

Distributed Science Value Proposition

- **Better Science (for Scientists)**

- Problem: Reproducibility Issues; **20% of U.S. health science research can't be replicated/reproduced***
- Solution: Improved reproducibility through transparency and immutable audit trail for research data; better quality data from standardization; improved materials; increased meta-analysis capabilities

- **Cheaper Research (for Funders)**

- Problem: Expensive; decreasing ROI; **\$30 billion in U.S. health science on non-replicable research***
- Solution: Increased return on investment for research dollars spent; reduced data management costs through blockchain/smart contracts, amplified with machine learning/AI; cheaper administration

- **Faster Miracles (for Everyone)**

- Problem: 17 years from bench to bedside; **2-5 years on administrative processes (my estimate)****
- Solution: Faster time from idea to treatment; improved outcomes with accelerated research and higher quality data; improved tracking of individual contribution allowing for expanded permissioned access of data to more researchers; faster administrative processes (e.g. IRB, grant review)

* "Economics of reproducibility in Preclinical Research" Freedman et al, PLoS 13(6) e1002165, 2015

** "Enhancing Federal Research: Traumatic Brain Injury & Blockchain Technology - Part 1.5, The Why." Manion, Feb 2018
<https://www.linkedin.com/pulse/enhancing-federal-research-traumatic-brain-injury-part-sean-manion-1/>

Distributed Science: Full METL Research to Faster Miracles

Blockchain for Social Impact Philadelphia - 13 Aug 2018
Sean T Manion, PhD

Science Distributed; Blockchain in Healthcare Global - IEEE ISTO

Mission Essential Task List (METL)

- Definition. A Mission Essential Task List (METL) is a list of tasks that must be accomplished to complete a mission.
- Derived from U.S. Military written requirement describing end-of-state training.
- For science:
 - Develop Hypotheses
 - Plan Research
 - Get Funding
 - Get Regulatory Approval
 - Collect Data
 - Analyze & Interpret
 - Disseminate (Publish & Present)

Sharing is Hard

“Scientists would rather share their toothbrush than their data!”

[Carole Goble, Keynote address, EGEE (Enabling Grids for EscienceE) '06 Conference.]

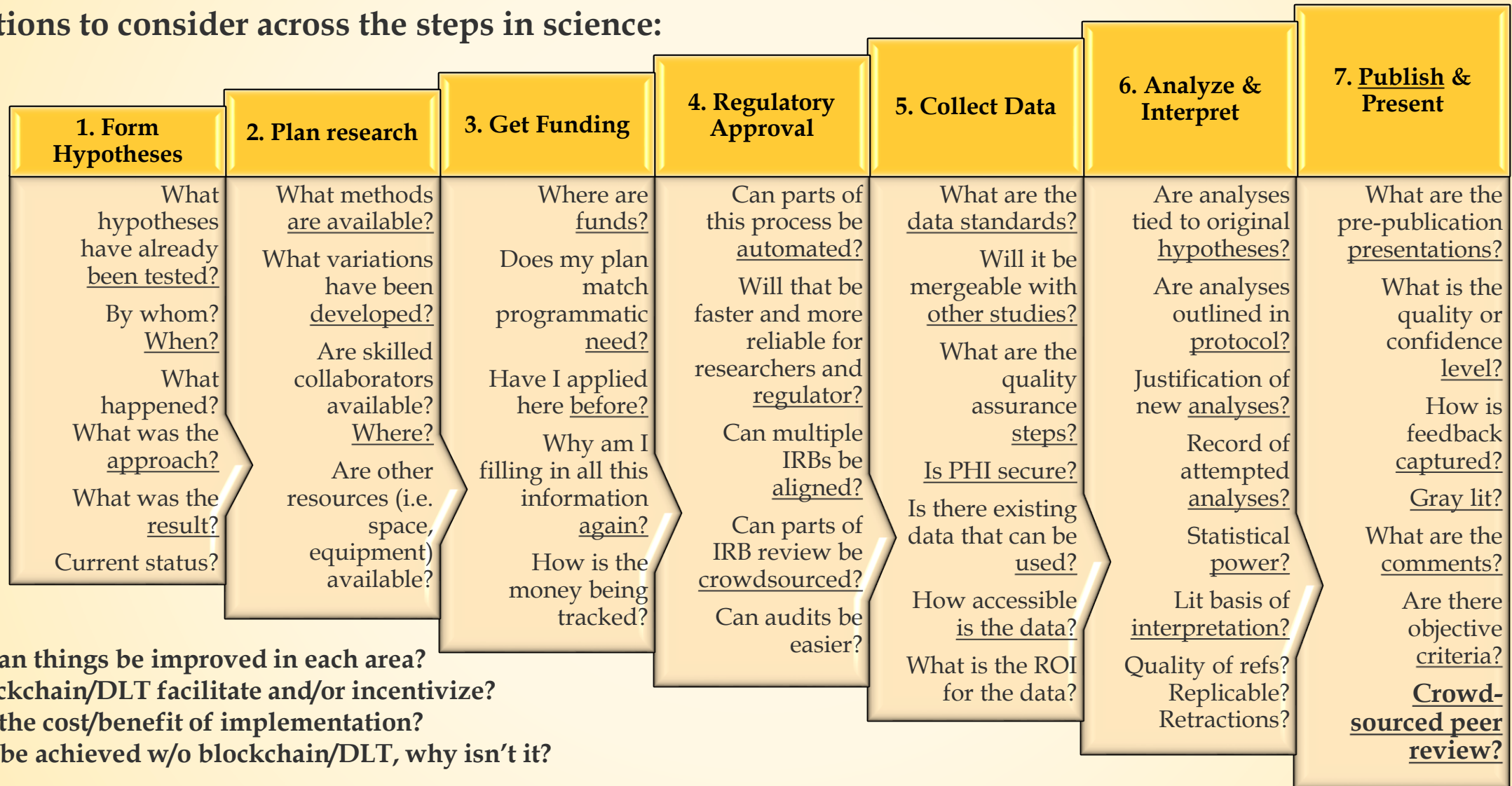
Barriers to sharing can relate to ...

- the Researcher - intellectual property issues
- the Institution - unrealized commercial value
- the Subject – confidentiality

[Anne Donnelly, University of Edinburgh, DIY Research Data Management Training Kit for Librarians]

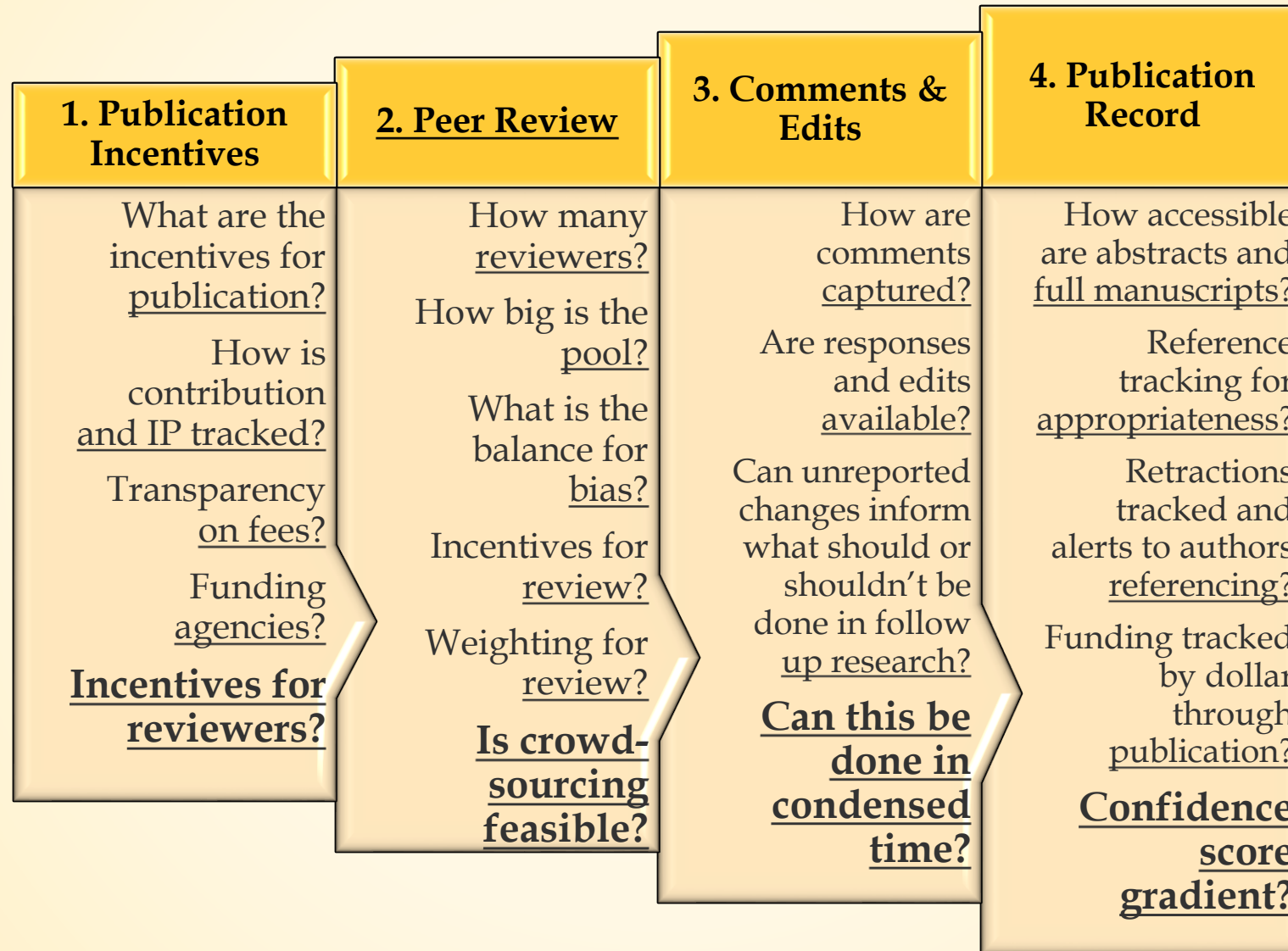
Distributed Science Opportunities?

Questions to consider across the steps in science:



- Where can things be improved in each area?
- Can blockchain/DLT facilitate and/or incentivize?
- What is the cost/benefit of implementation?
- If it can be achieved w/o blockchain/DLT, why isn't it?

Distributed Science Publishing Opportunities?



Crowd-Sourced Peer Review Pilot

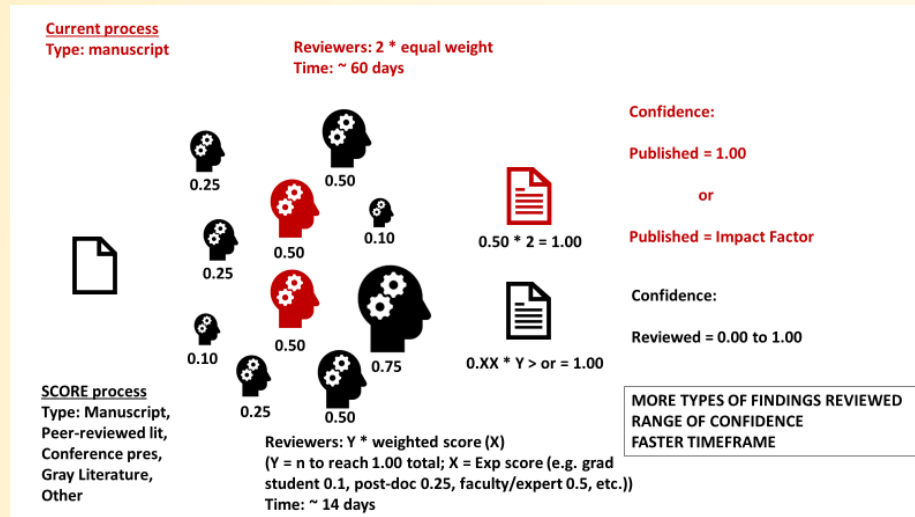
- Goal: to develop weighted crowd-sourced peer review of published and pre-published material to provide confidence score related to replicability
- Crowd-sourcing + standardized, systematic review + distributed ledger
- Science Distributed with Blockchain in Healthcare Global – IEEE ISTO, ConsenSys, and advisors from academia, government, and industry
- Interested in additional partners from academia and Open Science groups.
Contact us.

TA #2: Distributed Peer-review

Science Distributed, Blockchain in Healthcare Global IEEE ISTO, ConsenSys; Sean Manion, Heather Flannery, Tori Adams

HR001118S0047 SCORE BAA
Abstract Summary Slide

CONCEPT



APPROACH

Crowdsourced weighted peer-review of any type of material, finding, presentation, or manuscript

Blockchain/ distributed ledger technology for decentralized, real-time scoring; auditable record

Cochrane review-style breakdown by subject matter; objective scoring and categorization

Tokenization to incentivize review; crowd-balanced feedback to incentivize quality

IMPACT

Current peer-review system gives only published/not published or journal impact confidence buckets of prepared manuscripts

Distributed, crowdsourced, weighted, and incentivized feedback provides refined confidence score of multiple types of information in shorter timeframe

Goal: Create new model of confidence scoring for social & behavioral science information

CONTEXT

Current peer-review lacks differentiation between confidence in published lit and doesn't give any guidance on gray literature

Blockchain/distributed ledger technology is rapidly developing new models of incentive and crowdsourcing for expert involved tasks

Blockchain/DLT, smart contract, and crowdsourced confidence scoring can provide granular confidence scoring for info/intel

“BiHG” is a
New, Non-Profit
Trade
Association

Launching
Q3 2018

- BiHG's Mission: to address the barriers to adoption of blockchain and *converging innovations* in healthcare and life sciences while advancing progress in scientific reproducibility, medical ethics, human rights, and global inclusion
- Converging innovations: AI, IoMT, Biotech, Genomics, 3D Printing, etc.
- [BlockchainInHealthcare.Global](#) (website currently in development)
- Forever-free *Blockchain in Healthcare Global Webinar Series* now anchored in new organization: register here
<https://attendee.gotowebinar.com/register/2095593687889630466>
- Organized as an independent 501(c)6 membership organization under the IEEE ISTO
 - IEEE = Institute of Electrical and Electronics Engineers
 - ISTO = Industry Standards and Technology Organization
 - <https://ieee-isto.org>
- A 501(c)6 is a category of non-profit under United States law organized and operated primarily to ***promote the common business interests of its members***
- IEEE ISTO Member Programs may contribute to IEEE standards activities but ***also have a much wider aperture***