



# LABOR MANAGEMENT

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VIEW & SCHEDULE LABOR

A UX CASE STUDY BY  
KRISHNAN VIJAYARAGHAVAN

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- 2. THE PRODUCT LABOR MANAGEMENT  
THE PRODUCTION SUPERVISOR
- 3. DESIGN PROBLEM USER RESEARCH  
REQUIREMENTS  
CHALLENGES
- 4. DESIGN SOLUTION VIEW SCHEDULE  
LABOR ASSIGNMENT  
MITIGATE SHORTAGES  
REO INTEGRATION  
USABILITY TEST





# 1. PROJECT OVERVIEW



# PROJECT OVERVIEW



## WHO : THE UX DESIGNERS

Primary: Krishnan Vijayaraghavan

Secondary: Sameep Jayant, Vaibhav Vyas

UX Lead: Rajassekar Balasubramanian



## COLLABORATION

Users (Production Supervisors)

Product Owner

UI Developers



## SKILLS

Interaction Design

Data Visualization

Usability Tests

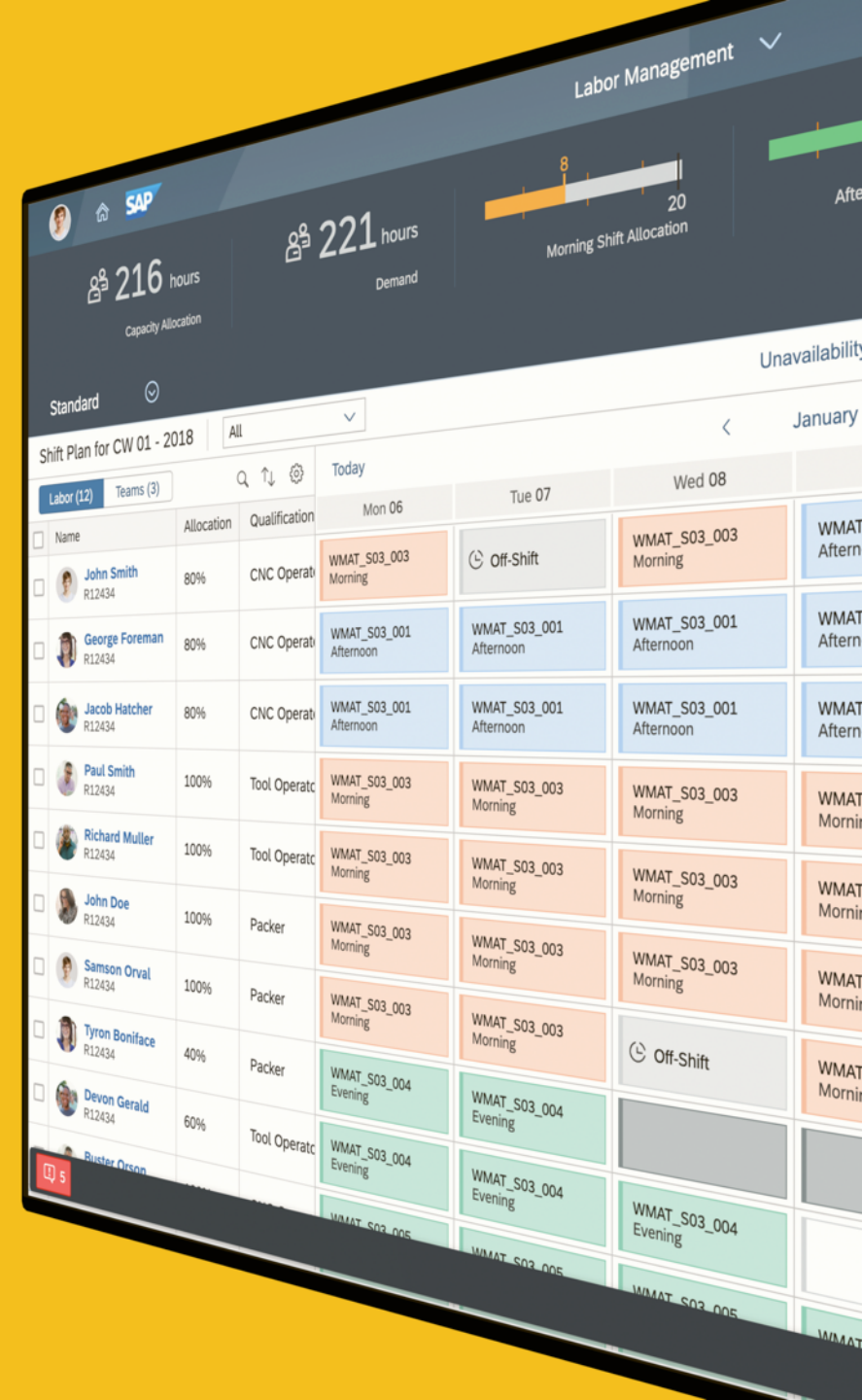
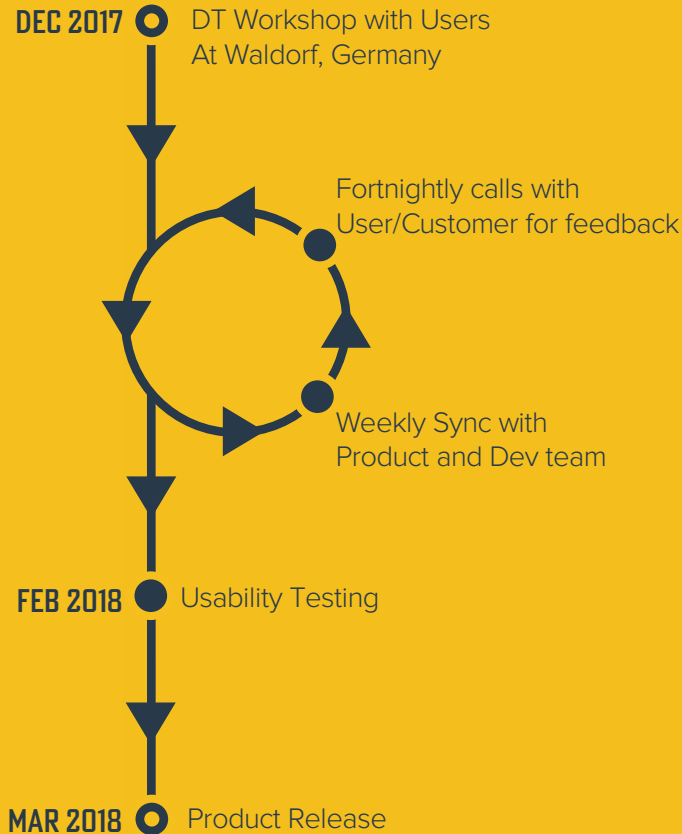


## WHERE : PRODUCT AREA:

Manufacturing (Planning)



## PROJECT TIMELINE



A low-angle, warm-toned photograph of an industrial setting. In the foreground, a worker wearing a white hard hat and a high-visibility safety vest is seen from the back, looking up towards the ceiling. Above the worker, several massive, tightly coiled rolls of metal are suspended or being processed by machinery. The background shows the complex structure of the factory with concrete pillars and various pipes and cables. The overall lighting is a warm, golden-brown hue, creating a sense of scale and industrial activity.

## 2. THE PRODUCT

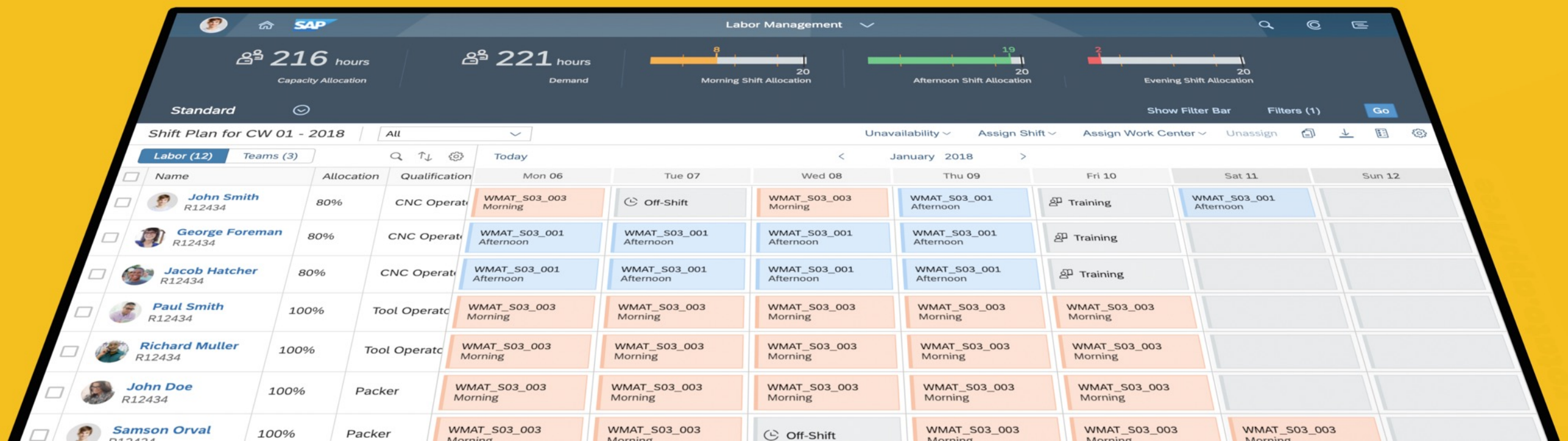


# LABOR MANAGEMENT

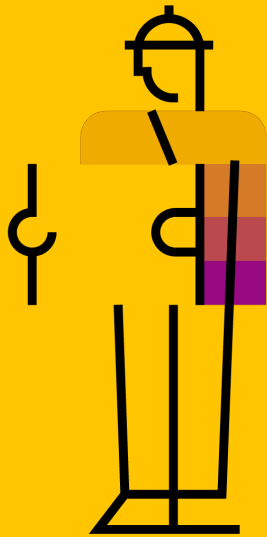
Labor Management is SAP's solution for a Production Supervisor to manage Labor assignments to Shifts and Work Centers on the Factory Shopfloor. It allows the **Supervisor to plan and assign qualified Labor to Shifts and Work Centers**, usually done a week or a month in advance. Once assignment is completed, the Shift Plan is published on the Shopfloor from which Labor can understand where and when they have to report to on the Shopfloor.

It is a cloud based web application under SAP's Digital Manufacturing Cloud suite that was first introduced in May 2018.

More Info: [SAP Digital Manufacturing Cloud](#)



# USER PERSONA : PRODUCTION SUPERVISOR



## COMPETENCIES

- Power User ☒ Casual User
- Proactive ☒ Reactive
- Team Worker ☒ Lone Fighter
- Global Focus ☒ Local Focus
- Innovative ☒ Conservative

The goals of a Supervisor are:



## ASSIGN LABOR

Ensure enough Labor is available on the Shopfloor to execute Orders by using a Shift Plan to **assign** qualified Labor to Shifts and Work Centers.



## VIEW SCHEDULE

Shift Plan can be viewed on Shopfloor from which Labor can understand **where** and **when** they have to report to in the Shopfloor.



## MANAGE SHORTAGES

Supervisor has to update **Labor availability** in case of absence and **assign** alternate Labor.

“I would like to keep the production running according to Production Plan based on the Resource, Labor and Tools availability”.



## Ressource / Mitarbeiter

### 1) Schichten

Früh 05:10 - 13:00  
 Mitt  
 Spät

Schichtpatterns

Mo Di Mi Do Fr Sa So  
 3 3 3 3 3 2 1

Kalender

Schichtplanung

### 2) Personal Schichten

KW 47

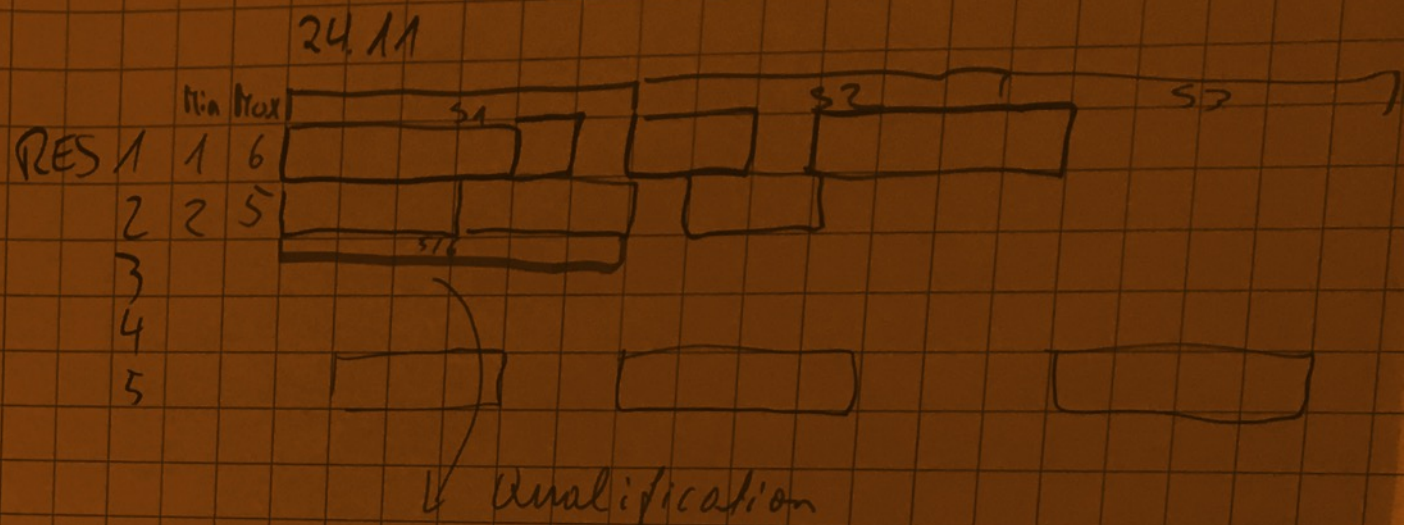
KW 48

SEW 16

Müller F M  
 Maier M M  
 Schmidt S F

### 3) Personal Schichten Ressource

Zell. 1 Mitte



## 3. DESIGN PROBLEM

| Res. 1 | Name 1 | Qualific |
|--------|--------|----------|
| " 5    | " 2    | x        |
| " 21   | " 3    | x        |
| " 47   | " 4    | x        |
|        | " 17   | x        |



# User Research

Labor management was conceived out of customer requests, as there was no application in the market for this. They were using either custom built solutions that were clunky or use spreadsheets (as shown below).

During User Research for its parent app REO (Resource Orchestration), Production Supervisors and Customers insisted that Labor Management is a crucial component for managing Shopfloor activities. So right after development of REO, User Research for Labor Management was initiated.

Mitarbeiter: Arbeitsplatz vorübergehend wechseln.

Vorübergehenden Arbeitsplatzwechsel erfassen:

1. Mitarbeiter auswählen

Alle Mitarbeiter: Filter

3138

Appold Dominik

8621

Becher Holger

1861

Behr Patrick

5488

Bieber Thomas

3153

Blum Daniel

7652

Cabukel Kurtulus

3515

Dilje Alexander

2594

Eberwein Helmut

7156

Endres Matthias

1666

Endres Rainer

2. Zeitraum auswählen

Mo Di Mi Do Fr Sa So

30

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21.11.2017

21.11.2017

3. Schicht auswählen

1. Schicht

2. Schicht

3. Schicht

Nach Schichtmodell

4. Arbeitsplatz auswählen

Alle Arbeitsplätze:

ICWL-31

30 -31 X 00

Drehen

Mv4

ICWL-31

35 -31 X 00

Drehen

RSA

ICWL-31

40 -31 X 00

Drehen

Hessapp

ICWL-31

45 -31 X 00

Drehen

TK2 - verkettet

ICWL-31

50 -31 X 00

Drehen

TK2 - Hand / Bohren / Fräsen

ICWL-31

55 -31 X 00

Mehrspindler

Einsteller

ICWL-31

60 -31 X 00

Mehrspindler

Bedienen

ICWL-31

65 -31 X 00

Mehrspindler

Reinigung

Abteilungsfilter

ICWL-31

Von Arbeitsplatz:

Name:

Dilje Alexander

Arbeitsplatz ID:

30 -31 X 00

Beschreibung:

Drehen

Beschreibung:

Mv4

Schicht am gewählten Startdatum:

315 / 1. Schicht

Auf Arbeitsplatz:

Abteilung:

ICWL-31

Arbeitsplatz ID:

40 -31 X 00

Beschreibung:

Drehen

Beschreibung:

Hessapp

Schicht neu:

Nach Schichtmodell

Um Buchen

Labor allocation app

| Schichtplan KW 47 |                              |                    | 2017        |    |    |    |    |    |    | November         |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
|-------------------|------------------------------|--------------------|-------------|----|----|----|----|----|----|------------------|----|----|----|----|----|----|--------------|------------------|----|----|----|----|----|----|----|
| Abteilung ICWL-31 |                              |                    |             |    |    |    |    |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
| Filter:           |                              |                    |             |    |    |    |    |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
| Arbeitsplatz      | Beschreibung                 | Mitarbeiter        | Mo          | Di | Mi | Do | Fr | Sa | So | Mitarbeiter      | Mo | Di | Mi | Do | Fr | Sa | So           | Mitarbeiter      | Mo | Di | Mi | Do | Fr | Sa | So |
|                   |                              |                    | 20          | 21 | 22 | 23 | 24 | 25 | 26 |                  | 20 | 21 | 22 | 23 | 24 | 25 | 26           |                  | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|                   |                              |                    | Frühschicht |    |    |    |    |    |    | Spätschicht      |    |    |    |    |    |    | Nachtschicht |                  |    |    |    |    |    |    |    |
| Drehen            | Diedesheim                   | Hofmann Manuel     | X           | X  | X  | X  | X  |    |    | Ulu Ritvan       | X  | X  | X  | X  | X  |    |              | Mauer Michael    | X  | X  | X  | X  | X  |    |    |
| Drehen            | Frontor                      | Grzegorski Andreas | F           | F  | F  |    | X  | X  |    | Kunze Henrik     | X  | X  | X  | X  | X  |    |              | Endres Rainer    | X  | X  | X  | X  | X  |    |    |
| Drehen            | MV6                          | Lambart Alexander  | X           | X  | X  | X  | X  |    |    | Bieber Thomas    | X  | X  | X  | X  | F  |    |              | Endres Rainer    | X  | X  | X  | X  | X  |    |    |
| Drehen            | MV4                          | Dilje Alexander    | X           | X  | X  | X  | X  |    |    | Fries Florian    | X  | X  | X  | X  | F  |    |              | Schmitt Matthias | X  | X  | X  | X  | X  |    |    |
| Drehen            | RSA                          | Krannich Helmut    | X           | X  | X  | X  | X  |    |    | Becher Holger    | X  | X  | X  | X  | X  |    |              | Reinwand Jens    | X  | X  | X  | X  | F  |    |    |
| Drehen            | Hessapp                      | Blüm Daniel        | X           | X  | X  | X  | X  |    |    |                  |    |    |    |    |    |    |              | Korndörfer Udo   | X  | X  | X  | X  | F  |    |    |
| Drehen            | TK2 - verkettet              | Lindner Christian  | X           | X  | X  | X  | X  |    |    | Rocznik Robert   | X  | X  | X  | X  | X  |    |              | Memmel Rainer    | X  | X  | X  | X  | X  |    |    |
| Drehen            | TK2 - Hand / Bohren / Fräsen | Häfner Rainer      | F           | F  | F  | F  | F  |    |    | Lenhart Albrecht | X  | X  | X  | X  | X  |    |              |                  |    |    |    |    |    |    |    |
| Mehrspindler      | Bedienen                     | Cabukel Kurtulus   | X           | X  | X  | X  | X  |    |    | Kubitzki Peter   | X  | X  | X  | X  | F  |    |              | Heindl Michael   | X  | X  | X  | X  | X  |    |    |
| Mehrspindler      | Bedienen                     | Eberwein Helmut    | X           | X  | X  | X  | X  |    |    | Müller Josef     | X  | X  | X  | X  | X  |    |              | Kaufmann Günter  | X  | X  | X  | X  | X  |    |    |
| Mehrspindler      | Bedienen                     | Endres Matthias    | X           | X  | X  | X  | X  |    |    | Scheuring Alfred | X  | X  | X  | X  | X  |    |              | Ottl Bernhard    | X  | X  | X  | X  | F  |    |    |
| Mehrspindler      | Bedienen                     | Melber Stefan      | X           | X  | X  | X  | F  |    |    | Weichlein Klaus  | F  | F  | F  | F  | F  |    |              | Schneider Klaus  | F  | F  | F  | F  | F  |    |    |
| Mehrspindler      | Bedienen                     | Ort Daniel         | X           | X  | X  | X  | X  |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
| Mehrspindler      | Bedienen                     | Sandgruber Johann  | X           | X  | X  | X  | X  |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
| Mehrspindler      | Bedienen                     | Schander Niko      | X           | X  | X  | X  | X  |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
| Mehrspindler      | Bedienen                     | Ziegler Erich      | X           | X  | X  | X  | X  |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
| Mehrspindler      | Reinigung                    | Stammel Werner     | X           | X  | X  | X  | X  |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
|                   |                              |                    |             |    |    |    |    |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |
|                   |                              |                    |             |    |    |    |    |    |    |                  |    |    |    |    |    |    |              |                  |    |    |    |    |    |    |    |

Spreadsheet used for Labor allocation

# USER RESEARCH

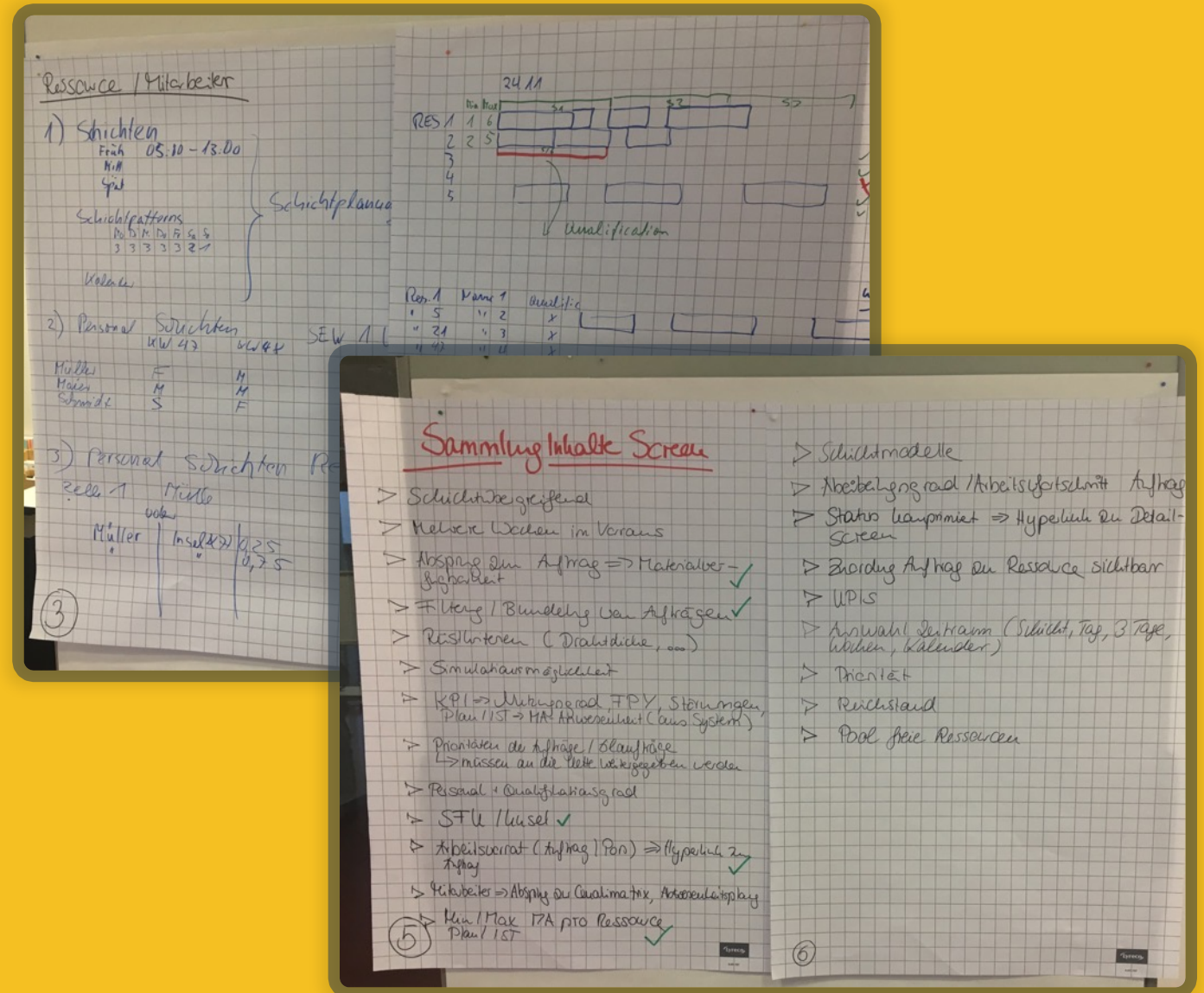
The initiatives started with a **Design Thinking Workshop** where customers and Production Supervisors were invited to SAP's Waldorf office. I was not part of this workshop as the customers requested it to be conducted in German and a UX Researcher conducted the session.

The session revealed:

- How the Supervisor currently allocates Labor into Shifts and Work Centers
- What information they need during allocation
- How they mitigate Labor shortages.
- How schedules are visualized in the Shopfloor by Labor

Additionally I requested for **Fortnightly calls** with Users where I could review design proposals and get feedback.

After the designs were completed, we conducted **Usability Tests** to validate it. The feedback was later incorporated into the final design.



Notes captured during DT Workshop



# REQUIREMENTS

Based on the User Workshop that was conducted with Supervisors and Customers, the Product team had narrowed down the requirements to be:



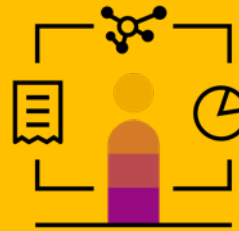
## 1. VIEW LABOUR SCHEDULE

A visualization that captures Labor assignment and Shift information. It will be used by Labor to identify which Shift they have to work, which days of the week and which Work Center.



## 2. LABOR ASSIGNMENT

A system for the Supervisor to plan and assign Shifts and Work Centers to Labor. The assignment of Shifts to Labor is usually done on a weekly basis or a month prior. There are exceptions where the assignment can happen just before a Shift.



## 3. MITIGATE SHORTAGES

The Supervisor has to ensure all Labor is utilized optimally and the system has to aid in making any quick assignment/reassignment decisions in case there is unavailability of Labor.



## 4. REO INTEGRATION

The Shift Plan created should also be integrated into REO so that the Supervisor can do Resource Planning based on the Labor Available.

# CHALLENGES

The each of core requirement posed a challenge on it own:



## 1. VIEW LABOUR SCHEDULE

How do I design a visualization that relates Labor, Shifts and Work Centers?



## 2. LABOR ASSIGNMENT

How can I use the Labor Schedule visualization for the Supervisor to plan and assign Shifts and Work Centers to Labor?



## 3. MITIGATE SHORTAGES

How to inform the Supervisor about Labor unavailability to assign an alternative Labor?



## 4. REO INTEGRATION

How to include the dimension of Labor and find a relation between Labor, Resources and Orders and present it in REO?



A large industrial facility, possibly a shipyard or a manufacturing plant, with a warm, orange-toned lighting. In the foreground, a worker in a dark shirt is working on a large, circular, metallic structure that resembles a ship's hull or a large industrial component. Another worker in a dark shirt and safety glasses stands nearby, observing. In the background, another worker is visible near a similar structure. The floor is dark and reflective, and there are various industrial components and materials scattered around. The text "4. DESIGN SOLUTION" is overlaid in the center of the image.

## 4. DESIGN SOLUTION

# DESIGN SOLUTION

I broke the whole requirements into different parts and attempted to solve each of them individually:



## SOLUTION 1: VIEW LABOUR SCHEDULE

- Use a Planning Calendar to visualize the relation between Labor, Shift, Calendar Week and Work Center



## SOLUTION 3: MITIGATE SHORTAGES

- Use Planning Calendar slot visualization, Alert box and KPI header to indicate shortages



## SOLUTION 2: LABOR ASSIGNMENT

- Use a Planning Calendar to show the visualization of the Labor Schedule and use that for Shift and Work Center assignment



## SOLUTION 4: REO INTEGRATION

- Use the Gantt Chart time axis of REO to establish relation between Labor, Shifts and Resource





SOLUTION 1

# VIEW LABOUR SCHEDULE

How do I create a visualization that relates  
Labor, Shifts and Work Centers?

# A VISUAL CONNECTION

The first challenge for Labor Management was to **visually represent Labor allocation for Shifts and Work Centers**. This view is used by the Supervisor for allocation and also by Labor for reporting. Solving this puzzle would also solve the 2 of the core requirements.

I studied the existing solutions our Customers and Supervisors were allocating their Labor but they were complicated and process seemed tedious.

One of the excels (shown on the left) seemed interesting. It split the components into a 'Shift View'. This had a Work Center based view which listed Work Centers on the left and the Labor working assigned next to it. Placed next to this is the Shift 1 Plan. A factory can have multiple shifts every day e.g. Morning, Evening and Night.

The Shift Plan shows which day of the week the Labor as to report to for that particular Shift. The drawback of this visualization is that the Labor will have to look at all Shift Plans separately to understand their Schedule.

| Schichtplan KW 47 |                              |                    | 2017    |    | November |    |    |    |    |
|-------------------|------------------------------|--------------------|---------|----|----------|----|----|----|----|
| Abteilung ICWL-31 |                              |                    |         |    |          |    |    |    |    |
| Filter:           |                              |                    |         |    |          |    |    |    |    |
| Work Center       | Description                  | Labor              | Mo      | Di | Mi       | Do | Fr | Sa | So |
|                   |                              |                    | 20      | 21 | 22       | 23 | 24 | 25 | 26 |
|                   |                              |                    | Shift 1 |    |          |    |    |    |    |
| Drehen            | Diedesheim                   | Hofmann Manuel     | X       | X  | X        | X  | X  |    |    |
| Drehen            | Frontor                      | Grzegorski Andreas | F       | F  | F        | X  | X  |    |    |
| Drehen            | MV6                          | Lambart Alexander  | X       | X  | X        | X  | X  |    |    |
| Drehen            | MV4                          | Dilje Alexander    | X       | X  | X        | X  | X  |    |    |
| Drehen            | RSA                          | Krannich Helmut    | X       | X  | X        | X  | X  |    |    |
| Drehen            | Hessapp                      | Blüm Daniel        | X       | X  | X        | X  | X  |    |    |
| Drehen            | TK2 - verkettet              | Lindner Christian  | X       | X  | X        | X  | X  |    |    |
| Drehen            | TK2 - Hand / Bohren / Fräsen | Häfner Rainer      | F       | F  | F        | F  | F  |    |    |
| Mehrspindler      | Bedienen                     | Cabukel Kurtulus   | X       | X  | X        | X  | X  |    |    |
| Mehrspindler      | Bedienen                     | Eberwein Helmut    | X       | X  | X        | X  | X  |    |    |
| Mehrspindler      | Bedienen                     | Endres Matthias    | X       | X  | X        | X  | X  |    |    |
| Mehrspindler      | Bedienen                     | Melber Stefan      | X       | X  | X        | X  | F  |    |    |
| Mehrspindler      | Bedienen                     | Ort Daniel         | X       | X  | X        | X  | X  |    |    |
| Mehrspindler      | Bedienen                     | Sandgruber Johann  | X       | X  | X        | X  | X  |    |    |
| Mehrspindler      | Bedienen                     | Schander Niko      | X       | X  | X        | X  | X  |    |    |
| Mehrspindler      | Bedienen                     | Ziegler Erich      | X       | X  | X        | X  | X  |    |    |
| Mehrspindler      | Reinigung                    | Stammel Werner     | X       | X  | X        | X  | X  |    |    |
|                   |                              |                    |         |    |          |    |    |    |    |
|                   |                              |                    |         |    |          |    |    |    |    |
| WORK CENTER       |                              | LABOR              | SHIFT 1 |    |          |    |    |    |    |



# A VISUAL CONNECTION

I investigated a **Labor-centric view**, instead of a Work Center based view. I assume the Supervisors are responsible for Work Centers and therefore look at this from a Work Center point of view.

But a Labor-centric view allows Supervisors and Labor to see Labor, Shift and Work Center allocation, and Day assignment all in one view for a calendar week. It also merges two tables (Work Center Plan and Shift Plan) to give a singular overview.

Labor can be listed on the left (as shown in the low fed mockup) and Calendar Week can be shown on the right. Each cell of this table can show which Shift and which Work Center the Labor will have to report to.

This view solved the 2 core requirements.

Shift Plan for CW 34 - 2017

All Shifts

Create PlanEdit Plan

| LABOR NAME | QUALIFICATION | MON 23/8 | TUE 24/8 | WED 25/8 | THU 26/8 | FRI 27/8 | SAT 28/8 | SUN 29/8 |
|------------|---------------|----------|----------|----------|----------|----------|----------|----------|
| Labor1     | Qual1         | S1, WC1  | S1, WC1  | S2, WC2  | S2, WC2  | S1, WC3  |          |          |
| Labor2     | Qual1         | S1, WC2  | S1, WC2  | S1, WC2  | S1, WC2  | S1, WC2  |          |          |
| Labor3     | Qual2         |          | S1, WC3  | S1, WC3  | S1, WC3  | S1, WC3  | S1, WC3  |          |
| Labor4     | Qual2, Qual3  | S2, WC2  | S2, WC2  | S2, WC2  | S2, WC2  | S2, WC2  |          |          |
| Labor5     | Qual3         | S2, WC1  | S2, WC1  | S2, WC1  | S2, WC1  |          | S2,WC1   |          |
| Labor6     | Qual3         | S3, WC1  | S3, WC1  | S3, WC1  | S3, WC1  | S3, WC1  |          |          |
| Labor7     | Qual1, Qual2  | S3, WC2  | S3, WC2  | S3, WC2  | S3, WC2  | S3, WC2  |          |          |
| Labor8     | Qual1         | S3, WC3  | S3, WC3  | S3, WC3  | S3, WC3  | S3, WC3  |          |          |
| Labor9     | Qual2, Qual3  | S3, WC2  | S3, WC2  | S3, WC2  | S3, WC2  | S3, WC2  |          |          |

Low fed visualization of a Labor-centric view

# ALTERNATE CONCEPTS

After establishing the visual relation between Labor, Calendar Week, Shift and Work Centers I had to investigate how this visualization can be translated from a low fed mockup to a technically feasible design.

I had started this design exercise by using a Grid Table for the visualization. It was a direct translation of the table used in my low fed mockup but I ran into a few road blocks with this design:

- Cells of Grid Table cannot have a background color and this was a deal breaker. Shift information is to be shown as a color so that Labor can easily see which Shift they have to report to.
- Cells of a Grid Table not capable of User selection, and this would be a problem for assignment use-cases for the Supervisor.

Assign Shift for CW 36 – 2017

| <input type="checkbox"/> | Name            | ID         | Qualification | Mon (23/09) | Tue (24/09) | Wed (25/09) | Thu (26/09) | Fri (27/09) | Sat (28/09) | Sun (29/09) |
|--------------------------|-----------------|------------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <input type="checkbox"/> | Brian Ringer    | 1239102    | Tool Operator | Shift 3     | Shift 1     | Shift 1     | Shift 1     | Shift 1     |             |             |
| <input type="checkbox"/> | Jessica Smith   | 870394932  | Tool Operator |             |             | Shift 1     |             |             |             |             |
| <input type="checkbox"/> | John Smith      | K47322.1   | Tool Operator |             |             |             |             |             |             |             |
| <input type="checkbox"/> | George Best     | 248303-02  | CNC Operator  |             |             |             |             |             |             |             |
| <input type="checkbox"/> | Paul Harrison   | 8948303-02 | CNC Operator  | Shift 2     | Shift 2     | Shift 2     | Shift 2     | Shift 2     |             |             |
| <input type="checkbox"/> | Lucy Diamond    | 48303-02   | CNC Operator  | Shift 2     | Shift 2     | Shift 2     | Shift 2     | Shift 2     |             |             |
| <input type="checkbox"/> | John Doe        | 1239102    | CNC Operator  | Shift 2     | Shift 2     | Shift 2     | Shift 2     | Shift 2     |             |             |
| <input type="checkbox"/> | Samson Orval    | 870394932  | Packer        |             |             |             |             |             |             |             |
| <input type="checkbox"/> | Tyron Boniface  | K47322.1   | Packer        |             |             |             |             |             |             |             |
| <input type="checkbox"/> | Homer Dylan     | 248303-02  | Packer        | Shift 3     | Shift 3     | Shift 3     | Shift 3     | Shift 3     |             |             |
| <input type="checkbox"/> | Mackenzie Frank | 8948303-02 | Packer        |             |             |             |             |             |             |             |
| <input type="checkbox"/> | Tyron Boniface  | 48303-02   | Tool Operator | Shift 3     | Shift 3     | Shift 3     | Shift 3     | Shift 3     |             |             |
| <input type="checkbox"/> | Cecil Foster    | 1239102    | Tool Operator |             |             |             |             |             |             |             |
| <input type="checkbox"/> | Titus Elliot    | 870394932  | Tool Operator |             |             |             |             |             |             |             |

High fed mock-up showing Labor Schedule in a Grid Table



# THE PLANNING CALENDAR

As the Grid Table was incapable of visualizing the Shift Plan, I considered another component that was new to the Fiori Design System – The Planning Calendar.

Planning Calendar fit all the requirements of this complex visualization:

- It had a table on the left showing the Labor details like Name, Qualification, Weekly Allocation etc.
- The right side is the Shift Plan with a Calendar showing the days of the week. Each row of the Calendar has ‘Slots’ that shows Shift and Work Center details. The Slots have colors to indicate the type of allocation (Shift type/Leave/Unavailable).

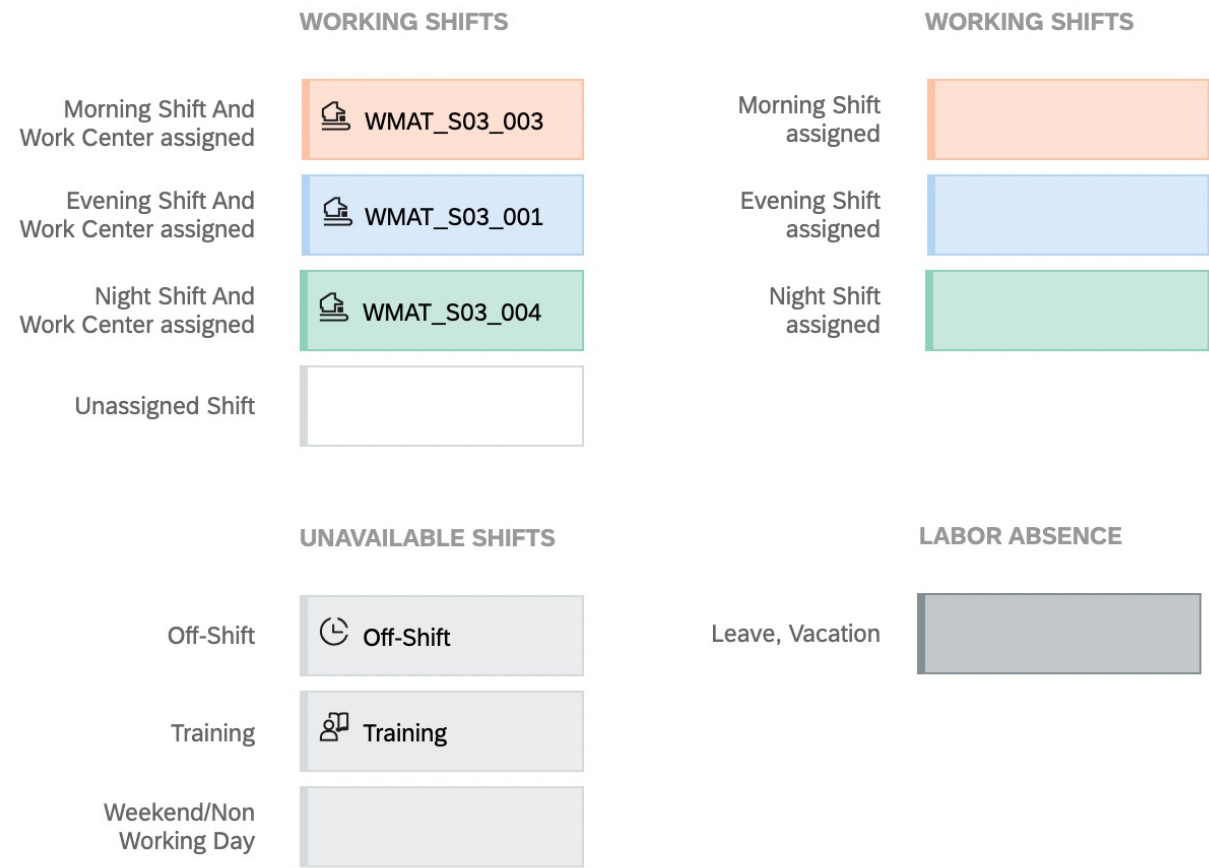
With this design for Shift Plan (screenshot on left), the 2 core requirements are met.

| Labor (12) Teams (3)     |   |            |               | Today < January 2018 > |                        |                        |                        |                      |                        |        |
|--------------------------|---|------------|---------------|------------------------|------------------------|------------------------|------------------------|----------------------|------------------------|--------|
| <input type="checkbox"/> | Name  | Allocation | Qualification | Mon 06                 | Tue 07                 | Wed 08                 | Thu 09                 | Fri 10               | Sat 11                 | Sun 12 |
| <input type="checkbox"/> |  John Smith<br>R12434      | 80%        | CNC Operati   | WMAT_S03_003 Morning   | Off-Shift              | WMAT_S03_003 Morning   | WMAT_S03_001 Afternoon | Training             | WMAT_S03_001 Afternoon |        |
| <input type="checkbox"/> |  George Foreman<br>R12434  | 80%        | CNC Operati   | WMAT_S03_001 Afternoon | WMAT_S03_001 Afternoon | WMAT_S03_001 Afternoon | WMAT_S03_001 Afternoon | Training             |                        |        |
| <input type="checkbox"/> |  Jacob Hatcher<br>R12434   | 80%        | CNC Operati   | WMAT_S03_001 Afternoon | WMAT_S03_001 Afternoon | WMAT_S03_001 Afternoon | WMAT_S03_001 Afternoon | Training             |                        |        |
| <input type="checkbox"/> |  Paul Smith<br>R12434      | 100%       | Tool Operato  | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning |                        |        |
| <input type="checkbox"/> |  Richard Muller<br>R12434  | 100%       | Tool Operato  | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning |                        |        |
| <input type="checkbox"/> |  John Doe<br>R12434        | 100%       | Packer        | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | WMAT_S03_003 Morning |                        |        |
| <input type="checkbox"/> |  Samson Orval<br>R12434    | 100%       | Packer        | WMAT_S03_003 Morning   | WMAT_S03_003 Morning   | Off-Shift              | WMAT_S03_003 Morning   | WMAT_S03_003 Morning | WMAT_S03_003 Morning   |        |
| <input type="checkbox"/> |  Tyron Boniface<br>R12434 | 40%        | Packer        | WMAT_S03_004 Evening   | WMAT_S03_004 Evening   |                        |                        |                      |                        |        |
| <input type="checkbox"/> |  Devon Gerald<br>R12434  | 60%        | Tool Operato  | WMAT_S03_004 Evening   | WMAT_S03_004 Evening   | WMAT_S03_004 Evening   |                        |                      |                        |        |

High fed mock-up showing Labor Schedule in a Planning Calendar (Final Design)

# SHIFT VISUALIZATIONS

- 1. To keep the visualization easy for Labor to understand, Shift allocations are assigned different colors.
- 2. The colors also aid the Supervisor to quickly identify unassigned and unavailable Shifts, so as to ensure Labor is optimally allocated.
- 3. These colors are customizable by the Supervisor in case they have any internal semantics for the Shift colors.
- 4. The Slots are designed to convey 11 different types of information to the Supervisor (listed on the right).







SOLUTION 2

# LABOR ASSIGNMENT

How can I use the Labor Schedule visualization for the Supervisor to plan and assign Shifts and Work Centers to Labor?

# LABOR ASSIGNMENT

Designing the process of Labor assignment was evolutionary that improved overtime with feedback from our Users.

The initial design had an 'Edit' mode for the Calendar (Flow A). As the app was intended to be used by Supervisors and Labor, I added the 'Edit' mode that was only accessible for Supervisors. The Labor can only see the Schedule and 'Edit' mode would be disabled for them.

Usability tests showed the Supervisor found this 'Edit' mode to be tedious and unnecessary. The Users requested to initiate the assignment process directly onto the calendar without having to go into an 'Edit' mode.

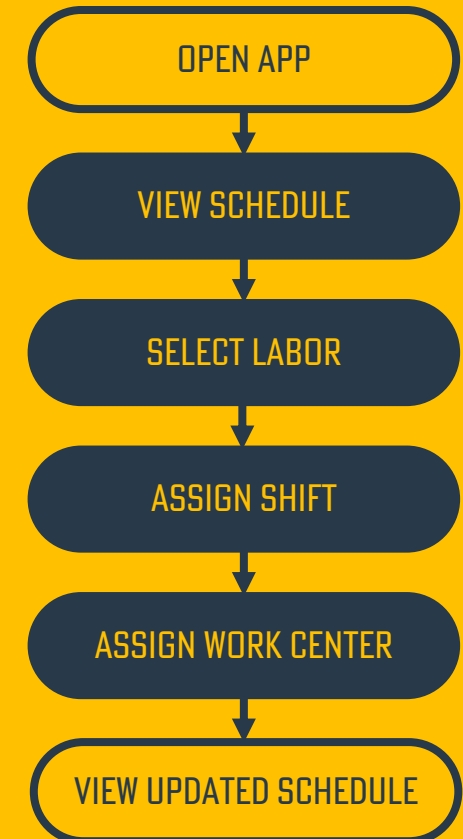
With this feedback I had come up with a solution of having **two separate apps** – one for the Supervisor and a different one for the Labor.

The Supervisor app has direct assignment of Shift and Work Center without any edit mode (Flow B) and the Labor app will only see the schedule .

Labor Assignment **Process Flow A**  
(Early Version)



Labor Assignment **Process Flow B**  
(Final Version)





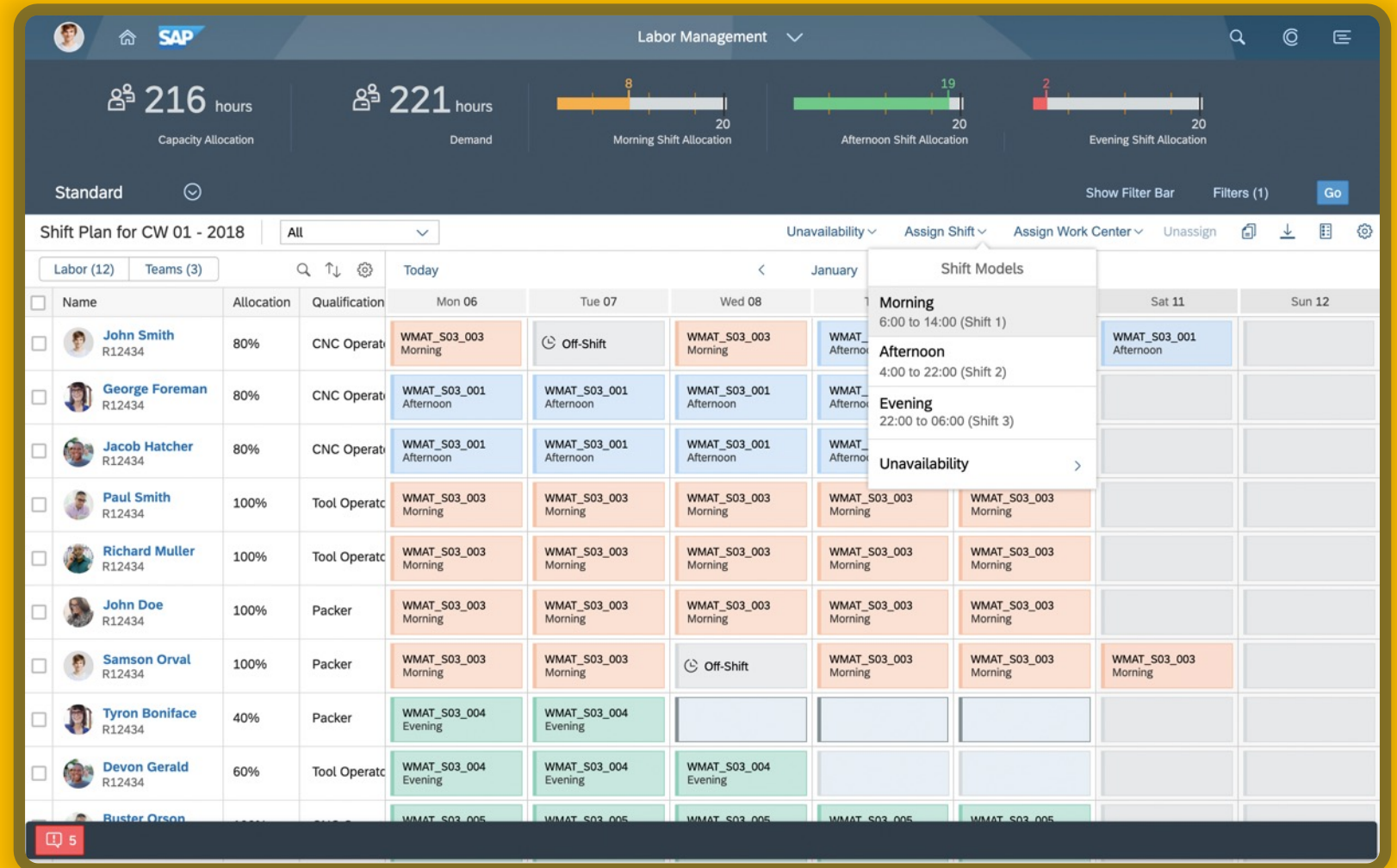
# SHIFT ASSIGNMENT

The advantage of the using the Planning Calendar was the interactive capabilities that it came with.

To assign Shift to Labor, the Supervisor can select the Slots for assignment and click on 'Assign Shifts' in the toolbar. A popover with the Shift Models is shown for assignment. Unavailability is chosen if the Labor is on leave that day or have other commitments.

Right-clicking on selected Slots will give a context menu for quick assignment of Shifts without having to go to the toolbar.

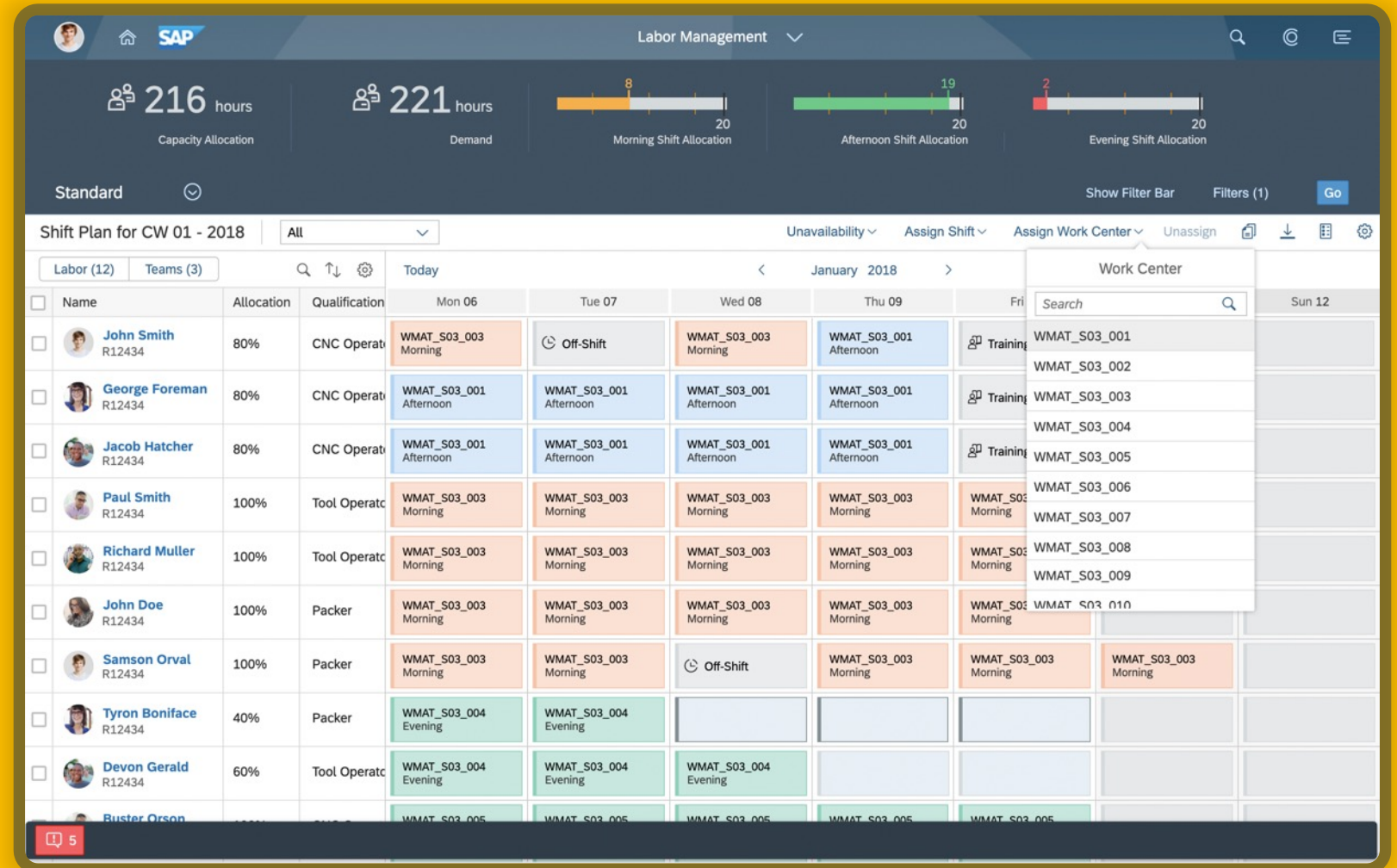
Later versions of Labor Management app would be able to sync directly with the HR system to fetch the Unavailability of Labor and update the schedule in the app automatically.



# WORK CENTER ASSIGNMENT

Once the Shifts are assigned to Labor, the Supervisor can select the required Slots and click on '**Assign Work Center**' button on the toolbar to see the list of Work Center to assign.

Right-clicking on selected Slots will give a context menu for quick assignment of Work Centers without having to go to the toolbar.





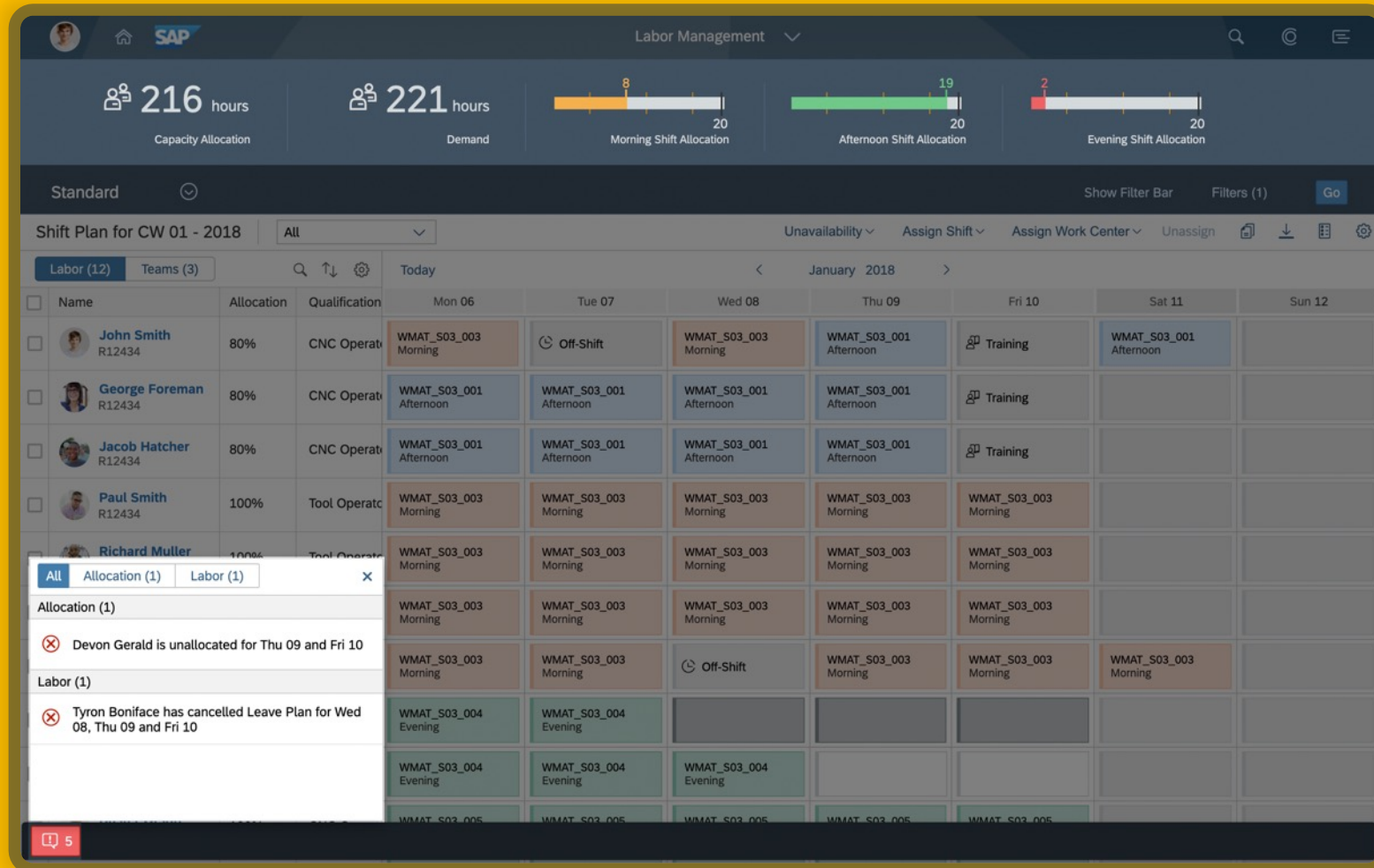
SOLUTION 3

## MITIGATE SHORTAGES

How to inform the Supervisor about  
Labor unavailability to assign an alternative Labor?



# ALERT BOX & KPI HEADER



In order for the Supervisor to be informed of Labor unavailability or shortage of Labor in a particular Shift, I had designed an Alert box and a KPI bar:

## ALERT BOX

All alerts of Labor Management that a Supervisor needs to take action on is listed in this box that is triggered from a button in the footer.

## KPI BAR

The KPI bar is a mini-dashboard on top of the UI. It has a summary of all key KPI's for that calendar week. It gives an overview of the Shift Allocations and the Shopfloor demand needs to be met through Shift Allocations.



## SOLUTION 4

# REO INTEGRATION

How to include the dimension of Labor and find a relation between Labor, Resources and Orders and present it in REO?

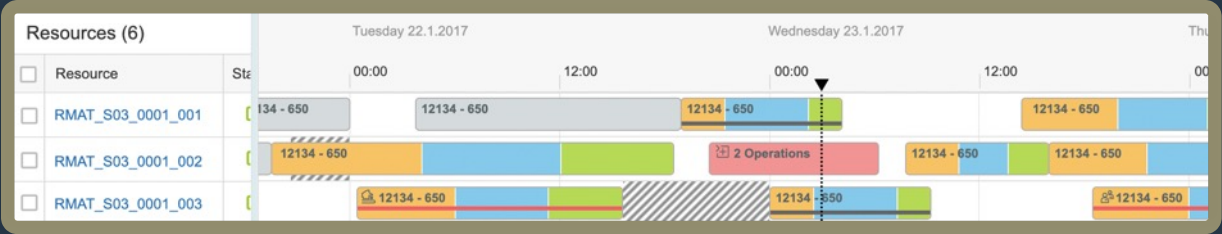
# REO INTEGRATION

Resource Orchestration (REO) is the Supervisors primary app to Plan, Monitor and Manage factory Resources and ensure it is running at optimum utilization. REO is driven from a Resource point of of view represented by a Gantt Chart with Resources and Operations.

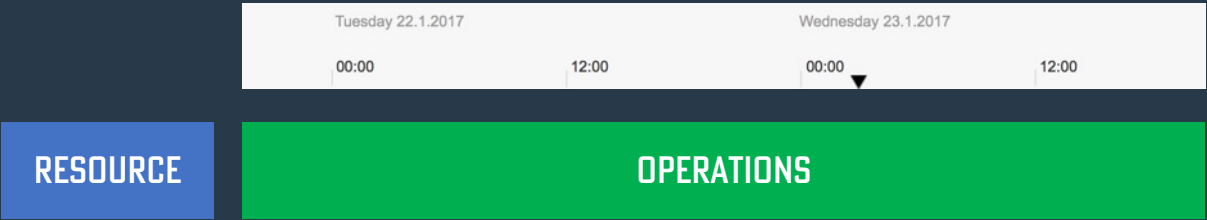
The challenge was to figure out how Labor is related to Resources and Operations and how this information could be presented in an already complex UI.

After discussions with Users and Product team, I designed a new Information Architecture that established a visual relation between Resources, Operations and Labor. Based on this, I determined that the commonality between a Resource and Labor will be the Time Axis of the Gantt Chart:

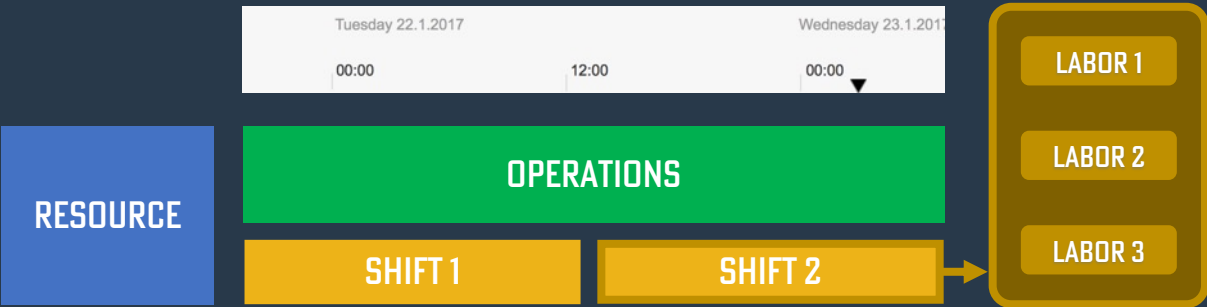
Each Resource has different Shifts that can be plotted on the same Gantt Time Axis (where Operations are already mapped to). These Shifts can show what Labor is being assigned to it (as a list), thereby show - which Labor is working on which Resource, at any given time.



REO with Gantt Chart showing Resources and Operations



Information Architecture showing relation between Resource, Operations and Time Axis



Information Architecture showing relation between Labor and Resource using Time Axis and Shift blocks



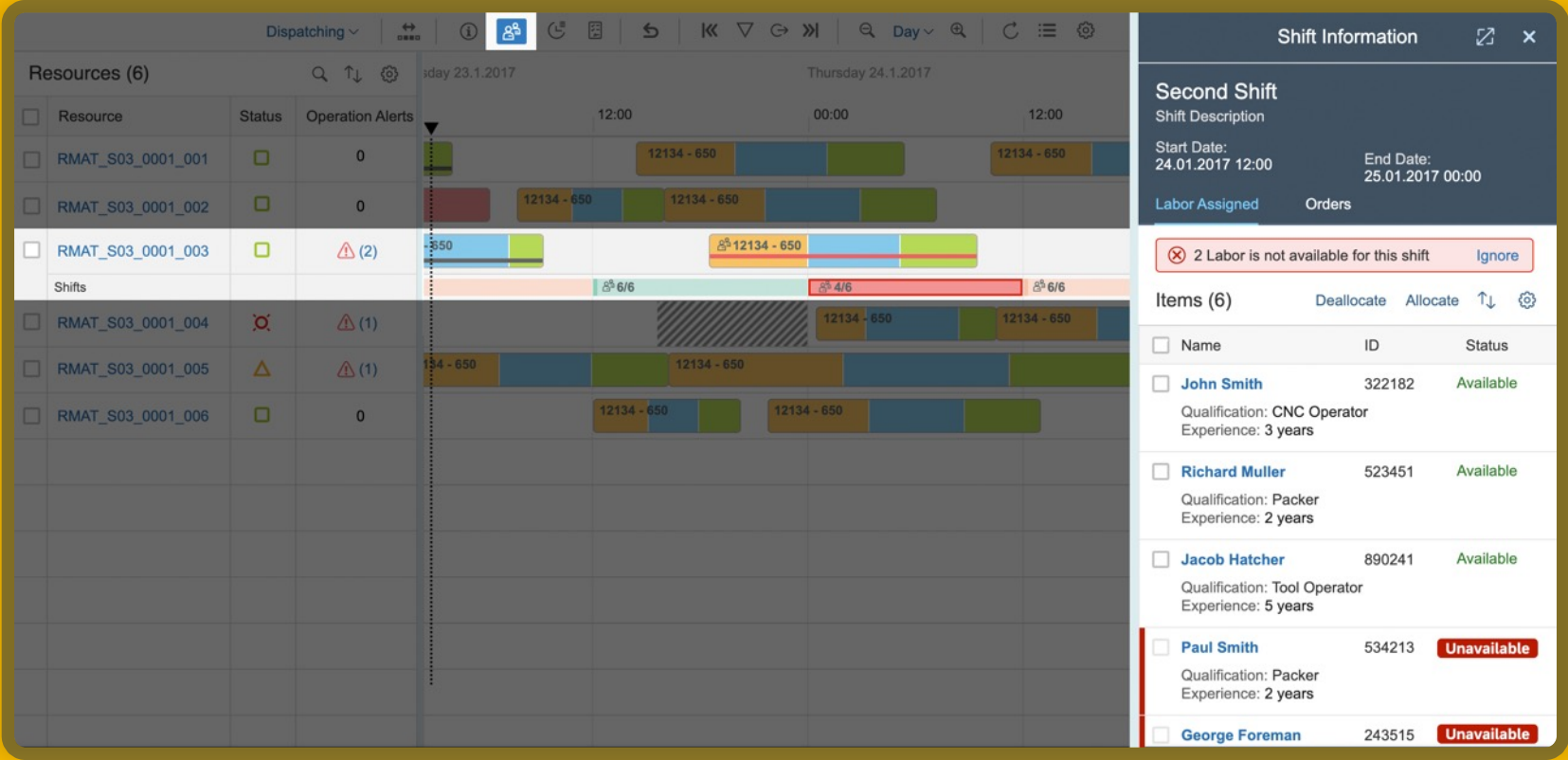
# REO INTEGRATION

To integrate this new Information Architecture in REO, I added a new row below the Resource line that shows the Shift blocks and this can be opened when needed.

The Supervisor can open this Resource-Shift view by either clicking on an Operation that indicates ‘Labor Issue’ or by selecting Resource(s) and then clicking on the Labor icon in the toolbar.

The Shift blocks can show Labor allocation and the colors can indicate any shortage status.

Clicking on a Shift block opens the side panel that lists all the Labor and their information that is currently assigned to that Shift.



REO integration of Labor Management

# USABILITY TESTS

After the design was finalized, we conducted a round of Usability Tests in our Waldorf lab. I had prepared a script based on the primary use-cases that contained 3 scenarios with Tasks and Questions. The test was conducted on 10 users from 5 SAP customers and yielded the following major results:

1. The Users gave good feedback to the general usability of the Planning Calendar.  
The visualizations were extremely useful to quickly get an overview of the Shift assignment and they were also happy with the fact that the colors are customizable.
2. One of the major drawbacks highlighted during the test was the 'Edit' mode for Labor assignment. As the app was intended to be used by Supervisors and Labor, the 'Edit' mode that was only accessible for Supervisors. This 'Edit' mode turned out to be tedious. Users requested to initiate the assignment process directly onto the calendar without having to go into an 'Edit' mode. With this feedback I had come up with a solution of having two separate apps – one for the Supervisor and a different one for the Labor.
3. A few Users requested a 'Copy Shift Plan' that allowed a Shift Plan to be copied to future Calendar weeks. This feature was later added to the app.

Formative Usability Test Script DRMO

**SCENARIO 1**

*John Smith is on Training on 23/Feb/2018. Please change the data correspondingly.*

**Task:**  
*Edit the Shift Plan*

Formative Usability Test Script DRMO

**SCENARIO 2**

*Jacob Hatcher is now required for shift 3 in CW 9. Adjust this correspondingly.*

**Task:**  
*Edit the Shift Plan*

Formative Usability Test Script DRMO

**2. BACKGROUND SCENARIO**

You are the Production Supervisor at your company. Your main job responsibility is to Plan, Monitor and Manage the Shop Floor Resources that you are responsible for including Labor and react to events on the shop floor.

**3. TASKS**

**SCENARIO 1:**

**Shift Planning for the Operators:**  
For CW8, the assignment is already done. Please now continue with the assignment for CW9. As part of your first tasks for the day, you must assign 2 labors to shift 1, 2 labors to shift 2 and 2 labors to shift 3 followed by assigning these Labors to Work Centers based on the information below:

**Task:**  
*Create a new Shift Plan for CW9 by assigning labors to Shift and Work Center. After creating the new plan, copy this Plan from CW9 to CW10 by selecting any day of this week.*

**Follow-up questions**

1. What do the colors in the calendar mean to you?
2. How easy was it for you to assign the Shift and Work Center to the Labor?

**Post-task questions**

3. How relevant was this task for what you do?
4. How easy or difficult was it for you to perform this task?
5. How satisfied are you with the application after performing this task?

1 Not relevant 2 3 4 Neutral 5 6 7 Very relevant

1 Very difficult 2 3 4 Neutral 5 6 7 Very easy

1 Not satisfied 2 3 4 Neutral 5 6 7 Very satisfied

SAP

5