The need for accurate assessment in surgical training has become even more important with the development of new surgical technologies. Difficult-to-master technologies such as the components of Minimally Invasive Surgery (MIS) highlight the need for surgical competence but do not inherently provide a solution for how to define and measure it. The long-term goal of STITCH is to build an integrated surgical technology environment designed for the continuous monitoring of task performance, with a particular focus on the inclusion of important but currently overlooked cognitive measures.

STITCH uses the configurable display developed in the REVEAL project to provide a high-resolution “desktop” environment, enabling the manipulation of multiple windows, each potentially with a feed from a different plug-and-play surgical device or data. For example, as in the image above, one window contains the laparoscope feed, and a second and third window both display MRI images. Additionally, the FaceLAB eye-tracking system follows the subject’s eyes, providing real-time data that can be used to give feedback on the subject’s stress, mental workload, and fatigue.

PLUG-AND-PLAY ARCHITECTURE

A key goal of the STITCH project is the creation of a fully integrated medical instrument plug-and-play environment. The STITCH Project is working with the CIMIT/ MGH Medical Device Plug-and-Play Interoperability program to define and prototype standards and techniques for creating safe systems of interoperable medical devices. The systems developed will be evaluated using the cognitive ergonomics model to determine whether or not such innovations are truly safer and more effective than traditional modes of practice.

That the current ad-hoc solution to the clinical problem of working with multiple devices has become an impediment to safety and effectiveness is readily apparent in every modern ER, OR, ICU and NICU in the country. Racks of devices constantly signal alarm conditions from the mundane to the life threatening with an endless chorus of beeping that taxes patient and caregiver alike. STITCH aims to untangle and organize some of this chaos while providing quantitative measures of improvement in clinical practice.

The current scenario where a clinician acts as integrator for a number of disparate devices. The clinician must maintain awareness of the multiple disparate devices, manually control their operation, and carry out the treatment plan while maintaining full awareness of the patient’s condition. The cognitive workload this entails is daunting for experienced practitioners and overwhelming for those in training.

The MD-PnP vision of a clinician interacting with an integrated system of medical devices that includes closed-loop control to support a specific treatment plan. The clinician has a single interaction point that is tailored to the specific treatment plan being employed. This significantly reduces the cognitive workload required to manage the clinical technology, freeing the physician to focus on patient care.

**STITCH**
Surgical Technology Integration with Tools for Cognitive Human Factors

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