



# Space for Smarter Government - Event Summary

## Cross-government Earth Observation - Discovery Day



Friday 20<sup>th</sup> November 2015 from 10.00 to 16.00



Venue - Satellite Applications Catapult



Hosted by the UK Space Agency's Space for Smarter Government Programme (SSGP)

### Overview

At the request of the cross Government Earth Observation Working Group (EOWG), chaired by the Permanent Secretary (Perm Sec) of the Department of Energy and Climate Change (DECC), the Space for Smarter Government Programme (SSGP) hosted a one day Government-Industry event focused on raising awareness and increasing mutual understanding of how Earth Observation (EO) could provide a solution or partial solution to some of Government's cross cutting policy needs and requirements<sup>1</sup>. The agenda for the day can be found at [Annex A](#).

### Background Context

The EOWG was established by DECC Perm Sec following a request from the Cabinet Secretary, Sir Jeremy Heywood, which challenged Whitehall departments to better understand the new and emerging opportunities for Government from Earth Observation and to consider how they might better use this technology and its uptake in order to achieve policy objectives. This is a cross Government activity following on from the Horizon Scanning activities on Emerging Technologies<sup>2</sup>.

### Event Aims

The Discovery Day aimed to bring together senior policy officials and industry representatives in a neutral non-competitive environment to explore and enable:

- Increased awareness of the cross-Government challenges and policy needs
- Better understanding of what could be done to meet that policy ask now and in future
- Wider visibility of the different business models available to meet the policy needs

This event summary paper is one of the published outputs arising from the day, and the event will also contributed towards a high level action plan focussed on priority areas (due to be submitted to the Cabinet Secretary early in 2016)

This event was seen as a key milestone for the EOWG, helping to identify, develop, test and prioritise the ideas and potential actions required in to help achieve cross cutting Government goals; to make better use of the transformative technologies which enable the public sector to make more efficient policy decisions.

<sup>1</sup> <http://www.spaceforsmartergovernment.uk/eo-discovery-day/>

<sup>2</sup> Satellites are one of the original "eight great" Emerging Technologies



## Attendees

The event involved ~80 participants from across Government, public sector bodies, not for profit organisations, industry reps and trade bodies/associations. A list of attendees and their respective organisations is included at [Annex B](#).

## Morning Presentations - Setting the Scene and Raising Awareness

All presentations will be published on the Space for Smarter Government website [www.spaceforsmartergovernment.uk](http://www.spaceforsmartergovernment.uk)

### *“Welcome to the Harwell Space Campus”*

The day opened with a welcome from Catherine Mealing-Jones, Director of Growth for the UK Space Agency (UKSA). Catherine set the wider context by describing the three major components of the UK space economy (upstream downstream and value added applications), the goals outlined in the Civil Space Strategy (for the UK to capture 10% (£40Bn) of the global space economy by 2030), the key role of the Harwell Campus in fostering collaborative working and an overview of SSGP’s remit to enable the uptake of space enabled services across Government.

### *“Aims and Objectives”*

Stephen Lovegrove, DECC Perm Sec and Chair of the cross-Government EOWG provided some contextual background to the event and why the group had been formed, referring to his tasking from Sir Jeremy Heywood, the Cabinet Secretary, the *8 Great Emerging Technologies* and the Government’s Horizon Scanning Programme. He set out the aims of the day, which included: increased awareness and a shared understanding of the opportunities & barriers to greater use of earth observations across Government and his hope that the day would lead to identification of some tangible actions or deliverables that could be reported back to the Cabinet Secretary with recommendations on how to progress these.

### *“The Public Sector Policy Ask”*

Professor Ian Boyd, Chief Scientific Advisor (CSA) for the Department of Environment, Food and Rural Affairs (Defra) and Deputy Chair of the EOWG, introduced the public sector “policy ask” and the way in which the generic and specific public sector needs and requirements came to be formulated. He explained what has stimulated Government to think differently, including investment in supporting infrastructure, technological change, ongoing capability revolution, data integration, cloud computing and the availability of different business models. He asked attendees to use today to think about how Government can be a better customer, especially in the context of the three types of cross cutting capability themes being explored at the event: emergency response and management, change detection and intelligence, surveillance and reconnaissance. This request was aimed both at both Government and Industry.

### *“End-to-end Earth Observation - Overview Capabilities and Opportunities”*

Chetan Pradhan from CGI and Sam Adlen from the Satellite Applications Catapult delivered a joint presentation on behalf of the industrial sector, UK Space, the Space Trade Association; the British Association of Remote Sensing Companies (BARSC) and the Satellite Applications Catapult.

The presentation focused on the importance of Earth Observation (EO) to Government; practical examples of what could be done, a vision for the future and the key economic growth drivers.



## Interactive Sessions - Raising Awareness & Clarifying Understanding

### *Morning Q&A Session*

After the opening presentations, the attendees were given the opportunity to ask questions of the speakers and of the wider audience concerning the policy ask and industry offerings. Mark Hampson from the Satellite Applications Catapult facilitated this lively debate, a transcript of which can be found at [Annex C](#).

### *Networking Lunch*

Attendees were given the opportunity to network over a buffet lunch, “ask an EO expert” and also attend the illegal fishing monitoring demonstrations in the Operations Room.

### *Afternoon Syndicate Breakout Sessions*

Having had an introduction to the aims of the day, the high level policy ask and an overview of the industrial capability, the attendees were then tasked with working in three smaller parallel syndicate sessions to discuss the following:

- Syndicate 1 - Topic 1 - Emergency Response and Management
- Syndicate 2 - Topic 2 - Change detection
- Syndicate 3 - Topic 3 - Real time monitoring/Intelligence, Surveillance and Reconnaissance (ISR)

Pre-reading on each topic was issued in advance of the day, outlining either real life case studies or consolidated policy requirements and challenges for each topic.<sup>3</sup> The Syndicate Chairs and assigned session facilitators were asked to summarise the top priorities for each syndicate session and later feed these back to the entire group in a plenary session.

The conclusions and suggested top priorities are outlined in the following sections, with detailed notes on the discussions within each syndicate group included at Annexes D-F.

## Emergency Response and Management

A detailed description of this syndicate session is provided in [Annex D](#), with the top three priorities identified as:

- There is a need for a predefined core dataset to inform decision making in a set of “typical” emergencies, which should be reviewed regularly to ensure they reflect future needs, technology advances and other changes.
- There is a balance to be made between speed and quality of information and cost but during a response – meeting the timeliness aspect is really important and needs to improve.
- Consistent data and information is important for more effective decision making. The Natural Hazards Partnership (NHP) already exists which informs the National Risk Assessment and should be used/further developed to meet the needs.

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<sup>3</sup> [Topic 1 - Emergency Response-UK](#), [Topic 1 - Emergency Response - Nepal](#), [Topic 2 - Change Detection](#)  
[Topic 3-ISR](#)



## Change Detection

A detailed description of this syndicate session is provided in [Annex E](#), but the top three actionable points include:

- An enduring communication approach/partnership between Government and Industry is needed - a partnership that exists outside individual procurements.
- Procurement lags behind other developments and more innovative ways of procuring are needed.
- The depth of conversation between Government and Industry on this topic needs to be further developed, focusing more on specific requirements in “theme specific” days that enable need to be matched with data available.

## Intelligence, Surveillance and Reconnaissance

A detailed description of this syndicate session is provided in [Annex F](#), but the top three priorities include:

- Further engagements/workshops to be organised between industry and interdepartmental Government representatives to explore the ISR specific requirements in more detail.
- A mechanism for the sharing of requirements, data, and capabilities between Government departments needs to be created.
- A summary of technical capabilities available needs to be created and disseminated throughout Government, and then maintained.

## Reflections, Final Q&A and Conclusions

A number of key priorities were identified in each of the syndicate sessions but it was clear from each of these discussions and the that there were underlying structures and cross cutting issues to address, at [Annex G](#), such as:

- Communication – There is a need for a common taxonomy, ongoing dialogue between Government and Industry; a long-term partnership approach and potentially pre-commercial engagement and development for cross cutting/common requirements or policy challenges
- Industrial Engagement - The first step towards a partnership/engagement model should come from Government and industry will naturally coalesce around that
- Integration - Government needs a more integrated approach across different departments and it needs to articulate public sector requirements (but at the right level to enable innovation). If Government is more integrated in setting their requirements, Industry need to adapt their business models to respond as there is a need for integrated products and services, both generic and intermediate across a number of departments.

## Wrap up

The outcome envisaged from the day was a collective view (across government and industry) of the cross-cutting policy requirements, a better understanding of the state of readiness of the EO technologies to support those requirements, and an outline plan of how to tackle the steps that need to be taken to match the requirements with the technologies. Although feedback is still being gathered, the event was deemed a success and this stated outcome achieved.

## Annex A

### Actual Agenda Followed

09:30 Registration Open

Timings	Topic	Who			
10:00	Welcome	Catherine Mealing- Jones, Dir Growth, UK Space Agency			
10:10	Purpose and Aims of the Day <b>Saturn</b>	Stephen Lovegrove DECC Perm Sec			
10:20	“The Public Sector Policy Ask” <b>Saturn</b>	Prof Ian Boyd Defra CSA			
10:40	“End to End - Earth Observation Overview” <b>Saturn</b>	Chethan Predhan & Sam Adlen UK Space/BARSC/SAC			
11:00	Facilitated Industry & Public Sector Open Discussion/Q&A Session <b>Saturn</b>	Chaired by Mark Hampson, Satellite Applications Catapult			
12:00	<i>Lunch &amp; Networking Opportunity – Demo Room, Ops Room and Spectrum</i>				
12:45	Syndicate Session Overview <b>Saturn</b>	Sara Huntingdon & John Vesey - SSGP			
	<table border="1"> <tr> <td>Syndicate 1 Topic 1 - Emergency Response and Management  Chair – Stuart Facilitator – Sam Notes – Dan SSGP - Jenny  <b>Saturn</b></td> <td>Syndicate 2 Topic 2 - Change detection  Chair - Ian Facilitator – Mark Notes – Jenny SSGP - Joana  <b>Jupiter</b></td> <td>Syndicate 3 Topic 3 - Real time monitoring/ISR  Chair - Chris Facilitator – Joel Notes – Kirsten SSGP - John  <b>Mars</b></td> </tr> </table>	Syndicate 1 Topic 1 - Emergency Response and Management  Chair – Stuart Facilitator – Sam Notes – Dan SSGP - Jenny  <b>Saturn</b>	Syndicate 2 Topic 2 - Change detection  Chair - Ian Facilitator – Mark Notes – Jenny SSGP - Joana  <b>Jupiter</b>	Syndicate 3 Topic 3 - Real time monitoring/ISR  Chair - Chris Facilitator – Joel Notes – Kirsten SSGP - John  <b>Mars</b>	<p><i>Topic 1 - Cabinet Office chaired sub group - Stuart Wainwright</i></p> <p><i>Topic 2- Defra chaired sub group - Ian Davidson</i></p> <p><i>Topic 3 - MOD chaired sub group - Chris Millward</i></p> <p>Stephen Lovegrove and Ian Boyd floating between sessions</p>
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14:30	<i>Coffee Break - Demo Room</i>				
14:45	Syndicate Feedback Summaries <b>Saturn</b>	Sara Huntingdon – SSGP Mgr Syndicate Chairs			
15:15	Action Planning/Next Steps Summaries & Open Session Q&A <b>Saturn</b>	Stephen Lovegrove and Ian Boyd  (SSGP – roving microphones)			
16:00	Wrap Up Session and Close <b>Saturn</b>	Stephen Lovegrove			

Departs 16:15

## Annex B

### Attendee list

Name	Gov/Ind/ Other	Organisation
Adina Gillespie	Ind	Surrey Satellite Technology Ltd
Alan McLarney	Ind	Stevenson Astrosat
Alan Pratt	Gov	Home Office
Andrea Minchella	Other	Satellite Applications Catapult
Andrew Groom	Ind	Airbus Defence and Space
Andrew Iwanoczko	Ind	Harris Corp
Andrew Taylor	Other	STFC
Andy Kirkman	Gov	Met Office
Andy Powell	Other	Knowledge Transfer Network
Andy Shaw	Ind	Terreflexion Consulting Limited
Ani Fox-Bochenkov	Ind	Amazon Web Services
Beth Greenaway	Gov	UK Space Agency
Catherine Mealing-Jones	Gov	UK Space Agency
Chetan Pradhan	Ind	CGI IT UK Limited
Chris Bush	Gov	BIS
Chris de Grouchy	Gov	Defra
Chris Jacobs	Gov	GO-Science
Chris Millward	Gov	MOD
Christopher Mutlow	Other	STFC- RAL Space
Claire Pitcher	Gov	DECC
Colin Baldwin	Gov	UK Space Agency
Dan Osgood	Gov	DECC
Dan Schnurr	Ind	Geospatial Insight Limited
Daniel Shaw	Gov	DCLG
Daniel Wicks	Other	Satellite Applications Catapult (Notes)
David Warrilow	Gov	DECC
David Woolnough	Gov	DFID
Doug Wilson	Gov	Environment Agency & Chair of UKEOF
Eamonn Prowse	Ind	Cyient Europe Ltd
Elena Lobo	Ind	DMCii
Emily Gravestock	Gov	UK Space Agency
Emma Hennessey	Gov	FCO
Farhana Amin	Gov	Defra
Francesca Kapfer-Gill	Gov	UK Space Agency
Gareth Crisford	Ind	CGG: NPA Satellite Mapping
Geraint Cooksley	Ind	Telespazio VEGA UK
Grant Privett	Gov	DSTL
Ian Downey	Other	ESA & SSGP Prg Bd



Ian Boyd	Gov	Defra
Ian Davidson	Gov	Defra
Ian Lisk	Gov	Met Office /Chair of Natural Hazards Partnership
Jenny Durnan	Other	SSGP team
Jenny Thorburn	Other	Satellite Applications Catapult (Note taker)
Joana Kamenova	Other	SSGP team
Joel Freedman	Other	Satellite Applications Catapult (Facilitator)
John Carstensen	Gov	DFID
John Philliban	Gov	MOD
John Vesey	Other	SSGP
Keith Beckett	Ind	UrtheCast
Kirsten Robinson	Other	Satellite Applications Catapult (Note taker)
Lawrence Way	Gov	DEFRA – JNCC
Lee Boland	Gov	UK Space Agency
Luana Avagliano	Gov	Resilience Direct/Cabinet Office
Mark Hampson	Other	Satellite Applications Catapult (Facilitator)
Mick Johnson	Ind	Airbus - Centre for EO Instrumentation& Space Technology
Paul Maltby	Gov	Cabinet Office - Government Digital Service
Phil Cooper	Ind	Sterling GEO
Phil Evans	Gov	Met Office
Phil Wyndham	Gov	Ordnance Survey
Philip Davies	Ind	Deimos UK Ltd
Richard Peckham	Ind/Other	Representing UK SPACE-Trade Association
Richard Tipper	Ind	Ecometrica
Sam Adlen	Other	Satellite Applications Catapult – Facilitator
Samantha Lavender	Ind/Other	Pixalytics Ltd / BARSC Chair
Sara Huntingdon	Gov	UK Space Agency – SSGP Manager
Sharon Archer	Gov	DECC
Stephen Spittle	Other	Satellite Applications Catapult
Stephen Briggs	Other	ESA
Stephen Lovegrove	Gov	DECC & Chair of the cross Gov EOWG
Steve Keyworth	Ind	Environment Systems Ltd
Stewart Larter-Whitcher	Gov	Ordnance Survey
Stuart Wainwright	Gov	Cabinet Office
Terri Freemantle	Other	Satellite Applications Catapult
Tim Godson	Gov	DCLG
Tim Vallings	Ind	Rezatec Limited
Tim Wheeler	Gov	DFID
Tom Price	Gov	BIS
Tony Sephton	Other	ESA /SSGP Pg Bd
Vicky Morgan	Gov	NERC/UK Environmental Observations Framework
Zahid Ghadialy	Ind/Other	techUK - trade body



## Annex C

### QUESTION AND ANSWER SESSION

**Introduction by Mark Hampson** – so to summarise the previous presentations - we are at a capability tipping point. The more we get to grips with this change – the better positioned we are for what is coming around the corner. Industry are keen to work with Government to support an export drive so let us now open the floor to questions:

**Peckham, Richard:** Question for Stephen Lovegrove: A big challenge here is cross cutting services and procurement tends to be in silos – is this happening with space services?

**Lovegrove, Stephen:** We have made a lot of progress on cross cutting services - but not in this space. In the last administration there was a big effort by Lord Maude to make sure procurement was coordinated and streamlined across Government. Property has been a big success story – in Bristol – 28 buildings to 3. Great deal of improvement in procuring professional services through crown commercial service and IT services. Not really happening with space services until EO working group has come together. Lot of work in Defra on deriving what satellite data could do for government but not across government in practice. Will be part of his recommendations to Sir Jeremy Heywood – what to embed to streamline an approach to this. Potentially some small structural changes but proportionate to the task.

**Iwanoczko, Andrew:** With regard to procurement is the future flavour akin to the G-Cloud service or is it something different? [NB: G-Cloud has been renamed Digital Marketplace]

**Maltby, Phil:** G-Cloud has moved to a mechanism for technical services and cloud based services for across government – a mechanism to streamline activity. In relation to the procurement of this (space data) type of activity – I am not sure how this will fit with it. (Paul gave an overview of the Digital Marketplace remit and description.) For instance, if you are a government department in a digital team and you want to spin-out a new digital service – the Digital Marketplace is a gateway to get into the system, it increases the speed of access and you know the service you get.

**Lovegrove, Stephen:** Regarding the extent to the way satellite data can be accommodated into G-Cloud – we are at the foothills of this approach - if this is possible indeed possible.

**Shaw, Andy:** Regarding this one-stop shop concept – it is difficult to get all customers together – to get individual data suppliers public and private to co-ordinate. Can you really get a one-stop shop and respect competition among suppliers?

**Crisford, Gareth:** We already do this for collecting data for MoD – we won a contract through open tender – it is data agnostic and we have agreements with all satellite data companies and we come back to you (Gov) with an appropriate solution and deliver services to you off the back of that.

**Tipper, Richard:** Have Government thought of what we could call intermediate data products – standardising procurement is all well and good – but the end-user has a specific requirement. There are low level products but the data requires lots of processing. One area we could look at potentially to improve efficiency is to define intermediary level products that are easily pulled into end-user data systems.



**Cooper, Phil:** Data providers are changing their business model and accessing content based on need – if something has happened, the data is useful – and the cost comes down then. The future is not a map - it's an app! Output is not a pretty picture, it's a bar chart, it's a piece of information. It's an instruction that says "this has taken place - go do something about it." This change is happening at a phenomenal pace. Data archives need to be mentioned – we should also realise the value of the data already available. The RPA has data that the energy sector can use as well. Energy sector pay based on something in a field – with no idea of whether a power line exists – there are opportunities going back and corroborating with archive satellite data.

**Way, Lawrence:** The critical thing to get a particular benefit in a policy is that you need to bring together lots of data sets. How unique is this to Defra? Get into smart-purchasing arena.

**Boyd, Ian:** Australian Data Cube example – Australian Government have put up money for their geological survey to collate large amount (back to the 1970s) of their satellite data – in a super computer environment so that apps can be built from that and questions asked of the data – the added value services that could come out of that are enormous. How do we build something like that here? Australians are happy to share their code to develop a similar product. We have a lot more cloud cover here – so wouldn't be as good if we just replicated in a UK context – but if we introduced SAR data – making it more capable. For government or industry to do – not just for government for other users as well. They spent about £4m to £5m – their estimate is that it would be about £1m or £2m to do in the UK.

**Bochenkov, Ani Fox:** We do this with US Geosat now – ie. topographic catalogue of Switzerland – people can come in and build services. Question is - how do you find a way to find a discount pricing schema so that as people come in from the UK – government has bought in advance cloud credits so people can use it. Need a way to figure out how UK government make it available and from procurement level – create a schema that people can come in and buy credits.

**Groom, Andrew:** Cost efficiency is implicit in Copernicus – in the UK we are well placed to capitalise on this Sat Apps ground segment. Working with Defra, through a Hub and Spoke structure, we can look at what these intermediate products look like. This is being implemented in the next few months and has significant export potential.

**Lovegrove, Stephen:** Among the policy professionals in the room – how many of you are aware of that activity and if you are aware and if you've had an opportunity to input requirements - are people aware at the other end – I fear that activity here is not informed about how it might be used on the ground.

*(Show of hands showed minimal awareness of this activity)*

**Briggs, Stephen:** We should be clear we are not starting from scratch today. DECC will be fully aware that assessment reports from IPCC – 70% based on satellite data. Red and Red Plus – not active in data use in UK – but Norway funding project in Ghana based on this. FAO, space agencies and other bodies working together. Data cubes are in use in Columbia and Kenya. Also depends on how policies are specified. Change in the way CAP payments made –I,e, aerial payments for yield payments – changed the model. Marine pollution schema based on satellite data. Demo of success is that the user community are not aware it is using satellite data. There is a danger policymakers want to define how service should be delivered or you have a service provider defining the policy – tread carefully. Ian Boyd said he wanted to look at linear features – no - Defra wants to look hedges and DfT want to look at roads – be careful to define exactly what you need where geospatially disaggregated data is required.



**Davidson, Ian:** The point of today is to have exactly those types of conversations.

**NHP/EA:** Q - What is going to happen next? There will be flooding in the north of England – looking at met office rain data. Your example screen image showed Maidenhead, but flooding in Maidenhead is not a problem – the problem happens further downstream – satellite data could be used to join up with EA river gauges to join data together.

**Avagliano, Luana:** Just wanted to highlight that we (Cab Office-RD) can plug in business modelling and predictions – working with universities and met office to pull in real live data – so where we have an API - we can do this – we've got a mechanism to provide data collaboratively.

Q - HM Gov has paid huge amount of money – what can you give us today for free and make available?

**Cooper, Phil:** For example a mobile phone company – in an emergency incident - they can boost a signal from that area and send data back into a central depository. The other end of that data is what you want out of the system – a text message to 1000 people to say you need to get out, a message to the water company – the value to them is two-fold to respond – but also - do we need to put four extra people onto the complaints desk – because this is how the company's performance is measured – this is their business impact. Need to consider who needs the information and what do they need to know – a text, pdf ...?

**Peckham, Richard:** – the answer to how much you can get for free - is not much. The private sector invests to make a ROI – if you make expensive satellites you have to get your money back – there are examples though (the Disaster Charter for example – used in the Nepal earthquake) – where data is given for free.

**Bochenkov, Ani Fox:** We have a free tier – and a scientific computing group which provides money for proof of concept. That helps you with the cloud computing end – but doesn't necessarily help you with the downstream application products.

**Avagliano, Luana:** HM Gov invest a lot in space – a lot of imagery is captured but not used – why can't we have that legacy data?

**Iwanoczko, Andrew:** Commercial products that use legacy/archive data are available – but funding strategies may need to change (do you want to pay lots for few users, rather a per service use) - what is the government funding and data strategy?

**Boyd, Ian:** The quick answer to that is - it depends – situations where we would want 100% product – if industry playing its game well it can make its money elsewhere – not going to be an early adopter – invest in a product and then sell it on – if we want to do that we will be a joint investor / partner. There are cast iron rules on data that a country needs – distributing data to farmers in an open and audited way – example of standardised policies of ways in which industry can make money – we'll pay for a bit not a lot of that. For the vast majority of products – describing a linear feature – generic component – specific component – a general point – you can get a long way along the line with a generic product and then you would pay for the specific add-on.

**Groom, Andrew:** yes we can give data for free – Sentinel – but would this solve your problem??? It still needs processing – that is the industry value-add – that is what industry would like to do.

**De Grouchy, Chris:** I am struck by the export market opportunities for this. If government works with industry – we are giving our time and expertise and it is important that we do that. If we do that



– is it not possible to create a new model where products are licensed back to us for free use in the UK and the company concerned is able to sell them abroad – and then they will reap the benefits of that? If it's a big commercial deal - could UK taxpayer take some royalty from that?

**Tipper, Richard:** Government needs to think through its process more quickly – investing in big ideas and wanting free things coming i.e. £20m – to help another country develop state of the art forest inventory, and then the data is siloed away in a cupboard and no one else can access it.

**Briggs, Stephen:** A service could be provided to deliver that – cost for just one country is not justified – but to 28 countries – that is where the risk is – negotiate with Defra for what price it would pay in the UK – but wouldn't cover cost for whole infrastructure. Government to be part anchor tenant, to help industry build appropriate service to sell elsewhere.

**Peckham, Richard:** In response to export questions. That is what we had in mind on smart procurement to stimulate export. A royalty on export sales – industry would be open to all sorts of models to make it work. For example: Airbus France – optical satellites – government is a part investor and underwrites some of the capacity and they get a royalty when it sells commercially.

**Lovegrove, Stephen:** On question of leave each to do what they do best. But when talking about new product sectors – asymmetry of information and asymmetry of risk – the concept of royalties etc are things worth considering – easier to go for anchor tenant discounts as a structure where you have clear markets and pricing structures – but in other markets not that clear.

**Mark Hampson** drew the session to a close by thanking all attendees for their participation in the session and encouraged those with burning specific questions to track down the relevant people over lunch or feel free to “ask the experts” – the Catapult EO Team at the registration desk - if they had any burning technical questions. He outlined the afternoon session would further build on the topics raised, but would be focussed around specific cross government themes/needs.



## Annex D

# Emergency Response and Management - Syndicate Session 1

### Introduction/Overview

Stuart Wainwright from the Civil Contingencies Secretariat (CCS) opened up the session with an introduction to CCS. CCS are accountable for protecting the livelihood of citizens during disasters such as flooding, earthquakes, industrial failures etc. The scale of their response can range from providing command and control capabilities and data to local responders including the likes of the Environment Agency, firefighters etc. through the Resilience Direct portal to briefing Ministers on domestic and international matters in the Cabinet Office Briefing Room (COBR). They also publish the UK National Risk Assessment (NRA).

He summarised the structure of this syndicate session was to review two case studies, which cover local/national levels and domestic/international settings:

- Domestic – Thames Levels flooding, winter 2013/14. This case study explores the information range of needs from responders on the ground to COBR
- International – Nepal earthquake, April 2015. This case study examined how the UK would respond and play a role in international humanitarian events.

The opportunities Stuart highlighted, was that EO is used tentatively across government and Government could be doing more. For example, they could combine vulnerability with warnings to offer a valuable predictive service.

The key points are:

- Time – data needs to be acquired fast.
- Access – data needs to be made available, perhaps via Resilience Direct. In such an environment the data could be accessed, used, interpreted and shared.
- Are there any specific nuances or general needs which apply to the different case studies.

The key challenges which need to be explored are:

- Is it expensive?
- Is there a lack of knowledge?
- Is there a gap in understanding vulnerability or pinch points e.g. when a landslide blocks an evacuation route/transport intersections, and how do we overcome this?



## Case study overview – 1: UK Flooding Event

### Introduction from the Environment Agency

During the response the Environment Agency combined information from satellites and drones to create a picture of what was happening. It was recognised a picture holds great power and makes a bigger impact– if you put an image in front of Ministers it gets a better response than numbers. It is important to keep the information at a strategic level.

Maps show what it's like now, which is important for helping decide where to mobilise troops. This should be combined with model data which provides a forward look i.e. what it's going to look like tomorrow, and when the event is likely to end.

Speed in response is very important, and it's necessary to bring together expertise and make data readily available. Furthermore, images are good, but not the answer to everything, they need to be backed up with other information i.e. local knowledge, complimentary contextual information.

Things to consider during the session:

- What did we know?
- What would we like to have known?
- Need to work with all major infrastructure owners including transport, police, fire etc. How do we bring all these people together in a service offering?
- Data provided to responders should be consistent – problem of people making decisions from contradictory information - who found data online (of unknown provenance)
- What are the key sorts of decision that need to be made and what information could support this?
  - Prioritisation – what's happening now, tomorrow etc.?
  - Where is the risk?
  - Where should we send resources?
  - What's the impact? (data experts do not understand vulnerability, which would facilitate this discussion)
- Before a flood arrives you should know where the greatest risks are, and combine with warnings.
  - Predict where to target before event even occurs – remember impact may be felt in a different location to where hazard strikes.
  - Changing picture where defences have been built, but also where they might be breached. EA already does identify areas of greatest risk for fluvial flooding, but perhaps not for groundwater flooding
  - How do we effectively continuously monitor the whole of Britain? – Sensors in every town?
- Communicating with Ministers and the public is different. The ways the vast volume of data is translated is key to making it useful for the audience. Need expertise to interpret and provide consistent data/advice.
  - Personal resilience is important, and people may only respond to certain messages
- Is there an opportunity to improve sat nav systems to identify evacuation routes (especially the less congested / safer routes)?
- Planning: Police need to know which roads are closed, and the NHS needs to know where the most vulnerable people are and plan accordingly.



- Could insurers be investing in EO data and share the data with government? They already invest heavily in this and have very sophisticated risk maps.
- When COBR's role is complete the recovery phase commences and DCLG take over and Chairs the flood recovery meetings. They want even more detailed maps during this phase to target damage and the most vulnerable. The Recovery Programme from the 2013/14 floods is just concluding now!

### Breakout group discussion points on Case Study 1

- Pre-planning response based on data
- Flooding example, but could be any type of hazards e.g. a cloud plume (chemical, nuclear, volcanic), sink holes, coastal erosion (storms, land movement)
- What is the risk to infrastructure (CCS, local authorities, EA, food production/distribution)
- One department will always lead the response, but lots of departments need to make decisions
- Sharing information to multi-agencies
- Timeliness is the biggest challenge – NOW. This is the critical difference between response and the day job, and depends on weather conditions
- Aftermath of impact – recovery response can be slower than immediate response
- Support provided by airborne imagery and people on the ground providing round truth
- How do we plan what imagery will be available before the event hits (if possible)? Rather than finding out what's available when the disaster has happened and face delays
- Transport, power lines, obstructions, flooding can all be assessed using EO – impact on CNI, business e.g. movement of freight stalled
- Solar activity – what impact does this have on GPS and satellite systems
- National Risk Assessment – gap analysis. What could industry offer pre, during and post event
- Tick list of some needs – regardless of hazard type
- Constantly monitor to identify the impact of earlier decisions e.g. shutting flood gates – does this cause flooding elsewhere?
- Real-time information e.g. height of flood surge
- Integrating ground sensing data observations with satellite data
- What are the priorities?
- What about data needs, will this be available at the time needed and will everyone want this?
  - Identify core databases that have multiple users
  - Think nationally, scale and response for UK (scenario based).
  - What data is useful?
    - Economies of scale
    - Past/present
    - Geological, hydrological, atmospheric modelling
- Issues: sinkholes. For example, Network Rail turned down solution to predict sinkholes. Others may have found it useful e.g. Highways England, EA etc. but they were never approached – maybe they could have joined funding pots to acquire the data??
- SSGP could collate user needs and identify capabilities in industry – play matchmaker
- Industry equivalent for NHP – look at solutions across a wide range of technologies. The Catapults are a good forum to set up such partnerships e.g. Digital Catapult looking at consuming information like this



- Timeliness – does industry feel comfortable working with others? Yes – multi-provider imagery and pre-plan based on flood predictions and scheduled flyovers
- Could rely on Copernicus, but can end up waiting too long
- Number of SSGP funded projects (SBRI Phase 1, 1/100 project), aiming to identify data needs and applications
- UK government funds pilot studies to leverage export. What is business model?
- UK government funds start-ups – prime business.
- Flooding is much worse in Europe, could we learn from them – or use their solutions? Could venture capitalists help fund development by start-ups?
- Is there a UN/EU mechanism for sharing data during international disasters – and is it better to send data or people?
- Planning – not just what’s available now, but what’s coming. What would be nice to have?
- Use of smarter/new technology to stay ahead of the game
  - Industry to think ahead
  - Lead time for new satellite is 15 years e.g. to fit a new type of instrument – if this would be helpful would need planning
- Need to understand gaps and capabilities
- Need to understand catchment behaviour, reconcile different data sources and accurately predict damage e.g. groundwater flooding. If this information was mapped it would be useful during a response and for daily activities
  - Saturation points
  - Soil moisture levels
  - Spring locations
- Integrity of infrastructure e.g. bridges could be monitored using EO rather than manual inspection
- Everything is going local – devolution of power
  - Becoming more disconnected there is a danger, therefore need to encourage dialogue now
  - Speak to the government infrastructure committee about the procurement of major infrastructure projects



## Case study overview – 2: Nepal case study

### Introduction from DfID/GO Science

The Department for International Development (DfID) coordinated the UK's response. In most circumstances international responses are led by the UK. DfID does not use much EO data, for example during the ebola response, but that may have been more because it was difficult to visualise the spread of disease from above.

This international disaster posed a challenge for humanitarian agencies. Such organisations would really like to have access to the amount of data available during UK (domestic) responses.

During this disaster COBR relied upon scientific evidence from the Scientific Advisory Group on Emergencies (SAGE) – a collection of UK experts. SAGE answered technical questions e.g. reasonable worst case scenario e.g. monsoon to hit shortly after the earthquake. It's not possible to use science to answer everything, and local knowledge is necessary.

For example, the British Geological Survey (BGS) used optical imagery provided by the Disaster Charter for landslide delineation i.e. to create polygons which showed the outline of the landslide footprint. They relied on multiple images, and intelligence in understanding the environment. Some of the work was automated, but not all due to the unique geography in Nepal compared to other locations where landslides occur. More detailed information provided close to large population areas. BGS still had to pay for some imagery in Nepal. Need a better mechanism to acquire data.

The Disaster Charter was activated for the earthquake. It was used to identify landslide locations, blocked roads and debris created dams (issue when monsoon arrives). This relied on optical imagery, but clouds obscured some areas.

Mobile phone operators kick started humanitarian action and boosted signal to allow people to communicate. This model of cooperation could be explored for the sharing of data.

Two key needs:

- Immediate aftermath – where's the worst of the damage? How many people were affected?
- Longer term implications (risk assessment) – potential landslide locations, vulnerable communities, debris blocked water courses causing issues downstream. There is a risk that recovery can be forgotten as the world loses interest, therefore there is a need to be more engaged.

Things to consider during the session:

How to share information derived from satellites with the national government who were coordinating the response, and with the local responders?

- Resilience Direct is used proactively and reactively in the UK – could something similar have worked here? Does anything similar exist for international disasters?
  - Base mapping availability – private sector offer support – not offered in a simple coordinated way
  - Is damage assessment/landslide identified automatically – not completely, iterative process that requires manual validation
- Most responses will receive huge amounts of interest/offers from the private sector e.g. machinery – but not from EO experts....why?
- Additional imagery had to be purchased by BGS. Why is there a limited ability to acquire imagery?



- Concern - many nations could have been doing the same work or was there any coordination? Need for links with international partners, though UK is often seen as a leader.
- How can industry support data delivery to end users? For example, when ground based comms go what can industry do? RAPID in SE Asia (IPSP) designed to provide sat comms using rugged data access server

## Breakout group discussion – Case study 2

What is the ask?

- During: Impact on population, natural features, urban, movements of people, ability to deliver aid (transportation networks), impact on critical services and core needs
- Pre: resource mapping, risk mapping, risk evolution (changes in the risk profile), demographic of population
- After: coordination (command and control – 1 language etc), what help has been requested, risk of repeatability (change of risk profile), what do you have to do as a result of stuff that has happened during, disease, planning and reconstruction
- Coordination should happen through UN system
- Deployment of UK resources – leaving information with local government
- Sharing of information
- Prioritisation (summary of prioritisation can be seen from flip charts)
  - Environmental and geomonitoring – good capability needs to be access and utilised
  - Data cube – common infrastructure for sharing of information
- Access information
  - Mapping of changes input into risk models – on going analysis and establishment of risk models
  - Layer satellite imagery – data agnostic services – don't limit ourselves to certain suppliers
  - Fast access is the biggest requirement for immediate response – this is possible but very expensive, costs should come down
- Increased capacity and future numbers of satellites will reduce time taken to get data

## Change Detection - Syndicate Session 2

### Summary of discussion

Government attendees were asked to note their user requirements (Government Policy) and barriers to these happening.

Ian Davidson (ID) provided a summary of the key points, as follows: matching demand, monitoring development, to inform risk management, climate change, sea level surface temperatures, assessing civil contingencies, information on renewable resources, habitat requirements/mapping, development and planning, land use. The environments in which people are working are complex, making it expensive. There is the requirement for wider, cheaper coverage.

Defra would be interested in using EO to determine if a farmer were complying with the 'Three Crop Rule'. The current method of risk-based analysis is timely and expensive. They need the information, rather than a (modelling) map.

Other Government EO end-use requests included:

- Trends and changes in crop habitat
- Where heat comes from – bodies? Power points?
- Water policy – data yield, rather than gathering data in situ
- Target monitoring on land

The Industry ask was that the requirements were defined. Then the methodology could be adopted and reused.

Industry attendees were asked to note what they wished they were getting from Government and any messages they wanted to give Government.

In summary, Industry requirements included better articulation of Government needs, better engagement, easy access to Government data sets, access to graduates, support from SMEs, other partnerships (collaboration opportunities, including international, and projects leading onto other projects). The requests were more generic, rather than change detection-specific.

Industry advised that change detection is complex, with different scenarios and scales that are evolving over time.

Industry admitted that it should be strategic in its thinking. Currently, it puts out project-based tenders for pieces of work that stop it from being strategic.

Government tenders are too rigid, making it difficult for Industry to ask questions. The procurement models are out-of-date. Government needs to be more creative and open, allowing for faster dialogues.

Industry understands that there is limited Government funding. Small projects need to go further. There needs to be more momentum, with projects leading onto other projects.

Defra now has a roadmap. SSGP is an intermediary enabler that can also help to open doors.



Up until now, conversations between Government and Industry have been relatively narrow, with little time invested. Unfortunately, Government has no corporate memory of previous discussions. Whilst it might not be possible to broaden the requirement, there is a need to broaden the process. To fix the issues requires a complicated, deep conversation.

Those who were neither Industry, nor Government attendees, were asked what needed to change in order to proceed.

In summary, to ascertain end-user community requirements, there should be a policy-specific event with an open audience including potential suppliers. Whilst using existing budgets, there is an opportunity for Industry to show Government how to do things more cost effectively.

Ian Davidson suggested that there needed to be a series of meetings (days/weeks/months) to dig deep (not topic-by-topic) and to focus on lessons learnt.

Industry highlighted that EO is global. International models might have relevance in the UK. These should be developed with a view to collaborating more with international partners.

*Table 1 - Government requirements as identified by departments*

<b>Government requirements - as stated by Departments</b>	
Rural payments	Improved accuracy, lower cost, better coverage, annual detection of boundary and within field features to validate rural payments claims
Water quality	Land based; land use and feature change as intelligence to target water quality monitoring investigations
Natural assets	Measuring the quality and status of our natural assets (non intensive land cover)
Risk management	Monitoring to inform risk management. Eg – UK Energy Infrastructure, Oil pollution and detection; Environmental impact of extraction
Climate change	Monitoring Climate Change Indicators. Eg – Sea levels, Surface temperature Issue: Who pays, given the policy is international?
Climate change	Information on global climate impacts/services. Eg – emission levels, de/re – forestation, carbon, ice cover, etc
Renewable sources	Intelligent information to inform policy decisions. Eg – untapped renewable resources, heat sources/loss
Heat detection	Matching demand for use of heat with environmental sources of heat (natural, man-made, potential, etc)
Urban development	Monitoring development – location, type (residential), speed of development
Urban development	Identifying new development sites – underutilised, well places, in need of redevelopment/regeneration
Habitat monitoring	Agree what habitats can be monitored with EO. Use EO to discover: where they are, extent, condition, linkage/connectivity. Working, updatable links with in situ data.
Heath analysis	Analysis of the heath and state of headwaters (structure, function and a pilot study). Aggregation of results to understand risk and priorities for remediation



Data	Data for - design, implementation (M&E), learning; Global emerging response
Data	An orthogonal dataset to support other statistical estimates. Eg PMI, GDP
Cost	Assessing the cost to business associated with civil contingencies, natural disasters, etc over the longer term

Table 2 - Government barriers for adoption of EO as identified by departments

- How much is **generically available** (commonality to improve cost efficiency)?

Government problems/barriers - as stated by Departments	
Awareness	Can it be done? With what confidence/resolution? Data is just a snapshot, but how might things change in the future? Matching EO plus other datasets (which may not exist)
Awareness	Limited awareness of what is possible; limited IT infrastructure; limited in-house expertise, limited budgets.
Awareness	Knowing what data is available
Awareness	Lack of sight of what non-Government customers need/uses
Awareness	Not fully understanding how EO might transform policy making and service delivery, rather than just make incremental improvements
Awareness	Persuading wider community to consider EO
Awareness	No consensus i.e possibilities and only potential agreement re need
Awareness	For 'hard' infrastructure, what does EO give us that the 'internet of things won't?
Access to information	Cost of access to information
Collective action	It's a global public good. Why should the UK taxpayer (alone) pay? How to get collective action?
Collective action	Prioritisation and harmonisation of EO ask
Cost	Government is already getting some information at a cheap price. EO seems expensive and for development type requires extra work to ground truth
Applications	Supply driven applications focused on EO not data/information flow
Risk	Risk appetite
Data	Sensitivity of EO to priority habitats
Data	Keeping up with new data streams and analysis
	No coherent market place in DFID; Diverse delivery across policy and geographical areas
	Do we join up government slowly and jointly commission intermediate products or take a risk
	Rapid prioritisation and service development – data, trailing
Cost	Capital and time to convince policy and operations leads that solutions will develop savings and improve service

Table 3 – Industry needs as identified by industry

- Information, Access
- Requirements
- Other Partnerships



- Data
- Innovative procurement
- Thematic information days
- Constructive dialogue, not a talking shop
- Partnership

Industry needs - as stated by Industry	
	Support for new graduates into the sector
	Support for SMEs away from big systems integrators
	Clear understanding of what the collaborative segment is and what is available and when
Clarity on requirements	Better engagement on government requirements; value adding products and more effective policy approaches and associated budget to work within
Clarity on requirements	Clear identification/articulation of your information needs; access to government to find out their needs
Clarity on requirements	R&D projects to ensure feasibility of space based information to meet needs (prototypes)
Clarity on requirements	Common framework
Clarity on requirements	Industry needs clarity but less specification, documentation and red tape. Huge specification docs with tender documents – it's impossible to understand what is actually required
Partnership	Partnership is needed – open, collaborative and willing to work together. The current culture is to treat industry as client/supplier relationship.
Partnership	Confidential conversation enabling collaboration (covered under NDA)
Partnership	Long term international partnerships
Partnership	Clarifying what government is going to fund and what not
Partnership	Anchor tenant for industry's services
Partnership	Consider an approach beyond one small project followed from another
Data	Investment in open datasets
Data	Easy access to government data
Data	Easy access to government data, when delivering government contracts

Table 4 - Industry needs as identified by industry

Industry messages

- Understanding
- Procurement
- Cost
- Benefits

What does Partnership look like - build on success?

Partnership means:

- Sharing
- Intelligence (needs/requirements)

- Investment (money/skills)
- Development (solutions)
- Benefits (profits/savings)

<b>What needs to be done differently? – as stated by non-Government/non-Industry</b>	
Partnership	Government is not sure what question to ask, industry doesn't know what the problem is – more open dialogue is needed
Partnership	The engagement model between industry and government needs to evolve on both sides
Need	Neutral intelligent information on what features can be derived from various EO sources
Awareness	Clear statement of policy needs
Awareness	Legal agreement behind the collaborative ground segment – who invests what?
	Appreciation on a senior level of the value of intelligence led decision making
	Use existing budgets for policy development – REDD and budget, fracking compliance – and innovative evidence base
	Scalable systems from detection of individual features, wall-to-wall analysis capability
	Return on investment – identify costs v financial savings; user qualitative benefits
	Non-experts need – training, demonstrators and support community
	Mechanism for better multi-disciplinary, multi-organisational engagement
	Artificial boundaries between Government, industry and academia
Data	When is data considered sensitive
Data	Data quality/assurance to published international standards

Table 5 - Specific Actions as identified by all

<b>Top Priorities – as stated by all</b>	
Research	Take advantage of the Nurse Review (a review into research councils led by Sir Paul Nurse) to propose a new model collaborative, applied and translation research programmes
Research	It would be helpful if there were long-term multi annual research and development programmes
Partnership	Partnership
Procurement	More innovative procurement routes; opportunity to join up with other departments on common areas of interest; eg land cover and change
Thematic days	Application specific working group days – SL suggestion
Thematic days	Keep the dialogue going – more days like today around specific themes/info needs [using the green dots on the UKSpace/BARSC slides?!]
Thematic days	Industry days to develop proposals/consortia/approaches to address specific problems
Awareness	Get away from the perception of EO as a Map, the future of EO is an App
Awareness	Educate non-EO people of the value of EO



## Annex F

# Intelligence, Surveillance and Reconnaissance - Syndicate Session 3

## Summary of Discussion

The session summary of activities can be split into 3 sections:

- Awareness
- Access
- Business Models

There was initially conversation around the capabilities of satellite technology with regard to the changing requirements of different parts of government, as outlined in the pre-reading. Industry was quick to assure that the capabilities required either exist now or are being developed.

This led to a conversation around how government communicates its requirements both internally and to industry, and to the development of potential actions to help improve operational efficiency.

### Awareness & Access

Gov -> Gov

Government departments are not always aware of the capabilities, datasets, and requirements of other departments. This leads to repeat purchasing, delays in the finding and sharing of data, and a reduction in the efficiency of service development within government.

Areas to explore further:

- Centralised list of available data sets already purchased (non-confidential)
- Centralised list of current data products and services being used by various departments
- Explore possibility for departments to create joint products services?

Gov -> Industry

Government departments are not always aware of what the current tech capabilities are, what sorts of datasets are available, and who they would talk to in industry to start to find current solutions or build new ones. The latest capabilities are sometimes presented in isolation from other capabilities in other sectors, limiting their usefulness to Government. Government also finds it difficult to get the right people from across all appropriate industry sectors together to discuss solutions.

Areas to explore further:

- A regular update paper/brochure outlining latest tech developments
- A space school for Gov/online training tool to ensure everybody can get up to the same level of basic understanding
- A list of trusted suppliers and a clear signposting mechanism to put departments in touch with relevant industry partners

Industry -> Gov



Industry sometimes has difficulty fully understanding the requirements of Government, and they are sometimes approached by different departments asking for different things. Government cannot always be completely open about its requirements as there is potentially a risk in exposing what it can't yet do. Industry can find it hard to access the right area of government to share their latest capabilities.

Areas to explore further:

- More face to face interdepartmental engagements for sharing cross cutting requirements and developing frameworks for service development
- Publicised engagements between Industry and Government
- Publicised lists of cross cutting requirements developed through workshops/engagements

### **Business Models**

As the argument evolves in favour of Government communicating with industry as a united front and developing internal mechanisms for sharing services, the necessity of new business models becomes apparent. There have been several complications due to licenses that only allow for a single customer to access a service, or for a dataset that can only be used in one way.

Areas to explore further:

- Business models need to be designed around:
  - Resource constraints in Government
  - The sharing of government data to service provider as a way of increasing efficiency
  - Products that will be used by multiple departments
- Products that draw on multiple sources with a greater customer base rather than expensive products from one source with a narrow customer base

### **Prioritised Action list**

1. Further engagements to be organised between industry and interdepartmental Government representatives.
  - a. Responsibility: Catapult
2. Mechanism for the sharing of requirements, data, and capabilities between Government departments to be explored
  - a. Responsibility: Government
3. Summary of tech capabilities to be created and disseminated through Government
  - a. Responsibility: Catapult or Industry

### **Summary**

Developing new, more efficient, business models to augment current ISR capabilities will require a two-way agreement between Government and Industry: Government must be able to bring coherent requirements from across all departments to Industry, and Industry must be in a position to offer cost-effective services to Government that incorporate capabilities from a number of sectors.

If this takes place then naturally business models may emerge that are designed around the sharing and transfer of data and services to different users, and Government will be able to help steer technology development into the directions most suitable for solving current and future challenges.



The SSGP and Catapult network should leverage its position as a neutral party to help facilitate these engagements and help interpret requirements where possible.

## **OPEN FLOOR - ACTION PLANNING DISCUSSION**

Peckham: Use for targeting – this is very difficult for commercial companies – what do we mean by targeting? Could be food aid... ?

Downey: Generic ability – high res is from niche and commercial

Millward: Lot of data coming on-board - How can we use that more effectively to get a similar result?

Philliban: Are there any regulations on what commercial providers can go down to?

Peckham: 30cms resolution – set by US - can't export beyond that

Amin: Rely on images than modelling is the impression of MoD use – are there suppliers to model for MoD as well as Defra?

Millward: Can we improve understanding of types of terrain for exercises – can we use satellite data?

Schurr: There is a company in Bristol modelling explosions of gas moving through a city – there are contracts you guys have with commercial guys – build the terrain model – set off the gas model.

Amin: Could the terrain model be used by DfT?

Pratt: These kinds of projects are shared across government.

Lavender: Modelling the satellite data itself – so you understand how the data interacts – trying to understand what is under the surface of the water – hidden information within that data set.

Peckham: Lot of work on automatic change detection – a focus for industry R&D efforts – when you say instant – how quickly do you mean – even that tech is coming – but not like the films yet! Possible in the future – if you want daily looks or several looks a day – can be possible – can be less labour intensive now.

Millward: Is there a way of taking all the data together and make it open source?

Downey: That work's best when you know half the answer already – if you know roughly what you are looking for and where.

Pratt: My kind of examples - can we be sure there is no unregulated small craft approaching coastline, change in an area around a sensitive installation?

Downey: Targeting of particular areas of interest – this is more feasible.

Philliban: Could you link it to mobile phone or crowd sourced data – to do some analysis on a choke point or spot that seems popular?

Downey: You can crowdsource about general marine traffic but general movement not

Millward: Automated, change detection – that stuff is in train – but a question of knowing what we want and feeding it to the right person in industry?



Lavender: Solution is combination of the human and computer brain – parts of the human element you can transition into the system – but you always need the human element.

Beckett: Use the analogy of gold-panning. Satellites can get you down to about a 10% - more scrutiny as you get down to the gold. Back to the various needs – what are the things we can do today. Resolution comes in different guises. Converse to that is coverage – under the microscope you use your field of view. 80% for ship detection – where do you draw the line? We've got the tech for 80% / 90% solution – we have a roadmap to solve that – the data science – we all have diff areas of expertise to pick the gold out of the pan. Some companies not looking at 70% of the data

Philiban: What's happened – auto-cueing – and moving to what might happen? Building up the threshold.

Beckett: Tipping and cueing – using social media to provide tipping and translating that into a coordinated request for data in that area. Tracking cellphone information – figuring choke points – that gets cued and then satellites take images to see what's happening.

Peckham: If time is critical you need to task a satellite – which then does involve money.

Millward: Is there a way we can get ahead of the game – speed –?

Beckett: But x doesn't know that y has it – centralising the data and co-ordinating that acquisition – sucking it down and putting it in a silo and it's never seen by anyone else.

Millward: Institutional stove-piping.

Schurr: Analogy of company X – all ordering maps from OS – sometimes for the same project – ringfenced every piece of geospatial data – and they hold it – the first stop is for someone to go back to that department. A repository. Data licensed to company X

Beckett: But that's still a silo.

Lavender: Data has to be bought with the right licence.

Pratt: Until you can get your collective acts together to bring me material that I want at a good price – I'm not buying it.

Lavender: The old model has to change. Got to sell it a lot cheaper to a lot of people – but the licensing has to change to help that – as a user of data – that's my frustration – if I buy data for a customer I have to negotiate a specialised license.

Crisford: Satellite operators are open to business models. That needs to be able to fund the maintenance and ongoing operating cost of that satellite operator. So many operators now that the demands of the customer are being listened to.

Peckham: Sat data providers passing over same bit of earth everyday – if you want to see what's changed – if there is a change tell me there is a change – pay for what you use.

Beckett: Maybe the intermediate product is the – nothing changed – nothing changed – and then one day something has changed and then you spend the money to look more closely at that change. The product is a change / no change report.

Amin: How much onus can be on industry to say we have developed is for "X" dept – we think it would work for "Y" dept – who takes ownership of that?



Peckham: Users to say what you are looking for? e.g looking at forests cutting or where they might fall down – generic software that underlies that. Who do we go to – to find out who is around?

Pratt: Are we in a by-gone era?

Beckett: the RFI is a way of soliciting what are your change detection needs.

Pratt: But that's not what I want I want to know how can a policeman do his job better?

Mealing-Jones: One of the biggest barriers is lack of awareness – a space school for government?

Crisford: Let's have a session on when we can see a small craft coming at speed to the coast

Filiban: Companies not willing to share their IP

Peckham: More innovation facilities. More AICs – nonpartisan – potential users and experts to brainstorm solutions.

Crisford: What are the problems that are valuable to solve?

Vesey: What is the budget currently spent to solve?

Pratt: Difficult to separate that out.

Amin: Getting industry coming in and setting the policy challenges.

Mealing Jones: Lots that government can do

Cooper: Requirement for a brokerage solution?

Pratt: Mark Walpole – if he bit on this as a topic - would be the cross government driver

Crisford: Is there a voluntary system for concerned citizens to send in data?

Mealing-Jones - Is there a mechanism to feedback on tweaks to government data sets – data.gov.uk – use Paul Maltby as the contact. Making available in one place – all the data – amalgamating into one place.

Peckham: techUK – feasibility days – bring the right people together – not just space companies – SBRI programme – specify the problem in a way that makes sense to you.

Crisford: Can this be done in a public way?

Catapult Ideas and Opportunities page – but not just a space solution

Beckett: Can we also ask is Gov interested in this capability – works the other way. In the USA NGA – “Crater” - joint research and development. A need for crater in the UK?

Filiban: Have managed to do that in defence – created a Centre for Intelligence and Innovation

Crisford: A government suggestion box – is that what we need?

Vesey: Need Gov to look to say - we've already got this.

## Annex G

### Action Planning Session

In a slight change to the pre-published agenda, following the syndicate feedback, the final session was run as a joint Q&A session with an opening summary from Professor Ian Boyd and concluding summary from Stephen Lovegrove.

#### Opening Summary

Ian Boyd highlighted that whilst there is SSGP, there is also a need for a 'senior body/champion' that can speak for and on behalf of Government, for example, on topics, such as joint data requirements. Until now, Government has been disjointed in its communication, which has caused Industry to be disjointed in its response. Government needs to take this forward to look at issues, including procurement and pre-competitive development.

Industry too needs to be more joined up. Government has already heard of generic products, and is seeking integrated ones. Government is ensuring that value is being driven into activities. It wants to encourage Industry to export products, rather than the current procurement model (i.e. charging the Government for the same items numerous times). A challenge is for Industry is to prove that Government is not paying for the same thing multiple times.

To summarise his take-aways from the day, Ian Boyd highlighted:

- A key theme for him was about establishing partnerships - and how could we achieve this?
- That a lot of the blame lies with Government - we recognise we are disjointed - hoping the Defra led Centre of Excellence can help improve this, but we also need to integrate different Government data needs and also need industry to offer up integrated products.
- Procurement - we need a better way - do we need pre-competitive development? We need to stop paying for the same products many times over... how do we capture what we buy/use and share this knowledge?

#### Q&A Session

Stephen Lovegrove underlined that it is not possible to see Industry in such a monolithic way, like Government. Is it possible for Industry to act in a way Government ought to?

**Peckham, Richard** noted that Industry can help through trade associations with identifying requirements, but ultimately Government needs Industry to be competitive. There should be some intermediate product in the mid-term. Going forward, it might be possible, using SMEs, to provide a more bespoke product.

**Lavender, Sam** noted that she has not seen a trade association developing a detailed specification.

**Peckham, Richard** clarified that he meant general requirements rather than detailed specification.



**Lavender, Sam** said that a small SME could only provide a certain amount of service. If it were a small grant, an SME could provide science into the service. It is an evolving process of competing and collaboration. It is better to grow the community to provide something that is good.

**Powell, Andy** raised the funding problems caused by so many different research councils. There should be procurement of pre-operational services to find out what science works, with the tender based on the customer's requirements.

**Boyd, Ian** agreed. Government needs to be funding activity in the pre-competitive area (basic science). There needs to be better use of Innovate and Catapult funding. Could we develop intermediate products that raise the game for everyone? Could Industry do this?

**Groom, Andrew** advised that, in principle, it is fine to do pre-competitive work. However, there is the risk that the company involved may end up being ineligible to bid for future work.

**Bochenkov, Ani Fox** noted that Industry providing guidance would need to be excluded from a bid. The EU solves requests for information by creating requests for requirements (i.e. how companies could help the EU). The Government could request a White Paper on how to collaborate in Industry. A logical group could arise from this request. Another White Paper could be on how to handle big, open data.

**Cooper, Phil** suggested that Government should stop relying on big IT contracts for everything. Building big computing systems that require updates every 5 years is not effective. Small business engagement would provide better value for money for Government.

**Shaw, Andy** wanted clarification on what is meant by the phrase, 'EO is expensive'. The complexity is that Industry cannot keep up with the pace of change, including procurement. There is the need to look at the art of the possible and to leave competitive procurement to the market.

**Mealing-Jones, Catherine** suggested creating a business model, using SSGP. Most of the things discussed can be achieved within SSGP if it were upscaled and resourced accordingly. Use the combined power and influence of Jeremy Heywood and Stephen Lovegrove and incorporate the action plan into SSGP strategic plan

**Tipper, Richard** underlined the importance of learning from international projects too, such as the UKSA's International Partnerships in Space Programme.

**Keith, Beckett** suggested that it would be good to see Government take chances on small things, with the risk of 'failure', rather than focus on large items. This will ensure innovation.

**Lovegrove, Stephen** responded, saying that he understood the logic- in reality - asking Government to fail is very dangerous. The outcome would be very public. It could result in risk averse staff. Government has structures in place to handle issues raised. First steps will have to come from Government via White Papers (etc.). Then there should be a move towards new institutions to handle the concerns.



## Conclusions and Wrap Up

Stephen Lovegrove then concluded the session by reflecting on a variety of points raised throughout the day including;

- There are economies of scale to be had through co-ordinated products and requirements gathering
- There is a much bigger role for a programme like SSGP - but how do we embed this within and across Whitehall and fund/resource this change?
- Procurement – do we need a centralised source of sharable data?
- How do we change behaviours and/or controls so technical services can't be developed in isolation?
- How do we raise awareness of what space can do and enable better sharing of requirements across Government - do we need a school for technology/space across Government?
- How do we allow better access – who should people talk to, where do they go to, how do we enable sharing across different sectors with maximum effect?
- Do we need intermediate products? Would this lead to lower costs systems and better predictive alert systems?
- How do we open up applications and services used in the various Departments across Government which are licenced for many to use?
- Future proofing is important as is the vocabulary and the continuity of this type of conversation.

He encouraged people to provide feedback on the event, and highlighted that an event summary paper would be written and widely circulated, and that he would write to the Cabinet Secretary after the next EOWG meeting in mid December, outlining the findings from the day with his recommendations on the actions that need to be taken forwards.

Stephen thanked the presenters, organisers, facilitators, note takers and attendees for their contribution, valuable time and input, in what had been for him a really enjoyable and thought provoking day and wished everyone a safe journey home.