Electronic Lab Notebooks (ELNs)
- Biovia

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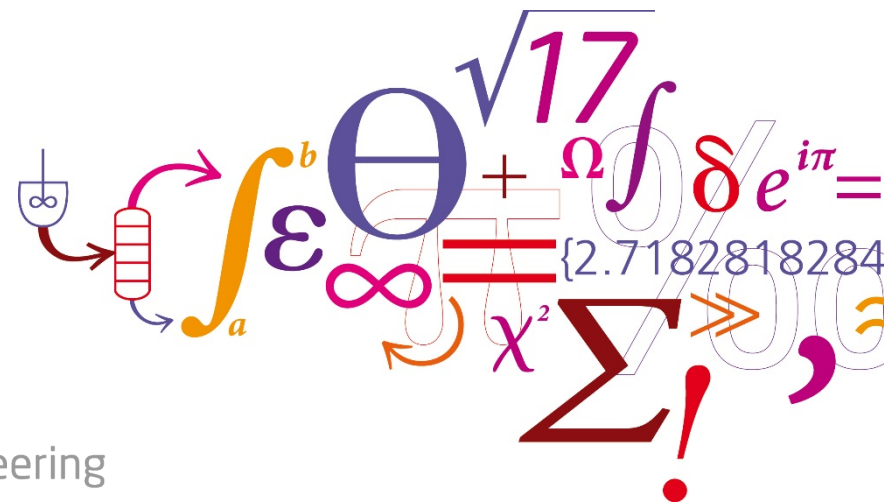
Background
Why did we consider using an ELN system?

- 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
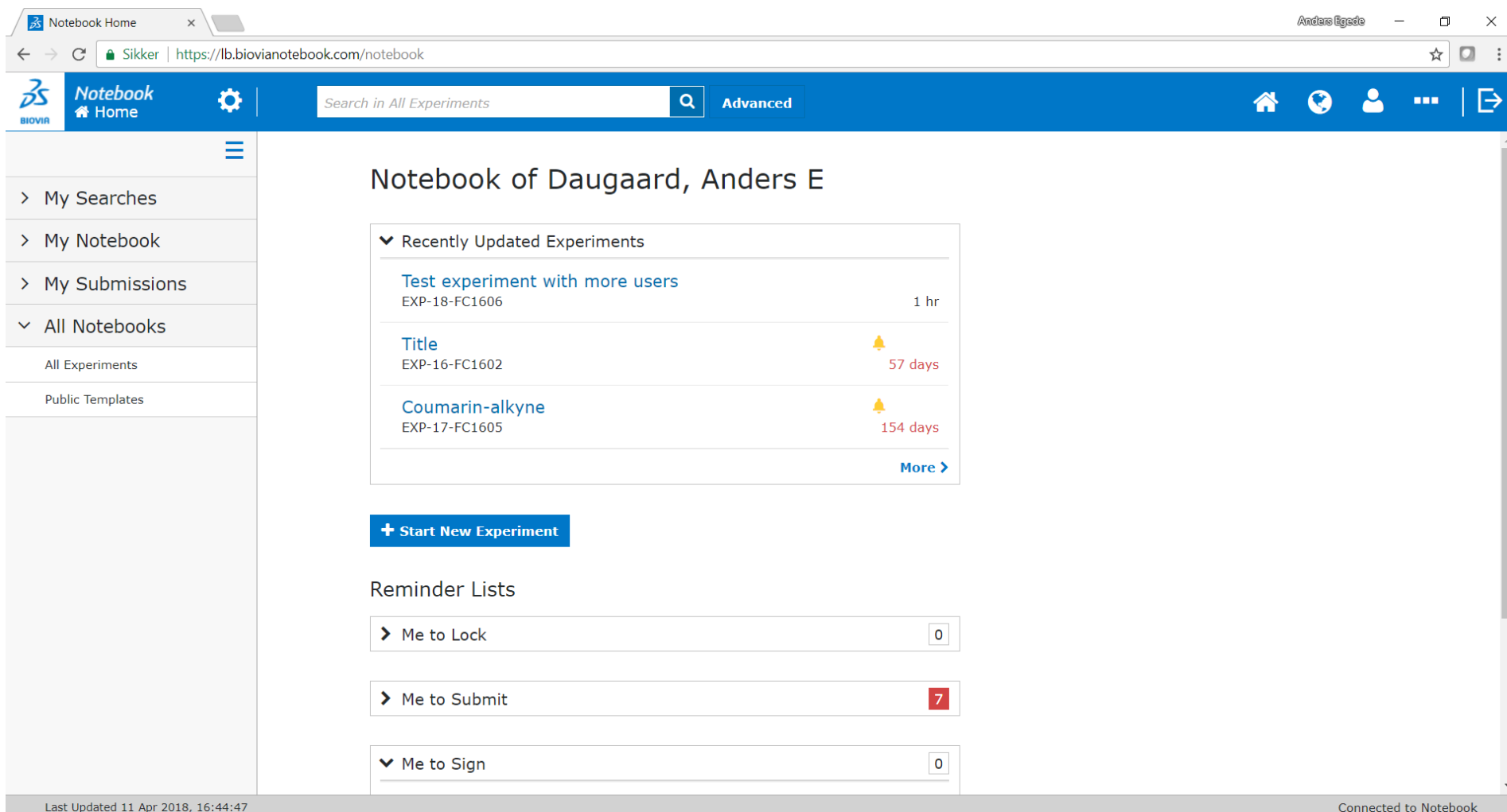
Electronic Lab Notebook (ELN)

- 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 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

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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

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Example of a typical entry

- 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

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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 <u>submitted experiments</u>.

- 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)

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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

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