

INTERNATIONAL BRAIN LABORATORY

**The International Brain Laboratory** building a global collaboration for more reproducible neuroscience

> Anne Urai Leiden University VU Data Conversations, 28 November 2020



### The state of systems neuroscience

- "How do neural circuits function?"
- $\bullet$ types that underlie even a modestly complex behavior

 $\bullet$ 

- "Neuroscientists would rather share their toothbrush than their data"
- Collaborating in the age of big data  $\bullet$ Traditional small-scale collaboration Centralized corporate organizational structure
  - Meso-scale, decentralized

No single lab can study the large set of regions, connections, and cell

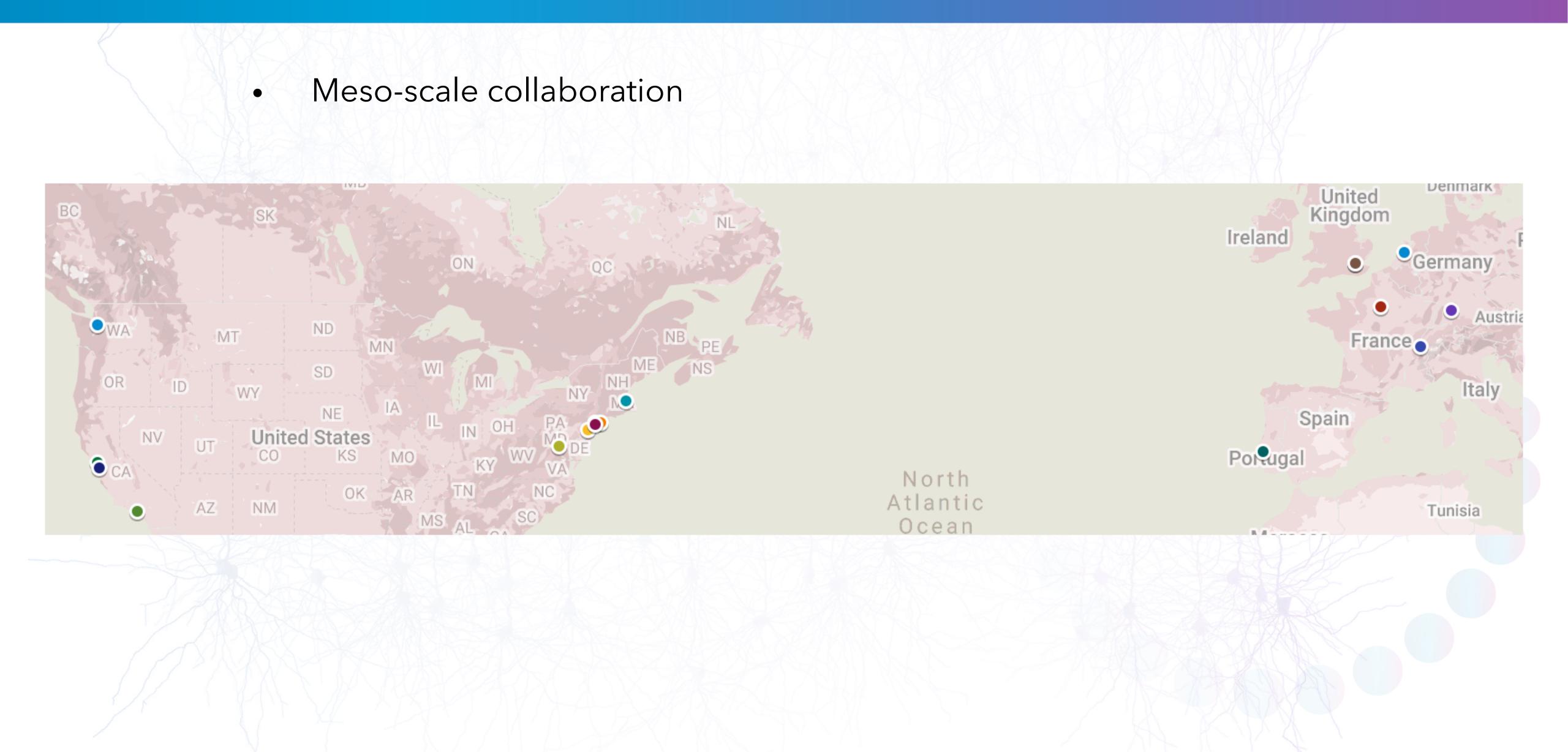






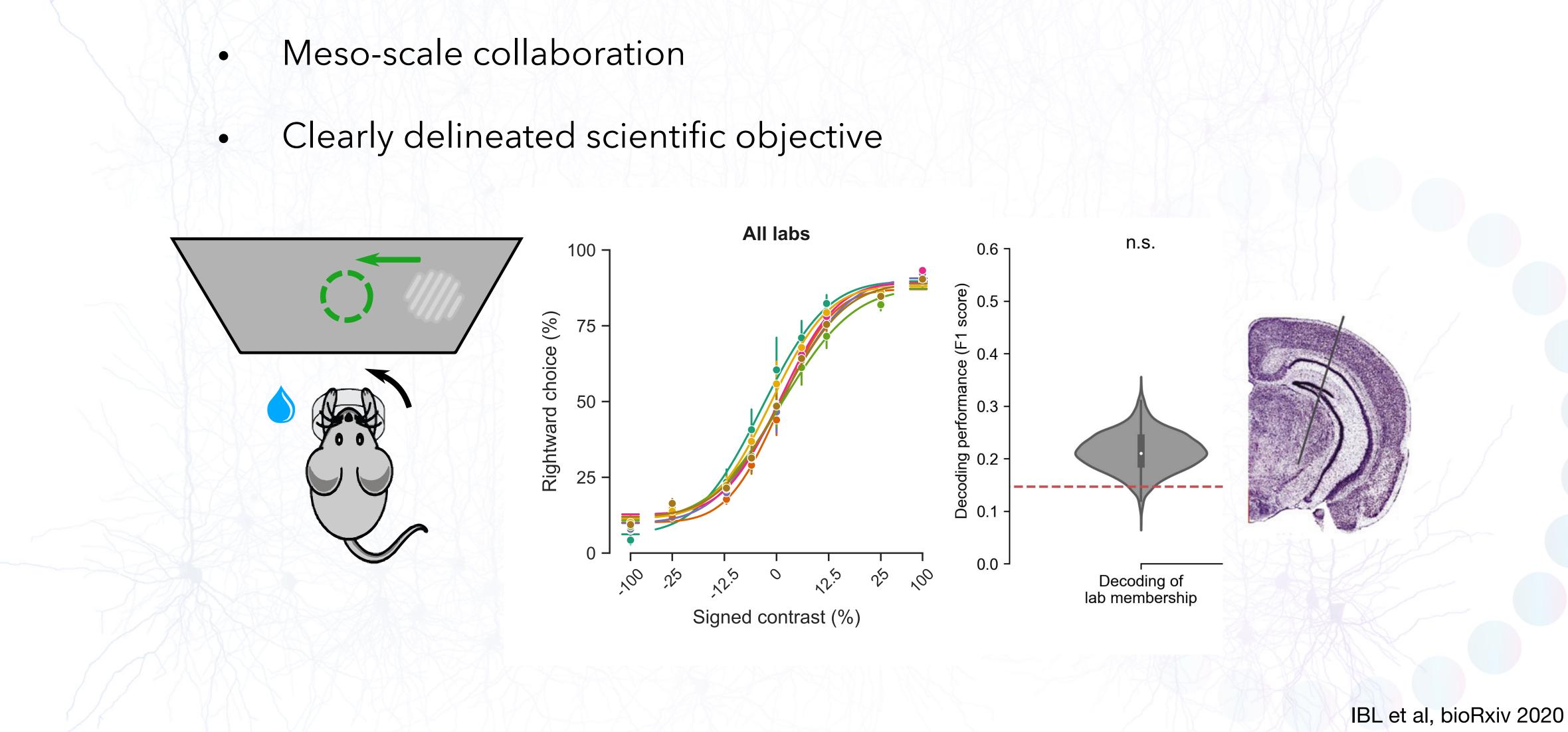


## The International Brain Lab model





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# The International Brain Lab model

Meso-scale collaboration

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- Clearly delineated scientific objective
- Standardized methods and protocols
- Data architecture and computational pipelines
- Closely linking theory and experiments
- Training not just mice, but people too!

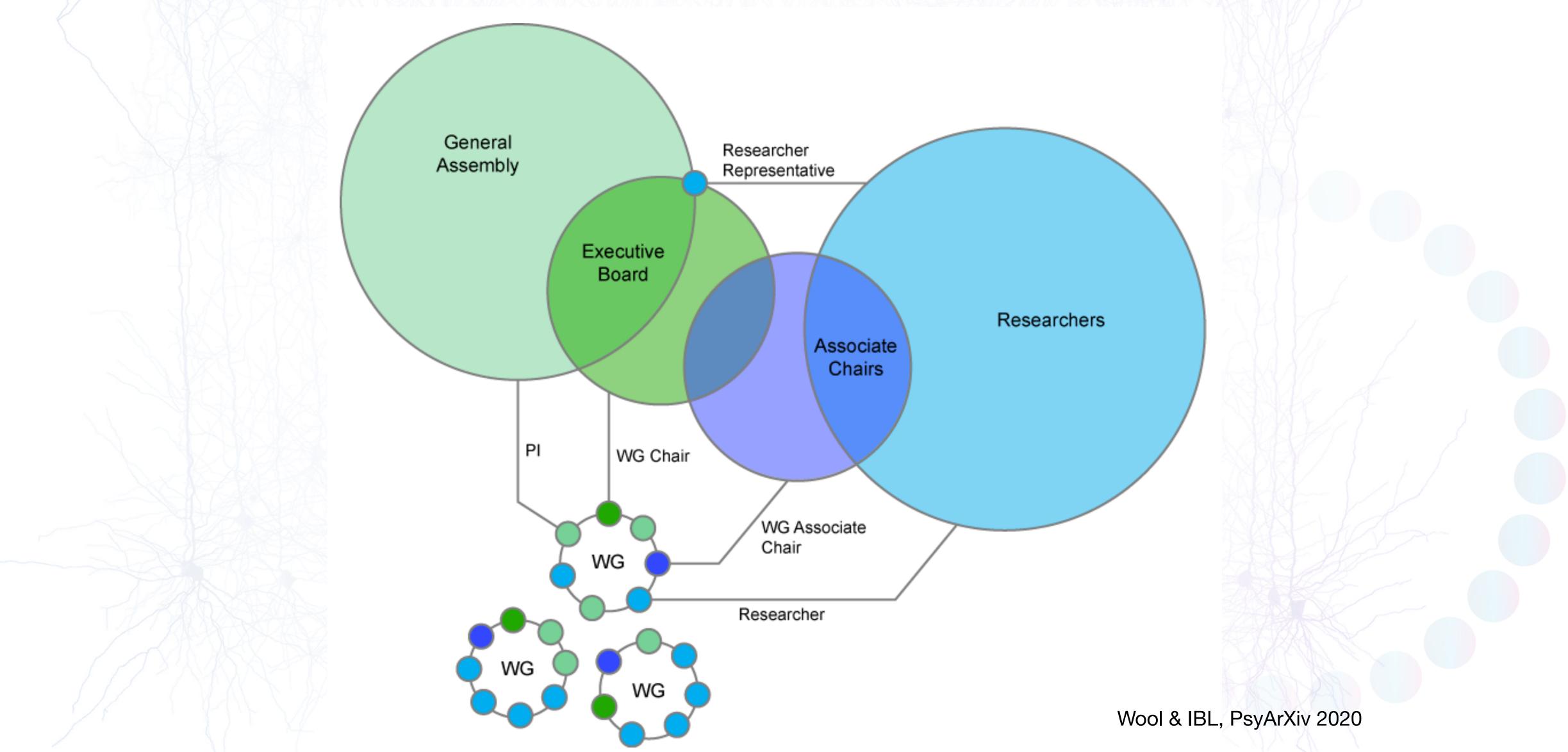








## 1. Organizational structure







## **2. Build infrastructure**

### Digital tools

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- Slack, GSuite, Zoom, GitHub

open access has facilitated a culture of transparency [19], the total amount of information generated within the collaboration presents an enormous practical obstacle: as of April 2020, there were 34,478 public Slack messages; 363 recorded Zoom meetings; 187 presentation slide decks, 233 spreadsheets, 1618 text documents, and 7603 PDFs in GSuite; 6148 Github commits; and over 500,000 experimental files in Datajoint. The IBL ecosystem, like other biological and social systems, is a network [20], but successfully distributing this much information across it is a daunting proposition.

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### digital lab notebooks, data server, JupyterHub

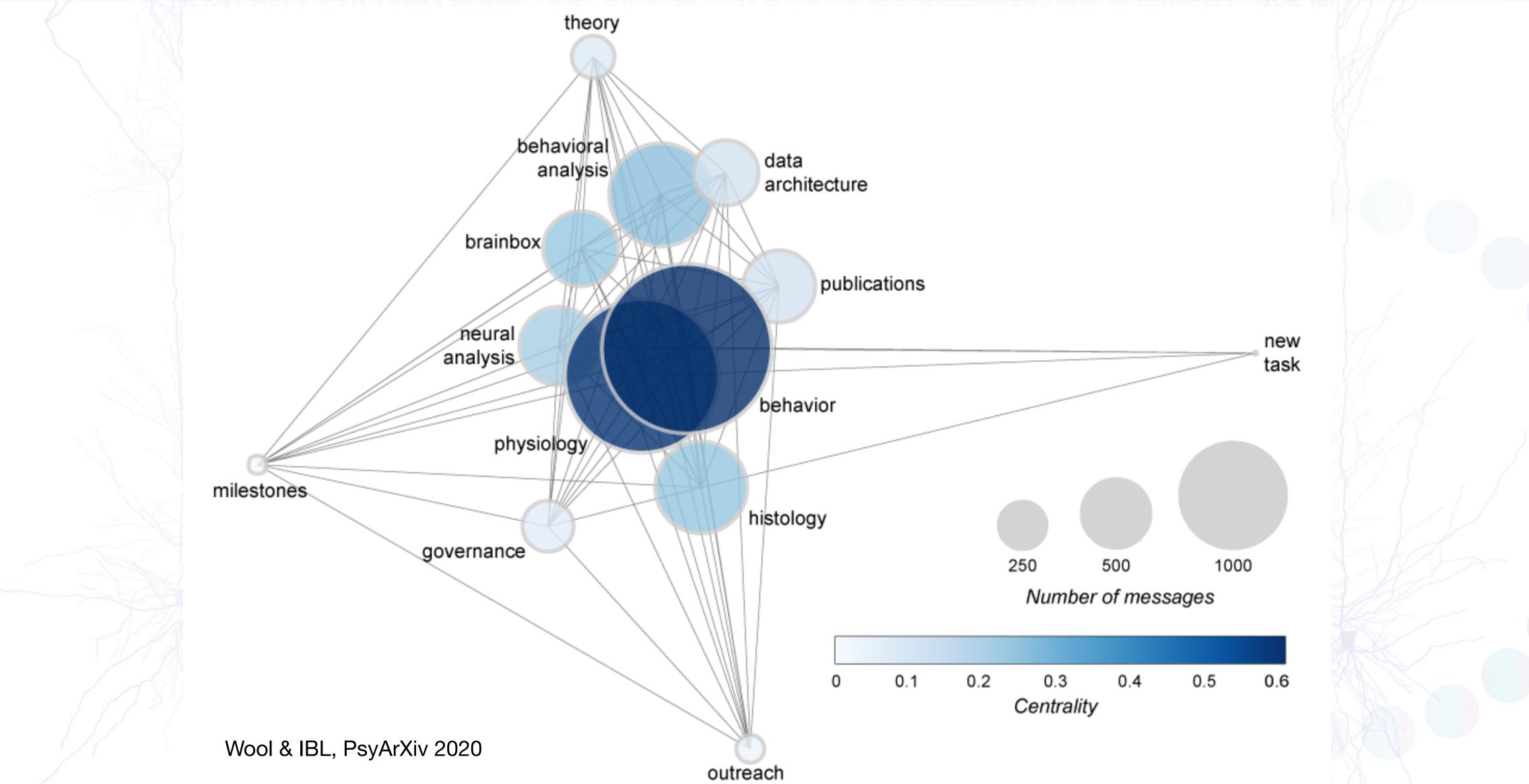








## 2. Build infrastructure











## **2. Build infrastructure**



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- Slack, GSuite, Zoom, GitHub
- Communicate, communicate, communicate!
- Personal connections
- Experts and 'hub/bridge people' •
  - Danger: sensitive to drop-out





### digital lab notebooks, data server, JupyterHub

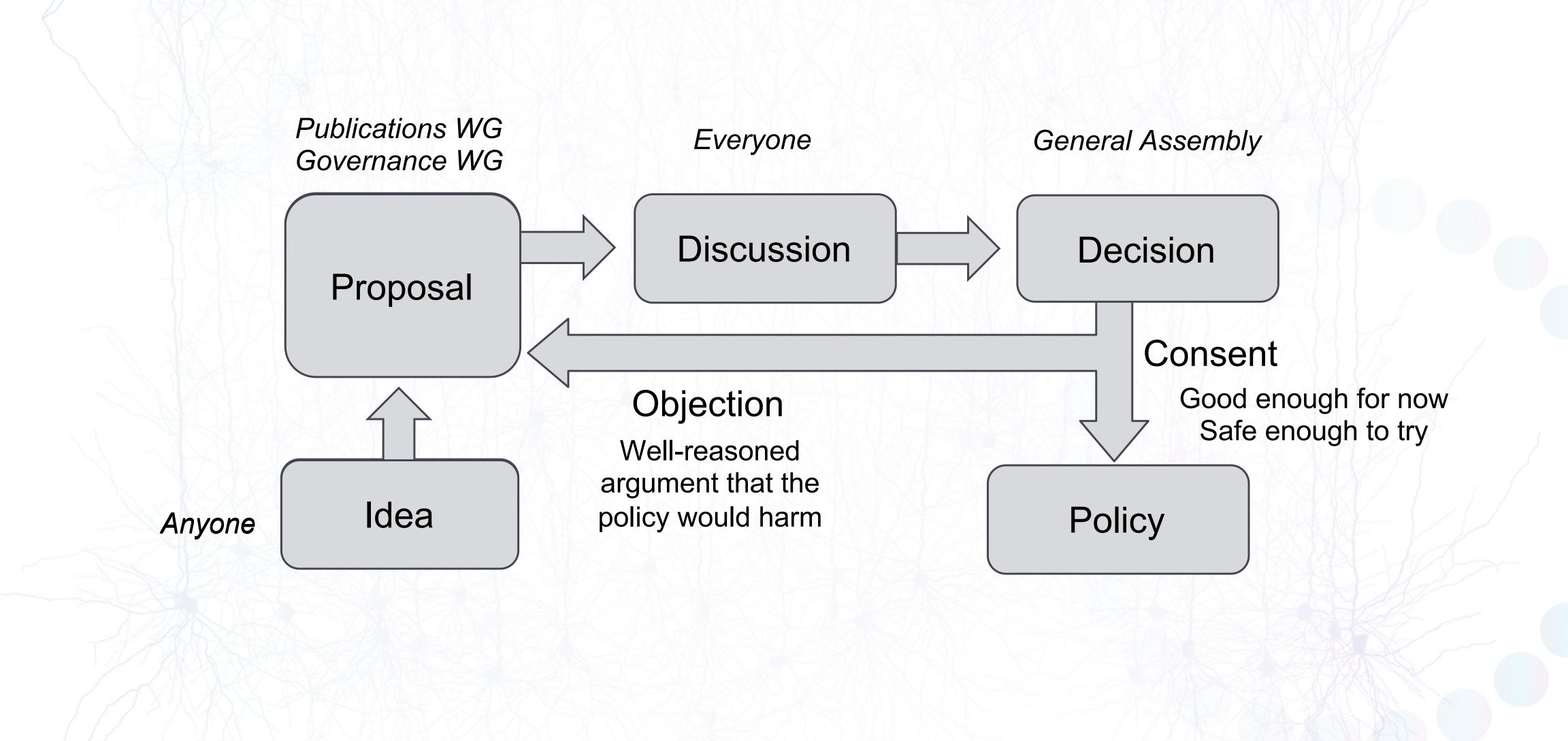


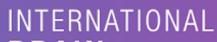






# 3. Making decisions: the sociocracy model





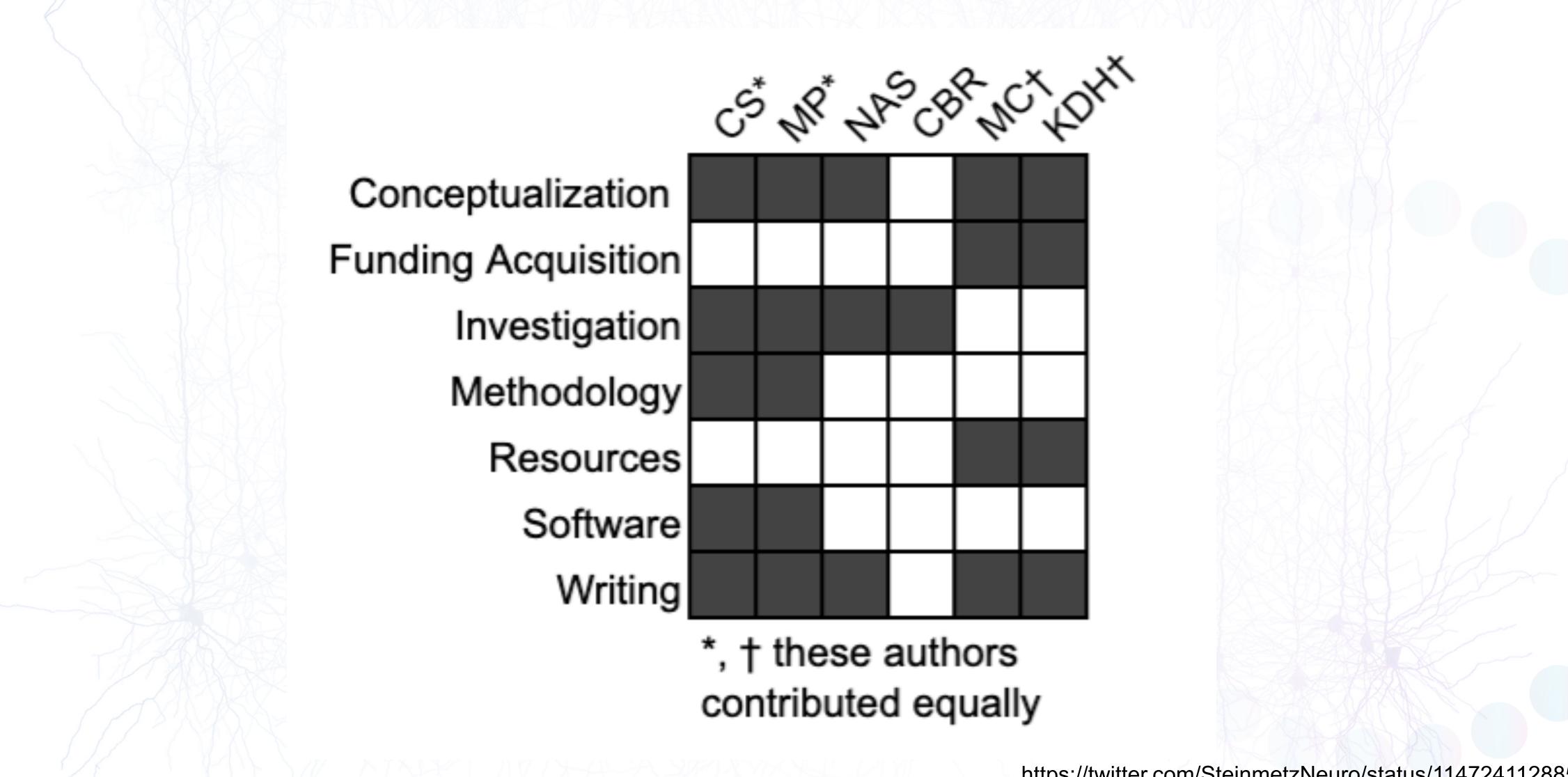
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## 4. Give credit where credit is due



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https://twitter.com/SteinmetzNeuro/status/1147241128858570752







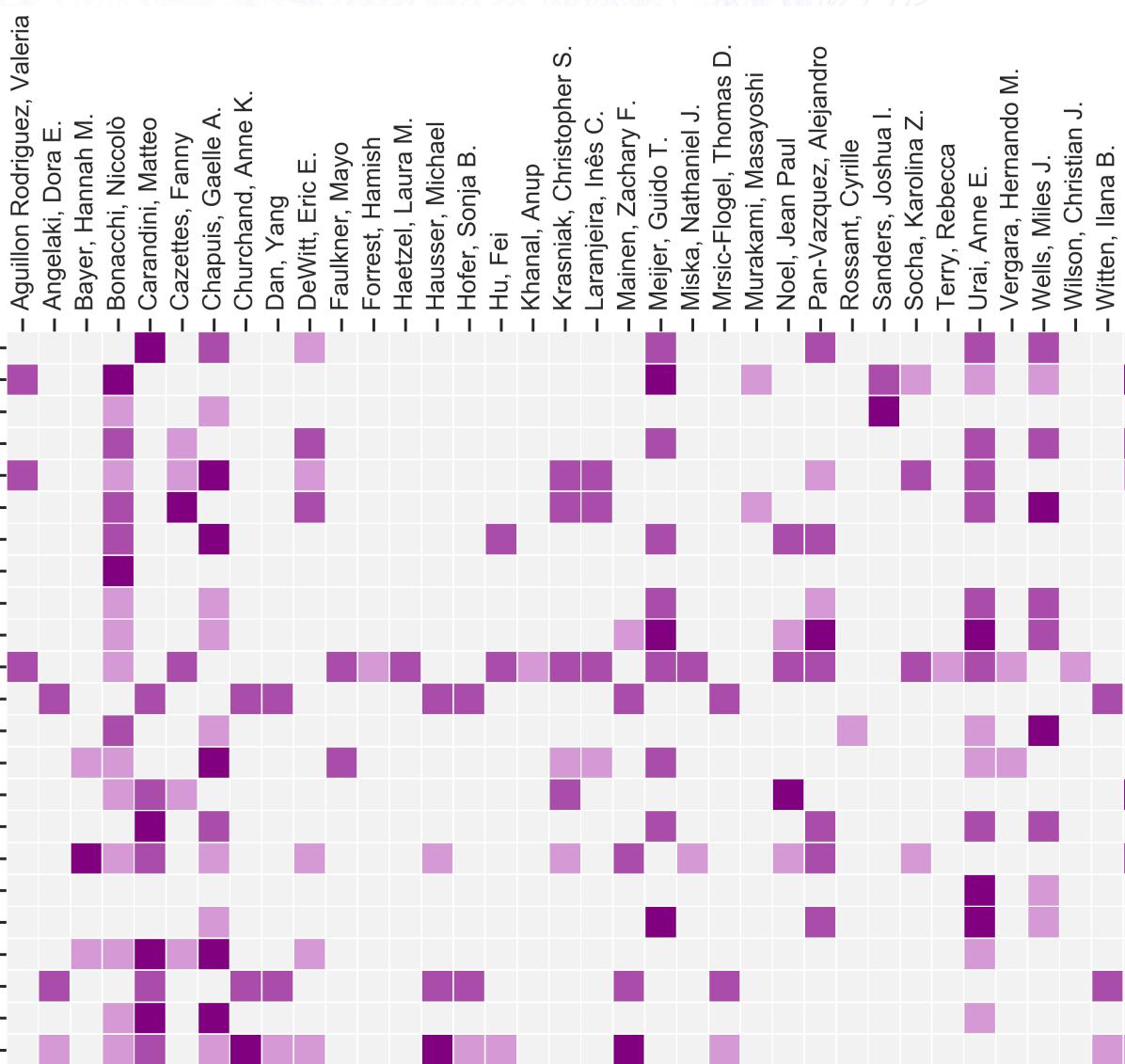




### 4. Give credit where credit is due

IBL et al. (2020) bioRxiv:909838.

CONCEPTUALIZATION: defined composition and scope of the paper -METHODOLOGY: built, designed and tested rig assembly – METHODOLOGY: designed and delivered rig components -METHODOLOGY: developed final behavioral task -METHODOLOGY: developed protocols for surgery, husbandry and animal training -METHODOLOGY: piloted candidate behavioral tasks -METHODOLOGY: standardized licenses and experimental protocols across institutions -SOFTWARE: developed data acquisition software and infrastructure -VALIDATION: maintained and validated analysis code -FORMAL ANALYSIS: analyzed data -INVESTIGATION: built and maintained rigs, performed surgeries, collected behavioral data -RESOURCES: hosted the research -DATA CURATION: curated data and metadata -WRITING - ORIGINAL DRAFT: wrote and curated the appendix protocols -WRITING - ORIGINAL DRAFT: wrote the first version of the paper -WRITING - ORIGINAL DRAFT: wrote the second version of the paper -WRITING - REVIEW AND EDITING: edited the paper -VISUALIZATION: created data visualizations – VISUALIZATION: designed and created figures -SUPERVISION: managed and coordinated team -SUPERVISION: supervised local laboratory research -PROJECT ADMINISTRATION: managed and coordinated research outputs -FUNDING ACQUISITION: acquired funding -









## 5. Trade-off individual and teamwork

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Wool & IBL (2020) *Knowledge across networks: how to build a global neuroscience collaboration.* Current Opinion in Neurobiology 65:100–107

IBL et al. (2020) A standardized and reproducible method to measure decision-making in mice. bioRxiv:909838

IBL (2017) An International Laboratory for Systems and Computational Neuroscience. Neuron 96:1213–1218



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# SIMONS FOUNDATION Wellcome

