



Impact of Research on society & Bibliometrics

Thank you for joining us.

The presentation will start in few minutes.

As it will be registered, please turn off your microphone.

Due to the big numbers of participants, please switch off your camera.

Sébastien Perrin, Sorbonne University

Kristell Roser, Sorbonne University

Open Science for you - An Introduction Series to Open Science | 4 July 2022



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Impact of Research on society & Bibliometrics

1. Impact on society

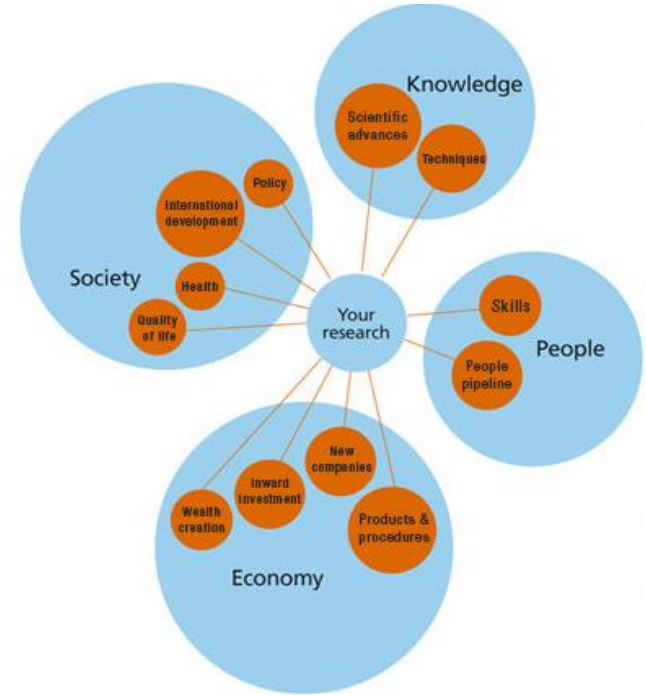
1. Science and society
2. Opening science
3. Citizen science

2. Assessing Research Impact

1. Assessing Science
2. Bibliometric indicators
3. Uses of Bibliometrics
4. Limits of bibliometric indicators
5. An example of bibliometric analysis

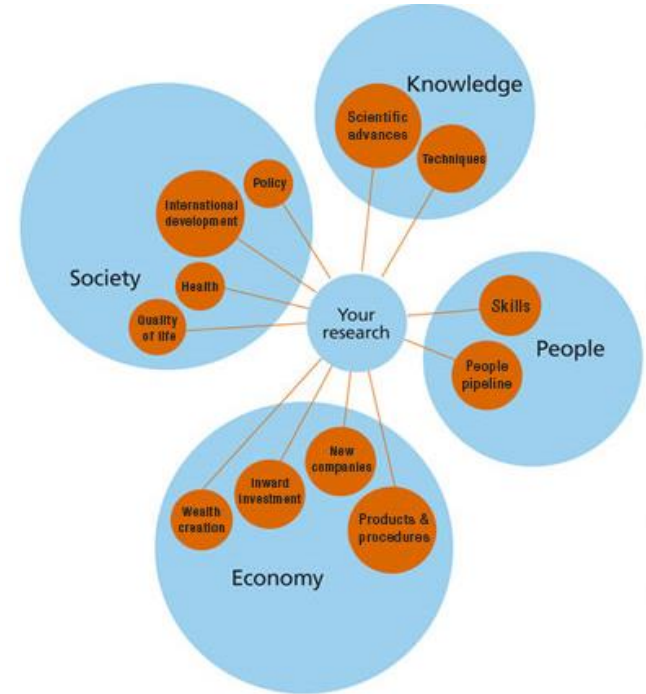
Research impact on society

- Research funding in France levels at 50 billion euros (2,2 % of the GDP)
 - In the European Union budget, 8% are dedicated to funding research



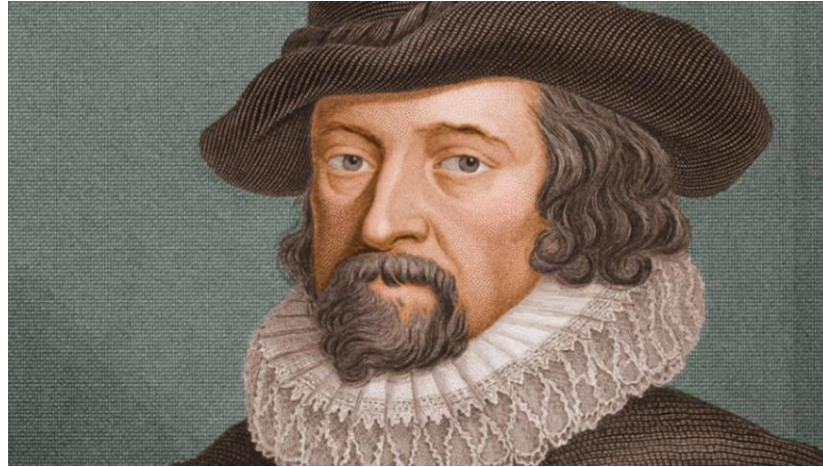
Research impact on society

- A difficult question, various approaches
- Consensus: science is at the core of modern society



Does science rule society?

- **Salomon's House** in *New Atlantis* (1626) by Francis Bacon

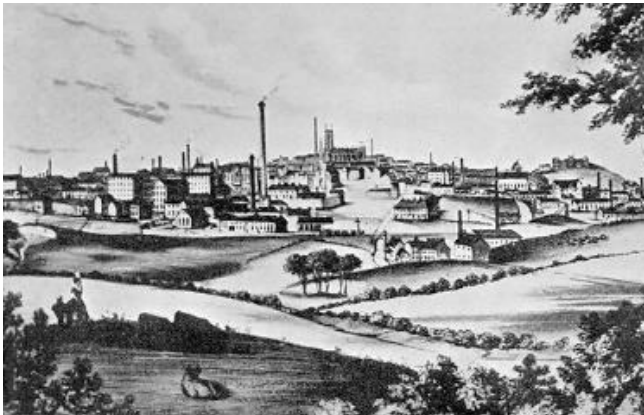


Does science rule society?

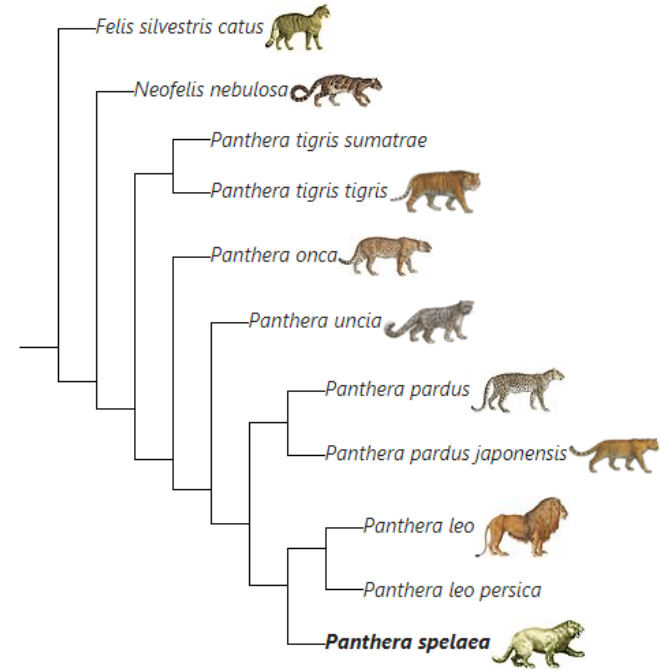
- **Salomon's House** in *New Atlantis* (1626) by Francis Bacon
- “We have three that bend themselves, looking into the experiments of their fellows, and cast about how to **draw out of them things of use and practice for man's life and knowledge**” – Francis Bacon, *New Atlantis* (1626)

Does science rule society?

- It became effective during the 19th century
- Big changes in beliefs and social organization



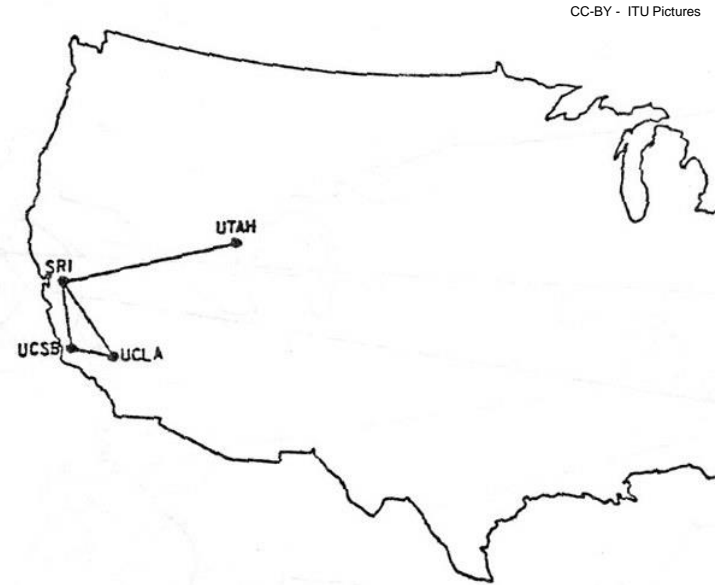
CC-BY-SA - Wellcome Foundation



CC-BY-SA - OmicronR, 2019

Does science rule society?

- Science: huge public investments after WW2
- Focus: **Internet**, the meta-innovation
 - Allowing anyone to access all mankind's knowledge
 - Vannevar Bush's "[memex](#)" that would accelerate science (1945)
 - Joseph Licklider : computers will make every human a scientist and allow **communication and collaboration** free from geographical limits (1960, 1968)
 - The history of the Internet became more or less a **model for innovation** emerging in universities



The ARPANET in December 1969

Science and Economy: making science profitable

- Bayh-Dole Act (1980): US universities are allowed to own and sell patents
- Rise of the big scientific publishers in the 1960s-1970s
- The Lisbon Strategy for the European Union (2000)
 - The “**knowledge-based economy**”: innovation is considered as the motor for growth

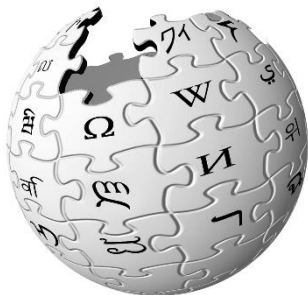


Patent law by Nick Youngson CC BY-SA 3.0
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Claiming Science as a common good

- Rise of a **new conception of knowledge**: Free software (1985), Creative Commons (2001), Wikipedia (2001)
- Public Library of Science launched through a petition (2001), Budapest conference (2001), Berlin Declaration on Open Access (2003)
- Early **open repositories / publishing platforms** : arXiv (1991), SciELO (1997), HAL (2001)...



arXiv.org

Opening Science: a new paradigm

- Academic world is turned towards society
- Openness and transparency make research outputs and outcomes better



Beyond communicating Science

- Society demands to understand and sometimes to be involved
- With the internet, there are many opportunities for the public to be aware of science processes and findings (videos, blogging, social network, games...)
- Openness goes beyond the mere communication of Science



Citizen Science: from openness to empowerment

- Involving the public in data collection, but also in the definition of the research questions
- With the internet, there are many ways to contribute (ex: [Science Ensemble](#))
- Open Science prepares the next step of democracy



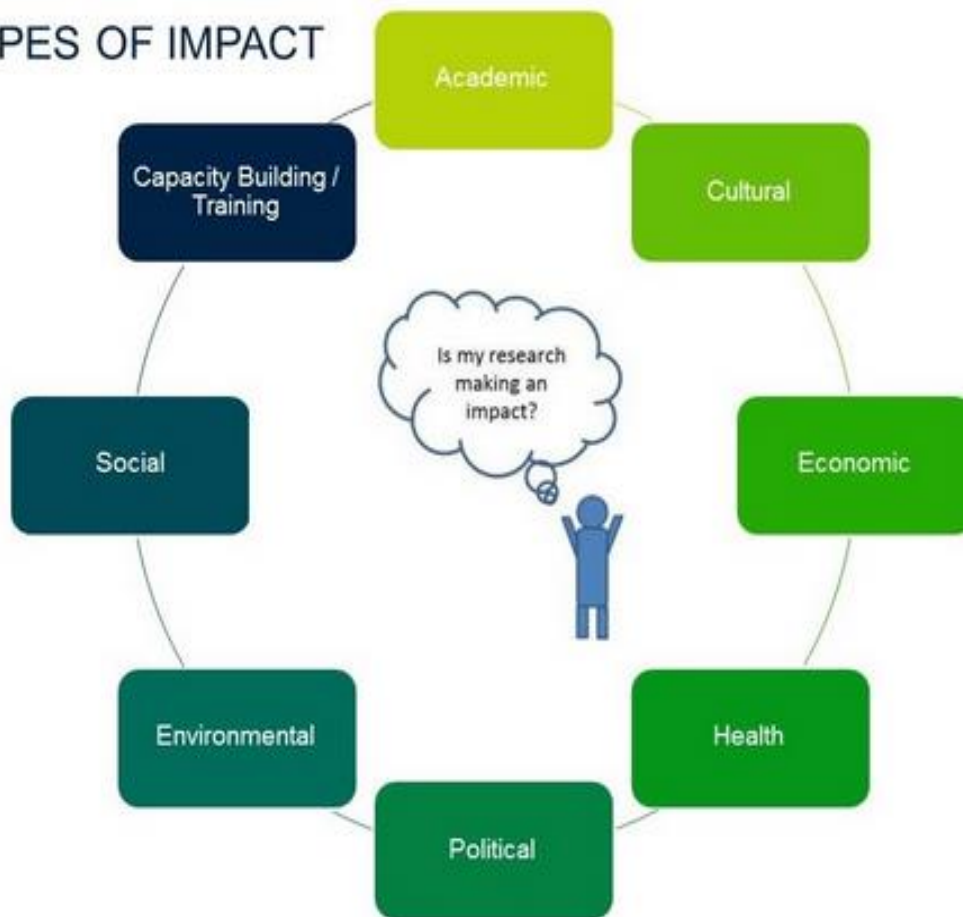
A volunteer collecting data about the local birds – CC-BY-SA: SEED Citizen Science Hub



Vodafone 5G antenna in Hattstedt (Germany) – CC-BY-SA: [Fabian Horst](#)

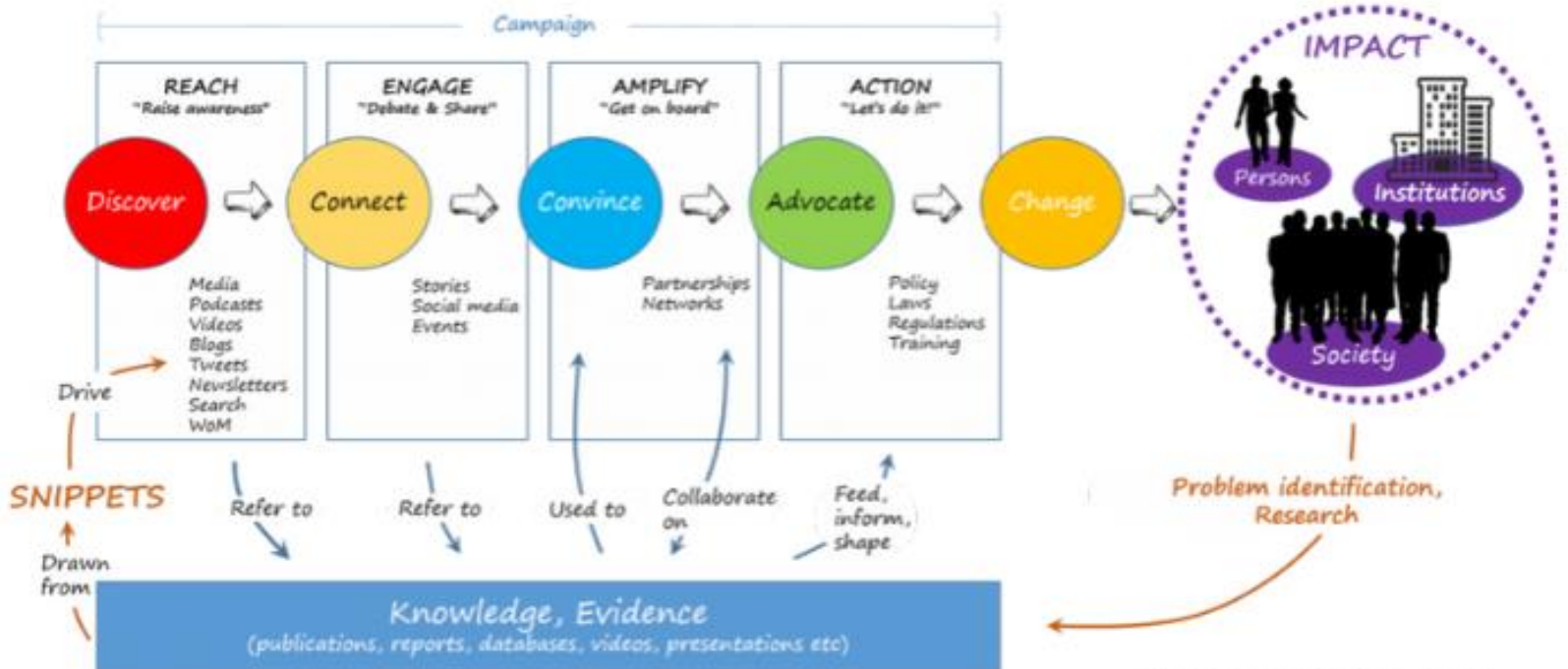
Research impact

TYPES OF IMPACT



Research impact

Generating Impact



Bibliometrics in research's assessement and policy

- Assessment of the scientific performance through:
 - evaluation of research proposals,
 - allocation of research funding,
 - university rankings.

Bibliometrics to measure the impact of Science

- Statistical methods
 - to explore the impact of :
 - science fields,
 - a set of researchers,
 - a particular paper,
 - to identify particularly impactful papers.



Commonly used bibliometric indicators

- Authors and institutions
 - Publication counts
 - Citation counts: number of times an author has been cited
 - H-index: measure of productivity and impact of a researcher
- Journals
 - Journal impact factor: evaluation of the relative importance of a journal
 - TOP factor: score of transparency and openness



Commonly used bibliometric indicators

- Articles
 - **Citation counts**: number of times an article has been cited
- Subjects
 - **Highly cited papers** are within the top 1% of papers in an academic field
 - **Hot papers** are in top 0.1% of papers in an academic field



Bibliometric indicators

- **H-index**: h publications cited at least h times

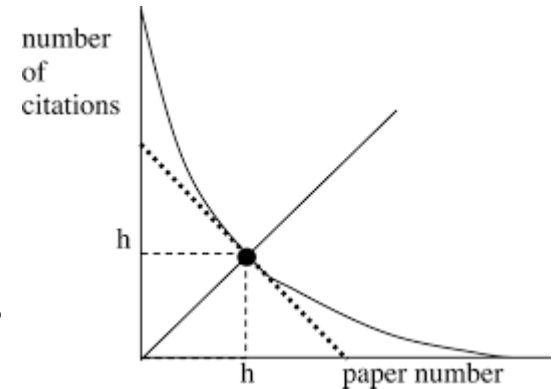
Lack of clear concept

Inability to assess early career researchers

Lack of field normalization

Differences between databases

Popularity, uninformed use



Source: Hirsch, 2005

Bibliometric indicators

- **Journal Impact Factor:** average number of citations per published paper averaged over two years

$$IF_y = \frac{Citations_{y-1} + Citations_{y-2}}{Publications_{y-1} + Publications_{y-2}}$$



Not to evaluate the quality of the journal

Not to compare cross-discipline journals

Bibliometric indicators



- TOP Factor grades the quality of process and implementation of scholarly values
- Transparency and reproducibility of research



Not to rank the journal

Uses of Bibliometrics

- Rankings

Ranking Institute	Date of inception
Shanghai Academic Ranking's of World Universities (ARWU)	2003
THE World University Rankings	2004
QS World University Rankings	2004
CWTS Leiden Ranking	2006

Source: Kayyali, 2020



Own methodology and indicators

Uses of Bibliometrics

- Rankings
 - Brand the institution
 - Improve organization and management
 - Help take important decisions
 - Influence partnerships and collaborations

Bibliometric indicators: limits

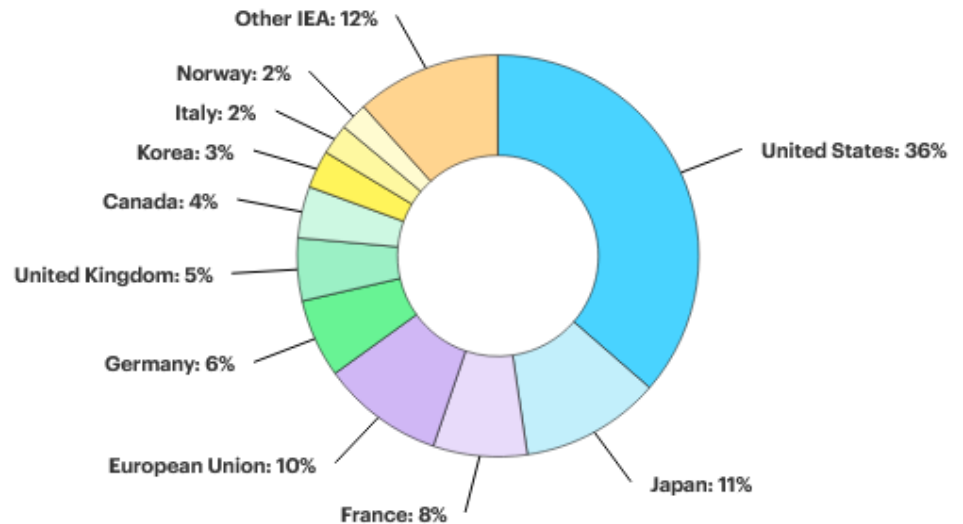
- **Assessing young scientists**
 - Short career
 - Few publications
- **Comparing journals**
 - Interdisciplinarity
 - Human and Social Sciences

Bibliometric analysis: an example

- 2021 Public RD&D budget:
 - EU: USD 2.5 billion
 - France: USD 1.9 billion

Public energy RD&D budgets by country for IEA members and the European union, 2021

billion USD (2021)





Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpolRenewable energy source integration into power networks, research trends and policy implications: A bibliometric and research actors survey analysis[☆]Emmanuel Hache^{a,d,e,*}, Angélique Palle^{b,c}^a IFP Énergies Nouvelles, 1–4 av. de Bois Préau, F-92852 Rueil-Malmaison, France^b IRSEM, Ecole Militaire, 1 place Joffre, 75700 Paris SP 07, France^c Université Paris 1 Panthéon-Sorbonne, UMR Prodig, France^d The French Institute for International and Strategic Affairs, (IRIS), France^e Economix-CNRS, University of Paris Nanterre, France

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Scenario

Survey

Power network

Policy

ABSTRACT

This article studies the integration of variable renewable energy sources (RES) into power networks. The main goal is to confront the contents and trends of scientific literature with the eyes and projects of researchers on future topics and issues to be solved, especially in terms of the modeling of electrical systems. The analysis relies on a bibliometric study of the Scopus database on the topic and on an online survey sent to the corresponding authors of the identified papers. The paper analyzes the dynamics of publication, clusters of collaboration, and main topics studied. It then identifies potential research leads, among which unresolved challenges regarding technical aspects, markets and financing issues, and social aspects. The disparity of models and results is still a necessary evil as research is not mature enough to integrate in one model all the very complex parameters of VRE integration into power systems. There is a lack of recurrence, though, such as the impact of emergent technologies or the development of substitute low carbon-emitting technology (other than solar and wind), need to be addressed. The paper also advocates the need for a systemic vision, for both research and policymakers that goes beyond the sole power system.

Bibliometric indicators used

- Number of publications by years / country / research institution
- Most popular areas of research
- Collaboration network
- Most influential actors
- Key concepts

Opening research

- Opportunities to gain recognition and resources:
 - Preserve and accessible content
 - Special funding / institutional supports
 - More citations
 - More projects and collaborators
 - More media coverage

“[OA] increases a work’s visibility, retrievability, audience, usage, and citations, which all convert to career building. For publishing scholars, it would be a bargain even if it were costly, difficult, and time-consuming. But... it’s not costly, not difficult, and not time-consuming.”

Peter Suber

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Thank you!

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