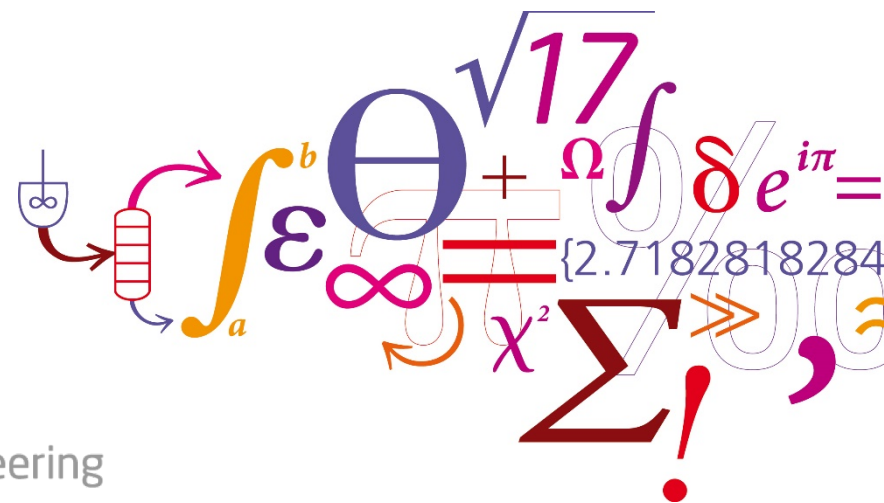


Electronic Lab Notebooks (ELNs) - Biovia

Anders Egede Daugaard
Assoc. Prof.



DTU Chemical Engineering
Department of Chemical and Biochemical Engineering

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)

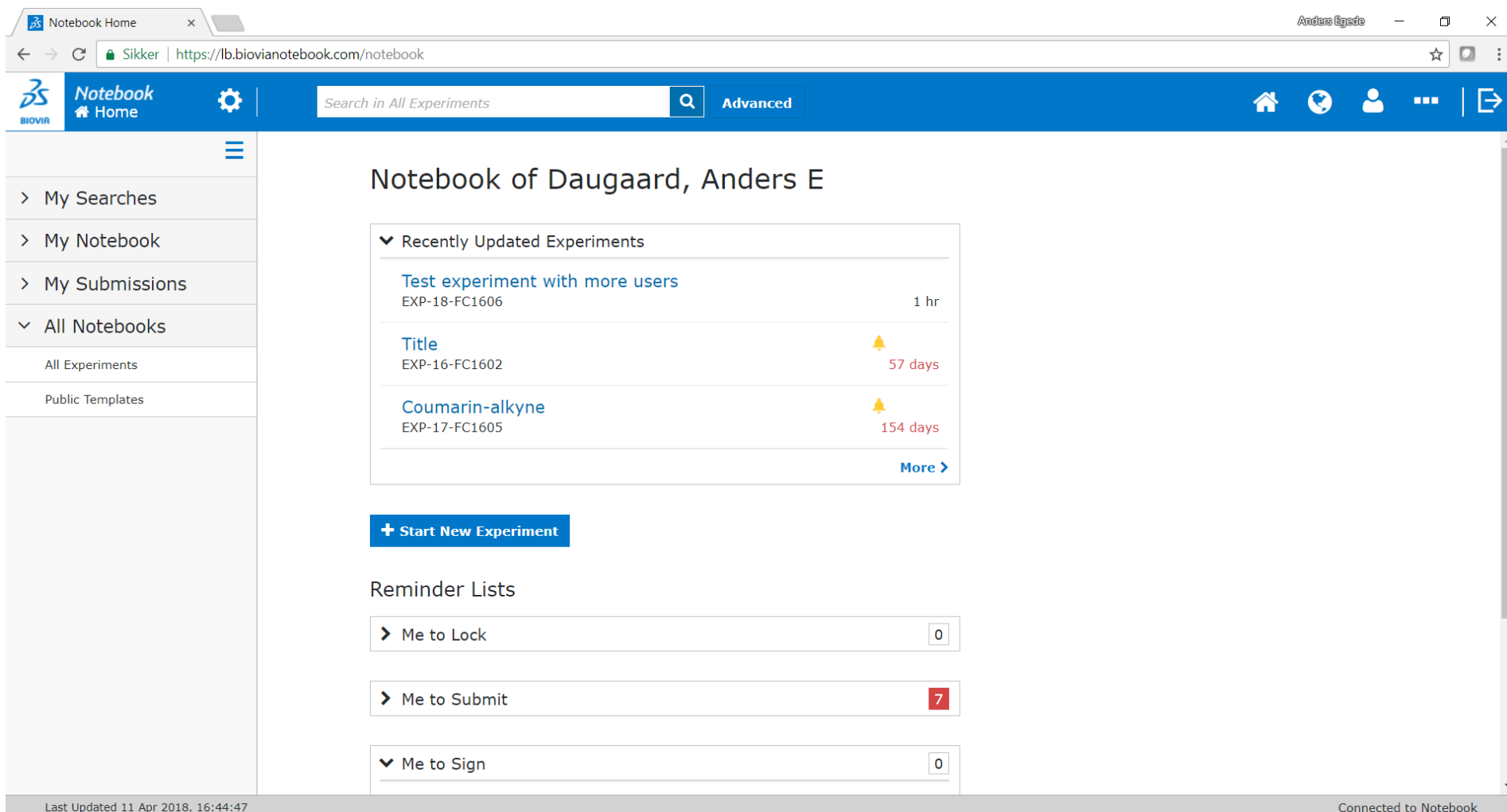
- Designed as replacements of traditional notebooks
- Advantages:
 - Searchable experiments
 - Cloud solutions – world wide access
 - Sharing methods and data in project group
 - External collaborators can have access
 - Unique IDs for samples, traceability.
 - Used accross platforms – phone, tablet, 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
 - B.Sc., B.Eng., M.Sc.
 - 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>



The screenshot shows a web browser window with the URL <https://lb.biovianotebook.com/notebook>. The page title is "Notebook of Daugaard, Anders E". The interface includes a navigation sidebar on the left with options like "My Searches", "My Notebook", "My Submissions", and "All Notebooks". The main content area displays a list of "Recently Updated Experiments":

Recently Updated Experiments	
Test experiment with more users EXP-18-FC1606	1 hr
Title EXP-16-FC1602	🔔 57 days
Coumarin-alkyne EXP-17-FC1605	🔔 154 days

Below the list is a button "+ Start New Experiment". Underneath, there are "Reminder Lists":

- Me to Lock: 0
- Me to Submit: 7
- Me to Sign: 0

The footer of the page indicates "Last Updated 11 Apr 2018, 16:44:47" and "Connected to Notebook".

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 dont 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 concervation 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