Electronic Lab Notebooks (ELNs) - Biovia

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Background
Why did we consider using an ELN system?

• Paper based laboratory notebooks
  – Handwriting (pros/cons)
    • Readability for others
    • Different letters (Chinese or other Asian languages), easy for the user, but difficult for documentation reasons.
  – Very different approaches to what goes in a labbook
    • Sporadic notes
    • NO structure
    • Repeatability for others?
    • Sample structure – also 2 years later?
  – Safety
    • Spills and other residue in the labbook

• Data handling
  – Data storage and backup needs to be done by every user
Electronic Lab Notebook (ELN)

• Designed as replacements of traditional notebooks

• Advantages:
  – Searchable experiments
  – Cloud solutions – world wide access
  – Sharing methods and data in project group
  – External collaborators can have access
  – Unique IDs for samples, traceability.
  – Used across platforms – phone, tablet, laptop
  – Prevent chemicals in offices
  – (Signing and electronic approval of labbooks)
  – Direct backup of analytical data

• Disadvantages
  – Cost of commercial systems, for Biovia app. 100 €/license
Testing ELNs at Chemical Engineering

• Danish Polymer Centre
  – Polymer synthesis
  – Physical characterization of polymers
  – Materials science

• Users
  – PhD projects
  – Postdoc/senior researchers
  – Associate professors/Professors

• Test system - Biovia ELN
  – App. 12-15 current clients
  – Label printer
  – Laptops in lab for writing labbooks
  – Experiments/entries app. 530
Example of a typical entry

- [https://lb.biovianotebook.com/notebook/experiment/EXP-17-FO9804](https://lb.biovianotebook.com/notebook/experiment/EXP-17-FO9804)
Experience from implementing ELNs

• Infrastructure
  – Access to electronic equipment in lab (computers or tablets)
  – Computers on analysis equipment should ideally be on-line
  – Demonstrations for all new employees/students (part of safety introduction)

• Users
  – Students are generally curious and interested
  – Senior researchers/postdocs, maybe more difficult

• General comments
  – It should be simple to do
  – Users should feel an advantage themselves
  – Students state that it is faster to prepare experiments (repetitions)
  – Linking experiments gives better overview
  – No lack of “space” as observed in classical labbooks
  – Easy to reclaim raw data
  – Documentation during external stays very easy
Managing projects

- Better overview of experiments (searchability)
  - What has been done on a specific reagent?
  - What was done by a specific student?
- Backup of data and conservation of data
  - Instrument crashes
  - Data is immediately transferred after analysis
- Administration of access

- Project work
  - Project work with several people adding data to a project
    - e.g. Student in connection to a PhD student
    - Postdoc /PhD
  - Former students – transferring experimental systems to new students
  - Maintaining standard protocols
  - You can easily follow experiments conducted during external stays.
Concerns to consider?

• It is a fixed database that cannot be exported to local use off-line.
  – Only really relevant if you decide to stop using the system.

• How do you get your data out?
  – Submission of experiments are required, before you can download all experiments.
  – One setting and then you download all raw data files and all submitted experiments.

• Storage limitations – max 10 MB pr file, unlimited number of files

• How easy is it to have computers available where people need to input the data?
  – If they need to bring it to the office to write the labbook, some of the benefits are not there.

• We don't have a server at DTU – hosted outside? (IPR)
Conclusion

• Biovia as a system
  – Generally we are satisfied with what it can do
  – It covers a broad user range and all seem to be able to learn
  – Maintenance is scheduled and conducted on time
  – Easy to administrate users and add new depending on activities

• Implementability
  – Students – are easy, they will adapt without problems
  – Senior researchers – some will, others not so much, they need to see the advantage.
  – Other faculty members – Challenging as users; more likely to implement for conservation of data, not as active users.

• Does it solve everything?
  – Definitely not – demonstrations are still essential
  – Documentation is of higher quality + backup is essential benefits