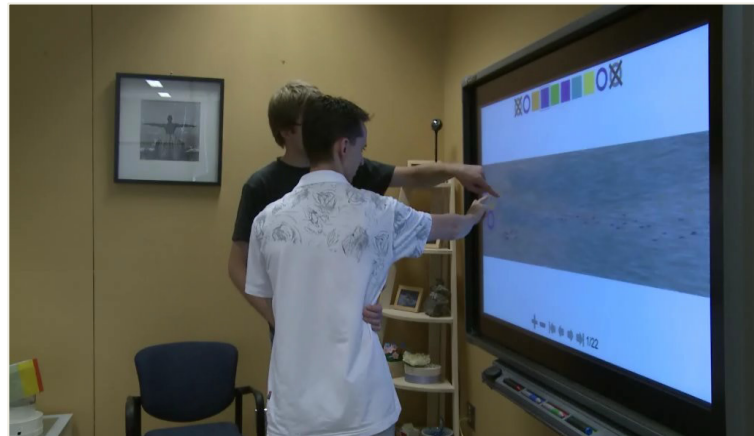


PhD Project Proposal:

An Interactive Visualization Continuum: Interactive Abstraction & Exploration of 3D Data

Understanding and supporting the exploration and analysis of 3D datasets that represent actual scans or computer simulations of our natural 3D world lies at the heart of visualization research. This applies to a variety of application domains including fluid mechanics, medicine, structural biology, etc. In these applications it is essential to make sense of increasingly growing amounts of data need to be able to create meaningful visual representation. Moreover, we also need to provide the domain experts with powerful interactive tools to explore the data in a range of interactive settings, from traditional PC-based tools to innovative environments that make use of direct touch interaction on large displays, tangible interaction, and gestural input. This means we need to support an interaction continuum between these extremes and use appropriate data abstractions in each of them.

Therefore, this PhD project will explore in what way we can connect visual data exploration environments to permit researchers and medical personnel to transition between individual work and collaborative discussions, using the appropriate visual representations for each of these settings. The PhD student will explore appropriate data abstraction techniques, for example using illustrative rendering techniques, and their interactive control to be able to support the data analysis and visualization.



With respect to the interactive settings we are interested in exploring multi-modal interaction techniques including touch input, gestural interaction, mobile input devices, tangible interaction, and voice control. The goal is to find a combination of interaction techniques that makes it easy for domain expert to adopt a system without having to face complex calibration, difficult system setup, or elaborate maintenance needs. For this purpose the PhD project will rely on a collaboration between visualization experts, human-computer interaction researchers, and domain scientists and will employ a participatory design approach.

The PhD research will be conducted under the supervision of Tobias Isenberg and within the AVIZ research team at INRIA Saclay—Île-de-France which concentrates on the visualization of complex data. AVIZ is one of the most respected research labs in information visualization and visual analytics worldwide. The PhD student will closely collaborate, in particular, with Mehdi Ammi from the LIMSI lab at CNRS whose expertise in haptics for virtual reality and human-machine interaction will be essential for the work. In addition, we will work with domain experts in fluid mechanics, medicine, and structural biology to demonstrate the general applicability of the developed techniques.

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