A Structured Approach to Laboratory Sample Inventory and Metadata Stewardship

UNIVERSITY OF CAMBRIDGE
Plant Sciences

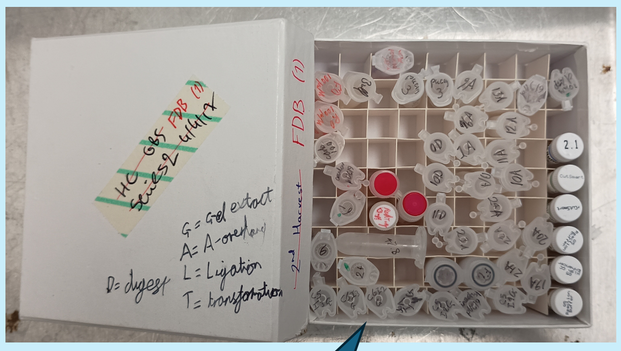
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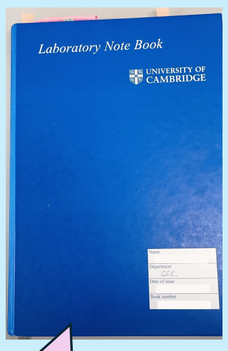
University of Cambridge, Department of Plant Sciences, Crop Science Centre

CROP SCIENCE CENTRE

What happens when a researcher leaves?

SAMPLES PERSIST. CONTEXT GETS LOST





What is it?

What experiment generated it?

Can I reuse it?

Can I trust the information?

Where are the samples?

Challenges of Laboratory Sample Stewardship in Academia



INCONSISTENT METADATA CAPTURE

- Fragmented records split across paper, personal drives, and ad-hoc spreadsheets
- Varied metadata standards



HIGH STAFF TURNOVER

- Leads to loss of sample metadata and experimental context



TIME & COMPETITIVE PRIORITIES

- Metadata documentation competes with lab work
- Voluntary effort isn't scalable

Piloting Testing: Start Small. User-Centred Design in Active Lab.

Pilot 1: Plasmids Metadata

How Much Structure Is Practical?

Minimizing Burden, Maximizing Reusability

Phase I: Scoping

Public Data Benchmark

Interviewers with Senior Researchers

DRAFT SCHEMA v01
Initial baseline metadata parameters

Phase II: Iterative Co-Design

LAB CONSULTATION
- Determine Mandatory vs. Optional Fields
- Establish Controlled Vocabularies

REFINED SCHEMA v02
Consolidate feedback

APPROVAL
- 2nd Round Lab Consultation
- Final Sign-off by Research Group Head

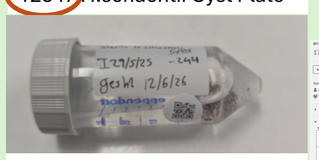
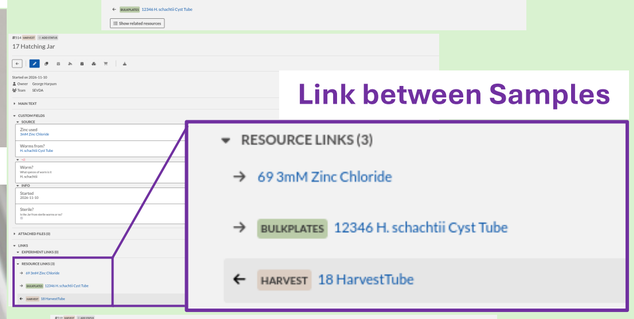
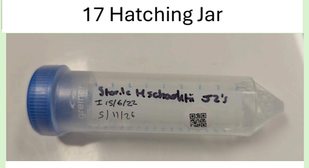
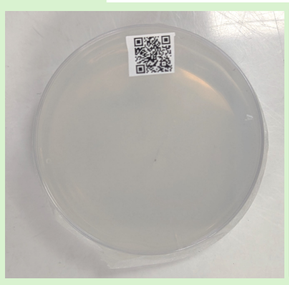
Phase III: System Rollout

DEPLOYMENT in ELN platforms
eLabFTW & benchling

Active Adoption
Training & Stewardship

Pilot 2: Nematode tissue culture:

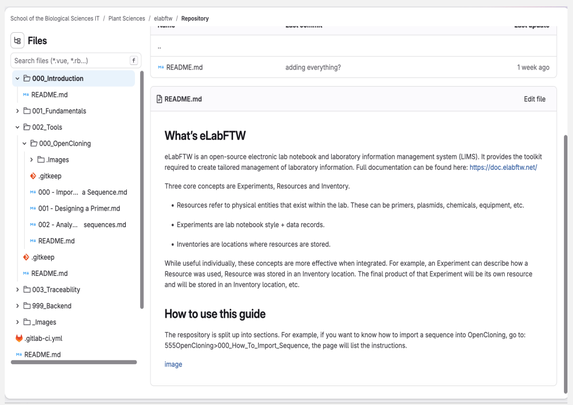
A sample inventory is more valuable when it connects samples to their experimental context

TYPE OF RESOURCE	PHYSICAL RESOURCE	eLABFTW RESOURCE
Cyst Plate	 12347 H.schachtii Cyst Plate	 Unique ID: #516 BULKPLATES IN PROGRESS 12347 Heterodera schachtii Cyst Plates
Cyst Tube	 12346 H.schachtii Cyst Tube	 Link between Samples: RESOURCE LINKS (3) 69 3mM Zinc Chloride; BULKPLATES 12346 H. schachtii Cyst Tube; HARVEST 18 HarvestTube
Hatching Jar	 17 Hatching Jar	 Storage Location: STORAGE (1) 1.00 in Crop Science Centre > Ground Floor > (CSG-25) Cold Room; Add container
Harvest tube	 18 Harvest Tube	
Inoculation plate		

Experiment:
Infection Assay which uses this inoculation plate

Data Stewardship Outputs

- **Plasmid Metadata Schema** deployed in ELN
- **Tissue Culture Inventory** in eLabFTW linking samples, storage locations and experiments
- **User Guide** in GitLab for sample metadata managing and eLabFTW API use



- **Case for dedicated departmental data steward roles**
- **Researcher skills developed** in metadata design, workflow analysis, engagement and communicating stewardship value

What did we learn?



- **Metadata is a People Problem First**

Data stewardship needs **researcher engagement, workflow understanding and "minimum useful metadata"**, alongside technical systems.



- **Sustainable RDM Requires Dedicated Capacity**

The work took more effort than expected, strengthening the case for dedicated, funded stewardship roles.



- **A Framework to Build on**

This project offers a practical starting point. Laboratory data management remains an ongoing challenge.