Xavier Hacking and Jeroen van der A

Getting Started with
SAP® BusinessObjects™ Design Studio
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Introduction

SAP BusinessObjects Design Studio (hereafter, Design Studio) was released in November 2012 and has been placed in the SAP business intelligence product portfolio as a primary tool for creating interactive analytical applications for the web and mobile devices. Based on strategy and direction statements from SAP, it is clear that Design Studio will play a central role in the BI portfolio, and we expect that more and more development will take place using Design Studio in the near future.

Given these circumstances, it is time to learn more about this new tool.

Target Group and Prerequisites

This book is intended for anyone who wants to learn more about Design Studio. It can be used by developers who are familiar with dashboard or application development with BEx Web Application Designer or SAP BusinessObjects Dashboards, but readers who are new to these tools will also find the book very helpful. No pre-existing knowledge is required, as the book will explain every aspect of Design Studio in a step-by-step way, building up from easy-to-understand overview chapters to chapters that are dedicated to creating complex applications.

Structure of the Book

As the goal of this book is to help you get started with Design Studio, we begin with a broad overview of the tool. In the first chapters, we introduce you to the product, compare it with other SAP products, and show several use case scenarios.

We follow this by going through every detail of the application. First we walk you step-by-step through the installation procedure. Then we describe the application environment and the general process of building an application. Next we describe every available component and its properties in detail.
Once you have mastered the basics, we go into more depth about how you can enhance an application. We describe how you add interactivity and give you a set of guidelines for creating applications. We then walk you through the creation of two complex applications.

- **Chapter 1: Introduction to SAP BusinessObjects Design Studio**
  We start the book with a general introduction to Design Studio. We give a high-level overview of what the tool is, what the application developers are able to do and build with the tool, and explain how it is positioned within the range of tools in the SAP BusinessObjects Business Intelligence platform.

- **Chapter 2: SAP BusinessObjects Design Studio vs. SAP BusinessObjects Dashboards vs. BEx Web Application Designer**
  This chapter offers a discussion of how Design Studio is different from SAP BusinessObjects Dashboards and BEx Web Application Designer.

- **Chapter 3: Usage Scenarios**
  In this chapter, we walk through a variety of examples to show you how applications developed in Design Studio can be used in different business scenarios. Each scenario tells a story of an end user who is using an application designed for his particular role or task. The scenarios show that Design Studio is able to deliver process support in very different situations, varying from real-time operational support to in-depth strategic analysis.

- **Chapter 4: Installation and Configuration**
  After the broad overview chapters, we focus more on Design Studio itself. In order to get started with Design Studio, we take you through the steps to install and set up Design Studio within your SAP BI environment. We also give an overview of the Design Studio architecture, discuss system requirements, and explain how to gather all the installation material. The chapter ends with your first login with the Design Studio client tool.

- **Chapter 5: The Integrated Development Environment**
  Once you’ve installed the Design Studio components and opened the Design Studio client tool for the first time, you will notice a whole lot of elements. This chapter explains the Design Studio integrated development environment, including the menus, toolbar, the Layout Editor,
and the several views for its components. After reading this chapter, you will be ready to dive into building applications.

- **Chapter 6: The Application Design Process**
  This chapter introduces you to the general process of building a Design Studio application. It serves as a tutorial to guide you through the steps in creating a simple Design Studio application, and serves as a basis for the more detailed chapters that follow.

- **Chapter 7: Components and Properties**
  In this chapter, we look at all the components and properties of Design Studio. Components are the building blocks of Design Studio, and an essential part of developing effective applications.

- **Chapter 8: Scripting for Interactivity**
  In this chapter, we take it to the next level and introduce you to the scripting language you use to create advanced interactive applications in Design Studio. We take a close look at the script language, and show examples of how to use these scripts in your applications.

- **Chapter 9: Design Guidelines and Visualization Methods**
  Before diving into the development of complex applications, we devote a chapter to the importance of the user experience. In this chapter, we provide some general principles that will help you build applications that have a greater chance of actually being used by the user base. We also describe each Design Studio visualization method, and give tips for when these methods may or may not be appropriate.

- **Chapter 10: Building a DuPont Analysis Application**
  In this chapter, we use the techniques we showed in the previous chapters to build a more advanced application with Design Studio: a DuPont analysis model. A DuPont analysis is an in-depth look at the return on equity of a company.

- **Chapter 11: Building a Sales Dashboard Application**
  In this chapter, we show a sales dashboard application that reports on worldwide sales. In this worldwide sales scenario, we track the sales data of seven global companies and their local markets.

- **Chapter 12: Outlook for SAP BusinessObjects Design Studio**
  In this last chapter of the book, we give you a preview of what you can expect from the future of Design Studio.
Once you are through Chapter 12, you will have a firm grasp of what Design Studio is capable of. You'll know how to install it, how to use it to build interactive applications, and you will have gotten some real-world experience with the tool. Finally, you will also be aware of where Design Studio is headed in the near future.

Downloads

In addition to the content in the book itself, we also offer some helpful downloads. You can use these files to review the applications that we build in the book, or use them to skip parts of the step-by-step tutorials we provide in the book. In the files, you'll find both full applications and CSS files. For the applications, you'll find:

- **Calculator application**
  This is an application example that we give in Chapter 8. Use this to try the calculator and understand how it has been built. You do not need any data source connections.

- **DuPont analysis application**
  This is the application we build in Chapter 10. To be able to use the general ledger input, you have to define your own data source connections.

- **Sales dashboard application**
  This is the application we build in Chapter 11. Again, keep in mind that you have to rebuild the data source connections for your own system.

In addition to the full applications, we also offer bare bone versions of the above. That way you don’t have to follow the steps to build the layout, but can move forward to the part where the interactivity is added to the application.

Finally, we also provide CSS files that you can use for the applications. Downloading these and adding them to the applications will save you some time, because you won’t have to manually type all the CSS code we give in the examples.
Now that you’ve been introduced to the Design Studio development environment, it is time to get your hands dirty. In this chapter we will walk you through the basic steps in building a Design Studio application.

6 The Application Design Process

At this point you know what Design Studio is, what its abilities are, and how it compares to similar tools in the SAP business intelligence portfolio. You have also been introduced to the Design Studio development environment. The next step is to learn about the general process of building a Design Studio application. This chapter serves as a tutorial to guide you through this process. Keep in mind that this is just a high-level overview to help you understand the process of building an application—all the specific details about the relevant components, properties, and methods will come in the next chapters.

Before we can build anything, we have to know what information the application should show and in what way it will be used. In this example scenario, we will build an application for a human resources manager. The manager wants to see the monthly trends for the headcount and the full-time equivalent (FTE) amount for each department. He also wants to see a list of employees for each department. This list should show the employee number, name, department, gender, nationality, and age for each employee. Finally, the application has to be accessible and usable on a mobile device.

The application in our scenario consists of three main sections:

- Monthly trend visualization for the two measures
- Employee list
- Filter for department selection
In this scenario we will use a Tabstrip component to format the two visualizations. The first tab will contain the monthly trend visualization, and the second tab will show the employee list.

To visualize the monthly trend for the two measures—headcount and FTE amount—we are going to use a Chart component of the Line type. To make this example a bit more interesting, we will add an option to switch between these two measures, so the Chart will show the trend of only one measure at a time. We can use a Radio Button Group component to achieve this. The list of employees, including all of the employee dimensions and measures, can be displayed with a Crosstab component. Finally, we need a filter to select the department for which the data should be shown. We will use a Dropdown Box component to achieve this. The filter should set the selection for both the Chart and the Crosstab. The Dropdown Box component has to be visible all the time, so we won’t add this component to the Tabstrip component.

Now that you know the requirements, we’ll use the rest of the chapter to walk you through the major development steps:

- Setting up the user interface and visualizations
- Adding the data
- Making it interactive
- Formatting and fine-tuning it
- Executing the application

Now let’s build an application!

### 6.1 Setting Up the User Interface and Visualizations

In this first step of building an application, we’ll start by setting up the components. You can do this by following the steps below:

1. Open Design Studio and log in to your SAP BI platform.
2. Select APPLICATION • NEW... to create a new application.
3. Enter a name and description for your application (Figure 6.1). Then select iPAD as a TARGET DEVICE, since you want to use this application on a mobile device. Click NEXT to continue.
4. You are going to create an application from scratch, so don’t use a template. Choose the BLANK option and click the FINISH button (Figure 6.2).

5. A clean Design Studio Layout Editor appears. Now it is time to add some components to create the user interface. First you want to add the TABSTRIP component. Select the TABSTRIP component from the CONTAINER COMPONENTS section in the COMPONENTS view. Drag it to
the Layout Editor and release the mouse button to drop this component. The component will appear in the Layout Editor but also in the OUTLINE view in the bottom-left corner of the screen (Figure 6.3).

6. This component should be as large as the whole application. To do this you can use the MAXIMIZE COMPONENT feature. Select the TABSTRIP component in the Layout Editor or in the OUTLINE view and select LAYOUT • MAXIMIZE COMPONENT from the menu bar. If you are familiar with the icons in the toolbar, you can use the MAXIMIZE SELECTED COMPONENT icon.

7. The TABSTRIP component has two tabs by default. Select TAB 1 by clicking it in the Layout Editor or select it from the OUTLINE view.

8. Rename the tab label by entering “KPI trends” in the DISPLAY • TEXT field in the PROPERTIES view. You can also do this from the OUTLINE view by right-clicking the tab and choosing the RENAME option.

9. Rename the other tab label “employee list”.

Figure 6.3 Tabstrip Component Added to the Layout Editor
10. Select a Chart component from the Analytic Components section in the Components view and drag it into the first tab of the Tabstrip component.

11. In the Preferences view of this Chart component, select Display • Chart Type to Line. You will notice that nothing happens. This is because you didn’t assign a data source to this component yet. We will further format the Chart component later on in this chapter.

12. To the first tab, add a Radio Button Group component from the Basic Components section in the Components view. Your screen should now look like Figure 6.4.

Figure 6.4 Tabstrip Component with Two Child Components

13. Select the second tab and add a Crosstab component to it. You can find this component in the Analytic Components section of the Components view. Make the Crosstab component as big as the tab by using the Maximize Component option.
14. Next you need to drag a DROPDOWN BOX component into the layout editor. You will use this component to select the department for which the data has to be shown. The DROPDOWN BOX component is located in the BASIC COMPONENTS section of the COMPONENTS view. Make sure that the DROPDOWN BOX component is not placed within one of the two tabs. Remember, you want this dropdown box to be visible all the time, independent of which tab is selected. It should therefore be positioned on the same level as the TABSTRIP component. If you are not sure about this, check the OUTLINE view.

In Figure 6.5 you can clearly see that the TABSTRIP_1 component contains two tabs (TAB_1 and TAB_2). TAB_1 contains the items CHART_1 and RADIOBUTTONGROUP_1. TAB_2 contains CROSSTAB_1. The item DROPDOWN_1 is positioned on the same level as TABSTRIP_1.

![Figure 6.5 Outline View with Multiple Component Levels](image)

If your OUTLINE view looks like the one in Figure 6.5, you are ready to add some data to the application!

### 6.2 Adding the Data

To bring data into the application, you need to add some data sources. In this example, we’ll use a BEx query as the data source. This BEx query contains six dimensions and three measures (Figure 6.6). The measures are located in the COLUMNS, and the CAL. YEAR / MONTH dimension is placed in the ROWS. The other dimensions are in the FREE CHARACTERISTICS section. The BEx query provides data for a 12-month period.
Follow the steps below:

1. In Design Studio, select **APPLICATION • ADD DATA SOURCE...** or right-click the **DATA SOURCES** folder in the **OUTLINE** view to add a new data source. Connect to the SAP BI platform by clicking the first **BROWSE...** button.

2. Enter the technical name of the BEx query in the **DATA SOURCE** field. You can also use the second **BROWSE...** button to search for the query (Figure 6.7). The data source gets the alias name **DS_1** by default, and you can leave it that way.

3. Now drag and drop this data source from the **DATA SOURCES** folder in the **OUTLINE** view onto the **CHART** component in the **KPI TRENDS** tab. As soon as you release the mouse, the **CHART** component will be assigned to the data source. You can also achieve this result from the **DATA BINDING** option in the **PROPERTIES** view of the **CHART** component.
4. The Crosstab component contains a different set of dimensions and measures than the Chart component, so you need to add another data source, specifically set up for the Crosstab. Since the BEx query contains all the dimensions and measures you need, you can reuse it. Copy and paste the data source (right-click the data source or use the Edit menu). A new data source with the alias name DS_2 will appear.

5. Right-click data source DS_2 and select Edit Initial View (Figure 6.8).

6. Now you have to rearrange this initial view. First drag dimension CAL. YEAR/MONTH from the Columns area to the Background Filter. You want the Crosstab to show data for only one month. Right-click it and set a filter on a single month. For this example we created a filter on 01.2003.

**Note**

To keep this example scenario simple we use a fixed filter here. In real-life you would add an additional selection option or a generated selection value instead.

7. Move the measures from the Rows to the Columns area. Since you need only the AGE IN YEARS measure, expand MEASURES by clicking the little arrow on the left and drag the other two measures out of the Columns area into the panel on the left.
Adding the Data

6.2

8. Add the dimensions EMPLOYEE, DEPARTMENT, JOB, NATIONALITY, and GENDER to the ROWS area.

9. The INITIAL VIEW should now look like Figure 6.9. Click the OK button to save these changes.

Figure 6.8 Initial View of Data Source DS_2

Figure 6.9 Rearranged Initial View of Data Source DS_2
10. Assign data source DS_2 to the Crosstab in the Employee List tab. As you can see, the Crosstab is now populated with a list of employee attributes (Figure 6.10).

Figure 6.10  Crosstab Populated with Data

6.3 Making It Interactive

You now have the components all set up in the Layout Editor, and the application is already connected with a BEx query, delivering the data you want to show. In this section, we will use some scripts to add interactivity to the application and to set up the filters.

Scripting Don’t worry if you are a bit overwhelmed by the coding we’re going to discuss here. Later in the book, we will explore scripting in a far more detailed way and will actually explain what is happening. For now, we’re just giving you the big picture. The following things need to happen:
When the application first starts up, the labels of the DROPDOWN Box component have to be populated with the values for the departments.

You have to set the initially selected label of the DROPDOWN Box component, since you want to see the data for only one department at a time.

Not only do you need to show the initially selected label, but you also have to make sure both data sources are actually filtered for this initial value on the department dimension.

When a department is selected from the DROPDOWN Box component, the CHART and CROSSTAB components should show the values for that department.

The RADIO BUTTON GROUP component must determine which measure should be presented in the CHART component. Only one of the two measures should be shown when the application starts.

Now let's code!

1. Select your application from the OUTLINE view. This is the top level.
2. In the PROPERTIES view, all the way down, click the EVENTS • ON STARTUP button to edit the script. This script will be executed when the application first starts up.
3. To populate the DROPDOWN Box component with labels from the DEPARTMENT dimension, use the following script:

   DROPDOWN_1.setItems(DS_1.getMemberList("0PERS_AREA", MemberPresentation.EXTERNAL_KEY, MemberDisplay.KEY_TEXT, 50));

4. In this example, use department 1300 (Frankfurt) as the initially shown department. First make sure the DROPDOWN Box component shows this value initially. Add the following script on a line beneath the script from the previous step:

   DROPDOWN_1.setSelectedValue("1300");

5. The next step is to filter both data sources so they will give only the data for department 1300 (Frankfurt) when the application starts up. On a new line write this script:

   DS_1.setFilterExt("0PERS_AREA", "1300");
   DS_2.setFilterExt("0PERS_AREA", "1300");
6. The code for the On Startup event is now finished (Figure 6.11). Click the OK button.

![Figure 6.11 On Startup Event Script](image)

7. Now head over to the DROPDOWN BOX component. Select it and in its Preferences view choose Events • On Select.

8. Add the following code to execute a filter on both data sources, with a value that is selected from the DROPDOWN BOX labels.

```javascript
DS_1.setFilterExt("0PERS_AREA", DROPDOWN_1.getSelectedValue());
DS_2.setFilterExt("0PERS_AREA", DROPDOWN_1.getSelectedValue());
```

9. Click OK to close the Script Editor (Figure 6.12).

![Figure 6.12 Dropdown Box On Select Event Script](image)
10. Finally, you have to set up the **Radio Button Group** component. Select the component and navigate in its **Properties** view to **Display Items**.

11. Here you will add the two selection values for the measures FTE and headcount. In the **Text (optional)** fields enter “FTE” and “Headcount” (Figure 6.13).

![Figure 6.13](image)

**Figure 6.13** Edit Display Items for the Radio Button Group Component

12. You need to get the values for the **Value** fields from the BEx query you used earlier as a data source for the application. Open BEx Query Designer and open the BEx query.

13. Select the key figure for FTE from the **Rows** section and go to the **Extended Tab** in the **Properties** view. Here you can find the enterprise ID of this key figure (Figure 6.14). You need this to create the filter in the **Radio Button Group** component. Copy the enterprise ID and paste it in the **Value** field for FTE in the **Edit Items** window in Design Studio.

![Figure 6.14](image)

**Figure 6.14** BEx Query Designer Properties for Key Figure FTE
14. Repeat these steps for the **HEADCOUNT** key figure and click **OK** to close the **EDIT ITEMS** window.

15. Now go to **EVENTS** • **ON SELECT** to open the **Script Editor**.

16. Enter the following code, where `<Enterprise ID KF>` should be changed with the enterprise ID of the key figures structure in your BEx query (Figure 6.15). You can find this the same way you got the enterprise IDs for the two key figures, only now you have to select the **KEY FIGURES** structure instead. You can also press **(Ctrl)+(Space)** while typing the code to select the dimension from the context menu.

\[
\text{DS}_1\text{.setFilterExt("<Enterprise ID KF>", RADIOBUTTONGROUP_1.getSelectedValue());}
\]

17. Close the **Script Editor** by clicking **OK**.

18. If you were to execute the application at this point, three lines would still be shown in the **CHART**. This is because the event script you just created for the **RADIO BUTTON GROUP** is only executed when a selection is made. Therefore, you need to add another line of code to the **On Startup** event of the Design Studio application to set an initial filter on the measures. Select the application from the **OUTLINE** view.

19. In the **PROPERTIES** view go to **EVENTS** • **ON STARTUP**.

20. Add the next piece of code. Again, you have to change `<Enterprise ID KF>` to the enterprise ID of the **KEY FIGURE** structure and `<Enterprise ID FTE>` in the enterprise ID for the FTE key figure.

\[
\text{DS}_1\text{.setFilterExt("<Enterprise ID KF>", "<Enterprise ID FTE>");}
\]
21. The complete Script Editor for the On Startup event should now look like Figure 6.16. Click OK.

![Figure 6.16 On Startup Event Script](image)

Congratulations: Your Design Studio application is now fully operational! But before you can start using it, you should take some time to focus on the application’s appearance to create a superb user experience.

### 6.4 Formatting and Fine-Tuning

Until this point of the example scenario, we didn’t take a lot of time to have you format the application in the right way. You just added the building blocks you needed and made sure the application worked and the components did what they had to do.

If an application meets all its functional requirements but is designed such that the user doesn’t understand what he sees or how things work, or it just doesn’t look nice, the application quickly loses its value. It may frustrate the user and eventually lead to a situation in which the application won’t be used at all.

Luckily, Design Studio provides a lot of options to customize and format the looks of an application. In this section we will go through a few of the features that would apply to our example application. Follow the steps below:
1. Place the DROPDOWN BOX component on the same height position as the TABSTRIP component. Select both components from the OUTLINE view by (Ctrl)-clicking them.

2. From the LAYOUT menu select the ALIGN TOP option. The DROPDOWN BOX is now moved to the top of the application.

3. Now you want this DROPDOWN BOX component to always keep the same margin from the right side of the application. Select the DROPDOWN BOX component.

4. In the PROPERTIES view set LAYOUT • RIGHT Margin to “20” (Figure 6.17).

5. Select the CHART component. In the PROPERTIES view set LAYOUT • HEIGHT to “450”.

6. Set LAYOUT • LEFT Margin to “30” and set the same value for BOTTOM Margin and RIGHT Margin. You’ll see that the WIDTH is set to AUTO (Figure 6.18). The CHART component’s width will now automatically resize when the user increases or decreases the application size.

7. Select the RADIO BUTTON GROUP component. In the PROPERTIES view set LAYOUT • WIDTH to “200”.

8. Set DISPLAY • COLUMNS to “2” (Figure 6.19).

9. Now drag the RADIO BUTTON GROUP component to a position just above the CHART component.
10. Once again, go to the Properties view and set Layout • Left Margin to “80” (Figure 6.19).

11. Since you already maximized the size of the Crosstab component in the Employee List tab of the application, you don’t have to edit the layout settings for that component. Now that all the components are in place, you can edit the appearance of the Chart. Select the Chart component.

12. Open the Additional Properties view from the View menu.

13. In the Additional Properties view, go to the Legend section and deselect the Display Legend checkbox (Figure 6.20). Since you already have a Radio Button Group component that indicates which measure the Chart is displaying, you don’t need an additional legend.
14. Click the Chart Area button, which is located above the Additional Properties view, and select Data Series.

15. Click the colored square and pick a color you like from the palette (Figure 6.21).

Figure 6.21 Data Series Pane in the Additional Properties View

The application you created is now nicely formatted and looks like Figure 6.22.

Figure 6.22 Layout Editor after Formatting
6.5 Executing the Application

It is time to check out your first application in Design Studio! Although we waited until the end to walk you through this process, keep in mind that you don’t have to wait until the application is completely finished to do some test runs. During the development process you constantly want to see how the application behaves and how the changes you make affect the application.

To execute the application, follow the steps below:

1. Select the Execute locally option from the Application menu to check the application in a browser window. The result is shown in Figure 6.23 and Figure 6.24.

![Image of Application Running in a Browser (KPI Trends Tab)](image)

Figure 6.23 Application Running in a Browser (KPI Trends Tab)
2. Switch tabs, set a filter on another division, and switch between the two chart measures.

3. Check the application on your mobile device by selecting the **Send to Mobile Device (using QR Code®)** command in the toolbar.

### 6.6 Summary

In this chapter, we went through a step-by-step tutorial to build a simple application with Design Studio. We used a Chart component and a Crosstab component to visualize and display data from a BEx query data source. To set up the overall layout of the application, we used a
Tabstrip component, which allows the user to switch between the Chart and the Crosstab. With a Dropdown Box component, a Radio Button Group, and some associated event scripts, we created the interactive elements in this application to filter the data and select the measures to be presented in the chart. Finally, we executed the application and checked its functionality.
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