

# Earth Observation for agriculture requires more than satellites: Addressing the *in situ data* bottleneck through sharing

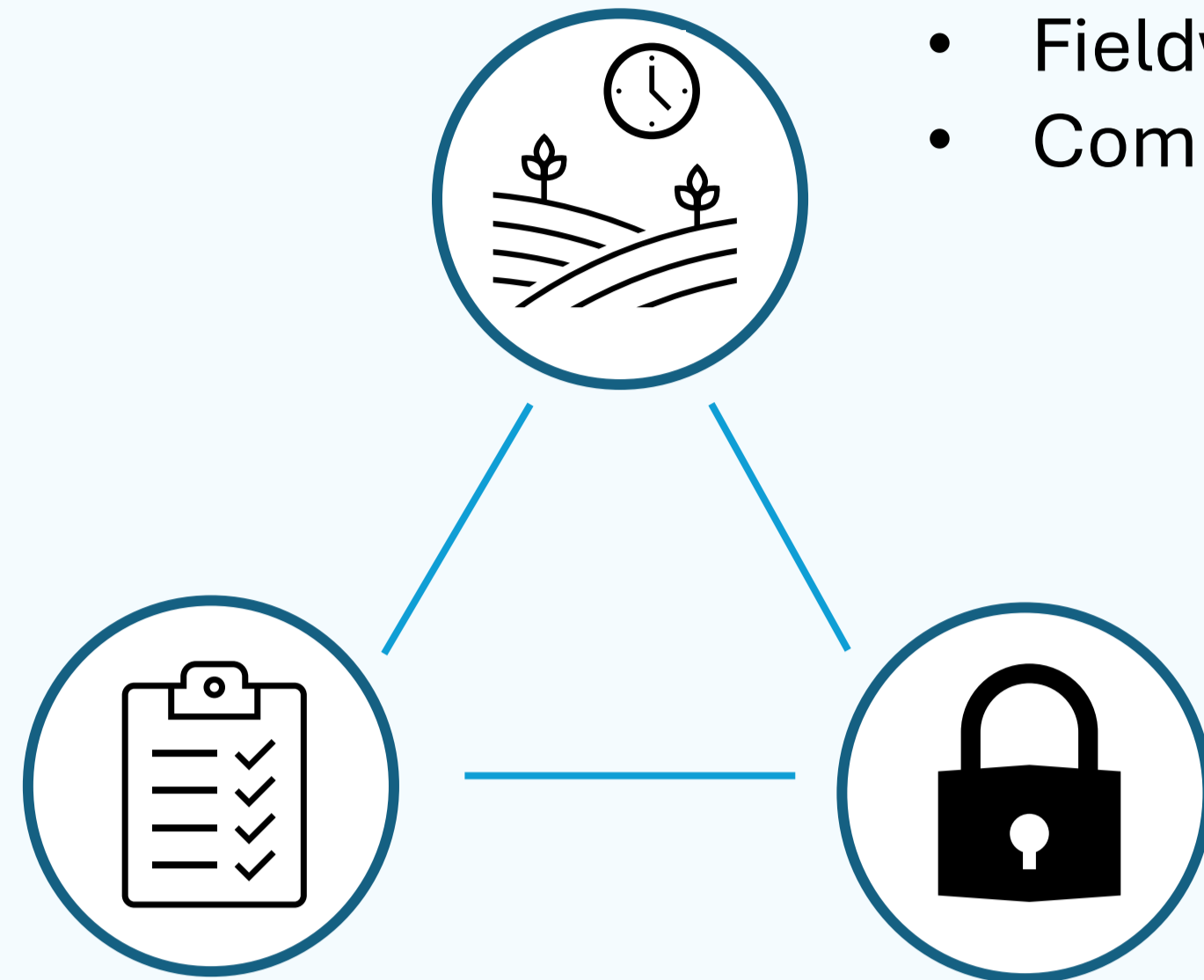
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**Agricultural monitoring has matured rapidly due to the abundant availability of free and open satellite data. These advances are persistently hindered by the scarcity, heterogeneity and limited accessibility of *in situ* data required.**

## Dimensions contributing to the *in situ data* gap

### Qualitative – Data inconsistencies and variable reliability

- Lack of harmonized measurement protocols and data formats [1].
- Bias and large measurement error in household and recall surveys [2].



### Quantitative – Limited spatial and temporal coverage

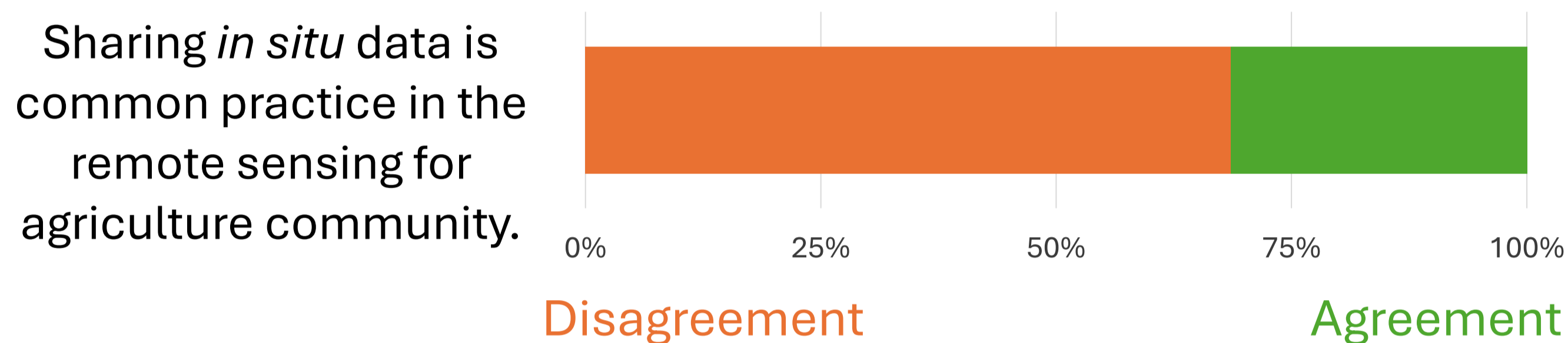
- Fieldwork is **resource intensive**.
- Complications are exacerbated in large or **remote areas**.

### Accessibility – Restrictions in data sharing

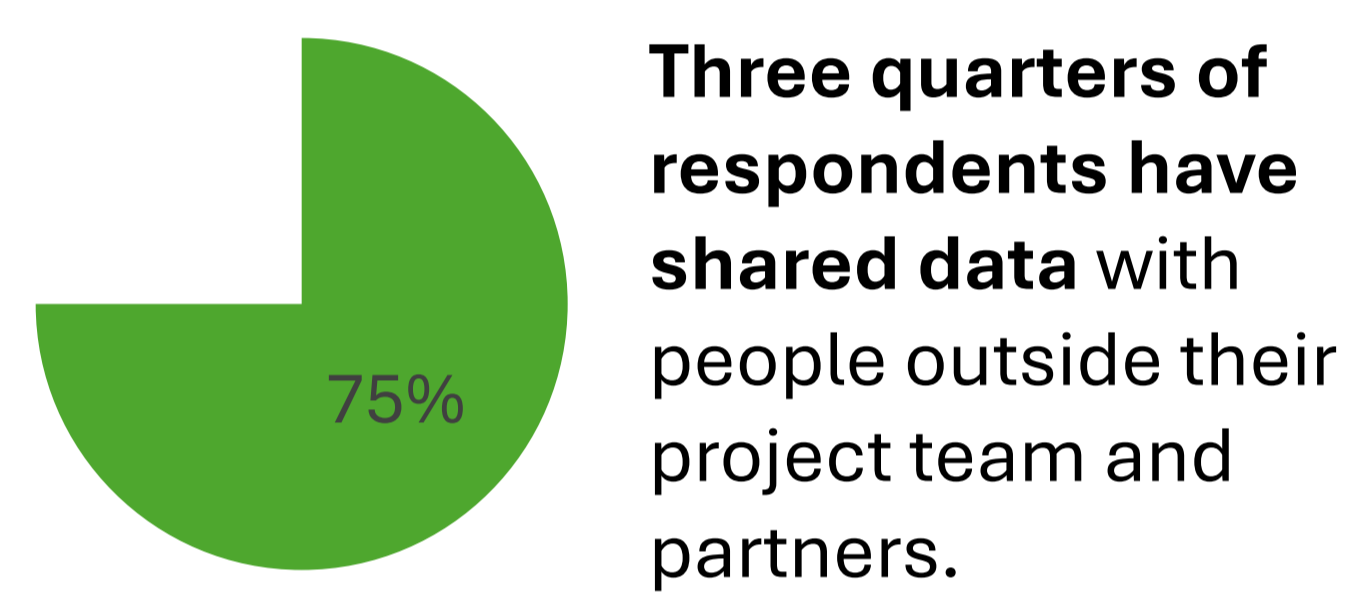
- **Economic and strategic value in observations** [3].
- **Ambiguous legal frameworks governing data rights** create uncertainty around data ownership, reuse and liability [4].
- **Concerns about direct or indirect identification** of personally identifiable information [5].

## Results: Survey on *in situ* data sharing practices and attitudes (69 respondents)

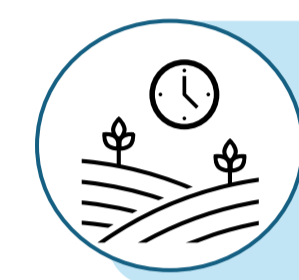
**There is unanimous consensus that sharing *in situ* data is essential for advancing the research field, yet it remains uncommon.**



Almost half of the respondents reported being restricted from sharing data due to organizational policies or regulation.

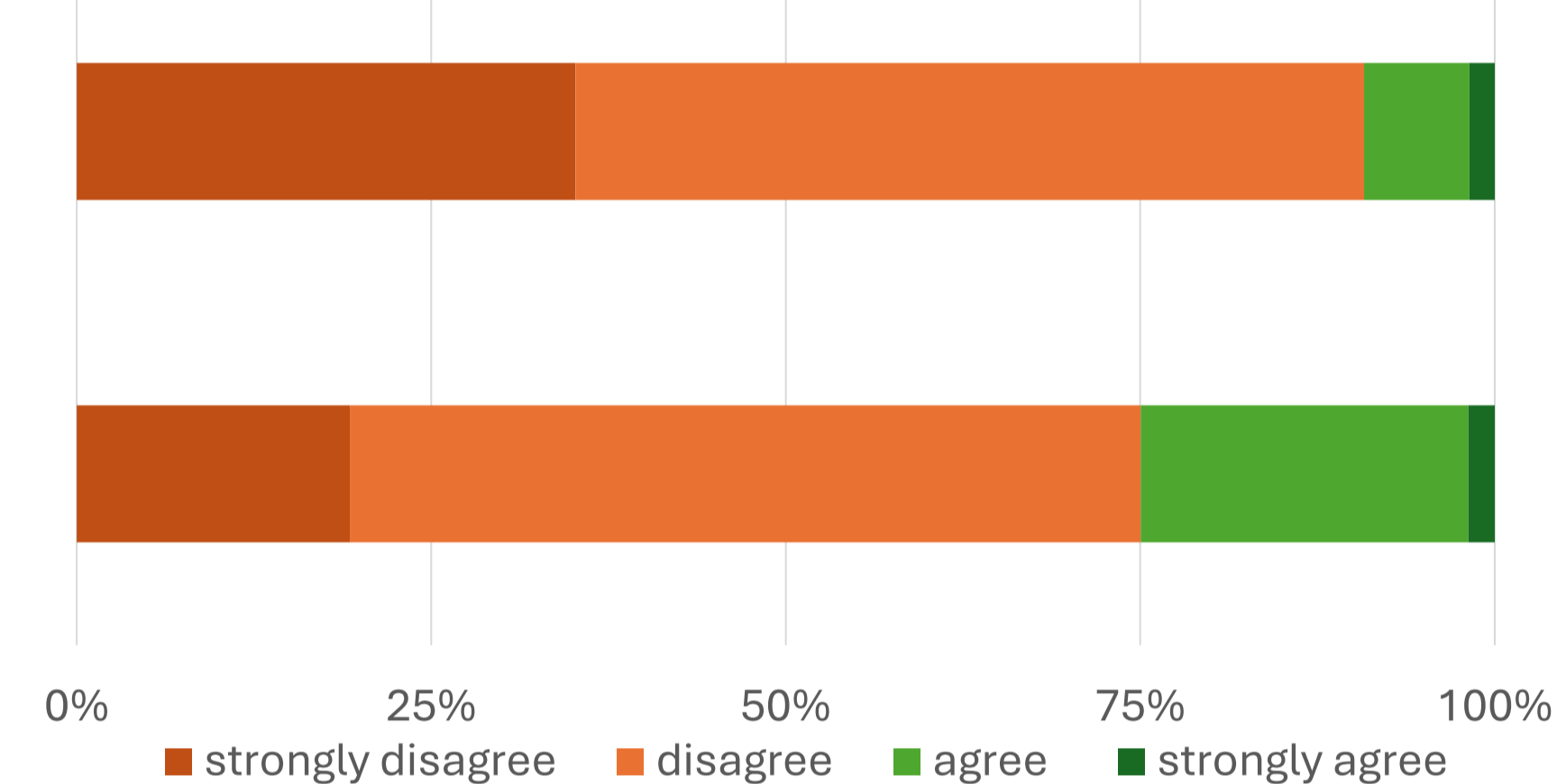


Three quarters of respondents have shared data with people outside their project team and partners.



**A large majority of researchers do not have sufficient time nor adequate money to prepare and store *in situ* data.**

Receipt of adequate funding to prepare and long-term store data for sharing.

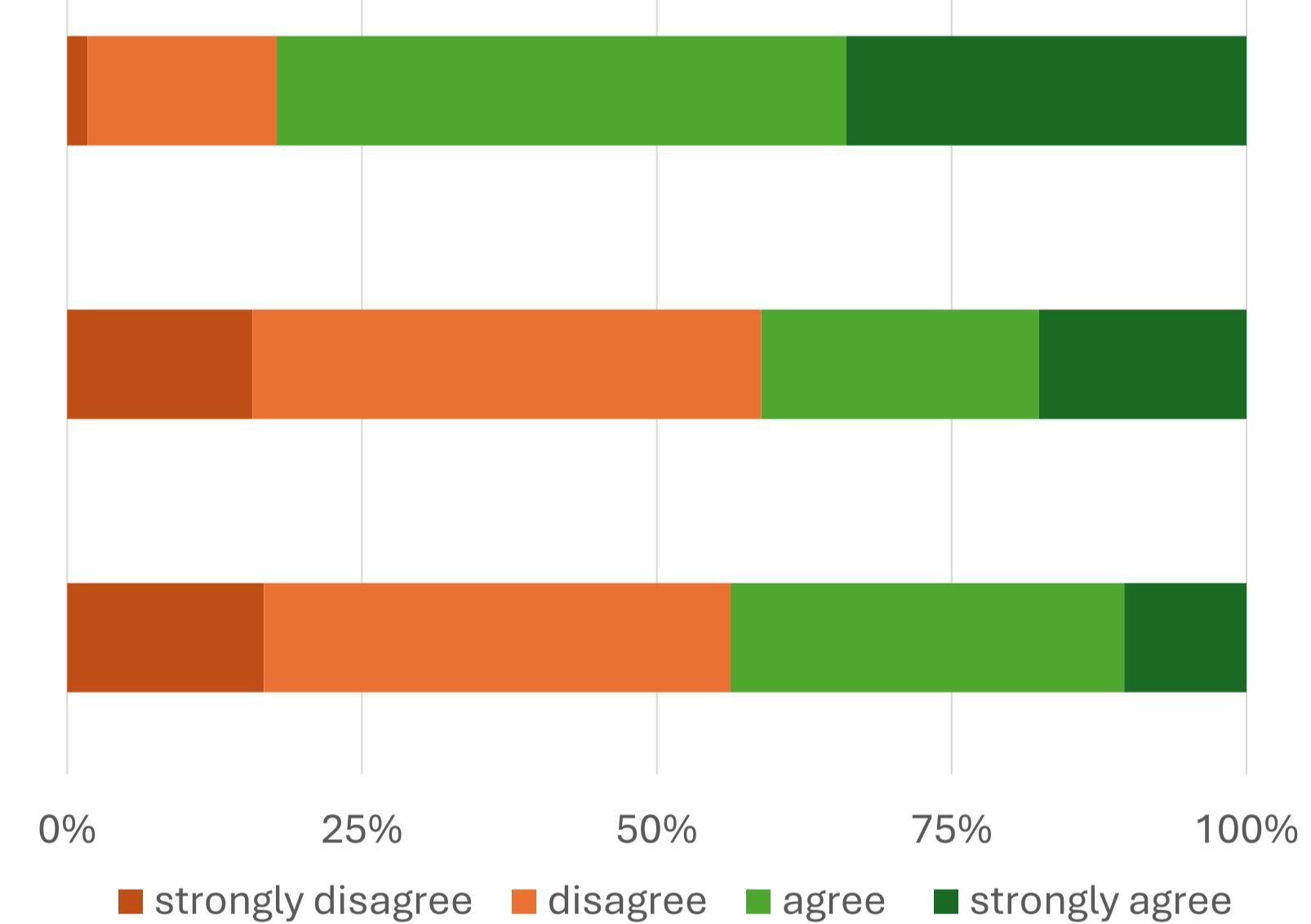


Sufficient time availability to prepare data for sharing.



**Ethical and privacy concerns are frequent, due to unclear data sharing guidelines and legal or licensing issues.**

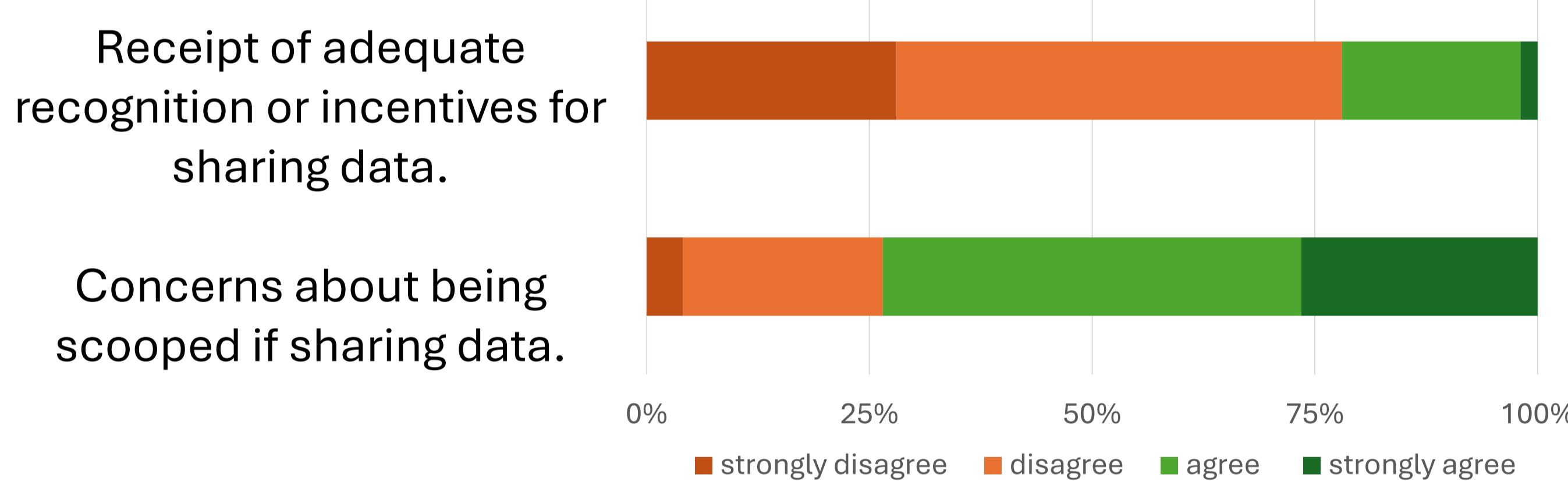
Concerns about ethical or privacy risks when sharing data.



Institution or funder provides clear guidance on data sharing.

Confidence in handling legal or licensing issues related to data sharing.

**There is wide consensus that not enough credit is provided given the time spent invested in building datasets.**



Data sharing is seldom rewarded in grant evaluations, promotion criteria, or journal metrics and fears of being “scooped” by others who publish first using shared data remain widespread, particularly among early-career researchers [6].

Agricultural data falls outside personal protection regimes (e.g., GDPR) and attributes such as cropping patterns, input practices, and soil characteristics can enable re-identification through statistical inference or machine-learning models [4,5].

## Recommendations

### For Research Funding Bodies

- **Mandate data management from project inception** through clear plans for repository deposition and metadata documentation.
- **Invest in systematic support for *in situ* data collection and stewardship** by developing and harmonising measurement protocols and metadata standards.
- **Evaluate data stewardship** in grant renewals and future funding decisions.
- **Support the development of institutional or trusted intermediary mechanisms** through controlled-access repositories, data use agreements, or secure enclaves.

**“The community should invest in community-backed, central, harmonized data repositories (e.g. WorldCereal Reference Data Module) and researchers should be forced by funding agencies to contribute data to those recognized platforms.”**

Public research organisation/national research institute survey respondent

### For Scientific Journals

- Require data to be shared according to the **FAIR principles**:
  - F indable
  - A ccessible
  - I nteroperable
  - R eusable
- **Recognise data as a primary research output.**
- **Adopt two-stage review models** for the assessment of both scholarly contribution and technical soundness of data and code.

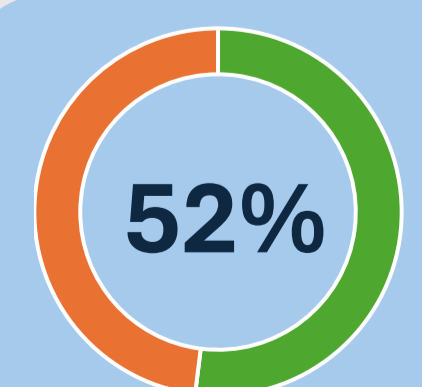
### For Research Institutions

- **Provide training** in data management and ethical sharing practices.

**“There is need to clarify which types of *in situ* data fall under the private, personal, sensitive data that are controlled by the country's data protection regulations.”**

Government ministry/agency or national mapping/statistical agency survey respondent

- **Invest in infrastructure** for long term data storage to prevent the “shelving” issue.
- **Develop appropriate legal, procedural, and technical support** similar to protocols for human/animal subject research.
- **Advocate for clearer legal frameworks**



**CURRENT GAP:** Only around half of primary funding agencies require open *in situ* data sharing.

Follow-up and engage



## References

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