Earth Observation cooperation with European Space Agency

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• European Space Agency
• ESA Programme Participation
• Ireland & ESA
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• Doing Business with ESA
Introduction

• Background - scientist to analyst to manager to advisor; in commercial, government, research, NGO and the UN

• Mission – to enable economic growth through the exploitation of space

• Vision – to help businesses of all sizes to realise the potential from space, to create valued partnerships to deliver game-changing results

• Role – professional support for development of EO applications & downstream services
European Space Agency

• International organisation with 22 Member States
• ESA promotes co-operation among European States in space research, technology and applications
• Its mission is to shape the development of Europe’s space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world
• ESRIN, the ESA centre for Earth Observation, is based in Frascati, near Rome, Italy
ESA EO Fleet
ESA Programme Participation

• Ireland participates in a range of programmes
  – Mandatory Programmes
    • ESA General Budget
    • The Science Programme
  – Optional Programmes
    • Earth Observation Envelope Programme (EOEP-4, 4th period 2013-2017)
    • Satellite Navigation Programme (Galileo, GNSS Evolution Programme)
    • Launchers Programmes (Ariane 5 & 6, FLPP)
    • Satellite Communications Programme (ARTES)
    • Space Science Experiment Payloads (PRODEX)
    • Life and Physical Sciences Programme (ELIPS)
    • General Support Technology Programme (GSTP)
ESA 2015 BUDGET BY DOMAIN

- **Space Situational Awareness**: 0.3%, 13.9 M€
- **European Cooperating States Agreement (ECSA)**: 0.0%, 2.0 M€
- **Basic Activities**: 5.2%, 232.1 M€
- **Scientific Programme**: 11.5%, 507.9 M€
- **Associated with General Budget**: 4.7%, 209.0 M€
- **Earth Observation**: 28.3%, 1254.3 M€
- **Launchers**: 13.7%, 607.7 M€
- **Human Spaceflight**: 8.4%, 371.4 M€
- **Telecom & Integrated Applications**: 7.0%, 309.2 M€
- **Navigation**: 15.0%, 664.5 M€
- **Robotic Exploration & Prodex**: 3.5%, 155.8 M€
- **Technology support**: 2.4%, 105.3 M€

**Budget 2015**: 4,433.0 M€

*Includes Programmes implemented for other Institutional Partners
Ireland & ESA

• Ireland’s annual investment in ESA 2015 €17.3m
  – Directly aligned Enterprise Ireland (EI) strategy and objectives of investment in the R&D capability of Irish Industry and with the EI and IDA Ireland strategy of supporting high potential start-ups and foreign direct investment
  – EI co-ordinates Ireland’s industrial & research participation in ESA programmes & assists Irish companies to successfully bid for ESA contracts
    • Expertise in developing & executing space strategies
    • Reference point for international space industry – identify linkages to facilitate international collaboration
ESA Membership

Objectives

• Support the development of a high technology **industrial sector** in Ireland that supports the European space programme and that can exploit global space market opportunities.

• Support the development in Ireland of a dynamic **research community** in space research, as well as in a number of space related technology domains.

• Promote the use of space based systems for **commercial and societal** needs.
Supporting EO Downstream Services

• Applications range from environmental monitoring, to emergency response, to risk analysis and indicator development e.g.
  – Marine (pollution detection, ship detection, fisheries spatial planning, bathymetry products)
  – Terrestrial (precision agriculture, urban spatial planning, forestry management)
  – Emergency risk & mapping (floods, landslides, pollution)
Supporting EO Downstream Services

• Success = Public sector + Industry + Academia engaging to develop services to deliver information locally, regionally and globally

• New EO downstream services using satellite based systems (e.g. ESA’s Sentinel satellites) introduced through collaborative research at pan-European level through ESA and Horizon 2020
Ireland & ESA in Numbers

• Over 50 Irish companies in the development of technologies for the commercial space market & of downstream products & services
• Projected growth to 80 companies in 2020
• Total employment in ESA participating companies
  – 1,300 in 2008 to 1,700 in 2013
  – projected to exceed 5,500 by 2020
• Irish companies generated €43m in the space economy in 2013
• Projected to grow to €133m by 2020
Ireland & ESA

• As ESA members Irish companies & research teams may bid for ESA contract development work in a range of ESA programmes
• Funding available depends on the scope of the procurement but is limited by Ireland’s financial contribution to the specific ESA programme
• Irish industrial participation primarily in hardware & software engineering
• Build on this with development opportunities in downstream EO applications and services
ESA Copernicus Programme

• Previously the Global Monitoring for Environment and Security Programme (GMES)
• Headed by the European Commission (EC) in partnership with ESA
• Unified data system for thematic information services:
  - Land management
  - Marine environment
  - Atmosphere
  - Emergency response
  - Security
  - Climate change
ESA Copernicus Programme

- ESA coordinates the delivery of data from >30 satellites – both ESA & contributing missions
- ESA developing a new family of satellites, called Sentinels, specifically for Copernicus
  - Each mission based on a constellation of two satellites
  - Sentinel-1A (April ’14) C-Band SAR data
  - Sentinel-2A (June ’15) high-res (10-60m) multi-spec (13 bands) optical imagery, 290km swath, 20k offshore
  - Sentinel-3 will continue Envisat’s altimetry observations & its multispectral medium resolution visible & IR ocean & land-surface observations
Sentinel-1A Imagery

Brussels, the first image from Sentinel-1A acquired in ‘strip map’ mode with a swath width of 80 km. The dense urban environment of Brussels is shown in white in the middle of the picture. Antwerp can be seen in the top left in red – blue colours and the greens depict vegetation in the surrounding areas. Waterways and low-reflective areas such as airport runways appear black. Among other applications, images such as this will be used for urban planning, for monitoring agriculture, for mapping deforestation and for managing water resources.
Sentinel-2A Imagery

A close-up of an area in the Po Valley – showing Pavia (centre) and the confluence of the Ticino and Po rivers – is a subset from the first image from the Sentinel-2A satellite acquired on 27 June 2015 at 10:25 UTC (12:25 CEST), just four days after launch. Processed using the high-resolution infrared spectral channel, the satellite’s instrument will provide key information on crop type and health, assisting in food security activities.
ESA Copernicus Programme

Sentinel-3 to provide continuity for ERS-2 & Envisat

This Envisat MERIS image acquired in May 2010 shows the electric blue-coloured plankton blooms swirl in the North Atlantic Ocean off Ireland. While individually microscopic, the chlorophyll that the plankton uses for photosynthesis collectively tints the surrounding ocean waters. This provides a means of detecting these tiny organisms from space with 'ocean colour' sensors.
ESA Copernicus Programme

• Copernicus services provide standardised multi-purpose information common to a broad range of application areas relevant to EU policies

• Development of products and services downstream of these Copernicus services to serve specific national (or trans-national), regional or local information needs will also meet needs of European and global markets

• In each thematic area, projects designed to explore the scope for downstream use in specialised areas have been launched
Opportunities for Development

• Grow the EO community IN Ireland
  – Core EO + Complementary industry & research - enhance existing capacity focusing on areas of strength and priority issues for Ireland e.g.
    • Protection and Management of Ireland’s Maritime Resources
    • Enhanced Terrestrial Monitoring
    • Civil security and emergency support
    • Infrastructure Development
Opportunities for Development

• Expand Corporate Industry Markets e.g.
  – Insurance - Index-linked schemes for Floods & Crops, Risk assessment
  – Oil & Gas - Environmental Impact, Health & Safety, offshore Explorations
  – Renewable Energy - Resources assessment (solar, wind, hydro, bio-fuels)
  – Green Business - Corporate sustainable development, Eco-Systems services
Opportunities for Development

• International partnerships & collaboration will enable the connection of local capabilities to on-going or planned global activities and initiatives

• Develop existing activities in Ireland through research investment and enhancing links with European and wider international bodies

• Enhanced data access
  – Copernicus Sentinels
  – Supercomputing
  – Cloud access
Earth Observation Envelope Programme (EOEP-4)

• Stable planning environment within which new types of environmental sensing technologies & the missions that will fly them are prepared

• Analyses terrestrial and marine change over time

• Earth Explorer component
  – Development & launch of new types of Earth observing spacecraft in response to requirements identified by the scientific community

• Development & Exploitation component
  – Preparatory activities for future missions
• Run as an optional ESA programme through successive five-year periods
  – Current EOEP-4 runs from 2013 to 2016
  – Commitments up to 2020
  – Offers a flexible, long-term, rolling environment for the planning of new activities, exploitation of results, contingency response and continuity of missions

• Procurement processes - open competition following the principle of georeturn, Member States receive a balance of contracts based on their programme subscription levels
Doing Business with ESA

• Register as an ESA Potential Supplier on the ESA Industry Portal, EMITS
  – Companies satisfying the SME definition criteria are included in the list of SMEs on EMITS
  – Register to the SME database
    • improve SME visibility to the wider EMITS user community
    • facilitate partnerships etc.
  – Apply for Open Invitations to Tender (ITTs)
• Notes on proposal preparation on ESA website
• National key contacts at EI
• Ireland’s Space Industry Directory
Thank You

Questions?

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