



Electronic Lab Notebooks: Sandia Pilot Project

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What is a lab notebook?

- A complete record of scientific data, including procedures (the actions you took), observations made, etc.—with sufficient information to reproduce your science, to support evidence for a patent, and to become a part of your scientific legacy!

What are Sandia's requirements?

- Laboratory Policy System (LPS) has policies to protect and retain scientific information (including RD001, IT010, QA001)

What are some Sandia resources?

- Common Operating Environment (COE); Common Engineering Environment (CEE); Approved Systems; COE includes MS Windows and integration of MS Office tools, including SharePoint, OneNote
- Lessons learned from past efforts for ELN at SNL

Hypothesis:

Using MS OneNote, combined with a CCHD-approved hardware platform and specialized training, improves the SNL R&D environment by:

- Making the lab and PI more efficient with documentation and organization;
- Sharing resources, documentation of procedures, etc.
- Making data easily accessible and organized for retrieval and future use by researchers
- Automating backups
- Complying with SNL policies such as R&D policy, data retention policy (access to archived data)

What do we learn if unsuccessful?

- What were the pain points that did not make the PI's life easier

What do we do if successful?

- Seek resources for broader implementation in “bench-scale R&D/S&E” across larger portions of SNL
- Seek resources to look at different possible solutions for different types of R&D performed at SNL

Project plan:

- Identify pilot participants, resources (IT support, training, Human Factors, hardware)
- Execute pilot (16 participants from 01800, 08600, 09000)
- Obtain feedback
- Submit recommendations

What is an Electronic Lab Notebook (ELN)?

- A complete record of scientific data, including procedures (the actions you took), observations made, etc.—with sufficient information to reproduce your science, to support evidence for a patent, to become a part of your scientific legacy! (but powered by electronics, rather than ink-and-paper)

What are some practices outside Sandia?

- NIST adopted the use of MS OneNote together with a specific Dell 2:1 tablet in calibration services
- INL and ORNL allow the use of MS OneNote
- Many discipline-specific ELN software products, especially for biosciences and chemistry R&D: See references^{3,4}

What do Sandians want in an ELN?²

- Data backed up seamlessly
- Share/collaborate with team, but also control access and security. Make peer review easy.
- Retain anything, including thoughts, notes, emails, sponsor correspondence, results, path to results, constraints/assumptions: **R&D reproducibility**
- Methodology: Why you made particular choices
- Version control: Can't delete ("pen", not "pencil"); time and date stamps. Verification of data for accuracy.
- Format that won't go bad over time
- Ease of use. Voice recording/camera (where allowed)
- Final "correct" version to formally document what you did and how you got there

Windows laptops used in the pilot						
Model	Weight (lb)	Screen	Camera	Touchscreen	# of USB ports	Notes
HP X360	3.0	13"	Yes	Yes	2 USBC, 2 USBA	Folds like tent. Needs ethernet dongle
Dell 7200	2.0 (tablet) + 0.8 (keyboard)	12"	Yes*	Yes	2 USBC, 1 USBA	Keyboard detaches. Needs ethernet dongle

A non-Bluetooth stylus, compatible with the tablet's stylus protocol.



References

- Philip Ryan, NIH Office of Intramural Training and Education, “Keeping a Lab Notebook”
- Notes from participants in SNL “How to be an effective PI workshop,” 2/21/2019
- “Lit Review and More” document from Alice Parsons, SNL Technical Library, including scholarly and trade articles, presentations, websites, and videos (will be in SNL Libguides and SNL ORDI resources)
- Such as: “How to pick an electronic laboratory notebook,” Roberta Kwok, *Nature* (2018), doi: 10.1038/d41586-018-05895-3