Creating Learning Systems with Mobile Technology to Improve Coordination in Perioperative Services
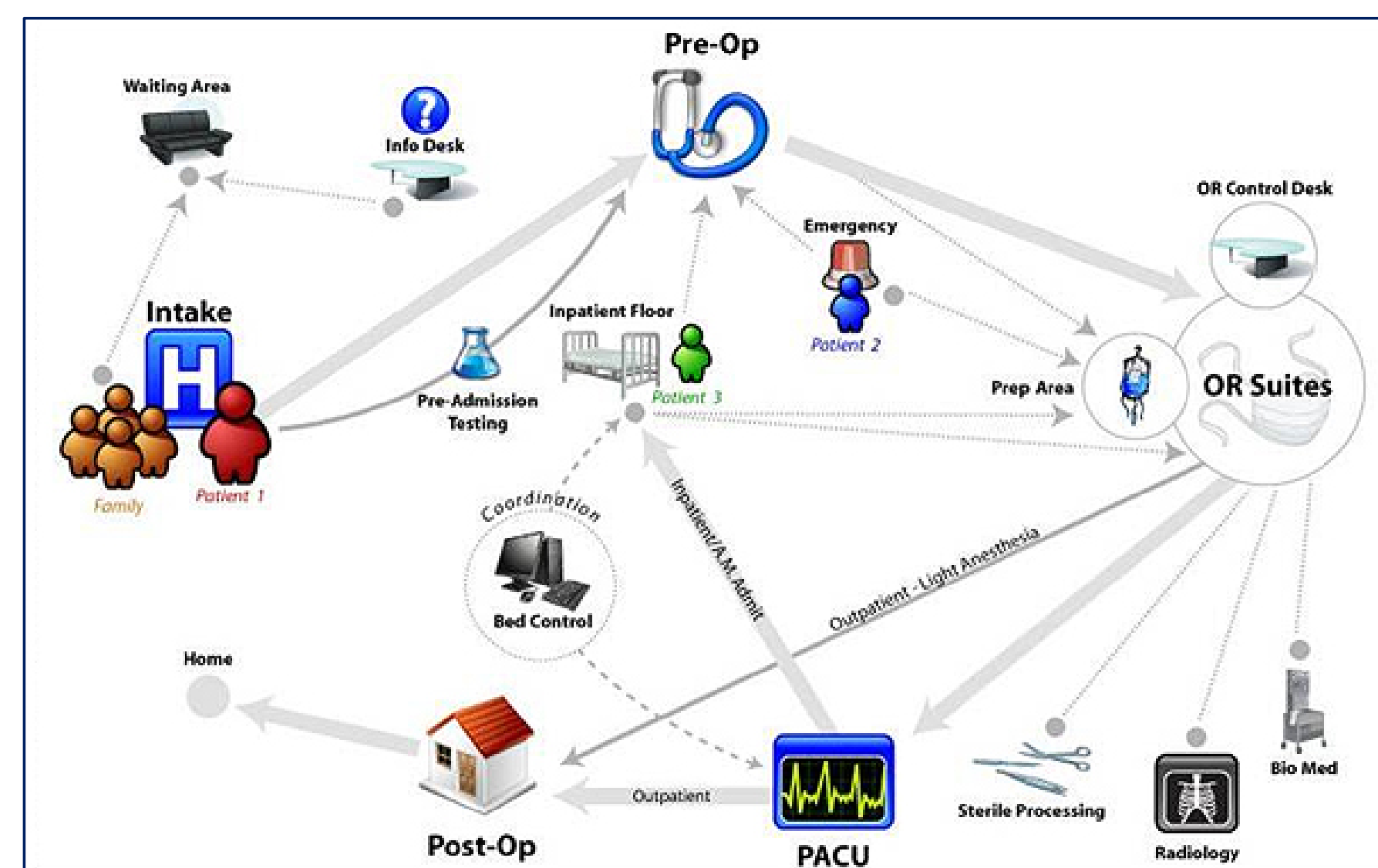
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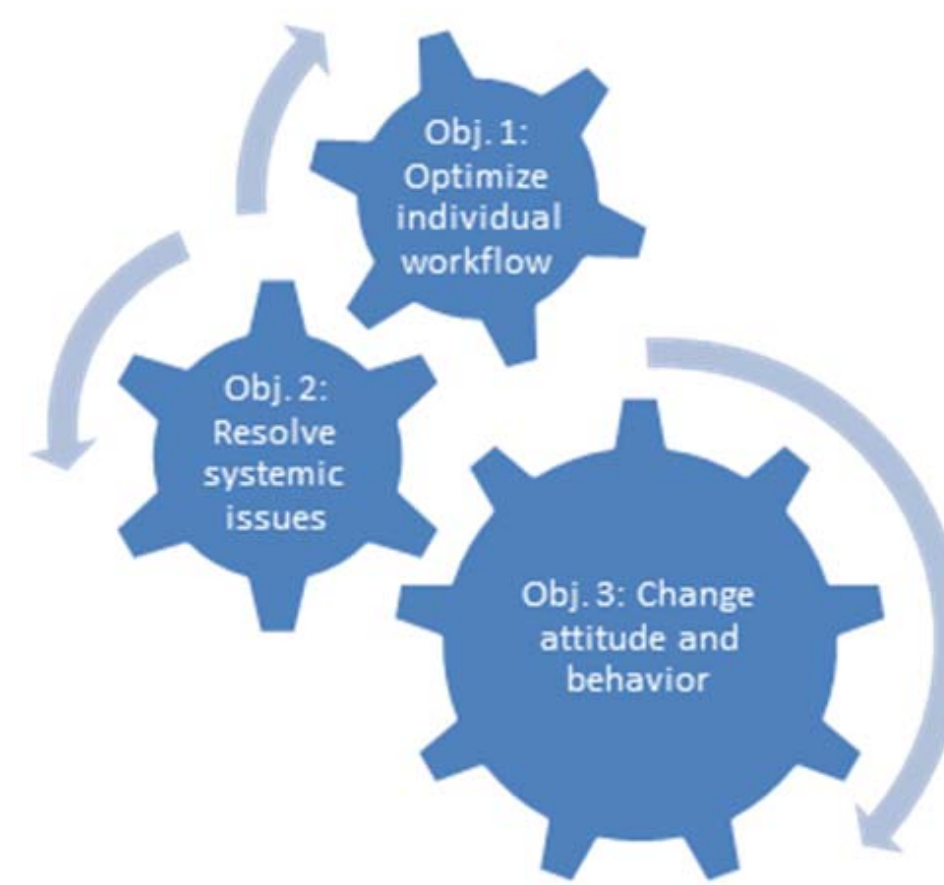Clemson University

Project Goals

Create new tools for healthcare providers to achieve improved coordination among Perioperative Services (periop) departments by

- Improving individual workflows
- Resolving systemic issues
- Changing staff behavior

Perioperative process flows [Source: http://www.pcts.com]

Project Motivation

A focal point of this project is to embrace and enhance mobile technology to facilitate patient flow through Periop (from Pre-op to PACU) by improving coordination between units and advancing post-hoc analysis.

Role of mobile computing in periop

Research Objectives

1. Enhance communication and coordination among Periop staff and quality of care by gathering important workflow milestones and introducing artificial intelligence techniques through the use of a smart-app.
2. Analyze workflow data (gathered with smart-apps) using data analytics to provide intuitive displays of real-time information for frontline staff and a daily performance dashboard for managers.
3. Induce behavioral and cultural change in healthcare systems through training and education.

The three proposed objectives reinforce each other to create new methods for healthcare providers to achieve improved coordination among POS departments by improving individual workflows, resolving systemic issues, and changing staff attitude and behavior

Smart-App Development

Preliminary development of the smart-app utilized the Android platform (Jelly Bean 4.2). The test devices included Nexus 4, 7, and 10. To date, a simple speech-to-text app has been developed. The team is currently evaluating algorithms for classifying text.

Tested mobile devices
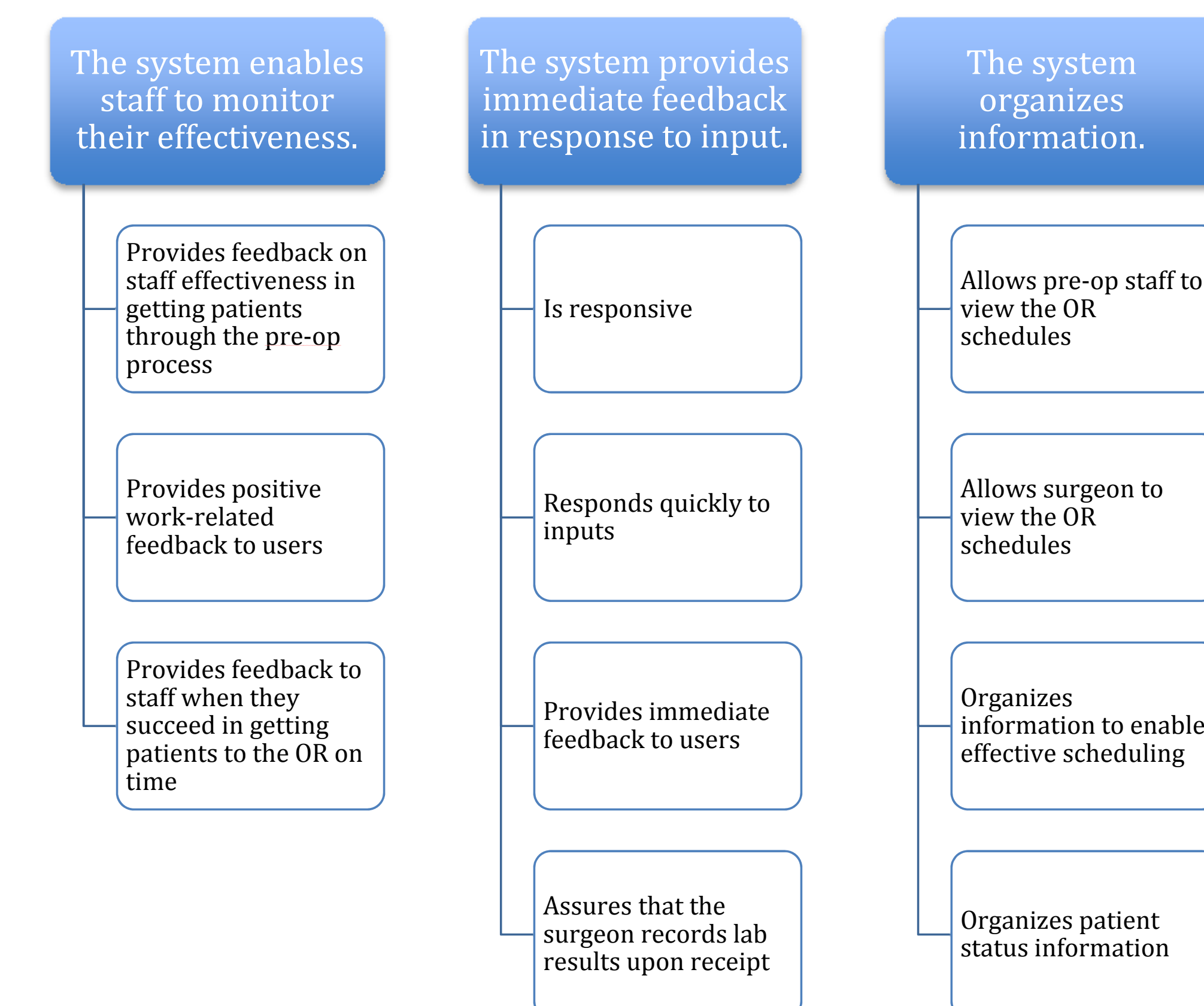

Screenshot of POS-MLS

Structured Interviews

Structured interviews of managers, anesthesiologists and nurses produced large amount of unstructured, qualitative data about user needs. The team has identified 390 user needs, organized into 37 categories using the Affinity process.

Example question 1: To use a handheld computer / mobile application in your daily work what would be important to you?
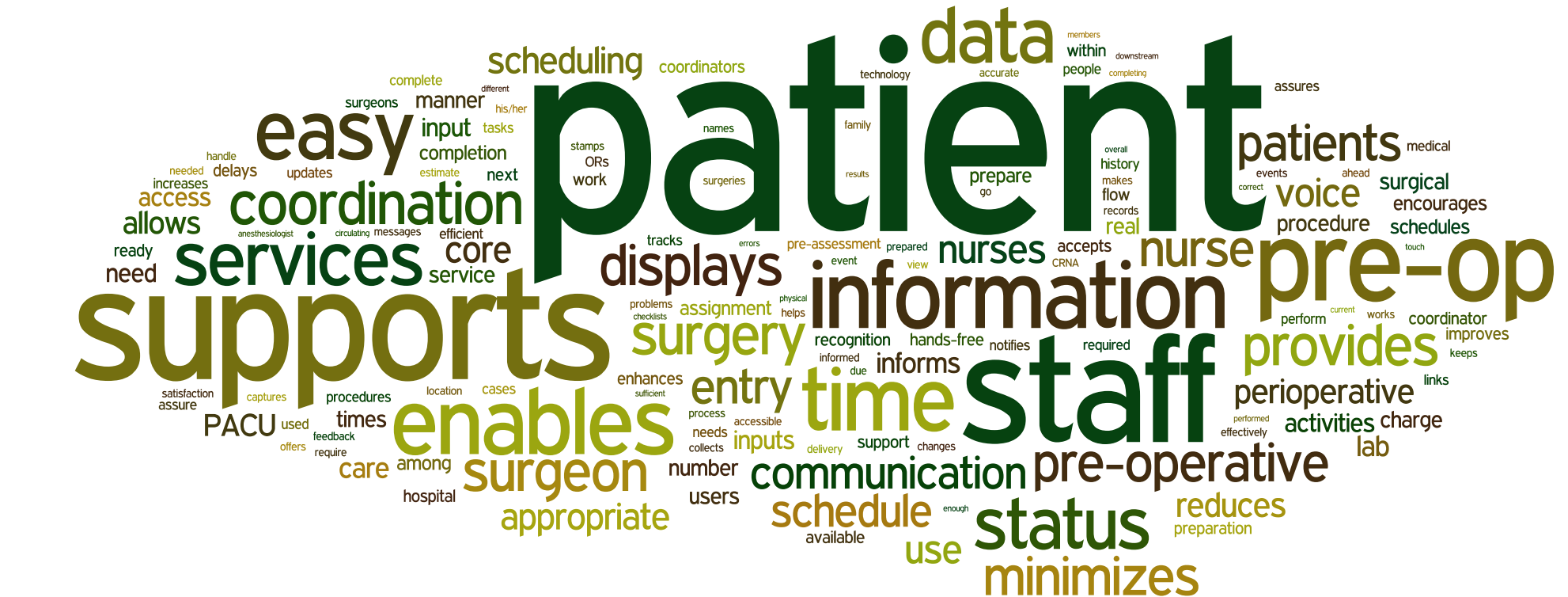
- Example answer: system responds quickly to inputs.

Example question 2: When you think of coordinating with those groups you work with, what are the problems / issues that come immediately to mind?

- Example answer: coordination among the core coordinators the pre-op charge nurse, the OR charge nurse, the anesthesiologist, and the CRNA board runner.
- Example answer: the need to travel to preop to resolve coordination issues.
- Example answer: the number of calls from the OR to PACU.
- Example answer: the need for staff to enter the OR to determine the status of surgery.
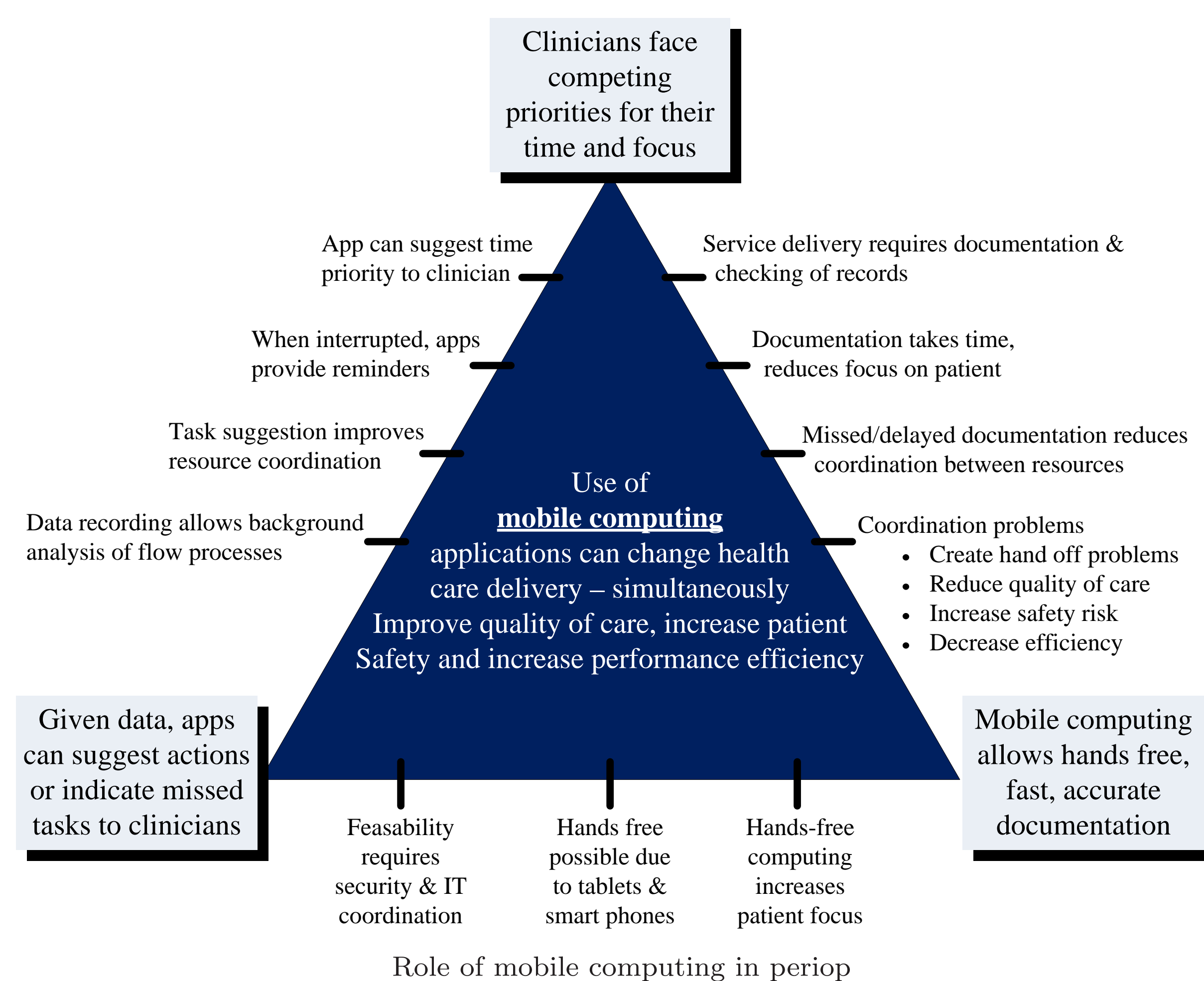

Partial affinity diagram generated from interview data

Word cloud generated from interview data

Next Steps

Immediate future work will focus on the following tasks.

- Distribute importance survey developed from affinity diagram
- Observe users at work at Greenville Memorial Hospital, Palmetto Health, and Medical University of South Carolina (MUSC)
- Conduct user interviews at Palmetto Health and MUSC
- Revise user requirements as clarified by surveys
- Refine text classification algorithm
- Test data gathering capability]item Prepare visual data displays

Acknowledgment