

SAP Fiori UX Design and Build Challenge

1. The Story – Diagnosing the Financial Health of Construction Projects

Segmentation: Construction industry, discrete industries.

Targeting: Project managers, project controllers.

Positioning: Project controlling.

Construction projects are non-standardized, complex and time-consuming undertakings. The construction process is subject to many risk factors which are impossible or difficult to predict such as adverse weather, equipment breakdowns or job accidents.

For construction companies it is vital to monitor and diagnose the financial health of their construction projects. An effective cash flow management is essential to be resilient against unforeseen problems. Even profitable companies can fail due to poor cash flow.

In addition to assessing the current financial status of a construction project, cash flow forecasting is crucial for success.

Cash flow forecasting is supported by developing billing schedules and cost control based on cost accounting methods. When attempting to diagnose financial health, both cash flow and revenues & expenses have to be considered as a whole.

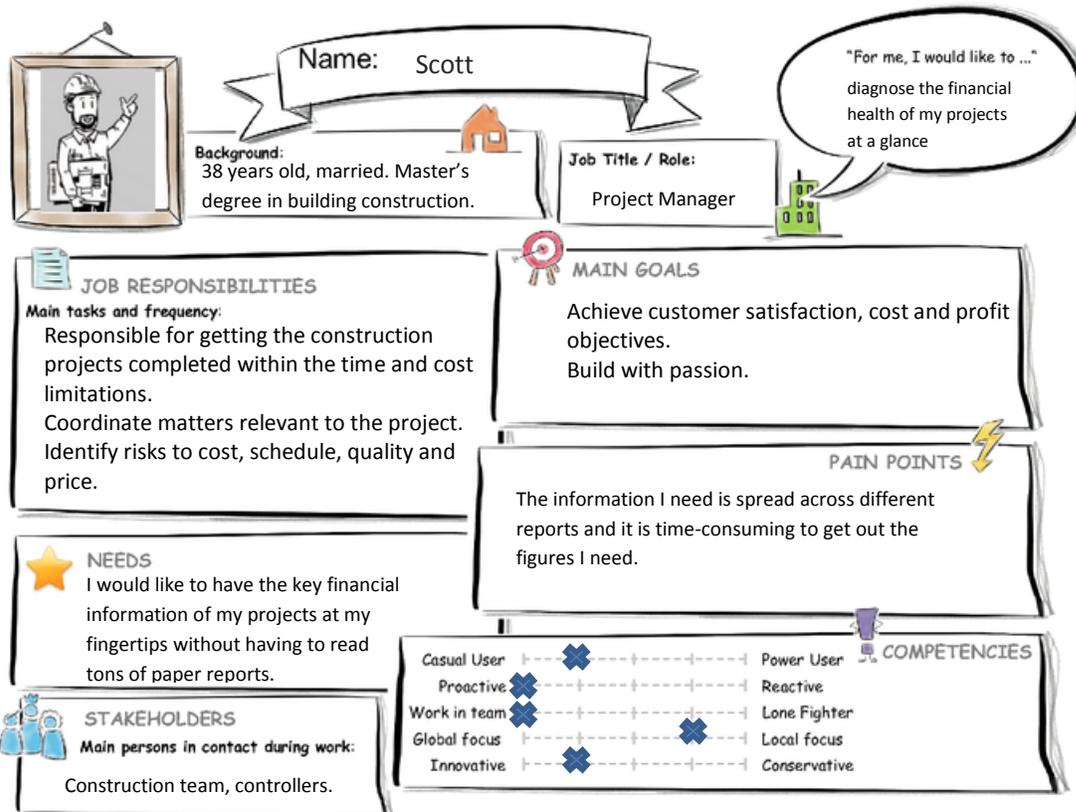
Project managers and project controllers will benefit from an application which presents the project's cash flow and cost at a glance to assist them in diagnosing the financial health of their projects.

For more information on project financial management in the construction sector we refer to [1].

Methods for diagnosing the financial health of a business are taught in the MOOC [2].

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2. Persona – The Project Manager



3. User Experience Journey

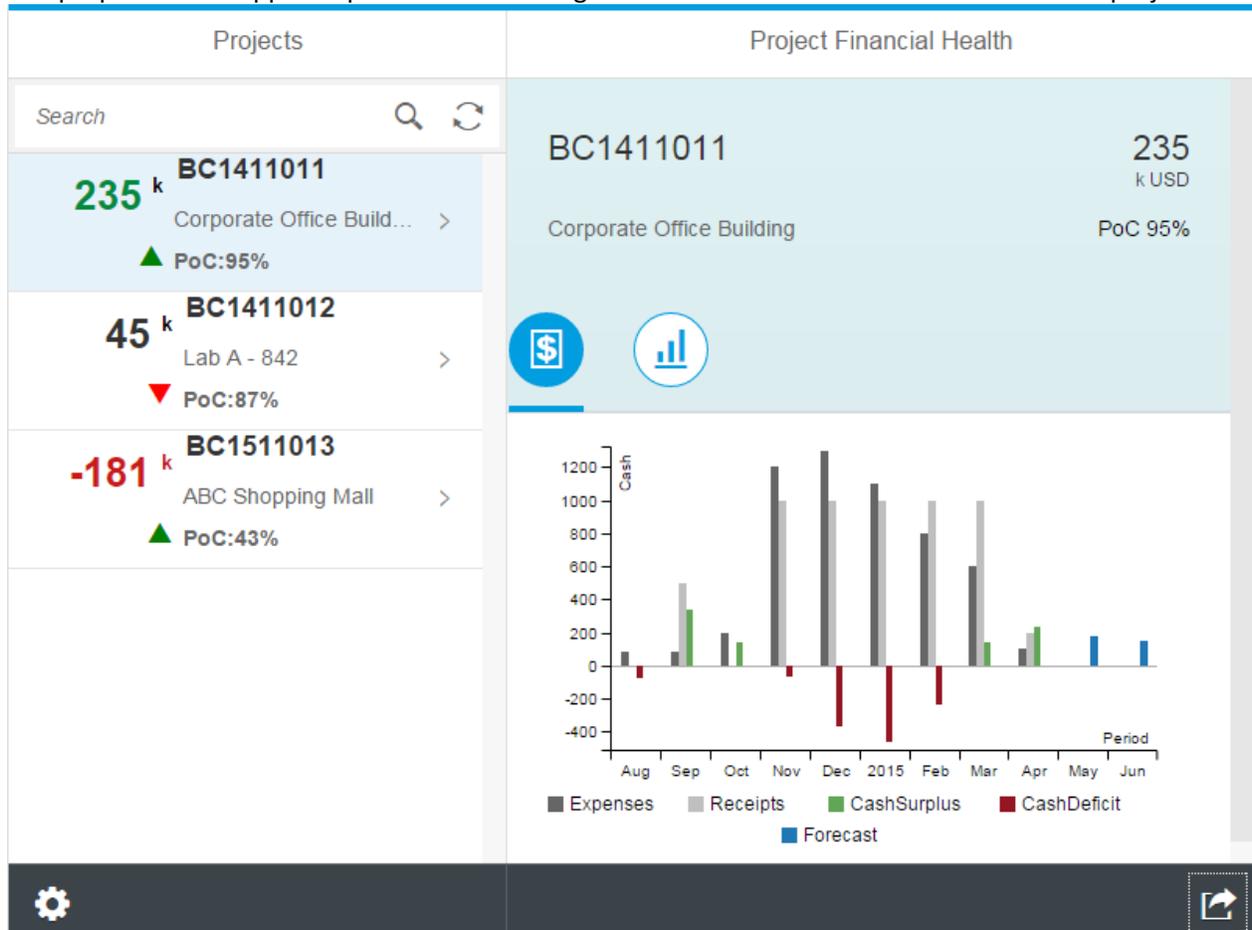
Mindset	Actions	Touch points
<i>What is on the Persona's mind while taking the actions of their journey? How do they feel each step of the journey?</i>	<i>What actions and activities does the Persona take while going thru the journey to achieve their goal?</i>	<i>What touchpoints does the Persona have? (Tools, channels, devices, conversations, and so on.)</i>
As a project manager, I am responsible for the control of project financial matters.		
Are cash funds available to pay the materials and subcontractors in the next weeks?	I have to call up Jane and ask her to print out the project cost report and the project cash flow report.	Accounting department
Tomorrow I will meet Jack, the corporate controller. I have to check whether there is a budget overrun.	Study the project reports.	Corporate controller
A payment request has to be prepared.	The progress of the work has to be estimated by the architect-engineer.	Architect-engineer
The monthly project accruals have to be completed.	I have to check the subcontractors' invoices. The progress of the electrician's work has to be evaluated.	Subcontractor

SAP Fiori UX Design and Build Challenge

4. Mock Up

The purpose of the mock up is to illustrate how the persona would experience the app.

The purpose of the app is to provide instant insight into the financial status of a construction project.



The app is based on the master/detail design pattern. The screen is divided into two areas: a master list on the left-hand-side containing all projects which are relevant to the user and a detail area on the right-hand side containing the charts for the project selected in the master list.

On a cellphone, only the master list is visible when the app is launched. Therefore, the master list should contain the key figures of the projects so that the user can decide which projects should be investigated in detail.

-181 k	Cash balance	-181 k BC1511013	Project ID and description
▲ ▼	Trend indicator: cash balance increasing or decreasing	ABC Shopping Mall > ▲ PoC:43%	PoC: Percentage-of-completion

The PoC method (PCM) is applied for revenue recognition both in US-GAAP and IFRS under certain conditions. The PoC can be determined by the cost-to-cost method.

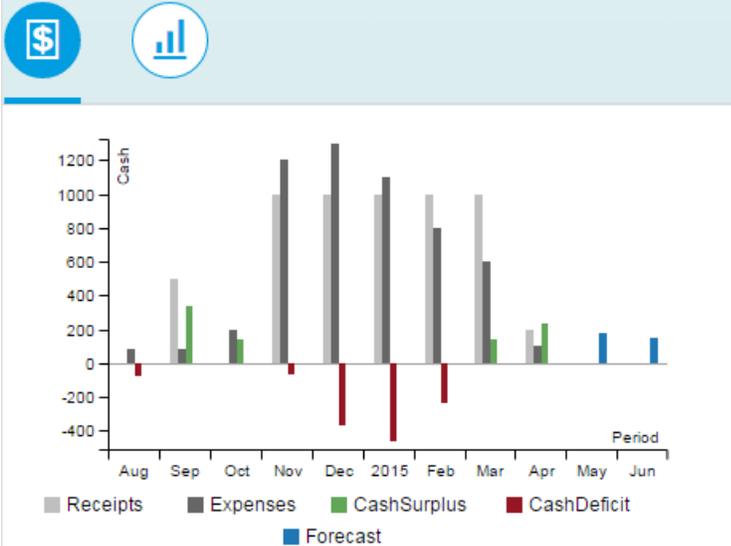
In the project beginning phase, start-up costs are incurred which lead to a negative cash flow. These start-up costs have to be recovered as the work progresses ([1], Ch. 11.12 Cash Flow).

The cash flow can also be negative due to retainages. Therefore, construction projects can make substantial demands on the contractor's cash.

SAP Fiori UX Design and Build Challenge

When the user clicks or taps on an item in the master list, the cash flow chart for the selected project becomes visible in the detail page. There are two tabs in the detail page:

	Cash flow chart
	Cumulated cost chart

 <p>The cash flow chart displays monthly data from August to June. The y-axis represents 'Cash' ranging from -400 to 1200. Receipts are shown as grey bars, Expenses as dark grey bars, Cash Surplus as green bars, and Cash Deficit as red bars. A blue forecast is shown for May and June. The chart shows five large expense spikes of 1000 units in August, September, October, November, and December, which are not fully covered by receipts, leading to cash deficits in those months.</p>	<p>Cash flow chart. According to the “Fiori Design Guidelines”, semantic colors are used for the cash balance. A cash surplus is shown in green color, a cash deficit in red color. Moreover, a cash forecast is included which is shown in blue. The sparse usage of colors draws the user’s attention to the main points. In the given example we can see five lump sum payments of 1000 (k) which are not sufficient to cover the expenses during the first half of the project.</p>
 <p>The cumulated cost chart shows the total cost over time from August to April. The y-axis represents 'Cost' ranging from 0 to 6000. The chart is a stacked bar chart with categories: Wages (yellow), Material (blue), Equipment (teal), Framing (pink), Fitout (orange), and Other (grey). The total cost increases steadily, following an S-curve pattern, with Framing and Fitout being the most significant cost components in the later stages of the project.</p>	<p>Cumulated cost chart. The Fiori qualitative color palette was used to visualize the different cost type groups. In the example given here we observe that framing costs prevail at the beginning, whereas fit out costs are increasing rapidly thereafter. Moreover, the s-curve pattern is clearly visible in the chart. ([1], Ch.9.19 Project Progress Curves)</p>

The app is not suited for a deep-dive analysis or a root cause analysis. However, it allows the project manager to detect critical situations.

SAP Fiori UX Design and Build Challenge

5. SAP Web IDE App

Demonstrate the implementation of the mock up.

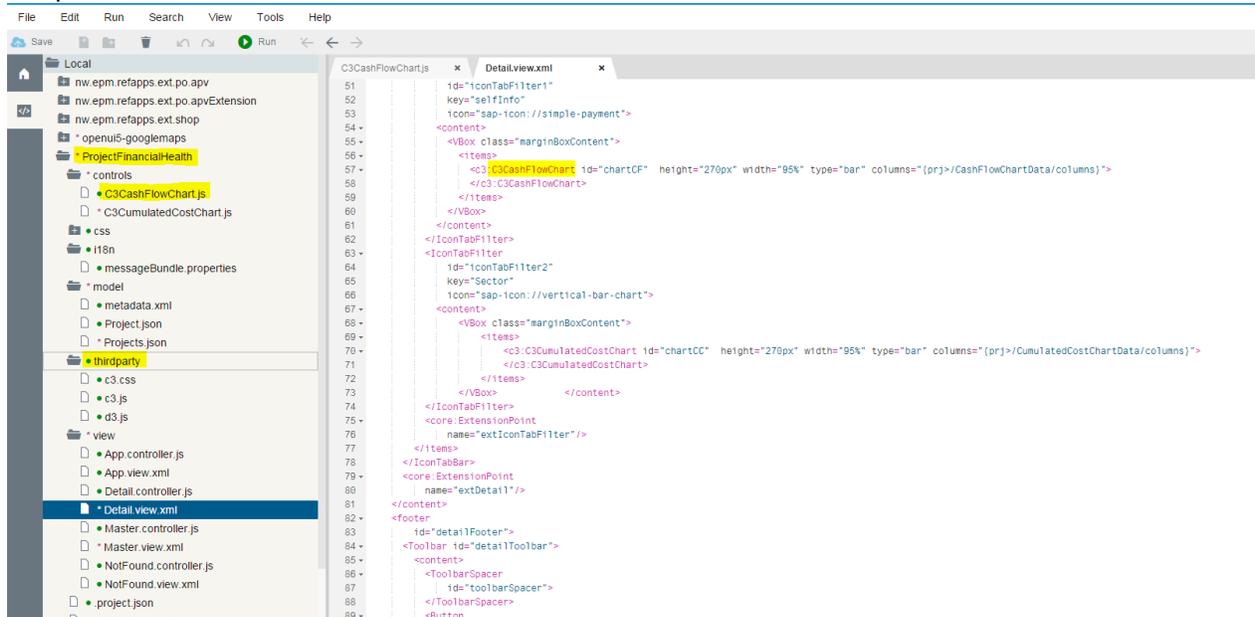
The mock up app has been published to Microsoft Azure: <http://fiorichallenge.azurewebsites.net/>.

Please follow this link if you want to experience the mock up.

Moreover, we provide some screenshots in this section.

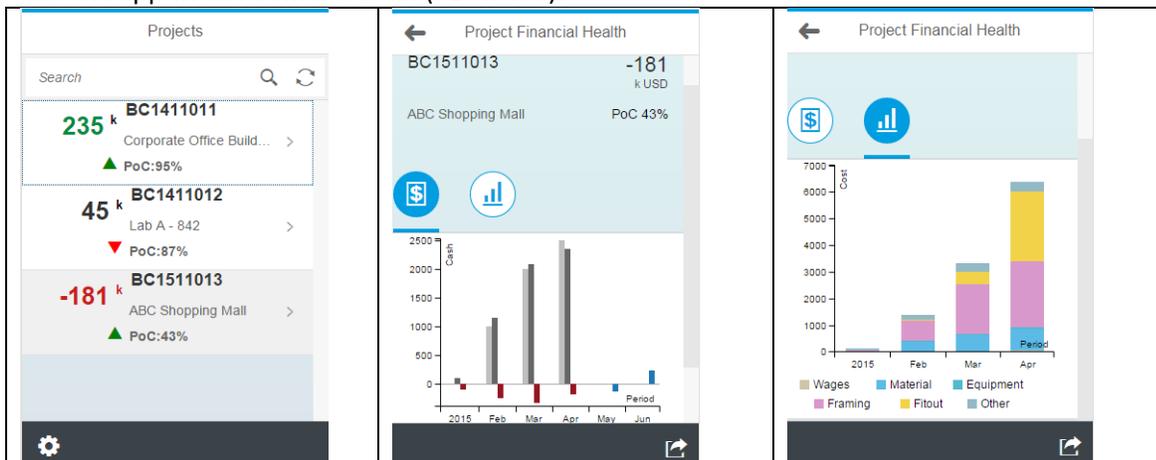
First of all I would like to thank John Patterson for his blog post in the SAP Community network [5], [6]. Although the focus of this blog post is on Google Maps, the examples provided also demonstrate how to use the chart tool C3.JS [4]. Both C3.JS and the visualization tools supplied by SAP (VizFrame) are based on D3.JS [3].

The app was developed in the SAP Web IDE starting with the SAP Fiori Master Detail Application template:



The folder “thirdparty” contains the additional libraries D3.JS and C3.JS. Custom controls were defined for both chart types (cash flow and cumulated cost). These custom controls can be used in the xml views like any other standard controls, see Detail.view.xml in the screenshot above.

The application preview is useful to simulate the app with different screen sizes. For example, we can test the app within a small screen (320 x 480):



SAP Fiori UX Design and Build Challenge

Demonstrate the implementation of the mock up using two design components.

1. Master list with sap.m.CustomListItem

The CustomListItem is used to customize standard list items. The project's current cash balance is the main KPI in this app, therefore it has to be an eye catcher. Moreover, we wanted to include a trend indicator. The trend can be positive even if the cash balance is negative, therefore it should be possible to use different semantic colors for the current cash balance and the trend indicator.

```
xmlns="sap.m"
xmlns:core="sap.ui.core"
xmlns:com="sap.ui.commons"
<CustomListItem press="onSelect" type="Navigation" >
  <VBox>
    <HBox>
      <VBox alignItems="End" justifyContent="Center">
        <items>
          <HBox>
            <com:TextView text="{CashBalance}" textAlign="Right"
              semanticColor="{CashSemanticColor}" design="H1" class="customListContent3" />
            <com:TextView text="{i18n>labelScaleThousand}" textAlign="Right"
              semanticColor="{CashSemanticColor}" design="H6" class="customListContent" />
          </HBox>
          <core:Icon src="{CashIndicatorIcon}" color="{CashIndicatorIconColor}"
            class="customListContent1" />
        </items>
      </VBox>
    </HBox>
    <VBox>
      <Label text="{ProjectId}" design="Bold" class="customListContent sapMSLITitleOnly" />
      <Label text="{Description}" class="customListContent" />
      <Label text="{i18n>labelPoC}:{PoC}%" design="Bold" class="customListContent" />
    </VBox>
  </HBox>
</VBox>
</CustomListItem>
```

Vertical and horizontal boxes were used to arrange the content.

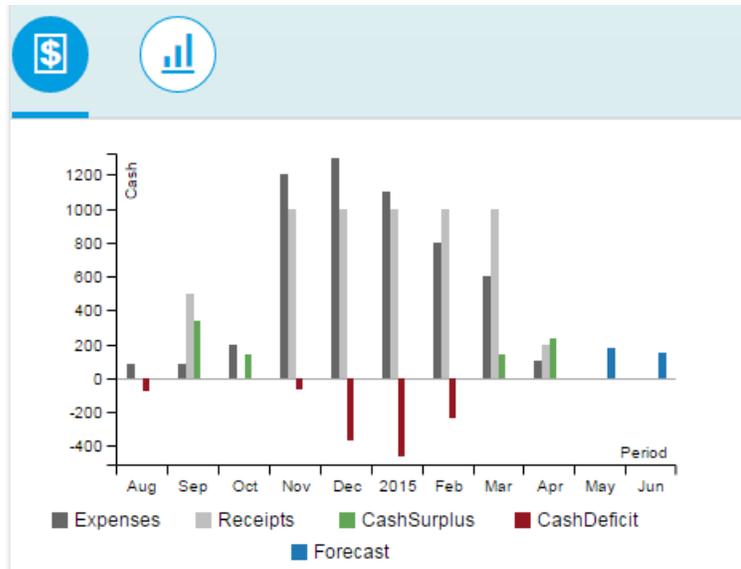


2. Detail view with icon tab bar (sap.m.IconTabBar)

Icon tab bars were used to incorporate two different chart types (cash flow and cumulated cost). The master/detail template generated an xml-view with an IconTabBar. The content of icon tab filters and the icons had to be adjusted:

```
xmlns="sap.m"
xmlns:c3="controls"
<IconTabFilter id="iconTabFilter1" key="selfInfo" icon="sap-icon://simple-payment">
  <content>
    <VBox class="marginBoxContent">
      <items>
        <c3:C3CashFlowChart id="chartCF" height="270px" width="95%" type="bar"
          columns="{prj}/CashFlowChartData/columns">
        </c3:C3CashFlowChart>
      </items>
    </VBox>
  </content>
</IconTabFilter>
```

SAP Fiori UX Design and Build Challenge



Example of an IconTabBar with the cash flow chart.

References

Project Financial Management:

[1] S.Keoki Sears, Glenn A. Sears, Richard H. Clough: Construction Project Management. A practical guide to field construction management. (PDF version available at www.slideshare.net)

Financial Analysis:

[2] Guy Ford: Diagnosing the Financial Health of a Business.

<https://www.open2study.com/courses/diagnosing-the-financial-health-of-a-business>

Data Visualization in Web Browsers:

[3] Data-Driven Documents: <http://d3js.org/> , <http://en.wikipedia.org/wiki/D3.js>

[4] D3-based reusable chart library (© Masayuki Tanaka) <http://c3js.org/>

[5] C3 with OpenUI5: <https://github.com/jasper07/openui5-googlemaps>

Google Maps Library for UI5

[6] John Patterson, Jul 1, 2014: <http://scn.sap.com/community/developer-center/front-end/blog/2014/07/01/google-maps-library-for-ui5>