
Electronic Laboratory Notebooks (ELNs)

An ELN is a software tool that, at its most basic level, replicates an interface similar to a page in a paper laboratory notebook.

In an ELN, you can electronically input protocols, observations, notes, and other data and metadata. Some ELNs can also manage inventories of samples, reagents, and other supplies, as well as track equipment and maintenance schedules.

What are the benefits of using an ELN?

- ELNs support [FAIR](#) principles, data management, and the creation of [data management plans](#).
- ELNs enable project leaders to oversee research effectively.
- ELNs facilitate easier data and documentation sharing with colleagues and collaborators.
- ELNs can prevent data loss, such as when an employee leaves.
- ELNs eliminate issues with unreadable/damaged/lost paper records.
- ELNs can be customized and integrated with other software.
- The operation of ELNs can be funded by scientific projects.
- Additionally, ELNs can provide specialized scientific tools for drawing chemical structures or molecular biology.

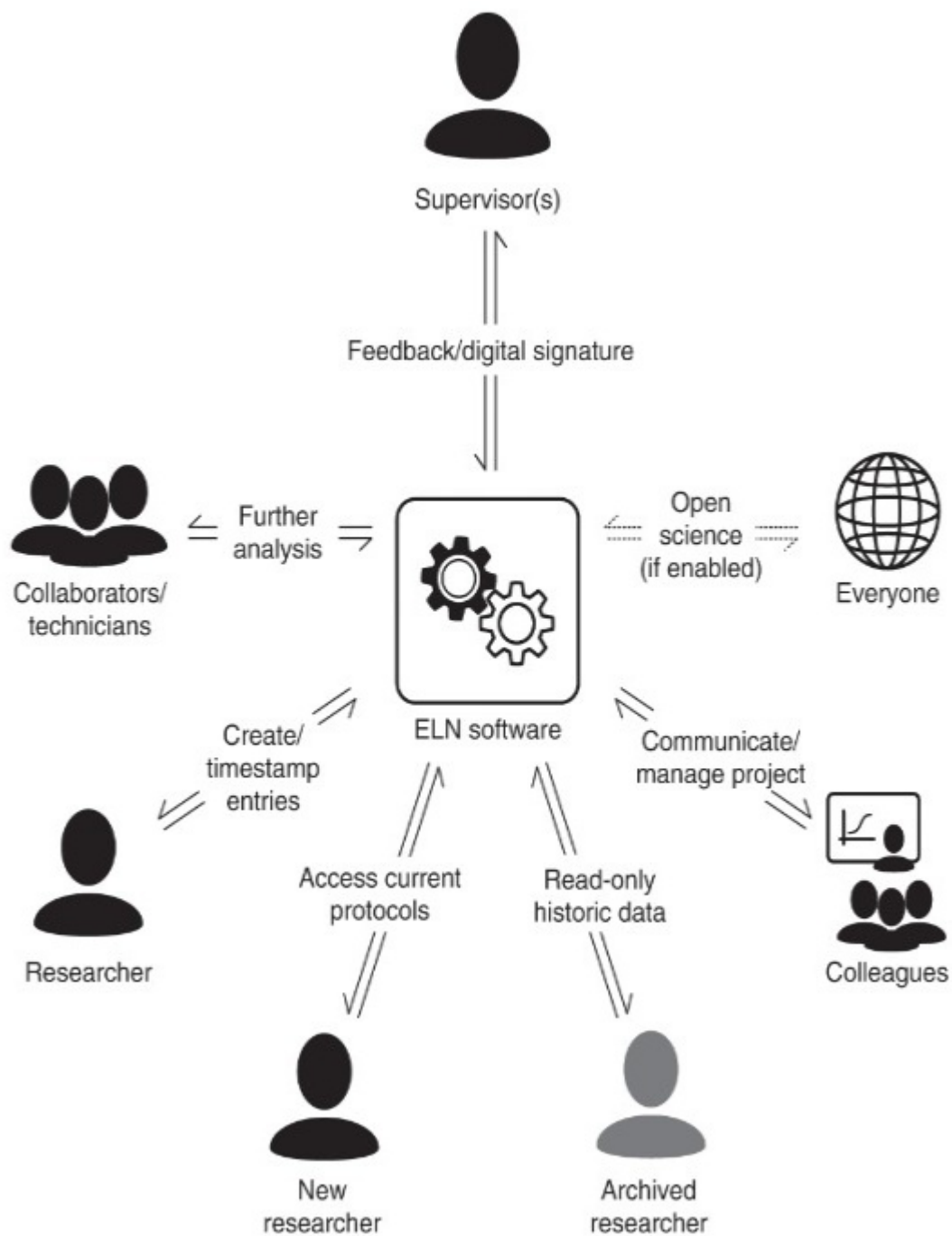
There is no "one-size-fits-all" ELN, so what should be considered?

- The type of science and specific features needed.
- Established procedures and preferences.
- Institutional policies.
- The level of data security required.
- Budget constraints.
- Setting up an ELN requires time and careful planning.
- The laboratory will need to decide how data will be organized and shared.
- Larger laboratories or those with extensive inventories should consider appointing a dedicated data steward.

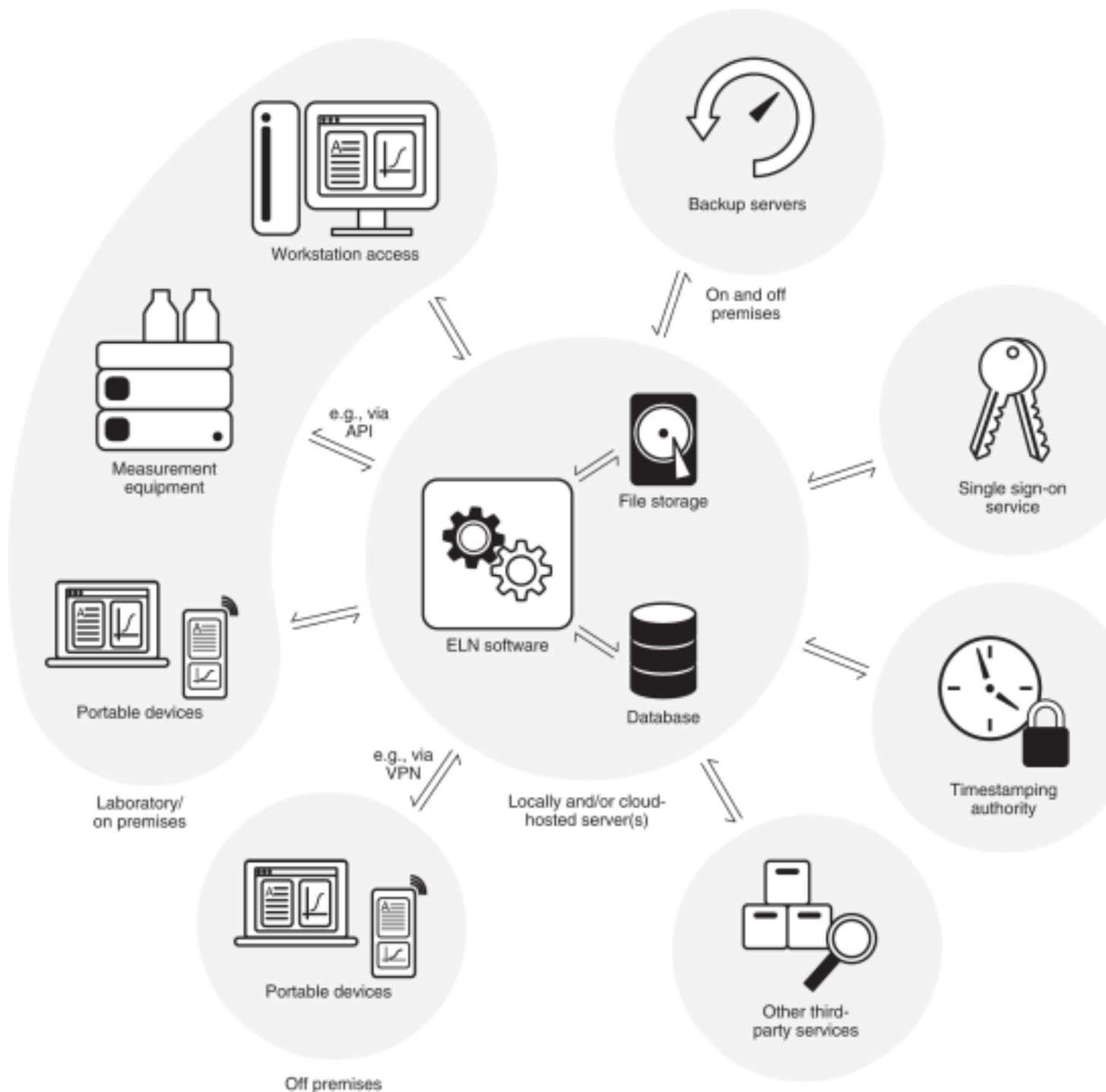
Will my data be secure in an ELN?

- ELNs typically offer robust security and audit features.
- ELNs generally meet the requirements for secure data management.
- ELNs use two-factor authentication and maintain unique login credentials.
- The security of an ELN is only as good as the security protocols of its users.

How Do ELNs Generally Work?



Researchers can create and secure records, share information with colleagues and collaborators, and access records from former team members. The degree of sharing is determined by local regulations, software features, and settings.



Accesses can be managed in ELNs in various ways and can be linked to the specific structures of devices.

Central recommendations encounter the complexity of considering all the demands of a particular field/laboratory/team, including institutional financial requirements. The following examples are currently in the general recommendation phase and require gradual implementation. They are a combination of recommendations from [the national ELN implementation group at EOSC](#) and commonly used software.

Current Recommendations for OpenSource Software for ELNs in the UK:

Kadi4Mat



"Kadi4Mat is the Karlsruhe Data Infrastructure for Materials Science, an open source software for managing research data. The goal of this project is to combine the ability to manage and exchange data, the repository component, with the possibility to analyze, visualize and transform said data, the electronic lab notebook (ELN) component." - [Kadi4Mat](#)

SciNote



"SciNote is a cloud-based ELN software with lab inventory, compliance, & team management tools used by the FDA, USDA and scientists in 100+ countries." - [SciNote](#)



elabFTW



"With eLabFTW you get a secure, modern and compliant system to track your experiments efficiently but also manage your lab with a powerful and versatile database." - [elabFTW](#)



openBIS



"Complete solution to managing your research data." - [openBIS](#)

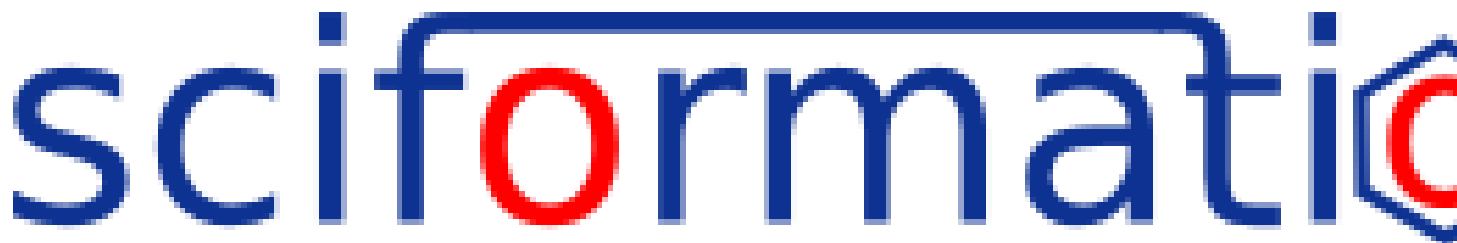


JupyterNotebook



"The Jupyter Notebook is the original web application for creating and sharing computational documents. It offers a simple, streamlined, document-centric experience." - [JupyterNotebook](#)

Sciformation



"Together with the MPI für Kohlenforschung, we have developed Sciformation ELN. It combines a lab notebook, a database for analytical data, a workflow for samples and analyses (LIMS), features to book devices and track maintenance works, a chemical inventory, an in-house ordering system and a literature database." - [Sciformation](#)

Current Recommendations for Free Software for ELNs and Notes in the UK:

Benchling



"The only biology-first platform for scientific data, collaboration, and insights." - [Benchling](#)

Confluence



"Intuitive structure makes set up, creation, and discovery easy." - [Confluence](#)

Evernote



"Evernote is a powerful tool for managing your tasks right alongside all of the information you work with every day."
- [Evernote](#)

General Methodology for ELN Implementation:

- Select the right tool for each lab individually.
- Establish own operational procedures based on recommendations/already tested methods.
- Adhere to institutional [data policy](#).
- Ensure training on new ELN systems:
 - monitor infrastructure needs – use of repositories, support.
 - train the entire lab at once.
 - avoid the "blank page syndrome."
 - focus training on typical workflows.
 - address specific needs.
 - provide existing examples of data organization and ELN usage.
 - identify key users and software in use.
 - utilize provided documentation and tutorials from the ELN supplier.
- Leverage existing user groups and set access permissions.
- Consider different methods of organizing ELNs, such as by project or person – organizational structure, hybrid organization options.
 - role of the administrator – adding projects, checking, organizing.
 - provide standards, naming conventions for projects, studies, experiments.
 - use keywords and tags.
- Employ industry standards for data organization – file organization, naming conventions, data retention, etc.
- Archive completed experiments – S3 storage at CESNET.
- Ensure and distribute rights and ownership, handle employee departures, user access revocation, etc.
- Report to suppliers for functionality improvements – through individuals, teams, faculty, or institution.

Additional Links for ELNs:

Comparison of ELNs by Longwood Medical Area Research Data Management Working Group (LMA RDMWG): [Link](#)

Comparison of ELNs by the National Group for Material Sciences: [Link](#)

ELNs for Intellectual Property Preservation: [Link](#)

General Webinar on ELNs: [Link](#)