

RESOURCE ORCHESTRATION

DESIGNING SIMPLICITY FOR COMPLEXITY

A UX CASE STUDY BY

KRISHNAN VIJAYARAGHAVAN

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*“Simplicity for me is more
information upfront that enable
faster decisions”*

- an SAP User during our usability tests

An aerial, top-down view of a large industrial complex, likely a refinery or chemical plant. The facility is composed of numerous interconnected structures, including tall distillation columns, large horizontal storage tanks, and a dense network of pipes and walkways. Several tall smokestacks are visible, some emitting plumes of smoke or steam. The overall scene is industrial and complex, with a dark, monochromatic color scheme overlaid with a semi-transparent dark layer to accommodate the text.

1. PROJECT OVERVIEW



PROJECT OVERVIEW



WHO : THE UX DESIGNERS:

Primary: Krishnan Vijayaraghavan

Secondary: Sameep Jayant, Vaibhav Vyas

UX Hub Lead: Rajassekar Balasubramanian



COLLABORATION:

Users (Production Supervisors)

Product Owner

UI Developers



WHERE : PRODUCT AREA:

Manufacturing (Planning)



SKILLS:

Interaction Design

Data Visualization

Accessibility

Usability Tests



PROJECT TIMELINE:

JUN 2017

User Workshop with Users
At Waldorf, Germany

Fortnightly calls with
User/Customer for feedback

Weekly Sync with
Product and Dev team

FEB 2018

Usability Testing

MAR 2018

Product Release



2. THE PRODUCT

BACKGROUND

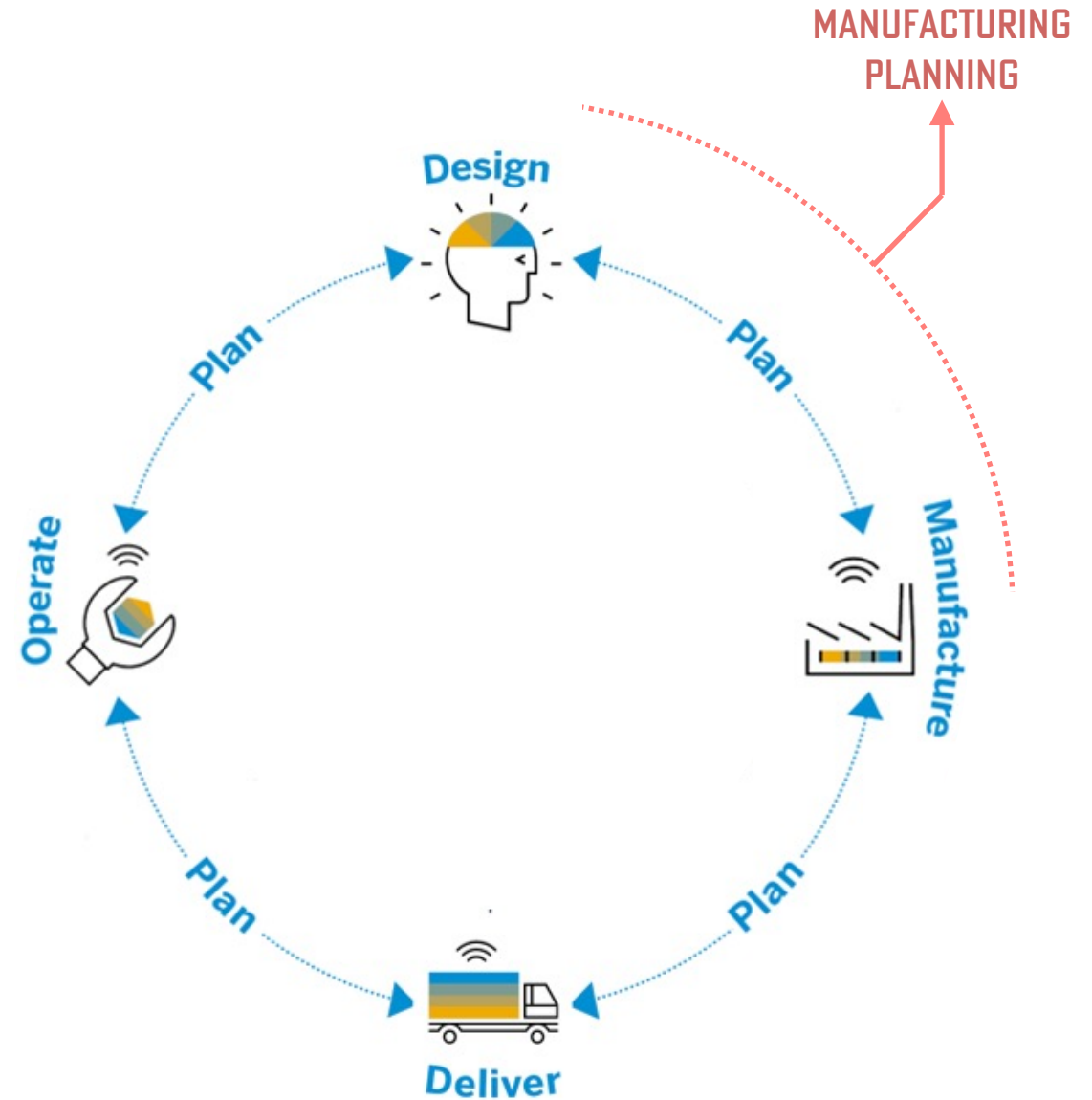
MANUFACTURING PLANNING:

The device from which this is being read. The chair that we sit on. The food that we eat. Pretty much everything around us. All of this is brought together by a vast and complex supply chain that requires meticulous planning at every step of the way.

Manufacturing Planning is one of the crucial aspects of this planning. A Factory shutdown due to a strike could result in product delays by months and lead to immense loss for its stakeholders.

Therefore, a **Production Supervisor** of a Factory has to plan the Shopfloor Resources carefully and resolve issues quickly.

This is where **REO** comes in. **REO** assists a **Production Supervisor** to plan Factory Shopfloor Resources and ensure that its production will run without any disruptions at optimum efficiency.



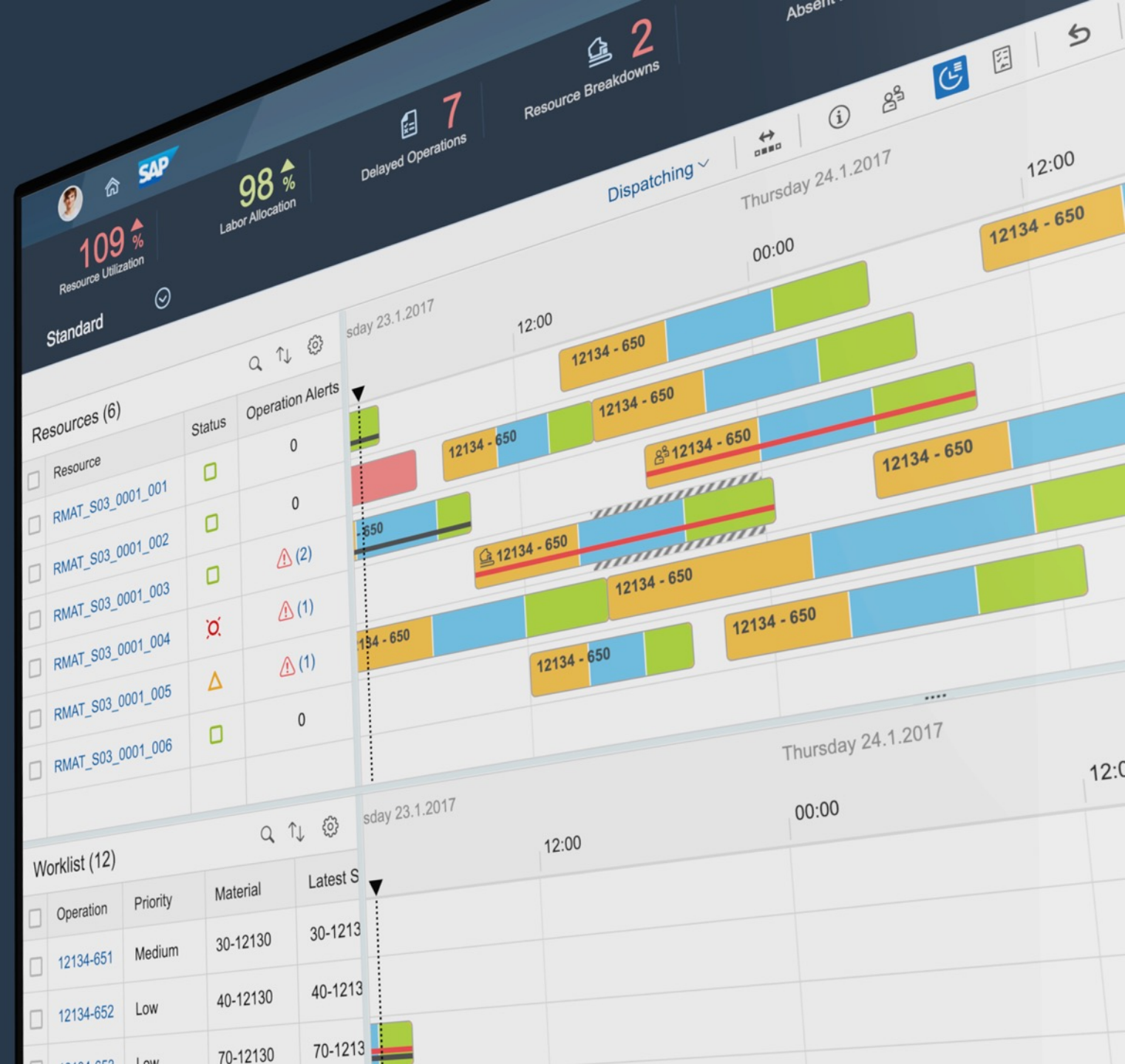
WHAT IS REO?

Resource Orchestration (REO) is SAP's one stop solution for **Production Supervisors** of a Manufacturing Plant to manage complexities of the Factory Shopfloor.

It assists the Supervisor to **Plan, Monitor** and **Manage** factory Resources and ensure it is running at optimum utilization. These 'Resources' could be Production Lines, Labor and Tools that are required to execute Production Orders.

It is a cloud based web application and one of the important systems under SAP's Digital Manufacturing Cloud suite that was first introduced in February 2018.

More Info: [SAP REO](#) [Trebing Himstedt](#)
Demos: [Trebing Himstedt](#) (German)
[Westernacher Consulting](#)



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:



1. PLAN

Plan and dispatch Production Orders to Factory Resources based on their availability and ensure the factory is running at optimum utilization.



2. MONITOR

Identify issues that disrupt the execution of Orders like missing Labor, Resource breakdowns etc. and delay Production.



3. MANAGE

Mitigate issues and modify the Plan by rescheduling Orders to alternate Resources, allocate alternate Labor to execute the Order etc.

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



3. DESIGN PROBLEM

USER RESEARCH

Considering the complexity of the product, I pushed for User Engagement from the start and validated every step of the design process through the following exercises:

User Workshop – To understand ‘How a cloud app could assist a Production Supervisor in running a Shopfloor’, we began with a workshop in Waldorf, Germany with interested customers from the manufacturing sector (listed on the right). I ran interviews with Users to gather insights that were later categorized and prioritized. This became the core requirements of REO.

Factory visit – We visited one of the Factories of Ebmpapst (a global manufacturer of fans) to study the Shopfloor environment and how Supervisors manage their Shopfloor Resources.

Fortnightly calls – Every design proposal was presented to Users for feedback through bi-weekly calls. This was useful as I could validate different concepts and their feedback was instrumental in the final design.



Endress+Hauser

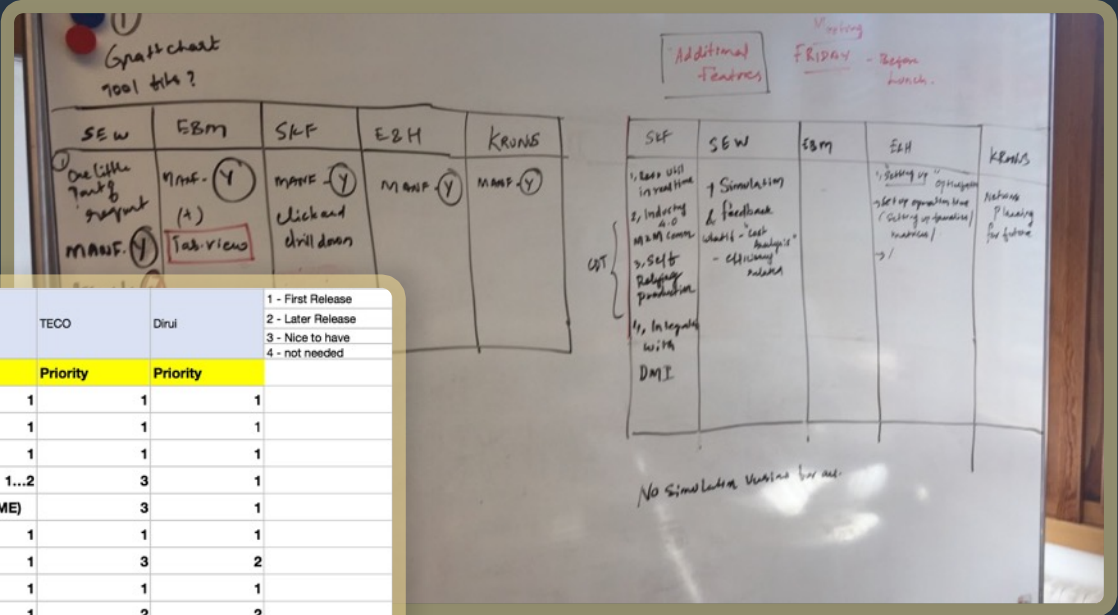
USER RESEARCH

General Questions		Krones	Endresst Hauser	S K F
Expectations	What are your current pain points on shop floor scheduling?	Manufacturing is important. What orders do I have to do today? Did he do the 10 or did he do something else? Some times orders are late. We need to know why? Is it a material problem? Who is responsible for it? Is it a purchase problem? Who and why is it late? If there is a problem, who and why is the problem?	No overview of the workload, the capacity situation, live status of the resources, the utilization of the resource and future information as well. Information on the resource - list of orders running on it.	Orchestration between the systems. Preparation - he needs to to did all the materials have arrived? Is it arriving? Situation on the shopfloor - The tools are ready to be used. Progress - basic KPIs - OE visualisation. State of the machines, Progress tracking. Insights in to the cross functional. The shop order is released and there is system breakdown, what can be done afterwards?
	Please list your main expectations (-3) on the tool?			Preparation - he needs to to did all the materials have arrived? Is it arriving? Situation on the shopfloor - The tools are ready to be used. Progress - basic KPIs - OE visualisation. State of the machines, Progress tracking. Insights in to the cross functional. The shop order is released and there is system breakdown, what can be done afterwards?
Questions on the production supervisor				
Role related Questions	How do you do Shop floor dispatching/monitoring today (hardware, software)?	Planning system - every night it is done by the system - a lot of people do not do it. The goal is to achieve 95% of what is planning. They use SAP system in the morning. Take print outs to see what they need to do. Manually programed excel charts. (Workload, understand the task) Planning is done on machine capacity. Capacity Planning is very important for planning. A lot of it is done on Excel.	They do not have a detailed scheduling tool. Standard SAP ERP system to get the list for the next day. Get the priority list from this. Make to Order to process - Customer decides the delivery date for the order. The information from ERP is maintained in an Excel.	Several scenarios depending on the business. Machine capacity, human resources, is developed internally (Excel tools, SQL databases) for planning. Production with ME - sequence is given to planning. Material - status is needed. PPDS is used for detail scheduling. 27000 orders are planning using PPDS. Only half the orders are planned on it due to the techniques in the production.
	How many resources/capacities the supervisor is responsible for?	850 resources in the system. In the average 77 resources. Print out the schedules for all the resources everyday.	20 capacities .	3 channels - each has 5 machines. Around 20.
	How many orders/operations he has to handle?			
	Please describe his main tasks...	Machine breakdowns - change the capacity accordingly. Labor rescheduling based on the availability. More orders through the year - manage the overload situation.	same.	conditional release. Closing of the orders.
	What triggers him to make adjustments to the plan?			

Interview Questions with Supervisors and Customers

USER RESEARCH

CUSTOMER NAME:		Krones AG	E&H Conducta	ebm-papst	SEW-Eurodrive	SKF	TECO	Dirui	1 - First Release 2 - Later Release 3 - Nice to have 4 - not needed
Functionality	Function	Priority	Priority	Priority	Priority	Priority	Priority	Priority	
Scheduling	Allocate / deallocate	1	1	1	1	1	1	1	1
	Insert operation	2	1	2	2	1	1	1	1
	Find slot	2	1	2	1	1	1	1	1
	Infinite planning	2	1	1	2	1...2	3	1	1
	Interrupt already started operation	1	2	1	1 (for SAP ME)	3	1	1	1
	Split operation	2	3	3	3	1	1	1	1
	Merge operations	2	3	4	4	1	3	2	2
	Propagate operations within one specific order	2	1	1	1	1	1	1	1
	Propagate operations along several orders	2	1	2	2	1	2	2	2
	Snap to shift	2	1	2	2	3...4	2	2	2
	Split orders	2	3	2	2	1...2	1	1	1
Shifts	Heuristics	2	1	2	2...3	2...3	1	1	1
	Visualize Shifts	1	1	1	1	1	1	1	1
	Plan Shifts	1	1	1	1	1	1	1	1
	Adjust shifts	1	1	2	1	1	1	1	1
	Simulate shifts	1	1	3	1	2	2	2	2
Labor	Availability of labor and/or teams (Number)	1	1	1	1	1	1	1	1
	Show Labor Name and Information	1	1	2	1	1	3	2	2
	Show Qualifications of labor and/or teams	1	1	2	1	1	2	2	2
	Show status for the labor (On leave/ Available)	1	1	2	1	1	2	2	2



Categorization and Prioritization of core requirements

REQUIREMENTS

Based on the User Workshop and previous User Research on the Production Supervisor, we had narrowed down core requirements of REO to be:



1. ONE STOP SOLUTION

Primary goal of REO is for a Production Supervisor to **Plan**, **Monitor** and **Manage** Shopfloor Resources and ensure production of the Manufacturing Plant is running as per the Production Plan.



2. ONE UI TO DO IT ALL

All features of REO should be accessible from a single UI. A Supervisor's decision is evaluated from **multiple perspectives** and needs crucial information upfront without navigating to different pages.



3. LABOR MANAGEMENT

Labor Management should be integrated into REO for the Supervisor to quickly mitigate Labor Shortage.



4. CUSTOMIZATION

Visualization colors in REO should be customizable, as Customers may have internal semantics attached to colors that may be different from the default colors of the design.

CHALLENGES

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



1. ONE STOP SOLUTION

How to design a system that can Plan, Monitor and Manage complex needs of a Shop-floor all from a single app and still keep it simple?

[Fiori Design recommends complex use-cases be broken into multiple apps, but User Research showed all use-cases should be possible from a single app as Users do not want to navigate to different apps for each use-cases.]



2. ONE UI TO DO IT ALL

How to show large amount of data in a single UI without drill downs or navigation to other pages but avoid information overload?

[A Supervisor takes decisions by examining Resources and Operations w.r.t Time. Operations have 16 fields of information and there could be 500 Operations to be monitored.]



3. LABOR MANAGEMENT

How to establish the relation between Labor, Resources and Orders and include the dimension of Labor in REO?

[Labor Management is a separate app, but the Supervisor still needs to act on any Labor Shortage, and find replacements directly from REO.]



4. CUSTOMIZATION

How to design a solution that lets Users customize colors used in the app and still support Accessibility?

[The design needs to ensure it is accessible despite User customizations. Minimum contrast ratio should be maintained between the visual elements. If a user accidentally chooses a dark color text and background, then the text will be unreadable.]



4. SIMPLIFYING COMPLEXITY

SIMPLIFYING COMPLEXITY

The challenges of designing an app that attempts at being a 'One Stop Solution', 'One UI to do it all' was not an easy mountain to climb. In order to make things easier for myself, I broke the whole requirements into different parts and attempted to solve each of them individually:



SOLUTION 1: ONE STOP SOLUTION

- **PLAN:** Gantt Chart for Planning and Dispatching
- **MONITOR:** Gantt Visualizations, KPI bar, Alert box
- **MANAGE:** Drag and drop interactions



SOLUTION 3: LABOR MANAGEMENT

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



SOLUTION 2: ONE UI TO DO IT ALL

- Use a progressive, contextual info view in the form of a 'Bite, Snack, Meal' to show all info on one screen



SOLUTION 4: ACCESSIBILITY

- Design a table view as an alternative view for Gantt
- Design color contrast checker to ensure readability is not affected by customization



SOLUTION 1

ONE STOP SOLUTION

How to design a system that can Plan, Monitor and Manage complex needs of a Shop-floor all from a single app and still keep it simple?

THE GANTT CHART

Based on User Research, the Production Supervisors use some form of a visual planning tool to plan their orders and were using Gantt Chart based applications.

A **Gantt Chart** is an interactive bar chart that presents time-dependent data. It can show the start and end of a particular activity and the sequence of these activities.

It is a 100 year old planning and scheduling tool that is used in Manufacturing, Defense and Project Planning.

The Gantt Chart seemed to be a good fit to solve many of the needs of a Supervisor and the Fiori Design System already has a Gantt Chart that I had used earlier while designing the **Production Scheduling Board**.

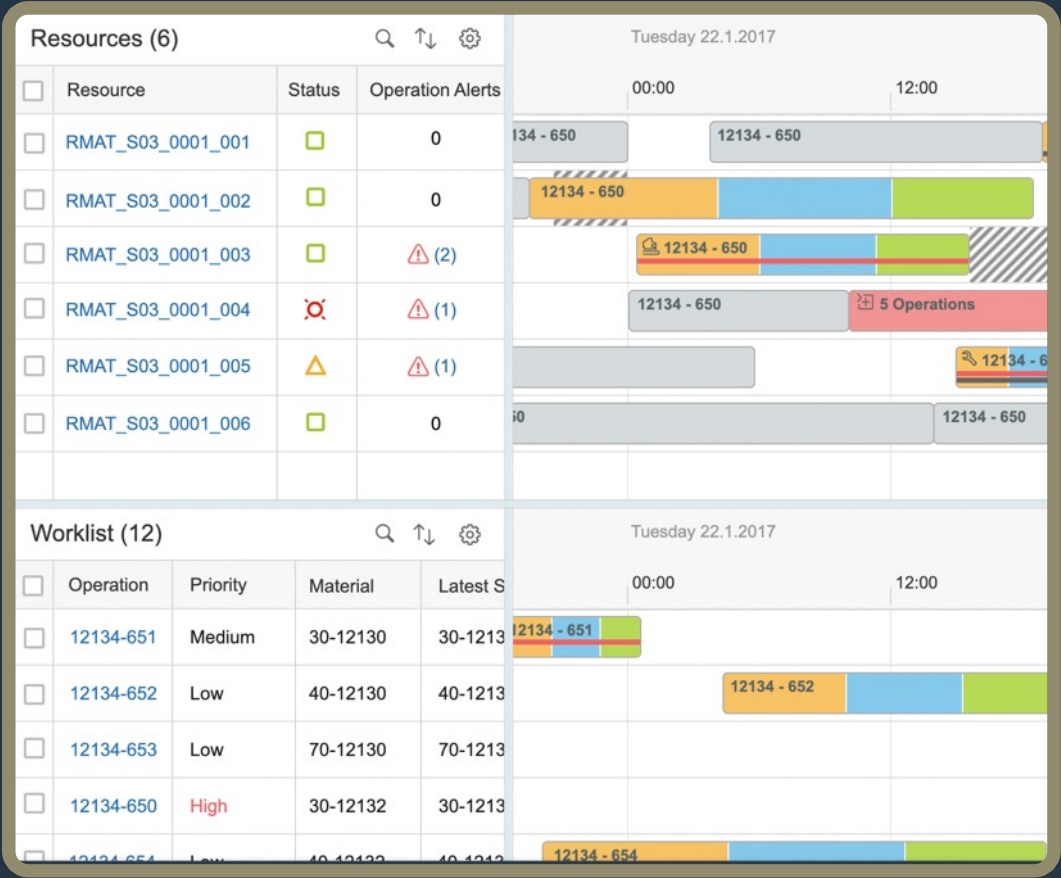
This also meant that the development team could **reuse this component** and reduce a lot of development time and resources.



Planning department bulletin board, 1911.¹

¹ Source: Wikipedia: Production Planning

GANTT FOR REO



Gantt Chart with Resources and Operations

Using the Gantt Chart, I was able to solve the first challenge: have all complex use-cases all within a single app:

PLANNING: The **Shopfloor Plan** that a Supervisor has to monitor can be displayed using a Gantt Chart where the **Resources** are listed in a table on the left. To the right, Orders are split into **Operations** that are represented as horizontal bars. The position and length of these bar reflects the start date, duration and end date of the Operation. To the top of this chart is a Time scale. An additional Gantt Chart shows the **Worklist** that contains all the Operations to be dispatched onto a Resource. **Planning and Dispatching** is done by dragging these bars to a Resource in the Gantt Chart above.

MONITOR: The Operation bars needs show **16 fields of information** for the Supervisor to monitor the shopfloor operations. I designed a visualization within these bars that used colors, lines and icons to show all this information.

MANAGE: Using **drag-and-drop** feature and the Supervisor can reschedule Operations to a alternate Resource or a more suitable time later and modify the Plan to manage any issues on the Shopfloor.

GANTT ALTERNATIVES

The Gantt Chart is generally considered as a complex component to use in the Fiori Design System and it had its pros and cons.

PROS:

- All complex use-cases are achievable using the Gantt Chart
- It is a reusable component which will reduce development cost and time

CONS:

- Restricted to desktops as it needs large visual space to show information
- Require considerable amount of scrolling and zooming back and forth to see the activities scattered across a long timeline

ALTERNATIVE EXPLORATIONS TO GANTT CHART

Considering the cons, I had come up with two alternative designs to a Gantt Chart to visualize the Shopfloor Resources. The Product and Development team liked the concepts, but had decided to go with the Gantt Chart as:

- Supervisors already use large screen desktops
- The alternate designs are abstractive in its visualization where as the Gantt Chart can show accurate information
- Using a reusable component will be easier to develop and maintain



Alternative designs for Gantt Chart

GANTT VISUALIZATIONS

SHAPE DESIGN

The Supervisor can **Monitor** the situation of a Shopfloor by visualizing how Operations are running on Resources. I designed a modular method of showing 16 different types of Operation information into a single visual pill shaped bar. These bars use colors, lines and icons to indicate Operation Activity times, Alerts, Production Progress etc. These fields are:

A. Operation Basic Info:

1. Operation Duration
2. Operation ID
3. Order Number

B. Operation Status:

4. Fixed
5. Labor Alert
6. Resource Alert
7. Overlap

C. Operation Activities:

8. Setup Start Date
9. Setup End Date
10. Process Start Date
11. Process End Date
12. Teardown Start Date
13. Teardown End Date
14. Production Progress

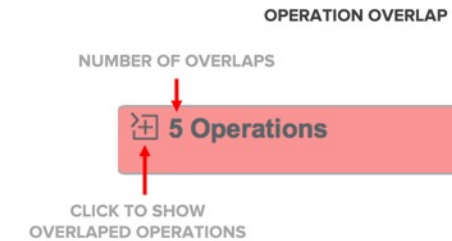
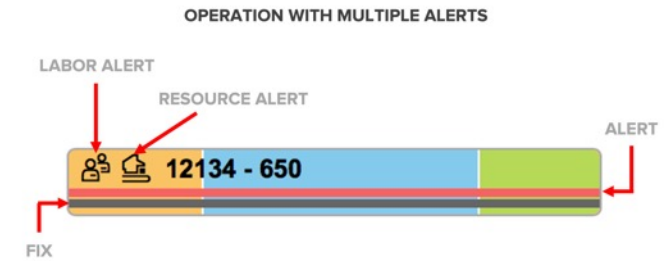
D. Resource Status:

15. Capacity Downtime
16. Non-working Time

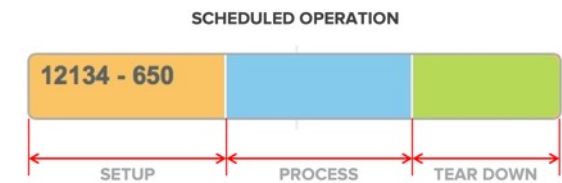
A



B



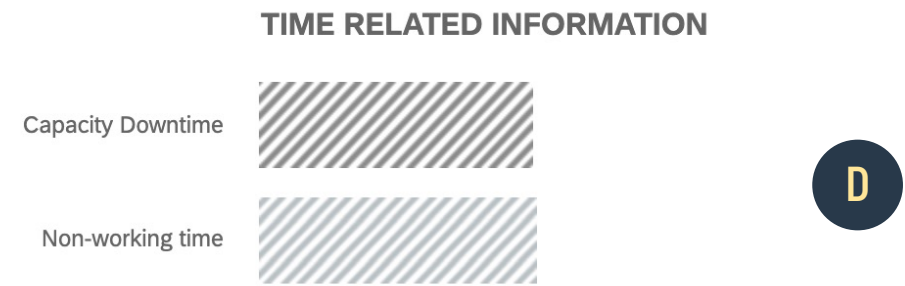
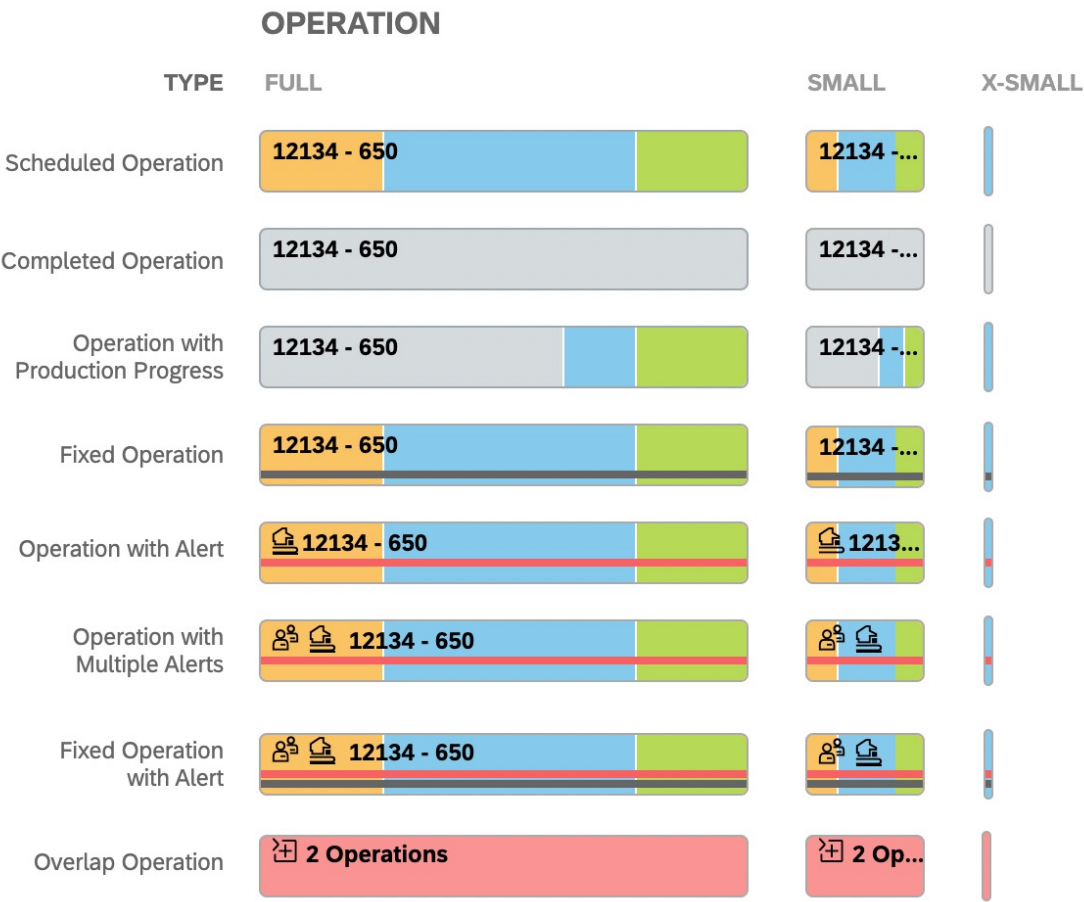
C



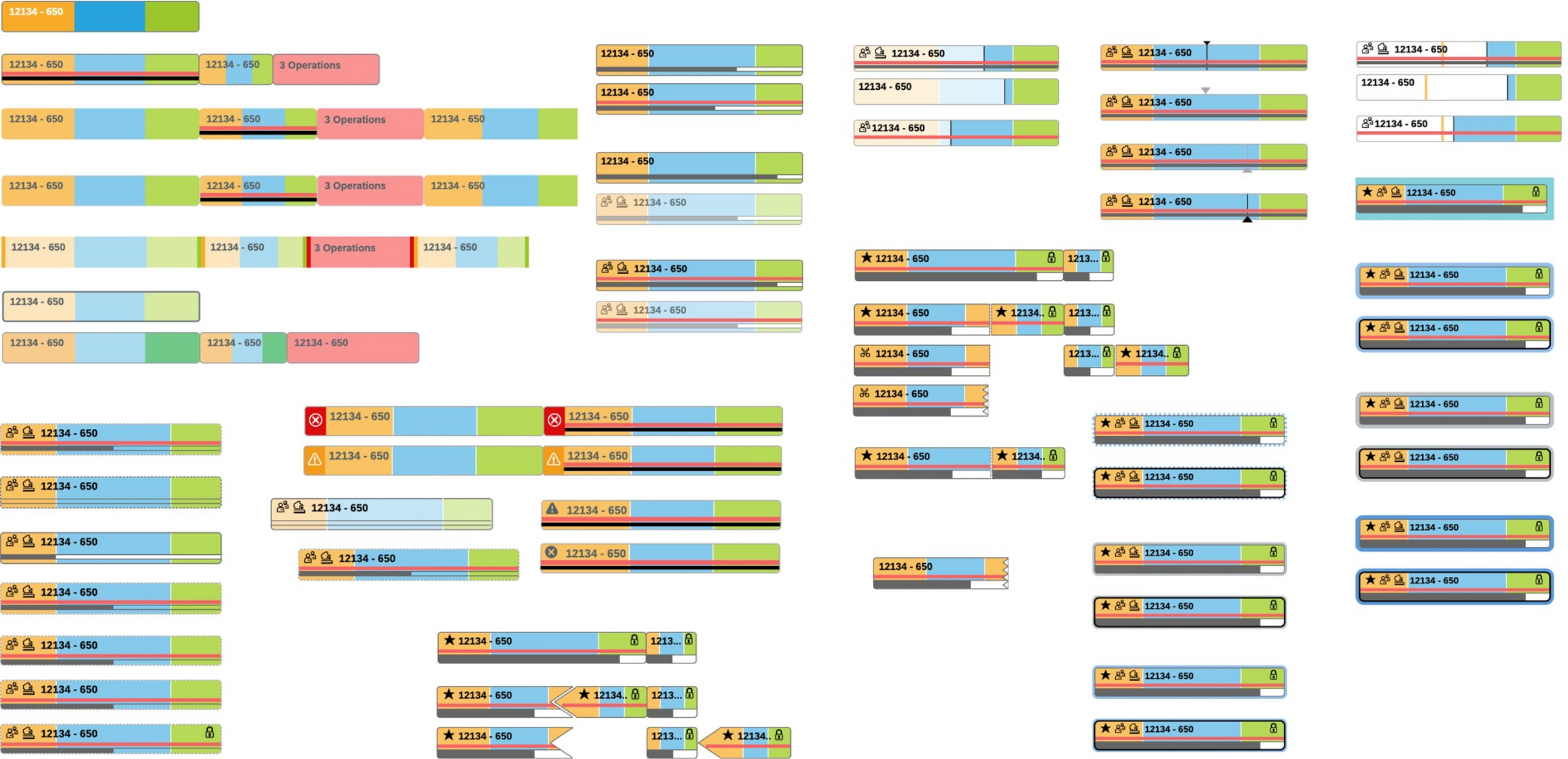
GANTT VISUALIZATIONS

SHAPE DESIGN

- These bars have additional features as well:
- Has a **light border and curved corners** to easily distinguish different shapes when they are placed next to each other
 - **Responsive in nature** (Full, Small and X-Small) as they still need to show information even when zoomed out
 - To avoid the bar from disappearing when the chart is fully zoomed out, it has a **minimum width** to indicate its presence so that the Supervisor does not miss out on Operations with a short duration
 - Usage of **status lines that span across the bar** for 'Alert' and 'Fix' status ensures that it is visible at every zoom level
 - Using **hatched patterns** to distinguish Resource-Time related information from Operation shapes
 - Using a **Legend** view for users to refer what each color, shape, line and icon indicates



SHAPE DESIGN EXPLORATIONS



ALERTS & KPI BAR

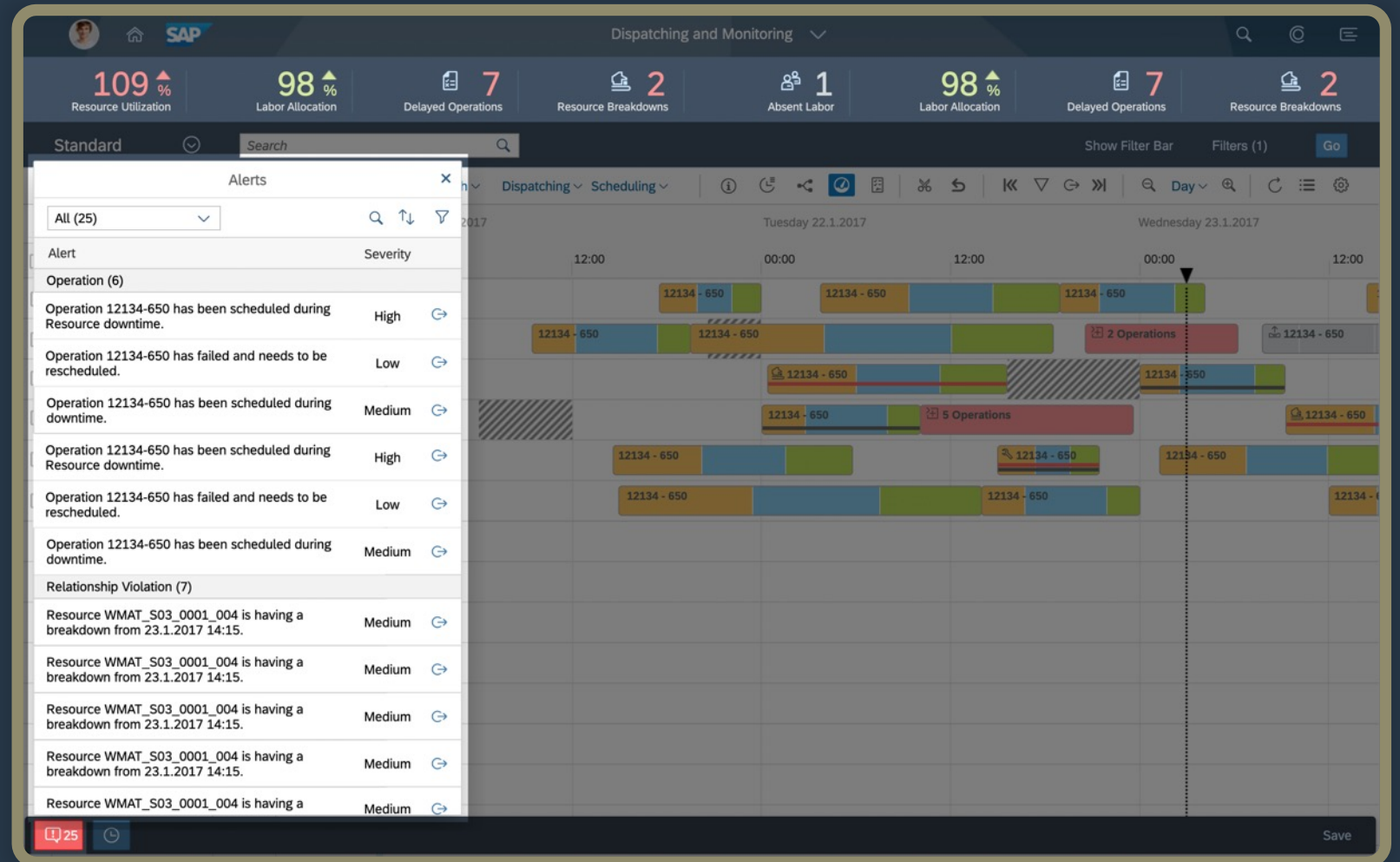
Along with Gantt Shape Visualizations to aid the Supervisor in **Monitoring** the Shopfloor, I had designed an Alert box and a KPI bar:

ALERT BOX

All alerts of REO that a Supervisor needs to take action on is listed in this box that is triggered from a button in the footer. Each alert has an icon that takes the User to the spot in the Gantt where the issue is, allowing quick resolution of the issue.

KPI BAR

The KPI bar is a new component I designed for REO that is a mini-dashboard with a summary of all key KPI's of the Shopfloor. It gives an overview of how the Shopfloor is performing and if any parameter requires optimization.

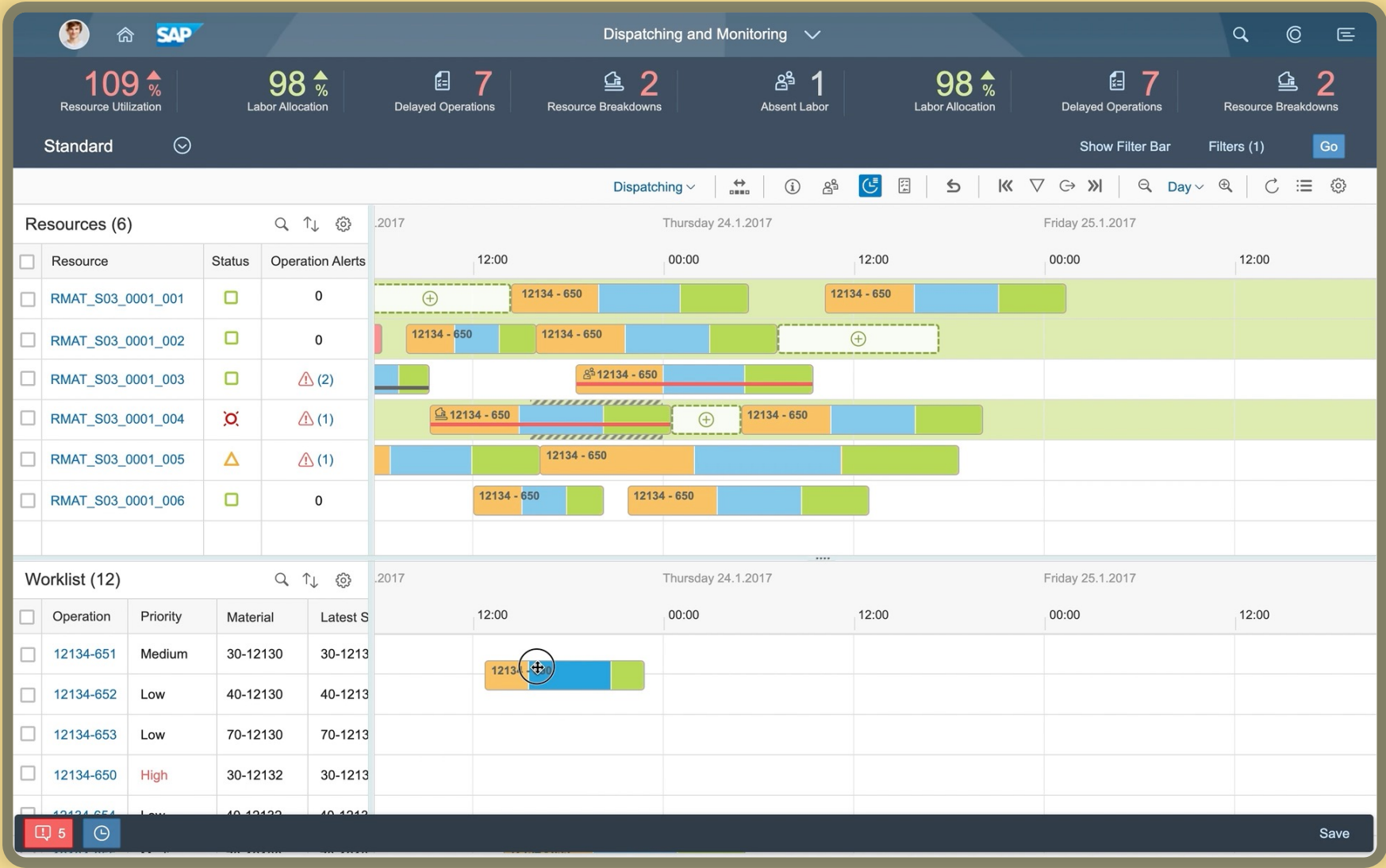


SOLUTION 1: PLANNING

Resources are listed in a table on the left of the top Gantt Chart. To its right, Orders are split into Operations that are represented by the bars. To the top of this chart is a Time scale. These two sections shows the Shopfloor Plan that a Supervisor has to monitor.

The Gantt Chart below has the Worklist that contains Operations to be dispatched to a Resource. Dispatching is done by dragging the bars to a Resource in the Gantt Chart above.

The Supervisor can dispatch a High Priority Operation by looking at the status in the Worklist table and dragging the Operation to a Resource. REO will show which possible Resource and slots when the Operation can be executed.



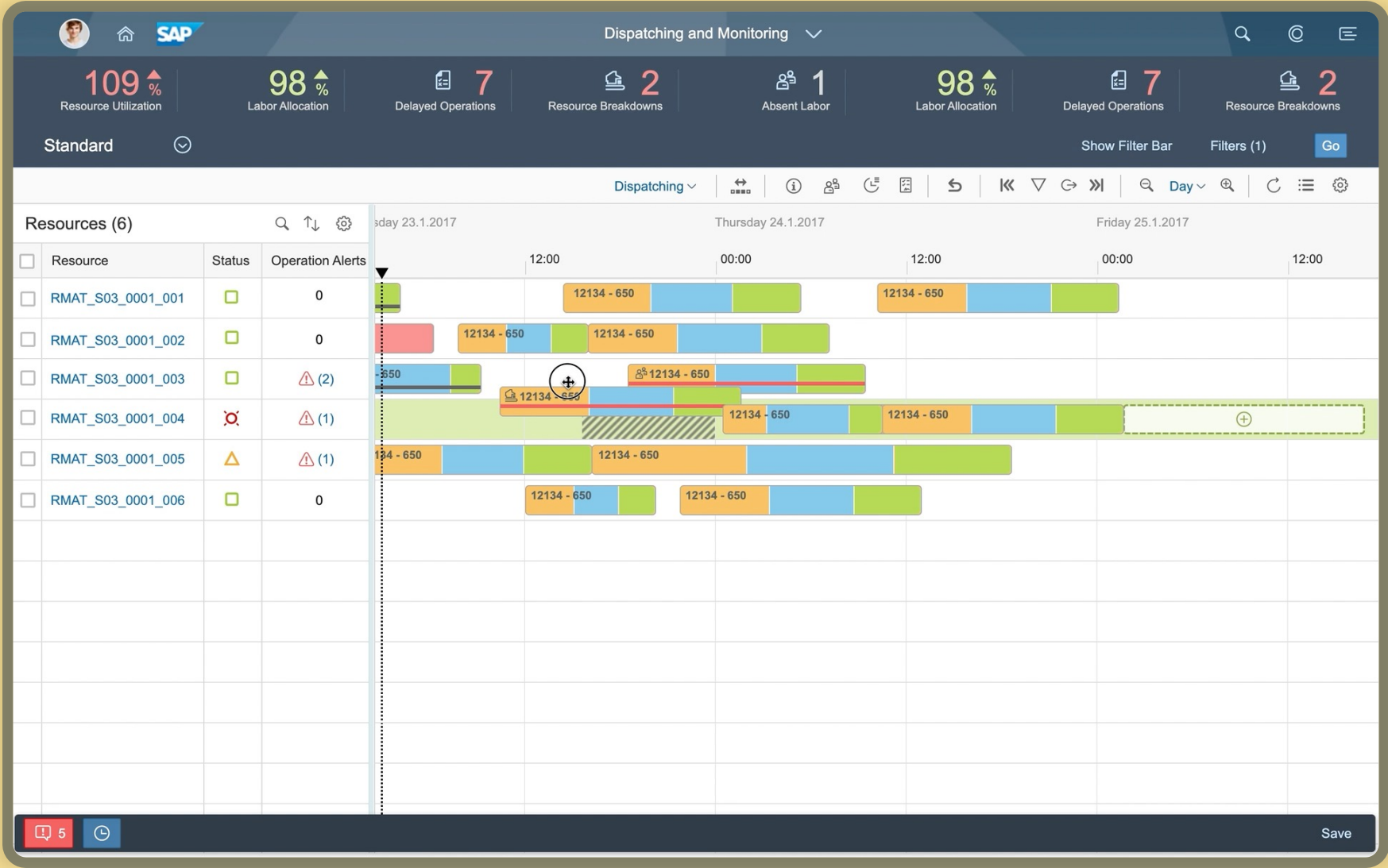
SOLUTION 1: MONITORING & MANAGING

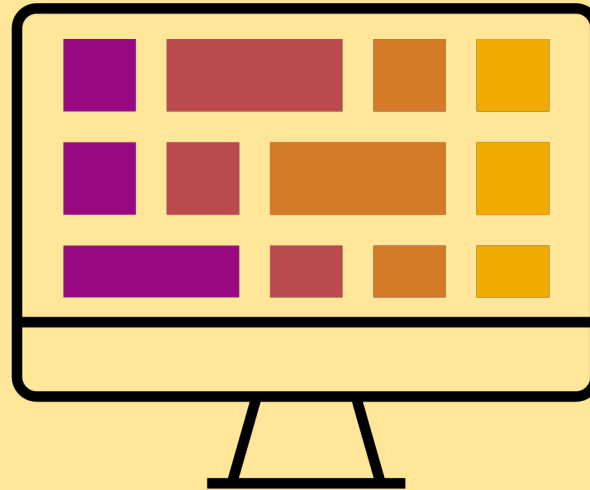
The Operation bars are designed to indicated different types of status for the Supervisor to Monitor.

A red line that goes across an Operation bar indicates an alert and the icon in the bar indicates the type of alert.

In this sample, one of the Resources has a breakdown (indicated by the black hatched pattern) and an Operation is scheduled during that time. The alert is shown on the bar and it indicates a Resource related issue.

The Supervisor notices this issue and can drag the Operation to a later time. During the drag event, REO will let the Supervisor know which would be the slot to drag to for rescheduling.



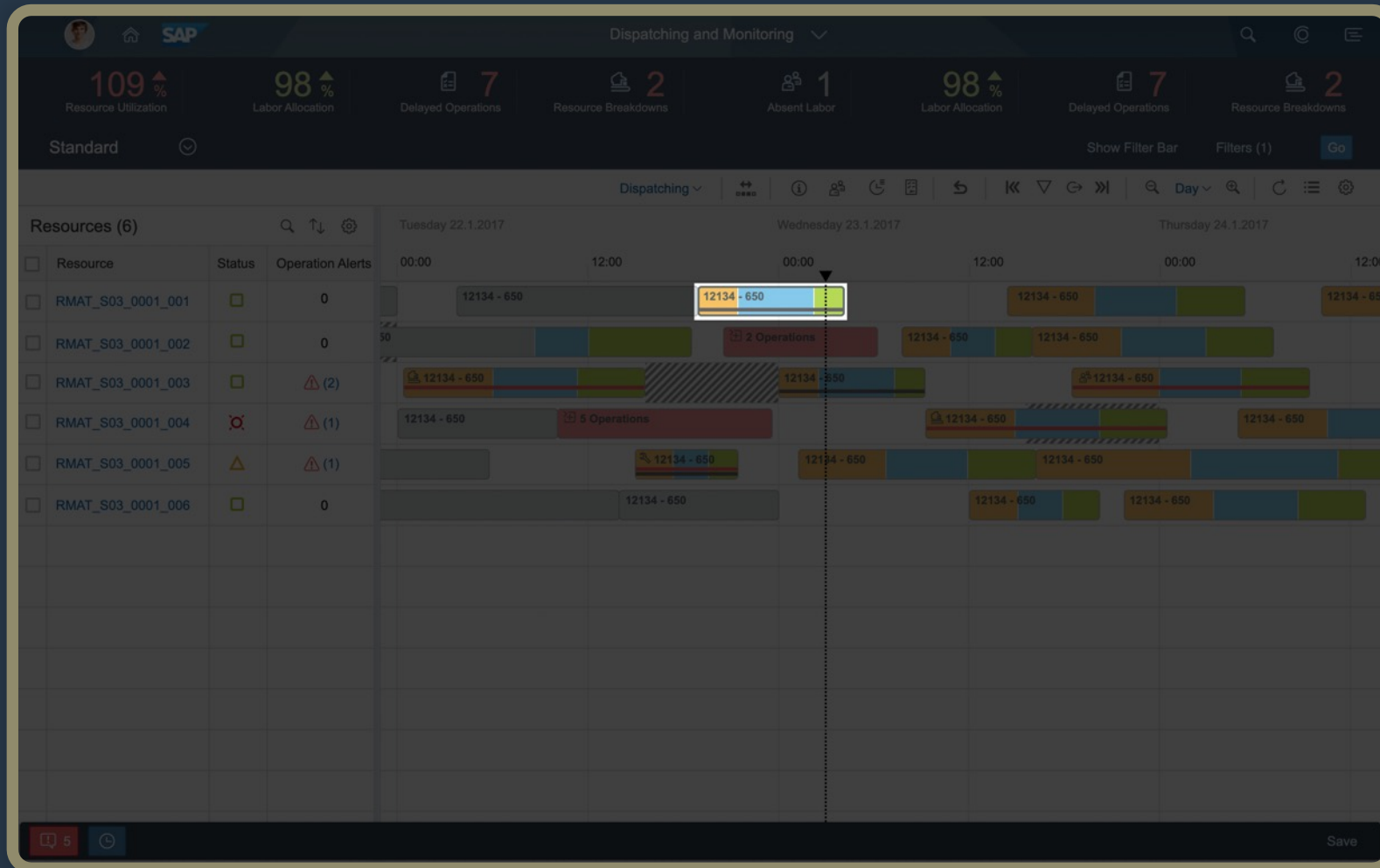


SOLUTION 2

ONE UI TO DO IT ALL

How to show large amount of data in a single UI without drill downs
or navigation to other pages but avoid information overload?

BITE, SNACK, MEAL



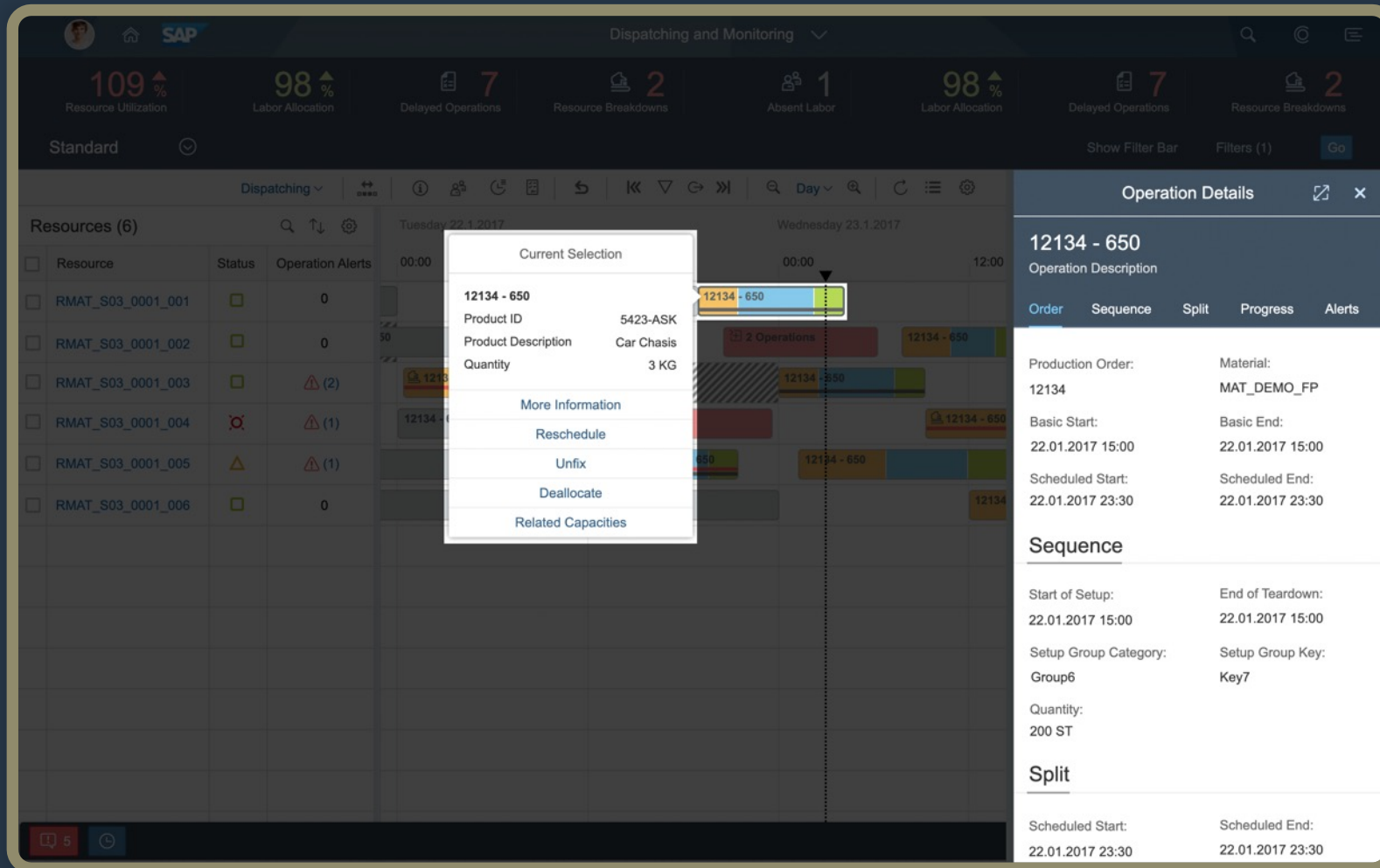
VIEWING INFORMATION

To solve the second challenge of balancing large amounts of information in a single UI and avoiding information overload, I designed a **Progressive, Contextual disclosure of Information**. I used the concept of ‘**Bite, Snack, Meal**’ to breakdown information into consumable chunks and present it progressively within the same UI.

BITE

The first ‘**Bite**’ level information is conveyed by the **Operation bar shapes** in the Gantt Chart. Each Operation is represented by a bar; its position and length reflects its start date, duration and end date. These bars use different colors, lines and icons to indicate Operation Activity times, Alerts, Production Progress etc.

BITE, SNACK, MEAL



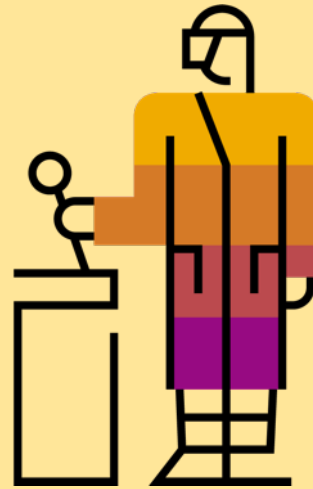
SNACK

The 'Snack' is a contextual popover that shows basic information and shortcuts to relevant actions for that Operation.

MEAL

The third level or 'Meal' is shown as a Side Panel that has complete information of the Operation. This allows users to see detailed Operation information in context with the Schedule of the Gantt Chart.

This panel is triggered by selecting the 'More Information' on the popover or selecting an Operation and clicking on the 'Info' icon in the Toolbar.



SOLUTION 3

LABOR MANAGEMENT

How to establish the relation between Labor, Resources and
Orders and include the dimension of Labor in REO?

LABOR MANAGEMENT

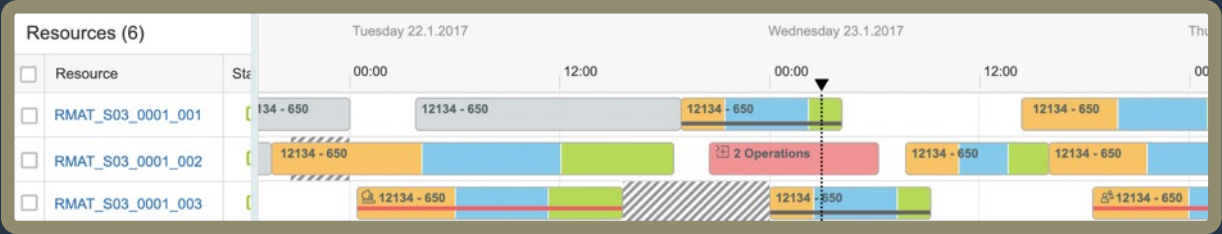
User Research and Workshops that were conducted indicated Labor Management is crucial for REO to be a viable product. REO is an app that is driven from a Resource point of view and the challenge for me was to figure out how Labor is related to Resources and Operations and how this information could be presented in an already complex UI.

After discussions with Users and the Product team, I designed a new Information Architecture that established the relation between Resources, Operations and Labor.

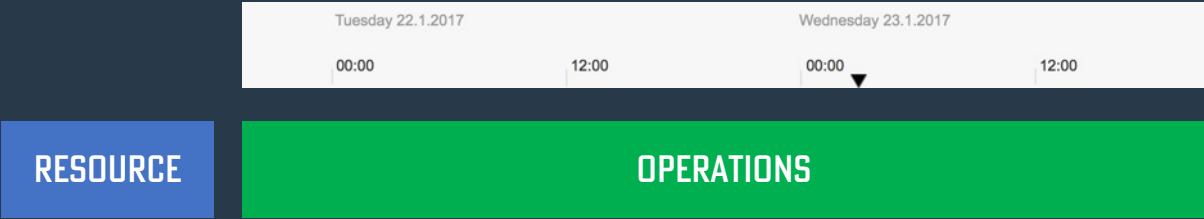
Based on this, I determined that the commonality between a Resource and Labor will be the Time Axis of the Gantt Chart:

Each Resource has Shift-timings that can be plotted on the same Gantt Time Axis (where Operations are mapped).

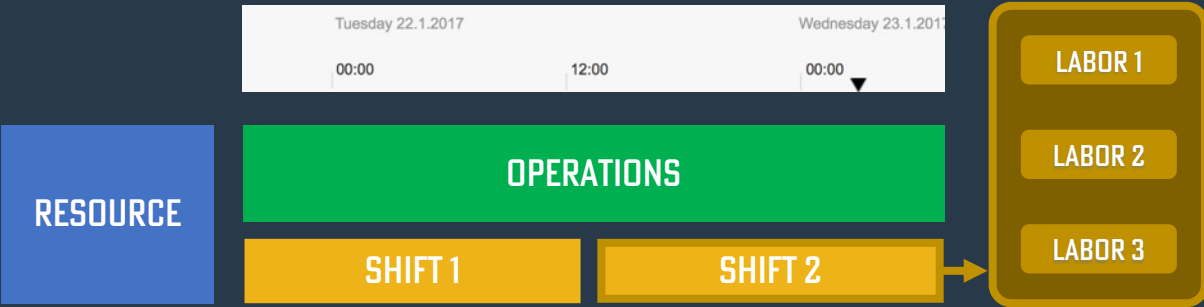
These Shifts can also show what Labor is being assigned to it (as a list), and thereby showing which Labor is working on which Resource, at any given time.



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

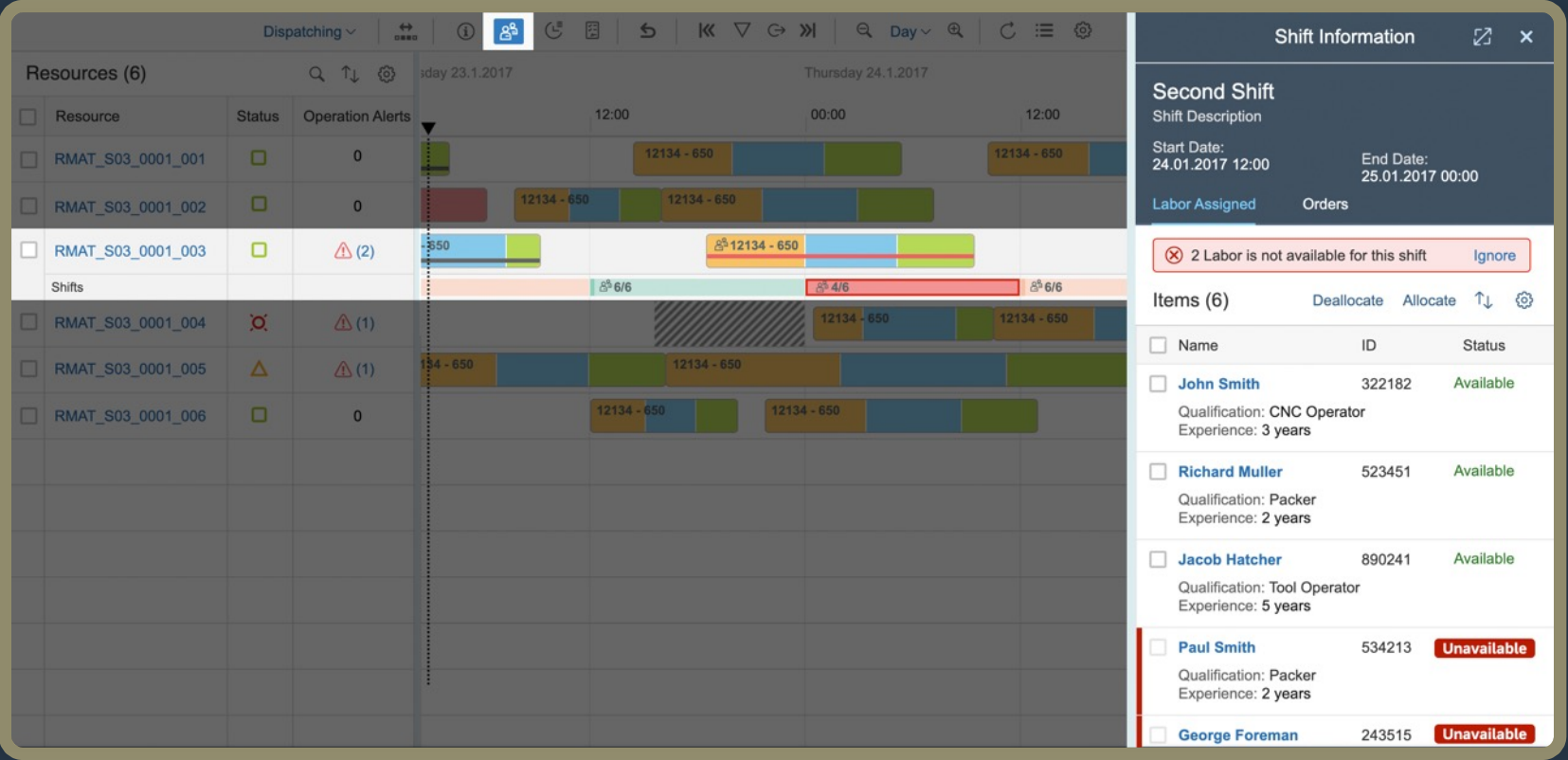
LABOR MANAGEMENT

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

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



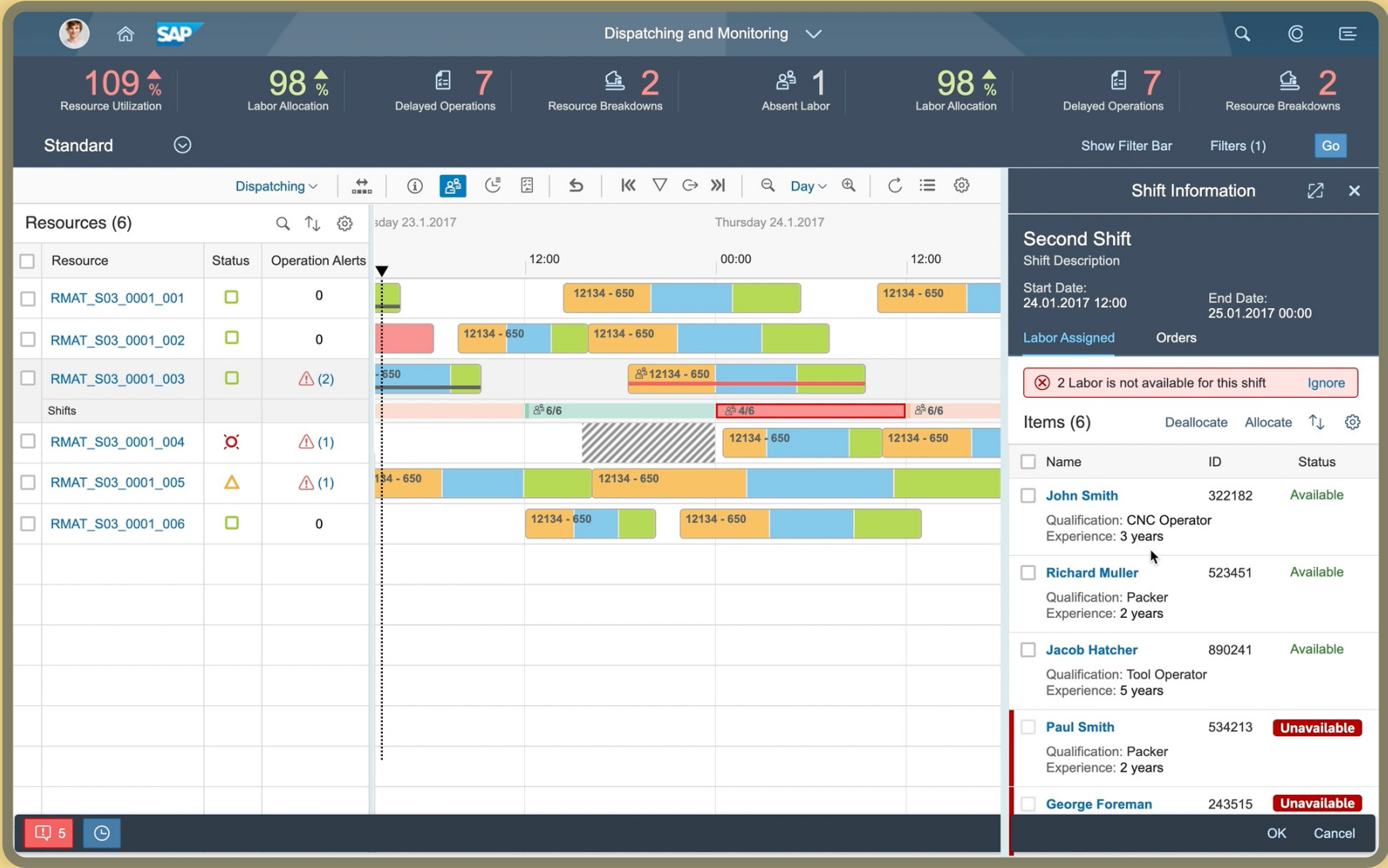
SOLUTION 3: IDENTIFY LABOR ISSUE

The Operation bars are designed to indicated different types of status for the Supervisor to Monitor.

A red line that goes across an Operation bar indicates an alert and the icon in the bar indicates the type of alert.

In this sample, one of the Operations indicate that there is a Labor issue. The Supervisor can click on the Labor icon of that Operation to open the Shift information for that Resource.

The Shifts blocks show Labor allocation and the color of the Shift indicates that there is a shortage. The Supervisor can then click on the Shift and a side panel opens in the right to show that 2 Labor is unavailable for the Shift thereby leading to the Labor Shortage.

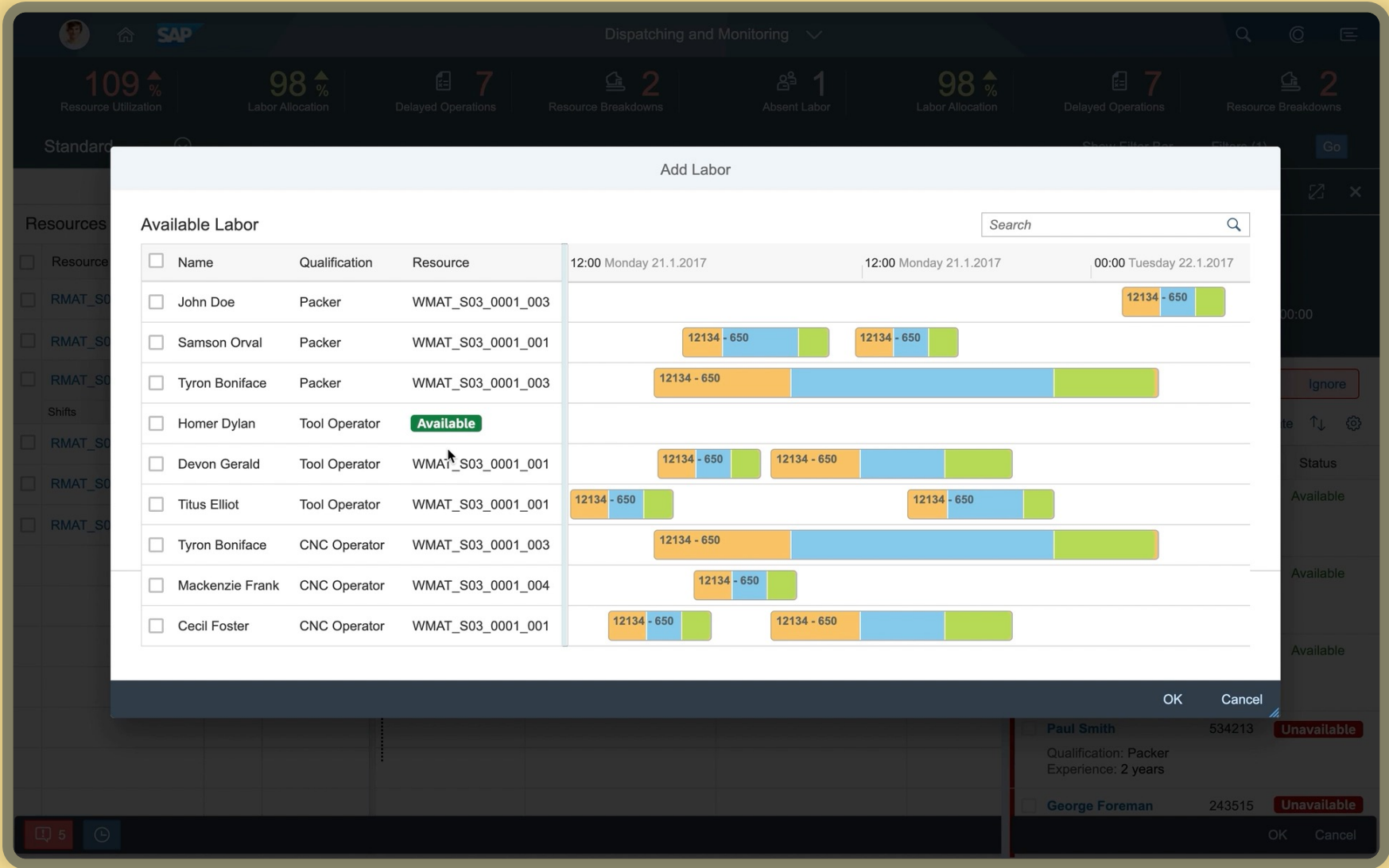


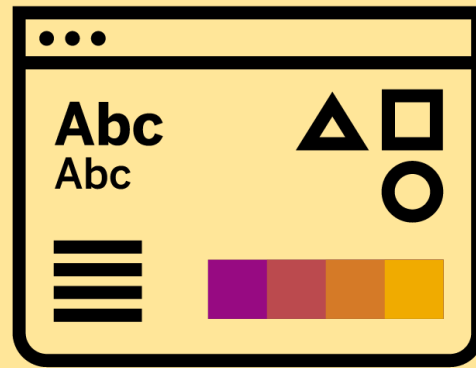
SOLUTION 3: RESOLVING LABOR ISSUE

Once the Supervisor understands that there is a Labor Shortage, REO gives the capability to allocate alternate Labor to overcome the shortage.

When the Supervisor wants to allocate alternative Labor, REO shows a list of qualified Labor to work on that Resource for that Shift along with their current schedule.

The Supervisor can take a call to either deallocate Labor from other Resources or use available Labor to resolve the Labor Shortage.



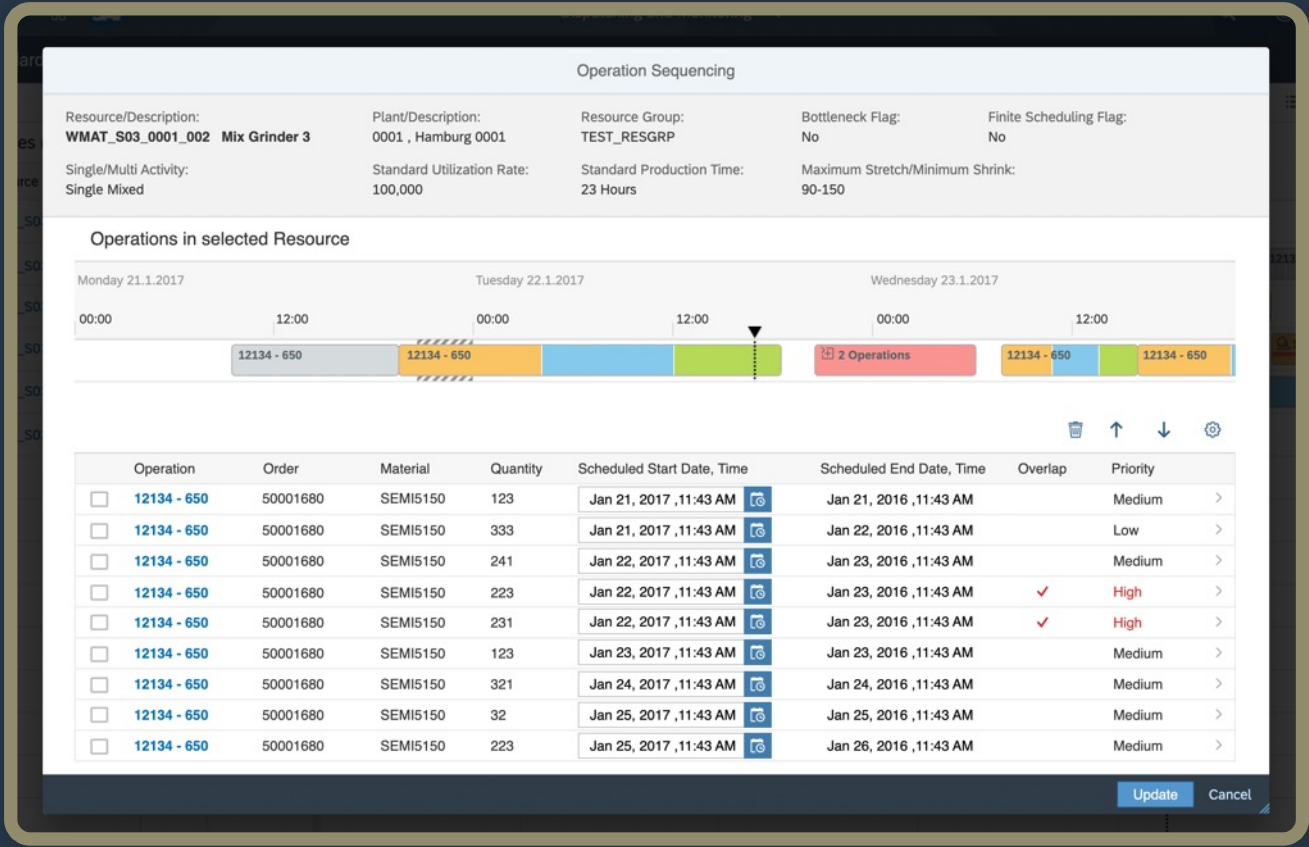


SOLUTION 4

ACCESSIBILITY

How to design a solution that lets Users customize colors used in the app and still support Accessibility?

ACCESSIBILITY



Alternative Table View for the Gantt Chart

The reusable UI components from SAP Fiori Design combined with the UI5 technology generally ensures Accessibility compliance. Yet Accessibility turned out to be a challenge for REO as information is presented through colors and it could affect visual perception. I took the following steps to ensure the application is accessible:

Alternative Table view for Gantt Chart – Information in REO is visualized by colors and this posed a challenge for color blind users. I redesigned the shapes with different borders and icons but it did not work due to the large amount of data that needs to be presented.

The other approach is I took was to show the data in a table. Each Resource and its Operations was shown as a table and the scheduling can be done with a date picker.

ACCESSIBILITY

Ensuring Contrast Ratio with color customization - Users wanted a provision to customize colors in REO, as they have internal semantics attached to colors. This was a challenge as the shapes in the Gantt Chart should have minimum contrast ratio between **Text** and **Background** colors. If a user accidentally chose a dark color text and a dark background, then text becomes unreadable.

To overcome this, I designed a mechanism (screenshot on the right) where users can chose to ensure optimum contrast ratio (of at least 4.5:1). If enabled, a user choosing a dark Text color can only choose lighter shades of colors for the Background and vice versa.

Pastel Colors – I had chosen pastel colors as default with enough color separation between them to avoid causing too much eye strain from seeing too many strong colors on the screen for a long time.

Theming support – All colors I used for the design is from the UI Framework and this had a benefit of Theming Support. This meant that all colors used in REO will automatically change to similar colors that work well with High Contrast (Black & White) themes that support people with visual impairments.

Settings

CHART SETTINGS **SHAPE SETTINGS** ALERT SETTINGS

☒ Show Text ☒ Ensure Optimum Contrast Ratio

Text Color:
Black

Setup Shape Color:
Orange

Process Shape Color:
Blue

Teardown Shape Color:
Green

Preview:
12134 - 650

OK Cancel

Settings

CHART SETTINGS **SHAPE SETTINGS** ALERT SETTINGS

☒ Show Text ☒ Ensure Optimum Contrast Ratio

Text Color:
White

Setup Shape Color:
Blue

Process Shape Color:
Orange

Teardown Shape Color:
Green

Preview:
12134 - 650

OK Cancel

Color customization with integrated Contrast Ratio checker

USABILITY TESTS

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

1. Overall positive feedback was received from Users as they were very happy that all solutions were integrated into one UI.
2. Out of the 5 scenarios, all users took more than 5 mins each to complete the first 2 scenarios. But the last 3 scenarios were completed in less than 1 min or at most 2 mins. The conclusion is that the learning curve for the app is more than other SAP apps, but once the user overcomes this, the tasks take far less time to complete since all the information is shown upfront, without any drill-downs.
3. Some of the icons were confusing as it did not communicate the intent of the icon. These were corrected with different icons being used or labels when needed.
4. Legends popover had a 2 step navigation to see the colors and labels, and this impacted the learning curve steeply. This issue was corrected later with all colors shown upfront.

Formative Usability Test Script REO

SCENARIO 3

In the Gantt Chart you are working with the order 1005212. This order has 3 operations and now you must schedule all the operations for this order in the right sequence.

Task:

1. *Idea*
2. *End*

Post-task

1. How relevant was this task for what you do?
1 Not relevant
2. How easy or difficult was it for you to perform this task?
1 Very difficult
3. How satisfied are you with the application after performing this task?
1 Not satisfied

SAP

Formative Usability Test Script REO

SCENARIO 2

You have been informed by an operator that one of the resource is down. There are multiple reasons to do an operation so you can then choose the right resource.

Task:

1. *Select an operation*
2. *Reschedule*
3. *Options*

Follow-up questions

1. How easy was it for you to identify the Operation that you wanted to dispatch?
2. Were you able to understand how to dispatch to an alternative resources for the work center?

Post-task questions

1. How relevant was this task for what you do?
1 Not relevant 2 3 4 Neutral 5 6 7 Very relevant
2. How easy or difficult was it for you to perform this task?
1 Very difficult 2 3 4 Neutral 5 6 7 Very easy
3. How satisfied are you with the application after performing this task?
1 Not satisfied 2 3 4 Neutral 5 6 7 Very satisfied

SAP

Formative Usability Test Script REO

3. TASKS

SCENARIO 1

There are 3 similar resources that can perform the same operation Ex. **ASSEMBLY** Operation. While dispatching you notice that one of the main resources is down. Dispatch the operation to an alternative resource of the same work center

Task:

1. *Identify the Assembly operation to be dispatched from the worklist*
2. *Identify the Resource that is down in the Gantt Chart*
3. *Dispatch the operation to an alternate resource of the work center*

Follow-up questions

1. How easy was it for you to identify the Operation that you wanted to dispatch?
2. How easy was it for you to detect alternative resources?
3. Were you able to understand how to dispatch to an alternative resources for the work center?

Post-task questions

1. How relevant was this task for what you do?
1 Not relevant 2 3 4 Neutral 5 6 7 Very relevant
2. How easy or difficult was it for you to perform this task?
1 Very difficult 2 3 4 Neutral 5 6 7 Very easy
3. How satisfied are you with the application after performing this task?
1 Not satisfied 2 3 4 Neutral 5 6 7 Very satisfied

5

CONCLUSION

Back in 2016, I saw this comic strip 'If Apple was a democracy' - What if Apple actually listened to what their customers wanted? Would going against minimalism by adding all those ports and features that customers wanted make the iPhone a better product?

There are two examples I associated simplicity with - The first iPhone with just ONE button on the front and other one is the Google Home Page. Both being minimalistic therefore simple. For a long time I believed that **Simplicity has to be tied to Minimalism**. 'Less is More', 'Keep it Simple' were key phrases that have been ingrained into my design philosophy.

REO changed that ideology for me.

"Simplicity for me is more information upfront that enable faster decisions"

This quote from our User during a usability test was an eye-opener. I learnt Simplicity can be subjective. One type of user's complex app might be another one's simple app. **Simplicity in UX Design is ultimately what empowers a User to accomplish their tasks as quickly as possible**. Minimalism can give a perception of Simplicity and have quick learnability, but may not be useful for day-to-day tasks of some power/pro users. REO is such an example.

On a closing note, Apple removed almost all ports from its MacBook Pro laptops with only 4 ports in 2016. Fast forward to 2021, almost all legacy ports removed in 2016 are back. The comic strip funny as it was in 2016, became a reality in 2021. And their 'Pro' Users are happy.

