

# PathOS

Open Science Impact Pathways —

U N R A V E L I N G O P E N S C I E N C E  
R E F I N I N G R E S E A R C H I M P A C T A S S E S S M E N T

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# Pathos

— Open Science Impact Pathways

**Programme:** Horizon Europe

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**Type of Action:** Research and Innovation

**Topic:** Modelling & quantifying the impacts of Open Science practice

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# The Diffusion Dynamics of Open Science

- Open Science propels the diffusion of research.
- Broader collaboration, extended access, & ... increased societal impacts ?
- Understanding diffusion dynamics key for more robust research assessments.

# PathOS Primary Objective

*Identify and quantify the **Key Impact Pathways of Open Science in science, society and the economy** to improve understanding and lead to effective policy-making*

## Beyond state of the art

- identify the **Causal Pathways** for Open Science and estimate **OS Impact Indicators** for selected case studies following a **data-driven, AI assisted** approach
- provide a framework for **Cost Benefit Analysis for Open Science practices** and apply it to select case studies

# Strategic Goals

- **Resources to Impacts:** Model how Open Science uses resources to generate layered effects in science, the economy, and society.
- **Quantification:** Identify and measure a breadth of Open Science's impacts.
- **Methodology in Action:** Operationalize and test methods and indicators that measure OS's impact through comprehensive case studies.
- **Balancing the Equation:** Develop and validate a cost-benefit analysis (CBA) methodology for open science, applying it to select practices.
- **Community Collaboration:** Foster and structure inclusive participation from policy and decision-makers in the design and implementation of R&I.



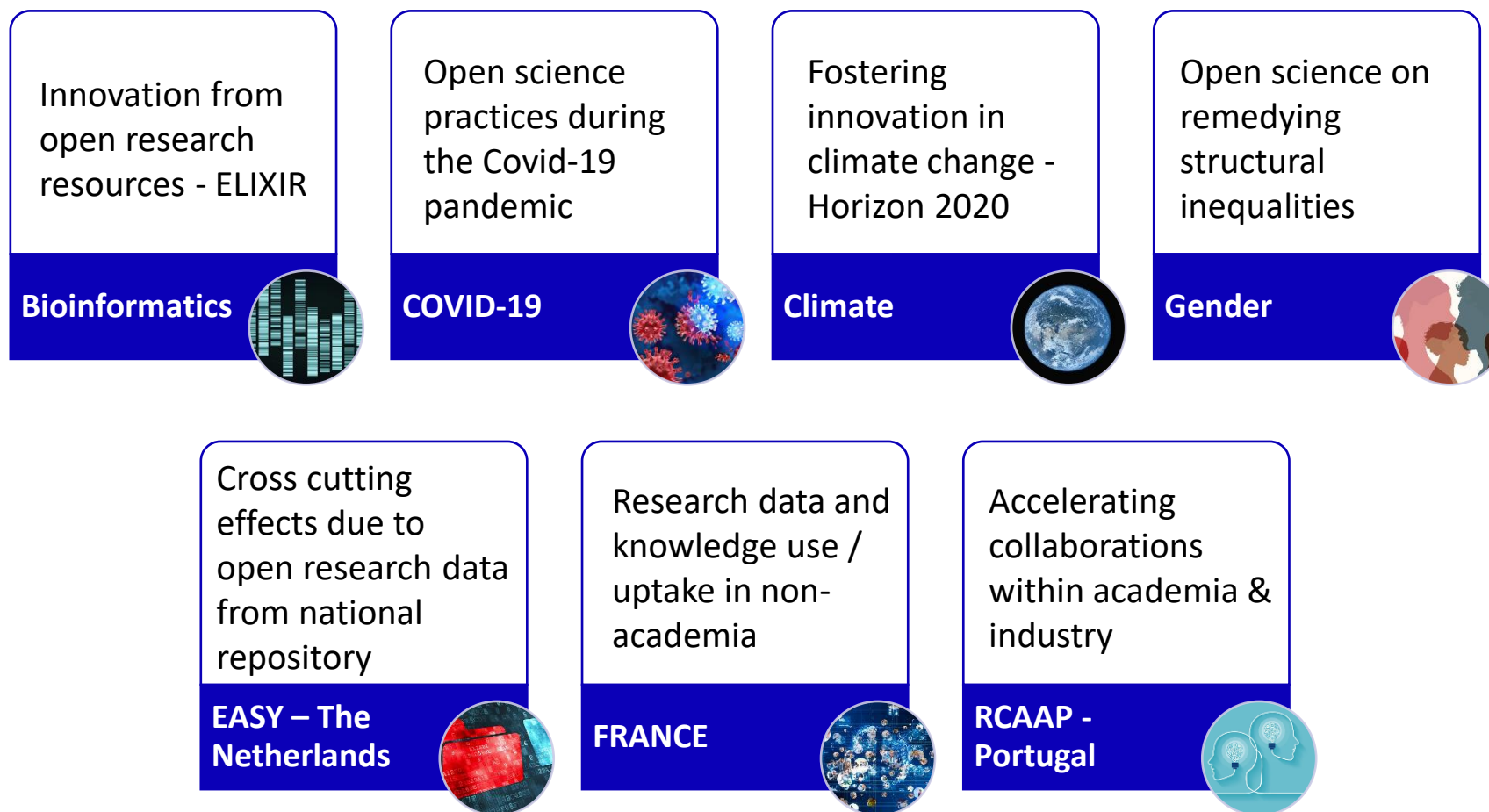
# Challenges in Quantifying OS Impact



Delineating the boundaries of a **single Open Science practice** can be more challenging than tangible **services**.

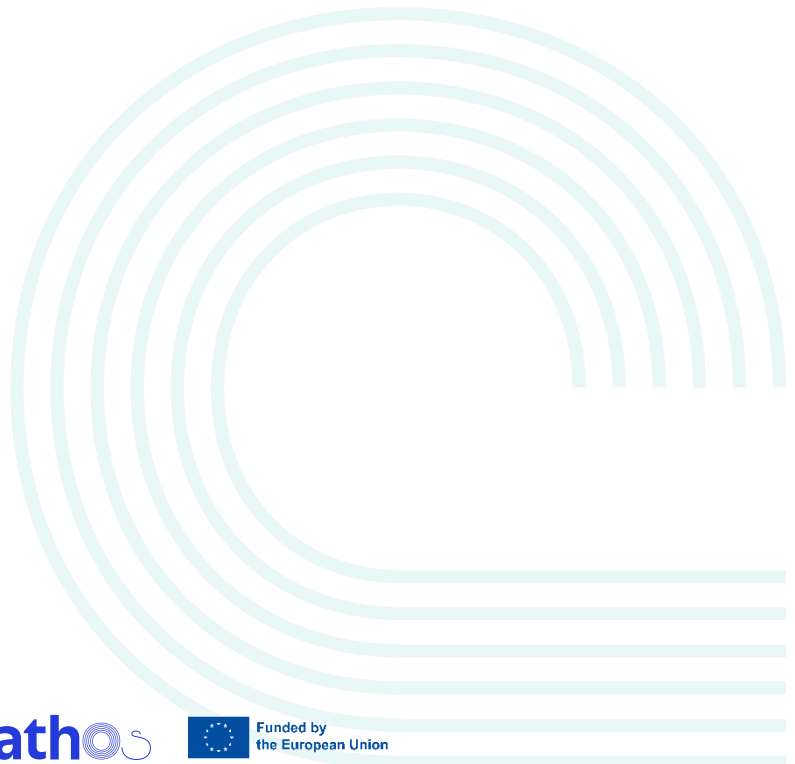
- Defining an appropriate counterfactual is essential.
- Attribute costs and benefits across multiple actors (the risk of double counting).
- Addressing endogeneity concerns.
- Handling overlaps in impact assessments.

# Investigative Case Studies



# Key Outputs

<https://pathos-project.eu/>



## Frameworks

01

- OS Impact Pathways
- Cost-Benefit Analysis for OS

## Handbook of OS Indicators

02

- Indicator "Recipes"
- Tools and datasets

*Release: v.1.0 (29 Sep 2023)*

## Literature Insights & Registry

03

- Lit Review on OS impacts
- Online registry of OS success stories

## Case Study Deep Dives

04

- OS impact assessments, Causality focus
- Cost-Benefit evaluations (*select case studies*)

## Training & Engagement

05

- Engagement programme
- Training for policy-makers & research administrators

## Recommendations

06

- Guidelines and best practices
- Project-derived insights

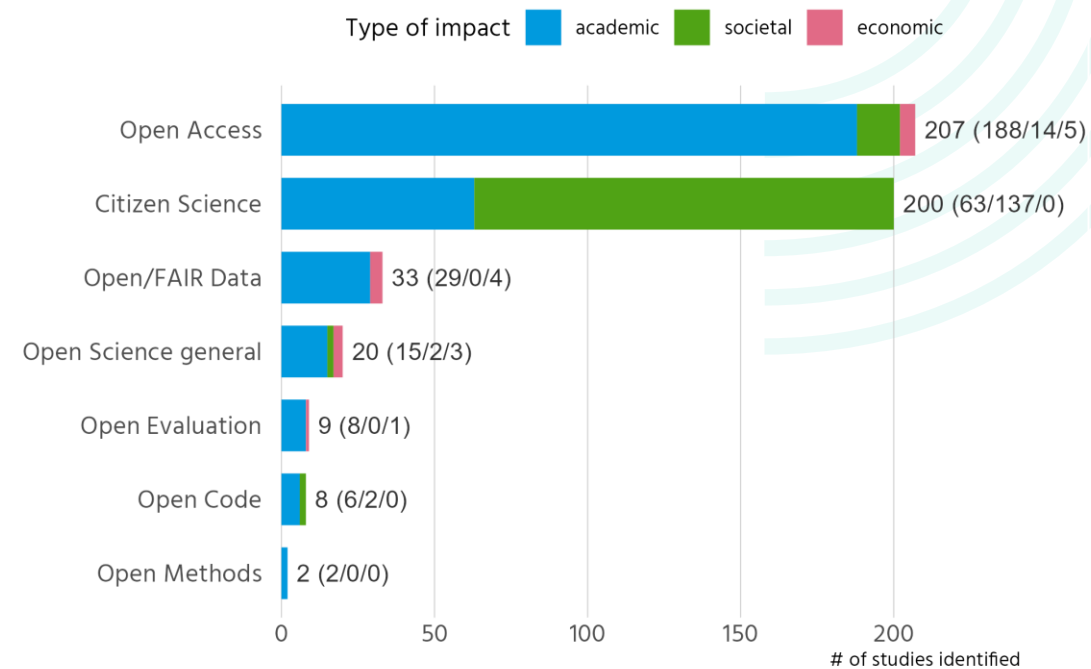


# Pathways

**FIRST INSIGHTS**

# Evidence of Open Science Impact

- Review of English works since 2000; over 30,000 initial records screened, **479 relevant studies** identified (311 academic, 155 societal, **13 economic**) – *preprints on comprehensive review coming soon*
- Some empirical evidence of socioeconomic assessment of data repositories, virtual laboratories, and other OS inputs
  - *(Koundouri et al. 2021; Fell 2019; Beagrie and Houghton 2021; Koundouri et al. 2020; Oxford Economics and Schults, 2018; Elsabry 2017; Sweeny et al. 2017; Houghton and Sheehan 2006)*
- Findings on economic impacts are rare and rarely comparable between different studies.
- Majority of papers demonstrate academic impact.



Klebel, T et al. (2023) <https://doi.org/10.5281/zenodo.7883699>

# Evidence of Open Science Impact

## Academic Impact

- Open Access
  - Strong citation benefits.
  - APCs limit access; concerns of "predatory publishing".
- Open/FAIR Data
  - Data reuse leads to citation benefits.
- Open Code/Software
  - Boosts software efficiency; linked to increased citations.
- Citizen Science
  - Enhances data collection speed; concerns about data quality.
- Open Peer Review
  - Generally positive impact on review quality.

## Societal Impact

- Citizen Science
  - Benefits span education, environment, policy, and community engagement.
- Open Access
  - Promotes public interaction, policy inclusion, and health outcomes.

## Economic Impact

- Limited studies (13) with a focus on health/biomed.
- Some evidence for economic potential of Open Access/Open/FAIR, but more quantification required.

# Policy Makers & Case Study Experts Insights

- **Diverse Impacts**

- From economics to inclusivity; demands unique metrics.

- **Case-specific Focus**

- Emphasizes the need for a nuanced approach

- **National Variations**

- Different effects based on a country's development.

- **Hidden Costs**

- Training expenses often underestimated.

- **Early Barriers**

- Institutions face obstacles in initial integration stages.

- **Lack of common understanding**

- Disparate understandings of Open Science can lead to inefficiencies.



# Pathways

**CONCLUDING**



# The Diffusion Dynamics of Open Science

- Still a lot of questions unanswered.
- PathOS aims to fill in the gaps and provide tools to be applied to different settings.
- Towards a comprehensive framework & enhanced and shared understanding.
- Incorporate Open Science practices thoughtfully into research assessment.



# PathOS

# Thank you

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