National Academies Study on Reproducibility and Replicability in Science

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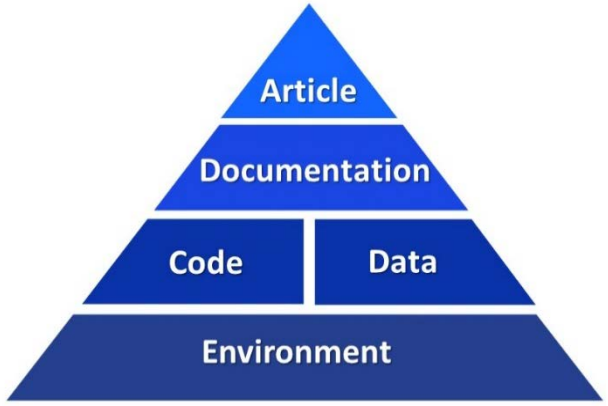
APPROACH

- **Committee membership**: 15 distinguished members
- **Chair:** Harvey Fineberg, President of Gordon and Betty Moore Foundation
- **Stakeholder input**: over 50 individuals representing a broad range of disciplines

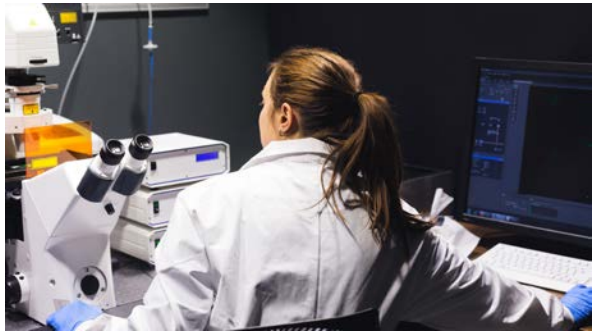
COMMITTEE'S CHARGE

- Define reproducibility and replicability accounting for the diversity of fields in science and engineering.
- Examine state of contemporary science with regard to reproducibility and replication.
- Determine if lack of replication and reproducibility impacts the overall health of science and engineering as well as the public's perception of these fields.
- Make recommendations for improving rigor and transparency in scientific and engineering research.

DEFINITIONS



- **Reproducibility** – obtaining the same results by using the same input data, computational steps, methods, code, and conditions of analysis



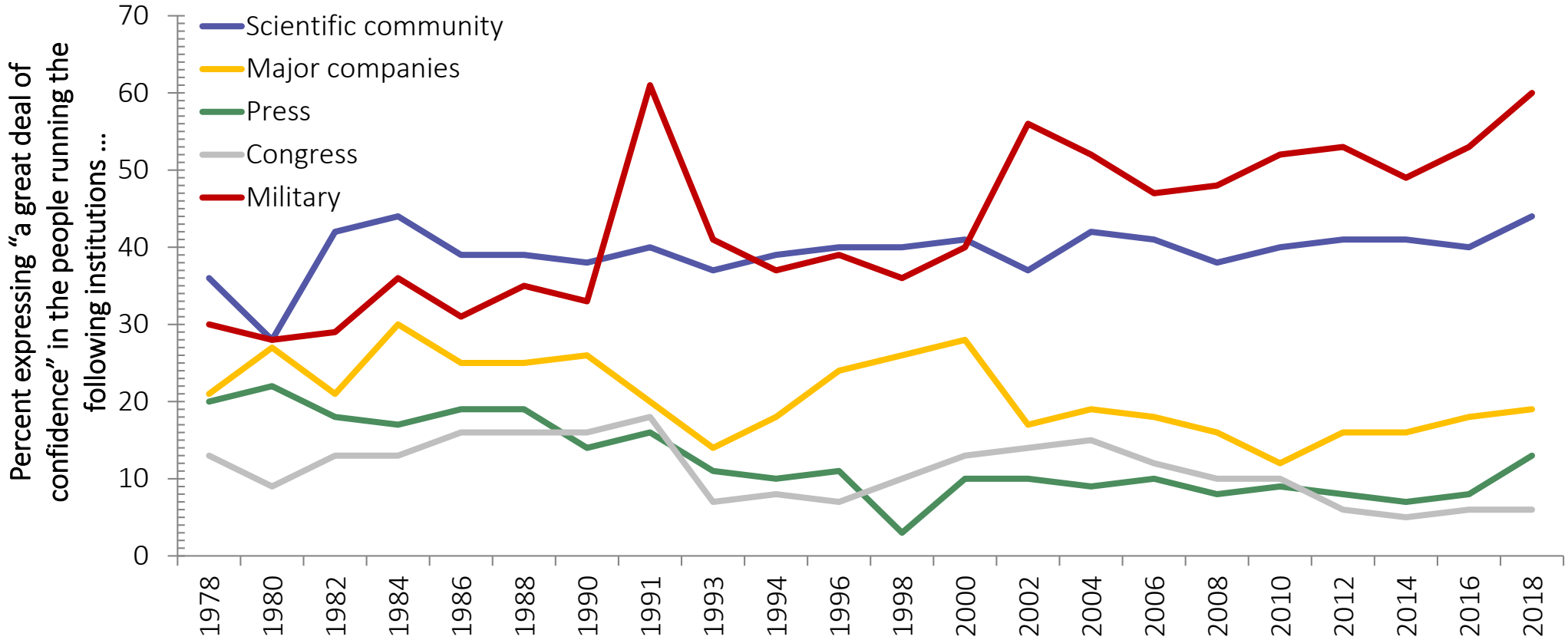
- **Replicability** – obtaining consistent results across studies aimed at answering the same scientific question

KEY REPORT FINDINGS

- ``No crisis….No complacency.'' *
- Reproducibility and replicability are very important but neither the main nor the most effective ways to ensure reliability of scientific knowledge.
- There are opportunities available to all stakeholders to strengthen research practices and reduce unhelpful sources of non-replicability.
- ``The public continues to trust the scientific community.''

* Source: Slides developed by the members of the Committee and NASEM staff for the report release webinar.

PUBLIC CONFIDENCE IN RANGE OF INSTITUTIONS



SOURCE: National Science Foundation (2018e, Figure 7-16) and General Social Survey (2018 data from http://gss.norc.org/Get-The-Data).

RECOMMENDATIONS FOR NSF (1 of 2)

Investments to consider:

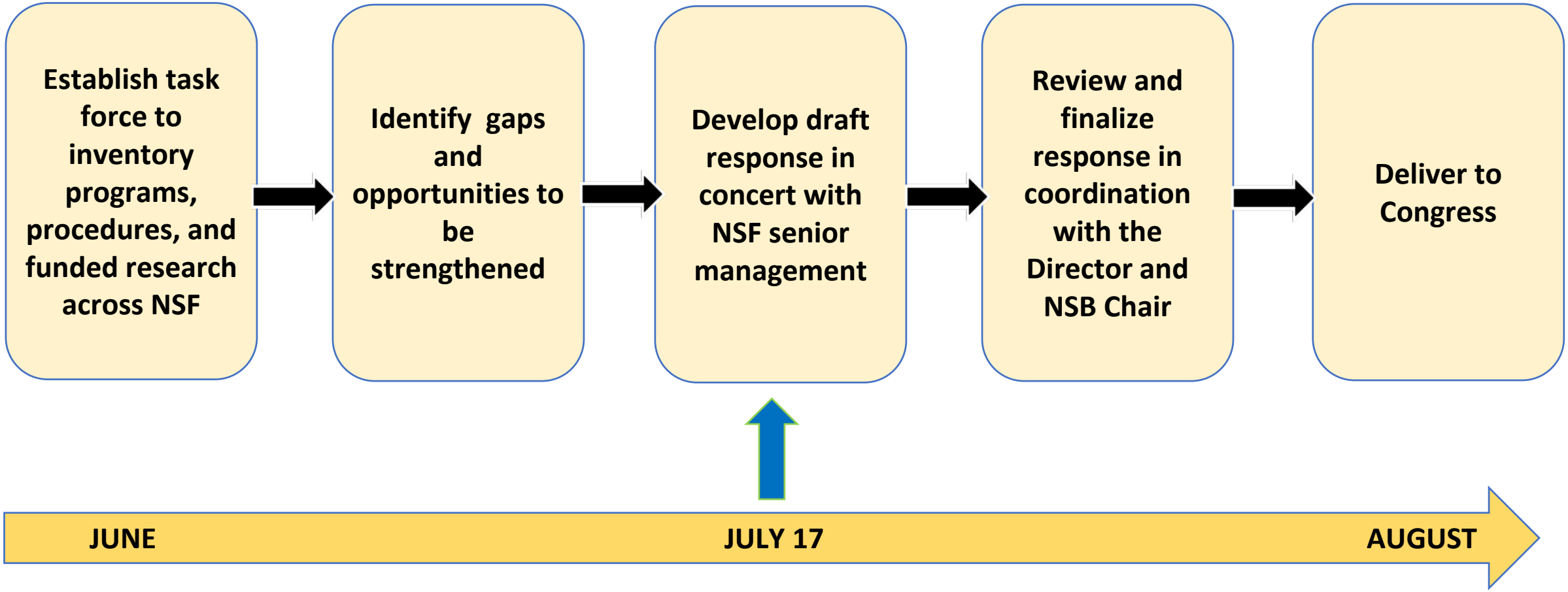
- Explore the limits of reproducibility,
- Promote computational reproducibility,
- Support reproducibility tools and infrastructure, and
- Support training of researchers in best practices.

Source: Slides developed by the members of the Committee and NASEM staff for funders' briefing

RECOMMENDATIONS FOR NSF (2 of 2)

- Facilitate transparent sharing through archives and repositories for data, code, and other digital artifacts.
- Guide investments in replication studies by criteria outlined in the report.
- Discuss uncertainties in grant applications; evaluate reproducibility and replicability during merit review.

NSF RESPONSE PROCESS



THANK YOU

QUESTIONS?