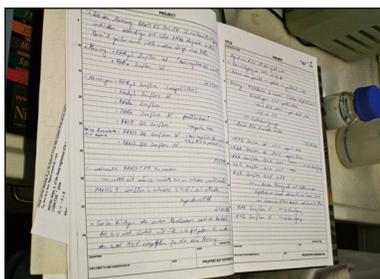


Category: Student

Project: Multitouch Lab Journal

What was the challenge?

Their work is cutting-edge, their digital tools hopelessly outdated. Scientists in biochemical laboratories around the world take on all kinds of challenges from developing more efficient batteries to healing cancer. To ensure reproducible scientific results and keeping track of all experiments, proper documentation is absolutely crucial. However, while scientists are surrounded by high-tech laboratory equipment many of them still use pen and paper to document their work. In a so-called "lab journal" they record all information that is needed to reproduce an experiment, e.g. methods, material specifications or calculations. External (digital) content like photos, illustrations or charts are printed out and glued into the lab journal. This all makes for a very time-consuming and cumbersome process that keeps scientists from doing more important tasks.



A typical hand-written lab journal

In collaboration with the German Fraunhofer Institute for Manufacturing Engineering and Automation (IPA) in Stuttgart, we set out to find a solution to this problem as part of our Bachelor's thesis. Our goal was to create a system that will not only be a(nother) digital version of the lab journal, but one that holistically supports the workflow of scientists, from bibliographical research to conducting experiments and evaluating the results. After an in-depth user research, we came up with the hard-

and software concept as well as the user interface and interaction design for what we called the "Multitouch Lab Journal".

What was the solution?

The Multitouch Lab Journal (MLJ) is a computer-system based on a big multi-touch screen. The system is protected by a solid glass surface and built right into a regular workbench. This way it enables easy access and operation, while saving valuable space in the lab. All data is saved on a central server and the MLJ is connected to other laboratory devices through the lab's IT system.

While the hardware of the MLJ is already cutting-edge, the user interface is really what sets it apart from other systems. One of the unique innovations is the new way of graphically managing experiments. All experiments are displayed as nodes within a tree-like diagram and can be organized into branches. Between experiments with similar results, keywords, methods etc. the system draws lines to show their connection. A Zoomable User Interface enables intuitive control, similar to the navigation on a digital map. This helps scientists to keep an overview over their work, easily

manage experiments and identify (hidden) connections and relationships.

Another innovation is the actual documentation of experiments. No longer are experiments recorded in a journal but in a Chinese fan-like document, which can be easily manipulated through gestures. In addition to a digital pen, the application uses intelligent recognition algorithms to detect user input. For example the MLJ recognizes whether the user wants to write a text, insert a picture or create a table. Based on users input the system supports them with handwriting recognition, shape correction, auto-completion or a calculator. Furthermore the MLJ is able to optically identifying objects on the table's surface and display metadata, e.g. the properties of a reagent. The system also contains a database with standardized templates for often-used methods and experiments. This enables scientists to quickly load a "recipe" and adapt it to their needs. Through the interconnectedness with other laboratory devices, the system can even execute parts of the documentation process by itself. This guarantees for an accurate record and saves valuable time.

However, the MLJ offers even more. Since most scientists work within a team, certain



The MLJ is protected by solid glass and built right into a regular workbench

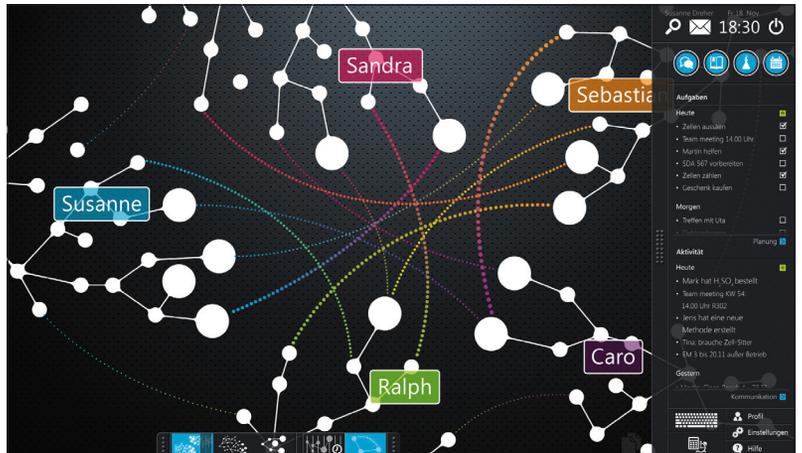
functionalities known from social networks enhance communication with coworkers and aid to keep track of the team's activities. For example experiments and results can be shared, viewed and commented on. The system also allows for reserving laboratory devices, scheduling meetings and ordering new supplies.

What was the outcome?

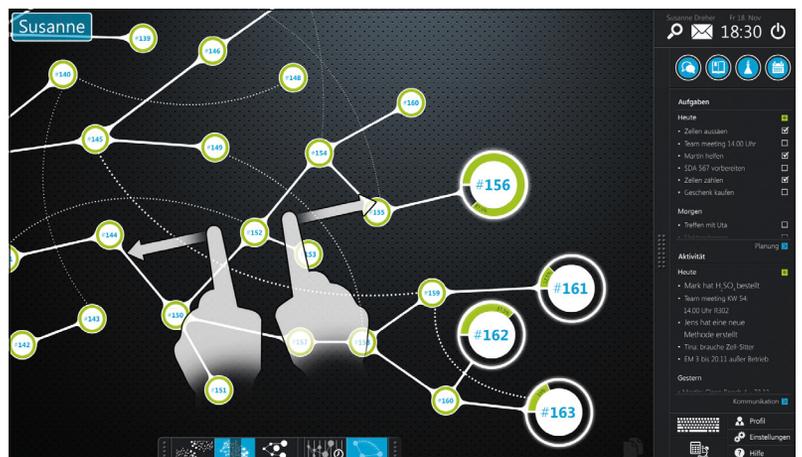
So far the MLJ is mostly a concept existing (only) on paper. However, engineers at Fraunhofer IPA have started working on implementing a prototype of the MLJ system within one of their experimental labs in Germany. Feedback from designers, scientists and engineers has been thoroughly positive and the question "When will this be available?" was placed more than once. Two of Germany's most influential design magazines (PAGE and WEAVE) have published short articles about the MLJ. "GIT", a professional journal for laboratories, has even dedicated a two-page article to the new system. Although the MLJ is not a fully functional system yet, we are sure that an exciting future lies ahead of it. The Multitouch Lab Journal could revolutionize the work in biochemical laboratories and allow scientists to spend less time at the desk and more in the lab – improving batteries and healing cancer.

Contact:

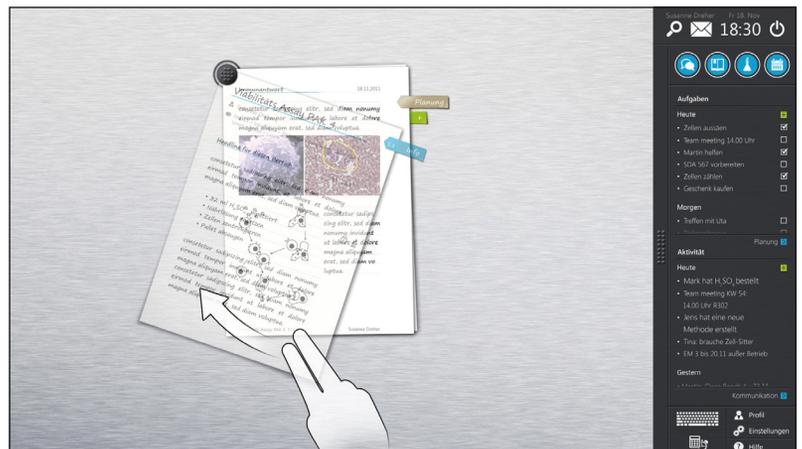
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The MLJ shows connections between experiments with similarities



All experiments are displayed in a tree-like diagram and can be manipulated using touch



Each experiments is documented in a Chinese fan-like document