

Digital Earth Australia: First Look

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OUTLINE

Phil Delaney and Eva Rodriguez

AGENDA

Time	Content	Presenter
12:00	Introduction	Phil Delaney
12:05	DEA Overview	Trevor Dhu
12:20	DEA Industry Consultation	Eva Rodriguez
12:25	View DEA	Phil Delaney
12:35	Access DEA	Phil Delaney
12:40	Analyse DEA	Felix Lipkin, Alex Leith and Phil Delaney
1:00	Questions	All
1:20	Next Steps and Close	Eva Rodriguez

WEBINAR OUTCOMES

- **Purpose:** Understand the purpose and scope of Digital Earth Australia
- **Collaborate:** Discuss the opportunities for the private sector to utilise DEA
- **Interact**
 - **View:** Use visual tools to access and compare DEA data products
 - **Access:**
 - Integrate DEA web services into your application (e.g. GIS package)
 - Know where and how to download raw data
 - **Analyse:** Set up a satellite imagery data cube on the cloud using Jupyter Hub
- **Support:** Know where to go for help, support and questions

BEING AGILE:

REQUIREMENTS AND SOLUTIONS
EVOLVE COLLABORATIVELY

RELEASING THINGS BEFORE THEY
ARE PERFECT



Australian Government
Geoscience Australia



Digital Earth Australia

Dr Trevor Dhu

A/g Branch Head,
National Earth and Marine
Observations



Why Digital Earth Australia?

The Australian Government announced an **ongoing** measure of ~\$13 million a year in the 2017-18 budget for Digital Earth Australia.

Why Digital Earth Australia?



The Australian Government is currently investing over **\$500 million a year** on monitoring, protecting or improving the health of our land and oceans

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Earth observations from space are the only hope of efficiently monitoring and targeting these investments

Why Digital Earth Australia?



DEA will improve the efficiency and effectiveness of the Australian Government's investments and improve how we manage our natural resources.

Why are we building DEA?

The Hon Senator Matthew Canavan

“Our investment in [DEA] will ensure a range of Australian industries have access to data that can help them:
tailor their investments,
create jobs in target regions, and
increase their competitiveness.”

Digital Earth Australia – Why?

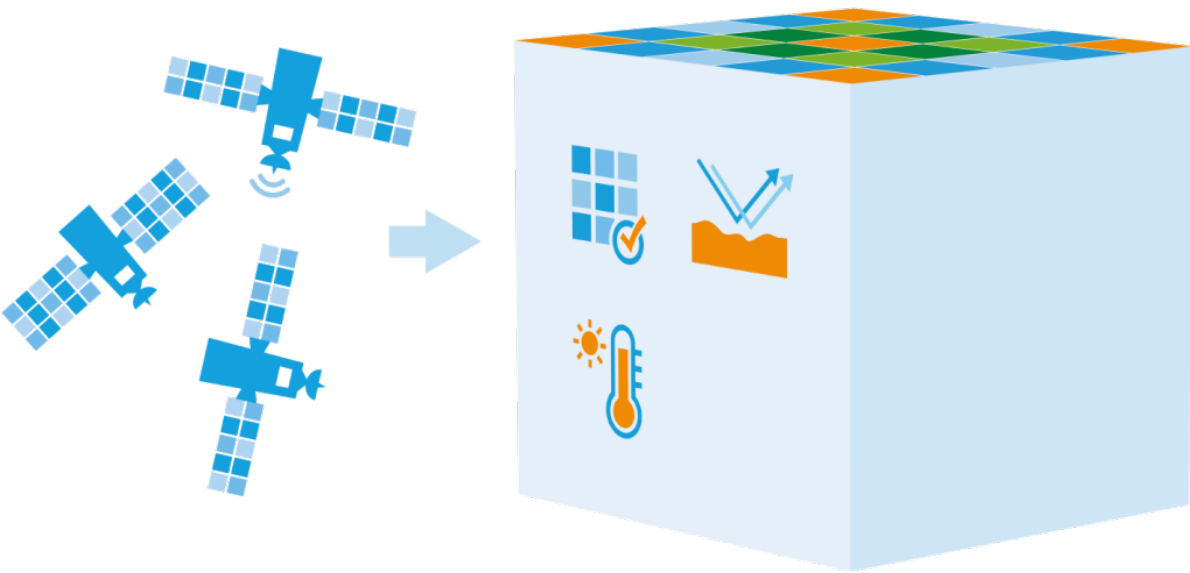


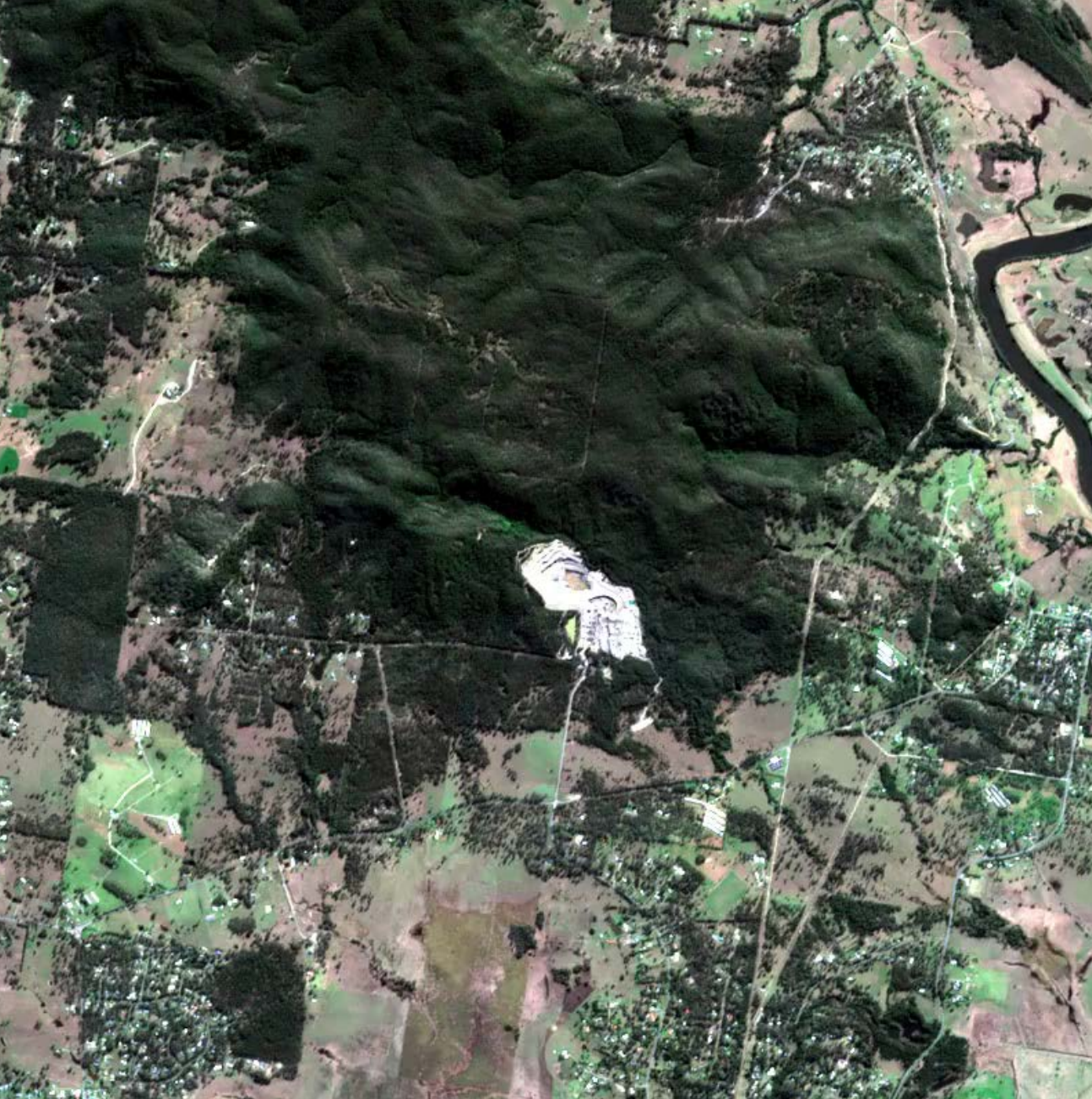
DEA will improve the efficiency and effectiveness of the Australian Government's investments and improve how we manage our natural resources.



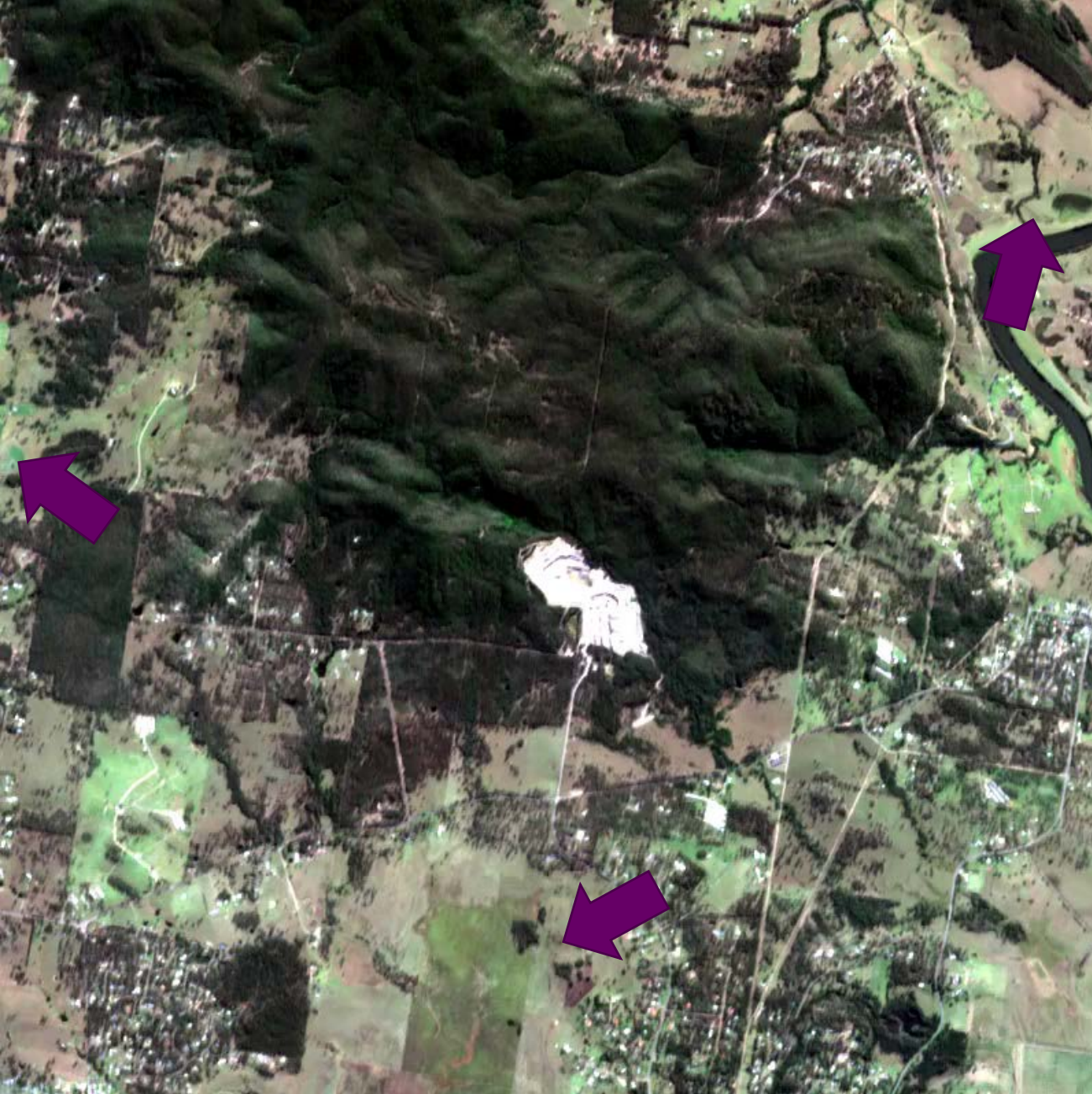
DEA will support innovation and growth in the digital economy and drive increased productivity across a wide range of sectors.

What is Digital Earth Australia?



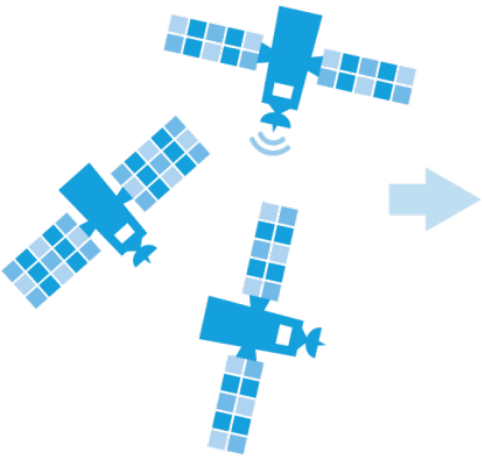


Seaham, NSW



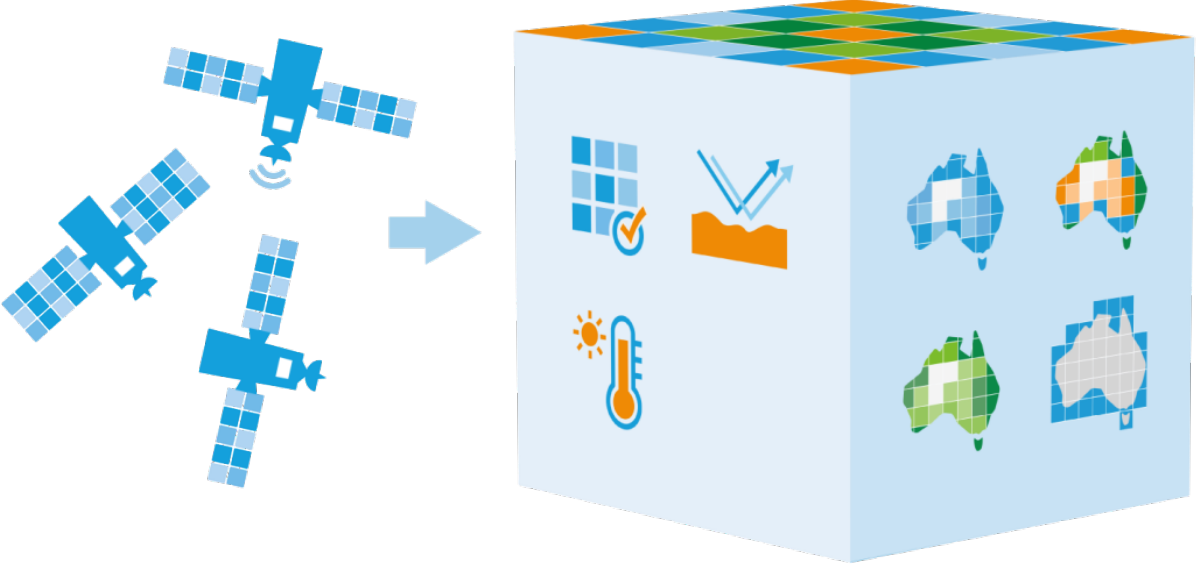
Seaham, NSW

What is Digital Earth Australia?



Satellite	When will it be available
Landsat (1987 – today)	Now
Sentinel2 ARD	~ 3 months
Near-real time Sentinel 2	Now (beta)
Near-real time Landsat	~ 3 months
Sentinel 1 RADAR	~ 1 year
Landsat Surface Temperature	~ 1 year

What is Digital Earth Australia?





■ green

■ dry

■ soil

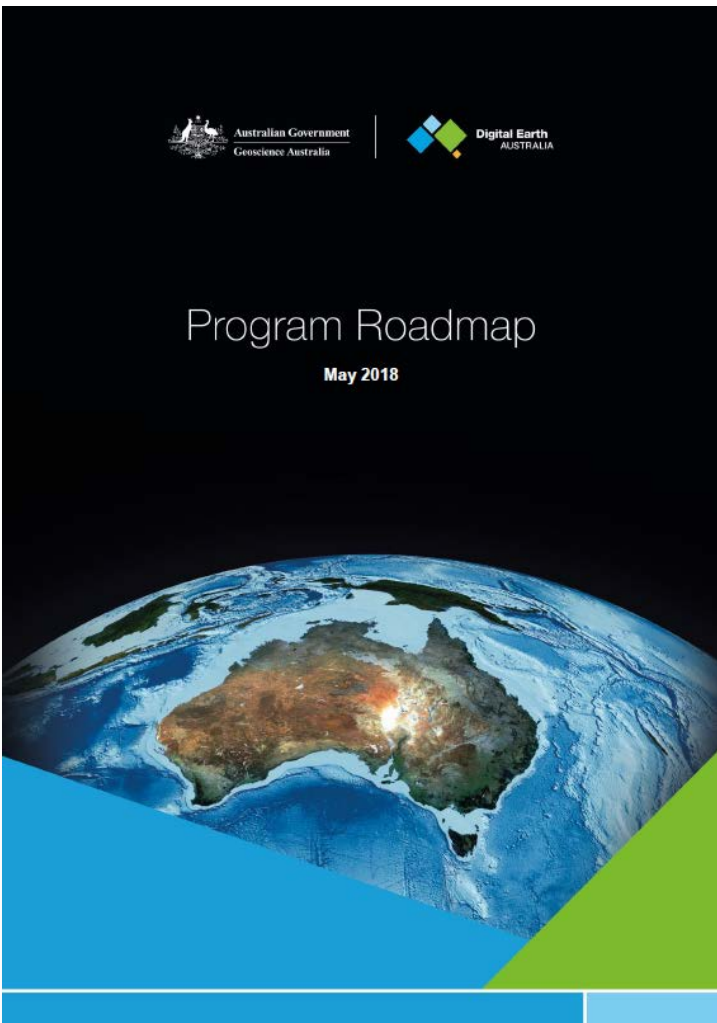
1988

2000

2006

2014

DEA Roadmap

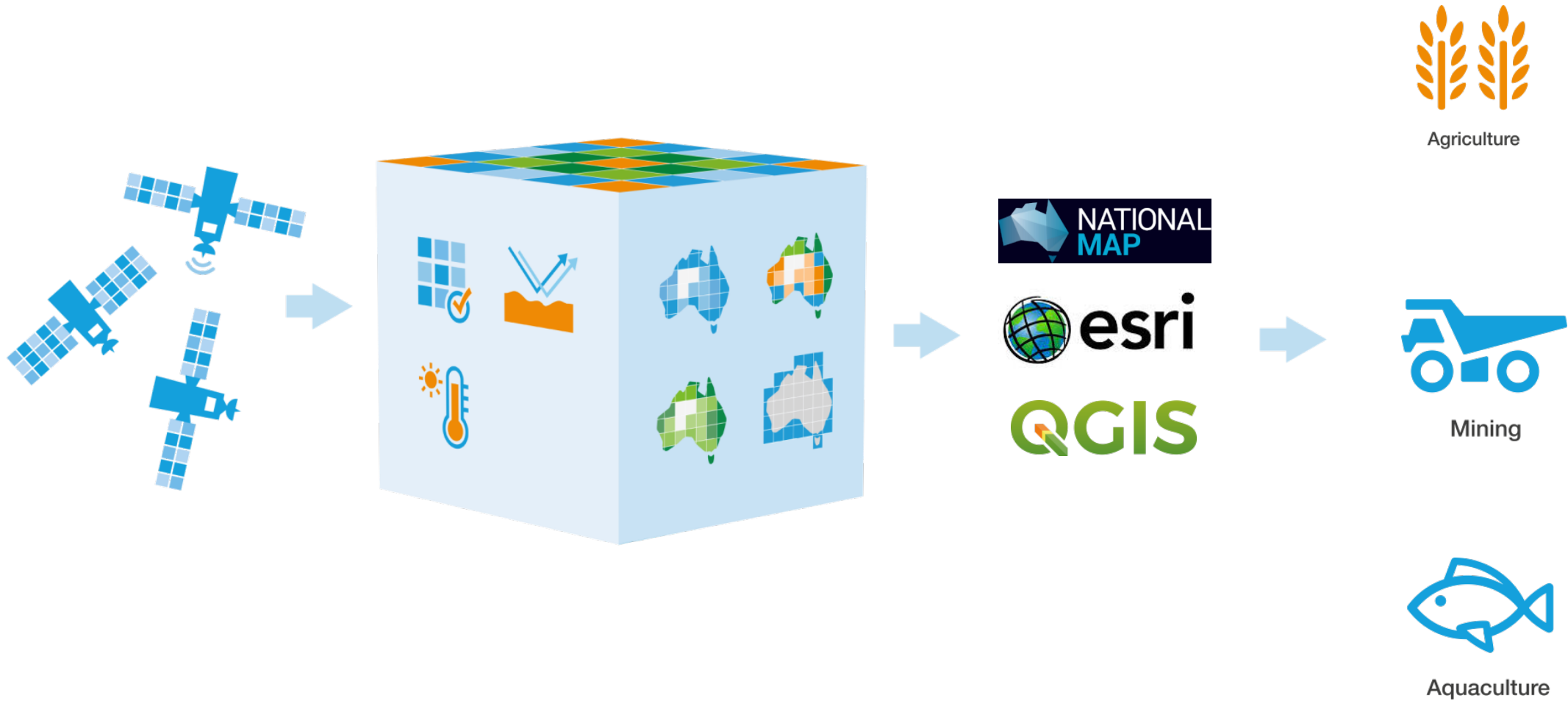


The DEA Roadmap:

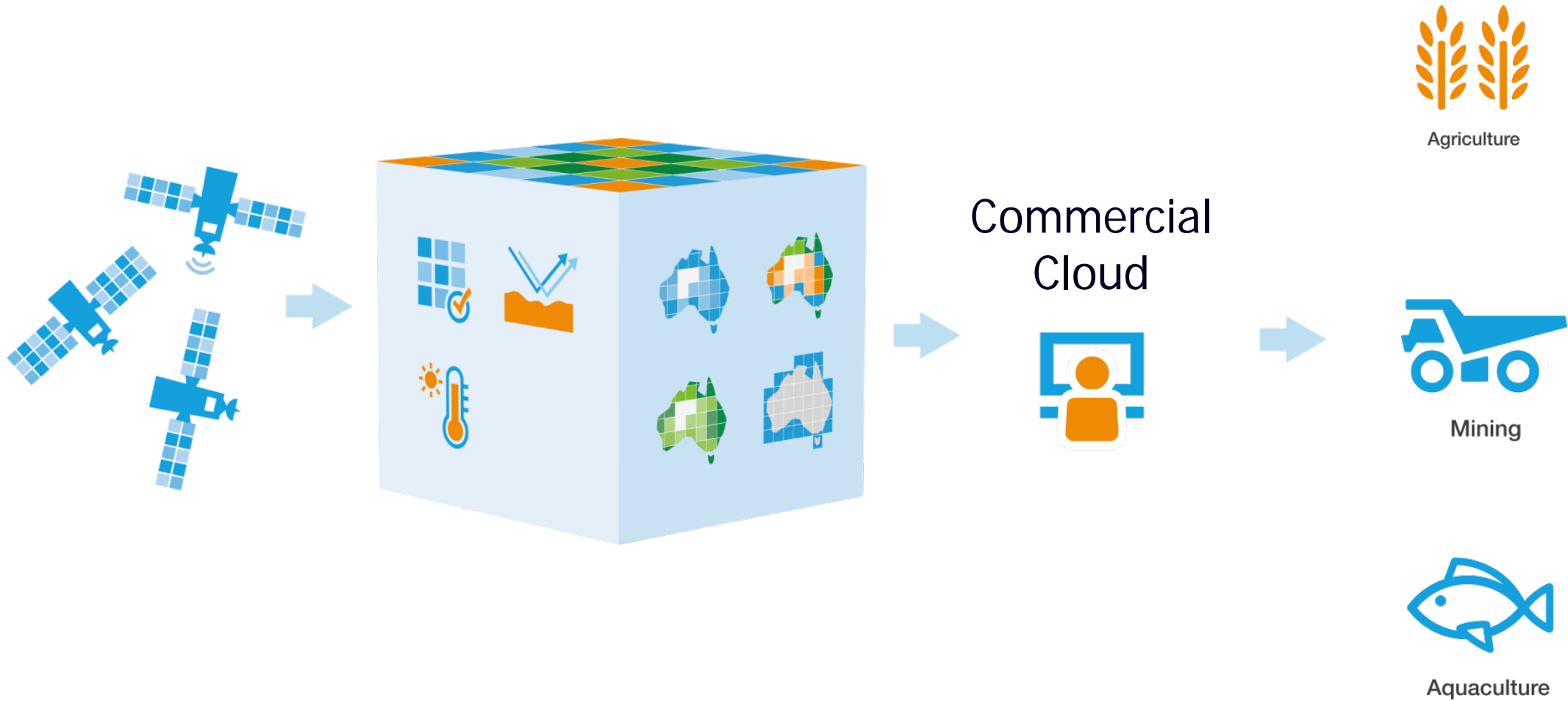
- outlines our strategic framework and provides an overview of the tactical direction of the DEA program.
- is constantly reviewed and regularly updated with the goal of increasing the value of the program to its users.
- **is not an** immutable set of projects and products that will be delivered to a specific timeline.

www.ga.gov.au/dea/news

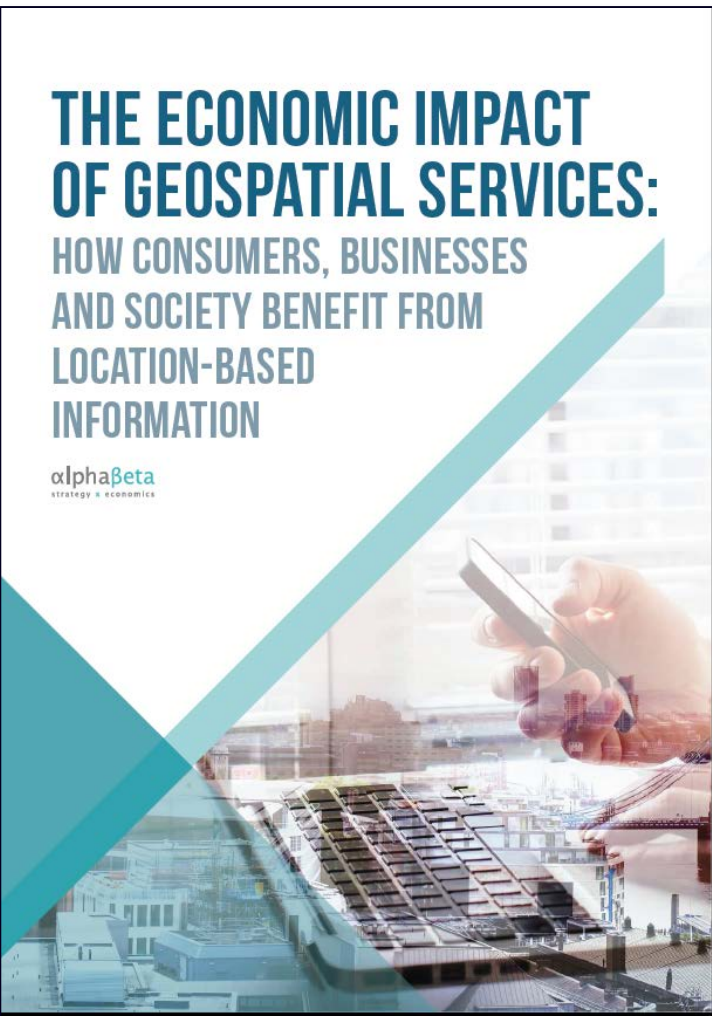
How could DEA support industry?



How could DEA support industry?



The opportunity is real – but we need your help



Geospatial services industry generated revenue of approximately

US\$400 BILLION IN 2016.



Geospatial services could have a significant productivity impact in sectors representing approximately

75% OF GLOBAL GDP.

DEA INDUSTRY STRATEGY

Eva Rodriguez

Why an Industry Consultation?

Motivation

Work with industry to understand their needs

Identify and remove barriers and blockages to Earth Observation data use

Support DEA adoption and integration in Australia

Ensure value generation for the Australian private sector

Australian Industry

Across sectors
Space and Spatial, Application Areas: Transport, ICT, Defence, Mining, Data Science, Health, Agriculture, Smart Cities, and Utilities

Across types
SME, Multinationals, Enterprise, Start-up, Research, Indigenous corporation

Outcomes

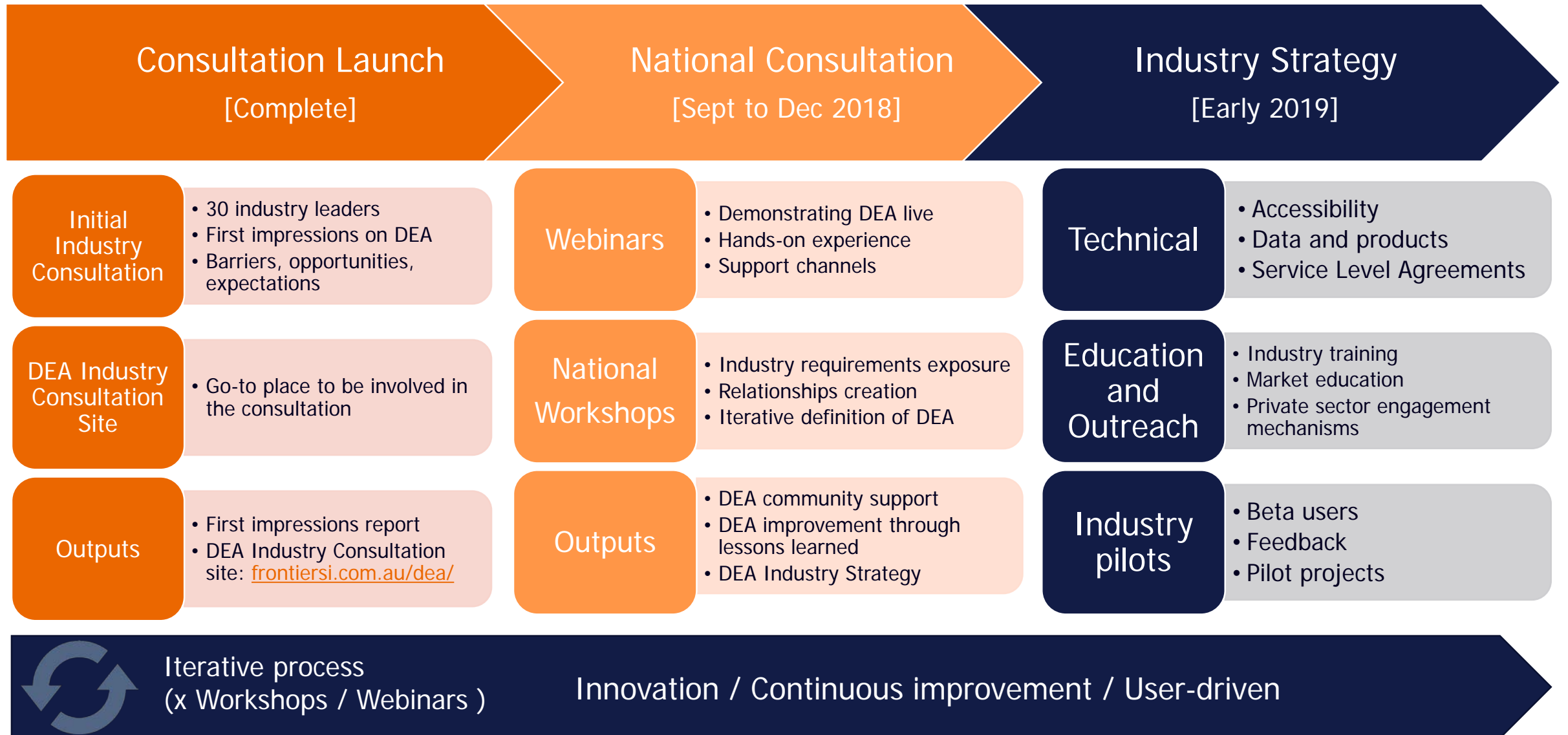
Industry innovation

Businesses creation and growth

New services, applications and products creation

International knowledge export

Industry Innovation – an Agile approach



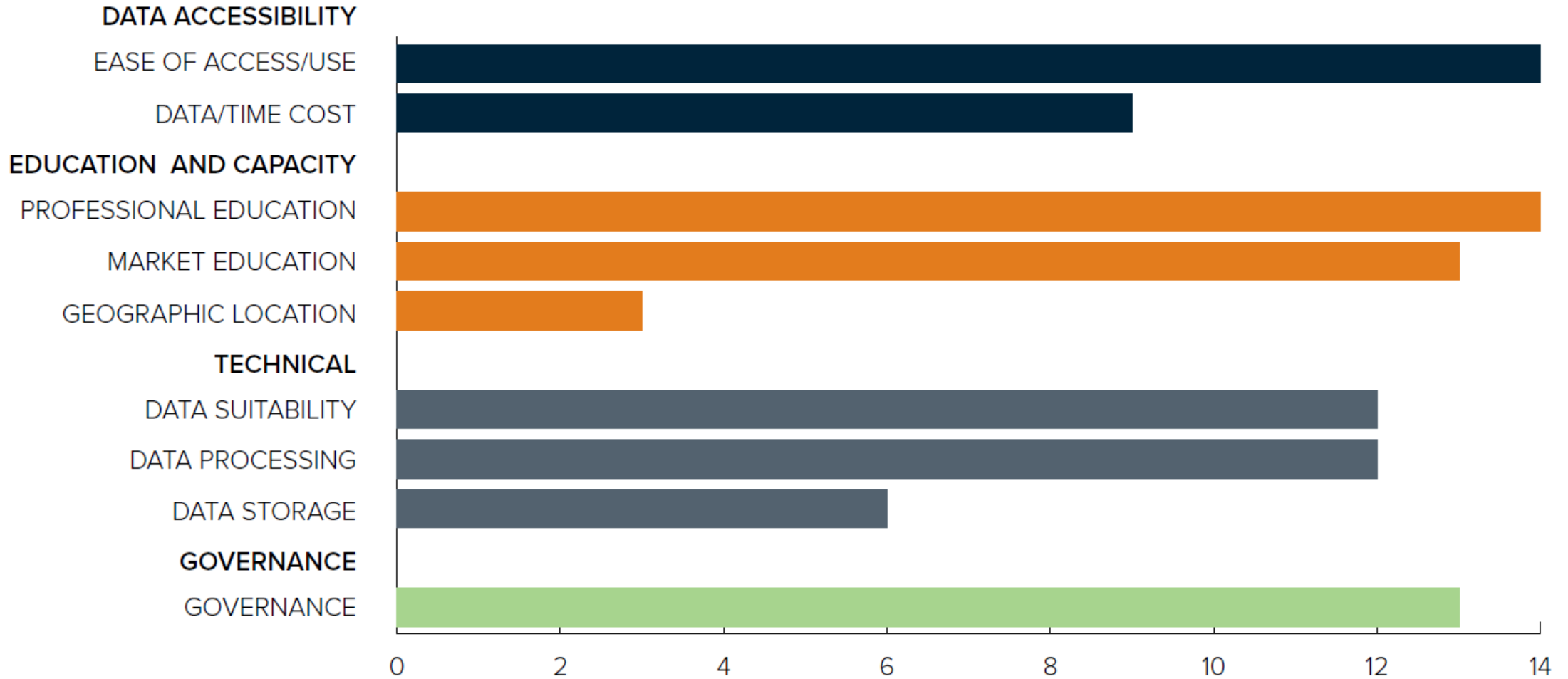
First Impressions Report: Overview



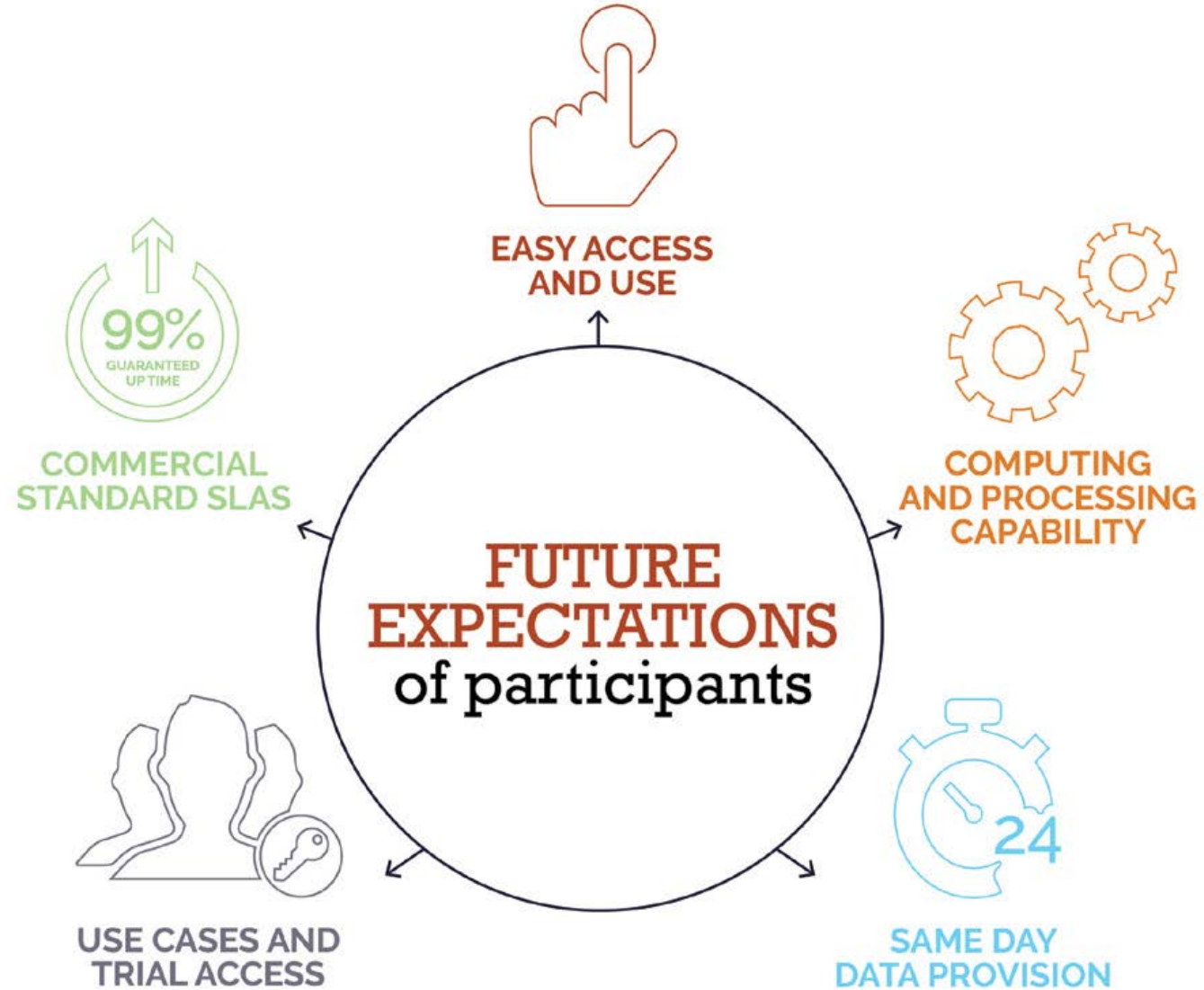
- “Long term public sector investment is needed to enable long term private investment to flow”.
- “As a small business, it is prohibitively costly resource wise to locate, download, store Earth observation data locally and then run intensive processes to find what you want”.
- “Geoscience Australia’s work is giving confidence in the use of remotely sensed data. They are doing background leg-work that many industries can build upon in innovative ways.”



BARRIERS TO EO DATA USE AND EXPLOITATION



FUTURE EXPECTATIONS



INTERACTING WITH DEA

Phil Delaney

DEMONSTRATION – LEVEL OF COMPLEXITY

Currently different ways to interact with DEA involve different levels of technical knowledge. In this demonstration:

- **View:** use visual tools to access and compare DEA data products
[**Beginner**] *All publics, knowledge on EO data and products useful*
- **Access:**
 - Integrate DEA web services into your application (e.g. GIS package)
 - Know where and how to download raw data[**Intermediate**] *Requires some GIS and web development knowledge*
- **Analyse:** Set up a satellite imagery data cube on the cloud using Jupyter Hub
[**Advanced**] *Python coding and Jupyter Notebooks knowledge desired*

VIEW DEA

Phil Delaney

VIEW AND COMPARE DATA OVER TIME

Example uses:

- Visual interpretation of landscape and spatial representation of location for in-field compliance activities.
- Reference information as a textual layer to understand attributes of the land for investigation activities.
- Predictions for plant growth (due to climatic conditions) based on time series comparison; in order to predict vegetation patterns, plant crops, buy supplementary feed etc.
- Provide concrete evidence / due diligence around property/landscape potential to FIs for financing property purchases.
- Using images for art; a time lapse series depicting change in Australian landscapes, utilising colour bands to tell a story.

NATIONAL MAP

National Map can be used to view a large range of national datasets, from satellite imagery to demographic data

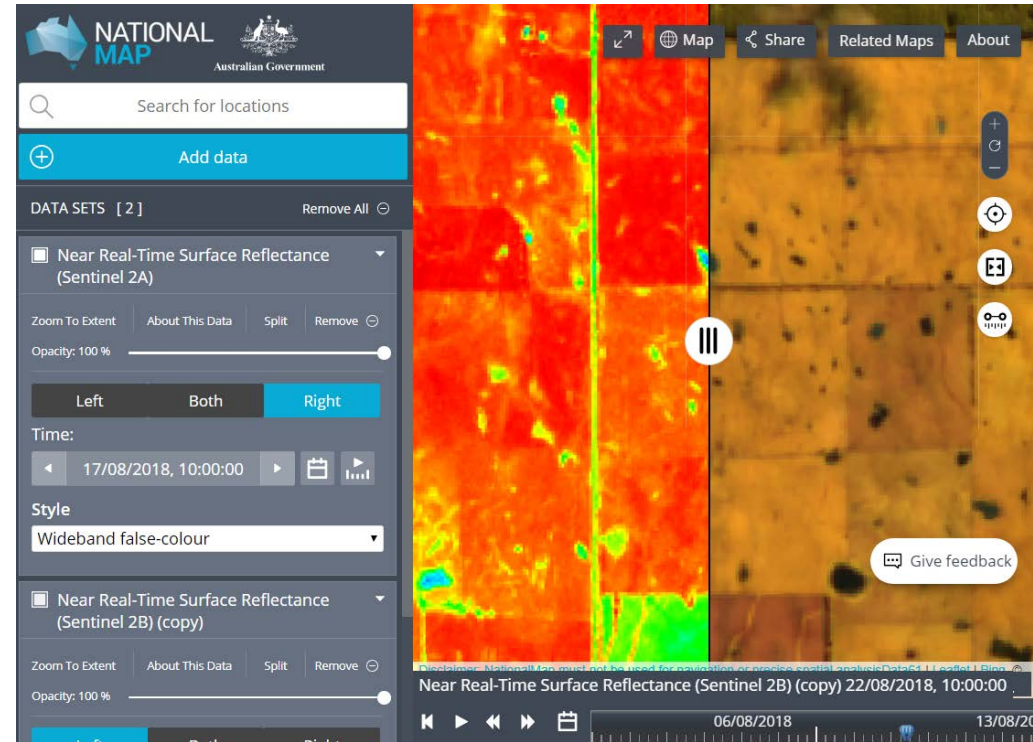
Web Link: <https://nationalmap.gov.au/>

Click "Add Data"

DEA data can be found under:

- Satellite Imagery
- Surface Water – Water Observations from Space
- Data Providers – Digital Earth Australia

Example: [Pre-loaded near real time example](#)



WATER OBSERVATIONS FROM SPACE

- Earth Observations Portal – Geoscience Australia

<http://eos.ga.gov.au/>

- The features in this portal are currently in the process of being migrated to National Map

ACCESS DEA

Phil Delaney

ACCESS DATA IN YOUR OWN APPLICATIONS

Example uses:

- Assess and review landscape changes to meet requirements under legislation e.g. woody change detection under State of the Forests Report.
- Understand prior changes in landscape to inform future activities, e.g. Burn Scar Mapping to inform backburning.
- Providing comparison imagery and data to compliance teams.
- Analysis of potential impact of climate change on biodiversity and categorisation based on identification of vulnerable areas.
- Reduce burden on survey respondents and improve timeliness of surveys (i.e. crop type) by supplementing survey responses with EO data.
- Deliver near real time imagery and information to farmers about their crop yield and vigour through a third party application they are developing.

WEB SERVICES

The following web services are OGC compliant, and can be incorporated into common mapping applications

- Sentinel 2 Near Real Time Data (rolling 30 day archive)

<https://nrt-au.dea.ga.gov.au/?service=WMS&version=1.3.0&request=GetCapabilities>

- Landsat 5, 7 and 8 surface reflectance 16 day composites

<http://gsky.nci.org.au/ows?service=WMS&version=1.3.0&request=GetCapabilities>

- Water Observations from Space

<http://eos.ga.gov.au/geoserver/NFRIP-WOfS/wms?>

Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

Browser

Recent Projects

Home
C:\
D:\
GeoPackage
Spatialite
PostGIS
MSSQL
Oracle
DB2
WMS/WMTS
XYZ Tiles
WCS
WFS
OWS
ArcGisMapServer
ArcGisFeatureServer
GeoNode

Layers

Create a New WMS/WMTS Connection

Connection details

Name: DEALandsat

URL: <http://gsky.nci.org.au/ows?service=WMS&version=1.3.0&request=GetCapabilities>

Authentication

Configurations: Basic

Choose or create an authentication configuration

No authentication

Configurations store encrypted credentials in the QGIS authentication database.

WMS/WMTS Options

Referer:

DPI-Mode: all

Ignore GetMap/GetTile URI reported in capabilities

Ignore GetFeatureInfo URI reported in capabilities

Ignore axis orientation (WMS 1.3/WMTS)

Invert axis orientation

Smooth pixmap transform

OK Cancel Help

Type to locate (Ctrl+K) Ready

*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

Browser

Spatialite
PostGIS
MSSQL
Oracle
DB2
WMS/WMTS
GSKY Web Map Service
DEA High Tide Composite 25m v2.0 false colour
DEA High Tide Composite 25m v2.0 true colour
DEA Intertidal Extents Model Confidence Layer 25m v2.0
DEA Intertidal Extents Model Relative Layer 25m v2.0
DEA Landsat 5 surface reflectance false colour
DEA Landsat 5 surface reflectance true colour
DEA Landsat 5 terrain corrected surface reflectance false colour
DEA Landsat 5 terrain corrected surface reflectance true colour
DEA Landsat 5 terrain corrected surface reflectance true colour
DEA Landsat 5 terrain corrected surface reflectance true colour
DEA Landsat 5 terrain corrected surface reflectance true colour
DEA Landsat 7 surface reflectance false colour
DEA Landsat 7 surface reflectance true colour
DEA Landsat 7 terrain corrected surface reflectance false colour

Layers

DEA Intertidal Extents Model Relative Layer 25m v2.0
DEA Landsat 8 terrain corrected surface reflectance q...

DATA DOWNLOAD

Users wanting to download Analysis Ready Data or derived products to undertake analysis using desktop applications can use the following links:

Direct data download from NCI Threads

- Sentinel Data from the Copernicus Data Hub

<http://dapds00.nci.org.au/thredds/catalogs/fj7/catalog.html>

- Landsat Analysis Ready Data

<http://dapds00.nci.org.au/thredds/catalogs/rs0/catalog.html>

- Landsat Derived Products

<http://dapds00.nci.org.au/thredds/catalogs/fk4/catalog.html>

Access through the Copernicus Regional Data Hub

- <http://www.copernicus.gov.au/>

DATA DOWNLOAD

Users wanting to download Analysis Ready Data or derived products to undertake analysis using desktop applications can use the following links:

Direct data download from Amazon S3

- Sentinel near real time data, and Landsat derived products

<http://dea-public-data.s3-website-ap-southeast-2.amazonaws.com/?prefix=>

Note:

1. While DEA intends to distribute data freely, future data egress costs from S3 could mean that data is released under AWS S3 “Requester Pays” policy (<https://docs.aws.amazon.com/AmazonS3/latest/dev/RequesterPaysBuckets.html>).
2. As DEA’s AWS offering matures there will be natural and unavoidable improvements to our directory structure and file naming conventions.

ANALYSE DEA

Phil Delaney, Felix Lipkin and Alex Leith

ANALYSE DATA IN THE CLOUD



Example uses:

- Environmental event detection; where an event is in the landscape as a function of time (e.g. flooding or water release programs).
- Creating images and maps for public outreach and awareness of environmental events.
- Detect vegetation change over time, and response to environmental events.
- Change detection of landscape for compliance purposes
- Change detection of landscape for management and monitoring, e.g. carbon accounting auditing.
- Facilitate analysis for scientific reviews and reports in order to provide advice or reach a conclusion for a client.



LEARNING THROUGH JUPYTER NOTEBOOKS

- The Jupyter Notebooks are
 - Open-source web applications that allows you to create and share documents that contain live code, equations, visualizations and narrative text
 - Intended to explain to users how to use Python code to undertake particular tasks
 - Widely used for data analysis and other areas of scientific computing
- The DEA notebooks presented intend to introduce users to the code required to access and analyse data on Digital Earth Australia
 - Users would then re-use this code in their own applications, and customise it
- A detailed introduction to [Jupyter Notebooks can be found here](#)

ACCESSING DEA NOTEBOOKS



- Register for a GitHub account here:

<https://github.com/join?source=header-home>

- Use the link below to access various notebooks:

- FrontierSI DEA Sandbox – smaller study areas, amazon deployment

<https://jupyterhub.test.frontiersi.io>

For users who have access to the National Computational Infrastructure:

- Geoscience Australia DEA User Guide

<http://geoscienceaustralia.github.io/digitalearthau/>



FRONTIER SI DEA NOTEBOOKS

- Demonstration highlighting:
 - How to navigate the notebooks
 - How to explore the demonstration applications
 - Example of a mining use case
 - Example of an agricultural use case



DEMONSTRATION



Cube in a Box

- The Cube in a Box is a simple way to run the Open Data Cube
- One button to spin up your own index of AWS, and index data from global data stores, or connect to your own data sources
- This does not access DEA data, but does utilise the open source technology underpinning DEA
- Template based using AWS' CloudFormation
- Deploys in 3 minutes
- Takes 5 minutes to index data
- Ready to run with Landsat 8 data from AWS auto-indexed
- <https://github.com/crc-si/opendatacube-cloudformation-testing>

DEA SUPPORT

Phil Delaney and Eva Rodriguez

RESOURCES TO ANSWER YOUR QUESTIONS

- DEA technical questions
 - Open Data Cube Slack Channel <http://slack.opendatacube.org/>
- Webinars, Workshops and DEA Industry Consultation questions
 - Contact FrontierSI Direct dea@frontiersi.com.au
- General DEA and data questions
 - Contact Geoscience Australia Direct earth.observation@ga.gov.au
- DEA Product Descriptions
 - <http://www.ga.gov.au/dea/products>
- Digital Earth Australia Github Account
 - <https://github.com/GeoscienceAustralia/digitalearthau>
- CSIRO Open Data Cube
 - Email Dr Alex Held on Alex.held@csiro.au or Rob Woodcock Robert.Woodcock@csiro.au

NEXT STEPS



Eva Rodriguez

NATIONAL WORKSHOP SERIES

- A DEA National Workshop Series is being planned in October 2018 to gather feedback from industry on:
 - Technical accessibility and direction
 - Service level standards
 - Developing new products using DEA
 - Communications and outreach
 - Education and training
 - Ongoing engagement mechanisms from the private sector
 - Pilot users
- Register your interest at: frontiersi.com.au/dea/

DEA National Workshop Series

Melbourne
Brisbane
Perth
Canberra
Sydney
Adelaide

Dates coming up

QUESTIONS



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Please help us improve these Webinars by answering the short survey posted in the chat window



THANK YOU FOR YOUR
TIME AND INPUTS

