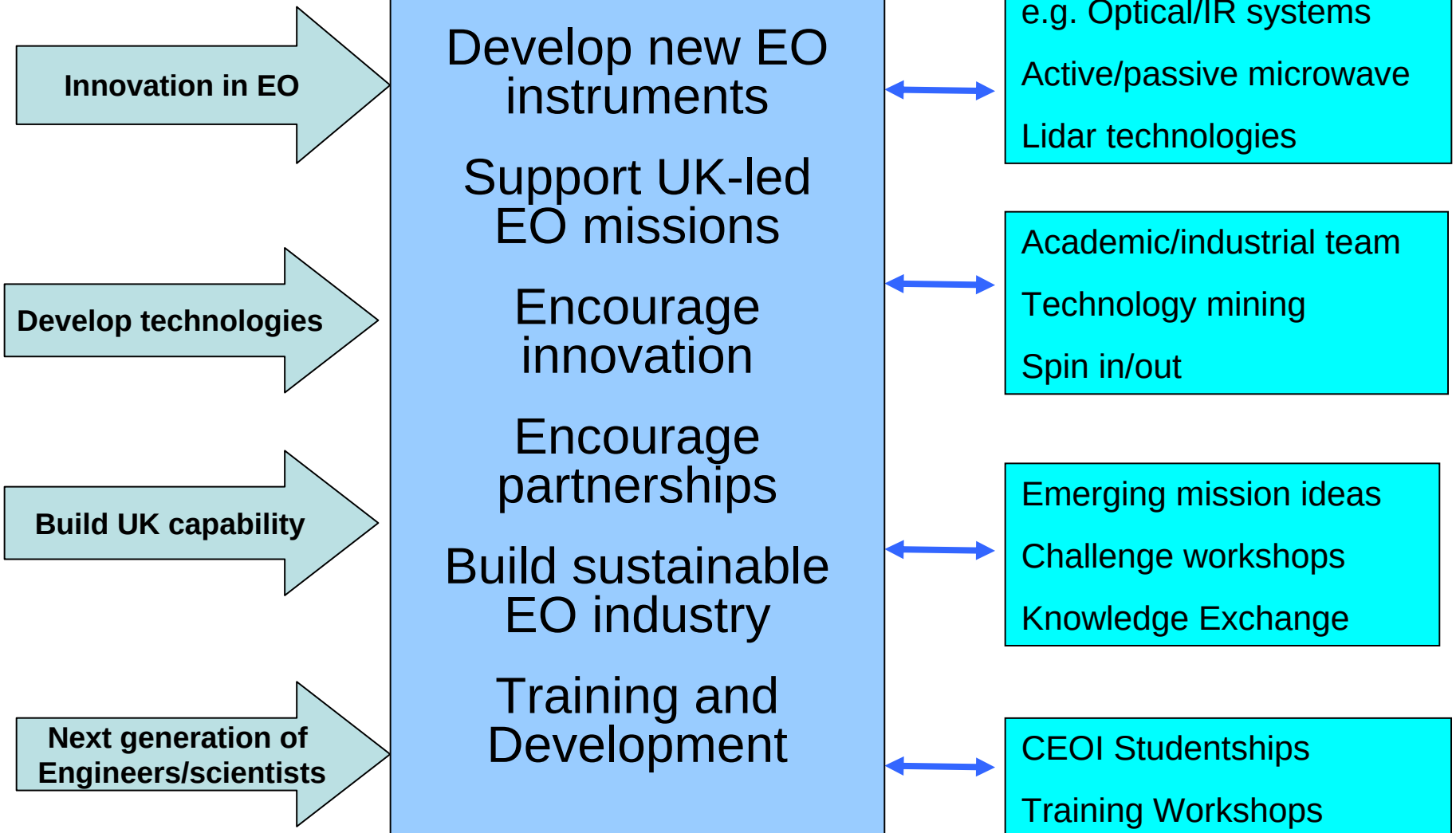
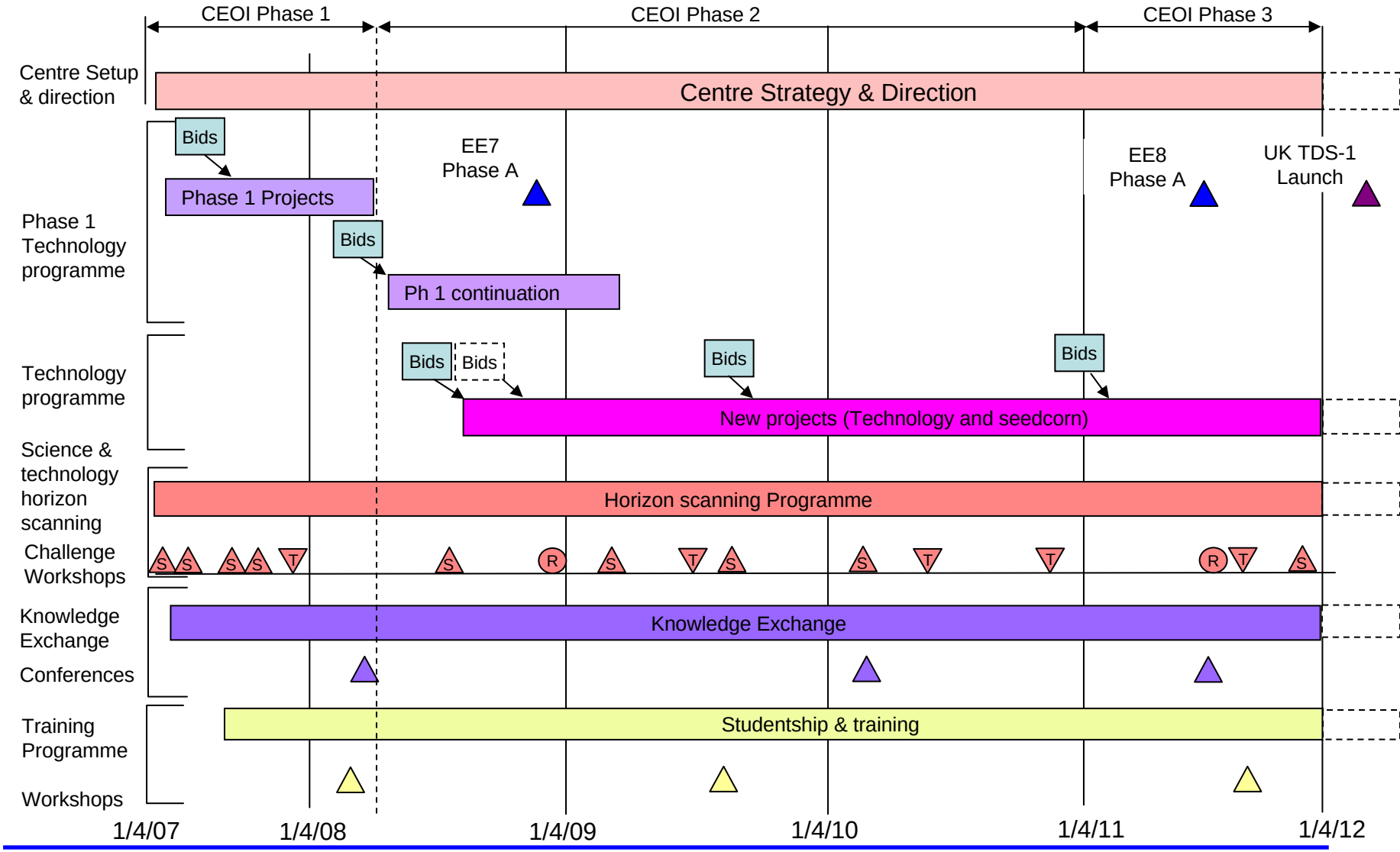


Science Driven <–> Project Based

Overall Programme



CEOI Technology Developments

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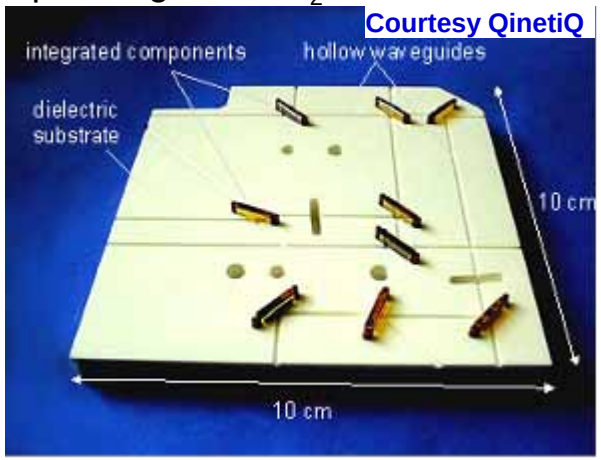
LIDAR technologies in 1.5-2.5 µm range for CO_2 measurement

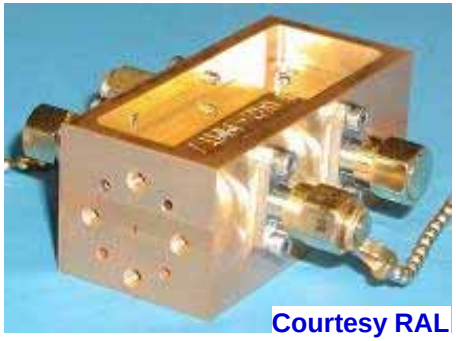


Integrated Optics Hollow Waveguide

QinetiQ with Uni. Of Leicester and CTCD

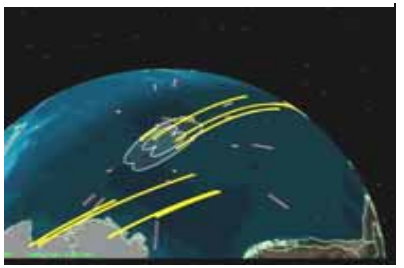
Millimetre wave radiometric sounding of the atmosphere

STFC/RAL with Astrium and QUB



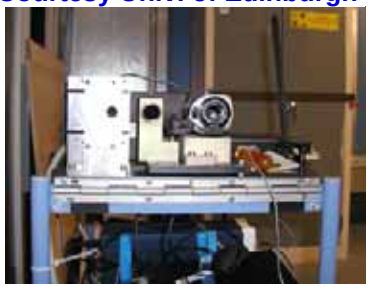
SHIRM 360 GHz image separator mixer using Schottky diode technology

GNSS Reflectometry



SSTL with NOCS, Univ. of Surrey & Univ. of Bath

Courtesy Univ. of Edinburgh



Multispectral Canopy LiDAR

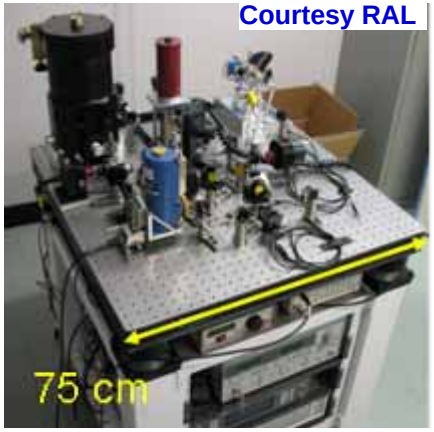
Univ. of Edinburgh with Selex Galileo

Courtesy SSTL

Univ. of Leicester with SSTL and Astrium

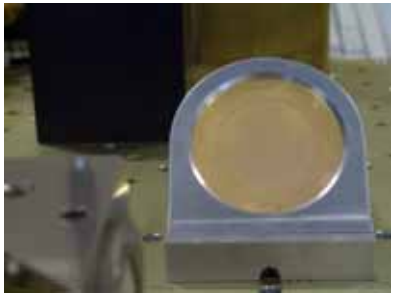
Spectrometers and detectors in UV/Vis/NIR for atmospheric composition measurement

STFC/RAL with Astrium



Laser heterodyne sounding in 4-150 µm range

Queens University Belfast



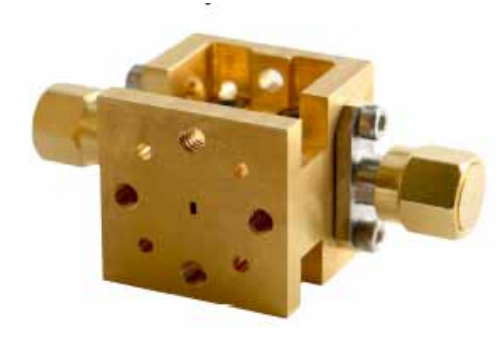
Frequency Selective Surface Filter

CEOI 4th Open Call

New Mainstream Projects

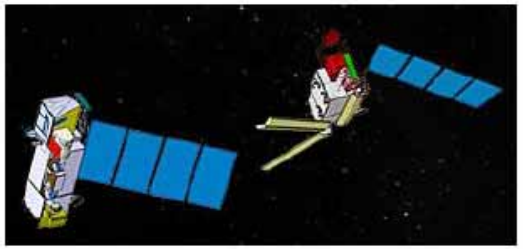
STEAM-R Technology Advancement (STFC RAL, Astrium)

- Raise the SHIRM device to TRL-5 in accordance with ESA requirements
  - Further SHIRM design iteration
  - TRL-5 environmental qualification programme
  - Modelling of measurement scenarios
  - Additional hardware to interface to DAC at UBern



Passive Microwave Technologies for MetOp 2nd Generation Astrium, JCR, RAL, SEA)

- Technologies for the microwave conical-scan imaging instruments for MetOp-SG B satellite. Launch ~2020.
  - Calibration subsystems design & analysis
  - Quasi-Optics design and analysis
  - Receiver breadboard tests (183GHz)
  - Active scan balancing subsystem design & analysis
  - Active balance mechanism breadboard test.



New Seedcorn Projects - 1

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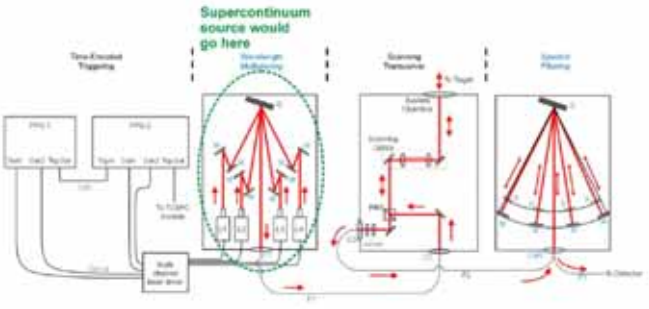
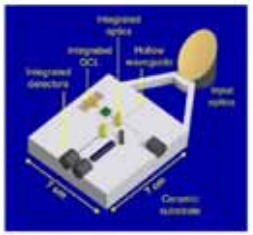
Hyperspectral Lidar (Heriot Watt, U Edinburgh, Selex)

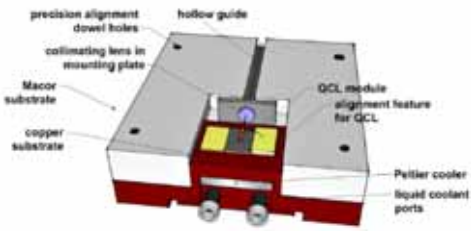
- Builds on prior CEOI work for a LIDAR instrument to measure forest canopy structure
- Will build hyper-spectral LIDAR instrument based on existing photon-counting system
- Will conduct ground and above canopy field trials, with comparison with independent ground-based measurements



Miniature LHR (STFC RAL, Hollow Waveguide Ltd)

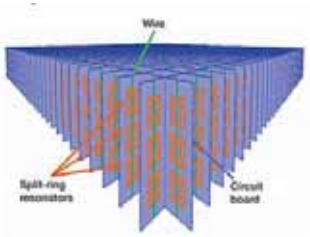
- A continuation towards fully encapsulated miniature Quantum Cascade Laser Heterodyne Radiometer
- Will integrate both a quantum cascade laser, and an optical detector in separate hollow waveguide modules

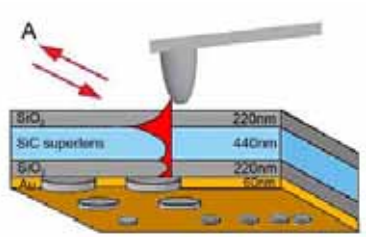




Meta-materials for Quasi Optical Systems (Astrium and QMC)

- examines the use of the resonant structures known as meta-materials, for the matching of elements in quasi-optical systems.

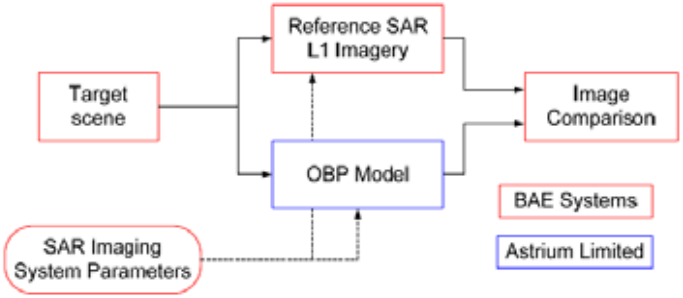




New Seedcorn Projects - 2

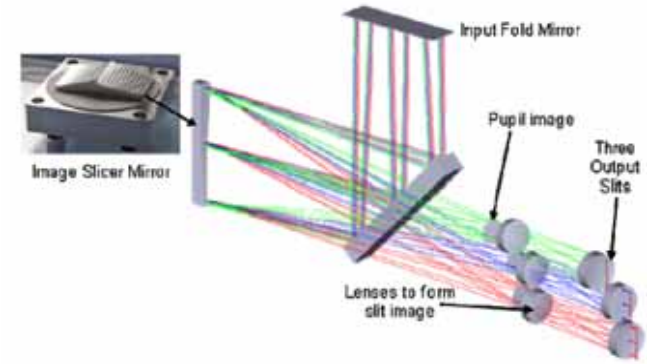
SAR On-Board Processing (Astrium, BAE Systems ATC)

- Design of an on-board SAR processor architecture to allow Level 1 processing for the Wavemill mission concept.
- The aim is to provide an accurate qualitative and quantitative description of a processor



PERSIST (U Edinburgh, UK ATC)

- Builds on prior CEOI work in image slicer technology for greenhouse gas spectroscopy
- Based on MIRI concept, but each sliced spectrum will examine a different spectral range.
- Breadboard to be constructed



Wideband Spectrometer (STAR-Dundee, STFC-RAL, Astrium)

- Will examine performance of a novel THz digital spectrometer design for atmospheric chemistry applications.
- The digital unit will be connected to the MARSCHALS submm wave airborne radiometer receiver to produce a full THz testbed

CEOI Meetings and Workshops

Event	Date	Place
Joint NCEO/CEOI Conference	5-8 Sep 2011	Warwick
NCEO/CEOI Round Table: Indicative Missions	22 Sep 2011	London (by invitation)
Emerging Technologies Challenge Workshop	12-13 Oct 2011	Coseners House
EO Market Development Workshop	24 Nov 2011	London (by invitation)
SAR Training Workshop	22 Nov 2011	London/Harwell tbc
Science Challenge Workshop - the Water Cycle	11 Jan 2012	Tbc