Research Data Security and Sovereignty in Europe

Perspective from Brain Research

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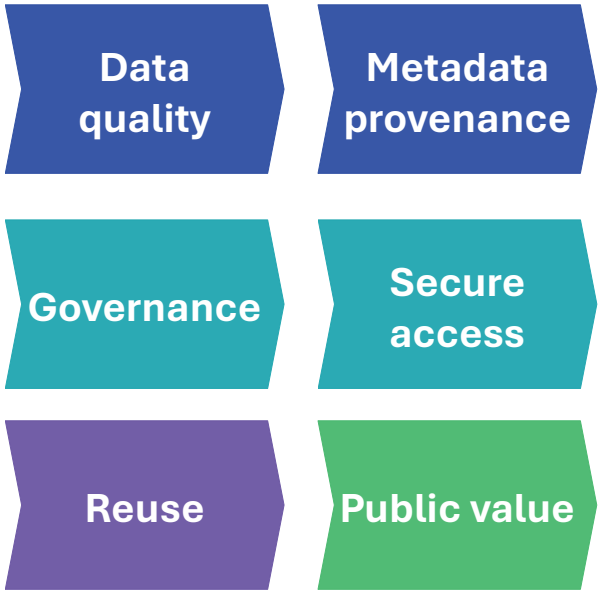
INTERNATIONAL BRAIN IBRO RESEARCH ORGANIZATION

100 years nencki institute of experimental biology

Research data is now strategic

- Evidential foundation of scientific claims
- Critical for AI, innovation and evidence-based policy
- Trust and value depend on quality, provenance and governance
- Data that are lost, manipulated, poorly documented, inaccessible, unusable or ethically compromised are insecure



Research data become European strategic capability only when they remain reliable, documented, verifiable, secure and reusable

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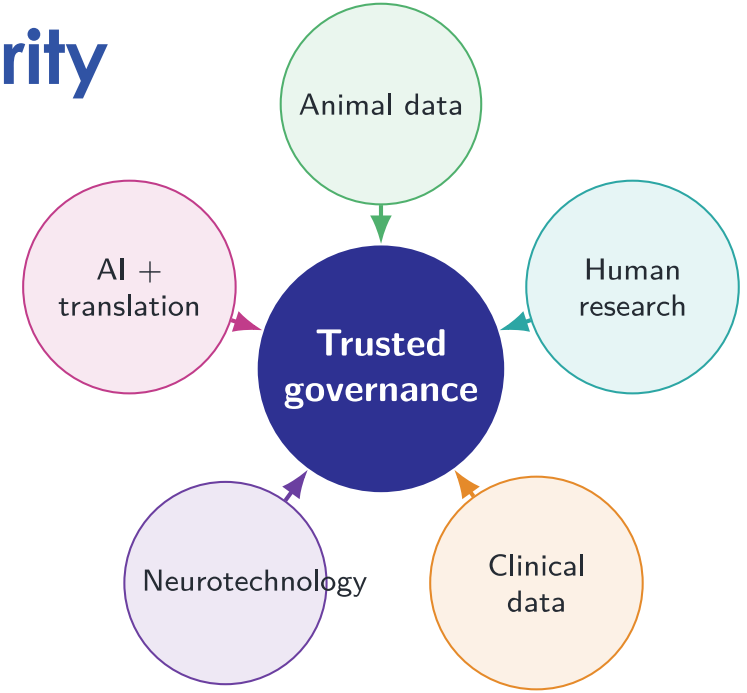
Brain research: multidimensional data security

- Animal, human, clinical, neurotechnology and translational data
- Ethically costly, clinically sensitive and scientifically high-value
- Neural and behavioral data may reveal health, cognition or vulnerability



Brain research shows why data security must include ethics, reproducibility, sovereignty, public trust and protection of vulnerable people

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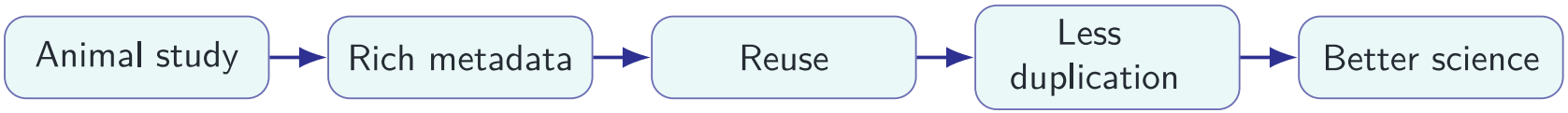
Animal research: openness must respect ethical cost

- Essential where validated alternatives are not yet sufficient
- Poor stewardship can lead to unnecessary repetition of studies
- Reuse requires metadata, protocols, provenance and spatial registration
- European capacity in animal research data is also a sovereignty issue



Funders should support data standards, metadata, atlases, repositories and stewardship that make animal research data reusable, reducing duplication while preserving scientific rigor.

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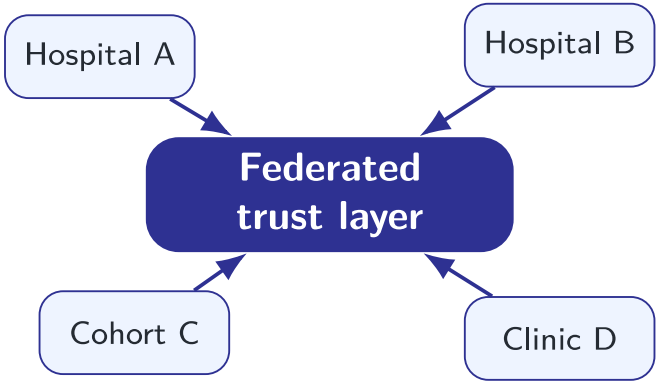
Human and clinical data: privacy is necessary, but not sufficient

- Data can reveal health, behavior, cognition, mental states and future risks
- Neural data raise issues of mental privacy, autonomy and identity
- AI tools must work across hospitals, scanners, protocols and populations
- The challenge: cross-border learning without uncontrolled data movement



Local, protected data; analysis across Europe

Human and clinical data must be protected, but they must also be usable across institutions if Europe wants reliable science and trust-worthy AI

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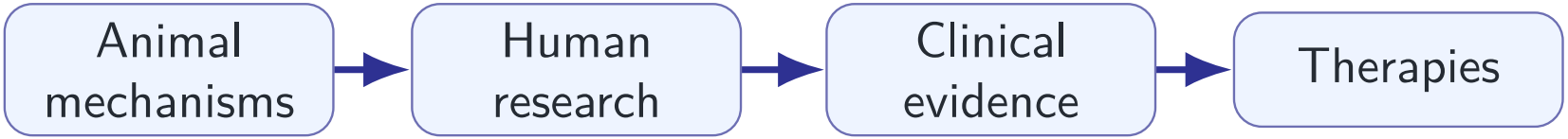
Translation: the missing bridge is well-governed data

- Animal, human experimental and clinical data often live in separate systems
- Translation links mechanisms, phenotypes, imaging, physiology and outcomes
- Standards, identifiers, ontologies, atlases and provenance are infrastructure
- Funders should support data infrastructure as a bridge, not merely an archive



standards | identifiers | ontologies | atlases | provenance | secure compute

Translation from animal models to human biology and clinical care fails when data are fragmented across species, methods, repositories, and governance systems.

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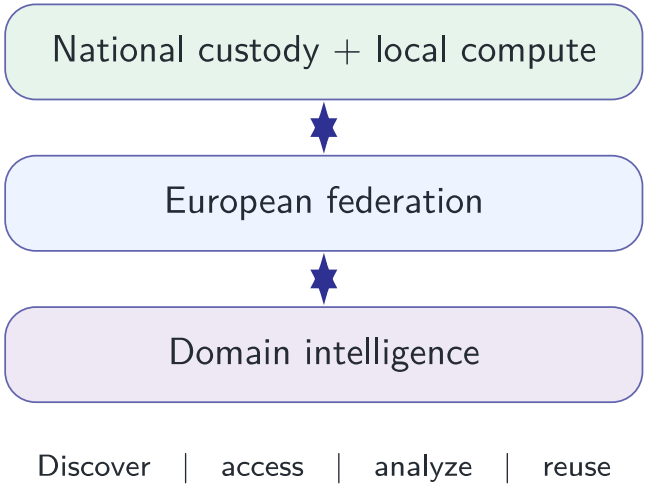
Repository dilemma: national, European or domain-specific?

- National repositories: legal control, accountability and sovereignty
- EOSC-like European frameworks: federation, discovery and common trust
- Domain repositories such as EBRAINS: scientific meaning, tools and standards
- Federated data systems also require distributed compute



**Europe does not need one giant database;
it needs a trusted federation in which
each infrastructure layer does what it does best**

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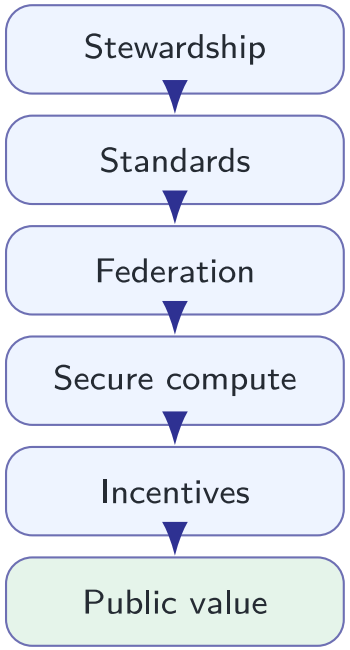
What funders and policymakers should do

- Fund long-term stewardship, not only deposition
- Support federated access and distributed computing for sensitive data
- Require metadata, provenance and standards for reuse and AI
- Connect national repositories, EOSC and domain infrastructures
- Reward high-quality data publication and researcher education
- Make long term commitments to sustain infrastructure



Funders should treat trustworthy data as a research output and secure data infrastructure as critical European research infrastructure

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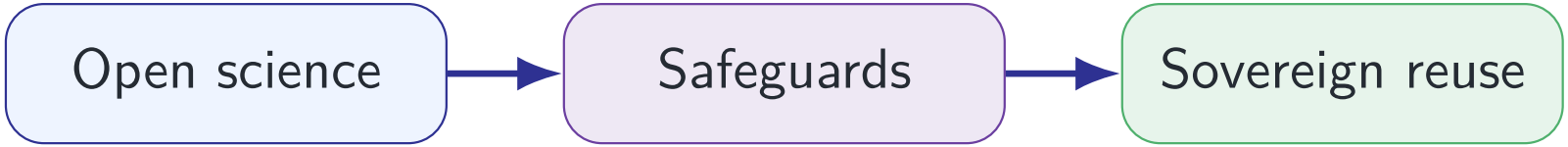
Takeaway: open where possible, protected where necessary

Europe needs a federated, secure and scientifically meaningful research data ecosystem

Open where possible. Protected where necessary.



Supported by distributed computing that allows data to remain under trusted local control while contributing to European-scale science and AI.

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Thank you

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