



# Some OECD Perspectives on Evaluation and Impact Assessment

Claire Jolly  
Head, IPSO Unit  
OECD Space Forum / Ocean Economy Group  
Directorate for Science, Technology and Innovation  
Organisation for Economic Co-operation and Development

Workshop: Advancing the understanding and  
measurement of the societal benefits of Earth Observations  
1 July 2019, ESRIN, Frascati



## Contents

---

- Evaluation and impact assessment of public research at OECD
- Illustrations from research on the space sector



# There are growing demands on evaluation of Science & Technology in every domain

---

- Demand for evaluation increasing as a tool for priority setting and decision making.
- ... and evolving from evaluating the quality of research (via peer review)
  - To assessing the outcomes, outputs and impacts of public R&D
  - To increasing interest in evaluating entire research systems, research portfolios and infrastructure



# Evaluation capacity remains weak and fragmented in most countries

---

- Evaluation functionally fragmented (basic/applied)
- Role of outside evaluators
- Importance of standards for evaluation (Handbook)
- Role of self-evaluation
- Establishing follow-up process and consequences
- Role of stakeholders outside research establishment (e.g. in peer review committees)



## Evaluation can no longer be done solely in relation to the national situation...

---

... but must be done in the light of international comparisons

- The use of international comparisons in policy analysis is increasing
- The evaluation of public policies, especially in those areas where countries are competing, cannot be done without reference to international benchmarks



## Impact assessment is part of evaluation but the rationale for impact assessment is expanding

---

- Impact assessment is more than measuring success in meeting past objectives
  - It is now more about determining where, who and how much to fund research and anticipate what society gets in return.
- An impact analysis should ideally help determine both the economic effects of public investment in R&D as well as the social impacts (e.g. better health outcomes?)



## But measuring impacts is not straightforward...

---

...nor an easy task especially as regards to demonstrating causality

- Many of the dimensions through which S&T impact upon society (e.g. societal, cultural or environmental impacts)
  - ❖ are not easily captured by existing national statistical frameworks,
  - ❖ they are less tangible and therefore difficult to measure or evaluate
  - ❖ and therefore difficult to link to policy interventions.
- In addition, returns from large-scale public investments are not always evident, immediate or sustained over time



## Evaluation of social / economic impacts requires the use of new metrics by the research community!

---

- But must ensure stakeholder involvement
- Also requires new communication channels (to decision makers, to agents, stakeholders)
- Balancing the tension between (scientific) relevance and social /economic impacts



## Choice of methodology is not universal but always context specific (1/2)

---

The selection of specific metrics for an economic impact study is determined by the following factors:

- objectives of the study
- the timing of the exercise (ex ante and/or ex post)
- nature of (expected, known) benefits and costs
- available assessment expertise
- resources provided for the study
- quality of primary data sources (both benefits and costs)



## Choice of methodology is not universal but context specific (2/2)

---

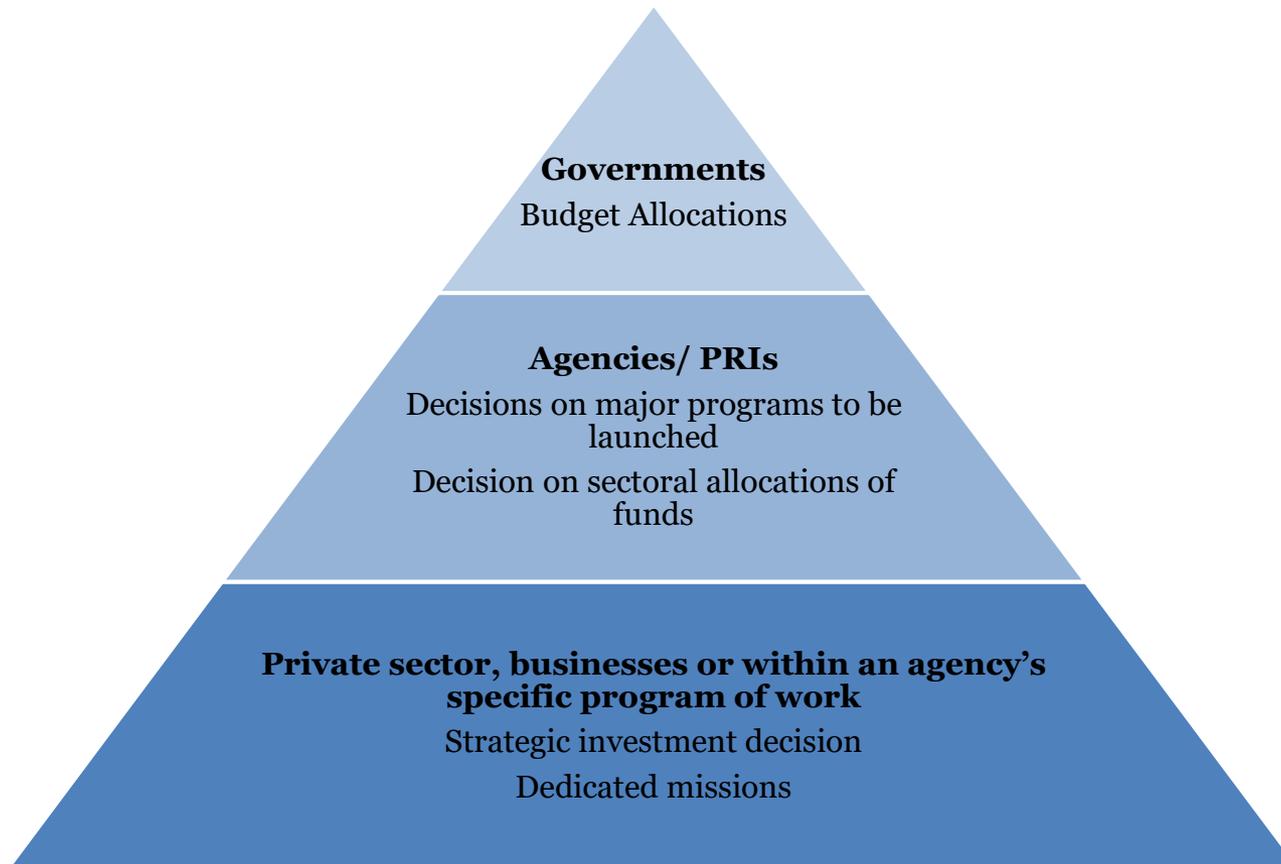
- Reviews by OECD/STI found:
  - *Bottom-up approaches* may be favoured, when the subject of the assessment is a research programme and/or institution that aims at developing a specific type of technology with a clear industrial focus;
  - *Top-down approaches*, especially econometric and mathematical models (e.g. general equilibrium), better suited to assess impacts affecting the whole research system and dealing with all types of research (basic and applied) in particular to assess systemic impacts *ex ante*.



# Different decision making levels

---

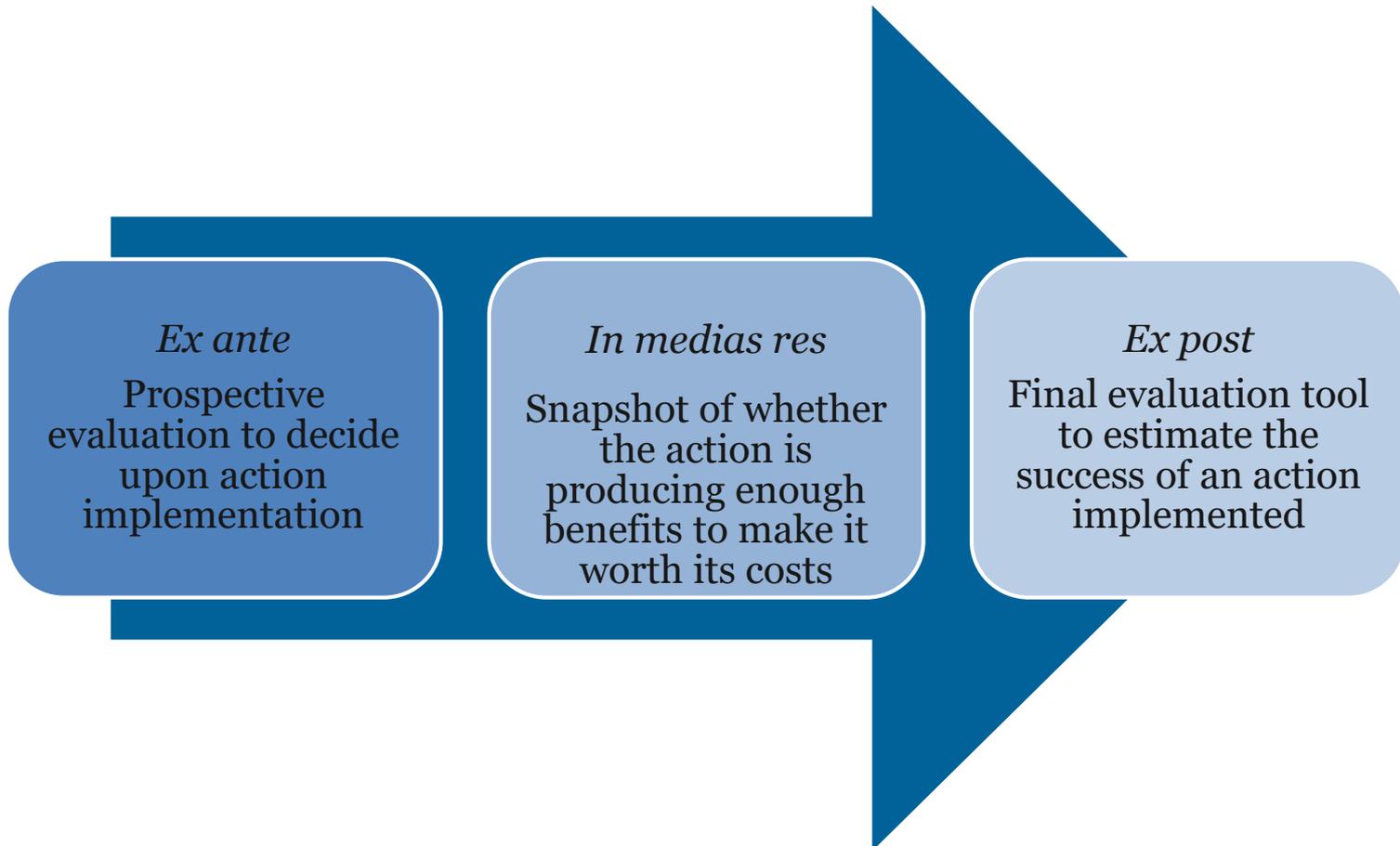
Impact assessment involves several actors, at **different levels of decision making** processes and with different priorities and objectives...





## Different timings

...and can be performed in **different moments**, according to the purposes of the evaluation





# Tool-Box for evaluation: selected methods

<b>R&amp;D PROGRAMMES OUTPUTS</b>	
<i>Scientific returns</i>	Quantifiable measure of publications
<b>“CLASSIC” RETURN ON INVESTMENT TECHNIQUES</b>	
<i>Key performance indicators</i>	Quantifiable performance measures
<i>Cost-benefit analysis (CBA)</i>	Measures tangible and intangible benefits and assesses these against costs
<i>Break-even analysis</i>	The amount of time necessary for benefits to equal costs
<i>Transaction costs</i>	Segmentation methods to calculate use and benefits to different user groups
<i>Cost-effectiveness</i>	Marginal costs for achieving specific goals
<i>Net present value</i>	The difference between the present value of cash inflows and outflows at a given discount rate
<i>Initial rate of return</i>	The discount rate that makes net present value of all cash flows equal to zero
<i>Value assessment</i>	A complex method that captures and measures factors unaccounted for in traditional return on investment (ROI) calculations
<i>Portfolio analysis</i>	A complex method that quantifies aggregate risks relative to expected returns for a portfolio of initiatives
<i>Real options analysis</i>	Analysis of capital investments in terms of the options they contain, with uncertainty accounted for by risk-adjusting probabilities (“equivalent martingale approach”)



## New practices being developed / refined to assess impacts...

---

... but methodological issues remain as does the issue of the (international) comparability

- Some of the most promising and forward-looking practices include:
  - General equilibrium models, econometric analyses, data linkages and scientometrics methods, survey-based indicators combined with econometric analyses and STILL case studies.
- Various methodologies are still evolving but...
  - until now, none of the available techniques has been able to capture the full range of impacts of public R&D on society
  - although they have opened new and encouraging lines of investigation.



## Analysis of existing case studies: example from the space sector

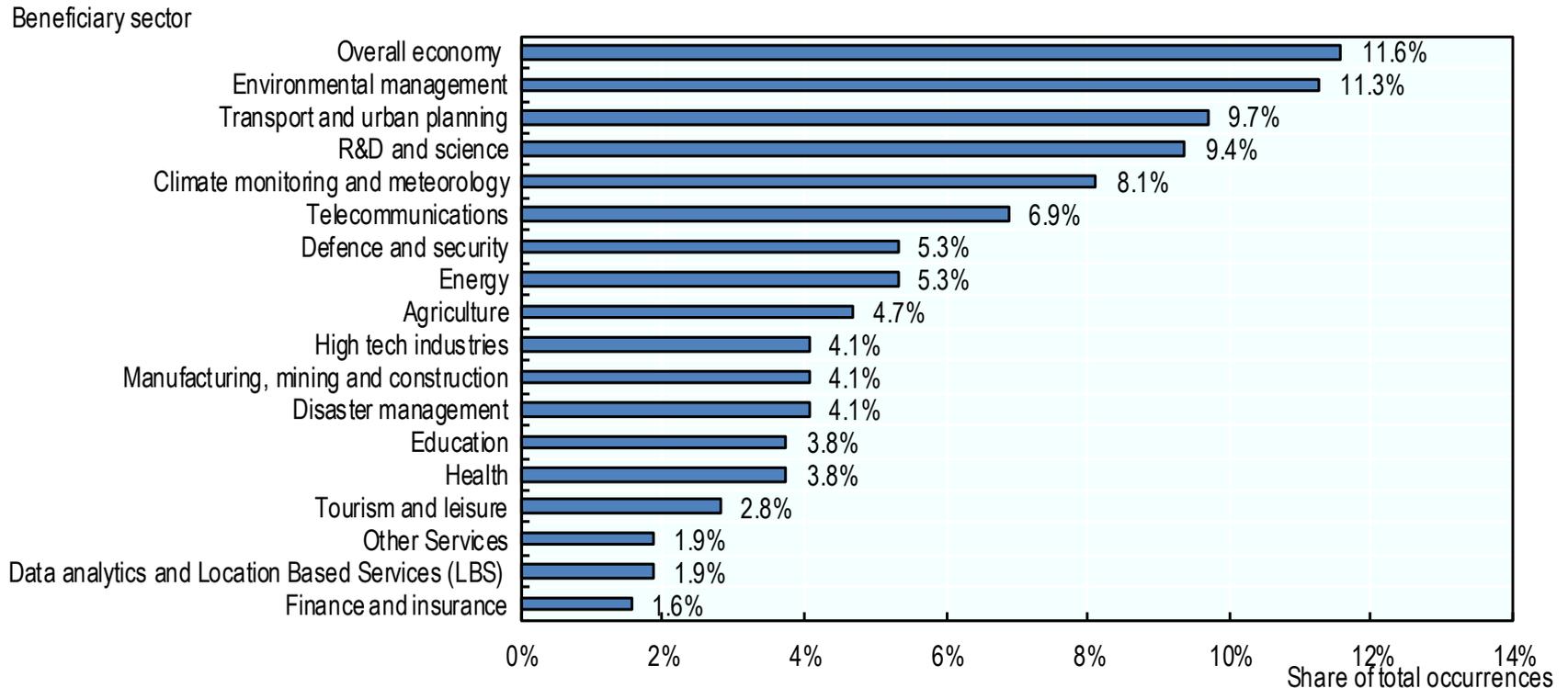
---

- +80 publications (1972-2018) focusing on a wide set of space-related programmes and investments
- Analysing existing studies provides an initial picture of what types of benefits space investments can generate and what kind of returns to expect
- The dataset comprises studies performed internally by space and non-space organisations, as well as academic papers



# Beneficiary sectors of space investments according to focus of selected studies

Based on the existing literature

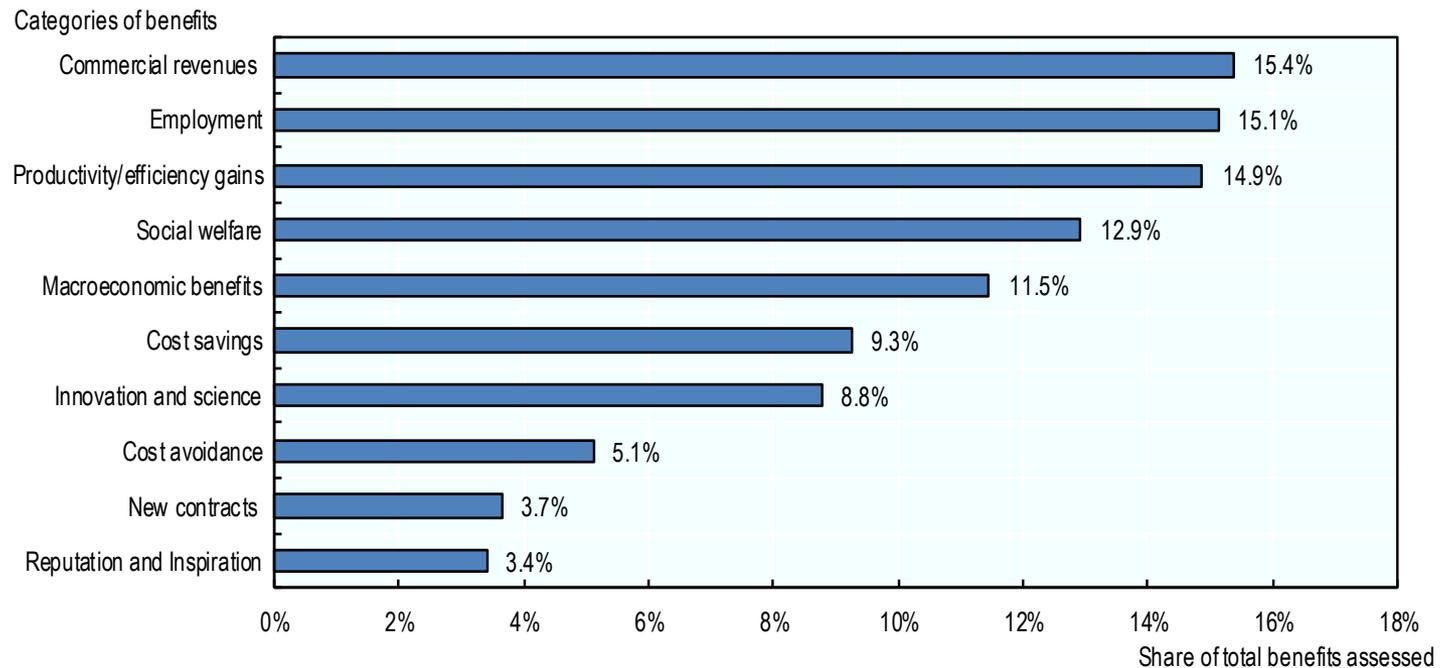


Source: OECD, *The Space Economy in Figures: How Space Contributes to the Global Economy*, forthcoming in 2019



# Types of benefits

As a share of the total listed benefits in the literature

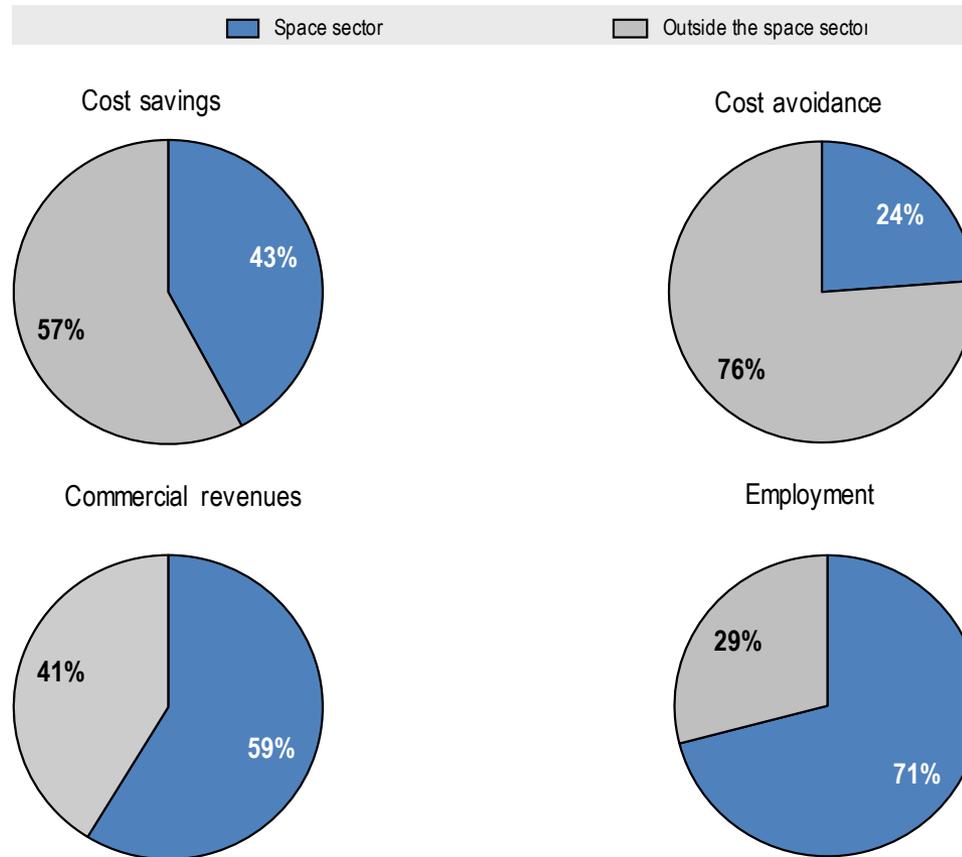


Source: OECD, *The Space Economy in Figures: How Space Contributes to the Global Economy*, forthcoming in 2019



# Where can we find the benefits of space investments?

As a share of the total listed benefits found in the literature



Source: OECD, *The Space Economy in Figures: How Space Contributes to the Global Economy*, forthcoming in 2019



## The need to move forward...

---

- More pressure to come with demands for more evaluation / impact assessment
- Such activities require resources (experts, time, funding, repeat exercises)
- It remains key to maintain the effort in building **internationally** the **knowledge base** to provide:
  - Know-how and valid experiences to practitioners (avoiding reinventing the wheel)
  - **Evidence-based** information to **decision-makers and citizens** on benefits (when they exist)