This is a template that can be used for the Prototype Challenge included as part of the openSAP course “Imagine IoT.”
**Summary**

The site manager for the biggest mining company in Sweden needs a solution where she can get an overview of the mine and monitor all equipment and especially workers that she is responsible for.

**Storyline**

The site manager is ultimately responsible for the operation of the ACME mine in Kiruna Sweden, including all equipment and especially workers.

She needs to be able to get a quick overview of the entire mine and also get immediate alerts if any accident or hazard conditions in the mine occurs. Preferably, the solution should also be able to give early warnings if condition of the environment in the mine, a worker or equipment is changing in a way that could leading to a dangerous situation, based on previous patterns.

The solution should be portable so the site manager can leave the control center room and be able to visit the mine or other areas.

Status and alerts should be graphical and be display on a map with color codes for simple overview of status. The solution should also enable fast drill down to details about a specific worker’s or equipment’s condition.

**Point-of-view (PoV)**

As a site manager for mining operation

**I need** to get a full overview of the mine and get a visual status overview, at the same time.

I should be able to drill-down to detailed info about workers and equipment in a few clicks. Info should be provided by real-time real time sensors and alerts should be triggered by pre-define thresholds or even better with warnings generated by predictive analyses.

This has to be presented on a mobile solution that I can run on an iPad.

**So that** I always can be in control and take necessary actions as soon as something happens.
Persona

Joanna
Site manager

I need to stay in control of the entire mine, since I have the ultimate responsibility for the entire operation

About

• 45 years old and divorced. 2 children. 15 years of mining experience.
• Being overall responsible, I need to always have a full view of status, but would also like to drill down to details
• Current stuck in the control center room. Would like to be able to be much more mobile
• Works closely with production, maintenance and HR managers in order to run the mine as efficient and safe as possible.

Responsibilities

• Ultimate responsibility for the entire operation of the mine
• Main responsible for security of workers
• Accountable for profit for the mine

Needs

• Solution that can run on iPad (preferably) or laptop. Would be nice to also access on mobile phone
• Graphical view of mine with status (number) and color
• Accessible via wireless/mobile networks
• ...

Main Goals

• At all times stay in control of status of entire mine
• Reduce accidents and damages
• Be able to be mobile and still in control

Pain Points

• Need to stay in Control Center room in order to have full control
• Currently 20 different applications needed to monitor all ongoing activities
• 10 different screens needed simultaneously to monitor the most important applications
• All 20 applications has different GUI (some even text based)
UX Journey

Describe Actions, Mindset, Feelings and Touchpoints

**ACTIONS**
- Comes to office in the morning
- Decides to check workers status
- Tries to call shift manager on intercom system
- Decides to check equipment status
- Busy checking in four different systems and making notes on paper
- Picking a call from shift manager

**MINDSET**
- "Aaargh, I am looking at 10 different screens."
- "What, update from mine entrance subsystem has not been executed yet?"
- "I hope I can reach him and that he is not too busy. Problem is that he can't see that it's me calling..."
- "Yes, he is answering and confirms all is OK"
- "Hmm, different solutions depending on what type of equipment"
- "This will take some time..."
- "I am so tired of having to go through the same process every morning."
- "At least good that all seems to be fine..."
- "There is a potential issue on level 775 m."
- "I need to wait for further updates."
- "Why was there no alert?"

**FEELING**

**TOUCH POINTS**
- 10 screens and 20 different applications in control center
- Central access control system, old mainframe based application
- Shift manager
- Equipment status transaction systems
- Equipment status transaction systems
- Shift manager
Prototype

Link to low-fi prototype:
https://standard.build.me/api/projects/bf0412725eefc4570cca2eaa/prototype/snapshot/latest/index.html#/14772990370243035_S7

Background
The starting point for this prototype was a program about the LKAB mine in Kiruna Sweden. Mine operation was supervised from a control center with a lot of screen, both video monitors and application screen. The situation seemed very complicated and to me it seemed difficult to get an overview of the situation. It also seemed that the manager in charge was stuck in front of the screen, since that was the only place where the manager could be in control.

There were a lot of equipment in the mine, but it seemed that in best case the equipment could transmit a video stream back to the control center. Also the environment seemed very challenging with damp, dirt and a lot noise. For the workers it was even worse since the had to outside in the dangerous conditions. Where there anyone who actually knew where all the workers were located and in what condition they were?

Here I started to envisioning a fully connected mine.

In the mine there is a local wireless network installed connected to cameras and sensors for environment conditions like temperature, humidity, CO level, visibility, vibrations, etc. All workers should be equipped with smart sensors that will measure the vital signs for each worker, like pulse, oxygen level in the blood, body temperature, etc. Also environment condition close to the worker is measured, like temperature and CO level.

Each worker is equipped with a smart watch where he can get information, messages and alerts. The worker is also equipped with a communication system for video and sound. The smart watches also serves as a peer-to-peer network extender, meaning that if a worker happens to be out of range for the local wireless, he can connect via another worker that is in range and has network access. All information from the sensors in the mine, the equipment and on the workers constantly collected and processed. Predictive analysis can give early warnings about changing conditions that can lead to hazardous situations for worker or equipment.

Further development....
Production data can be collected and give a constant overview of how much material that is processed by each equipment.

By scanning all goods taken into the mine, site manager can ensure that there are no dangerous mix of goods (e.g. oil and dynamite) or too much of any substance. Information will be presented on an iPad application with a graphical overview of the mine and status, number of active workers and equipment at each level.

Instead of being stuck in front of the screens in the control center, the site manager can be fully mobile and still be in full control. With the application it will be possible to drill down from overview to a single worker is just 3 clicks.. Same application can be by production manager, maintenance manager, HR manger, etc to be in control for the specific areas.

Other ideas could be to enhance the video images with augmented reality showing status of workers and equipment as overlay on live images.