# Overview of Labguru ELN – Centre for Oil & Gas - DTU

**System:**

*System:* Labguru (BioData, Digital Science)

*Where is system used:* Centre for Oil & Gas - DTU

*What is the intended purpose of the system:*

In order to promote and to ensure research integrity and transparency, the Centre for Oil & Gas- DTU has selected LabGuru as its research documentation system. This provides the relevant tools for documenting their research activities and is compatible with the workflows of the different research groups.

The implementation of an Electronic Laboratory Notebook aims to:

* Enable automatic storage and backup of the experiments and research results
* Give a better overview of projects and experiments
* Give easy access to the experimental work from anywhere
* Improve collaboration and knowledge sharing between group members and other research groups at the Centre
* Prevent loss of data
* Provide an easy way to find experiments and data
* Save time during documentation and reporting of research results

*How was the system chosen:*

The Centre has established a project coordinated by a working group consisting of:

* 1 Project manager
* 2 Data Managers
* 1 Laboratory Manager
* 3 Researchers
* 1 Data management officer from central DTU

The project was divided in two phases:

* Pilot: where different types of ELN software were tested and one solution was selected.
* Implementation: which involves the preparation of the necessary infrastructure (i.e. computers), preparation of procedures and guidelines for the use of the ELN, preparation of inventories, training and advocating, as well as monitoring activities.

Before starting to investigate different tools, the working group discussed the general features needed and gathered information about the different workflows. (Annex – Table 1)

Three different software were investigated:

* Biovia (Dassault Systemes)
* Labguru (BioData, Inc)
* Labware (LabWare, Inc)

In addition to the researchers in the working group, other scientists were invited to the demos offered by the vendors and were given the opportunity to test the tools, whenever possible.

A questionnaire was distributed among researchers who tested the systems in order to evaluate and select the appropriate ELN. (Annex - Questionnaire)

The ELN offered by Labware was not evaluated through the questionnaire. The vendor does not provide demo versions of the software for the researchers to test on their own. The vendor offered two demo sessions for researchers at the Centre, including the visit of a specialist in the use of the software to show how the functionalities of the ELN could be adapted to the Centre’s workflows. Therefore, researchers provided input to the working group directly after the demo sessions after which the working group decided to focus the evaluation on Labguru and Biovia.

Ultimately, the Labguru software solution was selected as it scored higher in three of the four evaluation categories of the questionnaire:

* Sharing/Collaboration
* Fit for purpose
* Overall evaluation

Although Biovia scored higher than Labguru in the category ‘Usability’, the difference was not sufficient to change the overall preference for Labguru.

Another important reason for the Centre to select Labguru is that the software also includes a Laboratory Information Management System (LIMS), which allows creating inventories of samples, equipment and reagents. An extensive part of the research done at the Centre involves samples analysis. Therefore, it is very relevant for the Centre to document those samples and to interlink the experimental data collected from them.

Considerations relating to cost were also integrated in the overall evaluation scheme and contributed to the selection of Labguru.

**Users:**

*Number of users that the system is offered to and their backgrounds:*

The system is provided by the Centre of Oil & Gas to all its employees involved in research activities. Until now, the Centre has purchased 60 licenses.

**Organization:**

*What are the technical requirements of the system:*

To use the system via https://www.labguru.com/, the user needs access to an internet browser.

*How is the technical installation and maintenance of the system organized:*

Data are stored on the Cloud services provided by BioData, Inc (Operated by Amazon Web Services). The data is automatically backed up daily to multiple remote servers including BioData’s Amazon Cloud.

The data manager of the Centre, who is also the owner of the account, has a backup strategy to keep an extra copy of the data on the Centre’s DTU fileserver. As the owner of the account, it is possible to export the entire account with all entries as a zipped file. LabGuru does not provide the option to do incremental backup.

Once the entire account is exported, it is downloaded and saved on the DTU fileserver of the Center, which is backed up following DTU backup standards. This procedure is repeated every month.

*How is the administration of the system organized (e.g. maintenance of users, permissions, common content):*

The Labguru system at the Centre of Oil & Gas has a set of user types with different privileges. The working group has drafted a document describing the different user titles and roles. When new users are created in the Labguru system, they will be created based on this mapping. In general, the system offers three roles:

* Owner (Data Manager): the role is set automatically when the account is opened. The owner is able to see all the projects and updates of the account. In this case, one of the data managers at the Centre has this role.
* Admin (Lab Manager/Senior Res./Lab Assist.): The admin can manage the account and create new inventories in the LIMS part of the system. Privileges for standard users can be set by the Admin. Until now, five members of the department has an Admin role. Researchers getting the Admin role will be agreed with the Owner of the account.
* Standard User (Researchers and students): A standard user can create his/her own project/experiment, can add and edit items in constituent modules, can add new items to the inventories and is able to delete only his/her own items. Among the standard users are researchers, PhD students and MSc students. Principal investigators are standard users with the additional right to witness experiments. Relevant research support employees at the Centre are also standard users, but with ‘read only’ rights.

**Costs:**

*What are the license fees (if any):*

Annual subscription for a Labguru account $600USD per year per user when using the Cloud services operated by Amazon Web Services.

*How are the running costs for system maintenance and administration financed (besides this activity):*

Through the internal budget of the Centre.

**Overall experiences and future actions:**

The project has started the implementation phase in January 2017. In September, the working group organized a kick-off meeting to announce the official launch of the ELN at the department. The following activities are part of the implementation phase:

* Infrastructure: The laboratories have been equipped with 5 additional laptops for the use of the ELN and some of the computers connected to the equipment will be connected to internet.
* Procedures and guidelines: The working group has drafted the documents “Procedures for documentation of research data using the Electronic Laboratory Notebook LabGuru” and “Mapping Roles and Rights in the ELN system”. These documents intend to guide the researchers on the use of Labguru and to clarify the way the system is administered. Both documents are published on the internal website of the Centre.
* Inventories: The relevant inventories of samples and equipment were prepared before the official launch of the ELN in September 2017. Additional inventories can be and will be created as the Centre develops its research portfolio. Having the inventories in place allows the researchers to link their experiments to a particular sample or equipment.
* Training and advocacy: Here, several activities have been implemented and occur on a running basis.
	1. Round of presentations for research groups, PIs and research support (i.e. Technology
	2. Maturation, Project/Programme managers): Already before the kick-off meeting, the researchers who are part of the working group did a round of presentations to all the research groups. During the presentation, researchers were introduced to the main features and versatility of Labguru.
	3. Presentation of ‘use cases’: Every second week there is a departmental lunch, where all employees are invited, where a researcher shows in a short presentation how they are using Labguru and which features are relevant for their work.
	4. Labguru as part of the introduction guide: When new employees/students arrive to the Centre, the Lab manager gives a general safety and procedural introduction. Through this, the students are introduced to the security rules in the lab and they are introduced to Labguru. Following this, a Lab Technician will help new users enter and set up their Labguru account.

**Challenges:**

* There has been some challenges to get the computer modelling groups to work with Labguru. Many of them use code repositories like GitHub/GitLab to keep documentation of their code. Although Git is a great tool for code versioning/repository, it does not allow researchers to provide the entire context to their code, thereby hindering the re-usability of the work and the knowledge transfer to new projects. Currently, the working group is in contact with the modelling groups to investigate what kind of documentation is necessary in order to re-produce their research and to better understand their workflows in Git. The aim is to find a way to use Labguru and Git in a complementary way, if possible.
* Subsequent to the kick-off in 2017, the working group is focused on developing the use and framework for ELN in the context of the Centre. As part of the training and advocacy activities listed above, the introduction of the ELN to new employees/students is the only event that continues. After nine months from the official launch of the ELN (kick-off meeting), the number of entries in the notebooks has not increased as expected. It has become clear that it is necessary to continue the training and advocacy activities for longer time and that a stronger involvement of the group leaders is necessary. Considering these challenges, the working group aims to re-vitalize the ELN implementation effort as well as re-activate a communication and advocacy campaign starting in Q3 of 2018.

ANNEX - Overview of an Labguru ELN – DTU - Centre of Oil & Gas

## **Table 1. Relevant features for the selection of an ELN system Centre of Oil & Gas – DTU**

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## **Questionnaire – Evaluation of an ELN software.**

These questions where distributed among the different researchers testing the ELN Biovia or Labguru or both.

**Sharing/Collaboration**

1. How does sharing of data/protocols/comments work in the ELN?
2. Does sharing functions improve your collaborative work?
3. Did you try to share data with external partners? How did that work?
4. The ELN system provides documentation of your work. Does this help you in communicating your results (publications, presentations, posters etc.)?
5. Does the ELN allow you to effectively review other people’s work?

**Usability**

1. Is the user interface logical or confusing, and why?
2. Have you experienced bugs/system incompatibilities?
3. Did you have any problem to install or access the software during the trial?
4. Was it possible to use tablets/laptops?
5. If you asked for support to the vendor during the trial, did you receive fast and useful help?

**Fit for purpose**

1. Are there limitations regarding the use of the ELN for your work?
2. Can the ELN handle your requirements for data size and type?
3. How does the ELN work for documentation of your computer simulations (if you have any)?
4. Does the ELN fit naturally into your everyday work?
5. Did you experience the need for a LIMS (cataloguing, sample management, barcode system, consumables ordering etc.)
6. If your test solution included a LIMS, did this work well for your work?
7. Some ELN vendors offer customization possibilities. Can you describe possibilities to improve the tested solution?
8. Does the ELN software allow you to link your experiments with data stored in the department’s server?
9. Can you easily find your data through the ELN system? Is the search tool of the ELN useful?

**Overall evaluation**

1. Will the ELN save time for you (in day-to-day activities/long term)?
2. Name at least 3 advantages you see with the present ELN?
3. Name at least 3 disadvantages with the present ELN?
4. Did it help you to prepare a test case workflow in advance?
5. Do you consider that having an ELN at the department is relevant for your work and allows proper management of your data?