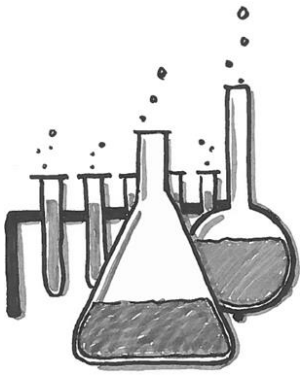
Lab Work

Experimental research in the laboratory is a major part in many research areas, as for example in analytical chemistry, microbiology and nanotechnology. Scientific results can often be reproduced given the exact same conditions. Therefore, good documentation of the used methods and experimental setups is crucial. On the other hand, measured data points themselves are usually not considered meaningful without scientific interpretation. It is often only the same researcher that designed and conducted the experiment that can understand and use the data. Publishing raw data sets is thus not of interest. Instead, the main focus is on the analysis and presentation of results in regular scientific articles. Journals require that sufficient details on the circumstances of the measurements are given in the main paper or as supplementary material so that other researchers in the same field can fully understand the experimental procedures and verify the outcomes.



Lab work is an experimental process that is characterized by a very high degree of freedom with lots of room for creativity and individual solutions. Projects can evolve and change constantly, which makes data management planning less straight-forward than for other types of research. Planning consists usually of getting an overview of the available equipment and establishing general rules and guidelines for working in a laboratory like only using designated lab computers to store data, for example.

In most cases, researchers document their work in paper or electronic lab notebooks (ELNs). The type and extent of documentation, however, is very individual. The notebook usually contains information about the equipment and the conditions under which the experiment was performed, e.g. in the form of sketches and calibration measurements. Additionally, most lab instruments provide specific metadata like timestamps or chosen settings as log files, which are manually or automatically transferred onto the computer. Some groups also use integrated Laboratory Information Management Systems (LIMS), where data from lab notebooks and log files can be gathered and integrated into project workflows. When measurements are based on dedicated physical samples, documentation can be built around unique sample identifiers in order to trace them and connect all available information.

Researchers in a laboratory are facing the problem that instruments often run on very specific software and that data from these instruments come in proprietary, vendor-specific formats. Sometimes, data are locked inside the instrument and are actually the property of the manufacturer. Maintaining access to the data and ensuring readability can be a cumbersome task, since software and interfaces become outdated very quickly.