Project Report for MediCall

Future Communication System for Anesthesiologists

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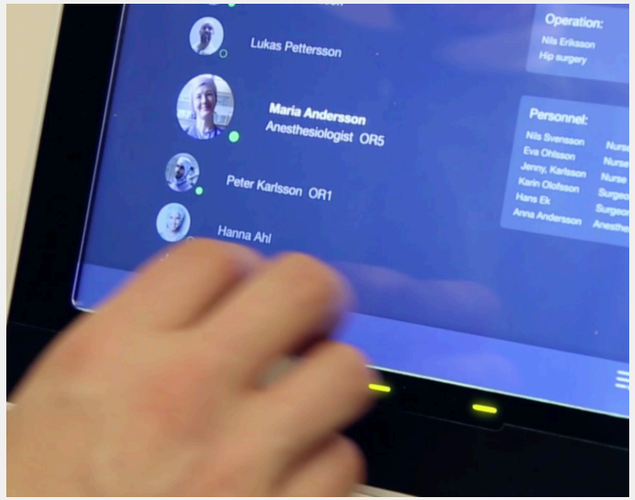
CONCEPT

This is a project where we worked with how to improve, make a more efficient and accurate communication form inside the operation room to the outside of the operation room. Medical is the result of this project, it is a concept that gives a helping hand and adds a extra layer of information in the communication that is already takes place today. The concept consists of a device inside the OR that are the OR communication system and one personal device. Between these devices the communication is made more efficient by its physical knob that is used for both setting the emergency level (see urgency level further down) and select who to call from the already pre-set list of people that the system provides. MediCall is based on the patient, patient's medical history, type of surgery and who is working estimating who the nurse is most likely to have to call during the surgery and creating a pre set phone list form that.

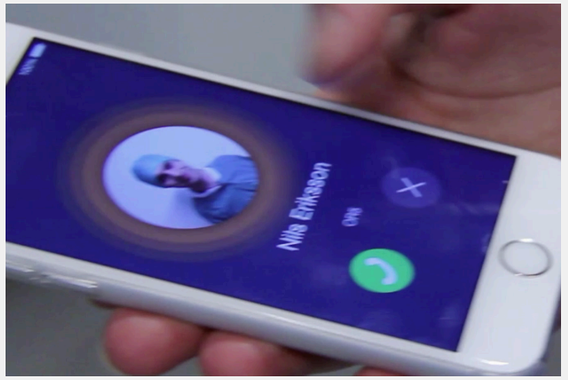
SCENARIO

As an example on how this will look and work in context we created a scenario video that we in this report explain as a storyboard (see next page).

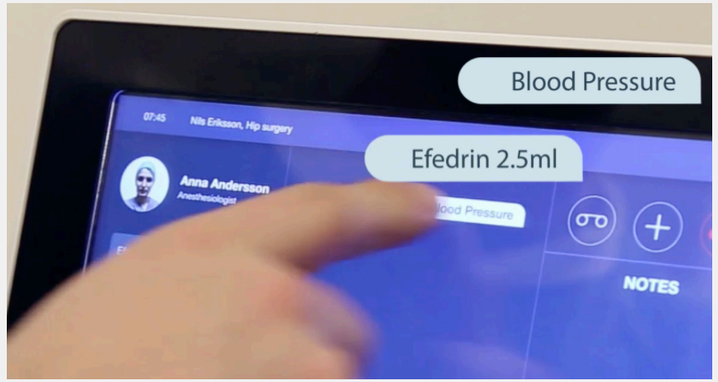
The patients bloodpressure is going down and Nils, the anesthesia nurse is doing everything he can to get it to go up again but it is not working.



Nils decides to call Anna, the anesthesiologist.
He sets the urgency level to orange.



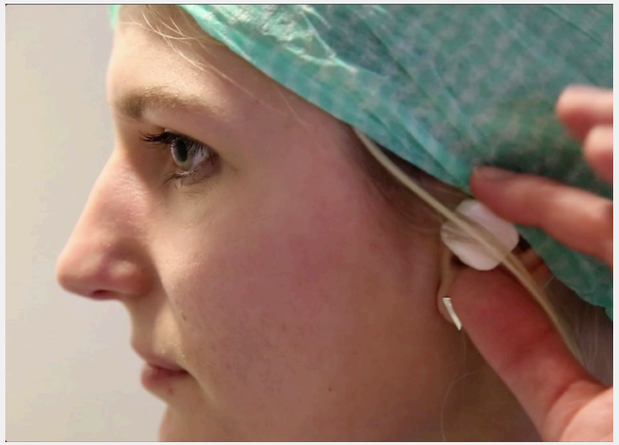
Anna anserws right away. "Hello this is Anna."



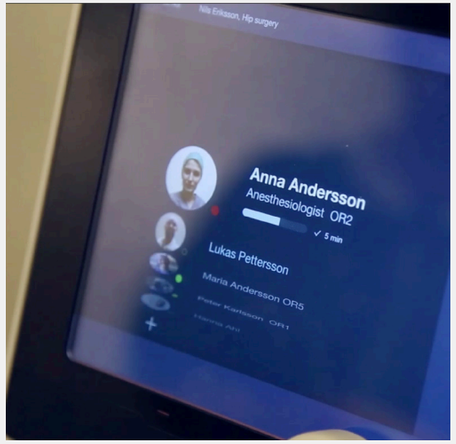
"Anna! The patient blood pressure is going down. I gave 2.5 ml of Efedrin but it is not working, what should I do?"
While Nils is talking he is sending the information that pops up from his words to Anna.

Anna sees the same information at her phone.
"Give him 500 ml of blood."

"Okay I'll order it right away."
Nils is ordering the blood after swiping ti to the notes section.



"Okay good! I'll be there is five minutes, see you soon!"



The timeline on the homescreen counts down and shows how much time it is left util the Anna will arrive.

5 minutes later Anna arrives to the OR.

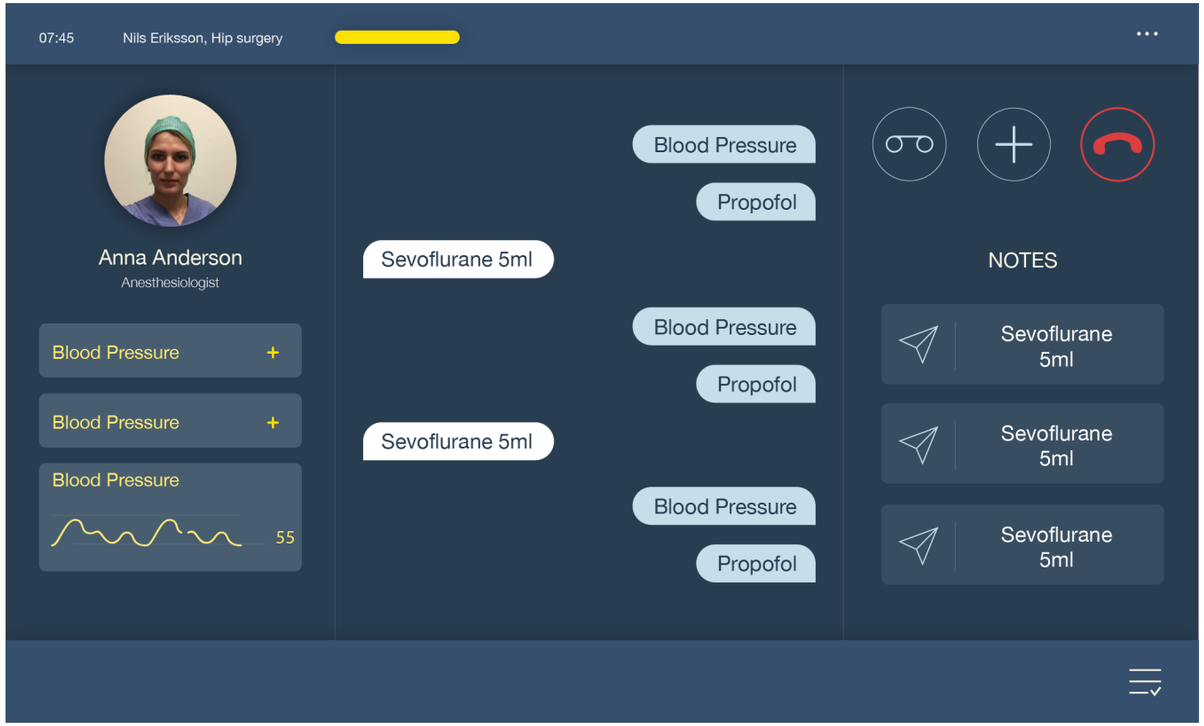
URGENCY LEVEL

Urgency level is set even before making the call by moving the knob sideways. It's a four step scale that is, at the time of setting, indicated by light. Green and yellow levels are for sending a update or a message that is not that urgent and gives you the choice if you want to call or record a voice message. Orange level is instantly calling the person or department that you choose and red if for emergencies and are sending a message to the anesthesia team that they have to come to the OR right away.

At the receiving end of the call the emergency level is indicated by colour and by sound so that the receiver knows if he/she needs to respond right away or can finish the task at hand first.

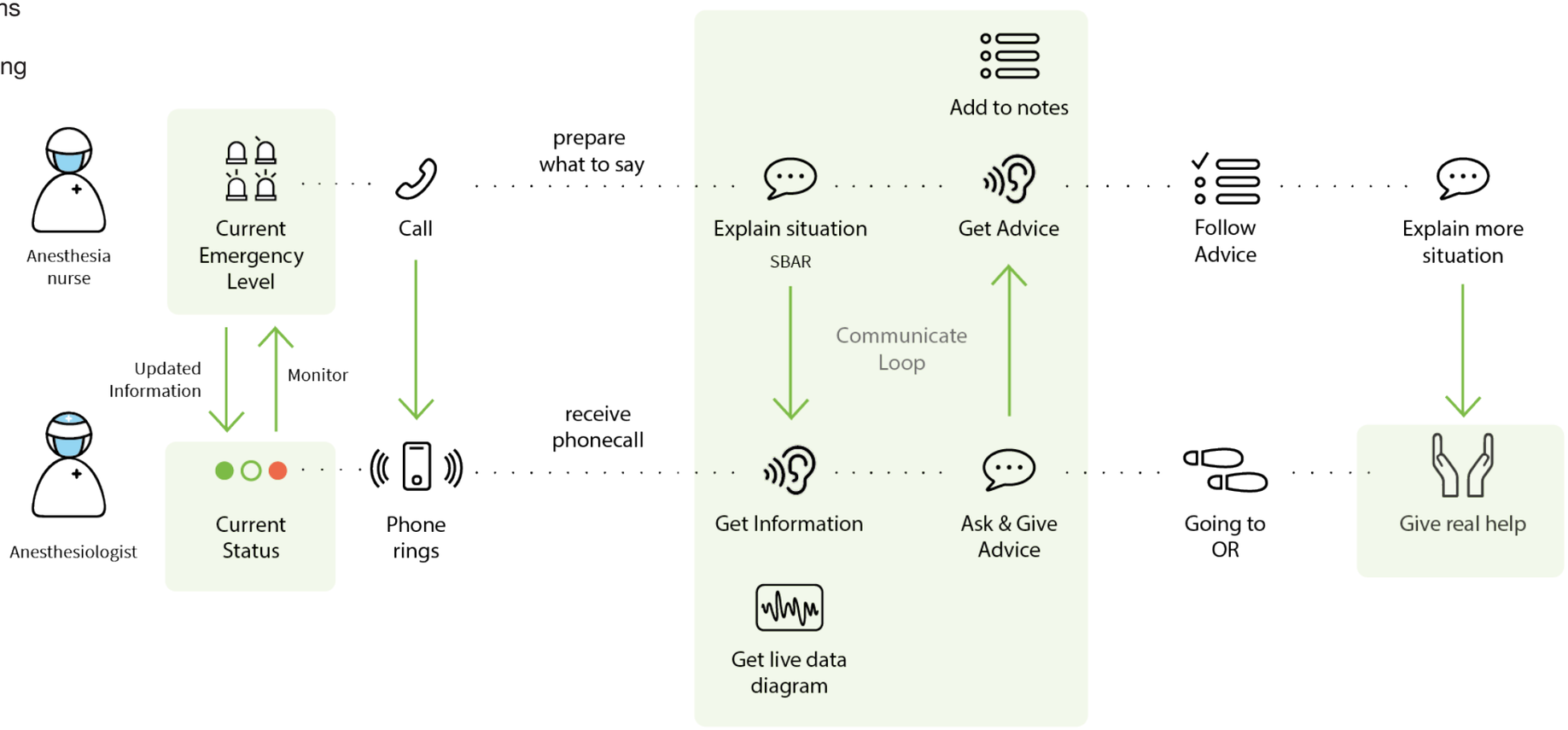
SHARING EXTRA LAYER OF INFORMATION

What we saw from our research is that a visual and mutual understanding of what the conversation is about is needed to be on the same page and see the entire picture of the situation to enable to make a as accurate judgment as possible. This is why with the help of voice recognition we are introducing the extra layer of information in the form of visual data that the people in the conversation can chose to share with each other by sliding it to the left (the side of the person you are talking to). It is also possible to save notes for yourself by sliding the speech bubble to the note section to the right. From there it is also possible to in a smooth way order more blood or other equipment.



IMPROVED WORKFLOW

The current communication flow has many practicalities that can go wrong and are today a system that are not designed but trying to adopt old technology in the system. With our solution we can solve some of the problems that exists with the old system. By communicateing the emergency level and giving all information that is needed already before the anesthesiologist arrived to the OR help can be given on a earlier stage in the process.



OBSERVATIONS

We started off our research by visiting Akademiska sjukhuset in Uppsala and and Norrlands universitetssjukhus, NUS and got the opportunity to observe 9 operations during these visits.

We also visited the collaborating partner (Gettinge) and learned more about their products.

We communicated the observations by acting them out using representations of the personnel in the room, as well as the machines and patient.

RESEARCH PRESENTATION

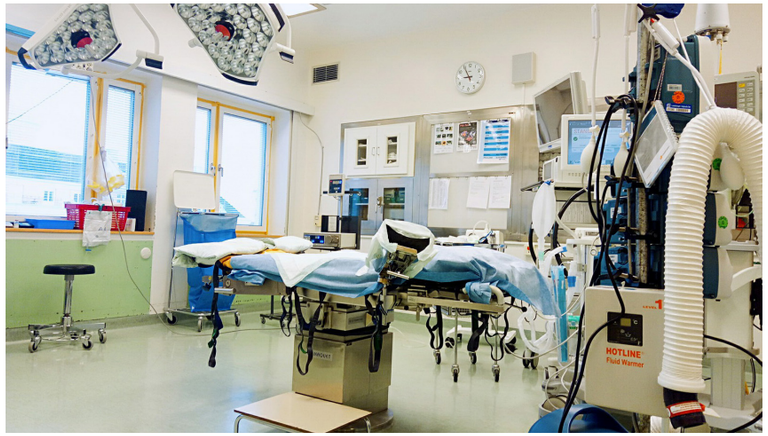
For the research presentation we clustered our observations in four different categories. Gaining trust, training, being out of control, response to unexpected events. We then presented these at the research presentation and had a workshop around these topics.

During the research presentation we held a small workshop where we discussed around our four topics. From these discussions we soon realised that most of it relates to and around communication and how the communication system works today.
We also collected many small stories and new information related to this during this presentation. This is how we saw the connection between the two areas of being out of control and response to unexpected events that we then chose to combine and work with furter.

"The phone got lost in my OR, it is a small phone and you could put it anywhere. it didn't have a specific spot."
- Selvi Olgac (IxD student that visited operations)

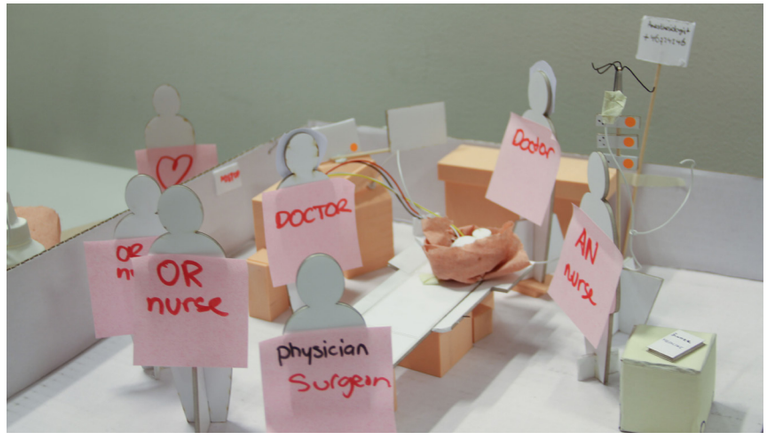
"Could we get rid of these" (pointing at the phones in the chart)
- Karin Blomquist Industrial designer at Maquet Critical Care

"Miscommunication could be solved in different ways (and it is crucial when you are in an unexpected event), first of all you try to solve it yourself and ask for help within the OR, otherwise you need help from outside and how to get that help. And if the patient is really bad, you don't have hands to make that call. Somebody else needs to make that call"
- Karin Blomquist Industrial designer at Maquet Critical Care



An operation room in Uppsala, Akademiska sjukhuset

Our model to act out the different scenario's in the operation room

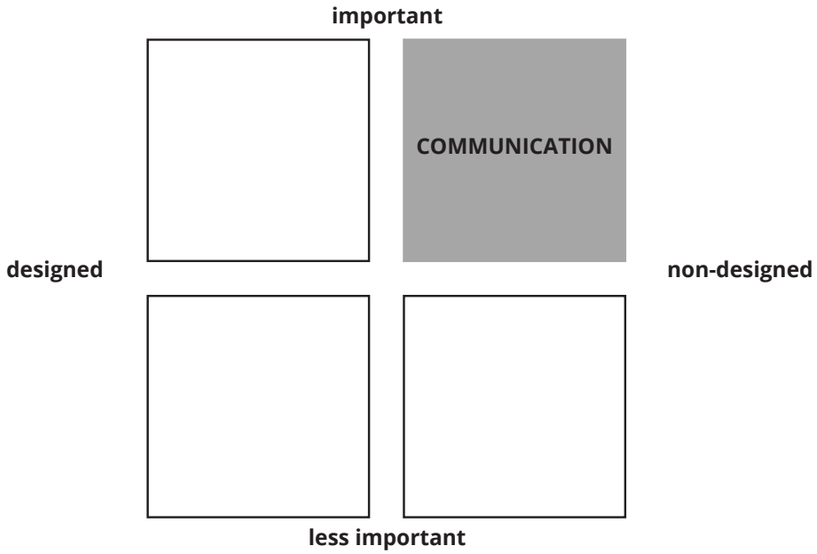


Our model to act out the different scenario's in the operation room

FOCUS AREA'S

After the mid-presentation we decided to go for the concepts of communication from inside to outside and monitoring from outside to inside the OR room.
We choose to focus on communication from inside the OR to outside to OR, because during our observations this area wasn't really designed. The different hospitals have different solutions for communication, but all of them we're not really optimal.

Because this is an area that is underdeveloped, compared to the other equipment in the OR and good communication is key to have good teamwork and in the end better treatment to the patient we wanted to focus on designing a communication system for calling from inside the OR to outside of the OR.

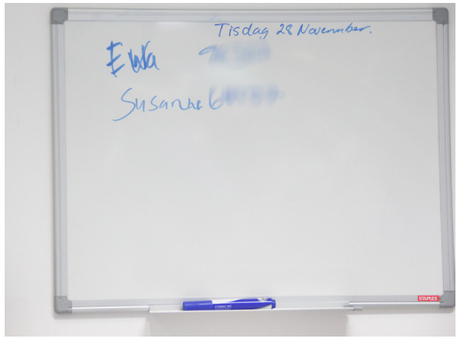


OBSERVATIONS

In Norrlands university hospital f.e. the procedure for 'real' emergencies was to call a telephone number that was written on the wall, this was than connected to a call center to send out an alert (through the pagers) to the personnel that could help.
Still the problems with phone numbers and efficiency of calling (having to find the phone number, explaining in which room you are) were there.
Based on these observations we made a workflow of the current situation.

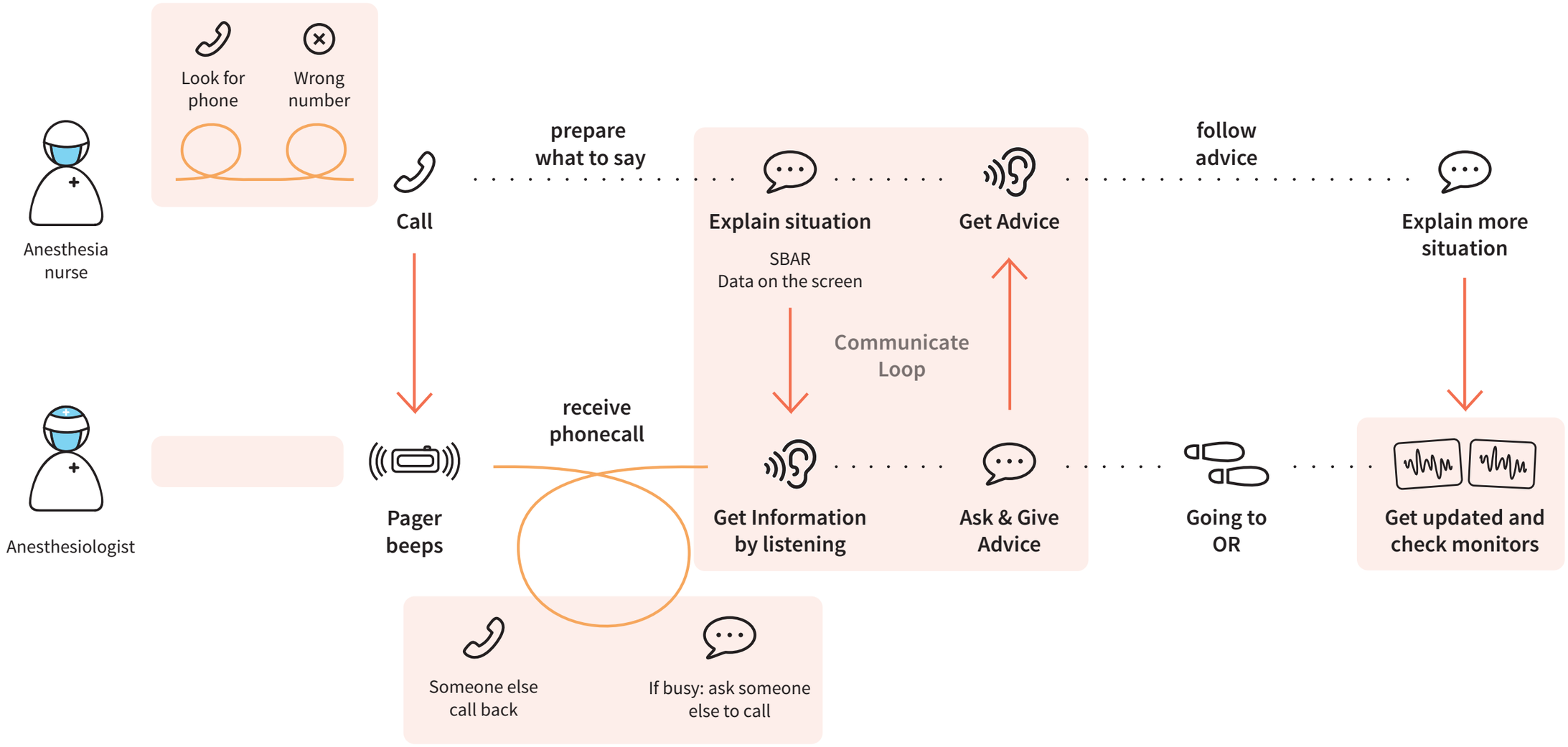
"The way I do that is by calling a pager using the phone on the wall, than the anesthesiologist can call the surgery room, and than I can explain the situation to the anesthesiologist. When I'm waiting for the anesthesiologist to call back I'm preparing what to explain, and try to have a sentence ready."
- Nils Pettersson, anesthesia nurse at Akademiska

"Some anesthesiologist have a smartphone that works as a pager and some only have a pager with them and have to call back through a phone on the wall. The good thing is that it is only a five digit number, so usually I know them by heart, otherwise I write them on my scrubs"
- Nils Pettersson, anesthesia nurse at Akademiska



Phone number on the whiteboard in NUS

The emergency number on the wall that connects you to the call center in NUS


Look for phone
Wrong number
Anesthesia nurse
Call
prepare what to say
Explain situation
SBAR
Data on the screen
Get Advice
follow advice
Explain more situation
Communicate Loop
Anesthesiologist
Pager beeps
receive phonecall
Get Information by listening
Ask & Give Advice
Going to OR
Get updated and check monitors
Someone else call back
If busy: ask someone else to call

HOW MIGHT WE COMMUNICATE MORE EFFICIENT AND WITH AN EXTRA LAYER OF INFORMATION?

INTERACTION POINTS & SCENARIO

Based on our research, we defined 3 interaction points to finish the task: picking information, sending information, getting feedback. However, there are more scenarios based on different emergency levels in consideration of anesthesiologist's needs. Therefore, we created four scenarios within our focusarea: updating, emergency call to everyone, calling for advice and calling for help.

The first step of ideation is ideating based on different interaction points created above. Afterward, similar ideas are grouped based on attributes such as controled by feets, voice control etc. Then we tested whether it is a attribute that fits the different interaction points as an integrated communication process from inside OR to outside. The second step is ideating based on the storyboards in the scenarios. With the 4 scenarios created above, we created storyboard frames. Then we ideate how these solution spaces will fit in the scenario as we are considering attributes and requirements within this scenario.

How might we **communicate** more efficient and with an extra layer of information?

COMMUNICATION

We ideated on how the communication can look like and what ways there are to communicate. There where a lot of discussions about what are the most efficient way of communicating. Is it better to transfer information and knolewdge by asking questions, send a voice message, in text or visually? We also discussed if just start to record a message and then the receiver answers when there are time, pre-recorded messages or if just a normal phone call would be more efficient. We explored these different ways of communication and triggers of the communication. After talking to nurses and conducting user tests we realised that actually a normal conversation talking back and forth are the best way of communication if we want it to be efficient and still keep the human to human interaction.

How might we communicate **more efficient** and with an extra layer of information?

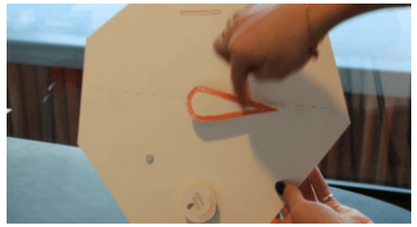
EFFICIENCY IN COMMUNICATION

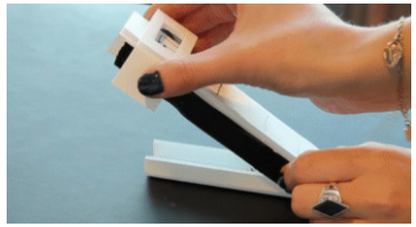
But how do we then trigger the communication? We explored many different ways of trigger the call both physical and digital, then compare their pros and cons. We focused a lot on how to trigger the connection fast and how to choose who to call in different situations. Here also we created a lot of prototypes that we showed for the nurses we have been in contact with to get feedback.

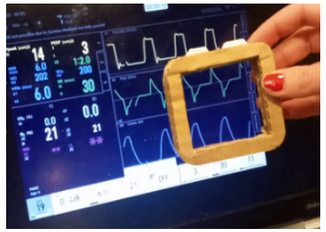
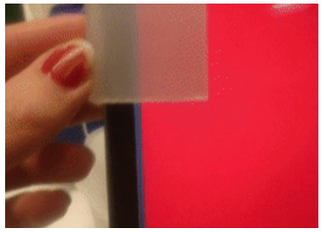
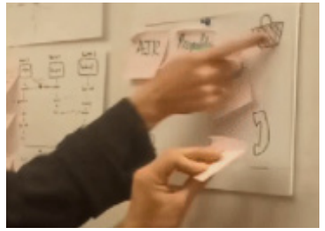
How might we communicate more efficient and with **an extra layer of information?**

EXTRA LAYER OF INFORMATION

In the exploration of the extra layer we tried out different way of picking what to sent and how to add it to the call. For example, send it as a video, have voice recognition as a supporting system, and adding a urgency level setting to the call so that the receiver know already before picking up if it is urgent or not.



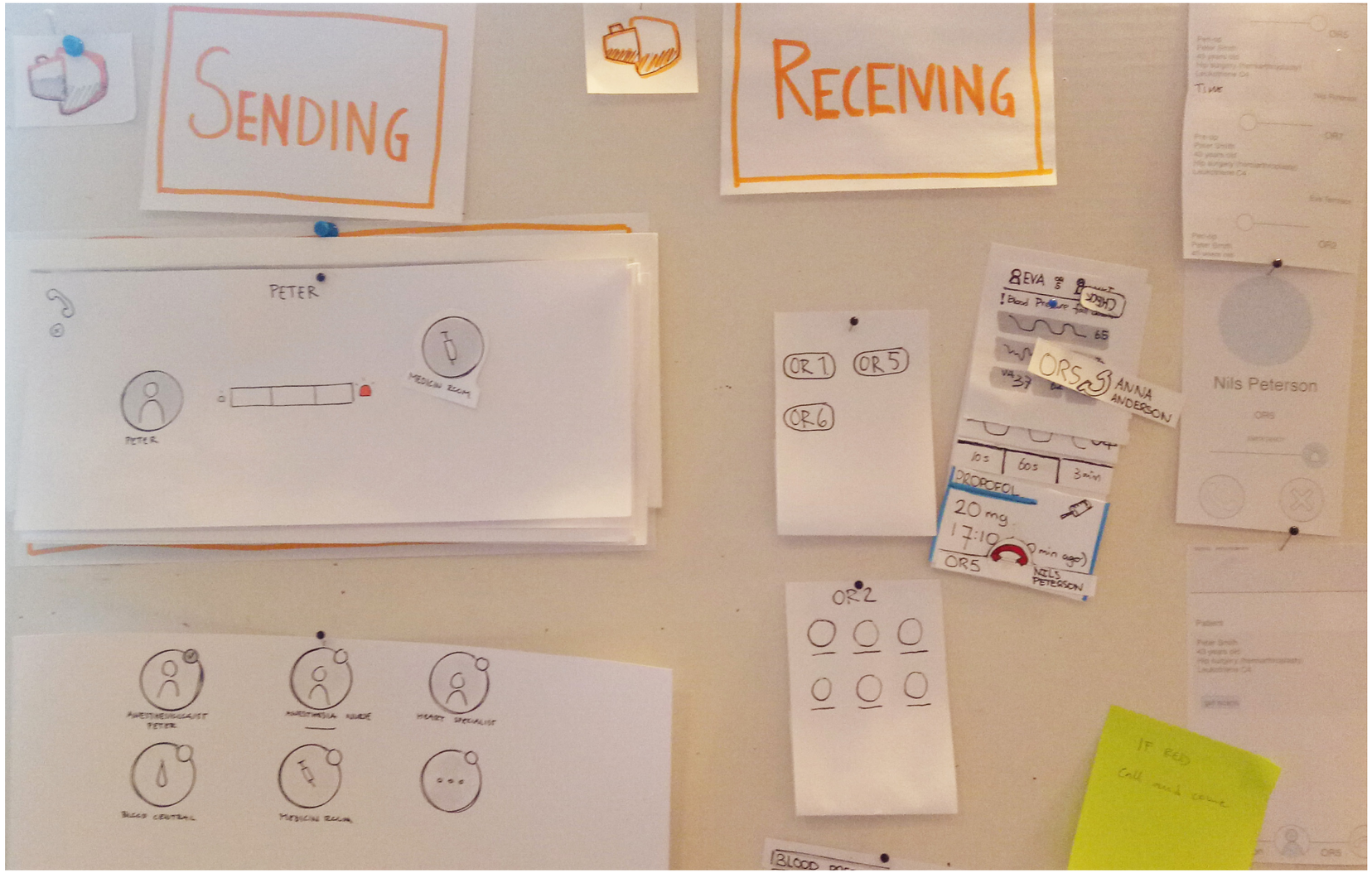


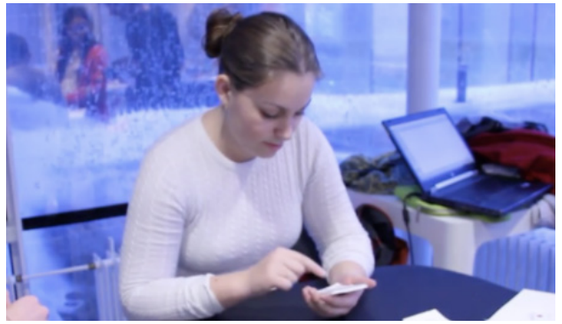




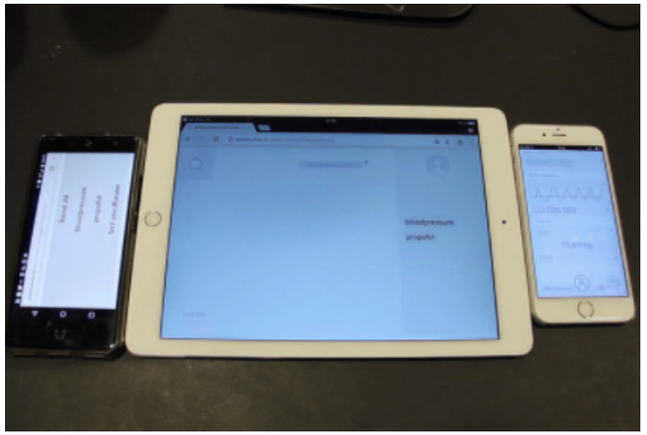
USER TESTING

The first prototype is based on new workflow for communication which puts all information in advance. That is, showing emergency level, pre-recording before operation, sending voice message and taking pictures of screen. We test its usability and interactions by inviting people to try this prototype with a script that brings them into scenario. Through observation, we find that people tend to call when time is limited, and send voice message when they are not urgent. This is totally different that what we had imagined. What's more, with extra layers of information, users have more steps to deal with. We need to find an efficient way to fulfill these tasks. How can we add extra layers without spending more time in operating it?

The second prototype is based on voice recognition and physical knob. We combine sharing data with talking, also combine emergency levels with calling. We find that people are comfortable with current flow during communication. Therefore, we get more feedback on details about usability, such as whether timeline is understandable or not, etc.







NUS PRESENTATION

Testing

During the presentation at Norrlands universitetssjukhus, we explored three different parts of the concept, the way to communicate the emergency levels, the way to communicate extra information and where to place the machine in the operation room and how it will fit in their professional context.

Feedback

The nurses explained that the most important part of our concept is that the nurse and anesthesiologist are on the same page. The feature of seeing where the other people are at the moment is also important to the nurses especially in the weekends where they aren't entirely sure whether who is on call or able to come physically into the OR room (in the same ward). We also asked if the concept to only send one piece of information would be better than sending everything, and it seemed that this concept of sending pieces of information is actually a good way.