



# Value in EO Workshop Measuring the Socio-Economic Benefits

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# Outline of presentation

- Overview of SeBS study (Sentinels Benefits Study)
  - Goals and methodology
  - Lessons learned
- Assessing the economic impacts through SeBS
  - The case of navigation off sea ice in Greenland
  - Measurements of economic impacts through SeBS: sources of value, indicators and uncertainties
  - Limitations and areas for improvement

# Study Overview

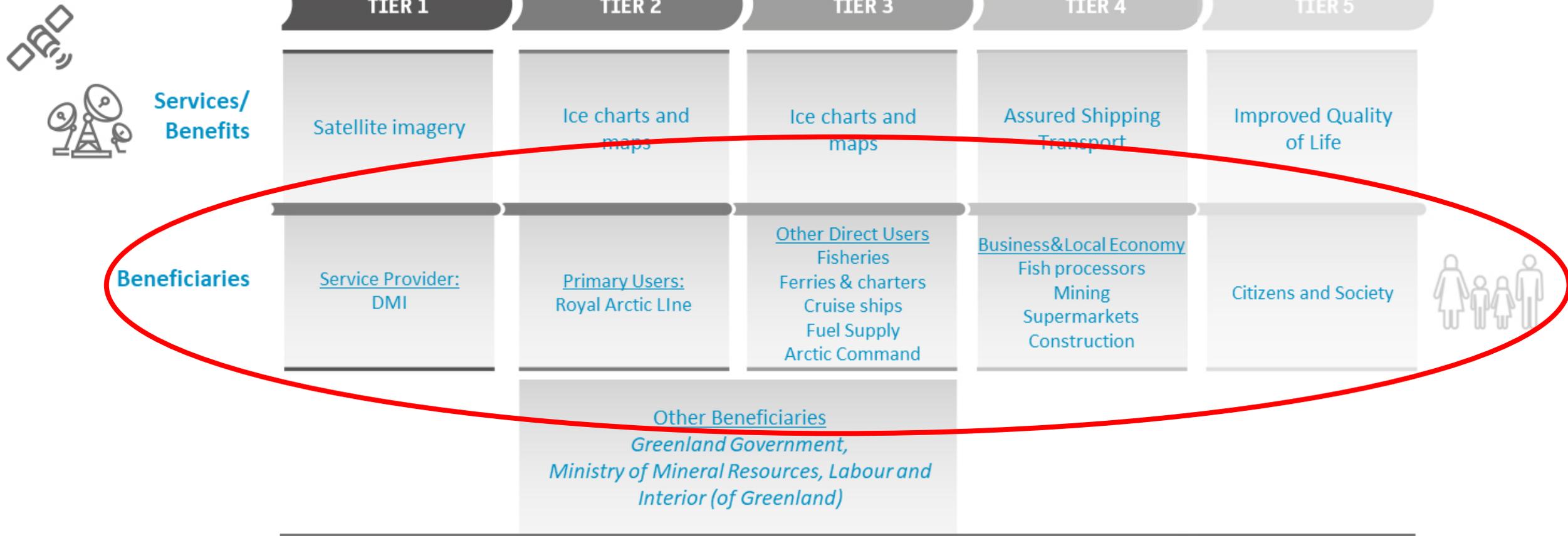
## Sentinel Benefits Study (SeBS) Goal:

- to demonstrate the value in EO data from the Sentinel Satellites and to showcase the results:
  - Identify mature cases
  - Analyse cases
  - Promote results
- Uses value-chain methodology to assess the “Value of Information”

## SeBS Results are used by:

- Copernicus governing bodies, to understand and promote the benefits brought by the investments into the Programme,
- Space agencies, to understand how the data are used and to show the benefits brought by the technology,
- Case stakeholders, to promote their capabilities and the power of the products and services that they deliver,
- EARSC, to promote the capabilities of the industry and the strong benefits which can result from the use of the EO services

# Value-chain methodology (ie. Greenland)



# SeBS Success Factors

- In-depth, robust analysis based on a value-chain methodology
- Specific cases based on the use of Sentinel data linked to a National dimension
- Knowledge of the Value-chain and its key players with a clearly identifiable primary user serving a Community or market
- A set of indicators, linked to the value-chain by models evaluated by experts based on facts, counterfactual or clear and credible assumptions.
- Convincing story-telling with a portfolio of promotional material
- As cases build up, a transversal picture giving further insights into how value is being created

# Some Lessons

- Really essential to get “under the skin” of a case to understand what is going on, who is benefiting and how
- Story-telling grows in importance and is an essential output
- Short cases are introduced which provide less detail but strong on a story
- Hierarchical support is necessary to ensure full engagement of the primary user
- Culture and approach must be complementary (letterbox approach does not work!)
- Simple flyers and attractive web-site are complementary tools to communicate with

# Case overview

Full Case  
Short Case  
Coming soon

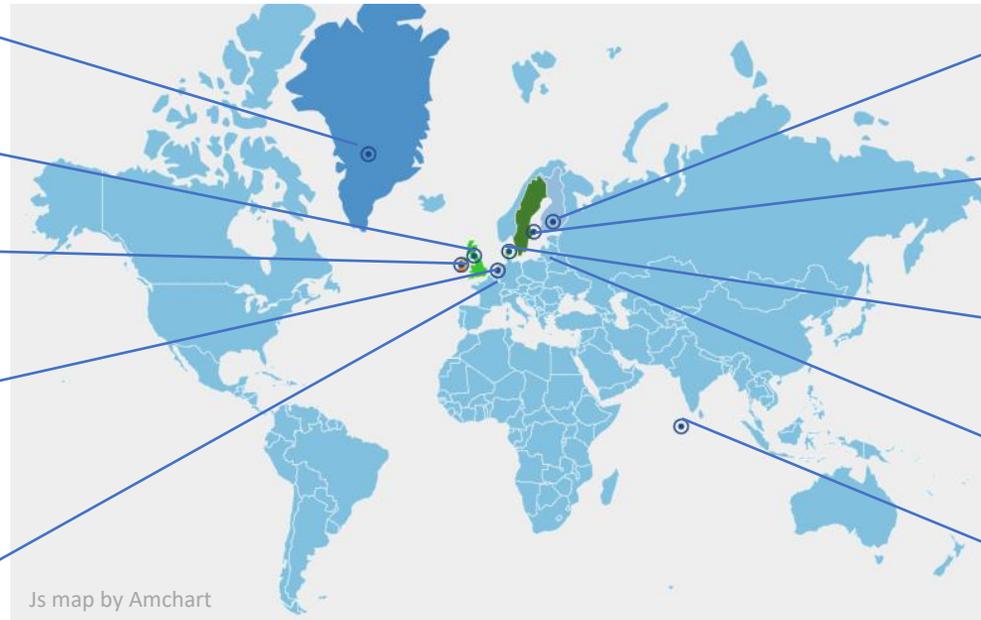
Ice navigation - Greenland

Peatland management - UK

Flood management - Ireland

Infrastructure monitoring -  
Netherlands

Growing Potatoes - Belgium



Winter navigation - Finland

Forestry management -  
Sweden

Farm management -  
Denmark

Cereal Farming- Poland

Dredging - Maldives

# Overview

	ECONOMIC	ENVIRONMENTAL	REGULATORY	INNOVATION & ENTREPRENEURSHIP	SCIENCE & TECHNOLOGY
Farming in Denmark	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★ ★ ★	★
Flood management in Ireland	★ ★ ★	★	★	★	★
Ice navigation off Greenland	★ ★ ★ ★	★ ★	★	★	★ ★ ★
Farming in Poland	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★ ★ ★	★
Winter navigation in the Baltic	★ ★ ★ ★ ★	★	★	★	★
Forestry management in Sweden	★ ★ ★	★	★ ★ ★ ★ ★	★ ★	★ ★
Infrastructure management in the Netherlands	★ ★ ★ ★	★	★	★ ★ ★	★
Growing potatoes in Belgium	★ ★ ★	★ ★ ★	★ ★	★ ★ ★	★ ★ ★

# Overview

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Farming in Poland	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★ ★ ★	★
Winter navigation in the Baltic	★ ★ ★ ★ ★	★	★	★	★
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Infrastructure management in the Netherlands	★ ★ ★ ★	★	★	★ ★ ★	★
Growing potatoes in Belgium	★ ★ ★	★ ★ ★	★ ★	★ ★ ★	★ ★ ★

Advancing the understanding and measurement of the societal benefits of Earth Observations, Rome, July 2019



# Measurements of **Economic** Value

Category	What it can mean	Specific Examples of Indicators	How we measured it
Avoided Costs (AV)	Alternative means to gather data	Helicopters removed from ice-breakers Flood area extent	Factual figures Counterfactual argument
Increased Revenues (IR)	Increased production/sales	greater potato crop yield	Expert opinion / assumption backed by figures
Reduced Inputs (RI)	Less time spent, or material saved	less time scouting reduced expenditure on fertilizers,	Expert opinion Expert opinion with models
Improved efficiency (IE)	Better use of resources	Pipelines maintenance, Less transit time for ships in sea ice	Expenditure model Expert opinion / model
Strategic Value (SV)	Societal Value to a country	Timber stocks in Sweden Community life in North Finland Value of Greenland	Hypothesis on willingness to pay by affected population Assumption backed by figures

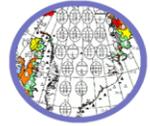
# Navigation through sea-ice off Greenland

- Sea-ice & icebergs pose a constant threat when shipping between villages and with Europe
- Navigators need latest information about locations of ice to navigate safely
- Using Sentinel-1 data, frequent ice charts are created for Royal Arctic Line and other maritime stakeholders
- **Benefit for**
  - **Primary user: Royal Arctic Line**
  - **Other direct users in transport**
  - **End use beneficiaries: businesses & local economy**
  - **Tertiary beneficiaries: citizens are assured of stocked shops**

**ROYAL**  **ARCTIC**



# The Value-Chain methodology example



- ▶ 1. Danish Meteorological Institute (DMI) produces daily maps of the ice conditions that help ships navigate through the ice off Greenland.



€800k pa

- ▶ 2. Royal Arctic Line use the maps to avoid the ice off Greenland, they have an exclusive concession for the sea transportation of all cargo to and from Greenland. As a result, the shipping company is Greenland's bridge to the rest of the world.



€2.75-3.65m

- ▶ 3. Other sectors depending on shipping such as local fisheries and oil transport save time and fuel and operate more safely.



€560k-1.02m

- ▶ 4. Business and the local economy operate more efficiently and safely, stimulating economic growth.

total

€8.6m-€12.5m



€200k-1m pa

- ▶ 5. Citizens can be sure that the supermarkets and other important shops will be stocked, jobs are assured through reliable navigations so increasing living standards.



€4.31-6.45m

- ▶ Greenland has a large geo-political strategic value which is enhanced by safe effective sea transportation.

# Indicators (Examples)

Indicators are not always unique to a single case; eg for Navigation through – or around – Sea-Ice  
2 cases studied so far: conditions differ but indicators are similar:

## Baltic

- Improved efficiency of icebreakers (IE)
- Helicopters removed from service (AV)
- Time saved by the ships (IE)
- Better use of resource (ports and industry) (IE)
  - Based on ship arrival time being better known (hours)
- Maintain territories and local Communities (SV)

## Greenland

- 
- Helicopters removed from service (AV)
- Time saved by the ships (IE)
- Better use of resource (ports and industry) (IE)
  - Based on ship arrival time being better known (weeks)
- Maintain territories and local Communities (SV)

# Overall economic benefits

## Table of economic benefits – assessment

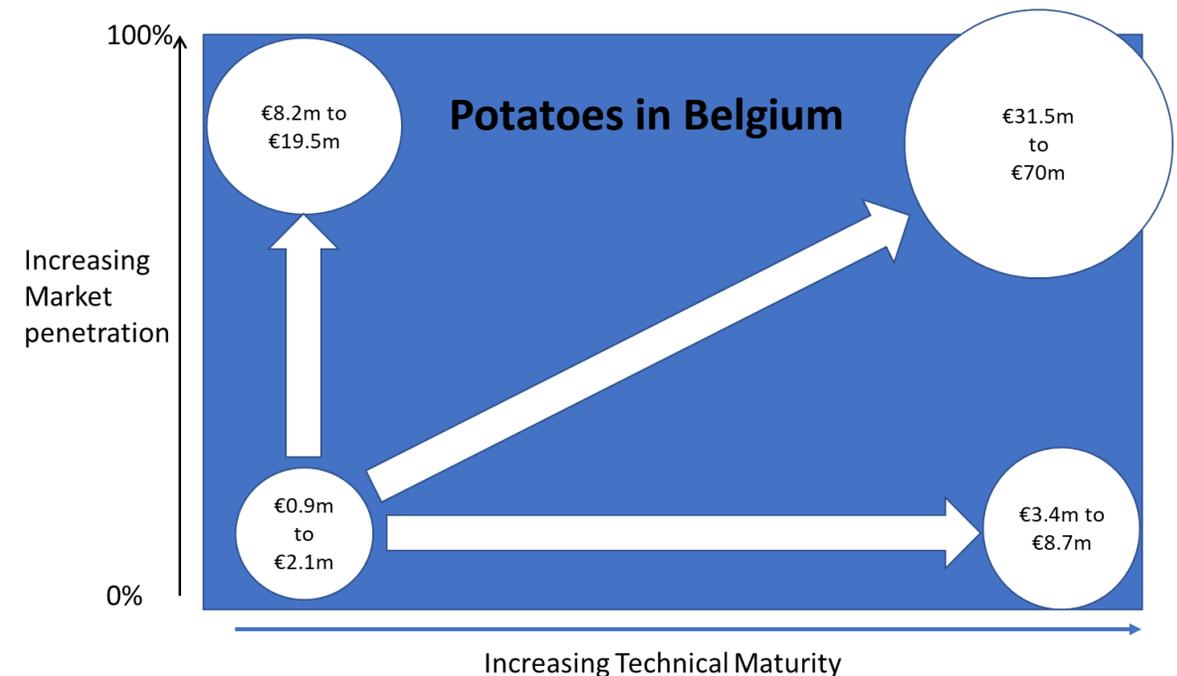
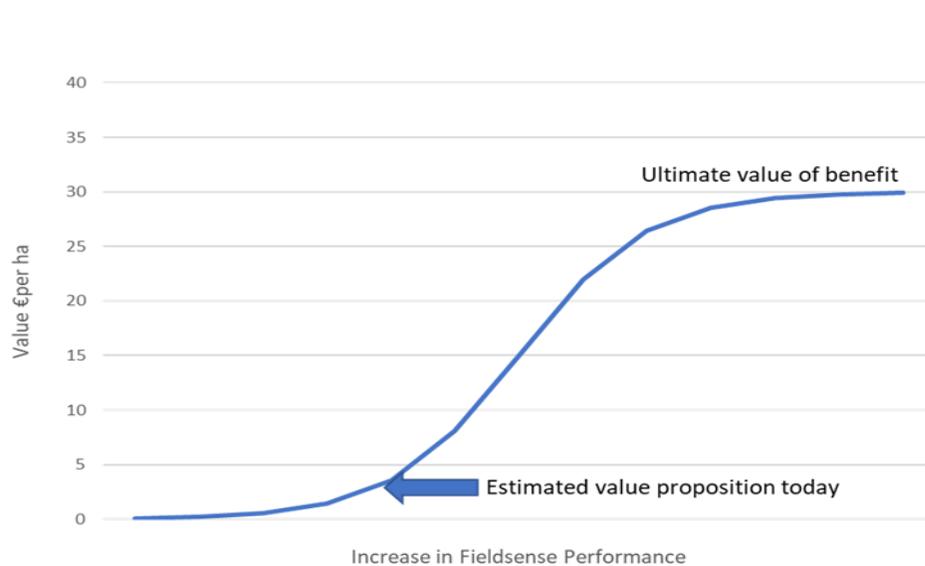
- Based on value today (assuming full, potential, market penetration).
- Ranges are caused by assumptions bracketing min and max values for some indicators.
- Assumptions based on desk research plus interviews with experts.

Case	Minimum €m p.a.	Maximum €m p.a.
Winter navigation in the Baltic	24.0	116
Forestry Management in Sweden	16.1	21.6
Infrastructure management in the Netherlands	15.2	18.3
Farm Management in Denmark	3.8	7.9
Flood Management in Ireland	6.5	30.3
Navigation through sea-ice in Greenland	8.6	12.5
Growing Potatoes in Belgium	8.2	19.6
Farming in Poland	1.0	8.0
<b>TOTAL</b>	<b>92.9</b>	<b>220.9</b>

# Benefits are not all available today

For some applications the benefit is not all available today but will increase with time:

- For mass consumers ie farmers, only a small percentage of them have started to use the application; market penetration up to 80% has been considered.
- Where technology will improve, ie farming applications (multi-year data, improved in-situ data etc) will increase the benefits and value.



# Limitations and areas for improvement

- More cases are needed with multiple examples of applications to help develop the wider picture. (geographic, thematic, business)
  - Extend to more European countries (goal of SeBS)
  - Several InSAR cases as the application range is very wide
  - Testing different business models (Denmark and Poland are similar yet different)
- Greater precision in models for example:
  - for the ship arrival time (statistical model) used in the Baltic,
  - For the reduction of fertiliser input cost in farming cases
  - For the benefits of having shared/common pictures ie in Ireland
- Better precision of the EO component contribution.



More info & full cases on:  
[www.earsc.org/sebs](http://www.earsc.org/sebs)



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