

Scientific inquiry requires transparency. Yet most scientific studies remain hidden within institutions and behind paywalls, causing research to go underutilized and under-appreciated. Change is happening thanks to technology, renewed interest in scientific first principles, and a realization that openness enables powerful forms of collaboration. How would a system of open science work for government scientists?

PRE-REG.

**FINDINGS** 

**PRODUCTS** 

Government FUNDED RESEARCH is published openly, not locked in proprietary journals. Regulators can insist that private research in the public interest (such as drug trials) be publish openly too. As open platforms catch on, the incentives to

publish openly increase in academia in a virtuous cycle.

MISINFORMED **NEWS** stories can be corrected more aggressively as fewer gatekeepers control access to original findings.



Both positive and negative findings are published for all to see. Experimental hypotheses are preregistered to prevent opportunistic misinterpretations of data in confirmatory studies. The field of KNOWLEDGE MOBILI-**ZATION** puts findings in the hands of the right users at the right times in the most useful forms of information product products designed around users to be more engaging.

## **OPEN ENGAGE-MENT**

Research does not always speak for itself. In open science, scientists discuss the technicalities and implications of their work with fellow professionals and the public at large. That engagement makes scientists more responsive to social and policy needs.

## **OPEN** DATA

Scientific data is underused unless shared and maintained. Most data is lost after a few decades due to neglect.\* OPEN-**DATA STEWARDSHIP** makes data easy to find, access, use, and expand. Making the raw numbers and original samples available is only part of the process. Full documentation of the data, models, and methods is required.

> DATA CLEANING is the quality control of the data set whereby errors and inaccuracies are removed, while consistency and completeness are added.



DATA REDACTION is the removal of sensitive data from a public data set for privacy and security reasons. Access to the full dataset is limited.

MANUAL

**SAMPLES** 

OPEN PUBLISHING PLATFORMS provide free access to more than just peer-reviewed journals. Writing up findings using open-source DOC-**UMENT PREPARATION SYSTEMS** (notably LaTeX) enables automated publishing to many document types.

> **POLICY ANALYSTS** gain access to better and more timely evidence in a handy form. Details and sources are easier to check. This evidence can then be used by policy-makers to make better informed decisions.



**DEMOCRATIC SCRUTINY** works best when citizens, activists, and journalists can judge the accounts of decisionmakers using the latest, most relevant evidence. Policy proposals benefit from exposure to a wider array of scientific studies and external analysis.

More comprehensive findings are accessible in a timely fashion through-out the scientific community, including CITIZEN SCIENTISTS who hitherto struggle to keep up with their respective disciplines. **OPEN TEXTBOOKS** and other information products teach new generations of would-be scientists.

CLAIM 1 🗸

CLAIM 2 X

CLAIM 3

CLAIM 4 X

CLAIM 5 ?



Scientists explain their work in **PUBLIC FORUMS** and become better attuned to related policy issues.



Government scientists are active in the SCIENTIFIC COMMUNITY to share, learn, and scrutinize each others' research.

www.elanica.com/eve-cues

All this material is stored in

an **OPEN REPOSITORY** that

except for physical samples,

facilitaties. APPLICATION

to access, organize, and

of practical uses.

Vines et al. "The Availability of Research Data Declines Rapidly

with Article Age," Current Biology, vol. 24, no. 1 (2014), pp. 94-97.

others can access freely online

which are retained in seperate

**PROGRAM INTERFACES (APIs)** 

allow external software apps

combine the data for a variety



Scientists share ongoing work by maintaining an **ONLINE PRESENCE** through blogging, social networking, and the like.

Data is

**MIRRORED** 

externally for

safekeeping.



In a COLLABORATORY, scientists pool expertise by bringing partners from various sectors into the research process.

Data availability allows others to make new discoveries, helped by visual and interactive **TECHNOLOGIES** that present



In a SCIENCE SHOP, scientists offer their expertise directly to citizens facing technical challenges in their community.

Scientists are held to higher METHODO-**LOGICAL STANDARDS** due to better peer review, replication studies, and follow on studies.



Practitioners can improve their work

Users can improve by adding

data quality and correcting.





with access to