CHAOSS

Metrics and valuation of Open Source projects:

A crossover between Open Source and Open Science

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A bit of context

- In the context of French research institutes, a strong current towards openness:
  - 2016 Loi Lemaire "For a Digital Republic":
    - Open Data "as a matter of principle"
    - Data <= Documents => Source code
    - Open Acess/Open Data in research (art. 30)
  - Natural affinity between science / open source
- But:
  - Lack of thinking about "business models" based on openness
  - Evaluations based on traditional metrics
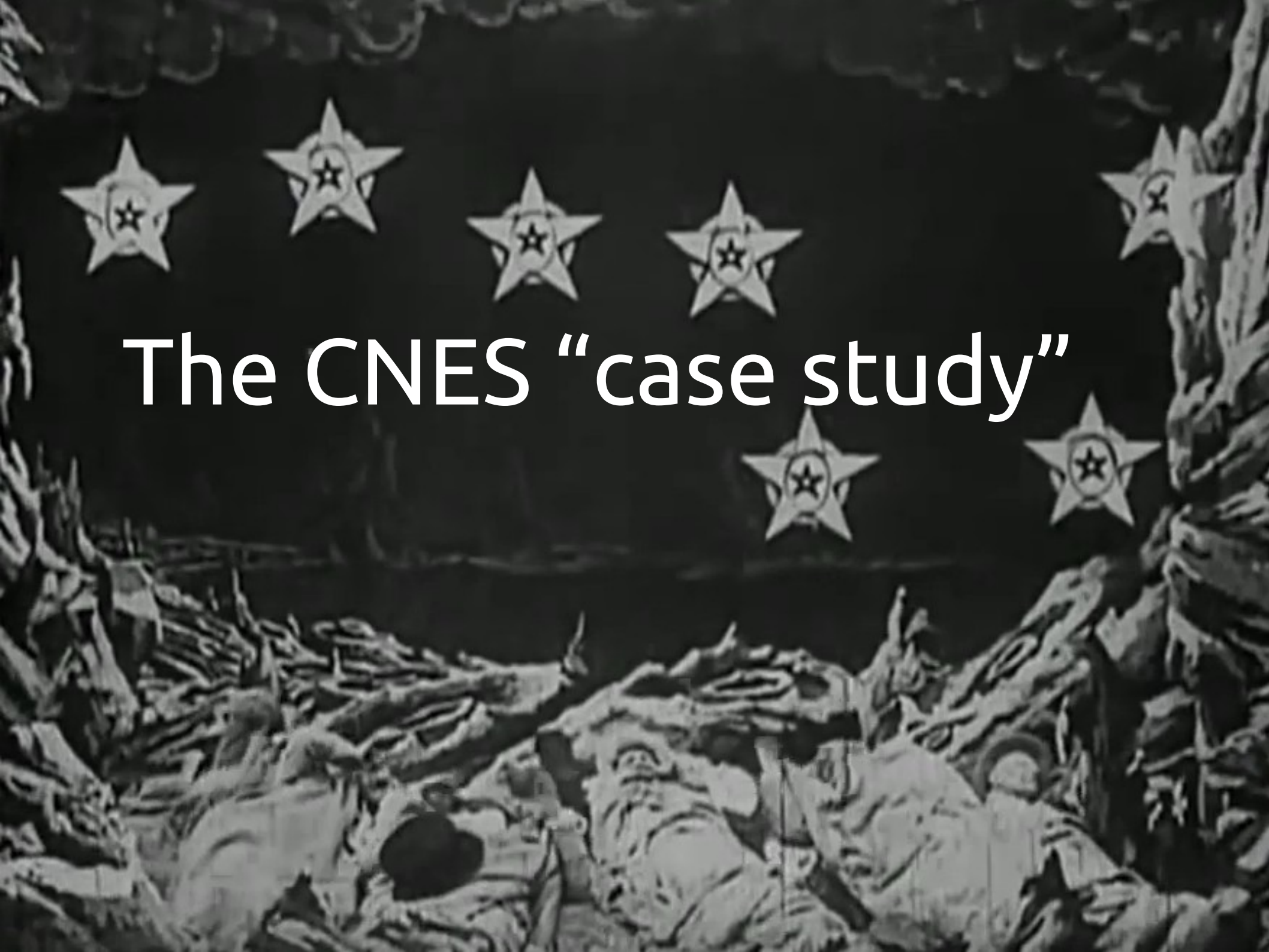
The path we explore

To solve these conflicting injunctions:

- A more global approach of valuation, including metrics adapted to Open Source ;

- building on the lessons of Academia and evolution with Open Science.

Starting with the *raison d'être* of the studied entity:

- What is considered as valuable?

- Where to measure it?

The CNES :

- French Space Agency
- Maintains and contributes to a significant number of Open Source projects

A study to have a pragmatic methodology:

- To decide to publish a project as Open Source or not
- To monitor its success ("generated value")/health once it has been Open Sourced

Current
targets
(and indicators)

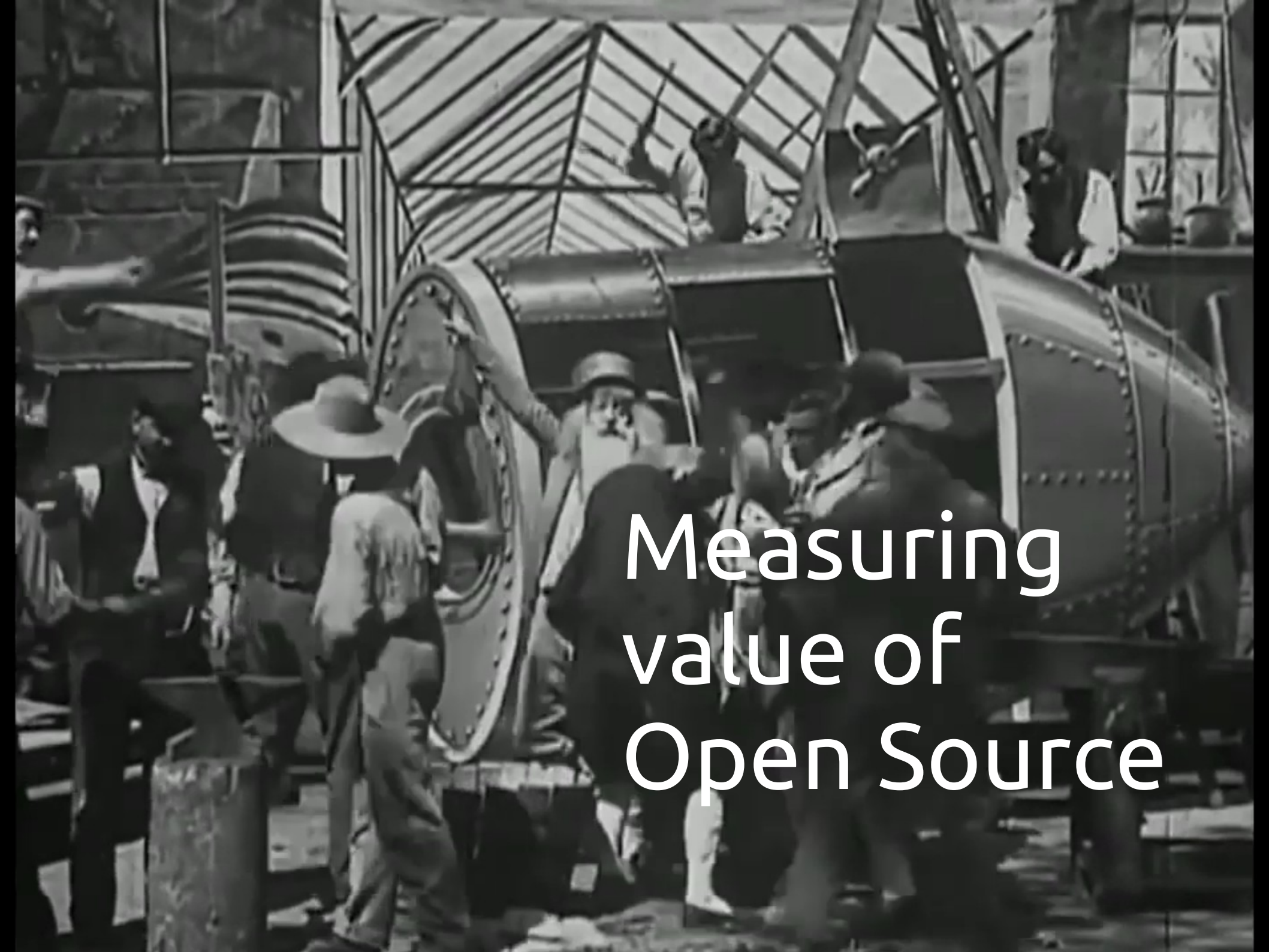## Objective and performance contract between the CNES and the French state

Performance indicators	Target
Number of patents	>35
Salary mass	2020 <= Value on 31/12/2016
Intervention costs	2020 <= Value on 31/12/2015
…	…

Performance indicators	Target
Scientific production indicator: France's contribution to the number of publications in the field of scientific research (in relation to European production, in relation to the world production)	
Scientific Recognition Indicator: 2-year Citation Index	
Indicator of the number of articles having as main author or co-authored by CNES staff members and published in peer-reviewed journals, excluding conference proceedings	

« All three are "science" monitoring indicators, whose changes can be commented on but for which it does not seem relevant to us to set targets today. »

- Shows that their is a possibility of flexibility
- Scientific evaluation : important issue and critics today with open science

Measuring value of Open Source

Value creation / value capture

Goals and missions of the CNES:

- Foster economical activities upstream and downstream

- Contribute to science and research in space related fields

- Economical efficiency

Types of value specific to Open Source

- "Correlational" value : can't be measured

- Usage value

- Contributions value

- "Scientific" value

Usage-related value

- Downloads: proxy problems + getting it is not using it
- Telemetry: privacy invasion problems
- Surveys: representativity problems
- Qualifying users (location, type of entity) is hard

Contribution-related value

- Classical Tooling: GrimoireLabs, Façade, …

- Classical problems: attaching contributions to entities

- Many manual tasks: classifying entities, checking/interpreting raw numbers

- Value capture by downstream but also by CNES itself

Scientific-specific metrics and value

"Scientific" value

New metrics, project-centered at least two levels:

- Articles about a given software project

- Articles using this software project to reach their results

- No current practice to ease automation, but:
  - Trend to require citation for SW
  - Using DOI, like for Datasets?

Development of metrics and misuse

Metrics in Research:

- 1970 Beginning of scientometry, main goals:
  - librarians : identify journals
  - researcher : identify pertinent information
  - Funders : choose the project to fund
- Publish or perish : from high value circle to hype value circle

Evolution of metrics and critics

- Evolution of metrics : H-Index, Eigen Factor, Altmetrics
  - Journal-centered to author-centered to article level metrics (post-publication: downloads, views, comments)

- Critics with Open Science
  - Better practice : reproducibility, transparency / economical balance (open access against lobbying of publishers)
  - Quantitative vs. qualitative evaluation: balance to find to avoid misuse and reification.

Perspectives

Open Source / Open Science : the risk of over-quantification

"As soon as subjects begin to regulate their relations with their fellow human beings on the basis of the exchange of equivalent goods, they are compelled to place their relationship with the environment in a reified relationship; they can no longer perceive the elements of a given situation except by assessing the importance of those elements in the light of their selfish interests." Axel Honneth, Reification

Tool evolution and convergence?

- Adaptation to new sources of information?

- Workflows for manual/automation integration?

(Open) Science: inspiration

- Development of meta research center as METRICS in Stanford
- Study on cognitive science and psychology about cognitive bias, decision making process (inclusivity, gender inequalities,)
- Systemic approach to study communities

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