

DESIGNED TO FIT: TAILORED TECHNOLOGIES FOR MEDICAL PRACTITIONERS

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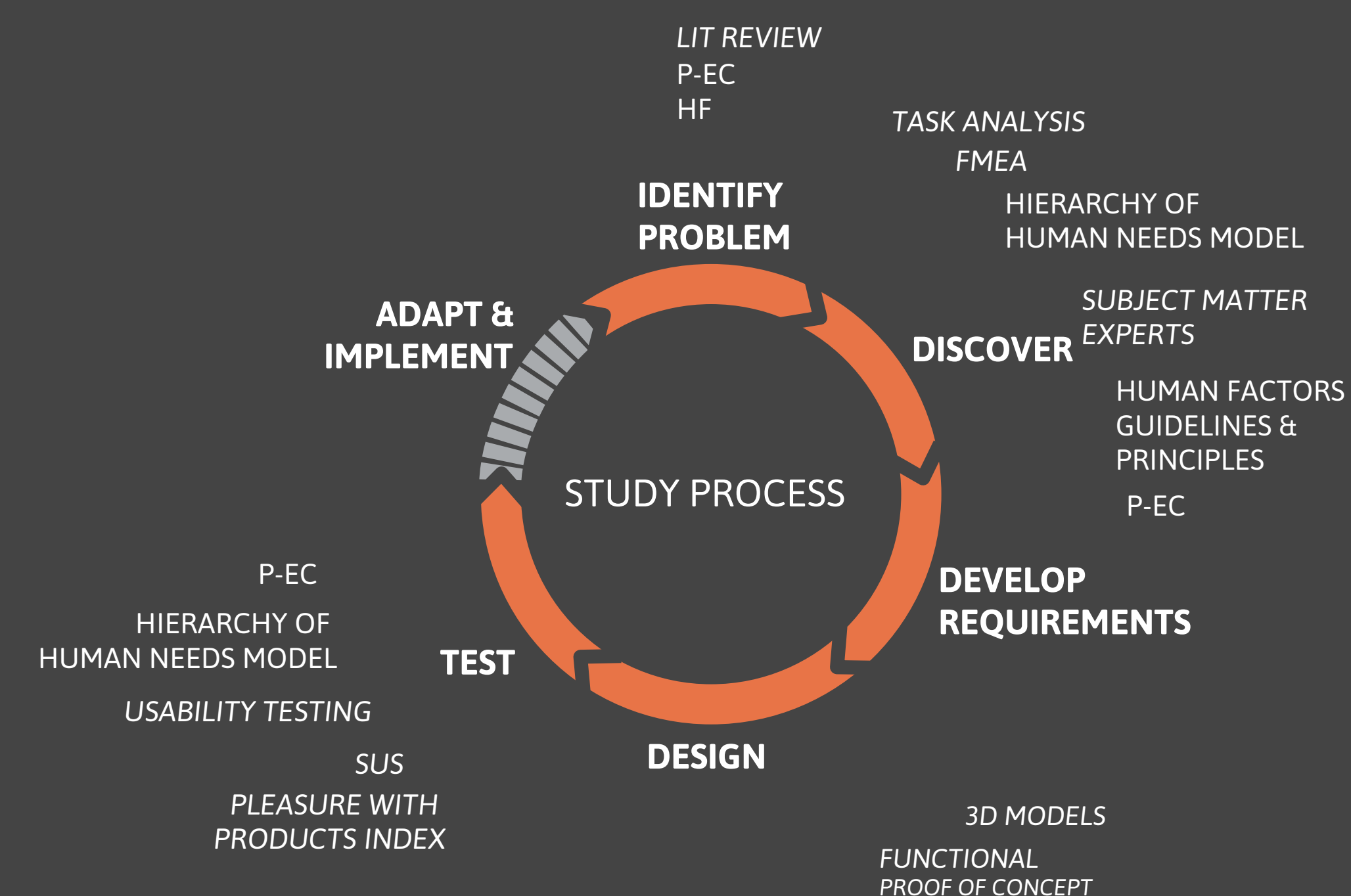
MOTIVATION: EMRs are disruptive

Although electronic medical records systems (EMR) present promising benefits, they have not yet been widely adopted. Many EMR are disruptive technologies; their complex hardware and software are not designed to account for the clinicians' characteristics and needs, thus, demanding a steep learning curve and diverted attention while being used. As a result, encounter time increases; clinicians' stress and discomfort arise from the interaction with disruptive technologies affecting doctor-patient communication and technologies are not adopted for further use.



PURPOSE: Design and Test

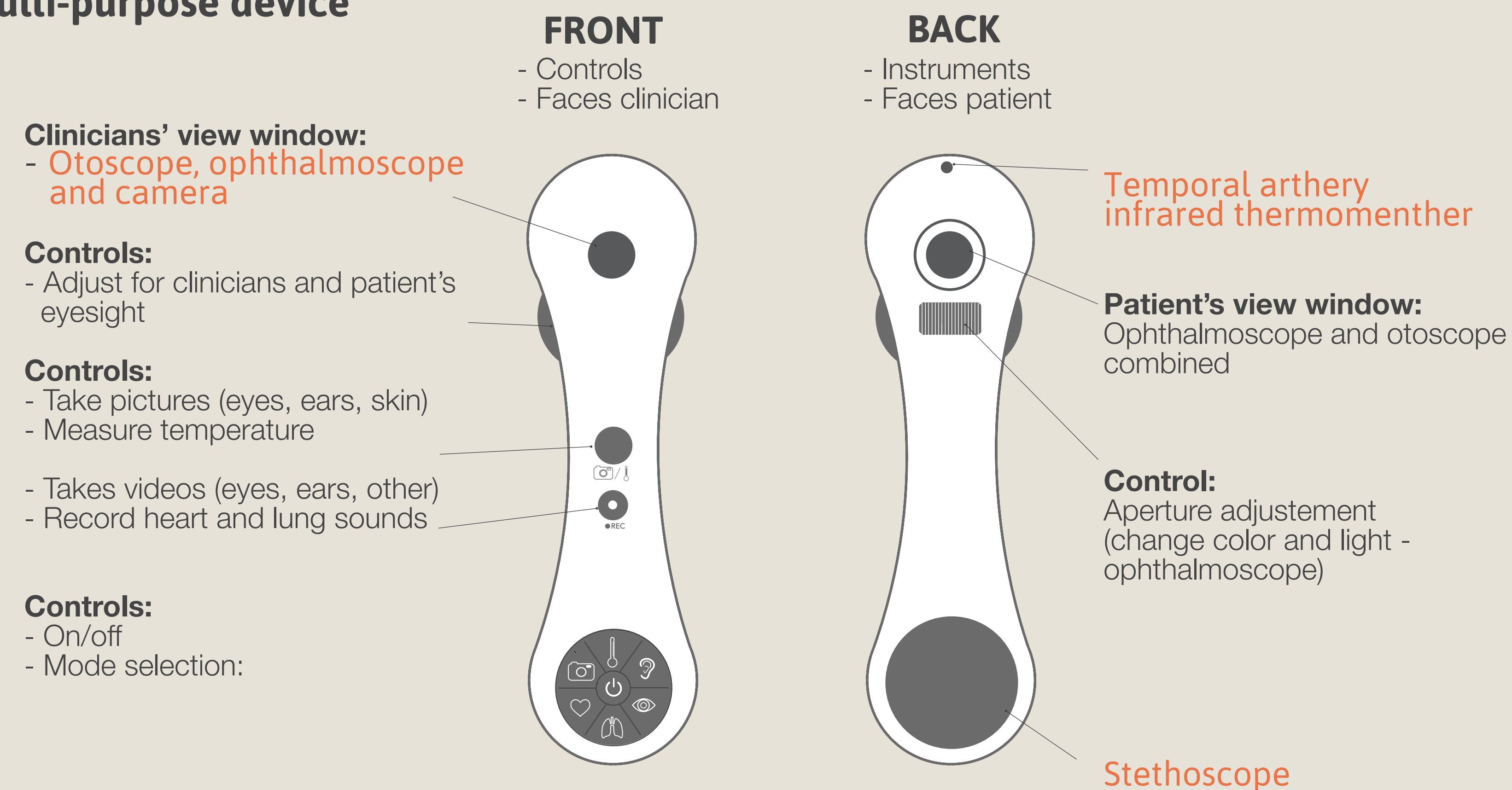
Apply human-machine systems engineering (HMSE) and person-environment congruence theory to **design and test a minimally disruptive device to improve the documentation of the medical exam**. The kit was developed as part of a comprehensive health care toolkit for Bauer Labs.



LIMITATIONS

1. Non functional models were used during the testing
2. Results cannot be inferred to the general population (small, not randomly selected sample)
3. Participants' biases about technology may affected results
4. Social desirability bias might affected responses
5. Researcher personal biases may affected results

Multi-purpose device



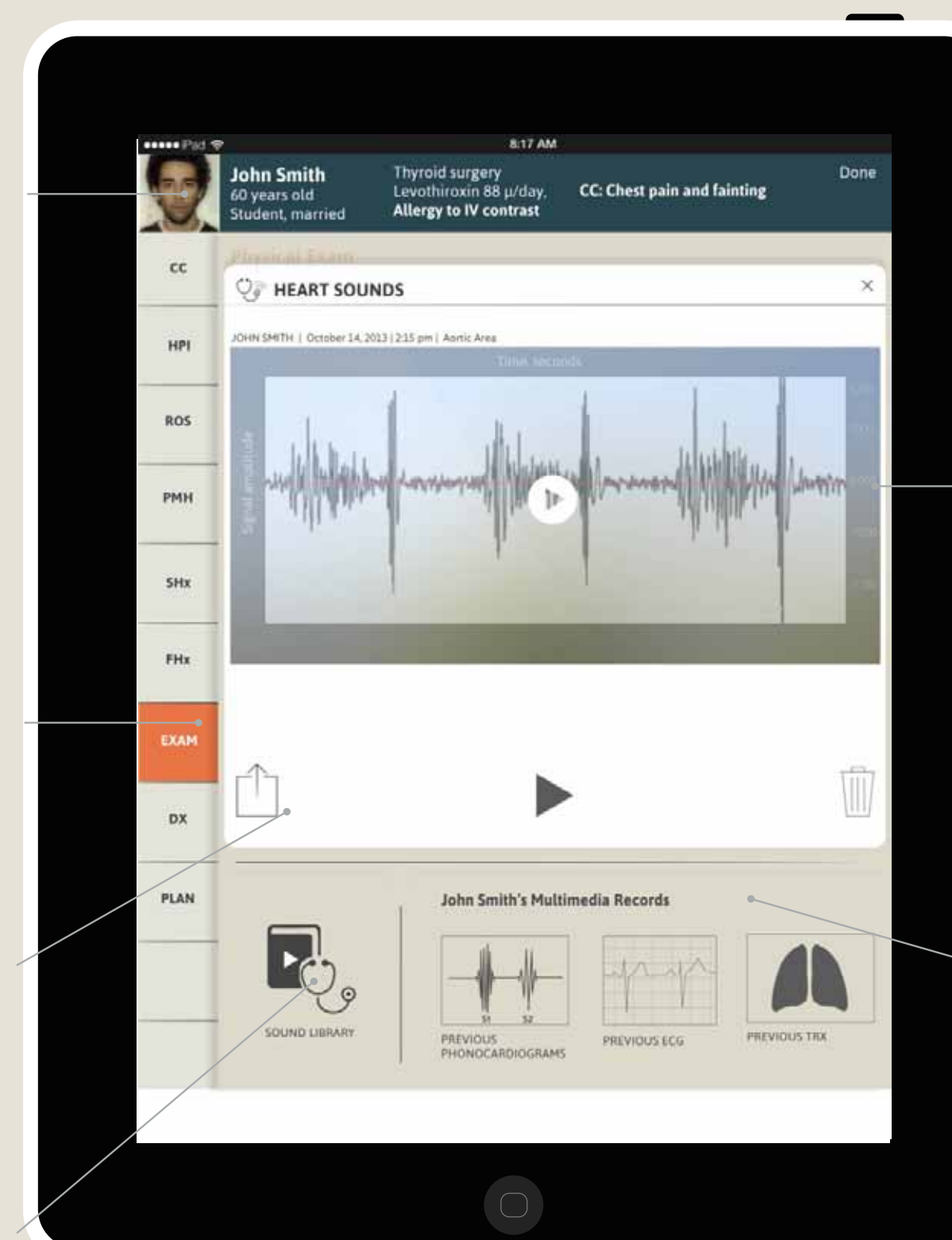
Tablet application GUI

The patient's picture and relevant information is always displayed.

Digital files are automatically saved on the patient records under the physical exam section.

Share the file with other clinicians to seek for a second opinion.

Compare patient's recordings to a collection of numerous conditions examples



Evaluate the digital files recorded with the instrument.

Access patient previous records to evaluate the patient condition and evolution.



CONCEPT DEVELOPMENT

A multifunction device to be used by clinicians during the physical exam, and its interaction with the patient EMR.

75 requirements guided the design of the physical examination kit.

Collects data from the physical examination and transfer it automatically to the patient's EMR.

Functionality:

- Used similarly to analog instruments
- Evaluate, save, delete, or share recorded information using a tablet computer
- Compare recorded data with libraries
- Consult with specialists around the globe

USER TESTING

Convenient sample of 7 Clinicians from Oregon

Objectives:

- Evaluate user experience and fit with system
- Verify requirements
- Evaluate perceptions of system interference with routine or relationship with patients

Procedure:

- Introduction to the system
- Scenario
- Online survey
 - System Usability Scale (modified)
 - Pleasure with products index (modified)
 - Requirements checklist
- One-on-one qualitative interviews

RESULTS:

Positive

System fits overall user characteristics and needs. Instruments included are the most frequently used

Most useful:

- Recording directly to the patient's EMR
- Documenting
- Built in camera (mostly for skin conditions and ears)
- Compare and evaluate patient conditions
- Compare and evaluate patient conditions with a database
- Share information with other clinicians

Usability and pleasure:

- Described as **very useful**, or having useful functions
- Perceived as **very easy to use**.
- Positive overall **satisfaction**, especially with the all-in-one instrument. Described as handier, or nicer to just have one thing in their hands.

Interference:

- Not perceived to interfere with doctor-patient relationship
- Perceived as a communication facilitator

Issues and challenges:

- Thermometer least useful feature (nurses do it)
- Stethoscope not easy to use (plug in - unplug, they could get tangled or lost)
- Concerned about **losing prestige** (stethoscope around neck as a symbol of status, i.e. only doctors wear them)
- Clinicians do not always wear coats with pockets. They would need to **carry the device in their hands** (different than designed)
- Concerned about accidentally pressing buttons
- Efficiency, a major concern in the medical community, could not be evaluated because of the use of a non-functional model.

Participant's suggestions:

- Record Physical exam in real time into the EMR
- Voice recognition
- Screen display (high quality)
- Diagnostic aid
- Treatment and test suggestion
- Tonometer
- Tympanometer
- Measure dimensions of skin lesions
- Echocardiogram