Towards A Seamless Surgical Simulation Learning Experience

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Introduction

The objective is to design a seamless learning journey supported by ubiquitous and cloud computing within an Intuitive Surgical digital ecosystem.
Traditional surgical simulation training sessions are typically restricted to a single hospital and contain institution-specific data, limiting the flexibility and accessibility needed for surgeons to track and improve their skills across multiple institutions (See Figure1 and Figure 2).

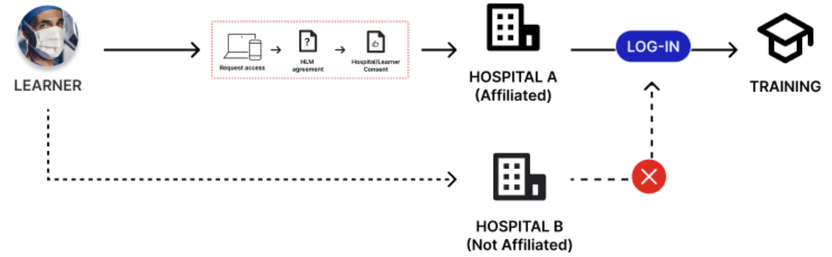


Figure 1 Limitation to access training session.

This limitations are;

- Surgeons often **rotate** between different hospitals.
- Surgeons are typically **affiliated with multiple** hospitals.
- Affiliation process at a hospital can take up to **30 days** .



17,527	30 days	10k
Surgeons are affiliated with multiple hospitals	To get log-in approvals	Users never achieved log-in access

Figure 2 Challenges in training session access.

Methods

We developed a simulation learning ecosystem that allows surgeons to access **personalized training data**, **analytics**, **tailored recommendations, surgical curricula**, and **personal settings** on any Intuitive Surgical simulator (See Figure 3).

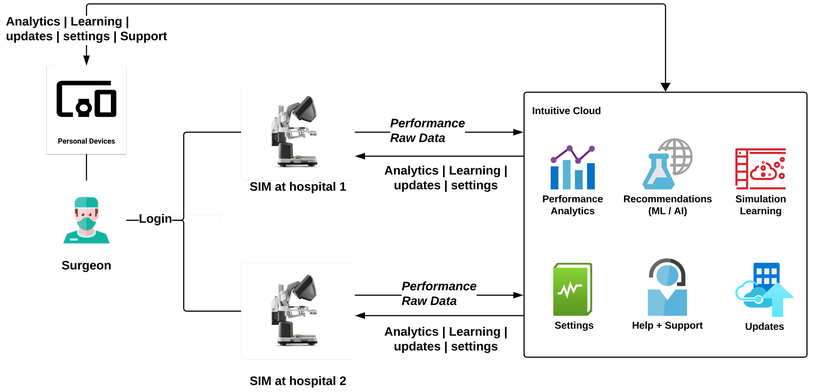


Figure 3 Our digital ecosystem.

Our digital ecosystem enables users to access their training sessions anytime, anywhere (see Figure 4).

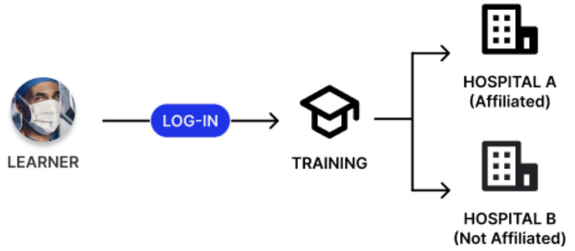


Figure 4 Seamless access to the learning ecosystem with single sign-on.

Preliminary Results

We evaluated the feasibility and efficiency of the ecosystem through a human-subject study involving **three experienced surgeons, three novice surgeons, and three naïve surgeons** (see Figure 5).

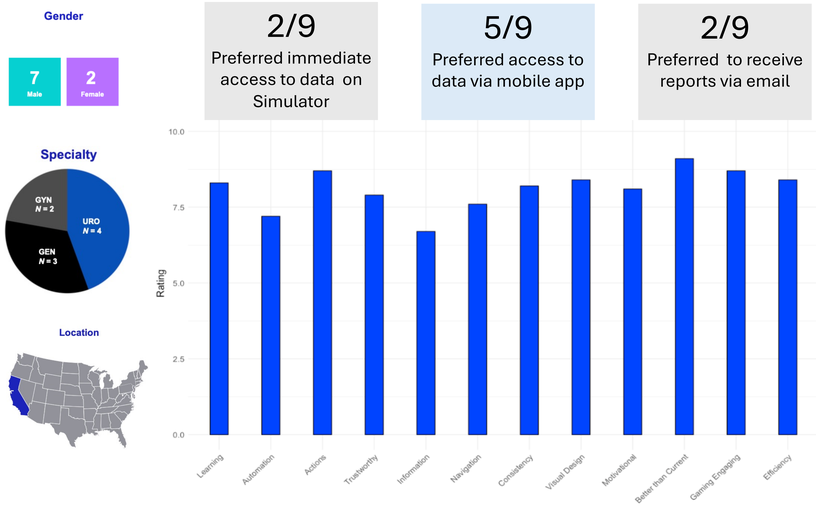


Figure 5 Overview of the feedback from the human subject study.

Conclusion

The solution enhances surgical training by providing secure, robust, flexible access to training data across hospitals. With anonymized actions and cloud-based retrieval, it ensures privacy, security, and global scalability for continuous surgical training.