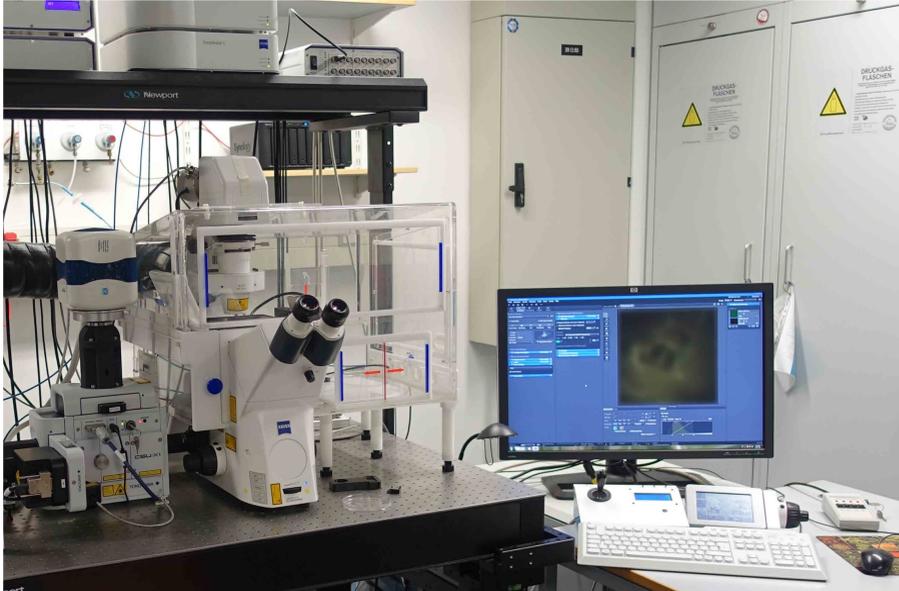


Hardware Software Interaction of Microscopes



Setup of a modern microscope system

Special Focus

The main focus of this thesis was on developing a user-centered interaction concept for the whole working station – from identifying to resolving the users' problems. Several MVP prototypes (minimum viable products) were tested to validate diverse ideas.

According to the users' needs, the master thesis has explored how to facilitate the interaction with the system. The ideas aimed for optimal and unobtrusive assistance within each user's individual workflow. The users should be supported in the basic understanding of the technical context. The new functions of the concepts had to be embedded in the established hardware in order to keep the setup as plain as possible.

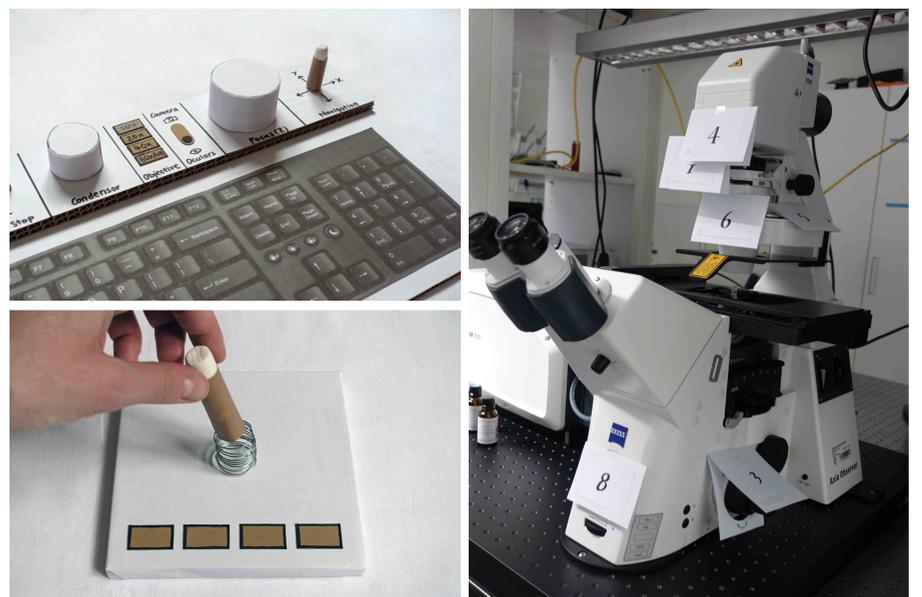
The concepts took into account the entire workplace with all its elements including software, hardware as well as the laboratory conditions and the specimen itself.

Abstract

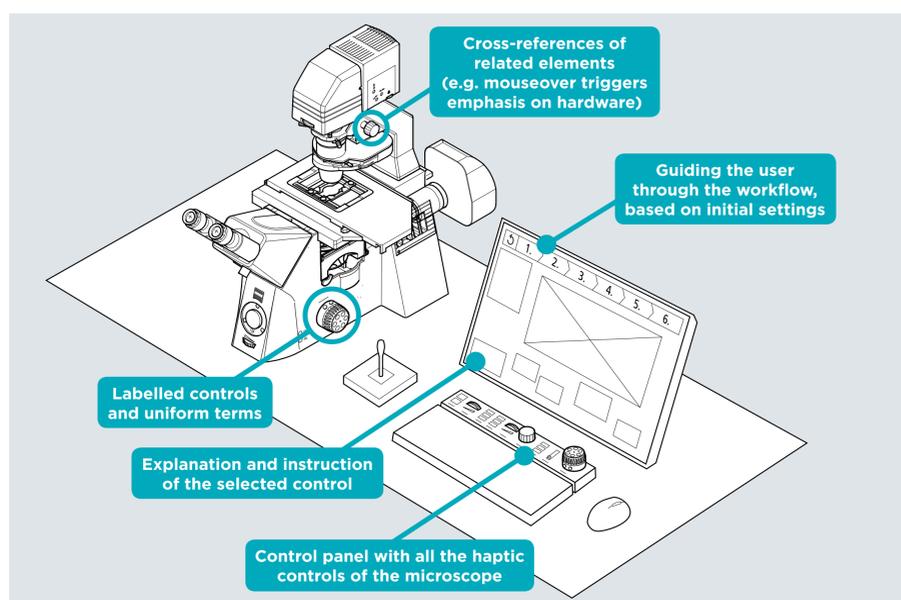
Modern microscopes in research institutions are a complex combination of many individual components. Users often interact with the microscope itself and the software at the same time. Contextual interviews showed that especially beginners and occasional users need detailed technical understanding within the complex workflows in order to operate a microscope.

The master thesis provides an interaction concept in which the entire workstation was reworked – including all its human-machine interfaces in hardware and software. Cross-references and explanatory captions improve the accessibility to the system. The concept is particularly designed for beginners and occasional users but should also support advanced users.

The user-centered methodology "Lean UX" was applied in order to solve the users' problems. After conducting contextual interviews the conception took place in two iterations including usability tests in different laboratories.



Examples of MVP prototypes for usability tests



Function range of the interaction concept

Result and Future Work

The result is a validated overall workplace concept that empowers beginners to operate the system intuitively. At the same time it supports advanced users within their individual workflows.

Haptic elements (including the classical PC setup) must be maintained as they are easy to understand and good for exact adjustments. A control panel uniting all the haptic controls of the microscope is placed next to the keyboard. Now the user can manage the whole system from the computer. The workflow-based software gives an overview of the whole process while only displaying currently necessary digital controls in detail. Since research showed that more links between software and hardware components need to be established, references are made throughout the workplace. Furthermore, all controls are labelled and explained for a better technical understanding.

The concept is a first approach which has to be extended and designed in more detail in further iterations. It would be interesting to create a set of interaction design patterns for similar use cases in other sectors.



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