ELN experiences and challenges

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Background

- Research field: Engineering shape, chemistry, and mechanical properties at small length scales (nm to cm) to control and/or analyze cell function.

- Mix of physics, chemistry, and biology.
- Lot of data generated (mainly time-lapse 2D/3D microscopy).

- Used ELNs from 2008-2010 (Contur iLabber) and from 2013 onwards (LabGuru).

Reasons for going for an ELN system

- Lots of experimental details got lost when a group member left
  - The lab notebooks left behind can often not be read/understood by others

- Experiments being redone by group members
  - New group members not aware of failed experiments already done by others (and the supervisor also failed to warn them…)

- Experimental details and original data difficult to dig out later
  - E.g. for manuscript revisions, a year after the first author had left for a job in industry and couldn't remember much

Reasons for choosing a commercial cloud based system

- (cloud based solutions was a less obvious option in 2008 than in 2016…)

- Low entry fee and work load for getting started with ELNs.
- Lots of experience and workhours used in the design and programming of the system.
- Flexibility in the number of users as the group size changes.

- Downside compared to freeware: Perpetual service fee.
- Downside compared to freeware: Proprietary data format (locked to one format of registering and retrieving data).

Choosing the right system

- First experience with iLabber (now Dassult Systems BIOVIA)
  - Quite successfully implemented in my group, but:
  - Early cloud based solution slow.
  - Quite strict experiment format.

- Reasons for choosing LabGuru
  - Appeared more accessible to new-comers and sufficiently mature and stable to keep it useful for long-term use.
  - More flexible and logical experiment registration format for research.
  - Financial backing by a big publisher supported a longer lifetime of the product, while the start-up Contur iLabber repeatedly changed owners.
  - Stability in format and annual cost very important
    - Your research history gets locked into a particular format that cannot be transferred to a competing system.
    - Thus, you are stuck with a perpetual payment scheme.

Generic ELN challenges 1

- Each system has an origin in a particular scientific environment
  - iLabber mainly designed for the needs of pharmaceutical research.
  - LabGuru mainly designed for cell biology and molecular biology.

- The original workflow tends to get hardwired into the recording procedure and the available extras, e.g. for managing stock.
  - If you are working in a different field, the navigation and structure of a particular ELN may be illogical, and features may be lacking.

- All ELNs suffer from the need to structure the recorded data
  - Common structure is a major benefit for data retrieval by others.
  - Conflicts with each scientist's established was of structuring their experiments in a full free-form physical lab book.
  - May seem a minor issue, but has turned out to be the main obstacle for broad acceptance by group members (applies both to iLabber and LabGuru).

Generic ELN challenges 2

- Response time
  - The early cloud version of iLabber (8 years ago) suffered from very long response times, in particular when handling larger data sets.
  - Much less of a problem.

- Handling large amounts of raw experimental data
  - Most ELNs, including LabGuru, not geared towards managing many GB of raw data that are easily produced by modern 2D/3D visualization techniques and high-throughput sequencing/screening across disciplines.
  - Better integration with dedicated cloud-based file storage system would be great. Even better if managed in a clever manner with local file servers for security and cost.

- Cloud-based ELNs: Data safety
  - How can researchers and their employers rest assured that their IP stored in the cloud remains inaccessible to others?