



SAP® Analytics Cloud

- › Your all-in-one guide to SAP Analytics Cloud
- › Connect to data sources and create stories, visualizations, and dashboards
- › Develop planning models, predictive models, and analytical applications

3rd edition, updated and revised

Abassin Sidiq



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Contents

Preface	13
1 Introduction	17
1.1 What Is Analytics?	17
1.2 SAP's Data and Analytics Strategy	19
1.2.1 Core Pillars of SAP's Data and Analytics Strategy	19
1.2.2 Comparing Cloud-Based and On-Premise Solutions	21
1.2.3 How Does SAP Datasphere Fit In?	22
1.3 Overview of SAP Analytics Cloud	23
1.3.1 Functional Areas	24
1.3.2 User Interface and Core Functionality	27
1.4 Architecture	45
1.5 Standalone and Embedded Versions of SAP Analytics Cloud	46
1.6 Summary	48
2 Data Integration	49
2.1 Data Sources Supported by SAP Analytics Cloud	49
2.1.1 Data Sources for Live Connections	49
2.1.2 Data Sources for Import Connections	55
2.2 Connection Types	61
2.2.1 Live Connections	61
2.2.2 Import Connections	66
2.2.3 Choosing a Connection Type	69
2.3 Integration Scenarios for Live Connections	70
2.3.1 Direct Connections via Cross-Origin Resource Sharing	70
2.3.2 Connections via Tunnels	75
2.3.3 Connections via Reverse Proxies	77
2.4 Integration Scenarios for Import Connections	79
2.4.1 Connections to On-Premise Data Sources	79
2.4.2 Import Connections to Cloud Data Sources	81
2.5 Summary	83

3	Navigation and Administration	85
3.1	Navigating the Home Screen and Main Menu	85
3.2	First Steps for Administrators	89
3.2.1	Users and Single Sign-On	89
3.2.2	Data Sources and Structures	91
3.2.3	Operational Concept	92
3.2.4	System Landscape	92
3.3	Administration Tools	96
3.3.1	Security	97
3.3.2	Transport	106
3.3.3	System	109
3.3.4	Administration	111
3.3.5	Files and Folder Structure	115
3.3.6	Content Network	118
3.3.7	Workspace Management	119
3.4	Creating Connections	120
3.5	Summary	123
4	Data Modeling	125
4.1	Why Use Data Models?	126
4.2	Types of Data Models	129
4.2.1	Datasets	129
4.2.2	Analytical Models	132
4.2.3	Planning Models	134
4.2.4	Embedded Models	135
4.3	Creating Models by Importing Data	135
4.3.1	Creating a Model	136
4.3.2	Creating Expressions	142
4.3.3	Executing Transformations	143
4.3.4	Creating Hierarchies	147
4.3.5	Creating Versions	148
4.4	Creating Models from Live Data Sources	150
4.5	Editing Models in the Modeler	158
4.5.1	Areas of the Modeler	160
4.5.2	Editing Models	163
4.6	Summary	169

5 Business Intelligence: Visualizations and Dashboards	171
5.1 What Are Stories?	172
5.2 Creating Stories	174
5.2.1 Pages	175
5.2.2 Classic Data Exploration and Your First Charts	178
5.2.3 Launch a New Story	183
5.2.4 Story Interface	184
5.3 Creating, Editing, and Formatting Charts	189
5.3.1 Creating a New Chart	189
5.3.2 Adding More Charts	195
5.3.3 Conditional Formatting	196
5.3.4 Showing Variances	197
5.3.5 Other Chart Functionalities	200
5.3.6 Defining Colors	205
5.3.7 Formatting Charts	206
5.3.8 Hierarchies	209
5.4 Creating, Editing, and Formatting Tables	209
5.5 Geo Maps	215
5.6 Texts, RSS Readers, and Other Elements	218
5.7 How Viewers Interact with Stories	221
5.7.1 Filters	222
5.7.2 Dimension and Measure Input Controls	230
5.7.3 Chart Interactions	232
5.8 Calculations	236
5.8.1 Calculated Accounts	237
5.8.2 Calculated Dimensions	240
5.9 Story Design	242
5.10 Sharing and Publishing Stories	245
5.10.1 Sharing, Exporting, and Publishing Stories	245
5.10.2 Publishing to Mobile Devices	249
5.11 Additional Story Functionalities	254
5.11.1 Creating an Embedded Model within a Story	254
5.11.2 Story Templates	255
5.11.3 Blending	255
5.11.4 Comments	258
5.11.5 Bookmarks	259

5.12 Optimized Story View Mode	259
5.13 Summary	261

6 Planning 263

6.1 Planning in SAP Analytics Cloud	263
6.1.1 Data Entry and Version Management	264
6.1.2 Planning within Stories	266
6.1.3 Planning Tools	268
6.2 Creating and Setting Up a Planning Model	270
6.2.1 Creating a Currency Conversion Table	271
6.2.2 Creating a Master Data Model	273
6.2.3 Uploading Transactional Data to the Model	281
6.2.4 Setting Up a Planning Model	286
6.3 Planning-Specific Functionality	289
6.3.1 Versions and Data Entry	289
6.3.2 Distributing Values	292
6.3.3 Allocations	297
6.3.4 Grid Pages	302
6.3.5 Value Driver Tree	305
6.3.6 Data Actions	309
6.3.7 Calendar	311
6.4 Summary	314

7 Predictive Analytics 317

7.1 What Is Predictive Analytics?	317
7.2 Smart Assist	322
7.2.1 Smart Discovery	322
7.2.2 Smart Insights	326
7.2.3 Search to Insight	328
7.2.4 R Visualizations	329
7.2.5 Automatic Forecasts for Time Series	333
7.2.6 Smart Grouping	335
7.3 Smart Predict: Predictive Scenarios	336
7.3.1 Time Series	336
7.3.2 Regressions and Classifications	343
7.4 Summary	343

8 Advanced Development Environment	345
8.1 The History of Stories and Applications	345
8.2 Creating Applications	348
8.2.1 Development Environment	349
8.2.2 Creating New Application Elements	352
8.3 Custom Widgets	366
8.4 Summary	370
9 SAP Digital Boardroom	373
9.1 What Is SAP Digital Boardroom?	374
9.2 Creating Boardrooms	379
9.2.1 Boardroom Types	379
9.2.2 Using Charts in a Boardroom	381
9.2.3 Creating an Agenda	382
9.2.4 Creating a Dashboard	387
9.3 Hardware Recommendations	392
9.4 Summary	393
10 SAP Analytics Hub and the Analytics Catalog for SAP Analytics Cloud	395
10.1 What Is SAP Analytics Hub?	396
10.2 Setup and Content Creation	398
10.2.1 SAP Analytics Hub Cockpit	399
10.2.2 Edit Mode and Content Management	404
10.3 Analytics Catalog	406
10.3.1 Adding Content to the Analytics Catalog	406
10.3.2 Browsing the Analytics Catalog	408
10.4 Summary	409
The Author	411
Index	413
Service Pages	I
Legal Notes	II

Preface

Since SAP officially launched SAP Analytics Cloud in the fall of 2015, the world of analytics has changed massively. The growing usage of analytics solutions within business units in companies, the transformation from on-premise landscapes to cloud-based vendors, and continuously growing data volumes impose new sets of challenges for analytics solutions and their providers. On top of that, the use of artificial intelligence (AI) has unleashed tons of new ways to access technologies and changed the way we think about data.

Analytics:
a supreme
discipline?

These changes create a challenging situation for many companies that must be overcome to stay competitive. Business units that strive for more freedom in analyzing data or require graphical and interactive reporting instead of tabular reporting also expect easy and intuitive solutions. Addressing this need, SAP Analytics Cloud is positioned as an analytics platform with high flexibility and many options for creating self-service scenarios.

Objective of This Book

SAP Analytics Cloud started as a platform and has gained a broad set of tools and functionalities to store and analyze data and provide multidimensional analyses as well as to enter data and establish planning scenarios. This book will cover these functionalities in great detail and provide examples for important workflows. Not only will you learn what SAP Analytics Cloud is, you'll also experience the opportunities the solution offers.

Why this guide?

In general, this book is designed as a guide to complete essential tasks and resolve common challenges related to SAP Analytics Cloud, and we'll provide detailed descriptions of the solution's user interface (UI) and its functionalities. The structure of this book is designed in such a way that you can easily distinguish between chapters that target administrators instead of users, for instance, and thus, you can choose the chapters that are most relevant for you.

This book also provides an overview of SAP's current analytics strategy and the role of SAP Analytics Cloud in that strategy. Besides providing deep insights on architectural and administrative aspects, all platform areas will be explored through detailed examples. You can download all the necessary data from <https://www.sap-press.com/5753> to follow along.

What you can
expect

Target Audience

Target audience and requirements This book primarily targets users of the solution but also consultants, administrators, and architects working with analytics landscapes and databases. By separating each topic into its own chapter, we've ensured that you can easily identify which chapters are most relevant to you.

The requirements to complete this book are fairly low. Besides access to SAP Analytics Cloud, you should simply reserve enough time to walk through each chapter carefully. The first chapters mainly focus on data integration and administering the solution. These chapters will be more interesting for administrators, architects, and power users with sufficient knowledge about data sources like SAP Business Warehouse (SAP BW), SAP HANA, or SAP S/4HANA.

Structure of This Book

- Structure of this book** The book is separated into ten chapters that target different audiences:
- **Chapter 1** introduces SAP Analytics Cloud. We'll describe how the solution fits into SAP's unified data and analytics strategy and describe basic use cases. You'll also learn more about the architecture of the solution in this chapter.
 - In **Chapter 2**, all aspects of data integration are covered in detail. In this chapter, you'll find detailed information about the data sources that are supported, and you'll gain a technical background in data connections. You'll also find example architectures and recommendations in this chapter.
 - **Chapter 3** will introduce administrators and new users to the SAP Analytics Cloud interface. After you familiarize yourself with its main screens, you'll learn more about the administrative tools available in SAP Analytics Cloud.
 - Because data modeling is an essential aspect of the analytics field, we'll cover this topic completely in **Chapter 4**. In this chapter, you'll see what data modeling in SAP Analytics Cloud looks like and learn the basic concepts behind data models. You'll also create a data model in this chapter that we'll use throughout the remainder of the book.
 - The central part of the book is **Chapter 5**. This chapter will introduce you to the concept of stories. After learning more about various page types, you'll create your own story using a broad set of functionalities. This chapter will conclude with a presentation of common business intelligence (BI) workflows.

- Planning, another important component of SAP Analytics Cloud, will be discussed in detail in [Chapter 6](#). After an explanation of the concept, you'll perform some example planning tasks.
- Another component of note is predictive analytics, which we'll introduce in [Chapter 7](#). In this chapter, you'll learn how to differentiate predictive analytics from BI and learn how to solve common challenges in SAP Analytics Cloud.
- Covered in [Chapter 8](#), the advanced development environment for SAP Analytics Cloud extends the product offering. In this chapter, you'll also find example code snippets to become more familiar with the solution. In addition, the chapter will describe custom widgets and show you how they can further individualize your applications.
- SAP Digital Boardroom represents an additional visualization layer on top of SAP Analytics Cloud, which we'll cover in [Chapter 9](#). After learning more about the concept in general, we'll create an example boardroom.
- This book concludes with [Chapter 10](#), in which SAP Analytics Hub and the analytics catalog for SAP Analytics Cloud are presented. This chapter will also cover administrative aspects of the solution.

While [Chapter 4](#) through [Chapter 10](#) focus on users who want familiarity with specific aspects of the solution, the first three chapters mainly provide information tied to implementing and integrating SAP Analytics Cloud. Those chapters primarily target IT decision makers, architects, administrators, and similar roles.

All examples in this book are designed to be simple and easy to follow. Our goal was to provide quick and intuitive access to the functionalities of SAP Analytics Cloud. [Chapter 4](#) to [Chapter 10](#) especially include many practical examples presented with sample data. However, you also can walk through these examples with your own data.

Additional Resources

In general, access to SAP Analytics Cloud is available via a paid subscription. Although a free trial version is available at <https://www.sap.com/products/technology-platform/cloud-analytics/trial.html>, only a limited set of functionalities is provided, and this version cannot be used for most exercises in this book. You can procure access to SAP Analytics Cloud either via your company or via SAP Store. All plans can be found at the following URL: <https://www.sap.com/products/technology-platform/cloud-analytics/pricing.html>.

Access to SAP
Analytics Cloud

The version used in this book is version 2024.02 (QRC Q1). Because SAP regularly updates the solution, some workflows presented in this book may change in look and feel. However, the instructions in this book are designed to still work in case of slight changes.

In addition, note that SAP Analytics Cloud can be purchased with different licensing types. Therefore, not every user will be able to follow all the chapters in this book. Contact your administrator before you begin to find out more about these distinctions and check the product help at <http://s-prs.co/v218514> for more information about the available licensing types.

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| Access to materials | Access to an on-premise data source isn't necessary to walk through this book. All examples can be performed using Microsoft Excel files. Those files and all other materials used in the book can be downloaded at https://www.sap-press.com/5753 . You'll find a compressed archive at the bottom of the page, in the Product Supplements section. Consider using an unarchiving program to unzip the archive. Both Windows 10 and current versions of Mac OS X can open compressed files natively without an external program. Although all examples in this book use Microsoft Excel files, you can also use your own data to follow along. |
| Technical requirements | To work with SAP Analytics Cloud, you'll need a computer or laptop with internet access. At the time of this writing, full support is only available for Google Chrome and Microsoft Edge, and we recommend using Google Chrome. If you want to open the Microsoft Excel files, you'll need either Microsoft Excel or an alternative spreadsheet solution. More information about technical requirements can be found at http://s-prs.co/v502624 . |

Acknowledgments

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|-------------------|---|
| Thank-yous | I personally want to thank you, the reader, for being interested in SAP Analytics Cloud and this book. I hope that this book provides a helpful overview of the solution and helps you become familiar with its capabilities.

I also want to thank everybody who helped me in creating this book. The tremendous support provided by the publisher and my family, colleagues, and friends made this possible.

Last, my deepest thanks go to my wife, who has always supported me throughout this whole process and all connected efforts. Without her help and commitment, this book would have never been published. |
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Abassim Sidiq

Chapter 1

Introduction

SAP Analytics Cloud not only provides an intuitive and easy-to-use user interface (UI) for business users but also offers easy access to corporate data. Why is this solution so unique among other SAP solutions?

Data is often called *the new gold*. Almost every person produces massive amounts of data—sometimes intentionally or sometimes not. Moreover, the generation of data is not limited to people anymore. Machines, household appliances, and even the smallest possible devices are often equipped with sensors or other data-collection mechanisms, and they provide detailed insights on process or environmental variables, for example. Especially in business, data has never been more important. Data offers a direct and unfiltered view of the facts to better understand why specific situations are occurring. As more and more companies are transforming their business to become more digital, they now collect massive amounts of data on all kinds of processes and events. While doing so, they often face challenges in harmonizing and understanding the actual data. In this book, we'll show you how you can successfully use SAP Analytics Cloud as a cloud-based solution in your company to help you make the right decisions.

Within this introductory chapter, we'll explain how SAP Analytics Cloud is positioned in SAP's solution portfolio and what its strategic direction is. First, we'll explain important terminology from the analytics space and then use this base to further elaborate on SAP's strategic vision for its data and analytics portfolio, both in the cloud and on-premise. Then, we'll introduce you to SAP Analytics Cloud and the solution's architecture.

1.1 What Is Analytics?

The term *analytics* is often used in various contexts and therefore can't be easily defined. This section's goal is not to deliver a universal definition but instead to build a framework around the term to create a common understanding for readers of this book.

This book will mainly focus on *business analytics*, which describes the usage of several analytics practices within a corporate or business context. The

Business analytics

core competency of SAP Analytics Cloud is to provide a solution for this area.

Business intelligence	A term that is commonly held equal to analytics is <i>business intelligence (BI)</i> . This term describes the analysis of historical data to derive insights about a current state or about historical trends or to make comparisons among similar situations. Typical BI tools include <i>dashboards</i> , <i>reports</i> , and similar visualization options, all of which often display data in charts or tables.
Planning	<p><i>Planning</i> is a widespread field that not only consists of strategy management but also involves topics like budgeting, forecasting, or profit and loss (P&L) analysis. Planning often considered a separate task or field but has strong dependencies on the results that are generated within the BI area.</p> <p>Some vendors, including SAP, extended planning to a new field called <i>predictive planning</i>. In this scenario, planning use cases are combined with technology from the predictive analytics field to incorporate data- and machine learning-based findings into the planning process.</p>
Augmented analytics	<p><i>Predictive analytics</i> is a more modern field in the area of analytics that has grown stronger in recent years. This analysis is focused on finding patterns in historical data to predict future developments and create better estimations.</p> <p>Recently, the extension called <i>augmented analytics</i> emerged, adding machine learning-based, automated functionality to the BI workflow. However, augmented analytics does not expose any technical elements to the business user. Instead, business users can access modern technology in a user-friendly way.</p>
Dashboards	<p>To conclude our definition of analytics, <i>dashboards</i>, or <i>analytical applications</i>, are worth mentioning. These dashboards are often built in a dedicated development environment that offers a broad set of functionalities. However, they require that the dashboard creator have strong expertise in the usage of such an environment. Dashboards often contain complex logic required by business users from various areas of a company who can't build those dashboards themselves. Therefore, dashboards are usually maintained by a central team, like IT.</p> <p>Dashboards and reports are still often seen as two different elements. However, in recent times, the border between them has become more fluid, bringing both worlds closer together. While reports are becoming more complex, the number of business users that can create complex dashboards is also growing. Therefore, it is often not very easy to look at both worlds separately.</p>

Core of Business Analytics

Business analytics can be roughly divided into the following four areas:

- BI
- Predictive planning
- Augmented analytics
- Analytical applications (dashboards)

We'll use this definition from now on as a framework for analytics and for using the solution described in this book. Ahead, we'll show you how SAP Analytics Cloud supports business users in all the areas of business analytics and how you can use the solution to overcome challenges and gain powerful insights.

1.2 SAP's Data and Analytics Strategy

While the overall IT market is focusing more and more on cloud-based solutions, one consequence of this development is that SAP now offers an analytics platform in the cloud. In the following sections, we'll outline the core pillars of SAP's strategy for analytics and then compare cloud-based to on-premise solutions. Additionally, SAP is now offering SAP Datasphere, which offers business users a solution that allows them to easily model data sources.

1.2.1 Core Pillars of SAP's Data and Analytics Strategy

SAP's overall technology strategy is to build a strong and market-leading software offering in the cloud. When looking at SAP's database and analytics portfolio, you'll see two development streams: on one hand, SAP offers a central and holistic data and analytics portfolio called SAP data and analytics solutions. On the other hand, SAP is still maintaining a selection of reliable *on-premise software* that supports users in a broad variety of tasks. The software as a service (SaaS) elements of the portfolio are solely offered via public cloud hosting.

SaaS

The SAP BTP data and analytics portfolio is described by the data value formula shown in [Figure 1.1](#). This formula determines the value of your data by its elements, specifically, its volume, its quality, and its usage. These elements are addressed by various solutions in the SAP portfolio.

Data value formula

According to the data value formula, data must have the necessary volume and be of the right quality to be used correctly. If all three elements are fulfilled, the highest value from your data is gained. SAP Analytics Cloud was built to cover the usage part of this formula by helping users correctly use their data to derive the required insights from it.



Figure 1.1 Data Value Formula

SAP Analytics Cloud benefits from SAP's strong investment in building a long-lasting and highly modern analytics platform that utilizes cutting-edge technology and leverages SAP's deep expertise in the field. SAP Analytics Cloud is designed as a platform of functionalities and services around all the core areas of business analytics we described in the previous section. Users can use a unified UI to access the functionalities of the solution.

Hybrid solutions

Beyond solutions that are solely cloud-based or on-premise, SAP is also putting major effort into realizing *hybrid scenarios*. These mixed scenarios consist of cloud-based and on-premise solutions being used together. SAP's key goal in this scenario is to provide a path towards a cloud transformation by seamlessly integrating both worlds. To ensure interoperability, SAP has created multiple interfaces, which are continuously extended. Nevertheless, SAP is heavily investing in cloud development while ensuring that hybrid scenarios offer users the best of both worlds and path towards a fully cloud-based landscape.

SAP Business Technology Platform Data and Analytics Strategy

In general, the SAP BTP data and analytics strategy can be summarized in the following way:

- The data value formula to orient how you generate value from your data
- High investments in the cloud-based portfolio and continuous maintenance of the on-premise portfolio
- SAP Analytics Cloud as the central analytics platform
- Hybrid scenarios as a step towards a cloud transformation with high interoperability

1.2.2 Comparing Cloud-Based and On-Premise Solutions

Although this book will focus on SAP Analytics Cloud, this section is designed to provide a brief comparison between cloud-based and on-premise solutions. Cloud-based solutions are often new to users (and new to companies) and might be thus viewed with skepticism. Therefore, this section will compare both types of software solutions with respect to the field of analytics.

When looking at SAP's on-premise portfolio, note how each solution covers a specific area of business analytics:

- For the creation of complex dashboards, SAP offers *SAP Lumira, designer edition*. With this solution, users can utilize scripting to create extremely specific and individual dashboards that meet highly custom needs.
- For planning scenarios, SAP offers *SAP Business Planning and Consolidation (SAP BPC)*. This solution can generally be used for enterprise performance management.
- In the area of predictive analytics, SAP is offering multiple solutions, including *SAP Predictive Analytics*. This tool allows users to access various data science utilities and statistical methods.

On-premise solutions

In addition, SAP still maintains a broad variety of other solutions that can be used, for example, for pixel-based reporting or for scheduling publications.

With the *SAP BusinessObjects Business Intelligence platform*, SAP is offering a central on-premise platform to host these applications. This solution offers a common basis for report storage, e-mail distribution, and connection management.

When looking at the cloud, SAP is exclusively focusing on SAP Analytics Cloud as its central offering. This solution not only serves as a central platform but also covers the previously-described areas of business analytics: BI, planning, predictive analytics, and complex applications (using the analytics designer for SAP Analytics Cloud). In this way, SAP Analytics Cloud can be used for creating reports and dashboards, establishing planning workflows, and creating predictive scenarios. In general, SAP recommends that organizations first evaluate the cloud portfolio before starting analytics implementations.

Centrality of SAP Analytics Cloud

Additionally, other major differences exist with regard to on-premise software. On-premise solutions are usually installed and maintained at the customer's site by the customer itself or by supporting parties. A vendor might update the solution over time and offer new patches or service and feature packs that either fix bugs or deliver new functionality. As the customer,

Maintenance and updates

you'll decide whether and when to roll out updates or implement patches. In the process, you'll have to take care of various dependencies with other software installations, which can cause trouble. Besides the software, you also must provide the hardware to run the software yourself. However, you can choose a managed hosting scenario in which an external party takes on the task of hosting and maintaining the hardware so that at least this effort is covered by someone else. Thus, overall, as the customer, your responsibility will be to ensure that the solution is running, while the vendor maintains the software itself and offers updates or patches for you to install and roll out.

Cloud-based solutions In the case of cloud-based solutions, especially when looking at SAP Analytics Cloud, SAP will take care of most tasks. SAP installs, updates, and maintains the software; you'll simply get access to the solution's frontend. Although the vendor is exclusively maintaining the software, you can still access an administration interface that offers a range of self-service scenarios to perform your own, customer-specific configurations.

Another characteristic of cloud-based solutions is their update behavior. The update frequency is usually determined by the vendor. Although some vendors still allow you to choose from a set of options for update frequency, in the end, the vendor will always perform the updates and ensure that users are working with the newest version of the solution.

The same applies to hardware availability. Since you are only renting or subscribing to SaaS solutions and thus paying for this access on a monthly, quarterly, or yearly cycle, for example, you won't necessarily have to provide any hardware to run the solution. In this way, you can lower your initial investment and also offer more flexibility.

1.2.3 How Does SAP Datasphere Fit In?

Although *SAP Datasphere* will not be covered in this book in detail, this section will provide a short overview of the solution and its importance for SAP Analytics Cloud. With SAP Datasphere (formerly known as *SAP Data Warehouse Cloud*), SAP offers a SaaS solution which enables both business and IT users to connect to data from various sources, model it, and make it available for further analysis. This is backed by a wide variety of features and connectors that cover a broad number of data sources.

The user interface is designed to be very intuitive and offers an easy path into the world of data modeling. On top of that, there are various features intended for technical users to create more complex scenarios.

While SAP Datasphere and SAP Analytics Cloud use the same frontend design and therefore look very similar, these solutions follow two different

approaches. SAP Analytics Cloud is primarily built to analyze data and drive business decisions. It also offers various connectors to data sources and a modeling layer, but these functionalities are designed to produce data that can be analyzed directly.

However, SAP Datasphere can be said to operate on a lower level. Here, you can design data models that are fed from various data sources. On top of that, technical models can be translated into business-friendly representations and model security can applied on a broader basis.

Instead of seeing these products as competitors, SAP actively promotes the usage of both solutions in parallel. SAP Analytics Cloud and SAP Datasphere can be connected to each other in seconds, which allows users of SAP Analytics Cloud to easily access data from SAP Datasphere. SAP is also continuously rolling out more features to further strengthen the value of this scenario.

1.3 Overview of SAP Analytics Cloud

SAP Analytics Cloud was first released in November 2015 (under the name SAP Cloud for Analytics, then later SAP BusinessObjects Cloud). The product itself is updated every two weeks by SAP, which includes bug fixes as well as new features and functionalities. However, this biweekly update cycle is only performed on partner and nonproductive tenants. Productive customer tenants are updated every quarter. SAP calls this update pattern the *quarterly release cycle*. Updates in the quarterly release cycle contain the same bug fixes and features or functionality as were shipped in the biweekly releases up to the point when the quarterly release cycle releases an update.

Because SAP Analytics Cloud is solely offered as an SaaS, the hosting and maintenance of the solution is provided by SAP in a public cloud environment. Thus, SAP Analytics Cloud is only available in SAP-run data centers.

Public cloud

SAP Analytics Cloud can be used as a standalone solution without any other SAP solution in place or can be used in a hybrid scenario. In this case, the solution can be placed into an existing architecture without having to replicate sensitive data to the cloud as the data remains in their on-premise data sources.

Data integration

Is SAP Analytics Cloud Exclusively Offered in the Cloud?

Although SAP Analytics Cloud is an SaaS offering, various integration scenarios for on-premise landscapes are available. Note that, in those scenarios, sensitive and important data can be kept within your company

network, which explicitly means that no data replication into the cloud or any other place on the internet is necessary. Therefore, SAP Analytics Cloud can also be used at companies that are not following a cloud-centric strategy or that are not allowed to upload their data to the cloud because of legal or privacy-related reasons.

It should also be noted that SAP Analytics Cloud can be a starting point on a journey toward a cloud architecture. It can be used to protect existing investments, which can still be used in parallel.

In general, SAP Analytics Cloud can be split into four functional components that sum up to the whole solution. Those components are not separate tools or solutions but rather are part of the SAP Analytics Cloud platform. With regard to licensing, you can even subscribe to some of these components separately. Nevertheless, all components share the same code line. Their UI design and behavior are kept as similar as possible to provide a unified user experience (UX).

Self-service Another important aspect of SAP Analytics Cloud is the *self-service* approach. Modern analytics solutions are increasingly used by business users directly; these users can create their own reports and maintain them independently from IT or other technical departments. These reports are often created to answer various questions right away without additional help. In addition, a majority of those questions can't be answered without having deeper knowledge of the business processes behind them. Knowledge of this kind usually resides within the business user rather than within IT. To ensure that business users have easy access to business analytics, SAP Analytics Cloud offers easy-to-use and intuitive UIs that allows for easy data exploration, as well as table and chart creation, for example.

Self-Service in Companies: Is It Even Possible?

The self-service approach has gained a lot of traction in recent years. Nowadays, college graduates often have some experience in data and reporting that hadn't been taught in such detail in the past. Moreover, more and more business departments are building their own knowledge around analytics to become more independent. With SAP Analytics Cloud, you can establish scenarios including self-service scenarios, as well as configure centrally governed setups.

1.3.1 Functional Areas

As shown in [Figure 1.2](#), the areas of business analytics we described in [Section 1.1](#) are represented in the various components of SAP Analytics Cloud.

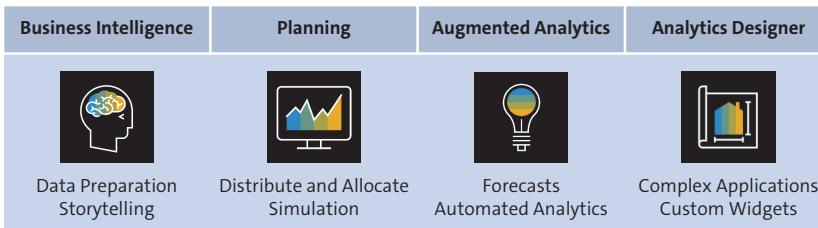


Figure 1.2 Core Components of SAP Analytics Cloud

The area of BI combines all functionalities ranging from data connectivity to reporting and collaboration. Also included are options to upload data to SAP Analytics Cloud, to define models from scratch, or to fix quality issues in uploaded data. *Storytelling*, which is SAP Analytics Cloud's term for *reporting*, is a strong feature of BI that gives business users and IT users easy and intuitive access to their data. We'll discuss BI in detail in [Chapter 5](#).

Business intelligence

Planning in SAP Analytics Cloud covers a broad planning engine consisting of various tools and functionalities that enable the establishment of complete planning processes. Therefore, data models are extended by planning-specific properties, and some additional functions are provided to better analyze key performance indicators (KPIs). In addition, users can create input-ready forms, apply extended formulas, and create additional chart types like the value driver tree (see [Section 1.3.2](#)). Planning will be covered completely in [Chapter 6](#).

Planning

For predictive analytics, SAP Analytics Cloud offers users various automated and manually executed processes. These automated functionalities are designed to offer business users an easy introduction into machine learning and the application of statistical methods to data. For more advanced users or data scientists, various additional options offer broader flexibility. Power users especially often have strong requirements or need precise fine-tuning options. Furthermore, many company-specific requirements or quality checks will need to be considered, which makes the field rather complex. A full description of predictive analytics will be provided in [Chapter 7](#).

Predictive analytics

The concept analytics designer is the newest component of SAP Analytics Cloud. This tool allows you to build complex analytical applications. Thus, power users can extend standard reports by using scripting and define more detailed settings on chart behavior, filters, or other elements.

Analytics designer

When compared with storytelling and BI, the analytics designer is clearly different from the self-service approach. This tool is designed for power users who are building and providing individualized and heavily customized dashboards for business departments and business users. Business users simply consume the dashboards; they don't modify them further.

These dashboards, which are often also called *applications*, are quite different from the reports built for BI, and the creation of dashboards requires deeper knowledge and coding skill. Dashboards also behave differently since these applications are usually customized and built for individual use cases.

Fluid borders SAP regularly enhances major elements within SAP Analytics Cloud based on customer feedback. This becomes visible through functional overlaps between the solution's components.

Unified story While the analytics designer is still treated as its own component, at the time of writing, SAP is working on merging the functionalities of SAP Analytics Cloud for business intelligence and the analytics designer. With the Q2.2023 release, SAP introduced the *unified story*. In particular, SAP decided to extend SAP Analytics Cloud for business intelligence by adding scripting functionalities from the analytics designer. While the creation of reports is still very intuitive and user friendly, technical users can now access extended features in the same working environment.

To make sure that the book's structure is still understandable, the unified story will be mainly presented in [Chapter 5](#). In [Chapter 8](#), the classical analytics designer is described with a recommendation on when to use which environment.

SAP Analytics Cloud as a platform Because SAP Analytics Cloud is designed as an analytics platform, it offers the following additional solutions or tools, which are based on the platform and strongly interact with it:

- SAP Digital Boardroom ([Chapter 9](#))
- The SAP Analytics Cloud mobile app ([Chapter 5](#))
- SAP Analytics Hub ([Chapter 10](#))
- The analytics catalog for SAP Analytics Cloud ([Chapter 10](#))

SAP Analytics Cloud is necessary to run these solutions, which we'll describe in more detail in later chapters.

SAP Analytics Cloud: Platform or Solution?

With regard to SAP Analytics Cloud, this book will often use the term *solution* or *platform*. Indeed, SAP Analytics Cloud is both a platform and a solution. When looking at SAP Analytics Cloud as a solution, offered functionalities include BI, planning, predictive analytics, and the analytics designer. At the same time, SAP Analytics Cloud is a platform that offers unified access to all those areas.

In contrast, an on-premise SAP BusinessObjects Business Intelligence platform is different because this platform primarily offers only platform services. For specific functionalities, additional solutions like SAP Lumira must be installed.

1.3.2 User Interface and Core Functionality

In this section, we'll introduce you to the UI for SAP Analytics Cloud and describe how to work with it in general. In the process, we'll provide an overview of core functionalities in the areas of BI, planning, predictive analytics, and the analytics designer. A detailed description of these areas with explanatory examples can be found in [Chapter 5](#) through [Chapter 8](#). In this section, we'll start by walking through some general navigation concepts, then we'll provide brief descriptions of the BI, planning, predictive analytics, and analytics designer solution components.

Navigation

The entry point into SAP Analytics Cloud is the *home screen*, shown in [Figure 1.3](#). Every user can customize the home screen and define specific elements to be displayed when opening SAP Analytics Cloud.

Home screen

The home screen provides access points to all functionalities within the solution and to all reports. In addition, the default home screen also provides an initial overview to new users by recommending some first steps. These steps include basic tasks for users but only cover some core functionality. The examples you'll find in this book are designed to cover the whole scope of the solution. Therefore, this book is a great way to expand upon the instructions and help material built into the solution.

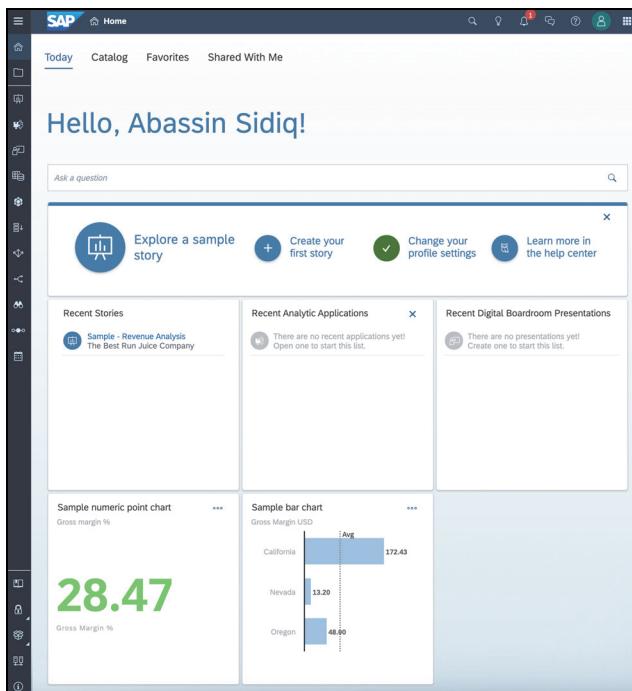


Figure 1.3 SAP Analytics Cloud Home Screen

Notifications In the top-right corner of the home screen, you'll find the notifications icon . The number displayed indicates how many unread notifications you have (in this case, one). By clicking this icon, you'll find information about recent releases and messages from other users. You'll also receive notifications whenever a report is shared with you or whenever a new task is assigned to you. Administrators will also receive additional system notifications, like the **New features are available.** message shown in [Figure 1.4](#).

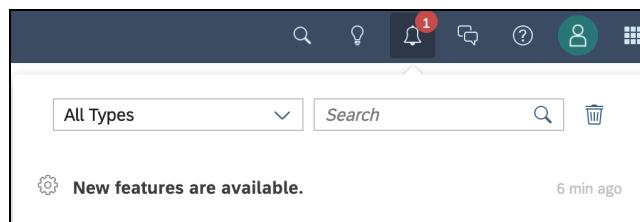


Figure 1.4 Notifications in SAP Analytics Cloud

Product help Near the notifications icon, you'll also find the product help icon . Click this icon to access various help texts (**Help** button) or videos as shown in [Figure 1.5](#).

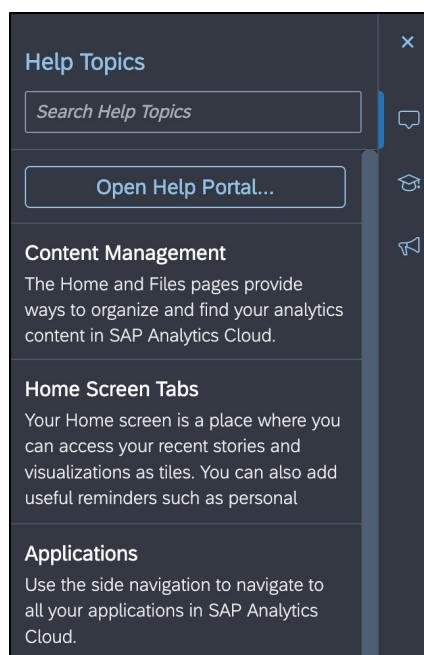


Figure 1.5 Product Help Overview

These capabilities include searching the help library (**Search Knowledge Base** button) or providing feedback to SAP (**Send Feedback** button). The

Submit Ideas button allows users to request new features. Product help can be launched from anywhere in SAP Analytics Cloud.

The video library covers almost all areas of the solution, explains its features, and illustrates many workflows through examples.

Business Intelligence

The field of BI unifies all the tasks that you'll perform in a typical analysis. In general, you'll begin with *data acquisition*, move over to *data visualization*, and then close the scenario with *publishing* your findings, as we'll discuss in the following sections.

Data Acquisition

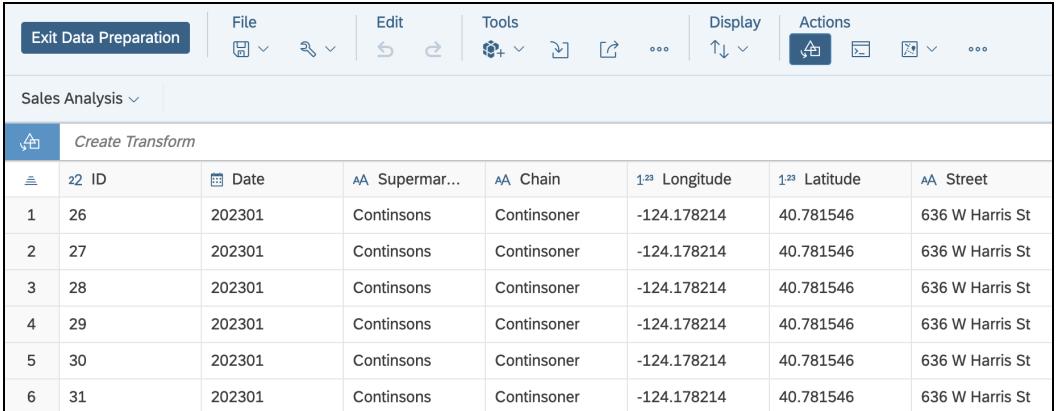
Data acquisition can be performed by business users or power users, depending on the use case and complexity. In this example, let's say a user wants to upload a file to SAP Analytics Cloud.

Data can be provided to SAP Analytics Cloud in several ways:

- Power users and business users building data models for access by a broader audience can use the *modeler* to build data models. Here, data can be either uploaded or external data sources can be connected to.
- Alternatively, users can directly upload flat files (e.g., a CSV or Excel file) into stories and build reports on the fly. In this case, users will start directly within the reporting environment and by default, the model is only available within that story.

After uploading a flat file, you can start editing or transforming the data within the solution. This process is also called *data wrangling*. [Figure 1.6](#) shows an example of an Excel file that was uploaded during the creation of a new story. We'll provide more details on this process in [Chapter 5, Section 5.11.1](#).

Data wrangling



The screenshot shows the SAP Analytics Cloud Data Preparation interface. At the top, there's a toolbar with various icons for file operations, tools, and actions. Below the toolbar, a header bar displays "Sales Analysis" and "Create Transform". The main area is a data grid with the following columns: ID, Date, Supermar..., Chain, Longitude, Latitude, and Street. The data rows show the following values:

	ID	Date	Supermar...	Chain	Longitude	Latitude	Street
1	26	202301	Continsons	Continsoner	-124.178214	40.781546	636 W Harris St
2	27	202301	Continsons	Continsoner	-124.178214	40.781546	636 W Harris St
3	28	202301	Continsons	Continsoner	-124.178214	40.781546	636 W Harris St
4	29	202301	Continsons	Continsoner	-124.178214	40.781546	636 W Harris St
5	30	202301	Continsons	Continsoner	-124.178214	40.781546	636 W Harris St
6	31	202301	Continsons	Continsoner	-124.178214	40.781546	636 W Harris St

Figure 1.6 Data Overview

During data wrangling, you have multiple tools available to fix data quality issues or to transform your data. In addition, you'll get a first look at your data, and through this overview, you can start creating relations between columns of your data—like hierarchies, for example.

You can use either your mouse or your keyboard to manipulate your data. The solution provides visual aids that automatically propose possible transformations and provide a quick preview. In this way, you can get a better understanding of the possibilities for your data right away. An example of such a transformation is shown in [Figure 1.7](#). Other options include the creation of hierarchies or enriching your data with geographical information.



Figure 1.7 Formula in Data Wrangling

The **Details** column, as shown in [Figure 1.8](#), on the right side of the page offers a quick overview of the file content. In this view, all columns of the uploaded file are shown as a list. The overview also shows which columns are categorized as dimensions and which as measures.

A screenshot of the "Dataset Overview" tab. At the top, it says "Sales Analysis" and "2000 rows 14 columns". Below that is a search bar. The main area is divided into two sections: "Output" and "Columns". The "Output" section has a dropdown menu. The "Columns" section is expanded and shows two categories: "Measures (5)" and "Dimensions (9)".

- Measures (5)**
 - Longitude SUM
 - Latitude SUM
 - Unit price SUM
 - Quantity *13 Issues* SUM
 - Revenue SUM
- Dimensions (9)**
 - ID
 - Date
 - Supermarket
 - Chain
 - Street

Figure 1.8 Details Tab

Every change you perform in the area of data wrangling will be captured in the **Transform Log**, which allows you to quickly undo or redo your actions, as shown in [Figure 1.9](#). This capability is an important aspect of self-service.

Transform log

You can interrupt your work in this process at any time and continue later. After finishing your data transformations, you can continue to create visualizations. In this step, you can either keep the data model contained or publish it for a broader audience. If you decide to publish the model, you can return to the data wrangling process and still perform transformations or changes.

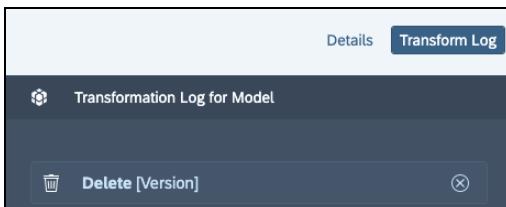


Figure 1.9 Transform Log

Data Wrangling

During data preparation (data wrangling), you can perform several actions to transform or enrich your data. These changes are captured in a history and can be easily undone. You can also repeat the process later.

As soon as the data is finalized, it can be published in a data model and made accessible to other users. A detailed description of data wrangling and the semantic options available can be found in [Chapter 3, Section 3.3](#).

Visualization

The visualization functionality in SAP Analytics Cloud is mainly focused on stories. Based on your use case, a story can be a report, a dashboard, or even an input form. Stories allow a user to create tables or charts and provide interaction. In addition, many tasks involving planning and predictive analytics can be performed within a story. [Figure 1.10](#) shows an example of a story.

Stories

In general, a story uses a “what you see is what you get” (WYSIWYG) format. While creating a story, you’ll immediately see the outcome of your work and can easily adjust the results to fit your individual needs. This feature supports the self-service approach because the technical complexity behind creating a story is hidden from the user as much as possible. This approach allows for the fast creation of reports without requiring deep knowledge in analytics.

WYSIWYG

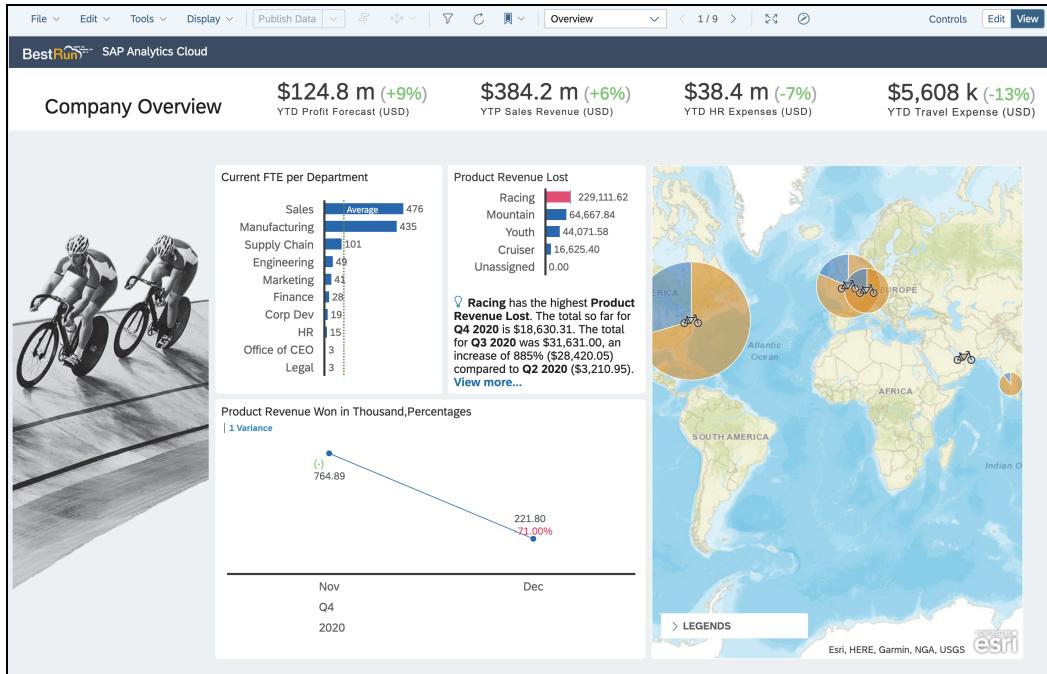


Figure 1.10 Example Story

Stories are the central way to interact with SAP Analytics Cloud for both story creators and consumers. As a report creator or owner, you'll have the authorization to create and modify reports. You can easily switch between the report creation and consumption views with a single click, thus allowing you to immediately view your changes.

Stories can contain multiple pages and can draw data from different sources. Stories provide the main environment for the majority of users. Besides visualizations, you can also link data models, enter data into planning models, or upload additional data within the story.

Creating a new story When creating a story, you'll be assisted by various options. In this way, you can create a story step by step. At the beginning, you can select from templates or various tools, as shown in [Figure 1.11](#). How those templates and tools work is described in detail in [Chapter 5, Section 5.11.2](#).

Stories

A story is an environment in SAP Analytics Cloud in which users not only perform classic analyses, but also realize scenarios around planning or predictive analytics. That's why the story is often just called a *report*.

Dashboards, on the other hand, are complex applications, created either partially within the story or in a different development environment—the analytics designer, which we'll present in [Chapter 8](#) in detail.

Over time, it's likely that the story will become the central platform to create reports and dashboards and the primary recommendation for asset creation.

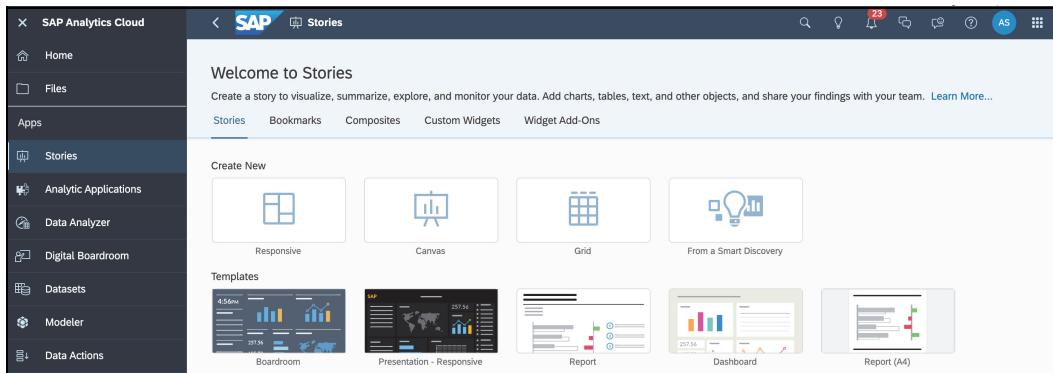


Figure 1.11 Creating New Stories

Within a story, you'll find various utilities and objects to create reports, including charts, texts, pictures, and filter controls. A button is always available for you to switch to *data exploration mode*. This mode can also be used as a starting point to create a new story. On this screen, you can easily create your first charts, or you can aggregate data.

In data exploration mode, you'll see all measures (e.g., revenue or costs) and dimensions (e.g., country or customer) available in a data model. To add measures or dimensions to the view, click on the + button, as shown in [Figure 1.12](#).

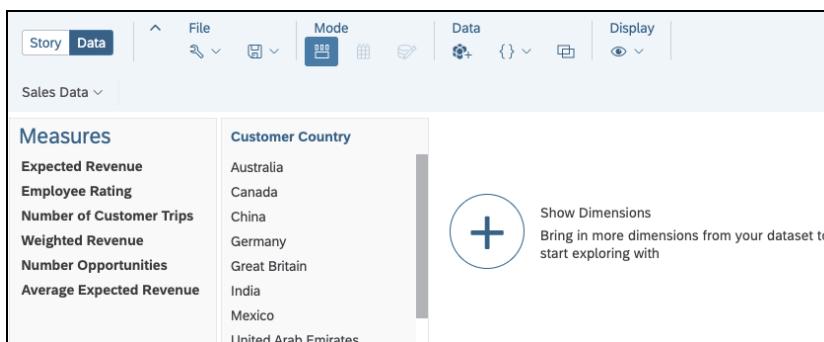


Figure 1.12 Data Exploration Mode in Stories

If you click on a specific dimension, like **Customer Country**, as shown in [Figure 1.13](#), you can create your first chart easily. In this case, you'll see the expected revenue by country.

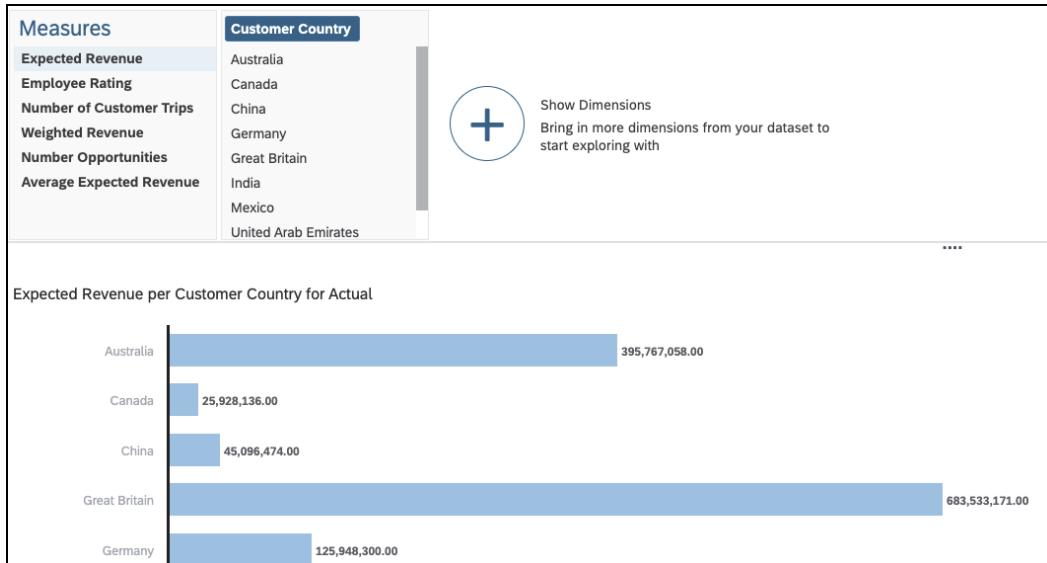
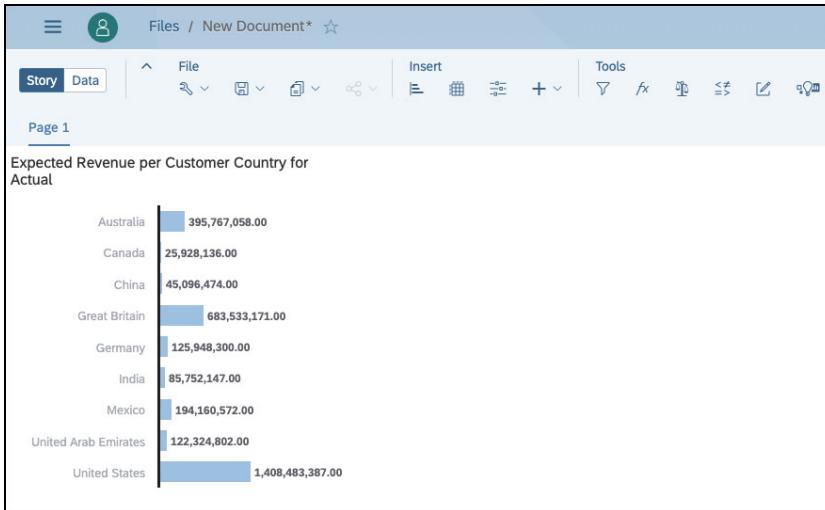
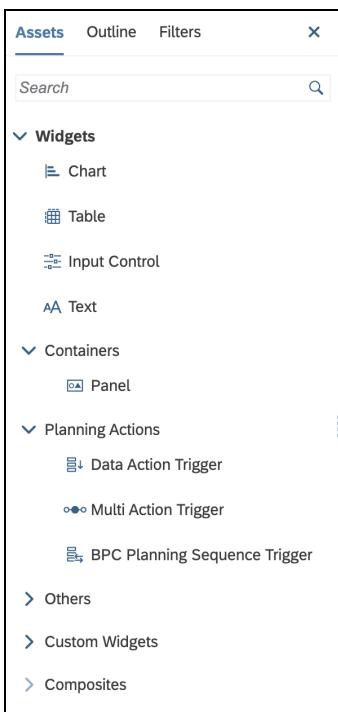


Figure 1.13 New Chart in Data Exploration

In data exploration mode, you'll get a good first impression of your data and see what information it contains. You can also reuse the chart you just created and copy it into a story. Thus, the process of analyzing the data and the process of visualizing this data is combined into a single guided process.

Canvas Data exploration can be performed multiple times to create more than one chart or table. This step is especially suited for users that have specific questions about their data but who may have little to no knowledge about the data model. After copying your chart to a story, you'll automatically jump into the story in edit mode. In this mode, you'll find your chart, as shown in [Figure 1.14](#).

Creating a report If you know your data already or feel confident enough, you can start creating a report by creating a new page right away. In this case, you can skip the data exploration mode. After creating a new page, you can add charts, tables, or other objects to it. An overview of the available objects is shown in [Figure 1.15](#). We'll provide more details on each object in [Chapter 5](#).

**Figure 1.14** New Story with Chart**Figure 1.15** Objects in Stories

Publishing

If you've finalized your story or if you want to interrupt your work to continue later, you can save it. To do so, SAP Analytics Cloud provides a folder

structure (see [Figure 1.16](#)). You can manage these folders with authorizations to control access to them.

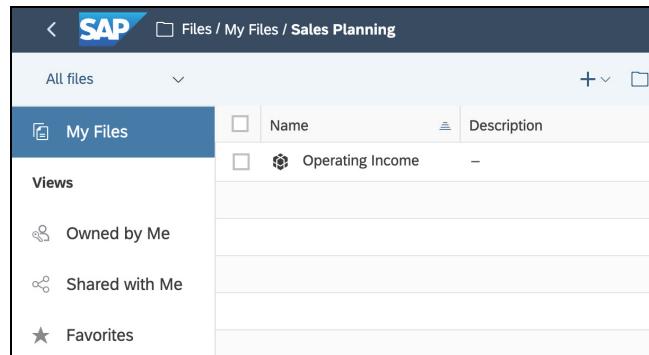


Figure 1.16 Folder View

Collaboration After you save a story, you can share it with other users in the system. You can share a story either by applying individual sharing settings to a story or by saving the story into a folder that is accessible to other users. The story creator is the primary person that controls the sharing settings. However, the authorization to share a story can also be given to additional users.

Moreover, SAP Analytics Cloud offers a discussion panel, accessible by the icon next to the notifications icon on the home screen, as shown in [Figure 1.17](#). Clicking this icon allows you to start a discussion with other users or groups of users.

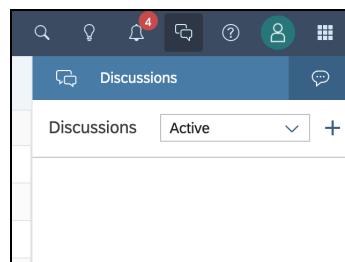


Figure 1.17 Starting a New Discussion

Linking a story Within a discussion, you can send text messages or link attachments, as shown in [Figure 1.18](#). When linking a story in a discussion, the story will be automatically shared with all discussion participants.

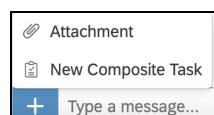


Figure 1.18 Writing a New Message

After sharing or publishing a story, the classic BI workflow is completed. Based on your individual scenario, you can restrict the creation of new reports to a specific group of power users, for example, who then can provide their reports to a broader audience. You can also establish mixed scenarios in which business users use prebuilt reports, for example, but still can modify them or run their own analyses.

Business intelligence workflow

Business Intelligence

All in all, BI can be summarized in three main steps:

1. Data acquisition

In this step, the data needed for the analysis is gathered and modeled. The data is either provided by the user or already exists in the form of a model and can be used based on individual authorizations.

2. Visualization

After successfully acquiring data, the data must be visualized. In this step, the user creates charts, tables, texts, or other objects to compose a report. The report will be used to analyze the data and to answer questions about the data.

3. Publishing

Because reports and their insights are often interesting to multiple stakeholders, sharing or publishing stories is an essential step. SAP Analytics Cloud offers built-in capabilities to offer an easy and intuitive sharing experience.

Planning

Planning is often considered its own world because this task requires special skills and is often connected to complex processes within companies. Therefore, many companies use separate solutions for solving planning cases. In addition, planning is often run separately from other central solutions and is only used to capture forecasts or budget values, which restricts their usage.

Nevertheless, planning can be connected tightly with other areas of business analytics. A core idea behind planning is to estimate future developments based on the broadest possible range of historical data. To achieve this goal, you can either use historical analyses or predictive forecasts. SAP Analytics Cloud follows this approach by heavily integrating planning functionalities with other areas of the solution. For example, its BI functionality also contains planning workflows if needed, which creates a beneficial synergy. In addition, some planning-specific utilities can't be reused in any other component. However, the overall UI is similar to guarantee a holistic experience throughout the platform.

Synergies with other areas

Data modeling An example of this unity is the data wrangling process we discussed in the previous section. SAP Analytics Cloud can also be used for modeling planning data and offers an optional checkbox to make a model compatible with planning, as shown in [Figure 1.19](#). This checkbox is available during data wrangling in the modeler. Once you select the **Activate Planning** checkbox, you can configure the additional settings needed for establishing planning workflows.

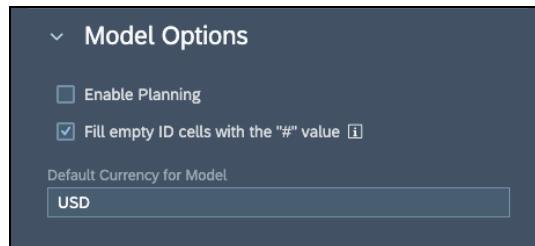


Figure 1.19 Option to Activate Planning in the Modeler

Planning models If you don't select this checkbox, an analytical model will be created. This model can be used fully for analyzing and uploading new data, no data entry can be conducted by users in forms or tables. In addition, various other planning-specific workflows only support planning models.

The structure of a planning model generally follows the concept of an *account-based model*. In this concept, a dedicated account dimension is created that contains all measures and KPIs and allows the creation of measure hierarchies. Both accounts and all other dimensions are structured and maintained in the modeler, as shown in [Figure 1.20](#).

OP_Accounts					
Member ID	Description	Aggregation Type	Account Type	Formula	Hierarchy
D00	Drivers				<root>
DRV0010	Growth Rate %		NFIN		D00
H000000	Finance	None			<root>
H100000	Operating Income	Sum	INC		H000000
H105000	Gross Profit	Sum	INC		H100000
H110000	Net Revenue	Sum	INC		H105000
H111000	Gross Revenue	Sum	INC		H110000
H111100	Gross Sales	Sum	INC		H111000
H111200	Retail Returns	Sum	EXP		H111000

Figure 1.20 Account Dimensions in Modeler

The visualization portfolio in SAP Analytics Cloud offers various ways to edit a planning model. One approach is in the grid page, which allows you to create tables and perform calculations in a sheet, as shown in [Figure 1.21](#).

Sales Data			
	Version	Actual	Forecast
Account			
Expected Revenue	3,086,994,047.00	2,778,294,642.30	
Number Opportunities	2,627.00	2,416.84	

Figure 1.21 Grid Page with Table

On a grid page, you can directly enter data into a model. In this process, you can create new versions and fill them by either applying formulas or entering the data manually. You can even use those values directly in visualizations. A detailed discussion of planning functionalities is provided in [Chapter 6](#).

In addition to the grid page, SAP Analytics Cloud offers various additional utilities for establishing planning workflows. An essential component of planning flow is the creation of *allocation processes*. These processes allow you to allocate and split aggregated values or entered data from one source dimension into multiple target dimensions.

Planning workflows

Because planning activities are often performed on aggregated levels, you must define *allocation steps*. Adding multiple steps together results in an allocation process that can be triggered in a story or in an application to allocate data entries, for example. The allocation step shown in [Figure 1.22](#) allocates IT expenses from a general cost pool into a product dimension and uses the gross sales measure to determine the cost share for each product.

Another tool in planning is the *value driver tree*. With a value driver tree, you can break down a KPI into its individual components and view these components in a tree structure, as shown in [Figure 1.23](#). The value driver tree also supports the implementation of simulation calculations, which show how the change of a single measure (or a leaf of the tree) impacts the overall KPI.

Value driver trees

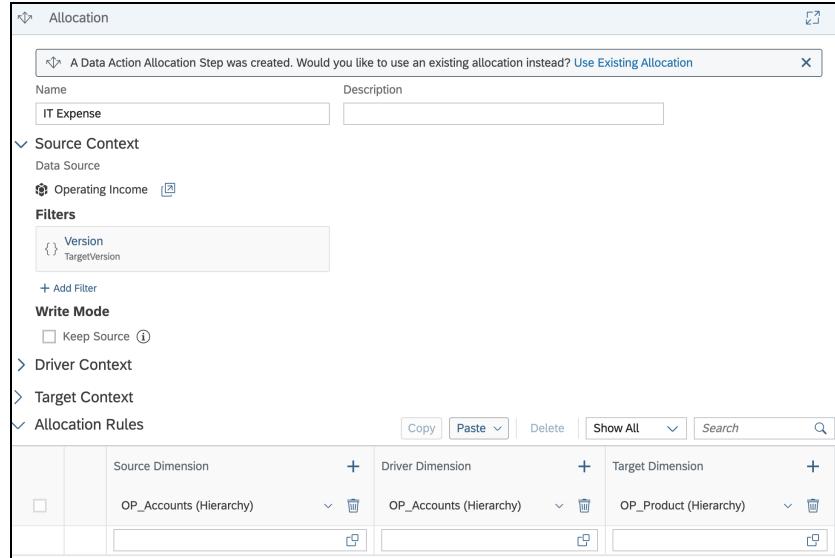


Figure 1.22 Simple Allocation Step

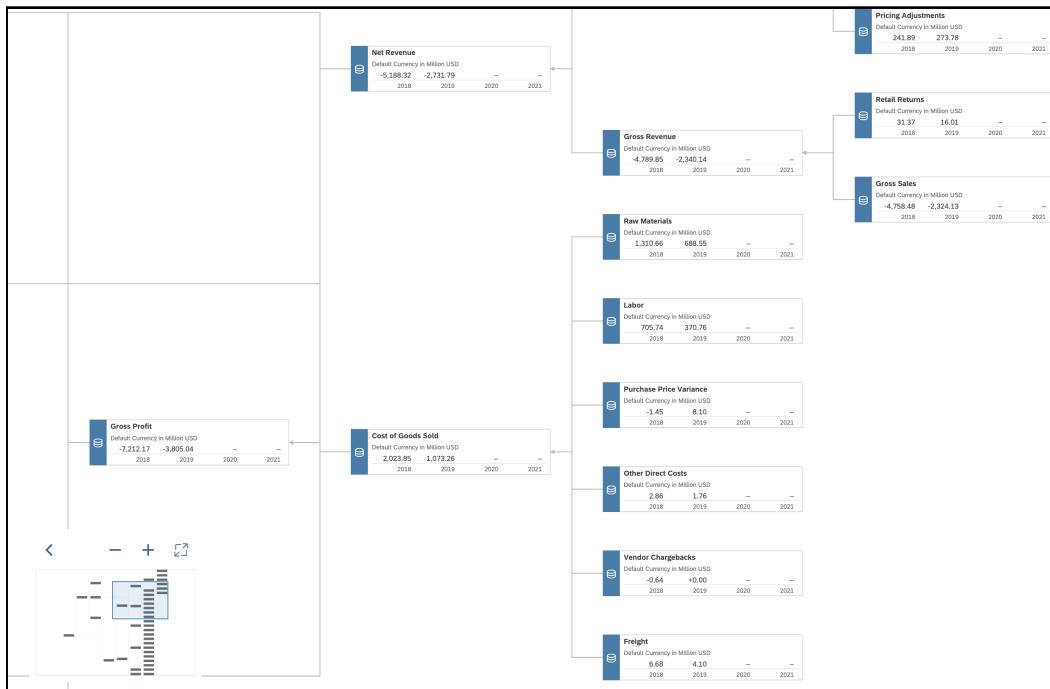


Figure 1.23 Example of Value Driver Tree

We'll create a value driver tree in [Chapter 6, Section 6.3.5](#), as an example. These tools are quite helpful since their simulation capabilities provide instant feedback on proposed changes.

Data actions make it possible to build and provide data entry forms, as shown in [Figure 1.24](#). Data actions

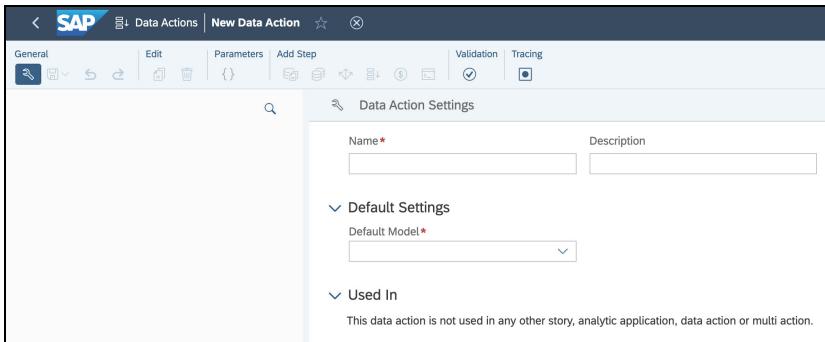


Figure 1.24 Creating New Data Actions

After their execution, data entry forms will follow a defined process, thus allowing you to govern any modification performed on data in models by following predefined sequences. After their creation, you can embed data actions into a story. You can set various parameters that define how users can modify data when executing the data action. We'll walk through the creation of data actions in [Chapter 6, Section 6.3.6](#).

SAP Analytics Cloud also offers a built-in calendar, as shown in [Figure 1.25](#). Calendar This calendar can be used to keep important dates or assign tasks to specific users. Tasks that are added to the calendar will be automatically shown to assigned users, who can then create reminders or even sticky the tasks to their home screens.

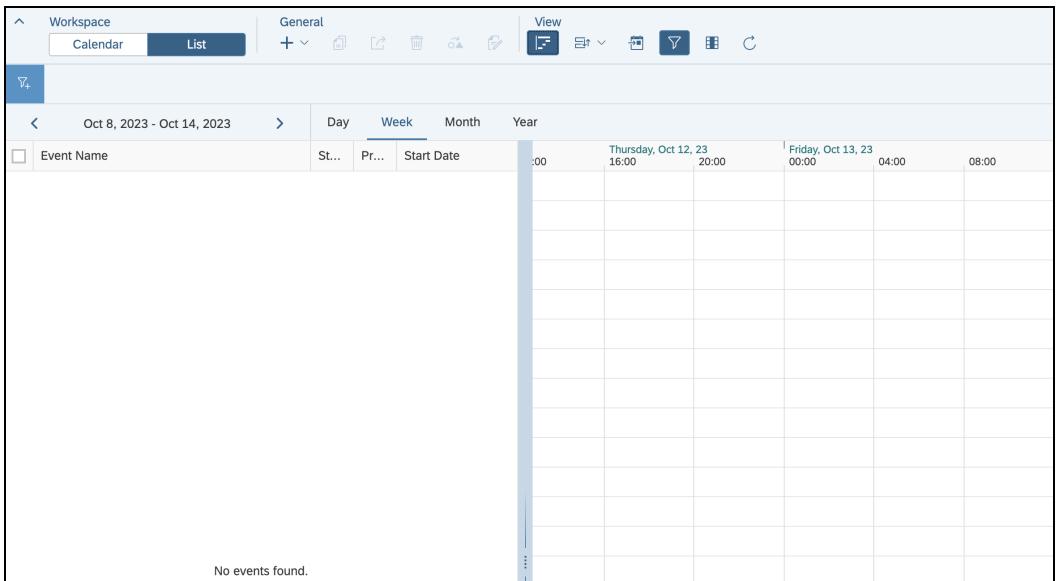


Figure 1.25 Calendar in SAP Analytics Cloud

Multistep planning processes The calendar simplifies the establishment of multistep planning processes, which often involve multiple people. With the calendar, you can also link specific data actions to a task so that users always have a clear overview of open tasks.

Planning

SAP Analytics Cloud offers a robust planning engine with a lot of functionalities. This solution allows you to define and execute planning processes that are integrated seamlessly with other areas of the platform, like BI or predictive analytics, thus creating synergies when planning.

Augmented Analytics

Another area of SAP Analytics Cloud tightly integrated with the platform is augmented analytics, which can be separated into two main fields:

- *Smart assist* tools require little to no knowledge in data science. Users can use automated functionalities that can be triggered by just a few clicks.
- *Smart predict* tools allow scenarios in which users have more options for defining individual parameters. However, these tools also require more knowledge to use.

Smart assist One of the smart assist tools is smart discovery, which allows you to investigate data models and learn more about key influences and other relations. To use smart discovery, you'll simply choose a measure or dimension that you want to know more about, as shown in [Figure 1.26](#). You can also exclude dimensions or measures that are obviously influencing your analysis target to get more reliable results.

Smart discovery will automatically execute machine learning algorithms and identify key influences and relations in data models. This capability also generates texts that provide detailed explanations of the insights it generates. We'll show how to use smart discovery in [Chapter 7](#). You'll also learn about other smart assist tools like *smart insights*, *search to insight*, or *R visualizations*. Because all smart assist tools and processes clearly target business users, they are fully integrated into either the home screen or a story and can be executed from there.

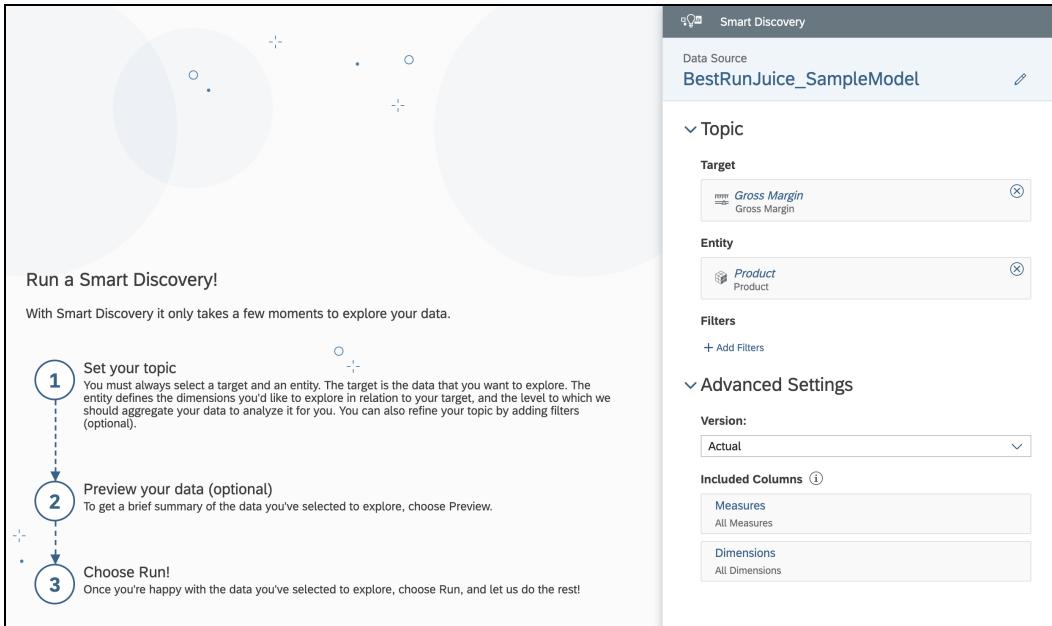


Figure 1.26 Running Smart Discovery

To create smart predict scenarios, SAP Analytics Cloud offers a dedicated environment. This environment offers various scenarios for answering different questions about data patterns and forecasts. With smart predict, users can create analyses of classifications, regressions, or time series forecasts, thus allowing you to predict future developments or identify critical customer segments, for example, as shown in [Figure 1.27](#).

Smart predict

Every scenario requires that you provide data and define various criteria to train the most accurate model. The more parameters you define, the better your model will become.

Figure 1.27 Creating a New Predictive Scenario

Predictive Analytics

SAP Analytics Cloud's predictive analytics component offers both automatic and manually triggered tools that are classified as either smart assist or smart predict functionalities. You can detect patterns or relations in your data, create time series forecasts, or create classifications or regressions. Once finished, you can use the results in planning and BI scenarios.

The workflows we've described so far are mainly guided and thus don't require deep coding knowledge. Nevertheless, many requirements must be fulfilled to further customize specific functions or workflows. SAP Analytics Cloud offers a broad set of tools to achieve this customization.

Analytics Designer

The analytics designer for SAP Analytics Cloud allows you to create complex analytical applications that extend the standard functionality by adding your own code or logic. This capability also allows you to completely customize a dashboard's behavior.

Target group The analytics designer environment is primarily designed for developers or power users capable of programming or scripting. In addition to using the standard functionality, the analytics designer allows you to extend a dashboard by adding complex coding. However, the consumers of such applications are still business users. In an ideal scenario, business users will request a specific dashboard from a developer or a power user to meet their individual needs.

Applications use a subset of the programming language JavaScript. The same syntax is also used in SAP Lumira, designer edition (formerly known as SAP BusinessObjects Design Studio). Users of SAP Lumira, designer edition, especially will easily adapt to the new cloud environment and quickly build their first applications in SAP Analytics Cloud.

The analytics designer is exposed in a dedicated development environment used to create new applications, as shown in [Figure 1.28](#), and allows the detailed customization of dashboards. However, a deep knowledge of scripting or coding is needed to work in this environment which is quite different from working with a story. The analytics designer will be covered in detail in [Chapter 8](#).

As mentioned earlier, at the time of writing, SAP is working on adding more functionalities of the analytics designer to stories. Therefore, several functionalities will be described in [Chapter 5](#) that require deeper understanding of scripting and are already available within stories.

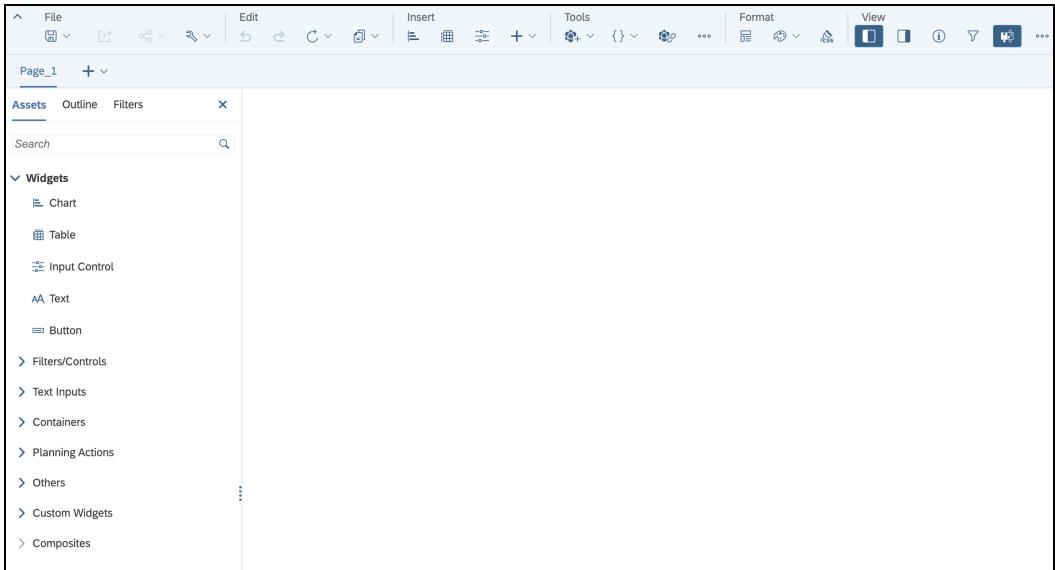


Figure 1.28 Creating New Applications

The overlap of functionalities between the new story and the analytics designer quickly leads to a question: Which development environment is the right choice? Since the features of the analytics designer are continuously being implemented into stories, SAP recommends you first evaluate if a story is the right reporting environment. If the functionalities contained therein are already sufficient, you should use a story. Since not all functionalities are currently available within stories, the classical analytics designer should be used in use cases where specific features are required.

Story or analytics designer?

Analytics Designer

The analytics designer provides users (typically developers) with an extended toolset to create complex dashboards (applications). This tool enables these users to use coding or scripting to embed complex logic to meet specific custom requirements.

1.4 Architecture

Now that we've analyzed each component of SAP Analytics Cloud in detail, let's briefly look at an overall architectural view of the platform, shown in [Figure 1.29](#).

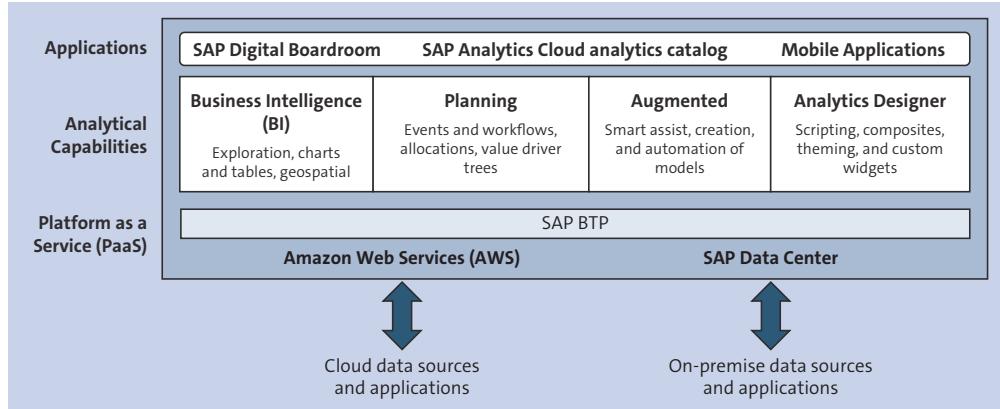


Figure 1.29 Architecture of SAP Analytics Cloud

The platform is hosted in a dedicated environment within SAP BTP, which again is hosted in SAP and non-SAP data centers, for example, AWS or Google Cloud Platform (GCP).

Data integration SAP Analytics Cloud allows you to integrate data from various SAP or non-SAP cloud-based and on-premise solutions. A full list of possible data sources is provided in [Chapter 2, Section 2.1](#).

Because the platform is a provided as one big solution, you can't always assign specific areas like data wrangling or visualization to a business analytics field like BI or planning. As you get comfortable with the solution, you'll see that many functionalities are reused in multiple components throughout the platform.

The top of [Figure 1.29](#) shows some additional applications: SAP Digital Boardroom, the analytics catalog, and the SAP Analytics Cloud mobile app. These applications are built directly on top of SAP Analytics Cloud and will be presented in [Chapter 9](#) and [Chapter 10](#), which will also outline how they interact with the platform.

1.5 Standalone and Embedded Versions of SAP Analytics Cloud

While SAP Analytics Cloud is well suited to resolve typical analytical challenges, many companies run multiple solutions that produce data. Often, these solutions carry their own analytical engines or their own prebuilt reports.

iFrame embedding SAP Analytics Cloud supports organizations trying to establish a holistic analytics workflow across multiple solutions, a process that is also called

embedding. One way to embed SAP Analytics Cloud into other solutions is using the iFrame technology. In this scenario, SAP Analytics Cloud is embedded into another website or solution.

In addition, SAP is strongly investing into establishing SAP Analytics Cloud as the standard analytical engine for the majority of SAP solutions. Various SAP solutions, including SAP S/4HANA Cloud, SAP SuccessFactors People Analytics, SAP Marketing Cloud, or SAP Sales Cloud are already equipped with an embedded version of SAP Analytics Cloud. This embedded version helps users get used to workflows and elements in SAP Analytics Cloud.

The embedded version of SAP Analytics Cloud is pretty similar in each of SAP's solutions and only varies slightly across solutions. In comparison to the standalone version, the embedded version only offers a story environment and can only connect to the data source into which it's embedded.

Embedded version

Which Data Sources Are Available?

If you use SAP S/4HANA Cloud, for example, the embedded version of SAP Analytics Cloud can only connect to core data services (CDS) views of this particular SAP S/4HANA Cloud instance.

Which functionality is available?

In general, refer to [Chapter 5](#) for an overview of all functionalities available in the embedded version of SAP Analytics Cloud. However, the availability of specific functionalities will vary depending on the SAP solution you're using.

No easy answer exists for the question if you should opt for the standalone or embedded version of SAP Analytics Cloud. However, we recommend asking yourself the following questions:

- Which license is available for you? Do you have access to a standalone version of SAP Analytics Cloud, or do you only have licenses for the embedded version of SAP Analytics Cloud as part of another SAP solution?

If you have licenses for the embedded version of SAP Analytics Cloud only, you can use these solutions as a way to try out the SAP Analytics Cloud first. However, if you already have licenses for the full version, you'll have more functionalities available in the full version.

- Which functionalities do you require? Is a story environment sufficient? Are all relevant data sources available?

The embedded version of SAP Analytics Cloud only allows you to create stories based on the data of the solution in which it's embedded. If you want to connect to multiple data sources or build analytical applications, the embedded version won't offer enough functionalities.

In addition, the following questions can further support your decision-making:

- Is SAP Analytics Cloud available as an embedded version for your data source? If so, are you planning to use SAP Analytics Cloud as your central analytics platform, or do you only want to create some reports for this specific data source?
- Do you need extended functionalities like the automated export of stories or access via mobile applications?
- How many users do you have? Are the licenses of an embedded version sufficient?

1.6 Summary

At the end of this chapter, we've discussed how SAP Analytics Cloud embeds itself into the analytics strategy of SAP. With SAP positioning itself as a cloud vendor, SAP Analytics Cloud is set to become the central analytics platform for SAP.

The solution combines functionalities for BI, planning, predictive analytics, and application design. SAP Analytics Cloud is completely hosted on SAP servers and is offered via the SaaS model. All updates and maintenance activities are performed centrally by the vendor and can't be influenced by you.

Now that you've seen what SAP Analytics Cloud is capable of, in the next chapter, we'll discuss how it integrates with data sources and landscapes.

Chapter 2

Data Integration

Analytics requires data to live. Therefore, to successfully establish SAP Analytics Cloud, a crucial task is to fully and correctly integrate your data. In this chapter, we'll explain data integration in general and describe various architectural scenarios.

When analyzing data, you'll face many obstacles. Incomplete datasets, incorrect information, or basic issues like missing data access can make the overall process rather difficult and annoying. SAP Analytics Cloud offers multiple options and can be integrated into existing landscape or used as a standalone platform.

In this chapter, we'll first provide an overview of all data sources supported in SAP Analytics Cloud. Then, we'll describe the differences between live connections and import connections, supported by integration examples for both scenarios.

2.1 Data Sources Supported by SAP Analytics Cloud

Before we differentiate the available technologies between the connection types described in [Section 2.2](#), let's first introduce you to all data sources supported by SAP Analytics Cloud. Live connections and import connections support different data sources, with some overlap. Therefore, both connection types will be discussed separately, including all their prerequisites and recommendations regarding their implementation.

We'll then describe the technical implementation of each data connection type in [Section 2.3](#) and [Section 2.4](#) using example architectural scenarios. You'll also find recommendations on when to use which data source.

2.1.1 Data Sources for Live Connections

For a *live connection*, at least one of the following data sources must be used:

- SAP HANA
- SAP Business Warehouse (SAP BW)
- SAP BW/4HANA

- SAP S/4HANA
- SAP BusinessObjects universes
- Embedded SAP Business Planning and Consolidation (embedded SAP BPC)
- SAP S/4HANA Cloud
- SAP HANA service for SAP Business Technology Platform (SAP BTP)
- SAP Datasphere
- SAP HANA Cloud

In addition, SAP HANA smart data integration, SAP BusinessObjects universes, and the APOS Live Data Gateway allow you to connect various additional data sources live.

SAP HANA To use *SAP HANA* as a live data source, you require at minimum SAP HANA 2.0 SP 1. The additional SAP HANA EPM-MDS plug-in must also be installed and must match the SAP HANA database version. Further information on the deployment of this plug-in and how to select the right version can be found in SAP Notes 2456225 and 2444261.

When using SAP HANA as a live data source, additional limitations may exist that require you upgrade your database to the latest version. These limitations can be found in detail in the product help referenced at the end of this section.

In general, SAP Analytics Cloud can only access SAP HANA data via SAP HANA views, for instance, analytic views, calculation views, or ABAP core data services (CDS) views.

When connecting with SAP HANA Cloud, no manual updates are necessary since the solution is updated by SAP automatically. However, for this connection type, additional connection restrictions may apply.

SAP BW To establish a live connection to SAP BW, you'll need at least SAP BW 7.5 SP 16, and you also may have to implement additional SAP Notes. SAP also recommends upgrading to the latest support package at least once a year.

You don't necessarily need to run SAP BW on an SAP HANA database. Nevertheless, you must consider the following points:

- Independent of the SAP BW version, you'll must always implement SAP Note 2541557. This SAP Note contains an automatic routine that analyzes your SAP BW system to find missing SAP Notes and patches you may need to implement. This step also allows you to use SAP Analytics Cloud live against older versions of SAP BW 7.4 and 7.5.
- You'll also need to upgrade your system kernel to revision 7.49, patch level 315 or higher. This step is necessary to connect SAP BW, as described in [Section 2.3.1](#).

- Not all functionality is supported in SAP BW 7.4. For the best functionality support, SAP BW 7.5 SP 16 is the minimum recommendation from SAP. Some functionality also requires SAP BW to run on an SAP HANA database. More details on this limitation can be found in SAP Note 2715030.

When connecting live to SAP BW/4HANA, you'll need to run at least the following versions:

SAP BW/4HANA

- SAP BW/4HANA 1.0 SP 8
- SAP BW/4HANA 2.0 SP 0

SAP also recommends upgrading to the latest support package at least once a year. You also must follow the implementation instructions found in SAP Note 2541557 and 2715030. SAP Note 2542557 will run an automated routine that identifies missing SAP Notes. Future changes may require you to deploy higher SP levels.

In both cases, when connecting to SAP BW and SAP BW/4HANA, SAP Analytics Cloud will always access *SAP BW queries*, including queries that were created in *SAP BEx Query Designer* (called *BEx queries*). Because SAP BW queries can contain complex features, SAP Analytics Cloud uses a native interface to SAP BW and SAP BW/4HANA. This native interface allows you to utilize almost all query functionalities (e.g., hierarchies, variables, queries with two structures, or queries that contain a default layout).

Supported SAP BW Query Features

The product help for SAP Analytics Cloud carries a full list of supported and unsupported features when using SAP BW queries as a live data source. You can access this list at <http://s-prs.co/v502600>.

A live connection to SAP S/4HANA requires at least SAP S/4HANA 1709 with SAP NetWeaver 7.52. SAP also recommends upgrading to the latest support package at least once a year. If you also want to connect live to SAP Marketing and SAP Marketing Cloud, the minimum requirement is SAP S/4HANA 1709 with SAP NetWeaver 7.52 SP 01. When connecting to SAP S/4HANA Cloud, you'll always need the latest version.

SAP S/4HANA

The general data sources for SAP S/4HANA are ABAP-based CDS views.

To connect SAP Analytics Cloud live to *SAP Business Suite powered by SAP HANA*, you must install an additional package: *SAP HANA Live for SAP Business Suite*. All prerequisites and instructions for the implementation can be found in the product help for SAP HANA Live for SAP Business Suite, available at <http://s-prs.co/v502601>.

SAP Business Suite

SAP HANA Live for SAP HANA contains various calculation views that you'll deploy on the SAP HANA database. Afterwards, you can use the live connection to SAP HANA.

SAP BusinessObjects universes SAP Analytics Cloud can also connect live to *universes* designed and deployed on at least *SAP BusinessObjects Business Intelligence platform 4.2 SP 9 or 4.3 SP 1*. You also must have a license for *SAP BusinessObjects Web Intelligence* and must use Apache Tomcat as your Java application server.

After successfully connecting SAP Analytics Cloud to the SAP BusinessObjects Business Intelligence platform, you can access universes. With universes, you have the option of building custom queries by selecting measures, dimensions, or filters.

Embedded SAP BPC While planning in general requires data to be uploaded to SAP Analytics Cloud, a live connection to SAP BPC is an exception to this rule. This live connection, however, only supports embedded models. Because SAP BPC embedded scenarios are always based on SAP BW, the same prerequisites are valid in this case. The following dependencies must be met:

- SAP BPC 11.0 requires at least SAP BW/4HANA SP 1.
- SAP BPC 11.1 SP 00 requires at least SAP BW/4HANA 2.0 SP 0.
- SAP BPC 10.1, version for SAP NetWeaver requires at least SAP BW 7.4 SP 12 or SAP BW 7.5 SP 8.

SAP Note 2541557 also must be implemented accordingly. All missing SAP Notes identified in this process also must be implemented.

Technically, a live connection to embedded SAP BPC connects to input-ready SAP BW queries. This approach allows users not only to visualize data in SAP Analytics Cloud but also to write back data or execute various planning functions.

When using planning sequences from SAP BPC in SAP Analytics Cloud, it may happen that you created planning variables that are mandatory but contain no default values. In this case, you must also implement SAP Note 2738235.

SAP Datasphere When connecting live to SAP Datasphere, you always need the latest version. However, as the service is offered via SaaS, SAP will automatically keep it updated.

If SAP Datasphere and SAP Analytics Cloud run on the same tenant, the connection is established automatically. However, this is only relevant for existing customers as new customers automatically get separate tenants when purchasing both solutions.

When connecting to SAP Datasphere, you can only access models that are provided as *analytical datasets*. Analytical datasets must be explicitly

created in SAP Datasphere as they require additional semantics. In addition, you may also face various restrictions, which are listed in SAP Note 2832606.

Connections to SAP HANA service for SAP BTP can be established to both SAP HANA 1.0 and SAP HANA 2.0 databases with and without SAP HANA Deployment Infrastructure (HDI) containers.

SAP HANA service
for SAP BTP

However, for connections to an SAP HANA 2.0 database, you'll need to install and configure the *analytics adapter for SAP HANA* additionally.

On top of the data sources described so far, various technologies allow you to connect additional data sources live to SAP Analytics Cloud:

Additional data
sources

- Data replication into SAP BW or SAP HANA
- SAP HANA smart data integration
- SAP BusinessObjects universes
- APOS Live Data Gateway

SAP BW provides various *connectors* to other systems to import data and expose it via SAP BW queries. Those queries again can be consumed in SAP Analytics Cloud.

SAP HANA smart
data integration

With SAP HANA smart data integration, you can also connect various additional data sources. SAP HANA smart data integration offers functionalities to access external data, transform it, and then expose it via SAP HANA views to other clients like SAP Analytics Cloud. Because SAP HANA smart data integration can also access its data source live, you can establish a full live connection to the desired data source if that source is supported.

SAP
BusinessObjects
universes

SAP BusinessObjects universes follow a similar idea and also allow you to use connectors to establish connections between external data sources and the SAP BusinessObjects Business Intelligence platform. Data can then be exposed via SAP BusinessObjects universes live to SAP Analytics Cloud.

The SAP partner APOS also offers the APOS Live Data Gateway connector, which allows live access to various additional data sources. APOS Live Data Gateway must be deployed locally in your company network. More information on supported data sources and configuration options can be found via APOS.

Data Sources for Live Connections

SAP Analytics Cloud offers various options for live data connections. In general, every data source has its own prerequisites and minimum revisions. In some cases, implementing additional SAP Notes will be crucial.

The technology behind live connections is described in detail in [Section 2.2](#). The prerequisites for successfully implementing live connections and example screens can be found in [Section 2.3](#).

Overview of data sources [Table 2.1](#) shows an overview of all data sources supported when using live connections and their minimum revision levels.

System	Version	Remarks
SAP HANA	SAP HANA 2.0 SP 01	<ul style="list-style-type: none"> ■ For SAP HANA 2.0, the SAP HANA EPM-MDS plug-in must be installed. ■ More information can be found in SAP Notes 2456225 and 2444261.
SAP HANA Cloud	Latest version	No analytics adapter for SAP HANA required.
SAP HANA service for SAP BTP	<ul style="list-style-type: none"> ■ SAP HANA 1.0 ■ SAP HANA 2.0 	If SAP HANA 2.0 is used, the SAP HANA analytics adapter for Cloud Foundry has to be configured as well.
SAP BW	SAP BW 7.5 SP 16	<ul style="list-style-type: none"> ■ SAP Note 2541557 must be implemented, which also contains instructions for earlier SAP BW versions. ■ Kernel version 7.49 PL 315 or higher is required. ■ Functional restrictions may apply, which are documented in SAP Note 2715030.
SAP BW/4HANA	<ul style="list-style-type: none"> ■ SAP BW/4HANA 2021 ■ SAP BW/4HANA 1.0 SP 8 ■ SAP BW/4HANA 2.0 SP 4 	<ul style="list-style-type: none"> ■ SAP Note 2541557 must be implemented. ■ Functional restrictions may apply, which are documented in SAP Note 2715030.
SAP Datasphere	Latest version	A list of all restrictions can be found in SAP Note 2832606.
SAP S/4HANA	SAP S/4HANA 1709	SAP NetWeaver 7.52 required.
SAP S/4HANA Cloud	Latest version	

Table 2.1 All Supported Data Sources for Live Connections

System	Version	Remarks
SAP Marketing	SAP S/4HANA 1709 SP 01	SAP NetWeaver 7.52 SP 01 required. Also applies for SAP Marketing Cloud.
SAP ERP powered by SAP HANA	SAP ERP 6.0 (starting with availability of SAP HANA Live for SAP Business Suite)	The add-on SAP HANA Live for SAP Business Suite must be installed.
SAP BusinessObjects universes	<ul style="list-style-type: none"> ■ SAP BusinessObjects 4.2 SP9 ■ SAP BusinessObjects 4.3 SP1 	<ul style="list-style-type: none"> ■ A license for SAP BusinessObjects Web Intelligence is required. ■ Apache Tomcat must be used as Java application server.
Embedded SAP BPC	<ul style="list-style-type: none"> ■ SAP BPC 11.0: SAP BW/4HANA 1.0 SP 04 ■ SAP BPC 11.1: SAP BW/4HANA 2.0 SP 00 ■ SAP BPC 10.1, version for SAP NetWeaver: SAP BW 7.4 SP 17 or SAP BW 7.5 SP 08 	SAP Note 2541557 must be implemented.

Table 2.1 All Supported Data Sources for Live Connections (Cont.)

All current prerequisites and minimal revision levels can also be found in **Prerequisites** the product help for SAP Analytics Cloud at <http://s-prs.co/v502602>.

2.1.2 Data Sources for Import Connections

Because an import connection leverages different technologies than a live connection, it supports a significantly higher number of data sources. A full list would be too long, so we'll focus on the most important ones, such as the following:

- File upload (CSV and Microsoft Excel files)
- SAP BW and SAP BW/4HANA
- SAP HANA
- SAP HANA Cloud
- SAP Cloud for Customer
- SAP S/4HANA and SAP S/4HANA Cloud
- SAP ERP

- SAP BPC (versions for SAP NetWeaver, for Microsoft, and for SAP BW/4HANA)
- SAP BusinessObjects universes
- SAP Integrated Business Planning for Supply Chain (SAP IBP)
- SAP SuccessFactors and SAP SuccessFactors Workforce Analytics
- SAP Business ByDesign
- SAP Concur
- SAP Fieldglass
- Google Drive, Google Sheets, and Google BigQuery
- Salesforce
- Open Connectors capability of SAP Integration Suite
- Java Database Connectivity (JDBC) driver for additional data sources
- OData services
- Partner connectors offered by APOS, CDATA, and DataDirect Cloud

File upload The file upload option supports CSV and Microsoft Excel files with the extension .xlsx. Files can be uploaded either via a browser or via a file server. If the file server is connected to SAP Analytics Cloud, the import process can be scheduled regularly.

SAP BW and SAP BW/4HANA When importing data from SAP BW or SAP BW/4HANA, SAP Analytics Cloud can only access SAP BW queries. In this mode, SAP BW 7.3x or higher is already sufficient. For SAP BW/4HANA 1.0, SP 04 or higher is required. In addition, SAP Note 2440670 must be implemented.

As with a live connection, an import connection to SAP BW has various restrictions when consuming queries or visualizing the data. The data import process from SAP BW and SAP BW/4HANA can be scheduled on a regular basis.

Supported SAP Business Warehouse Query Functionality

The product help for SAP Analytics Cloud contains a matrix that shows all supported functionalities when importing data from an SAP BW query. This matrix can be accessed at <http://s-prs.co/v502603>.

SAP HANA For import connections with SAP HANA, SAP HANA 2.0 SP 1 or higher is required. You can import data from analytic views or calculation views.

SAP HANA Cloud When importing from SAP HANA Cloud, the newest version of the database is required. Since the solution is only available as an SaaS offering, SAP automatically keeps it updated.

SAP S/4HANA and SAP S/4HANA Cloud For data import connections to SAP S/4HANA, at least SAP S/4HANA 1610 with SAP NetWeaver 7.51 SP 2 is required. For planning scenarios based on

SAP S/4HANA, at least SAP S/4HANA 1809 SP 1 is required. In addition, SAP Note 2753796 contains more information. When using SAP S/4HANA Cloud, the latest version is required. Both data sources support scheduled data imports and use CDS views to consume data.

For SAP ERP, SAP Analytics Cloud can import data from InfoSet queries and SAP BW queries natively. Data imports can also be scheduled in this case. The minimum version required is SAP ERP 6.0 enhancement package (EHP) 7 SPS 04. SAP ERP data cannot be imported into datasets.

SAP ERP

When connecting to SAP BPC, version for the Microsoft platform, at least version 10.0 SP 12 or version 10.1 SP 2 is required. In general, the same revisions are valid for SAP BPC, version for SAP NetWeaver. However, with version 10.1, only standard models are supported. Also, you'll need to implement SAP Notes 1858257, 2550738, and 2755379 first.

SAP BPC

When using SAP BPC, version for SAP BW/4HANA, only standard models are supported. In this case, at least version 11.0 SP 01 or 11.1 SP 00 is required. Here, you'll also have to implement SAP Notes 1858257 and 2755379.

In all three cases, the data import can be scheduled on a regular basis. The connection to SAP BPC also offers a bidirectional path, which means that data can be not only imported to SAP Analytics Cloud but also written back to SAP BPC. This allows you to use SAP Analytics Cloud as a planning front-end for data entries based on SAP BPC.

For SAP SuccessFactors, the data import connection will only consume transactional data. Analytical data can be retrieved from SAP SuccessFactors Workforce Analytics. In the case of SAP Fieldglass, report data will be imported. The same applies for Salesforce, for which only Salesforce reports can be imported. The SAP Concur connection only supports one entity during the import process. All of those connections support scheduled data imports on a regular basis.

Cloud solutions

Depending on the cloud solution, only a specific data type can be accessed. For SAP SuccessFactors, you can access transaction data, but for SAP SuccessFactors Workforce Analytics, you can access analytical data. For SAP Fieldglass, report data is imported. From SAP Concur, you can import one entity only, while the Salesforce connector only imports Salesforce reports.

Cloud solutions

The *Open Connectors* of SAP Integration Suite offer additional possibilities to connect to external data sources. For this approach, you'll need a dedicated SAP BTP account with an active subscription for Open Connectors.

Open Connectors

The following data sources are supported:

- Autotask CRM
- Close.io
- ConnectWise CRM REST Beta

	<ul style="list-style-type: none">■ Infusionsoft REST■ Insightly■ Microsoft Dynamics CRM■ NetSuite CRM 2018■ Amazon S3■ Box■ Dropbox■ Egnyte■ Microsoft OneDrive■ Microsoft OneDrive for Business■ SFTP Element■ SharePoint
OData	SAP Analytics Cloud also offers a generic OData connector that supports services that are compliant with OData versions 2.0 and 4.0. OData can be used to connect to various solutions including SAP Cloud for Customer or SAP Business ByDesign. In general, the OData driver can also be used for on-premise data sources that expose an OData application programming interface (API). As for the other connections, OData imports can be scheduled regularly. Because OData is a generic standard, restrictions or limitations may apply. Furthermore, you may be required to perform additional configuration steps or meet specific requirements. To find out more about these additional requirements, refer to SAP Help Portal at the following URL: http://sprs.co/v502604 .
Data sources for JDBC	Because SAP Analytics Cloud also supports generic JDBC drivers, which you can use to connect a broad portfolio of databases that are not provided by SAP. Whenever your database vendor offers a JDBC driver, you can connect this database to SAP Analytics Cloud. Some data sources possible when using JDBC include the following: <ul style="list-style-type: none">■ Amazon EMR Hive 5.6 (Hive 2.1), Hive 0.11, and Hive 0.13■ Amazon Redshift■ Apache Hadoop Hive and HiveServer in various versions■ Apache Spark 1.0 and 2.0■ Cloudera Impala 1.0 and 2.0■ IBM DB2 in various editions and versions■ SAP's data federator server in various editions■ Greenplum 3 and 4■ HP Vertica 6.1, 7.1, and 8

- Hortonworks Data Platform 2.3 and 2.5
- IBM Puredata (Netezza)
- Informix Dynamic Server 10, 11, and 12
- Ingres Database 9 and 10
- Microsoft Parallel Data Warehouse
- Microsoft SQL Server in various versions
- SAP MaxDB 7.7 and 7.9
- MySQL and MySQL 5
- Netezza Server and Netezza Server 4, 5, 6, and 7
- Oracle in various versions
- PostgreSQL 8 through 13
- Progress OpenEdge 10 and 11
- SAP BusinessObjects Data Federator Server XI R3 and R4
- SAP SQL Anywhere (formerly known as Sybase) in various versions
- Snowflake
- Teradata in various versions

In general, every data source connected via JDBC allows you to use Freehand SQL to perform data extracts and query definitions. Some data sources additionally support graphical modeling of queries via the Query Builder. To find out more about the supported data sources for graphical query building, refer to the product help for SAP Analytics Cloud.

Furthermore, various SAP partners offer connectors to connect additional data sources to SAP Analytics Cloud. Some examples include the following:

- APOS Semantic Data Driver
- CData API Server
- DataDirect Hybrid Data Pipeline

Connectors for additional data sources

These connectors allow you to connect to many additional non-SAP data sources like QuickBooks, Microsoft SharePoint, MongoDB, Google Analytics, Marketo, or Microsoft Dynamics CRM. Check with these partners directly to find out more about specific implementation instructions and requirements or limitations.

Import Connection

An import connection allows you to connect SAP Analytics Cloud to a broad portfolio of SAP and non-SAP data sources. This option also requires lower version levels than a live connection. However, you should still check each data source individually to determine if an import connection meets your requirements.

Import connections Because an import connection uses a completely different technology, we'll describe this technology in detail and highlight some potential integration scenarios in [Section 2.4](#), which will also lay out additional requirements for establishing import connections. A summary of all data sources supported for import connections is shown in [Table 2.2](#).

System	Version	Remarks
File upload	–	CSV and XLSX files are supported.
SAP BW	SAP BW 7.3x	–
SAP BW/4HANA	<ul style="list-style-type: none"> ■ SAP BW/4HANA 1.0 SP 04 ■ SAP BW/4HANA 2.0 SP 00 	SAP Note 2440670 must be consulted first and may need to be implemented.
SAP HANA	SAP HANA 2.0 SP1	–
SAP HANA Cloud	Latest edition	–
SAP S/4HANA	SAP S/4HANA 1610 with SAP NetWeaver 7.51 SP 2	For planning scenarios, SAP S/4HANA 1809 SP 01 is required.
SAP S/4HANA Cloud	Latest edition	–
SAP ERP	SAP 6.0 EHP 7 SPS 04	Data will be imported from InfoSet queries and SAP BW queries.
SAP BPC, version for the Microsoft platform	<ul style="list-style-type: none"> ■ SAP BPC 10.0 SP 12 ■ SAP BPC 10.1 SP 02 	–
SAP BPC, version for SAP NetWeaver	<ul style="list-style-type: none"> ■ SAP BPC 10.0 SP 12 ■ SAP BPC 10.1 SP 02 	Version 10.1 only supports standard models.
SAP BPC, version for SAP BW/4HANA	<ul style="list-style-type: none"> ■ SAP BPC 11.0 SP 01 ■ SAP BPC 11.1 SP 00 	Only the standard model is supported.
SAP BusinessObjects universes	<ul style="list-style-type: none"> ■ SAP BusinessObjects 4.1 SP 05 ■ SAP BusinessObjects 4.2 SP 04 	Online analytical processing (OLAP)-based universes are not supported.
OData	OData 2.0 and 4.0	–
JDBC	–	A JDBC driver is required.

Table 2.2 All Supported Data Sources for Import Connections

All current prerequisites and minimum revision levels can also be found in the product help for SAP Analytics Cloud at this URL: <http://s-prs.co/v502605>.

2.2 Connection Types

When consulting the product help for SAP Analytics Cloud or working in the various solutions, you'll often encounter the terms *live connection* (also *remote* or *online connection*) and *import connection* (also *data import*, *data acquisition*, or *local data*). Especially important is correctly differentiating between these concepts to successfully implement SAP Analytics Cloud. In the following sections, we'll walk through both connection types and then provide some recommendations on when to use each type.

2.2.1 Live Connections

The live connection is so called because of the way it connects to data. When using this type of connection, no sensitive data is stored in the cloud; instead, data is only be accessed directly from the data source during the runtime of the story or application. The data sources that can be used in this context are listed in detail in [Section 2.1.1](#). To better understand the technology behind live connections, we'll first introduce some essential terminology that will also help you to choose the right integration scenario for your needs.

[What is a live connection?](#)

Because SAP Analytics Cloud is provided as an SaaS, it's always hosted in a public cloud-based data center available on the public internet. The SAP server hosts all application components as well as *code libraries* that aren't included in your browser's standard deployment. These code libraries will allow your browser to render modern web applications.

[How it works](#)

Now, we'll walk through a data access example to better understand how a live connection works. The essential elements in this scenario are shown in [Figure 2.1](#).

In this scenario, we assume that SAP Analytics Cloud is already set up and configured to connect to a live data source. The user (denoted as the *browser* in [Figure 2.1](#)) is located within the company network. The browser accesses a simple story already created and stored in SAP Analytics Cloud. This story is shared users who can access it. For the database, we're assuming SAP HANA is in place in our example, but the same setup is valid for the other data sources mentioned in [Section 2.1.2](#).

[Scenario for a live connection](#)

Once the user opens the URL for SAP Analytics Cloud in his browser, the browser will contact the SAP data center and retrieve the most current version of SAP Analytics Cloud. Specifically, the browser downloads the newest

[Access to SAP Analytics Cloud](#)

version of the code libraries and the application elements being executed in the browser locally. No component will be installed on the user's computer, nor can the solution be used offline. This process is not limited to the first access but will be repeated for every step a user performs within the application. Thus, SAP Analytics Cloud will only download the components it needs once they're accessed. This connection is represented by the arrow connecting the browser with SAP Analytics Cloud, as shown in [Figure 2.1](#).

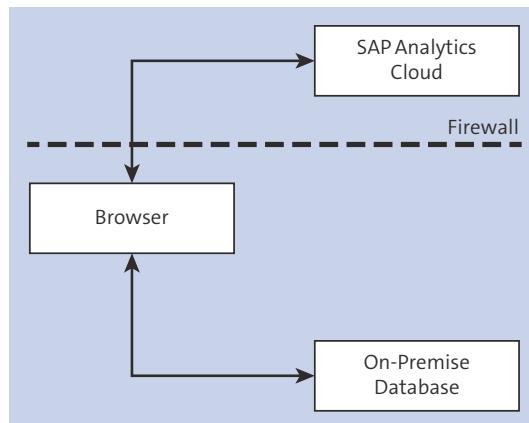


Figure 2.1 Simple Diagram of a Live Connection

Once a user opens the solution, application components will be downloaded over time, instead of downloading everything at the beginning. This approach not only increases performance but also optimizes resource usage.

Application Hosting

In SaaS scenarios, the whole application is hosted in a data center and is provided by the vendor. In the case of SAP Analytics Cloud, a user accesses the software by opening its URL and starts downloading the application's components into the web browser, where they're executed.

Story with live data

Continuing with the scenario, the user can now open a story, which is only built on a live data connection. This step is already different from working with data uploaded to SAP Analytics Cloud. Because no data is stored in the cloud, the story only consists of *metadata*. This metadata is essential for live connectivity because this capability allows you to use SAP Analytics Cloud in scenarios in which sensitive data that cannot be published to the cloud and must be kept on-premise.

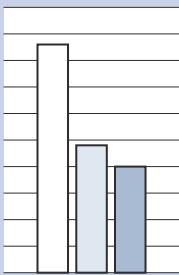
Metadata

Metadata is designed to contain no sensitive data, instead containing all the information required to create a chart or any other form of visualization.

Thus, no transactional data or any results are stored in the cloud. Metadata can be understood as instructions for the browser to get the necessary data needed for creating a specific kind of visualization.

As shown in [Figure 2.2](#), for example, the browser receives the information that the story contains a bar chart. This bar chart shows the dimension country on the X axis and the measure revenue on the Y axis. The data source is model A, which is based on a live data connection to SAP HANA. The model references the SAP HANA view VIEW1 in the SAP HANA schema Schema1. The SAP HANA system can be accessed at IP address 10.10.2.6.

Example: Metadata



- Chart type: Bar chart
- Dimension: Country
- Measure: Revenue
- Data source: Model A
- Connection type: Live
- System: SAP HANA
- View: Schema1.VIEW1
- Hostname/IP: 10.10.2.6

Figure 2.2 Metadata Package

Metadata

When using a live connection, only metadata is stored in the cloud. This information includes the data source IP required to access data and a descriptive information. Metadata doesn't contain any sensitive data, which also means that no transactional data is stored in the cloud.

The browser will now directly contact the SAP HANA database at the address indicated in the metadata to get data. The SAP HANA database will first check if the user is authorized to see this data and will then handle the query and process it, including all aggregations and calculations. Afterward, only the results are sent back to the browser.

Data transfer

The application executed in the browser (SAP Analytics Cloud) will now open the results package and visualize it in a chart or table according to the instructions contained in the metadata package. This connection was shown earlier in [Figure 2.1](#) by the arrow between the browser and the on-premise database. In this scenario, sensitive data directly moves from the on-premise database to the browser without passing through the firewall or being routed via the internet. Furthermore, a user cannot push data into the cloud. Once the

browser is closed, data will be removed from the browser's cache. The same process applies to live connections to SAP BTP or SAP S/4HANA Cloud, where data is going directly from a database to the browser.

Other features The live connection has several features worth mentioning, such as the following:

- **Company network**

The browser will directly connect to the database, which means that the database doesn't have to be exposed to the public internet. In addition, no connection needs to be established between SAP Analytics Cloud and the database. However, note that the user must thus be in the company network for the setup to work. Nevertheless, options exist for running this setup outside of a company network. More information on this topic will be provided in [Section 2.3](#).

- **Authorizations**

The database will check an individual user's authorization every time a story is opened or data is accessed by asking the user to authenticate. This authentication can be performed via either user name and password or *single sign-on (SSO)* whenever SSO is supported. Therefore, a user cannot bypass database security and authorization capabilities, which also allows you to reuse the existing authorization concepts already in place for the database itself.

- **Aggregations**

Besides providing the data, the database also takes care of aggregating and calculating the data. In the previous example, the chart only shows revenue by country. Rather than requesting all raw data and computing the required aggregations in the browser, SAP Analytics Cloud directly requests aggregated data, which is processed in the SAP HANA database. In the end, only the revenue for each country is transferred to the browser.

Advantages of a live connection With these considerations in mind, a live connection has three major advantages:

- **Reduced data volume**

The amount of data transferred is reduced heavily. Because no raw data is transferred, only aggregated data, SAP Analytics Cloud and the live connection can use standard internet connections.

- **Fast data processing**

The second advantage is the aggregation behavior itself. Raw data (e.g., transactions) must be aggregated at some point so that it can be visualized in a chart. Because this aggregation requires hardware resources, it can become a very lengthy process on slow hardware. Because databases are usually hosted on strong servers, whereas applications are executed

on standard computers or notebooks, the databases perform better when it comes to aggregating and calculating data. This approach improves performance and at the same time allows the user to run SAP Analytics Cloud on typical devices like desktop PCs, notebooks, or mobile devices like smartphones and tablets.

- **Real-time data**

Live connections also allow you to establish real-time scenarios. Because no transactional data is stored in the cloud, each time a report is accessed, data must be requested. Although databases use caching to reduce heavy data loads, SAP Analytics Cloud allows users to explicitly request new data. In addition, stories can be configured to automatically refresh with new data, which allows users to always access a real-time view of the data.

Due to the technical design of a live connection, restrictions also exist with regard to supported features. In general, every kind of data operation is performed in the data source. Because SAP Analytics Cloud offers various functionalities and workflows that can't be processed by data sources out of the box, they are either implemented afterward (e.g., through deployment of SPs) or are just not supported at all.

Limitations of live connections

Because each data source has its own list of limitations, they are all documented in the product help for SAP Analytics Cloud. However, with every update of SAP Analytics Cloud, SAP improves feature support and continues to narrow the gap between live connections and import connections.

Live Connections

A live connection is designed to keep all sensitive information within the company network. In this scenario, only application components and potentially metadata are retrieved from the cloud. All sensitive data is accessed directly from the data source during the runtime of the report. The data source checks if the executing user is authorized to view the data and aggregates the requested data to the desired level so that only the necessary data is transferred to the browser.

Because this design requires that the data source perform all data-related actions, some features are restricted or do not work in this scenario. However, with every update, SAP works on supporting more functionalities.

In general, a live connection is recommended in the following situations:

- You're not allowed to save sensitive data in the cloud.
- You're pursuing a hybrid scenario in which data should explicitly be kept on-premise.

- A database like SAP BW already exists and contains data models and authorizations.
- The restrictions that come with live connectivity do not limit your use case.
- You're working with large amounts of data that's refreshed often and for which you've already modeled processes.

A direct comparison between live connections and import connections can be found in [Section 2.2.3](#).

2.2.2 Import Connections

What is an import connection?

Alternatively, you can also use an import connection to connect SAP Analytics Cloud to a data source. In this case, data first will be replicated into SAP Analytics Cloud before visualizations are created on top of it. Because SAP Analytics Cloud runs on an SAP HANA database in the cloud, you can create complete data models. All data sources that can be used for data import are found in [Section 2.1.2](#).

To better understand an import connection, let's look at an example in which data is imported from SAP BW. In this scenario, a user wants to create a data model in the cloud that's filled with data from an SAP BW query. However, this scenario doesn't apply to all data sources listed in [Section 2.1.2](#). A full description of all scenarios will be provided in [Section 2.4](#).

How it works

In general, SAP Analytics Cloud offers a full-blown data modeling and storage engine, which means it can also be used as a standalone solution in the cloud. While uploading CSV or XLSX files is performed within the browser, additional setup is needed to allow data imports from on-premise data sources.

Scenario for an import connection

Our example, shown in [Figure 2.3](#), already covers a complex case since two additional components must be deployed on a server in your company network. Although SAP offers an automated routine that deploys both add-ons together, they are still shown separately in [Figure 2.3](#). In some cases, one component (usually, the cloud connector of the SAP Connectivity service) or both components are already in place and can be used for the import connection.

In this scenario, the browser is only communicating with SAP Analytics Cloud, which also means that this scenario works outside of your company network. The only other thing to consider is how to make the data source accessible to SAP Analytics Cloud. In this example, we assume that an SAP BW system is hosted within the company network, which is a quite common case.

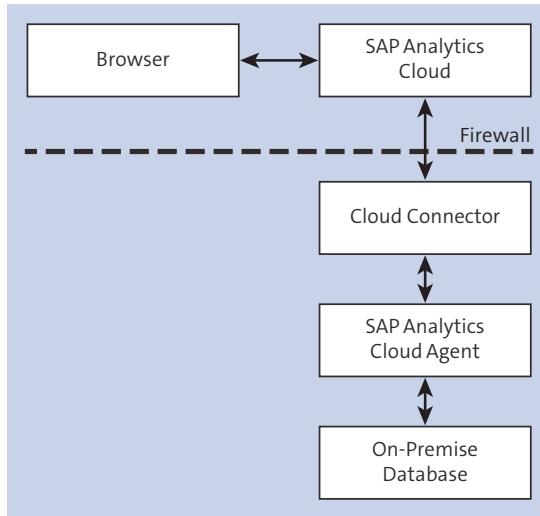


Figure 2.3 Simple Diagram of an Import Connection

The first important component of this setup is the *cloud connector*, which must be deployed on a server within the company network. This component allows SAP Analytics Cloud to connect to the company network. The cloud connector basically opens the firewall for all requests coming from SAP Analytics Cloud while keeping the overall firewall intact. It also takes care of forwarding requests internally.

Cloud connector

Companies that are already working with SAP BTP usually already have the cloud connector in place. Depending on its configuration, you can easily reuse the component to support SAP Analytics Cloud import connections. However, the connection requires you perform several configuration steps within the cloud connector itself, which can negatively affect existing setups.

The second component required is the *SAP Analytics Cloud agent*. This agent is also deployed within the company network and translates all requests coming from SAP Analytics Cloud into the language of the database. Therefore, all required database drivers must be installed with the agent. In the case of SAP BW, *SAP Java Connector* must be installed. We'll provide more details on this driver in [Section 2.4](#). The same applies to JDBC connections, for which the JDBC driver must be installed with the agent.

SAP Analytics Cloud agent

Cloud Connector and SAP Analytics Cloud Agent

The cloud connector allows SAP Analytics Cloud to connect to your company network by opening a secure tunnel between your network and SAP's data center.

The SAP Analytics Cloud agent acts as a translator that receives requests from SAP Analytics Cloud and translates these requests into the language of the database.

Data transfer Once a user starts the data import process in SAP Analytics Cloud to get data from SAP BW, SAP Analytics Cloud will contact the cloud connector hosted in your company network. The cloud connector opens a secure tunnel that allows SAP Analytics Cloud to communicate with the SAP Analytics Cloud agent. The data request itself is sent to the agent. The cloud connector must be initially configured once and only reacts to data requests coming from the SAP Analytics Cloud instance that is indicated during the configuration.

The SAP Analytics Cloud agent then translates the data request into the language of the database by using the syntax defined in the database's driver. Once the database responds with the requested data, the data passed back to the cloud, where it's persisted in data models.

Other features Thus, import connections feature some specific characteristics, such as the following:

- **Import of data models**

While live connections only transfer the results to be visualized in a report, an import connection allows you to transfer full data models to the cloud. This capability enables users to create data models in SAP Analytics Cloud that are filled with data from external data sources but can be used independently of it.

- **Authorizations**

The authorization of the user who is importing the data is important. When importing data from an SAP BW query, all data exposed through that query will be imported to SAP Analytics Cloud. During the process, the user can already restrict the uploaded data by applying restrictions or filters. However, SAP BW will still apply the user's authorization on the SAP BW level. Nevertheless, the authorizations are not replicated into SAP Analytics Cloud, which means they must be created there again.

- **Scheduling**

An import process can be planned and executed on a regular basis (known as *scheduling*). If the data source supports it, the import process can be repeated every day or week, for example. Scheduling enables you to automatically keep data models in SAP Analytics Cloud up to date. Scheduling is especially recommended for scenarios in which the database is updated often and therefore always contains new data.

To use all the functionality available in SAP Analytics Cloud, it's necessary to import the data and store it in the cloud with an import connection. Because data import connections usually replicate all the data exposed by the data source, users can build full data models in SAP Analytics Cloud. Nevertheless, some functionality (like planning) requires the user to provide suitable data.

Limitations

Import Connections

With an import connection, data models are fully transferred to SAP Analytics Cloud. Depending on the data source, additional configuration and setup steps may be necessary. With most data sources, the import process can be scheduled and executed regularly.

The data import process doesn't copy any data authorizations. These authorizations must be created again in SAP Analytics Cloud. Also, at the moment the data is imported, the backend authorizations of the importing users are applied. Thus, the import process should always be triggered by a person with the necessary authorizations. Once data in the backend (e.g., in SAP BW) is changed, the data model in the cloud must be updated as well to represent the latest state of data.

Because data is stored in SAP Analytics Cloud, all available functionalities can be used after importing data.

2.2.3 Choosing a Connection Type

Now that you've learned about both connection types, you may be wondering which connection type is better for you. In general, you can always use both connection types in parallel, but you cannot convert connections between both types. If a data model was created on a live connection initially (which means the data model only contains metadata), it can't be converted into an import connection-based model anymore. The same applies for data models in the cloud, which cannot be converted into live data connections.

Nevertheless, several criteria can make the decision of connection type easy. You should ask yourself the following questions to better understand which type is the right one for your case:

Connection type criteria

- Are you allowed to transfer sensitive data (i.e., transactional data) to the cloud?
- Is the desired data source supported for live connections or import connections?

- Does the data source already have authorizations in place, and if so, does modeling authorizations again in the cloud make sense?
- Does the desired use case require functionality that isn't supported with a live connection?
- How often does this data change, and do reports always need to show the latest state of the data?

This list of questions doesn't cover all aspects of connectivity but can help you determine the right type of connection for a particular use case.

2.3 Integration Scenarios for Live Connections

This section will discuss two integration scenarios when connecting to live data sources: cross-origin resource sharing (CORS) and reverse proxies. In this section, we'll describe the prerequisites for each connection type and walk you through important configuration steps. The general design of live connections was described in [Section 2.2.1](#).

2.3.1 Direct Connections via Cross-Origin Resource Sharing

CORS The primary scenario for live connections was described in [Section 2.2.1](#). This scenario is often called a *direct connection* or a *CORS connection*. CORS is the technology that enables the connection. SAP clearly recommends using CORS if a live connection is desired. In addition, CORS is the only supported live connection scenario.

Same-origin policy In general, browsers follow a *same-origin policy*. This policy forbids web pages or scripts from sending requests to other websites or servers that aren't trusted in the background (due to security concerns). In the past, hackers often modified popular websites and placed their own malicious code into them. Users accessed these web pages and didn't realize that, in the background, their computer was connecting to a malicious server. With a same-origin policy, modern browsers stop this behavior and thus protect users.

However, this safeguard is a major issue for live connections. In this scenario, the browser asks SAP Analytics Cloud to directly connect to a data source and retrieve data from that data source. Normally, a browser would forbid this request since the request redirects the user to a completely different data source.

CORS is a mechanism that allows this behavior to respect same-origin policies by meeting specific requirements. Therefore, SAP Analytics Cloud and

the data source will both be configured and made aware of each other's existence. (SAP Analytics Cloud gets to know the data source, and the data source gets to know SAP Analytics Cloud.) In this case, the browser will allow the user to be redirected to the data source directly.

Note that CORS doesn't require any physical connection between SAP Analytics Cloud and the data source. The trust is built in by configuring the URL of SAP Analytics Cloud with the data source. Afterward, the data source will accept all data requests coming from this specific SAP Analytics Cloud instance.

In the following sections, we'll show you how to create direct, live connections to both on-premise and cloud systems.

Direct Connections to On-Premise Data Sources

When using the direct connection, no additional server needs to be deployed in your local company network. [Figure 2.4](#) shows a setup in which the data source can't and shouldn't be reached from the public internet. The user must be logged on to the company network either being connected to it physically or using, for example, a virtual private network (VPN) tunnel.

Company network
internal setup

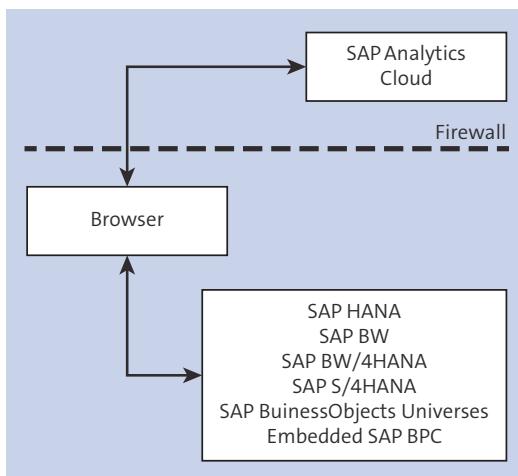


Figure 2.4 Direct Live Connection within a Company Network

This setup requires additional configuration based on the data source. These configuration steps are documented for each data source in the product help and are always up to date to meet the latest version. You'll also find additional requirements and SAP Notes that you may need to implement first. A list of all live connections and their setup requirements can be found in SAP Help Portal at <http://s-prs.co/v502606>.

In general, the following steps are necessary to establish a live connection:

1. The data source must be checked for its ability to expose a CORS connection. If the version is too low and doesn't meet the prerequisites, you'll either need to update it or implement SAP Notes.
2. The CORS configuration must be performed for each data source. In this step, depending on the data source, several parameters must be activated and the URL of SAP Analytics Cloud must be stored. Some systems also require restarting.
3. The connection parameters must be configured in SAP Analytics Cloud once. In this step, the user logs on to SAP Analytics Cloud and creates a new connection. The user will be asked to provide logon data to the data source to test the connection. However, this logon data will not be stored.

An overview of all supported data sources can be found in [Section 2.1.1](#).

Access via public internet

While the setup shown in [Figure 2.4](#) only works within a company network, the setup shown in [Figure 2.5](#) also works for the public internet, where the user is not connected to the company network.

In this option, the user accesses the data source via a live connection from the public internet. However, in this scenario, the user must be able to reach the data source directly. To get this scenario working, you can, for example, define firewall exceptions for specific devices or users. Another option is to set up the firewall to accept only specific requests from the public internet and pass them through to the data source. Independent of the technology used, SAP Analytics Cloud always requires you to provide an IP or URL that can be used to access the data source.

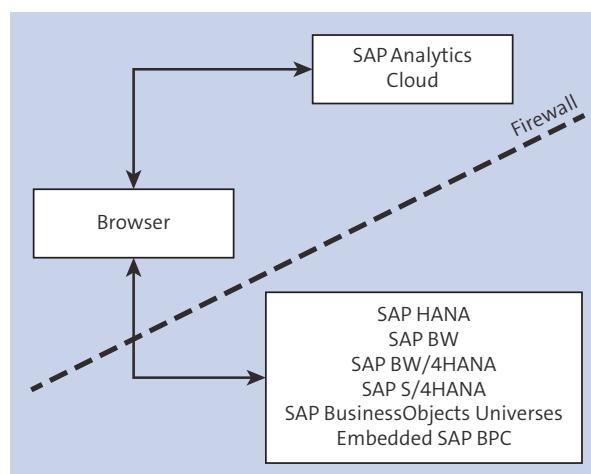


Figure 2.5 Direct Live Connection via the Public Internet

Figure 2.4 and Figure 2.5 both show simplified configurations in which no *identity provider* is in place. An identity provider is required to use SSO. Thus, without SSO, the data source will always ask a user to provide logon credentials in order to access data via a live connection.

SSO via an identity provider

To make this authorization more comfortable for users, SAP Analytics Cloud offers the ability to use your own identity provider, which must be compliant with the *SAML 2.0* standard. An example of such a setup is shown in Figure 2.6.

The identity provider is usually run centrally within your company and has the single purpose of identifying and authenticating users. In many companies, this verification is usually performed by a user once during system startup or when logging on to a company portal. Then, a certificate is issued that can be used to automatically authenticate, in the background, to other services like SAP Analytics Cloud or a data source.

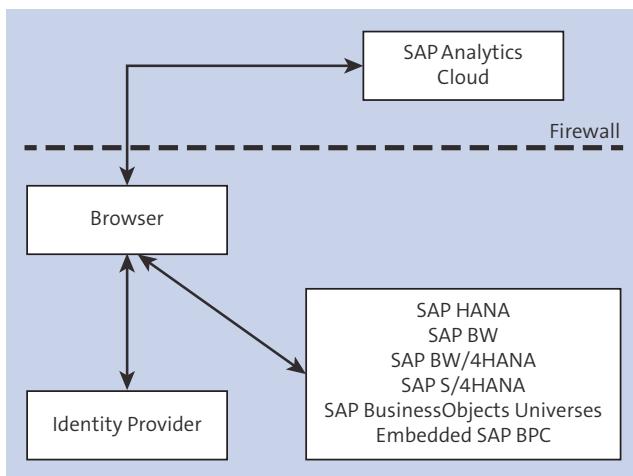


Figure 2.6 Direct Live Connection with Identity Provider in Place

However, the following prerequisites must be met:

Prerequisites

- The identity provider must meet SAML 2.0 specifications.
- SAP Analytics Cloud and the data source must use the same identity provider.
- The identity provider doesn't have to be exposed to the public internet.

After its configuration, the identity provider adds an additional security layer. From this point on, all logon requests are passed over to the identity provider, which can be also configured to be reachable only from within the company network. Doing so, however, would make accessing SAP Analytics Cloud from the public internet impossible.

Other identity provider scenarios Of course, other scenarios are possible when using your own identity provider. We won't provide diagrams of the various other options here for the sake of brevity. But for a user on the public internet, for example, if the identity provider and data source are both located within the company network, then the user must be able to reach the identity provider somehow. Furthermore, you can also place an identity provider on the public internet while the data source still resides within your company network. As long as the user is still able to reach all parties (SAP Analytics Cloud, identity provider, and data source), this setup will work fine.

Direct Connections to Cloud-Based Systems

For live connections to cloud-based systems, the setup is quite easy. If, for example, you use SAP S/4HANA Cloud or SAP BTP as a live data source, the browser will again directly connect to the services to retrieve the data required.

In this scenario, a user can be either within your company network, as shown in [Figure 2.7](#), or on the public internet, as shown in [Figure 2.8](#). Again, you simply must ensure that the user can always reach all parties directly.

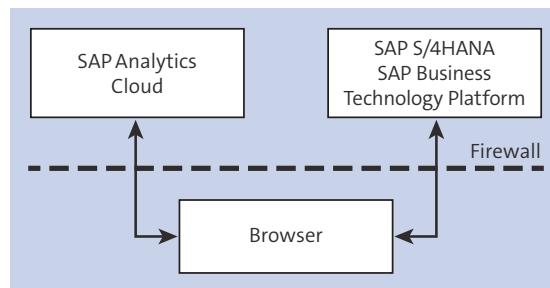


Figure 2.7 Direct Live Connection to a Cloud System from a Company Network

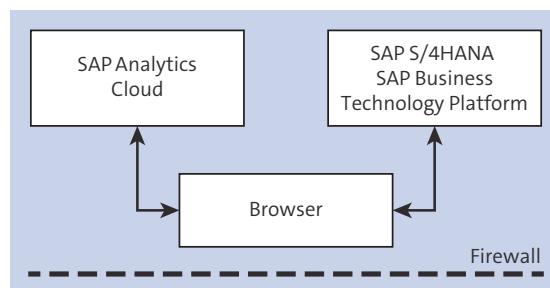


Figure 2.8 Direct Connection to a Cloud System via the Public Internet

Direct Connection

When using the direct connection via CORS, no additional server is required. The browser is directly connected to SAP Analytics Cloud and to the data source. Between the data source and SAP Analytics Cloud, no connection needs to be established. Another option is to configure your own identity provider.

2.3.2 Connections via Tunnels

Connections via CORS are not only fast and secure but also require little configuration effort. However, CORS always requires that the user have direct access to the data source, which is not always possible. Especially when connecting via the internet, many companies face challenges in exposing data sources outside of its firewall, which can pose serious threats. Thus, SAP offers tunnel connections for a selected list of data sources.

The following data sources can be connected to via tunnels:

- SAP BW
- SAP BW/4HANA
- SAP HANA
- SAP S/4HANA

Connections using tunnels are rather similar to CORS, but the main difference is that a middleman, called the *cloud connector* of the SAP Connectivity service, handles the connection. The cloud connector is installed on the edge of your company network on a server and opens a secure connection between internal servers and the internet. Thus, browsers running SAP Analytics Cloud can connect to a data source without having direct access to that data source.

Differences from
CORS

A tunnel connection is especially relevant for the following use cases:

Use cases

- Users need to access data from the internet, but you don't want the source system itself to be accessible from outside.
- Users need to access content from data sources in a mobile application with SSO enabled.
- SAP Analytics Cloud needs to automatically generate print versions of stories based on a live story and publish them (see [Chapter 5, Section 5.10.1](#)).

A tunnel connection is shown in [Figure 2.9](#). Similar to a CORS connection, the browser is situated in the public internet and directly accesses SAP Analytics Cloud. However, to access data, the browser doesn't reach out to the

Tunnel connection

source system anymore but instead contact the cloud connector, which communicates itself again with the data source.

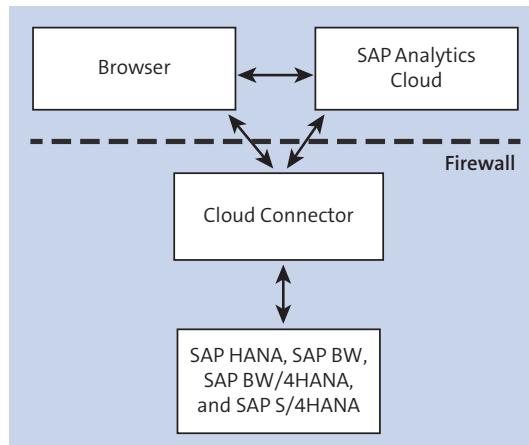


Figure 2.9 Live Tunnel Connection via the Public Internet

Tunnel connection setup As with CORS connections, a tunnel connection requires various configuration steps before it can be used productively. These steps are described in detail in the product help for each data source. You'll also find all the prerequisites or SAP Notes that may need to be implemented before establishing a connection (see <http://s-prs.co/v218508>).

The following steps describe the basic setup steps that must be performed for each data source:

1. The data source must be first checked for suitability with tunnel connections (for example, by checking the version). Depending on the data source, additional configuration steps may need to be performed.
2. The cloud connector must be set up and configured. This step includes establishing a connection between SAP Analytics and the cloud connector as well as between the cloud connector and the desired data source.
3. The connection parameter must be stored in SAP Analytics Cloud. For this step, you'll need to log on to SAP Analytics Cloud and create a new connection. However, the connection will not be tested before an actual data model is created.

The required versions for each data source can be found in [Section 2.1.1](#).

SSO via identity provider A tunnel connection also supports the usage of an identity provider to enable SSO. The requirements that the identity provider must meet are described in [Section 2.3.1](#).

On-premise scenario The architecture for this scenario is shown in [Figure 2.10](#). Note that the identity provider is connected to the cloud connector and not to the

browser itself. Both the data source and SAP Analytics Cloud must use the same identity provider.

Tunnel connections are only available for the supported data sources in an on-premise scenario. For other scenarios, you must configure a CORS connection, as described in [Section 2.3.1](#).

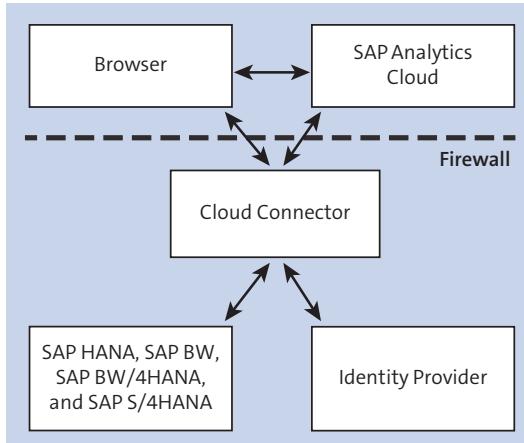


Figure 2.10 Live Tunnel Connection with an Identity Provider

2.3.3 Connections via Reverse Proxies

As an alternative to CORS, SAP offered connections via *reverse proxies* (called PATH). The crucial element of this scenario was a proxy residing in your company network that handled all requests.

Reverse proxy

Reverse Proxy No Longer Recommended

Although reverse proxies are still available for customers who used it in the past, officially, they are no longer recommended. We still discuss reverse proxies in this chapter, but new customers won't be able to use this setup. For them, SAP explicitly recommends using the CORS connection described in [Section 2.3.1](#).

The idea of the reverse proxy is based on the same-origin policy described in [Section 2.3.1](#). The same-origin policy prevents applications or scripts from connecting to other, untrusted servers in the background. Therefore, the reverse proxy was designed as a go-between to capture all communication.

A reverse proxy is deployed on a server in your company network. Technically, the reverse proxy is installed on an *Apache Tomcat* server or *SAP Web Dispatcher*. The server will be configured to forward requests to either SAP

How it works

Analytics Cloud or the on-premise data source. During this process, the proxy always pretends to be the data and application source facing the browser, as shown in [Figure 2.11](#).

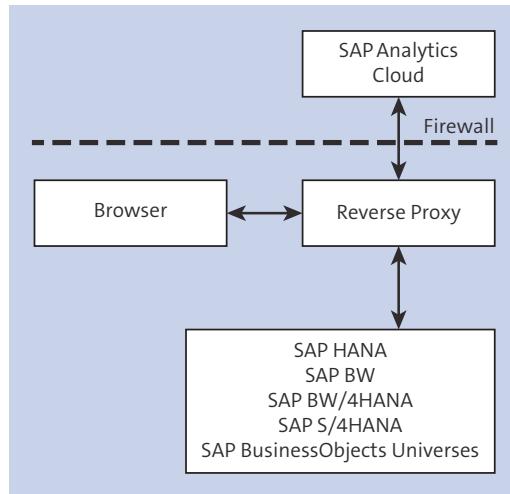


Figure 2.11 Live Connection via Reverse Proxy from a Company Network

Instead of accessing SAP Analytics Cloud via its own URL, the browser opens the URL of the reverse proxy. The proxy then redirects the request to SAP Analytics Cloud and retrieves the application components, which are passed back to the browser. Once the user wants to connect a data source, the reverse proxy forwards that request to the data source and sends the results back to the browser.

The reverse proxy also can be placed outside of the company network, which makes SAP Analytics Cloud and the live connection also work via the public internet. However, the reverse proxy still must be able to reach the data source directly. This direct connection can be achieved either via VPN or by setting up firewall rules. An example scenario is shown in [Figure 2.12](#).

- Limitations and SSO** In terms of feature limitations, no difference exists between a CORS connection and a reverse proxy setup. The reverse proxy setup also allows the usage of SSO. However, SSO may only work with Apache Tomcat for some data sources.

Live Connections

A live connection can be established either via CORS, tunnel connection, or via a PATH connection through a reverse proxy. Because CORS doesn't require an additional server and acts directly, this approach is officially recommended by SAP.

The reverse proxy setup is still available for customers who used it in the past, but new customers going forward cannot create reverse proxies for this case. The reason for this limitation is the need for an additional server and higher complexity due to additional configurations.

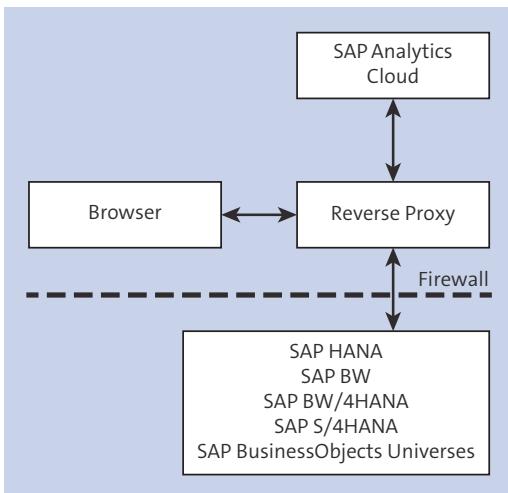


Figure 2.12 Live Connection via Reverse Proxy via the Public Internet

2.4 Integration Scenarios for Import Connections

In general, all scenarios for import connections are quite similar. However, depending on the data source, additional resources may be necessary, as described earlier in [Section 2.2.2](#). In the following sections, we'll walk you through importing data from on-premise and cloud sources.

2.4.1 Connections to On-Premise Data Sources

We already presented a complex data source scenario in [Section 2.1.2](#) that uses SAP BW as a data source. In this section, we'll go into more detail and describe each component separately. [Figure 2.13](#) shows all necessary components required for an import connection.

In general, an import connection to an on-premise data source always requires the cloud connector and the SAP Analytics Cloud agent, both of which were described in [Section 2.2.2](#). Only OData services and import connections to SAP BPC, version for SAP NetWeaver, don't require the SAP Analytics Cloud agent.

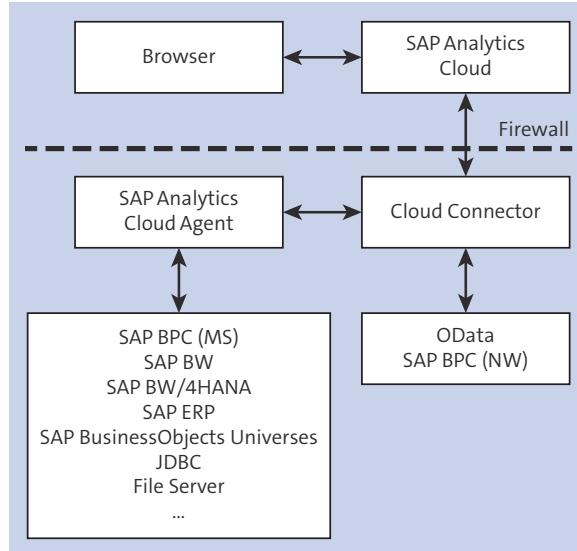


Figure 2.13 Components Needed for an Import Connection

Setting up an import connection

- To set up an import connection, the following steps must be performed:
1. The cloud connector must be deployed on a suitable server within your company network. Once installed, you must configure the component with the details that are provided in the administration area of SAP Analytics Cloud (see [Chapter 3, Section 3.3.4](#)).
 2. If needed, SAP Analytics Cloud must be installed and configured within your company network. Ideally, the solution is deployed on the same server where the cloud connector resides. You'll also need to install all required database drivers.
 3. The SAP Analytics Cloud agent will be configured in SAP Analytics Cloud and is ready to use (see [Chapter 3, Section 3.3.4](#)).
 4. Now, the data source itself can be connected to SAP Analytics Cloud.

Because most of these steps are performed just once initially, the user performing these steps must have administrator rights in SAP Analytics Cloud as well as sufficient authorizations for the on-premise data sources. The user should also be familiar with server setups. Because the setup requires you to change network components, more than one person may be necessary to complete the setup process. Detailed instructions for each data source can be found in the product help for SAP Analytics Cloud at <http://s-prs.co/v502607>.

Simplified installation

All steps can either be performed manually or partially automated. For the latter, SAP offers *SAP Analytics Cloud Agent Simple Deployment Kit*, a script routine that simplifies setup and automatically runs through all the steps. However, most configuration can't be changed before installation and may

not match your individual requirements. In this case, installing the components manually might be the better approach.

The automated routine is based on a script that allows some parameters to be configured up front. Then, the script installs an Apache Tomcat server, the cloud connector, and the SAP Analytics Cloud agent. The biggest advantage of using this routine is the time saved, and the default configuration requires only a few changes and reduces errors. More information about SAP Analytics Cloud Agent Simple Deployment Kit can be found at <http://s-prs.co/v502608>.

An important characteristic of an import connection to SAP BPC and to file servers is its ability to write back data. When using SAP BPC as a data source, you can replicate planning models into SAP Analytics Cloud, enrich these models there by adding new data or making new versions, and then write data models back to SAP BPC. An import connection to a file server allows you to import CSV and XLSX files. The file server must be located in the company network and connected to the SAP Analytics Cloud agent. In addition, SAP Analytics Cloud can also export data models to the file server and even export these models on a regular basis.

Writing back to SAP BPC and file servers

2.4.2 Import Connections to Cloud Data Sources

Besides using on-premise data sources, SAP Analytics Cloud can also connect to cloud-based data sources and import data. To perform this import, several setup dialog boxes can guide you through the process step by step. Import connections to cloud data sources for a company network are shown in [Figure 2.14](#), and connections via the internet, in [Figure 2.15](#). When using this connection type, whether the user is located within or outside of the company network makes no difference.

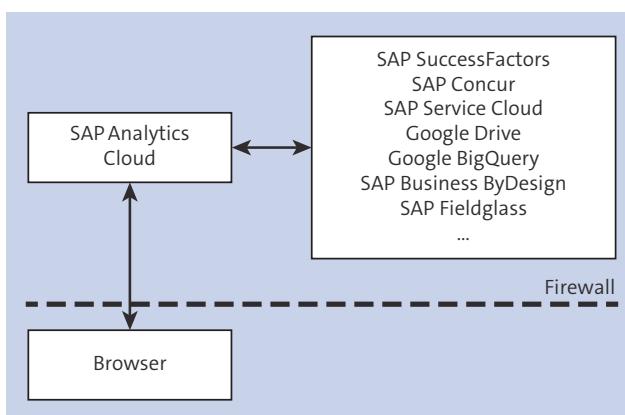


Figure 2.14 Import Connection to Cloud Systems Using SAP Analytics Cloud via a Company Network

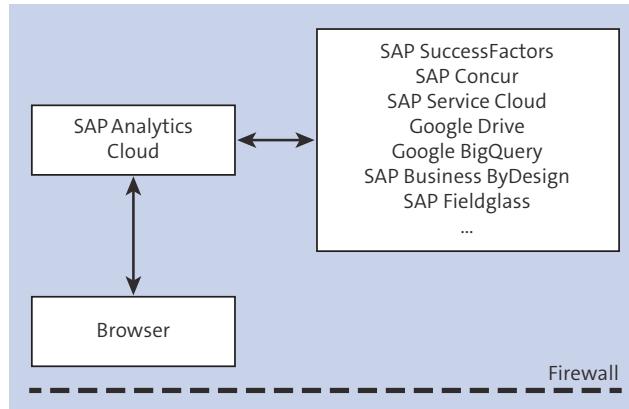


Figure 2.15 Import Connection to Cloud Systems Using SAP Analytics Cloud via the Public Internet

Setting up an import connection To set up an import connection to a cloud data source, SAP Analytics Cloud offers dialog boxes that are tailored to each data source specifically. Depending on the data source, additional configuration steps may be necessary.

In general, the following steps are required:

1. The data source must be prepared to support data import in some cases. You may need to first activate an API or another type of data access at the data source. This step will equip you with either credentials or keys that you'll need to enter into SAP Analytics Cloud.
2. A new import connection is created in SAP Analytics Cloud. You'll now choose the system to which you want to connect.
3. Depending on the data source, you may see an additional dialog box asking you to log on with your credentials. Afterward, the data source may ask for your permission to grant SAP Analytics Cloud access to the data. Alternatively, SAP Analytics Cloud may also ask you to provide the credentials you received in step 1.
4. The data source can be used for modeling data models.

The exact procedure for each data source is described in detail in the product help for SAP Analytics Cloud at <http://s-prs.co/v502609>.

For some data sources, you can also use scheduling to import data on a regular basis. More information on this topic can be found in [Section 2.1.2](#).

Import Connections

An import connection requires additional components depending on which data source is being used. The initial setup of these components should be

performed by an administrator since system access may be necessary. When connecting to cloud-based services, SAP Analytics Cloud offers dialog boxes that guide the user step by step. However, in some cases, you may first have to perform additional configuration steps at the data source itself.

2.5 Summary

With regard to data integration, SAP Analytics Cloud is robust and flexible and can connect to either live data sources or imported data sources. Live data connections are quite unique as sensitive data does not actually leave your company network. However, not all features may be available in this connection mode.

Alternatively, you can upload or import data into SAP Analytics Cloud, which will give you full access to all functionalities. However, this connection type may require additional effort to ensure data access security.

Before we can start uploading data to SAP Analytics Cloud, we'll need to set up SAP Analytics Cloud, which we'll discuss in the next chapter.

Chapter 3

Navigation and Administration

To get started with SAP Analytics Cloud, you'll need to perform some initial administrative tasks. In this chapter, we'll present all the tools you'll need to set up and configure SAP Analytics Cloud as well as describe important points to consider before using the product productively.

After you've bought a license for SAP Analytics Cloud, SAP will send you an email with a URL to access your own instance of the software. In general, the URL matches the following pattern: <https://<customername>.us10.sapanalytics.cloud/>. The URL contains the customer name and the data center location, which in this case is the United States (denoted by us10). SAP Analytics Cloud can only be accessed via this URL by both administrators and users. No other workable management landscape or backend is intended for customer access. By setting the appropriate roles, you can ensure that users only see the functions they need.

Administrators are provided various user interfaces (UIs) to set parameters and adjust the system configuration to fit a company's needs, including options to maintain users and connections to other systems.

Configuration tools

In this chapter, we'll introduce you to the home screen of SAP Analytics Cloud and the navigation menu, then we'll describe your first steps as an administrator and how you can connect to other data sources.

Supported Browsers

To access SAP Analytics Cloud, you must use a supported browser. Currently, Google Chrome and Microsoft Edge are the only browsers that fully support the solution. Internet Explorer is supported in a restricted mode that only allows the consumption of stories.

3.1 Navigating the Home Screen and Main Menu

After logging on to SAP Analytics Cloud, you'll be immediately redirected to the home screen, which is the central point of entry for users, as shown in [Figure 3.1](#). The home screen can be customized to a great extent and therefore can provide important initial information.

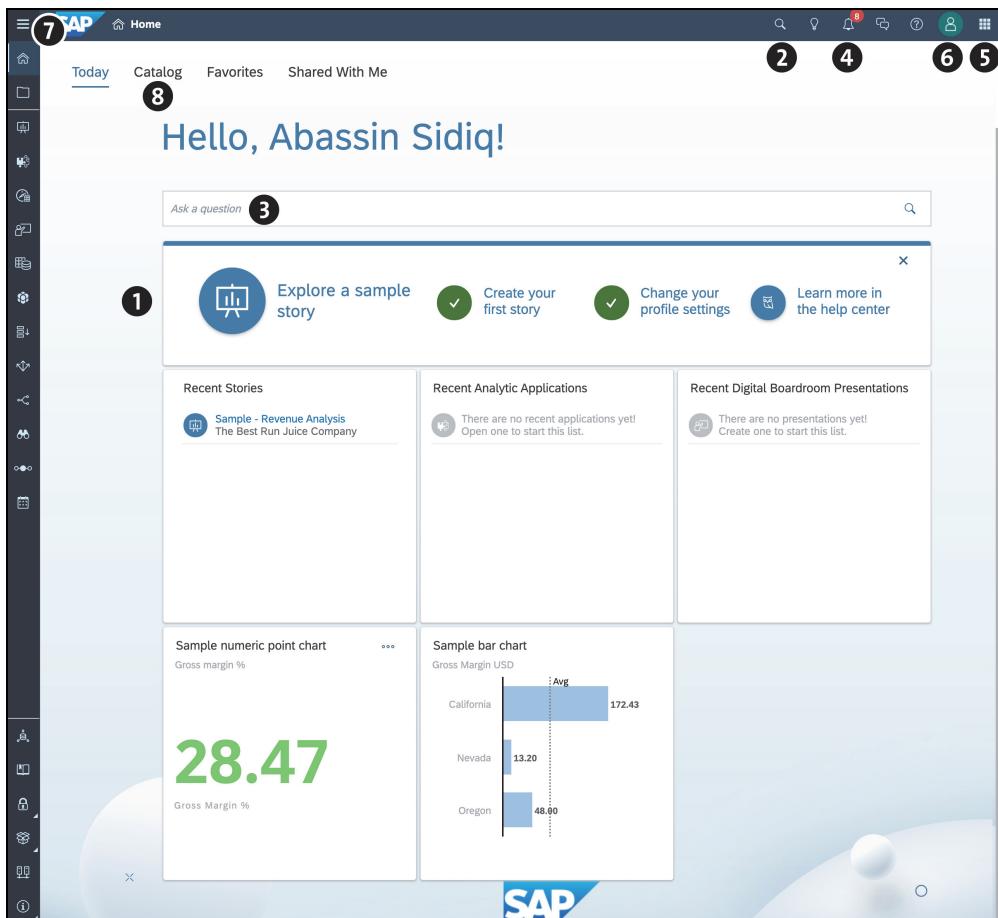


Figure 3.1 Home Screen after First Logon

Home screen The home screen shown in [Figure 3.1](#) can be separated into eight essential areas:

① Main screen

This area can be completely customized. Initially, the main screen offers recommended steps for new users to perform, a list of recently accessed stories, a list of featured files, and sample charts. Users can remove these elements or add new ones. These elements could include notes, charts extracted from stories, or dates from a calendar.

② Content search

The search function allows users to search through the content of SAP Analytics Cloud. Users can find stories, applications, or boardrooms, as well as models and other elements like datasets. However, the search function can't search within that content.

③ Search to insight

With search to insight, users can use natural language to generate charts and tables. Based on machine learning algorithms, this functionality offers proposals and recommendations.

④ Notifications, discussions, and help

Next to the search functionality, you'll find notifications, the discussion pane, and access to the product help. The notifications keep users up to date and inform them about new system updates, recently shared reports, or new tasks. Within the discussion pane, users can easily access all open discussions.

The help area offers multiple tools. Users can turn on guided page tips that show context-based information while they interact with the system. Other buttons allow you to access various help documents and videos as well as to submit bugs, leave feedback, or raise new ideas.

⑤ Application switch

The application switch offers direct access to various solutions, including SAP Data Warehouse Cloud or SAP Analytics Hub. The switch only shows solutions you've subscribed to.

⑥ Profile settings

This area allows users to customize their profile settings or request more roles. In this area, users can also log off from the system.

The **Profile Settings** area offers options to change your password or modify various parameters, as shown in [Figure 3.2](#). Users can modify the language of SAP Analytics Cloud and the language of the data being accessed. In this way, users can, for example, interact with the interface in German but access English-language data from a data source.

Profile settings

⑦ Main menu

The main menu can be accessed via the button shown in [Figure 3.3](#). The menu provides access to various tools and functionalities within SAP Analytics Cloud. The available options automatically adjust depending on the roles a user is assigned to. Only administrators or system owners will see the full menu. When using a browser that isn't fully supported, the menu will only show supported functionalities.

In addition to the ability to create or browse stories, applications, models, predictive scenarios, widgets, or other elements, the menu also offers quick access to the calendar, planning processes, and administrative tools like security settings, the deployment menu, and the system configuration.

Main menu

③ Catalog

This area can be used to promote stories, boardrooms, applications, or external content. More information about the analytics catalog for SAP Analytics Cloud can be found in [Chapter 10, Section 10.3](#).

You'll see this menu throughout this book as the usual starting point for various workflows. The lower items below the horizontal separator are especially suited for administrators and need proper authorizations.

The screenshot shows the SAP Analytics Cloud Profile Settings interface. At the top, it displays the user's name, Abassin Sidiq, and an 'Upload Profile Picture' button. Below this, there are fields for First Name (Abassin), Last Name (Sidiq), and Email (abassin.sidiq+3@sap.com). A note provides instructions for updating personal information via SAP Cloud Identity. At the bottom, there are 'Edit Profile & Change Password' and 'User Preferences' sections. The 'User Preferences' section contains various settings like Language (English), Data Access Language (English), Date and Time Formatting, Number Formatting, Scale Formatting, Currency Position, Default Application (SAP Analytics Cloud - Default), Clean Up Notifications (Never), Email Notifications (File Request Notifications, System Notifications, Product Updates & Learning), and In-App Notifications (File Request Notifications). A 'Close' button is located at the bottom right.

Figure 3.2 Profile Settings

The screenshot shows the SAP Analytics Cloud main menu. The left side features a sidebar with navigation links: Home, Files, Apps, Stories, Analytic Applications, Data Analyzer, Digital Boardroom, Datasets, Modeler, Data Actions, Allocations, Value Driver Trees, Predictive Scenarios, Multi Actions, Calendar, Workspace Management, Content Network, Security, Transport, Connections, and System. The 'Home' link is highlighted with a blue background.

Figure 3.3 Main Menu

3.2 First Steps for Administrators

Before you roll out SAP Analytics Cloud to your users, several important administrative activities must be performed. This section mainly focuses on tasks for administrators who set up SAP Analytics Cloud. We'll present all necessary tools to perform this setup. SAP Analytics Cloud itself is presented in [Chapter 1](#). This section will conclude with an overview of the content network.

Before starting with SAP Analytics Cloud, you should first plan your initial activities. This step is essential to ensure that your users will later enjoy a seamless user experience (UX). The following questions will be addressed throughout this section:

- How many users will work with the solution?
- Do you want to provide single sign-on (SSO)?
- Which data sources and connection types will be used?
- Do you want to reflect your organizational structure in SAP Analytics Cloud?
- What should your folder structure look like?
- What will your operational concept look like? Who will be allowed to create content, and who will consume it?
- Do you need additional development or quality tenants of SAP Analytics Cloud?

Essential questions

These questions not only hint at the topics you must consider before implementing the solution; they also allow you to gain a realistic estimation of the effort needed for implementation. Ahead, we'll discuss these questions from a high-level perspective. Not all of these questions can be answered by using examples or scenarios. A presentation of the necessary tools will be covered in [Section 3.3](#) and [Section 3.4](#).

3.2.1 Users and Single Sign-On

The number of users is important for system usage. If you expect a high number of users working with SAP Analytics Cloud (more than 100 users), you should seriously consider using SSO and setting up a structured operational concept. In addition, having the organizational structure reflected within SAP Analytics Cloud's file structure may also make sense.

Number of users

The user creation process itself must be planned accordingly as well. SAP Analytics Cloud has its own user management functionality because the solution can also be used as a standalone solution. While users can always be created manually, alternatively you can use CSV import, copy and paste,

or import from Active Directory capabilities to create new users. When using SSO, you can fully automate the process.

Licenses Because SAP Analytics Cloud offers various license types that include additional functionalities, you should plan up front how you want to assign those licenses to your users. You can always change the assignments later.

SSO When planning to use SSO, several prerequisites must be met within SAP Analytics Cloud. Especially when the number of users is high, SSO should be set up correctly because you can also use it to assign authorizations via teams and roles to users. If the standard roles delivered by SAP do not match your requirements, you should create custom roles first. Teams allow you to assign authorizations on folders and files (i.e., stories or applications) to control if users are permitted to see the content or even modify and delete it.

Identity provider In general, the following considerations apply to the usage of your own identity provider to establish SSO:

- The identity provider must comply with the SAML 2.0 protocol.
- You must determine a unique attribute on which the user is mapped between SAP Analytics Cloud and the identity provider. In many cases, this mapping either uses an email address or a unique user ID.
- If you want to assign roles and teams, you must configure additional SAML tags in your identity provider. These tags contain all roles that the user owns and all teams to which the user belongs. Therefore, these tags must be created and maintained in the identity provider.
- If you want to use the identity provider to authenticate against your data sources, for instance, SAP Business Warehouse (SAP BW), you must ensure that both SAP Analytics Cloud and the data source use the same identity provider.
- If you don't want to use your own identity provider, SAP Analytics Cloud ships with *SAP Cloud Identity Services* by default. Users are then completely managed in SAP Analytics Cloud.
- The status of a user and all assigned roles and teams are checked on each logon. To remove a user from a team, you only need to modify the user's membership to the team within your identity provider, and SAP Analytics Cloud will automatically apply this change.

The configuration of a custom identity provider is described in detail in the product help, available at <http://s-prs.co/v502610>.

3.2.2 Data Sources and Structures

To determine which data sources you'll use later, refer to [Chapter 2, Section 2.1](#). Depending on the data source and connection type, you may need to perform additional configuration steps in SAP Analytics Cloud. These steps may include the creation of new connections (see [Section 3.4](#)) or setting up the SAP Analytics Cloud agent (see [Chapter 2, Section 2.2.2](#)).

Connections

To reflect your organizational structure within SAP Analytics Cloud, you should make sure to plan accordingly before you start the implementation.

Organizational structure

In general, SAP Analytics Cloud has its own authorization management tools. Although existing backend authorizations are fully respected when using a live connection, you can still assign authorizations in SAP Analytics Cloud to determine the visibility of (and specify additional rights) for stories, folders, or other objects. However, those authorizations can't override backend rules. Nevertheless, these authorizations can be used to hide specific objects from users who are not authorized to see that data, for example.

Authorizations and Live Connections

When using a live connection, all data authorizations are driven by the data source. Although a user can access a story built on a live connection, that user may still not see any data. In this case, the user doesn't have the necessary authorizations in the backend and will be presented with an error message.

Multiple functionalities in SAP Analytics Cloud can help you implement your organizational structure. On one hand, you can use teams to group multiple users. You can then assign access rights for objects like stories, applications, models, or folders to those teams. Every member of a team then automatically inherits these access rights. If a user is removed from team, that user automatically loses all associated access rights. You can also assign team membership via SSO so that you don't have to maintain membership manually in SAP Analytics Cloud.

In addition, the solution offers a full folder structure in which all stories, applications, models, and other elements are contained. You can also use these folders to reflect your organizational structure and use team authorizations to make them visible to the appropriate user groups. An example of such a folder structure is shown in [Figure 3.4](#).

Folders

The creation of a folder is described in [Section 3.3.5](#) with an example. Folders can always be created, edited, moved, copied, or deleted and thus are a robust mechanism for maintaining content and meeting organizational needs.

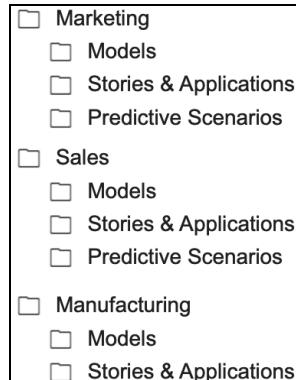


Figure 3.4 Folder Structure Example

3.2.3 Operational Concept

Operational concept Depending on the planned system size, a particularly important task may be defining an operational concept. This operational concept could include a clear definition of the functionalities users should be allowed to use. This concept can be steered by using roles in SAP Analytics Cloud, which allows for the detailed setup of competences and responsibilities.

One of many options is to distinguish between story creators and viewers. By using roles and authorizations, you can determine folders in which only a small number of people can store stories or applications, but which can be accessed by a broad audience.

By using the role concept, you can steer which specific functionalities are available to specific users. You can, for example, define a role for users that can only consume stories but are not allowed to upload any personal data. You can also configure roles that allow users to create personal stories or applications, while an additional role would also allow users to publish the content centrally.

3.2.4 System Landscape

System landscape You should also consider using multiple systems in your landscape if required. If you're planning to use SAP Analytics Cloud with a low number of users and only a few reports, one productive system should be sufficient. In general, having multiple systems isn't mandatory. However, if you're facing complex requirements or conditions, a second instance of SAP Analytics Cloud can be of great help. Examples of such conditions include the following:

- You're mainly planning to use live connections to your data sources, which again are separated into multiple systems for development, quality, and productive usage (i.e., in SAP BW). You want to connect SAP Analytics Cloud to all stages in your landscape.
- Story creators or developers are not allowed to see productive data.
- Stories should be developed in a completely isolated environment and show nonproductive data at that stage.

If one of these conditions is met, a system landscape with more than one system is recommended but still not mandatory. After all, you may face additional challenges with another system.

Whenever a strict separation of development and productive systems are desired, a system landscape with multiple systems, as shown in [Figure 3.5](#), is the preferred setup. This setup has the following advantages:

- You can maintain different users in productive and nonproductive systems. Therefore, you don't have to assign productive licenses to report developers.
- You have an isolated environment to try out new functionalities or to adjust reports.
- You can modify and update existing reports without having to interrupt any productive usage. Once you're done with adjustments, you can easily transfer the content to a productive system.
- The test system license doesn't differentiate between different license types. All users in the system can use all functionalities. Thus, users can try out and evaluate additional elements like planning.

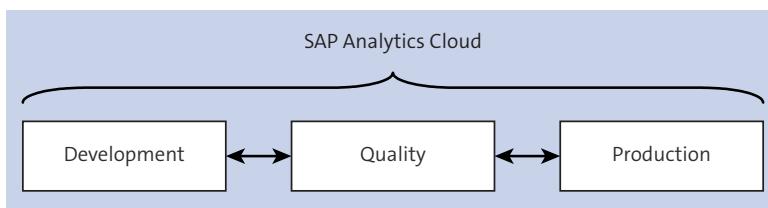


Figure 3.5 Multisystem Landscape with Three Systems

This final point is particularly important in scenarios like the scenario shown in [Figure 3.6](#). In this example, an SAP BW system is used as a data source. The SAP BW system is split across three instances: development system (BWD), quality system (BWQ), and productive system (BWP).

Live connections to multiple instances

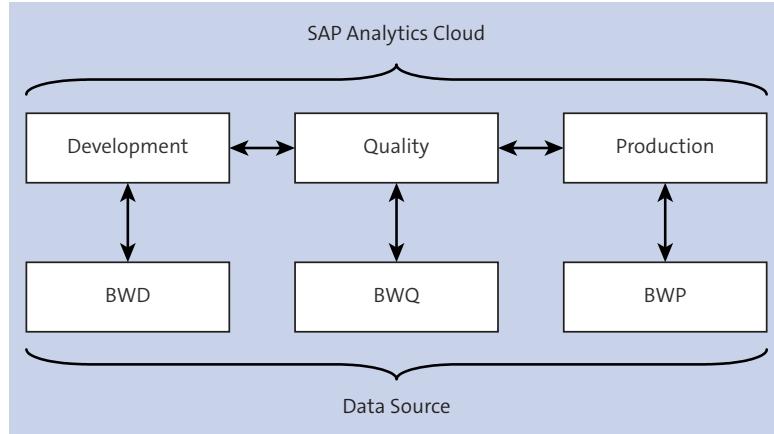


Figure 3.6 Multisystem Landscape with Three Instances When Using Live Connections

In general, SAP Analytics Cloud uses models to expose data. These models can either contain uploaded data or represent a live data source. If a model is based on a live data source (e.g., SAP BW), the model doesn't contain any actual data but instead refers to a query or a view in the data source (e.g., SAP BW query). To better understand this relation, as shown in [Figure 3.7](#), the concept of data models is described in detail in [Chapter 4](#).

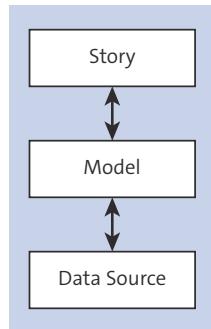


Figure 3.7 Relationships among Story, Model, and Data Source When Using Live Connections

Changing the connection type

When creating a story in SAP Analytics Cloud, only models will be used to connect to data. The model determines if the data is stored in the cloud or imported (the data resides in the cloud) or if it's coming from a live data source (the model is just referring to the data source). Therefore, you can move from a productive data source to a nonproductive one (or vice versa) on the model level only. This move can be specified in the model's settings, where a new data source can be indicated. In a story, when trying to exchange the model behind a chart, the chart will be completely reset.

If a developer who isn't allowed to see productive data wants to update a productive story, that developer first must change the data source in the model. The developer can now open the story and start working on it. However, this change applies to all users, which means that, at that moment, the story can't be used productively. The developer first must reset the story to the original data source.

This problem can be solved by using a system landscape with multiple instances because stories, applications, or models can be transported between multiple systems. This approach allows stories and models to be identical in multiple instances in which only the data source below the model is different. While the model in the development instance is referring to nonproductive data, the model in the productive instance shows productive data.

Figure 3.8 shows a full picture of this scenario. In this example, the SAP BW system has three instances (BWD, BWQ, and BWP). Three instances of SAP Analytics Cloud exist, and all connections are live.

Transportation

System landscape
with multiple
instances

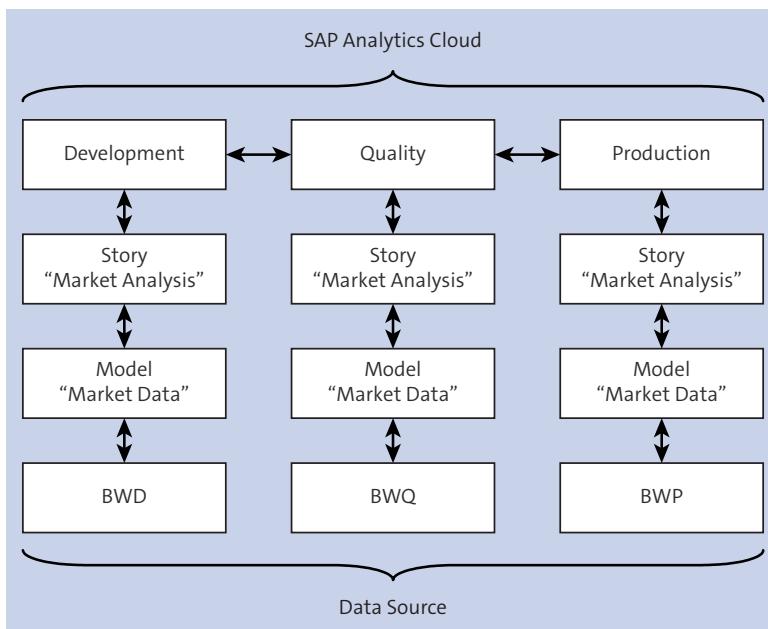


Figure 3.8 Relationships among Content in a Multisystem Landscape

Let's say the Market Analysis story is first created by a developer or creator and then validated in a quality system. Afterward, the story will be published for productive usage. Both the story and model carry identical names in all three instances. The only difference among all three models is the data source. The story will show nonproductive data in the first two instances and show productive data in the last instance.

If a developer now wants to enhance the story, the story is isolated in the development environment. Once his enhancements are finalized, he can transport the revised story to the quality system and then to the productive system. When transporting content, technical names are kept the same so that existing content will be replaced. Users will automatically open the most recent version.

System Landscapes

In on-premise setups, having multiple instances of a system is common to keep development, quality validation, and productive usage separated. SAP Analytics Cloud also offers the option to manage multiple instances and to transport content between them.

Whether multiple instances are really needed depends on the individual situation. Especially in big landscapes or when productive and nonproductive assets are strictly separated, a landscape containing multiple systems adds significant value.

Independent of the desired setup, SAP Analytics Cloud never allows administrators to delay updates or implement their own modifications. All development and test instances are maintained by SAP, as in productive systems.

3.3 Administration Tools

Access via the main menu

As described in [Section 3.1](#), SAP Analytics Cloud offers multiple tools to configure and adjust the solution to meet individual needs. In general, these tools are accessed via the main menu (shown earlier in [Figure 3.3](#)) and are only visible for administrators and users carrying the appropriate roles.

The available tools include the following:

- The **Security** options allow you to create, maintain, and delete users, teams, and roles. You can also access the change and activity log and process role requests.
- The **Deployment** options offer tools to export content from SAP Analytics Cloud or import content into the solution.
- All connections are created, maintained, and deleted in the **Connection** options. This menu area will be described in detail in [Section 3.4](#).
- The **System** options provide access to the system monitor, settings, and information about the solution. You can analyze your system's usage, modify system settings, and retrieve your current version here.

The menu options above the horizontal line are not exclusively available to administrators but may be used by them to perform some tasks. For

example, the folders can be accessed from this part of the menu. We'll present each tool in detail in the following sections.

3.3.1 Security

The **Security** menu options, shown in [Figure 3.9](#), provide access to security settings within the solution and enable you to monitor activities and changes. We'll look at each of these options in this section.

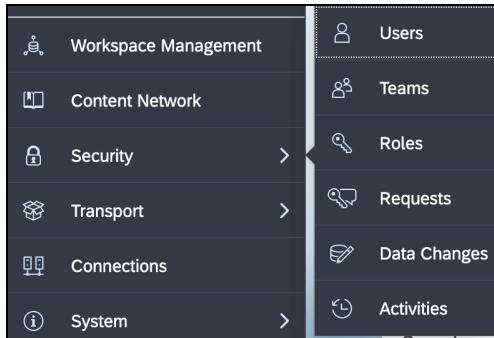


Figure 3.9 Security Menu

User Management

The **Users** area is the central space for creating and maintaining users in SAP Analytics Cloud. All users are shown in a table view, as shown in [Figure 3.10](#).

Security / Users								
	USER ID	FIRST NAME	LAST NAME	DISPLAY NA...	EMAIL	MANAGER	ROLES	LICENSES
<input type="checkbox"/>	ASIDIQ	Abassin	Sidiq	Abassin Sidiq	abassin.sidiq@s...		System_Owner	System

Figure 3.10 Users Overview

Single Sign-On

If you use SSO with your own identity provider, your user management activities will be performed via the identity provider. Based on your setup, SAP Analytics Cloud will only be used to define additional attributes.

Each user carries the following attributes, which are shown and maintained in the table view:

User management

- User ID
- First name

- Last name
- Display name
- Email
- Manager
- Roles
- Licenses
- X.509 certificate (optional)

Creating users If you want to create a new user, you must at least fill out the **User ID**, **Email**, and **Roles** columns. These fields can be maintained either via manual entry or by copying and pasting. To create a new user, follow these steps:

1. Click on the plus icon ①, as shown in [Figure 3.11](#).
2. A new entry will be created in the table, as shown earlier in [Figure 3.10](#). Fill out the required fields as described.
3. After you click on **Save** ⑤, shown in [Figure 3.11](#), the user will be created. The user will be automatically sent an email with an activation link. After clicking the link, the user can also set a password. You can also create multiple users at once.

Deleting users To delete a user, first select the user by clicking on the row number shown to the left of the username. Then, you can delete the user by clicking on the **Delete** button ③. If the user has already created content, you'll be asked to specify another user to own the content. You can also delete multiple users at once.

If you just want to enable or disable users, you can use the **Activate Users** or **Deactivate Users** buttons ②. This will preserve their content, but restrict their access to the system. To show or hide deactivated users, you can use the **Filter Users** button ⑩.



Figure 3.11 User Management Menu

Additional options If a user has deleted or lost their activation email, you can resend it by clicking on the **Resend Invitation Email** button ⑥. To transfer the role of the system owner to another user, click on the **Assign as System Owner** button ⑦. The system owner is the only one allowed to configure a custom identity provider. Only one user can be assigned this role at any point in time. All other administrators need to carry the respective administrator role.

Instead of manually creating new users, you can also import a user list. Click on the **Refresh** button ④ to refresh the user list. After clicking on the **Import** button ⑧, you can choose to either upload a CSV file or import users from Active Directory via the *SAP Analytics Cloud User and Team Provisioning application programming interface (API)*, as follows:

Importing and exporting users

- If you choose to use the file upload option, you must provide a CSV file that matches the structure of the user table in SAP Analytics Cloud. If the layout is not fully met, you can still manually map the columns in your flat file to the ones in SAP Analytics Cloud.
- To use the import option from Active Directory, you must first prepare your Active Directory and then use the SAP Analytics Cloud User and Team Provisioning API. The necessary prerequisites and implementation steps are documented in the product help at the following URL: <http://s-prs.co/v502611>.

The **Export** button ⑨ creates a list of all users in SAP Analytics Cloud, which can then be downloaded as a flat file.

Teams

After creating users, you can create teams and assign users to them. To access the team interface, you must open the **Teams** submenu, under the **Security** menu options, as shown in [Figure 3.12](#).

Name	Team Members	Created	Last Changed
Sales_NA Sales Team North America	1	2020.01.30 Abassim Sidiq	2020.01.30 Abassim Sidiq

Figure 3.12 Team Overview in SAP Analytics Cloud

Click on the **+** button to create a new team. You must at least fill out the **Team Name** field. You also can add a description, as shown in [Figure 3.13](#).

Creating a new team

By selecting the **Create a Folder** checkbox, you'll create a new content folder that's only accessible to the team that you just created.

Assigning Teams via Single Sign-On

If you use SSO, you can also use your identity provider to assign users to a team. You still must create the teams in SAP Analytics Cloud first, however. After you perform this step, you can configure the SAP Analytics Cloud system to use SAML attributes to assign users to teams. A detailed description of this procedure can be found at <http://s-prs.co/v502612>.

The screenshot shows the 'Create Team' dialog box. At the top, it says 'Create Team'. Below that, there's a field labeled 'Team Name' with the value 'SALES_LATAM'. Underneath it is a 'Description' field containing 'Sales Team Latin America'. There is a checked checkbox labeled 'Create a Folder'. Below this is another field labeled 'Folder Name' with the value 'SALES_LATAM'. On the left side, there's a section for '1 Team Member' showing a list with one item: 'Abasssin Sidiq' next to a user icon. To the right of the list are buttons for 'Search' (with a magnifying glass icon), 'Display Name' (with a dropdown arrow icon), and icons for sorting (up and down arrows) and adding/removing items (+ and -). At the bottom right of the dialog are 'Create' and 'Cancel' buttons.

Figure 3.13 Creating a New Team

Teams provide significant advantages in authorization management. SAP Analytics Cloud organizes all content in a folder structure. All authorizations within this structure can be assigned to specific users or teams. If a team is authorized to open a folder, all members will automatically be able to see the folder. If the team is later removed from the list of authorized people to view the folder, all team members will automatically lose access.

Roles

Roles While teams are primarily used to steer access to objects, roles allow you to control which users can use which functionalities and also assign licenses based on your contracts with SAP. To access the interface, you must open the **Roles** submenu after clicking on **Security**. Now, you can create, maintain, and delete roles. Depending on the licenses you've procured, SAP Analytics Cloud will provide default roles for each license type, as shown in [Figure 3.14](#).

The role overview shown in [Figure 3.14](#) provides not only a quick overview of your current pool of roles and how many users are assigned to them but also display information about each license type and the roles that belong to it. A detailed overview of all role types can be found in the product help at <http://s-prs.co/v502613>.

How Licenses and Roles Interact

You can purchase different SAP Analytics Cloud licenses that include different scopes of functionalities. The cheaper a license is, the less functionality

is included. Mixed license scenarios are possible in which only a selected number of users are equipped with more expensive licenses, while most users can carry the cheaper license.

The assignment of licenses to users is handled through roles. If a role requires a user to have a specific license type, that license type will be automatically assigned to that user if the number of contracted licenses has not been exceeded. When the number of paid licenses is exceeded, the administrator will receive a warning.

Analytics Hub	Analytics Hub Admin Full Privileges	Analytics Hub Content Creator Full Assets Privileges, Read Structures Privileges	Analytics Hub Viewer Read Assets Privileges
	Assign Users	1 User	1 User
+ Create a New Role			
Business Intelligence	Application Creator Analytics Designer Privileges	BI Admin Full Privileges	BI Content Creator Create and Update Privileges
	1 User	Assign Users	2 Users
	BI Content Viewer Read Privileges	Digital Boardroom Creator Create, Read, Update, Delete Privileges	Digital Boardroom Viewer Read Only
	2 Users	1 User	1 User
	Predictive Admin Full Privileges	Predictive Content Creator Create and Update Privileges	
	Assign Users	2 Users	
+ Create a New Role			

Figure 3.14 Overview of Standard Roles

Standard roles cannot be modified. If you need other roles, you must create new custom roles. The reason for this limitation is SAP's update behavior. If you modify a standard role, the next update of SAP Analytics Cloud may overwrite your changes or replace your roles with new ones. Custom roles, however, will not be modified or replaced.

Creating new roles

A user can own multiple roles, so you can assign users both standard and custom roles to grant them access to some additional functionality only. This flexibility allows you to grant users without the administrator role the rights to create new connections to data sources that can then be used by all users.

To create new roles, you have the following two options:

- Click on the + button in the top right to open the dialog box for creating a new role. In this case, you must specify which license type you want to attach to the role via the **License Type** field, as shown in [Figure 3.15](#).
- Below each license type, you'll see a button labeled **Create a New Role**. After clicking this button, the license type in the role creation dialog will be automatically filled out accordingly.

The dialog box has a title bar 'Create a New Role'. It contains four input fields: 'Name' (with placeholder 'BI Content Extended'), 'Description' (with placeholder 'Extended role for a BI Content Creator'), and 'License Type' (a dropdown menu currently set to 'Business Intelligence'). At the bottom are 'Create' and 'Cancel' buttons.

Figure 3.15 Creating a New Role

After creating a new role, you'll see a dialog box in which you can select a template role, as shown in [Figure 3.16](#).

The dialog box has a title bar 'Select a Role Template'. It lists nine template roles: Blank, Application Creator, BI Admin, BI Content Creator, BI Content Viewer, Digital Boardroom Creator, Digital Boardroom Viewer, Predictive Admin, and Predictive Content Creator. At the bottom is a 'Cancel' button.

Figure 3.16 Role Templates

If you want to use custom roles only for your users, you can choose an existing standard role and then extend it with added functionality or cut away unwanted functionality. The template role will be copied, which means that, after a role update by SAP, the custom role created from that template role will not automatically adapt changes into the custom role.

By clicking on a role, such as **BI Content Creator**, a new interface will open that shows the newly created role. All settings attached to the template role will be automatically copied so only a few clicks will be required to customize the role.

In general, each functionality can be assigned with the **Create**, **Read**, **Update**, **Delete**, **Execute**, **Maintain**, **Share**, and **Manage** permissions, as shown in [Figure 3.17](#). If a functionality doesn't offer a specific permission, only a subset of the permissions can be assigned. You can easily select the desired permission by selecting the desired checkboxes accordingly.

Name	Create	Read	Update	Delete	Execute	Maintain	Share	Manage
> Dimension	<input type="checkbox"/>							
> Currency	<input type="checkbox"/>							
Planning Model	<input type="checkbox"/>							
Analytic Model	<input type="checkbox"/>							
SAP Cloud Platform Datasource					<input type="checkbox"/>			
Other Datasources					<input type="checkbox"/>			
KPI	<input type="checkbox"/>							
Role	<input type="checkbox"/>							
User	<input type="checkbox"/>							
Team	<input type="checkbox"/>							
Activity Log		<input type="checkbox"/>		<input type="checkbox"/>				
> Data Change Log		<input type="checkbox"/>		<input type="checkbox"/>				
Lifecycle		<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Connection	<input type="checkbox"/>							
Private Files	<input type="checkbox"/>							
Deleted Files					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ownership of Content			<input type="checkbox"/>					
System Information		<input type="checkbox"/>						
Allocation Step	<input type="checkbox"/>							

Figure 3.17 Role Details

Additional Information About Roles and Permissions

Detailed documentation for all roles and their permissions can be found in the product help at <http://s-prs.co/v502614>.

You can also use roles to assign data authorizations. After clicking on the **Select Model** button, you can select a model, which must contain acquired

Model-specific
authorizations

data. Now, you can assign access to specific dimension members (e.g., United States in the country dimension). However, SAP officially recommends using folders and the modeler (see [Section 3.3.5](#)) to manage the visibility of a model and its content.

Additional functionality The buttons in the top right allow you to perform additional actions, as shown in [Figure 3.18](#), such as saving the role, reselecting the template role, and opening the role configuration window, shown in [Figure 3.19](#). In this window, you can define the role as a standard role that is automatically assigned to newly created users.



Figure 3.18 Menu in Role Overview

You can also grant carriers of a specific role full data access, as shown in [Figure 3.19](#). This option should only be used with caution. By selecting the **Enable Self-Service** option, the role is available for all users to request. Users can then request the role to be granted within SAP Analytics Cloud. This request will be then handled by a designated processor, which must be defined upfront. These users can then approve or reject the role request.

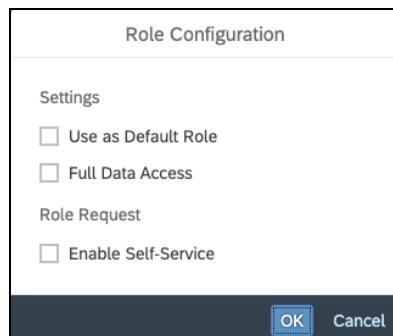


Figure 3.19 Role Configuration

Assigning roles By clicking on the **Assign Users** button, you can assign a role to users. This task can also be performed in the user management interface.

Assigning Roles via Single Sign-on

You can assign both teams and roles via SSO if desired. Doing so, however, adds additional requirements, which must be handled in advance. The exact procedure and prerequisites can be found in the product help at <http://s-prs.co/v502615>.

Requests

To process requests for additional roles by users, the **Security** menu options include the dedicated **Requests** entry. This role must be made visible to request processors by assigning the appropriate role. Processors can then either accept or decline requests. Each request can be enriched with a comment so decisions are easier to understand later.

Processing role requests

Data Changes and Activities

The last two entries of the **Security** menu options provide access to logs of system activity and data changes for auditing.

The **Data Changes** interface contains a list of all data changes for each data model, as shown in [Figure 3.20](#). This information is especially important for planning use cases in which data changes must be logged for legal reasons.

The screenshot shows a SAP application window titled "Security / Data Changes". The top navigation bar includes the SAP logo, a search icon, a notification bell with 50 messages, and user profile icons. Below the title, a dropdown menu shows "Operating Income". The main area is a table with columns: Date, OP_Accounts, OP_Product, OP_Region, Version, Audit Time, Audit User, SignedData - ..., SignedData - ..., SignedData - ..., and Audit Action. The table has a header row and several data rows. At the bottom right of the table are buttons for Refresh, Filter, Download, and Delete, along with a "Search" input field and a magnifying glass icon.

Figure 3.20 Data Changes

To view the log, you must select a data model first. Then, you'll see a full log that contains every data change, including the timestamp and the user who applied the change.

View data changes

With the buttons in the top right, you can add more columns from the model. You can also apply filters to the log or download the log as a file. If you don't need some logs anymore, you can delete them here.

Because data changes are only logged for planning models and data actions, the second entry in the **Security** menu area, **Activities**, logs all user activities in SAP Analytics Cloud, as shown in [Figure 3.21](#). The activities log can also be filtered, downloaded as a file, or deleted.

The screenshot shows a SAP application window titled "Security / Activities". The top navigation bar includes the SAP logo, a search icon, a notification bell with 47 messages, and user profile icons. The main area is a table with columns: Object Type, File Name, Object Name, Description, User Name, Activity, Status, and Timestamp. The table has a header row and several data rows. At the bottom right of the table are buttons for Refresh, Filter, Download, and Delete, along with a "Search" input field and a magnifying glass icon.

Object Type	File Name	Object Name	Description	User Name	Activity	Status	Timestamp
User		ASIDIQ		ASIDIQ	Update	Succeed	2021.09.19 22:51:12
User		ASIDIQ		ASIDIQ	Update	Succeed	2021.09.19 22:51:12
System Information		sap.fpa.services.cor...		ASIDIQ	Read	Succeed	2021.09.19 22:51:11
User		ASIDIQ		ASIDIQ	Login	Succeed	2021.09.19 22:51:10

Figure 3.21 Overview of Activities

3.3.2 Transport

The **Transport** menu options include various tools to export and import content like models, connections, or stories, as shown in [Figure 3.22](#). You have two options within SAP Analytics Cloud to transport content. Option 1 is to export the content to a local file and then upload it to another tenant. The second option is a cloud-based transfer to another tenant via *content network storage*, which is part of the content network described in [Section 3.3.6](#).

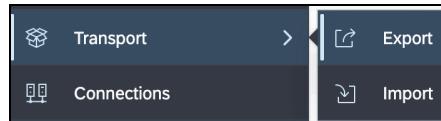


Figure 3.22 Transport Menu

The option to transfer data via a file system will be deprecated in the future, which is why SAP recommends that you primarily use the content network option. However, the export mechanism is very similar in both workflows.

- Exporting** Within the **Export** submenu, you can choose between two options: **Content Network Storage** and **File System**. The **File System** option contains a list of all previously created export jobs and enables you to create new exports, as shown in [Figure 3.23](#). In general, you always must create an *export job* to transport content. Each job has a name and carries the definition of the transported content. In this way, you can later track all exports and their contents and when they were processed. Export jobs also can be triggered again.

Content Network Storage					
File System					
Name	Status	Target	Start time:	Finish time:	
<input type="checkbox"/> EXPORT_CX_CONNECTION	<input checked="" type="checkbox"/> Success	Local	2021.06.03 11:04:31	2021.06.03 11:04:37	
<input type="checkbox"/> EXPORT_COMMERCE	<input checked="" type="checkbox"/> Success	Local	2021.06.03 11:03:36	2021.06.03 11:03:42	
<input type="checkbox"/> EXPORT_TK_BLOG	<input checked="" type="checkbox"/> Success	Local	2021.05.25 08:26:12	2021.05.25 08:26:15	

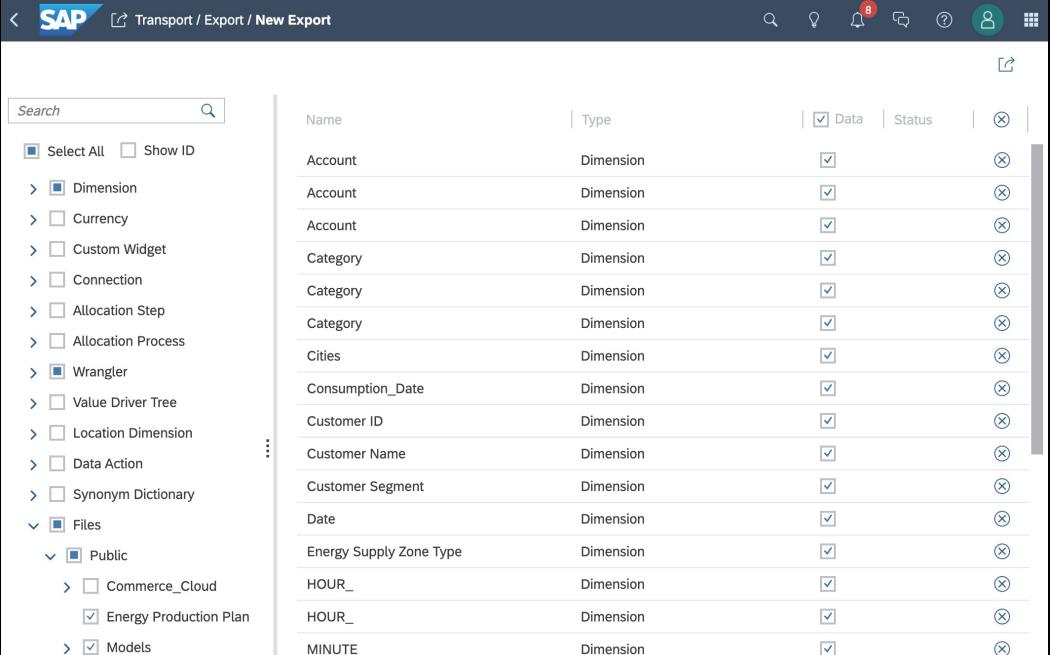
Figure 3.23 Overview of All Export Jobs

- Creating a new export job** Click on the **+** button in the top right to create a new export job. The object selection screen will open, where you'll specify the content that you want to export, as shown in [Figure 3.24](#).

Stories can be found under the **Files** section. In general, you can only export stories that are stored in the **Public** folder. When selecting a story, all dependencies (e.g., models) will be selected and exported as well. You can also

specify if the export should contain transactional data by checking the relevant box. If you don't export transactional data, only the model structure will be exported without its actual contents.

Figure 3.24 shows an example in which a story is selected to be exported. That story again retrieves data from data models, which are also selected and will be included in the export. After clicking on the **Export** button  in the top right, you'll have to provide a name for the export job. If desired, audit data can also be included in this step. *Audit data* denotes all data changes that were performed on a planning model.



The screenshot shows the SAP Analytics Cloud interface for 'Transport / Export / New Export'. On the left, there's a sidebar with a search bar and a tree view of objects. The tree view includes categories like Dimension, Currency, Custom Widget, Connection, Allocation Step, Allocation Process, Wrangler, Value Driver Tree, Location Dimension, Data Action, Synonym Dictionary, and a expanded 'Files' category containing 'Public' (Commerce_Cloud, Energy Production Plan) and 'Models'. On the right, a table lists objects with columns for Name, Type, Data (checkbox), and Status (checkbox). Most objects have the 'Data' checkbox checked. The table includes rows for Account (Dimension), Category (Dimension), Cities (Dimension), Consumption_Date (Dimension), Customer ID (Dimension), Customer Name (Dimension), Customer Segment (Dimension), Date (Dimension), Energy Supply Zone Type (Dimension), HOUR_ (Dimension), and MINUTE_ (Dimension).

Name	Type	Data	Status
Account	Dimension	<input checked="" type="checkbox"/>	
Account	Dimension	<input checked="" type="checkbox"/>	
Account	Dimension	<input checked="" type="checkbox"/>	
Category	Dimension	<input checked="" type="checkbox"/>	
Category	Dimension	<input checked="" type="checkbox"/>	
Category	Dimension	<input checked="" type="checkbox"/>	
Cities	Dimension	<input checked="" type="checkbox"/>	
Consumption_Date	Dimension	<input checked="" type="checkbox"/>	
Customer ID	Dimension	<input checked="" type="checkbox"/>	
Customer Name	Dimension	<input checked="" type="checkbox"/>	
Customer Segment	Dimension	<input checked="" type="checkbox"/>	
Date	Dimension	<input checked="" type="checkbox"/>	
Energy Supply Zone Type	Dimension	<input checked="" type="checkbox"/>	
HOUR_	Dimension	<input checked="" type="checkbox"/>	
HOUR_	Dimension	<input checked="" type="checkbox"/>	
MINUTE_	Dimension	<input checked="" type="checkbox"/>	

Figure 3.24 List of Objects after Selecting Story

Next, click on the **Export** button to trigger the export job. A progress bar will display the current status of the job. For each object, an indicator will show if the export was successful or not, as shown in Figure 3.25. After you successfully run the export job, the file will be automatically downloaded.

After you've downloaded the package, you can import this package into another instance of SAP Analytics Cloud. However, this step is only supported if the system into which you want to import the package carries the same release level or a revision that's one level higher. The revision of the system where the content was exported from must not be higher than the revision of the system where you want to import the content.

Importing

Name	Type	Data	Status
Account	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Account	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Account	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Category	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Category	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Category	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Cities	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Consumption_Date	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Customer ID	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Customer Name	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Customer Segment	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Date	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
Energy Supply Zone Type	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success
HOUR_	Dimension	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Success

Figure 3.25 Successful Export**Creating an import job**

To import data into SAP Analytics Cloud, you must access the **Transport** menu and open the **Import** submenu. This interface is quite similar to the export interface described earlier. Each import is also processed as an import job. To create a new import job, you must first upload the package into SAP Analytics Cloud via the **Upload** button . Then, click on the **+** button in the top right to create the import job itself. Select the file you just uploaded or any other package that had been uploaded previously. After successfully running through those steps, you can select which objects you want to import. After triggering the import job, a progress bar and a status bar will show you details about successful processes or about errors that occurred. When importing data into SAP Analytics Cloud, technical names and descriptions will be maintained as they were exported. If objects with the same names already exist, SAP Analytics Cloud will provide options to either skip those objects or replace them with the newly imported content.

Content network storage

Alternatively, you can use the content network storage option to export the content. The procedure is similar to the process for file system export. However, in this scenario, three major differences exist:

- You can export content that is outside of the **PUBLIC** folder. Thus, you can also export content that is only accessible to a restricted user group.
- You can define a target system that allows you to directly export your content to another system.
- The content will be hosted on SAP's servers and can't be downloaded to your computer.

Besides these points, the procedure is identical. Therefore, both options can be used to transfer content between systems.

3.3.3 System

The **System** menu provides access to the monitor, the administration interface, and information about your SAP Analytics Cloud instance, as shown in [Figure 3.26](#). This menu provides access to almost all of the administrative functionalities.

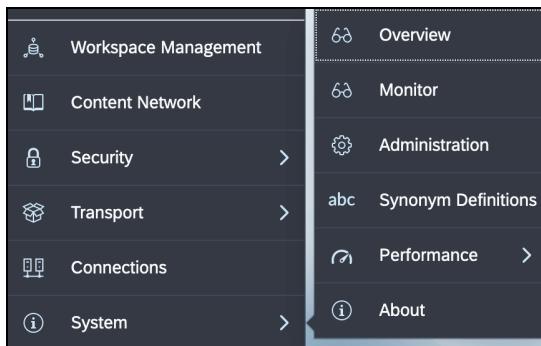


Figure 3.26 System Menu

Within the newly-introduced **Overview** option, you can access a prebuilt dashboard that offers a wide range of information about your SAP Analytics Cloud tenant and its usage. This dashboard is split into multiple categories including license usage, storage usage, performance, and various other metrics (see [Figure 3.27](#)).

Overview

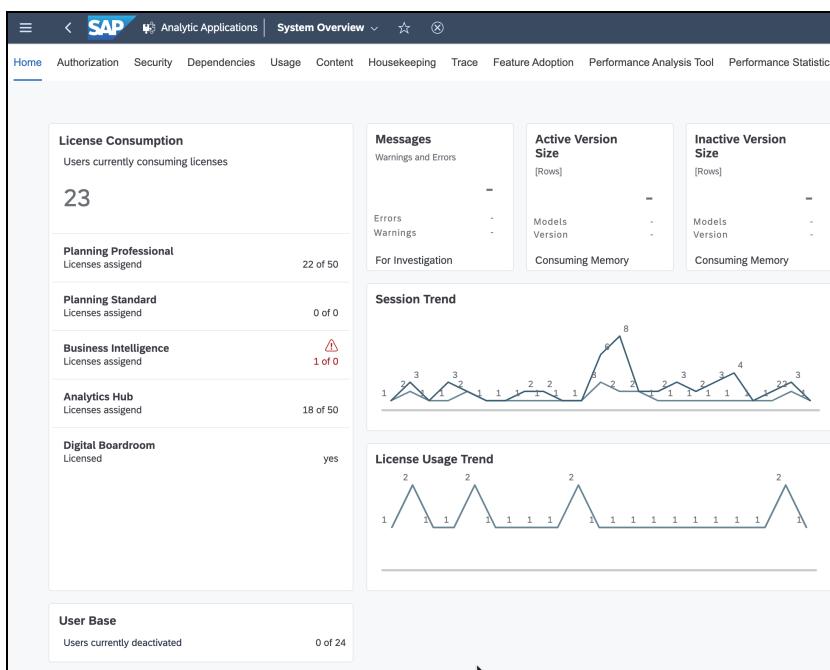


Figure 3.27 System Overview

The **Trace** tab contains a list of all errors that were encountered so far in SAP Analytics Cloud. These errors are described in detail and can be used to help SAP Support solve your issues.

The **Usage** tab shows the system usage for each user as well as storage consumption. Storage consumption can be viewed either by user or by data model.

- Monitor** The **Monitor** submenu contains the former system monitor, which allows you to access some relevant system information and track usage. Through the system monitor, you can see how your licenses are used and how many users are logged on, as shown in [Figure 3.28](#).

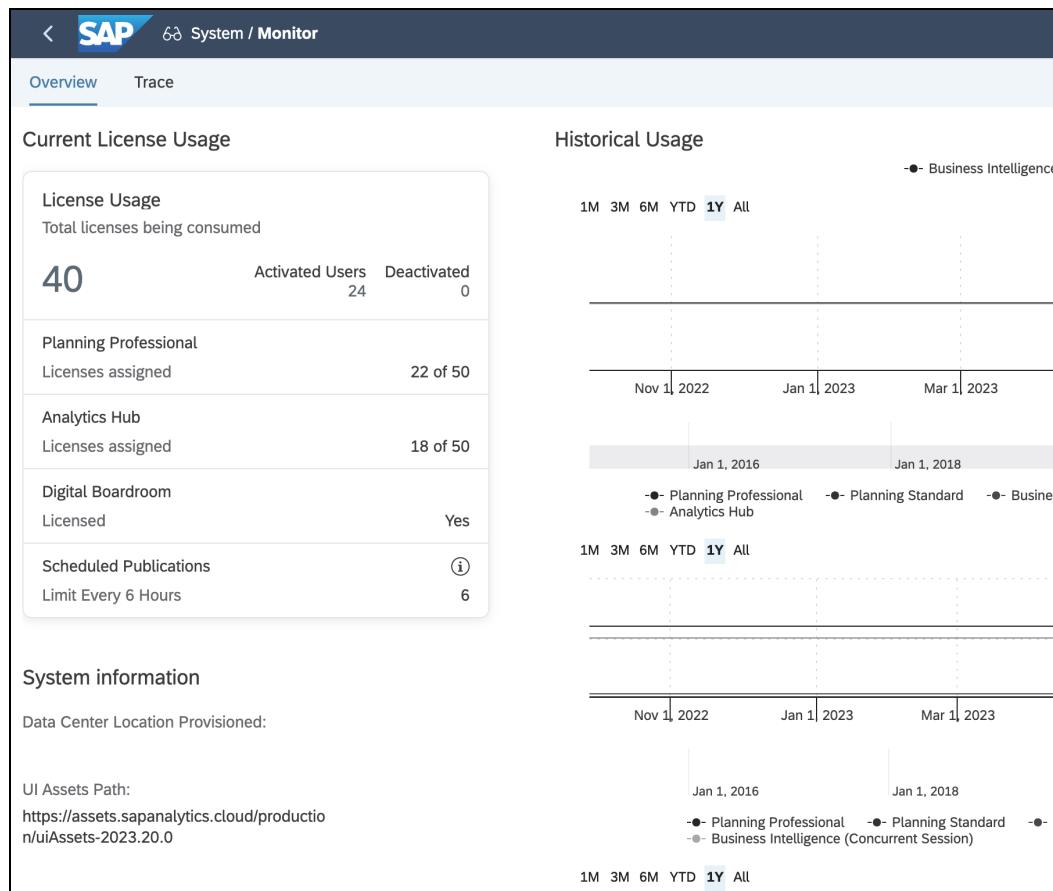


Figure 3.28 System Monitor

The monitor will be deprecated in the future. SAP recommends the usage of the **Overview** going forward.

3.3.4 Administration

The administration interface provides access to various tools to change system settings or perform additional configurations, as shown in [Figure 3.29](#). These options include changing individual settings parameters, establishing SSO, or connecting other services to SAP Analytics Cloud.

Name	Value
Content Namespace	t.Z
Enable Job for Export and Import	<input type="radio"/> OFF
Remove Story URL from Appendix	<input type="radio"/> OFF
Package size for export	50000
Allow sharing of Content Network packages with OEMs	<input type="radio"/> OFF
Allow Discussion Deletion	<input checked="" type="radio"/> ON
Commenting in embedded mode	<input type="radio"/> OFF
Allow Schedule Publication for non-SAC users	<input checked="" type="radio"/> ON
Allow Schedule Publication	<input checked="" type="radio"/> ON
Allow Publication Bursting <small>①</small>	<input type="radio"/> OFF
Maximum number of concurrent publications <small>①</small>	
Display Actual Dates of Calendar Events <small>①</small>	<input checked="" type="radio"/> ON
Trace Level	Error
Default Application <small>①</small>	SAP Analytics Cloud
Ask for Permission when Uploading Personal Data	<input type="radio"/> OFF

Figure 3.29 System Configuration

The **System Configuration** tab offers access to system settings that can be either turned on or off or in which you'll enter values. All settings are established for the whole system. To adjust these settings, click on the pencil icon  at the top right of your screen, which will make all cells available for editing. After adjusting their values, click on the **Save** button  to save these changes.

System configuration

The **Data Source Configuration** tab provides various workflows to connect some of the supported data sources to SAP Analytics Cloud. Under this tab, you can set up the Universal ID that will be used to log on to SAP Business

Data source configuration

Technology Platform (SAP BTP) to set up the cloud connector or integrate your Open Connectors account, as shown in [Figure 3.30](#). Under this tab, you can have the option for data in a live connection to still leave the network and be processed in SAP's landscape. This option is necessary for some functionality. In addition, on this screen, you can set up the SAP Analytics Cloud agent connection; connect to your on-premise instance of SAP HANA smart data integration; or create data repositories from live connections, which are needed for smart predict (as described in [Chapter 7, Section 7.3](#)).

The screenshot shows the SAP Analytics Cloud interface with the 'Data Source Configuration' tab selected. The main content area is divided into three sections:

- SAP Cloud Platform Open Connectors Account:** Describes connecting to third-party data sources via Open Connectors. It includes a blue button labeled 'Let's integrate your Open Connectors Account' and a link for users without an account.
- SAP BTP Core Account:** Describes connecting to on-premise data sources via the SAP Cloud Platform Cloud Connector. It includes a section for entering a Cloud Platform ID, a text input field, and a button labeled 'Add Cloud Platform User'. It also includes a note about using advanced features and a toggle switch for allowing live data to leave the network.
- Live Data Sources:** Describes the option to leave live data through SAP's network for processing. It includes a note about using advanced features and a toggle switch for allowing live data to leave the network.

Figure 3.30 Data Source Configuration Tab

Additional Information about System Configuration

Because you can activate many optimizations and adjust a lot of settings, administrators should carefully review this area. Administrators can turn on parallel access to live data sources or enable progressive chart rendering, for example. A list of all parameters and their functions can be found in the product help at <http://s-prs.co/v502616>.

If you want to import data from an on-premise data source, you must configure the SAP Analytics Cloud agent and enter the agent's details under

this tab. You must provide information in the **Host**, **Port**, **Username**, and **Password** fields. A detailed description of the cloud connector and the SAP Analytics Cloud agent can be found in [Chapter 2, Section 2.4](#).

The *SAP HANA smart data integration* service is required to allow live blending between on-premise live connections and data stored in the cloud. More information on blending can be found in [Chapter 5, Section 5.11.3](#).

The **Security** tab is the central interface to configure SSO and connect your own identity provider. This page offers a step-by-step approach that guides you through the setup steps, as shown in [Figure 3.31](#).

SAP HANA smart data integration

SSO

The screenshot shows the SAP Analytics Cloud Security configuration interface. The top navigation bar includes tabs for System Configuration, Data Source Configuration, **Security** (which is selected), External Systems, App Integration, Notifications, Default Appearance, and Catalog. Below the tabs, there are two main sections:

- Authentication Method:** Describes SAP Cloud Identity as the default method, with an option to switch to SAML Single Sign-On (SSO). A note indicates that only system owners can edit the SAML configuration.
- SAML Single Sign-On (SSO) Configuration:** Contains three steps:
 - Step 1: Download Service Provider metadata**: Metadata is required for trust setup; a link to view details and a download button are provided.
 - Step 2: Upload Identity Provider metadata**: Metadata from the identity provider is needed; a link to view details and an upload button are provided.
 - Step 3: Choose a user attribute to map to your identity provider**: SAP Analytics Cloud users are mapped using a shared attribute; a note says to choose an attribute type or skip.

Figure 3.31 Step-by-Step Guide to Set Up SSO

In general, you must first exchange the metadata of SAP Analytics Cloud and the identity provider. Then, you must choose which attribute you want to use to check a user's identity. SAP Analytics Cloud and the identity provider use the chosen attribute to verify a user's authenticity and whether the user is allowed to log on. In addition, you can also add URLs that are displayed to users so that they can change their passwords or manage their profiles.

Further information on SSO can be found in [Section 3.2](#). If you want to use the identity provider to authenticate against a live data source (e.g., SAP HANA or SAP BW), you should first consult [Chapter 2, Section 2.3](#).

- External Systems tab** The **External Systems** tab allow you to connect to additional services. Because SAP Analytics Cloud offers you the ability to use the programming language R (for more information, see [Chapter 7, Section 7.2.4](#)), SAP provides an R server by default. You can choose to allow R on live data models on the **External Systems** tab, which means that data will be processed through SAP servers, as shown in [Figure 3.32](#). However, no data will be stored on SAP servers.

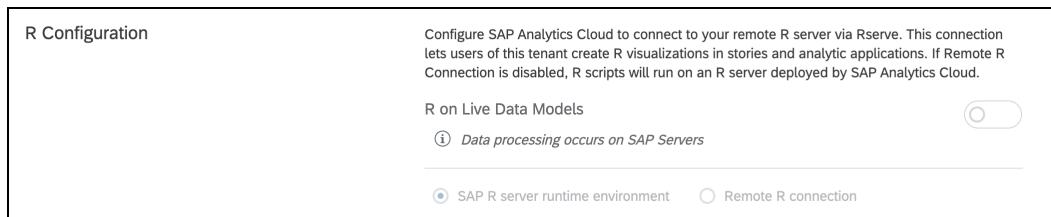


Figure 3.32 R Configuration

The R server can be extended by a vast number of packages, so SAP also allows you to connect your own R server. However, this R server must be accessible from the public internet.

- App Integration tab** SAP Analytics Cloud also offers access to some APIs, and the clients of these APIs need to authenticate themselves. Under the **App Integration** tab, an OAuth 2.0-compliant interface is provided to connect external clients. Those APIs can be used, for example, to manage users or content via external tools.

Additional Information about App Integration

More information about app integration and hints on how to use app integration services from SAP Analytics Cloud can be found in the product help at <http://s-prs.co/v502617>. Because APIs aren't needed to follow along with this book and because the use cases are very individual, we won't cover app integration in detail in this book.

- Notifications and appearance** The **Notifications** and **Appearance** tabs offer interfaces to add email recipients to receive important system information on updates or downtimes. You can also choose other themes for the SAP Analytics Cloud user interface and turn on or off default elements of the home screen for all users.

If you want to use the analytics catalog for SAP Analytics Cloud, you can activate this component under the **Catalog** tab. More information about using and setting up the analytics catalog will be provided in [Chapter 10, Section 10.3](#).

3.3.5 Files and Folder Structure

Although files and folder structures are not exclusive to administrators, we'll describe these settings in this section because administrators will also have to solve various tasks related to them. You can access the file structure by clicking on **Browse** in the main menu and selecting the **Files** entry, as shown in [Figure 3.33](#).

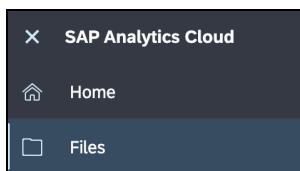


Figure 3.33 Accessing Files

The **My Files** overview is the central catalog for stories, models, board-rooms, and other objects. This screen is similar to a typical file structure of an operating system and provides various functionalities to manage the visibility of its content. As shown in [Figure 3.34](#), folders, stories, and other elements are shown in a list and feature symbols to facilitate differentiating them from each other. The **Public** and **Samples** folders are included by default.

Files

All files	Name	Description	Type	Owner	Created On
Views	Input Forms	Input Forms	Folder	–	Dec 3, 2019 13:23
Owned by Me	Public	Public	Folder	–	Dec 3, 2019 13:23
Shared with Me	Samples	Samples	Folder	–	Dec 3, 2019 13:23

Figure 3.34 Files Repository

Folders Interacting with the folder structure is quite similar to interacting with any other typical file browser. Clicking on a folder or object will open it. Clicking on a column title (e.g., **Name**, **Description**) will sort all entries by that column in either ascending or descending order.

Actions The action bar at the top of the file list provides access to various actions, shown in [Figure 3.35](#), such as the following:

- By clicking on the **+** button ①, you can create new stories, applications, boardrooms, models, and other objects. Each object is covered in detail throughout this book.
- Clicking on the **Folder** button ② will create a new folder. That folder will be created as a subfolder of the current folder. The button also provides access to copy and move capabilities for manipulating folders.
- If you select a file or a folder, you can rename it by clicking on the **Edit** button ③. If available, you can also change the description for that object.
- To share an object with other users or change existing permissions, click the **Share** button ④.
- The **Copy** button ⑤ copies the current object.
- To delete an object, click on the **Delete** button ⑥.
- To change the owner of an object, click on the **Change Owner** button ⑦.
- The **Upload** button ⑩ allows you to upload new data into the folder structure. If you want to import data from a CSV or Excel file, choose the **Draft Data** button ⑧ after uploading the file.
- The other buttons let you **Refresh** the view ⑨, **Hide or Show Columns** ⑪, or **Filter** ⑫ the view by object types.



Figure 3.35 Action Bar in Files

Sharing objects Important tasks for administrators include defining concepts for the folder structure and managing sharing and permissions. When creating teams, you can also automatically create folders for them. In addition, you can define individual sharing settings for each object or folder.

To see all folders in SAP Analytics Cloud, click on the **System** entry under **Views**, as shown in [Figure 3.36](#).

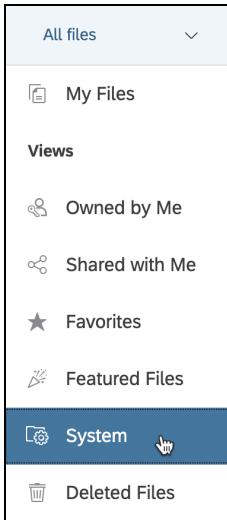


Figure 3.36 Accessing the System View

To share an object, follow these steps:

1. Select the folder or object (e.g., a story) you want to share with other users. Then, click on the **Share** button, shown in [Figure 3.35 at ④](#), to open the **Share Folder** dialog box, where you'll define who should be able to access the content by either specifying individual users or teams. You can also specify what access rights they should receive, if subfolders and files should be included, and whether you want to send an email to those users, as shown in [Figure 3.37](#).

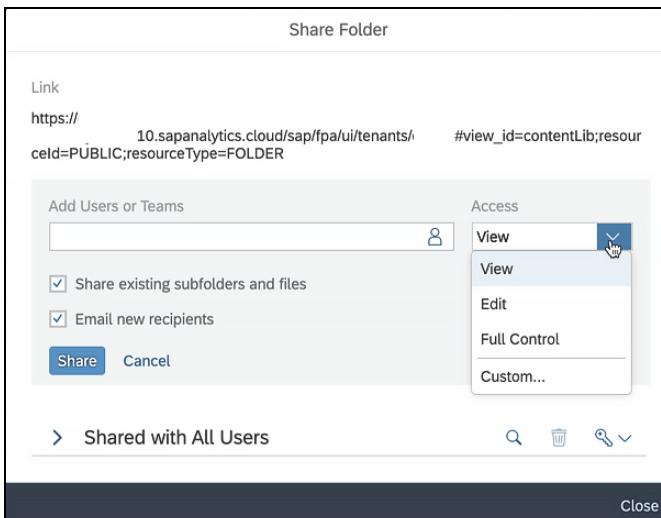


Figure 3.37 Sharing Folders

2. Depending on the object, you may see a URL that can be used to access the object directly. However, users still need access permissions, so simply having the URL is not enough. More information on sharing a story can be found in [Chapter 5, Section 5.10](#).

3.3.6 Content Network

Another important place for administrators is the content network, which can be accessed from the main menu and selecting **Browse • Content Network**, as shown in [Figure 3.38](#).

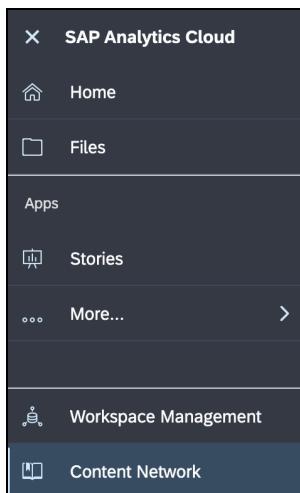


Figure 3.38 Accessing the Content Network

The content network combines two tools:

- **Package transportation**

With this tool, you can export content from your system and store this content on SAP servers so that other SAP Analytics Cloud instances can retrieve it. You can also access content packages that were exported in the past or content that was shared by other tenants. The procedure for using this tool is similar to the process described in [Section 3.3.2](#).

- **Business content and samples**

SAP and partners offer a broad portfolio of ready-to-use business content, as shown in [Figure 3.39](#), which can contain data models, connections, stories, or boardrooms. The content can be imported directly from this tool and used with your own data.

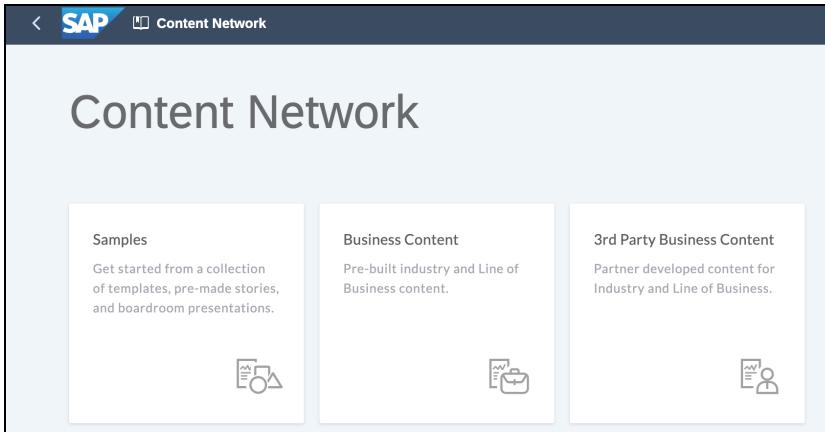


Figure 3.39 Content Network

3.3.7 Workspace Management

SAP recently introduced a new concept to segregate content in SAP Analytics Cloud called *workspaces*. The idea behind this concept is to provide business units or teams an environment in which they can operate freely and take over more responsibilities in content ownership and management. All workspaces can be viewed by clicking on the **Workspace Management** entry in the main menu, as shown in [Figure 3.40](#).

Workspaces

Figure 3.40 Workspace Overview

Right now, workspaces allow you to restrict content sharing to the boundaries of the space itself. Within a workspace, teams can be assigned, and workspace administrators can be designated, as shown in [Figure 3.41](#). These settings allow you to equip business units with their own working environments and help them control the visibility of their own content.

The screenshot shows the 'Sales NA' workspace management interface. At the top, there are tabs for 'Overview', 'Teams', and 'Workspace Admins'. The 'Overview' tab is selected.

General Settings:

- Name: Sales NA
- Description: Workspace for Sales members in North America

Teams:

Assigned Teams:

<input type="checkbox"/>	Team Name	Team Members
No teams added.		

Workspace Admins:

Assigned Admins:

<input type="checkbox"/>	Member Name
No users added.	

Figure 3.41 Managing a Workspace

Since workspaces have only recently been introduced into SAP Analytics Cloud, we expect that this feature will be extended by SAP in the near future.

3.4 Creating Connections

Connection overview Another action that's usually performed by administrators or power users is the creation of connections to data sources. This task can be performed via the **Connection** entry in the main menu, as shown earlier in [Figure 3.26](#).

The **Connections** interface, shown in [Figure 3.42](#), shows all centrally created data source connections, as well as additional connections that can be used, for example, to export stories to Google Slides or to transfer predictive models to other predictive analytics software.

To create a new connection, you may need to perform some additional configuration steps up front and decide how you want to connect to your data sources. Detailed explanations and decision support can be found in [Chapter 2](#).

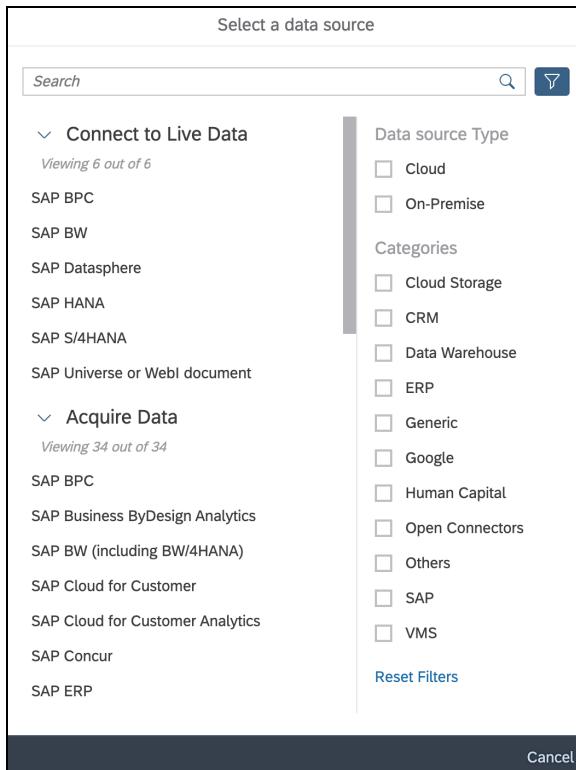
	Name	Type
<input type="checkbox"/>	B4H B4H Live Connection	BW — DIRECT Live Data
<input type="checkbox"/>	BIX BIX	BW — DIRECT Live Data

Figure 3.42 Connections Overview

To create a new connection, first click on the plus icon + in the top right of your screen. Then, you'll see a list of available data sources, as shown in [Figure 3.43](#). Now, specify if you want to use a live connection or an import connection. After you select a data source, another dialog box will open where you'll fill out the necessary information for connecting to the data source.

Creating a new connection

After you select a data source, another dialog box will open where you'll fill out the necessary information for connecting to the data source.

**Figure 3.43** Selecting a Data Source

SAP BW connections The example shown in [Figure 3.44](#) involves a live connection to an SAP BW system. The **Direct** connection type will be automatically preselected, and thus, you only need to fill out the **Name**, **Description** (optional), **Host**, **HTTPS Port** (the standard port is 443), and **Client** fields. Be aware that many SAP BW systems are configured to use a different HTTPS port than the default.

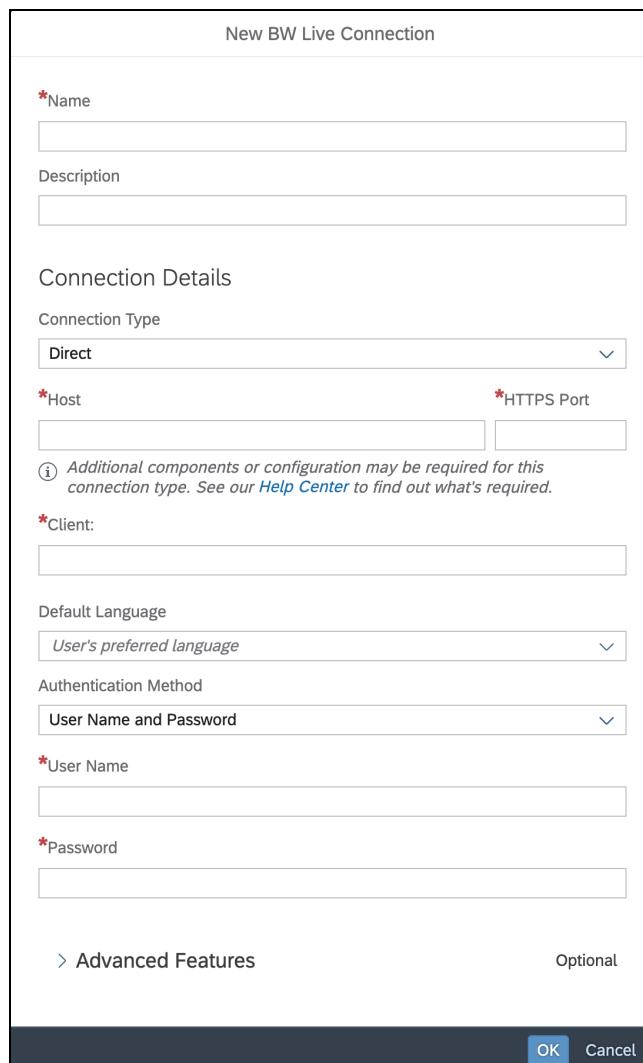


Figure 3.44 Creating a Live Connection to an SAP BW System

By default, the **Default Language** field is filled with **User's preferred language** so that each user can decide the language in which the data is retrieved from the data source. For the **Authentication Method**, you can choose **None**, **User Name and Password**, or **SAML Single Sign On**. Depending on your selection, you may need to fill in a user name and password. When

you connect to a live data source, this information will not be persisted and is instead only used once to test the connection. If other users want to use this connection later, users must provide their own credentials to authenticate against the data source.

Within the **Advanced Features** area of the connection, the SAP BW connection can be made available for scheduling and access through SAP Support (see Figure 3.45). In this scenario, data has to be processed through SAP servers, but it allows you to create reports automatically on a scheduled basis.

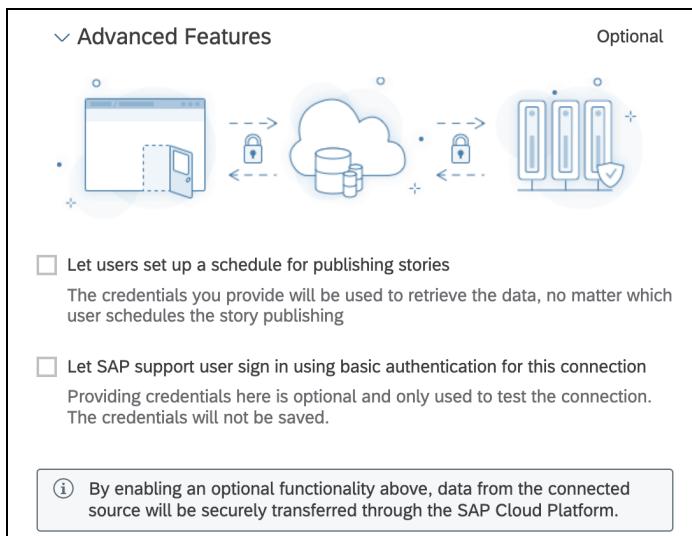


Figure 3.45 Advanced Features of an SAP BW Live Connection

When setting up an import connection, however, you have the option to persist the user name and password and have it automatically shared once you share the connection (see [Chapter 2, Section 2.2](#)).

Credentials for import connections

Live connections don't have to be shared since they are visible to every user by default. When importing data, SAP Analytics Cloud will use the provided credentials to import all data. You can then set permissions on the imported data in the model. The model creation process is described in detail in [Chapter 4](#).

3.5 Summary

In general, SAP Analytics Cloud is marketed as an intuitive and easy-to-use solution that provides users a jumpstart into reporting. Nevertheless, preparation may need to be performed up front and planned out in detail. Before using SAP Analytics Cloud productively, administrators should

think of an operational concept first. Depending on the size of the planned landscape, additional effort may be necessary. Therefore, you should discuss the questions listed in [Section 3.2](#) carefully. All tools for configuring and setting up SAP Analytics Cloud are described in detail in [Section 3.3](#). You should also make sure to create connections that will be used by a broad number of users.

Now that you've finished setting up SAP Analytics Cloud, you're ready to upload some data into the system. In the next chapter, you'll learn about various model types and create your own data model.

Chapter 4

Data Modeling

A well-defined data model is the core of a good analysis. Creating a data model is often a time-consuming task. Nevertheless, a well-prepared data model can help you avoid making incorrect interpretations of data, avoid quality issues, and lower barriers to entry.

Surprisingly, many statistical concepts can be applied directly to real-life situations. For example, according to the *Pareto principle*, established by Vilfredo Pareto, 80% of a desired goal can be achieved by investing 20% of the overall effort. However, to also fulfill the other 20% of the goal, the other 80% of the effort must also be invested. Although this principle can't be scientifically proven, it accurately describes the effort required in data modeling processes.

While data collection and acquisition are usually done quickly (which amounts to approximately 80% of the data model), the actual work lies in removing quality issues and cleaning the data (which amounts to approximately 80% of the overall effort). However, as reliable insights require high-quality data, this goal cannot be ignored.

In this chapter, we'll discuss data modeling in SAP Analytics Cloud in detail. After introducing you to the available data model types, we'll show you how to create a data model step by step with an example.

Demo Data Availability

To demonstrate the steps for creating a data model in this chapter, we'll use a demo dataset that you can download at the publisher's website for this book, at <https://www.sap-press.com/5753>. Look for the package to download after clicking on **Product Supplements** at the bottom of the page. If you purchased the e-book version of this book, the demo dataset can also be found in your SAP PRESS library. Information about the version of SAP Analytics Cloud used in this book and supported browsers can be found in the introduction of this book.

4.1 Why Use Data Models?

Data and information Although nothing reflects the truth better than data, understanding your data is difficult without the proper semantics. Also, since data points are specific, they often just show a small part of the big picture. Therefore, you may need to get datasets from multiple sources and relate them to each other.

In general, data will need to be enriched by information to actually become knowledge, as shown in [Figure 4.1](#). This enrichment is a key idea of a data model, which can equip data with semantics so that the data can be analyzed.

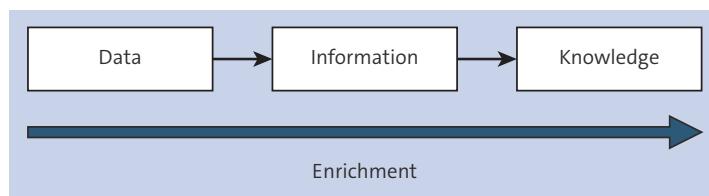


Figure 4.1 From Data to Knowledge

SAP Analytics Cloud follows this principle and offers multiple options for enriching data with information or with semantics so that your data can be used for analysis and visualization.

Data models The foundation for this capability is the *data model*. In SAP Analytics Cloud, a data model can represent all kinds of data, independent of whether the data is imported, retrieved from a live connection, or uploaded as a flat file. In the case of a live connection, the data model is only stored partially in SAP Analytics Cloud because of the connection design. When connecting to SAP Business Warehouse (SAP BW), for example, the data model itself must already be defined in the data source (SAP BW), and SAP Analytics Cloud or the user simply consumes the data. This approach is also valid for other live data sources. Although SAP Analytics Cloud allows you to define additional semantics on top of live data, you can't change the data or the model completely. When importing data into SAP Analytics Cloud, all modeling activities are performed in the solution.

Models

For simplicity's sake, we'll refer to data models simply as models from now on. Both terms are synonymous in this case.

Model types SAP Analytics Cloud supports various model types that can be used for different scenarios. Some model types offer more flexibility but require more

information and data. Others are only available with specific licenses. This limitation applies to planning models, for example, which require a dedicated license to create them. We'll describe model types in detail in [Section 4.2](#).

When creating stories and applications or exploring data, users in SAP Analytics Cloud generally interact with models. These models can be created either up front or, depending on the data source, during the creation of a new story. In general, the model carries multiple pieces of information. Besides transactional and master data, a model also contains information about the data sources and potential scheduling jobs, as shown in [Figure 4.2](#). The *semantics* of a model can be used to give your data meaningful descriptions and interpretations.

Imported data model

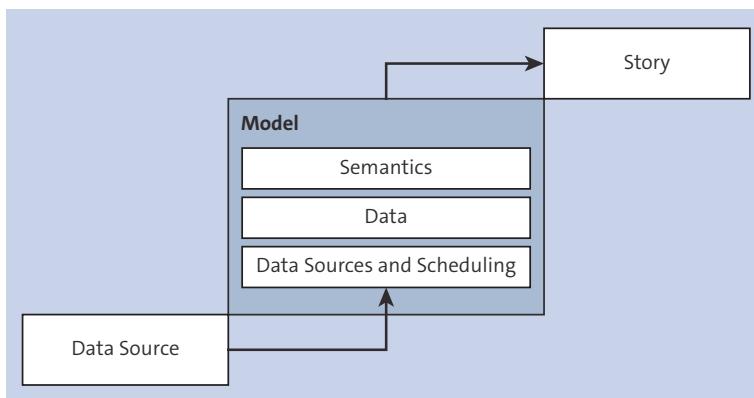


Figure 4.2 Simple Version of Model for Import Connection

After successfully uploading or importing data into SAP Analytics Cloud, the data wrangling process will be initiated. During this process, data can be manipulated, and quality issues can be resolved. Users can use multiple transformations to run various operations on the data. The data wrangling process can be launched again later but should be used initially to define a model structure. More information on data wrangling is presented in [Section 4.3](#).

Data wrangling

Semantics play an important role in data modeling by determining if a column represents a measure or a dimension. In addition, semantics also define additional elements, like date columns or hierarchical relationships between individual columns. Semantics are therefore essential to data models.

Semantics

Models can be configured to automatically refresh their data from the data source, which is also called *scheduling*. This feature, however, is only supported for import connections and a selection of data sources. More information on this topic can be found in [Chapter 2, Section 2.2.2](#).

Scheduling

Ultimately, the model acts as the data source in a story or a report. The architecture shown in [Figure 4.2](#) is valid for imported data mainly. In general, SAP Analytics Cloud understands already defined semantics in data sources but allows users to adjust semantics during the upload process. Models can also be exported again.

Models for live connections When using a live connection, a data model is still needed but doesn't play such a big role. The model is still the layer between a story and a data source and allows for minor adjustments or enhancements.

Additional semantics To better understand what's meant by additional semantics, as shown in [Figure 4.3](#), let's look at an example. When using a live connection to an SAP BW system, only SAP BW queries are accessed.

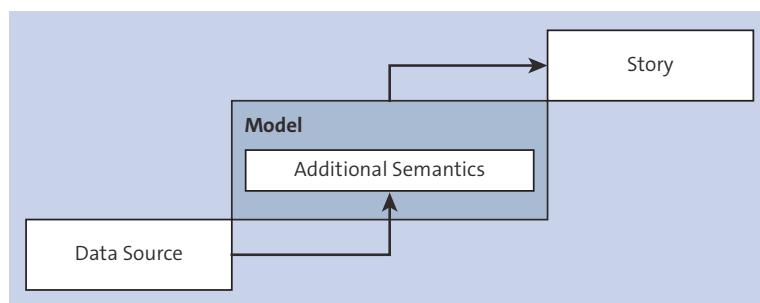


Figure 4.3 Simple Version of Model for Live Connection

These queries already expose modeled data. Queries can contain data from multiple sources, and they already contain information about measures and dimensions. Sometimes, they even expose a default layout or complex calculations. You still must create a model in SAP Analytics Cloud to build a story, but this model only contains information about the SAP BW query (query name, system, list of dimensions and measures) and no transactional data. The model creator can still define additional semantics on top of the model, like hidden or renamed dimensions. In a story, you can also create calculations on top of an SAP BW query.

Flexibility Neither the data itself nor the SAP BW query definition can be modified in the model anymore. Thus, the model is only able to enrich the existing data source. The reason for this limitation lies behind the architecture of the live connection. Because the browser directly accesses the data source, at no point in time does SAP Analytics Cloud have access to the transactional data. Therefore, no ability exists for manipulating the data in the cloud. More information about these technical limitations can be found in [Chapter 2, Section 2.2.1](#).

Other live data sources Although our example uses an SAP BW connection, these considerations apply to other live data sources as well. Only in the case of connecting a live

source to an SAP BusinessObjects universe is the model creator presented with a dialog box for selecting the dimensions and measures from the universe to be exposed in the model. We'll describe all the available model types, and you'll learn how to differentiate among them in following chapters, in addition to learning how to create and use those models.

4.2 Types of Data Models

SAP Analytics Cloud offers various types of data models, which we'll describe in this section. As mentioned earlier in this chapter, not every model type is available for every license. In [Section 4.3](#) and [Section 4.4](#), we'll explore some examples of creating various kinds of models. You'll learn how to create a dataset in [Section 4.2.1](#). We'll show you how to use datasets, which are required to create predictive scenarios, in [Chapter 7, Section 7.3](#).

In general, SAP Analytics Cloud differentiates among *analytical models*, *planning models*, and *datasets*. Every model type has specific characteristics that determine for which activity the model is used. In addition, with embedded models, the model is part of a story and belongs to it. The creation of embedded models is described in detail in [Chapter 5, Section 5.11.1](#).

4.2.1 Datasets

Datasets represent simple tables in SAP Analytics Cloud and allow no additional semantics. These tables can be either uploaded as flat files, created via an import connection from various data sources, or from SAP HANA live connections. All datasets are stored as objects in the folder structure.

Sample Files for This Section

To demonstrate the creation of the dataset, we'll use the *Dataset.xlsx* file, which is part of the demo data package download for this book found at www.sap-press.com/5753.

Datasets can be created in one of the following ways:

Starting points

- From the main menu, select **Datasets • Create New**, as shown in [Figure 4.4](#).
- When browsing through the folder structure, click on the plus icon + in the action bar at the top. Then, you can choose to create a new dataset. More information on this topic can be found in [Chapter 3, Section 3.3.5](#).

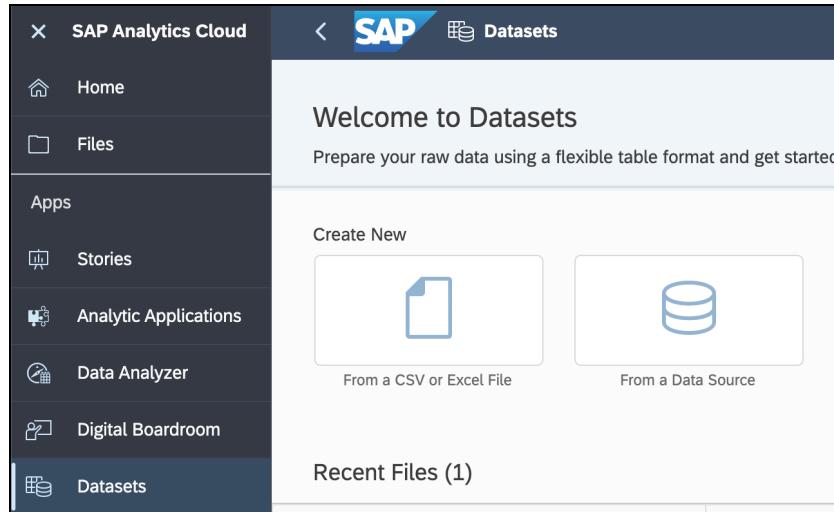


Figure 4.4 Creating New Datasets

Select data source After navigating to the **Datasets** menu, you'll be prompted to select a data source. Click on **From a CSV or Excel File** to upload a flat file. Alternatively, you can import a dataset from an SAP S/4HANA system, create a live connection to SAP HANA, or acquire data from numerous other supported data sources.

In the next step, you'll choose the location of the file on your computer. Click on the **Select Source File** button, as shown in [Figure 4.5](#). Now, the file selection dialog box for your operating system will open. Choose the *Dataset.xlsx* file, which is part of the demo data package.

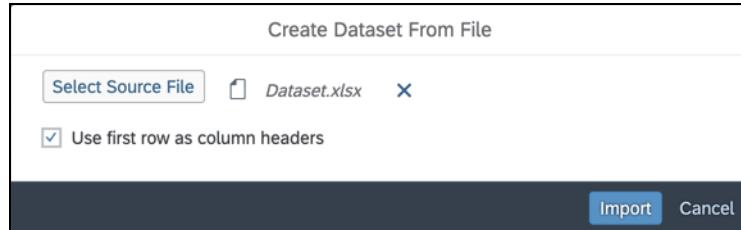


Figure 4.5 Selecting Files to Upload

If not done automatically, make sure the **Use first row as column headers** checkbox has been selected. This step ensures that the first row of the flat file is correctly used for the labeling of each column.

Saving datasets After clicking the **Import** button, provide a name and location for the dataset. For our example, let's save this dataset directly into your personal folder and call it "Sales Data," as shown in [Figure 4.6](#).

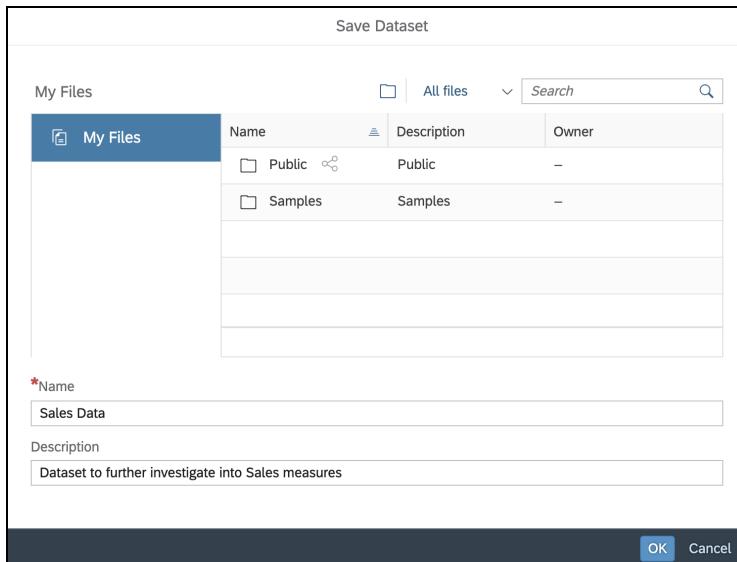


Figure 4.6 Determining Locations for Datasets

After successful upload, the folder will be opened and displayed. Click on the dataset to open it, and you'll see its contents again, as shown in [Figure 4.7](#).

The screenshot shows the SAP Datasets interface. On the left, there is a table titled 'Create Transform' with columns 'Date', 'City', and 'Revenue'. The table contains 21 rows of data. On the right, there is a 'Dataset Overview' panel. It shows 'Sales Data' with '1092 rows' and '3 columns'. Under 'Measures (1)', there is a row for 'Revenue' with a 'SUM' aggregation. Under 'Dimensions (2)', there are dimensions for 'Date' and 'City'.

	Date	City	Revenue
1	2023-01-01	Agoura Hills	6825
2	2023-01-01	Alameda	2730
3	2023-01-01	Anaheim	6951
4	2023-01-01	Bakersfield	6552
5	2023-01-01	Belmont	3738
6	2023-01-01	Buellton	2688
7	2023-01-01	Buena Park	2730
8	2023-01-01	Burbank	3738
9	2023-01-01	Calimesa	3738
10	2023-01-01	Campbell	9534
11	2023-01-01	Cerritos	3738
12	2023-01-01	Chatsworth	2730
13	2023-01-01	Chino	7476
14	2023-01-01	Cloverdale	5796
15	2023-01-01	Concord	6825
16	2023-01-01	Covina	5796
17	2023-01-01	Culver City	7476
18	2023-01-01	Cupertino	7791
19	2023-01-01	El Cajon	3087
20	2023-01-01	El Monte	3486
21	2023-01-01	El Segundo	3612

Figure 4.7 Dataset Preview

If you've chosen to import a dataset from a data source instead of uploading a flat file, the process is similar. Instead of selecting a file on your computer, you must first connect to the data source. Then, you can select from among the available data providers. Within a data provider, either drag and drop or click on items to select specific dimensions and measures, which will be then imported as a dataset.

Datasets are needed to run predictive scenarios, which are presented in detail in [Chapter 7](#).

4.2.2 Analytical Models

While datasets solely represent tables and allow no additional semantics, models can be more complex. A model represents data and enriches it with additional information—like hierarchies, for example. A model also allows the definition of additional measures or groupings of dimension members. As long as you only want to analyze data without entering any planning data, an analytical model offers all necessary tools and functionalities.

Analytical model details Let's now look at analytical models in detail. In [Section 4.2.3](#), we'll present planning models, which extend analytical models with some capabilities. A special case is an analytical model based on a live connection, which is described in [Section 4.4](#).

Structure of analytical models In general, an analytical model follows a common structure. The model usually contains dimensions (including an **Account** dimension and optional **Date** dimension), data sources, and additional information about the model. Within the model, additional options like data access control over specific dimensions and performance optimizations can be activated.

[Figure 4.8](#) shows the individual components of an analytical model. In general, a model should be first filled with data. In the beginning, you can also start with *master data* only. Data can be, for example, acquired from a table that imported from a data source to SAP Analytics Cloud or uploaded as a flat file.

Data wrangling After the data import, you'll be presented with the optional data wrangling step. In this step, you can transform the data and ensure that dimensions and measures are identified correctly. The data will be then automatically split into master and transactional data. If you started with a blank model without uploading any file, you must create the master data first and then later upload the transactional data.

In addition, if supported by the data source, scheduling can be set up, which will automatically and regularly import data from the data sources below

the model. Scheduling can be activated for each combination of model and data source.

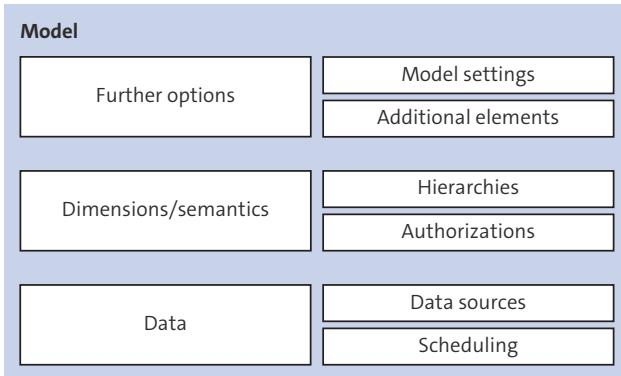


Figure 4.8 Detailed Model Structure, Based on Data Import

After successfully importing the data, it will be structured and saved in dimensions. These dimension structures follow the master data layout (such as IDs, descriptions, and hierarchies) and are referenced by transactional data when accessing the model. A dimension can be global or private. *Global dimensions* can be used across multiple models, whereas *private dimensions* are only available to the model in which they were created. Global dimensions should be used when their contents are relevant across multiple contexts. Some examples include dimensions for products, cost centers, or regions, which are usually maintained centrally and can be directly reused across multiple models.

Dimensions

Besides master data, dimensions can carry additional information, like hierarchies or authorizations. This info is maintained on the dimension level. Measures are structured in account dimensions (following the account-based model).

Model-wide settings also can be configured, including the following:

Model settings

- Currencies
- Performance optimizations
- Model privacy
- Data access control

We'll discuss each of these settings in detail in [Section 4.5.2](#).

An analytical model based on a live connection is a special case. Because live data sources usually aren't directly exposed to users, they're represented by models. As a result, the general model concept still applies in this case. The components of this special kind of model are shown in [Figure 4.9](#).

**Analytical models
for live connections**

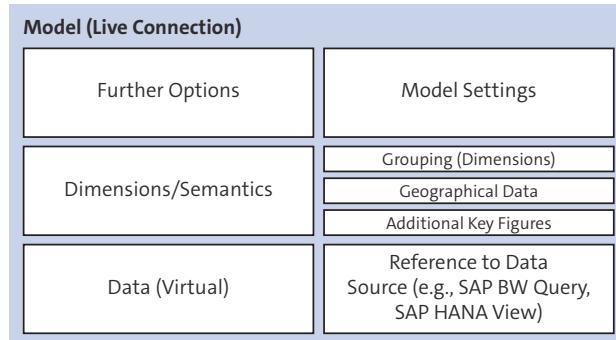


Figure 4.9 Detailed Model Structure, Based on Live Connections

- Metadata** In this scenario, the data is completely virtual. The model only points to the actual data source and simply carries information about its columns and measures. More information about this data, which is also called *metadata*, can be found in [Chapter 2, Section 2.2.1](#).
- Semantics** However, models based on live connections still allow you to define additional semantics. Depending on the data source, dimensions can be grouped, renamed, or hidden. If a data source supports geographical data, this aspect can be indicated in the model. In addition, some data sources support the creation of additional measures or calculations in the model via formulas.

4.2.3 Planning Models

The general structure of a planning model is rather similar to that of an analytical model. Therefore, not every element will be described in detail in this section. However, a planning model extends an analytical model by various functionalities that are necessary for planning activities later and to establish planning workflows.

- Additional configurations and functionality** Examples of additional functionalities in planning models include the following:
- Categories to map versions (e.g., budget, plan, forecast)
 - Preconfigured time dimensions, which can be adjusted to match the dates in your data
 - Audit functionality to track and trace model changes
 - Additional data authorization features to control data visibility

Also, only planning models allow users to enter data into them. Specifically, workflows enable users to enter new values or modify existing ones by editing existing versions (e.g., actual or forecast) or by the creation of new private versions that are later published. Planning models also support comments on specific data points, the allocation of values, and data entry

processes. Depending on your licenses, planning models may not be available to some or all of your users.

4.2.4 Embedded Models

An embedded model represents another special case. Similar to an analytical model, an embedded model is part of a story and can only be used within it.

An embedded model is predominantly used by users who want to analyze their data without creating a model that could be potentially used for other stories or use cases. In this case, a user can upload data into a story by uploading a flat file or with import connections. When this workflow is triggered directly from within a story, an embedded model is automatically created that is only accessible within this story.

Use case

Users can still perform data wrangling on these models. As long as the model isn't published explicitly, it's only visible and accessible within the story. To make the data model generally available for more stories, the model can be published, which will thus convert the embedded model into a full analytical model. Embedded models therefore can't be created outside of a story. The creation and usage of an embedded model is described in detail in [Chapter 5, Section 5.11.1](#).

4.3 Creating Models by Importing Data

In this section, we'll walk you through an example of creating a model based on imported data. The data source is a list of sales activities. We'll upload this file to SAP Analytics Cloud and generate a model from it. These steps are important and required to walk through the remaining chapters of this book, which rely on this data model.

Sample Data

The model creation process we describe in this section is based on sample data. The data used is contained in the *Sales Analysis.xlsx* file, included as part of the demo data package you can download from the website for this book at www.sap-press.com/5753.

The *Sales Analysis.xlsx* file contains data about articles that were sold in supermarkets across the state of California. We want to find out more about these activities, including how high our revenue was and how many products were sold in total.

Sample data

Table 4.1 shows an overview and description of all the columns found in the Excel file.

Column Name	Description
ID	Unique number to identify each record in the table
Date	Month of sale
Supermarket	Name of supermarket
Chain	Chain to which a supermarket belongs
Longitude	Geographical information
Latitude	Geographical information
Street	Street name
City	City name
Product	Product name
Product group	Product group to which a product belongs
Unit price	Measure
Quantity	Measure
Revenue	Measure
Version	Determines if the measure is an actual value (Actual) or forecasted value (Forecast)

Table 4.1 Description of Sales Analysis.xlsx File Contents

As shown in Table 4.1, some columns directly relate to each other. Others contain additional information like geographical information. In the following example, we'll upload this file to SAP Analytics Cloud and create a model based on it. This data will be analyzed and graphically reported on in Chapter 5. Knowledge of the home screen (as described in Chapter 3, Section 3.1) and the folder structure (as described in Chapter 3, Section 3.3.5) are prerequisites for Chapter 5.

4.3.1 Creating a Model

You have two options for creating a new model:

- When in the folder structure, click on the + button and choose the **Model** entry.
- Open the main menu of SAP Analytics Cloud and navigate to **Modeler**, as shown in Figure 4.10. There click on **Model**.

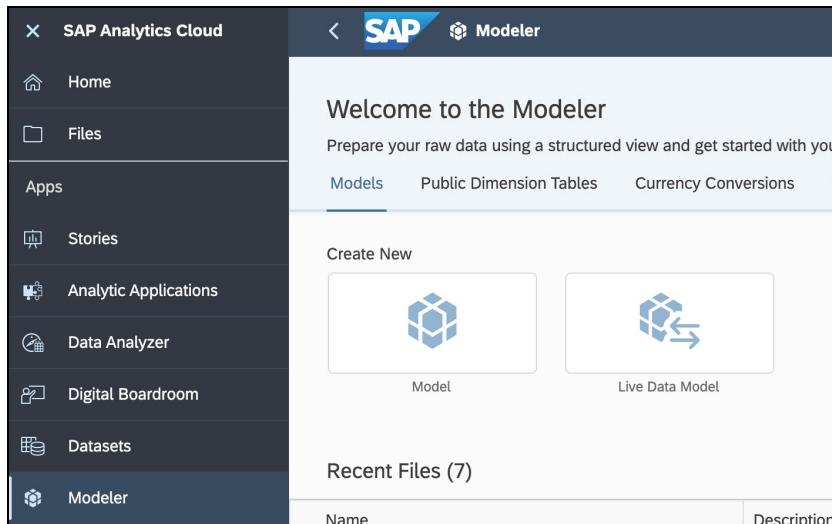


Figure 4.10 Creating New Models from Main Menu

Next, you'll be asked to select the model type. In this step, you can choose to create a blank model or start with data. For our example, we'll upload a flat file. Choose the **Start with Data** option (see [Figure 4.11](#)).

Starting with data

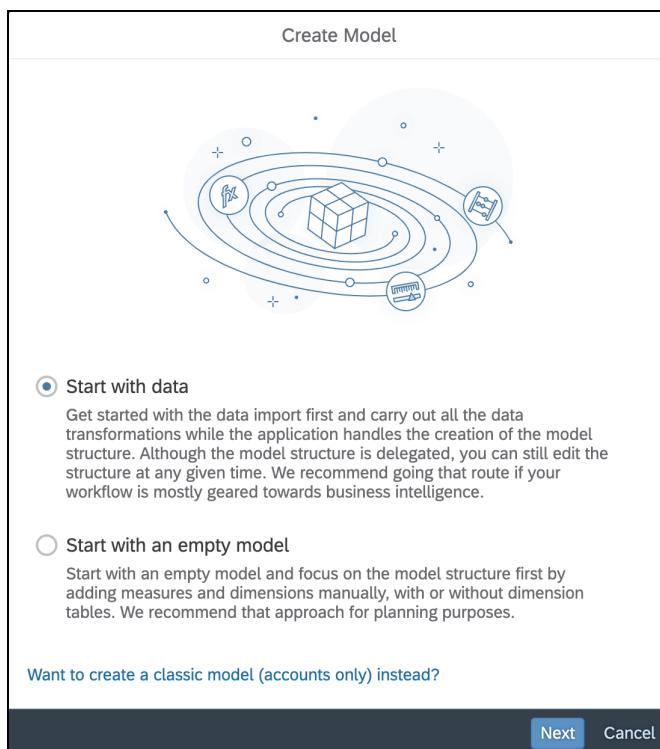


Figure 4.11 Model Creation

Now, select the **File (Local File or File Server)** option, click on **Select Source File** and select the *Sales Analysis.xlsx* file that you downloaded earlier, as shown in [Figure 4.12](#). Select the **Use first row as column headers** checkbox if this option was not activated automatically. This step ensures that the first row in the Excel file is not used as transactional data. To upload the file, click on the **Import** button.

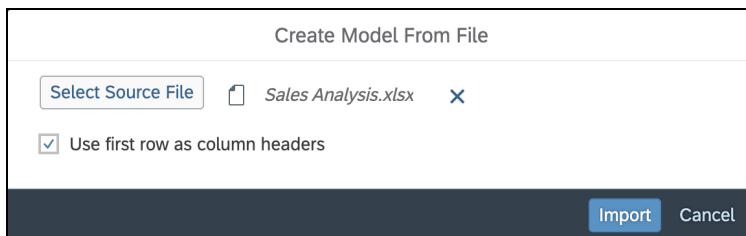


Figure 4.12 Selecting an Excel File

Creating a Blank Model

As an alternative to uploading a flat file, you can also create a blank model from scratch. In this workflow, you would first maintain master data before you upload transactional data. The steps for creating such a model is demonstrated for planning scenarios in [Chapter 6, Section 6.2](#).

- Draft data** The data will be now uploaded in the background. Do not close to your browser or navigate away from SAP Analytics Cloud, which would abort the upload process. Notifications throughout the whole upload process will inform you of the current status. After the file is uploaded successfully, you'll be automatically forwarded to the model overview into which the file has been uploaded as shown in [Figure 4.13](#).
- Saving models** Before we can fully edit the newly created model, we need to save it first. Therefore, click on the **Save** button in the top bar. Now, you must specify where the model should be stored. By default, you'll be presented with your own private folder. Click on the **New Folder** icon to create a new sub-folder and call it "Sales Data." Use the same name for the model and save it by clicking on **OK**, as shown in [Figure 4.14](#).
- Data wrangling** To continue with the model creation process, click on the **Transform Data** button in the bottom right. The system will inform you that you'll initially work only on a data sample, as shown in [Figure 4.15](#).

The screenshot shows the SAP Modeler interface with a model named "Sales Analysis". The left pane displays the "Model Structure" with sections for Measures and Dimensions. The Measures section lists Longitude, Latitude, Unit price, Revenue, and Quantity. The Dimensions section lists ID, Date, Supermarket, Chain, and Street. The right pane shows the "Model" details, including preferences (Planning Capabilities: off), data sources (none), and related objects (none). A data foundation table is also visible.

Figure 4.13 New Model after Successful File Upload

The screenshot shows the "Save Model" dialog box. It displays a list of files in the "My Files / Sales Data" folder. There are no files matching the specified filter type(s) in this folder. Below the list, there are fields for entering a name ("Sales Data"), description ("Optional"), and owner. At the bottom, there are "OK" and "Cancel" buttons.

Figure 4.14 Saving Models

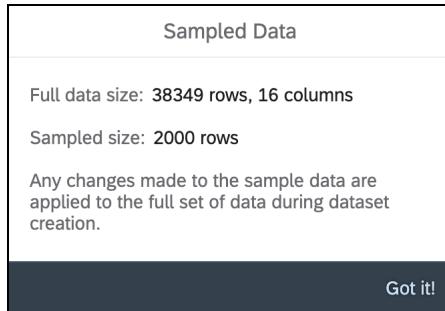


Figure 4.15 Data Sample Notification

Because the amount of data in the file is too high for previewing it completely in the browser, only 2,000 randomly selected records will be shown. However, all changes that you perform now will be applied to the full dataset.

The data wrangling area allows you to manipulate the data or to apply transformations by using formulas, as shown in [Figure 4.16](#).

	AA Version2	AA ID	AA Date	AA Supermar...	AA Ch
1	public.Actual	380	202301	Lion Mart	Lion
2	public.Actual	461	202301	Lion Mart	Lion
3	public.Actual	497	202301	Lion Mart	Lion
4	public.Actual	537	202301	Lion Mart	Lion
5	public.Actual	862	202301	Lion Mart	Lion
6	public.Actual	944	202301	Lion Mart	Lion
7	public.Actual	982	202301	Lion Mart	Lion
8	public.Actual	1043	202301	Lion Mart	Lion
9	public.Actual	1176	202301	Lion Mart	Lion
10	public.Actual	1187	202301	Lion Mart	Lion
11	public.Actual	1213	202301	Lion Mart	Lion
12	public.Actual	1230	202301	Lion Mart	Lion
13	public.Actual	1269	202301	Lion Mart	Lion
14	public.Actual	1301	202301	Lion Mart	Lion
15	public.Actual	1395	202301	Lion Mart	Lion
16	public.Actual	1473	202301	Lion Mart	Lion
17	public.Actual	1482	202301	Lion Mart	Lion
18	public.Actual	1497	202301	Lion Mart	Lion
19	public.Actual	1565	202301	Lion Mart	Lion
20	public.Actual	1576	202301	Lion Mart	Lion

Columns Overview

Sales Data 2000 rows
16 columns

Search

Columns (15)

- AA Version2
- AA ID
- AA Date
- AA Supermarket
- AA Chain
- AA Street
- AA City
- AA Product
- AA Product_Group
- AA Version
- 1:23 Longitude
- 1:23 Latitude
- 1:23 Unit_price
- 22 Quantity
- 1:23 Revenue

Figure 4.16 Data Wrangling Overview

The data wrangling screen is separated into multiple areas. At the top, you'll find the action bar, which provides access to all functions, as shown in [Figure 4.17](#), such as the following:

- The **Close Data Transformation** icon ① returns back to the model overview. The model won't be published, but the system will save its current state in data wrangling.
- The **Undo** ② and **Redo** ③ icons undo and redo the last change or action.
- The **Sorting** icon ④ can be used to determine the sorting order of the records.
- The **Transform** bar (shown in [Figure 4.16](#) below the action bar) can be made visible by clicking on the icon ⑤.
- The **Custom Expression Editor** icon ⑥ opens a dialog box to create a calculated column.



Figure 4.17 Action Bar of Data Wrangling Section

Let's now look at some examples to learn how to use these functionalities.

On the right, you'll see a sidebar where you can configure the model or **Sidebar** modify individual columns, as shown in [Figure 4.18](#).

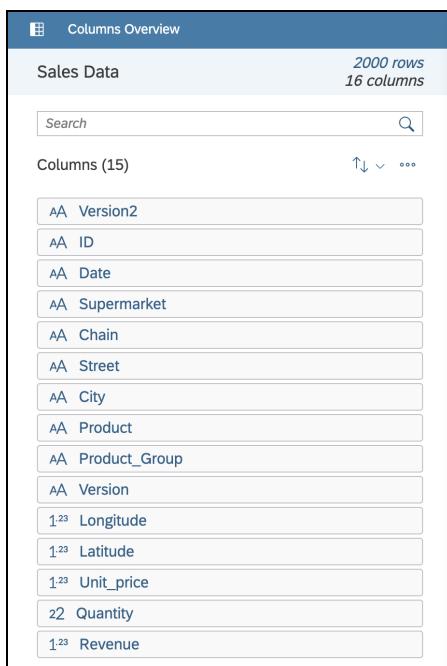


Figure 4.18 Sidebar

The sidebar initially shows general information and metrics about the uploaded flat file. The **Columns** section provides information about the recognized columns and their classification as texts or digits.

4.3.2 Creating Expressions

In our case, the columns in our data have been correctly recognized in general, but some relationships must be modeled manually. Also, you can provide additional information for some of these columns.

Start by selecting the **Date** column. The sidebar will automatically adjust itself, as shown in [Figure 4.19](#). You can use the sidebar to change the data type or get more information about data quality. The **Data Distribution** section shows you how the values of the column are distributed and therefore can provide you early insights into the data.

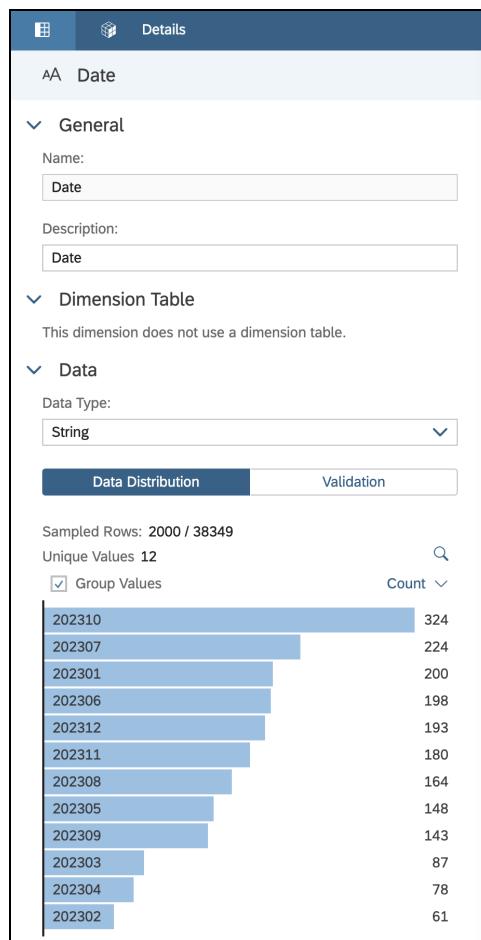
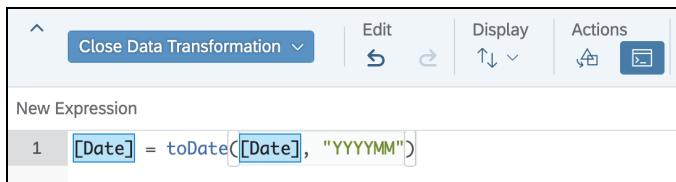


Figure 4.19 Sidebar of the Date Column

Because the **Date** column contains date information, we need to change its **Type** to **Date**. To create or modify a column, we can use expressions. In this case, SAP Analytics Cloud provides the `toDate()` function. This function can be used to convert a column into a date column by applying a specific format. In our case, the format **YYYYMM** needs to be applied.

Open the expression editor in the action bar and fill in the formula `[Date] = toDate([Date], "YYYYMM")` as shown in [Figure 4.20](#). While typing the formula, you will notice how the editor will support you with suggestions. Confirm the formula by pressing the `Enter` key on your keyboard.



[Figure 4.20](#) Creating an Expression

The columns **Longitude** and **Latitude** indicate that the model contains geographical information as coordinates. This info can be converted into a *geographical hierarchy* during data wrangling so that the data can be later shown on a map.

Geographical data

Again, we will make use of the expression functionality. Open the expression editor again and apply the `makeCoordinate()` function this time. The function can be used to convert latitudes and longitudes into geospatial data that can be consumed in SAP Analytics Cloud. Enter the formula `[Stores] = makeCoordinate([Latitude], [Longitude])` as shown in [Figure 4.21](#).



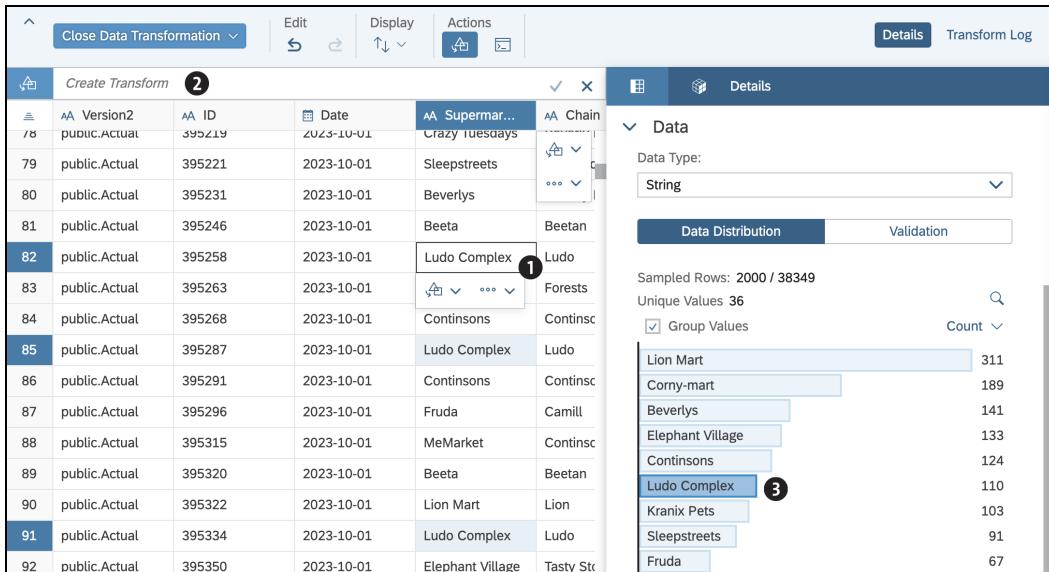
[Figure 4.21](#) Enriching Geographical Data

4.3.3 Executing Transformations

If you want to replace individual values, you can either click on the value or create a new transformation rule. In our example sales data, we now know that the supermarket brand Ludo Complex was renamed to Fresh Tasters. However, this name change isn't yet reflected in our dataset. Therefore, we want to fix this issue now in data wrangling.

Figure 4.22 shows multiple ways to replace the value, such as the following:

- Click on the value you want to replace in the table ① or in the sidebar ③. In the popup menu, click on the **Transform** icon  and select **Replace value with...** to assign a new value.
- By using the formula bar at the top ②, you can create a transformation manually.



The screenshot shows a data transformation interface. On the left is a table with columns: Version2, ID, Date, Supermarket, Chain, and others. A row in the table has the value "Ludo Complex" selected in the "Supermarket" column. A small circular icon with the number 1 is placed over this cell. On the right, there is a sidebar titled "Create Transform" with the number 2. It contains a "Data" section with a "String" dropdown and a "Data Distribution" tab showing a list of unique values and their counts. A search bar and a "Count" dropdown are also present. A circular icon with the number 3 is placed over the "Lion Mart" entry in the distribution list, which has a count of 311.

Figure 4.22 Replacing Values

Creating a transformation Now, we'll use the first method to create the transformation. After you click on the **Transform** icon , you'll see various proposals for replacements, as shown in Figure 4.23. Select **Replace value with....**

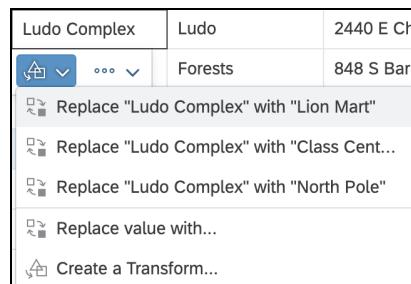
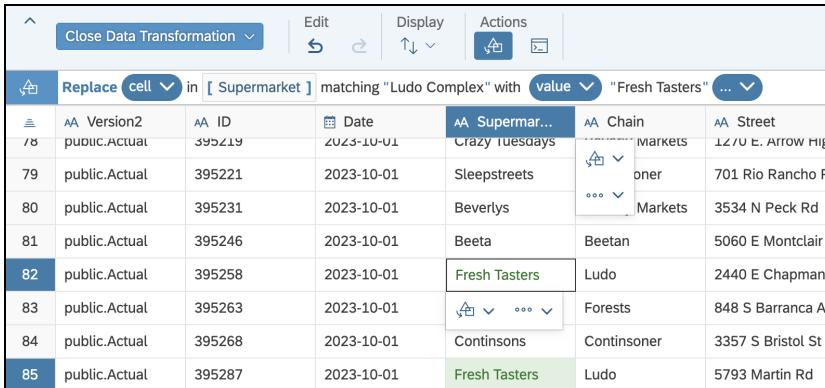


Figure 4.23 Creating Transformations

A formula that's already partially filled out will be shown in the formula bar. Enter the new supermarket name ("Fresh Tasters") in this formula, as shown in Figure 4.24. Press **Enter** for the transformation to be applied.



The screenshot shows a data transformation interface. At the top, there are buttons for 'Close Data Transformation', 'Edit', 'Display', and 'Actions'. A dropdown menu is open, showing 'Replace cell' selected. The formula bar indicates 'Replace cell in [Supermarket] matching "Ludo Complex" with value "Fresh Tasters"'. The main area displays a table with 8 rows. The first row has a 'Replace' button over the 'Supermarket' column. The last row also has a 'Replace' button over the 'Supermarket' column. The table includes columns for AA Version2, AA ID, Date, AA Supermar..., AA Chain, AA Street, and Markets.

	AA Version2 public.Actual	AA ID 395219	Date 2023-10-01	AA Supermar... Crazy Tuesdays	AA Chain Ludo	AA Street 1270 E. Arrow Hie
79	public.Actual	395221	2023-10-01	Sleepstreets	onner	701 Rio Rancho F
80	public.Actual	395231	2023-10-01	Beverlys	Markets	3534 N Peck Rd
81	public.Actual	395246	2023-10-01	Beeta	Beetan	5060 E Montclair
82	public.Actual	395258	2023-10-01	Fresh Tasters	Ludo	2440 E Chapman
83	public.Actual	395263	2023-10-01	Forest	Forests	848 S Barranca A
84	public.Actual	395268	2023-10-01	Continsons	Continsoner	3357 S Bristol St
85	public.Actual	395287	2023-10-01	Fresh Tasters	Ludo	5793 Martin Rd

Figure 4.24 Replacing Values by Applying Formulas

The formula bar allows you to perform the following additional operations:

- Concatenate
- Split
- Extract
- Replace
- Change
- Filter

Additional transformations and log

Transformations are generally captured in a history that can be accessed by clicking on the **Transform Log** button on the top right, as shown in [Figure 4.25](#). In this history, you can view all transformations and roll them back if desired.



The screenshot shows the 'Column Transform Log' section. It displays a single transformation entry: 'Replace 'Ludo Complex' with 'Fresh Tasters' in [Supermarket]'. There is a close button (X) next to the entry.

Figure 4.25 Transform Log

To verify the dimension, click on **Details** in the top right and return to the initial sidebar view of the column, as shown in [Figure 4.26](#).

Since we've finished all data transformations, we want to continue our data preparation back in the modeler. Therefore, click on **Close Data Transformation** on the top left and select **Save Changes Before Closing**, as shown in [Figure 4.27](#).

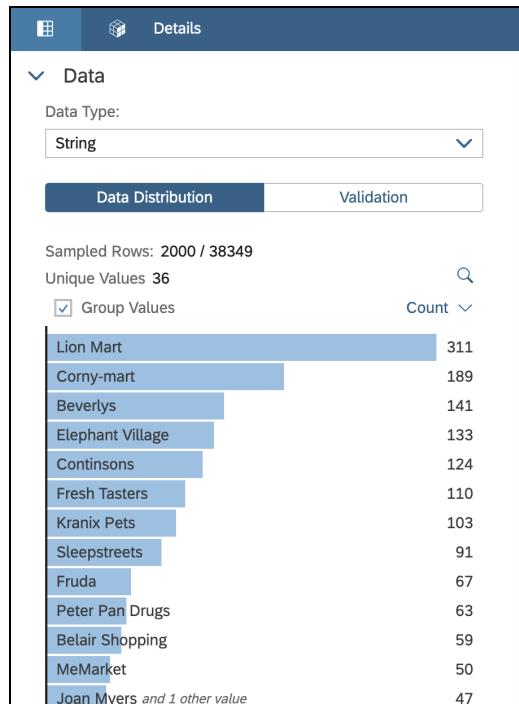


Figure 4.26 Dimension Sidebar View



Figure 4.27 Closing Data Preparation

- Measures** To ensure that you can use your measures for reporting later, check if they were recognized correctly. Verify that the **Unit price**, **Quantity**, and **Revenue** columns have been recognized by looking at the **Measures** section, as shown in [Figure 4.28](#).

Measures			
Name	Description	Data Type	Additional Details
Longitude	Longitude	Decimal	...
Latitude	Latitude	Decimal	...
Unit_price	Unit price	Decimal	...
Revenue	Revenue	Decimal	...
Quantity	Quantity	Integer	...

Figure 4.28 Measures

4.3.4 Creating Hierarchies

As shown earlier in [Table 4.1](#), the dimension **Supermarket** is part of a hierarchy. The **Supermarket** column is a child of the **Chain** column.

The modeler allows you to create simple *parent-child hierarchies* as well as more complex *level-based hierarchies*. The relationship is quite simple in our case (**Chain** is the parent of **Supermarket**), so the parent-child hierarchy is sufficient.

Hierarchies

Parent-Child Hierarchies

A simple parent-child hierarchy simply consists of one parent and its children. In this example, the **Chain** is the parent, and each **Supermarket** is a child. If another level above or below exists, a level-based hierarchy must be created. The creation of both hierarchy types follows the same procedure.

To create a parent-child hierarchy, you must first select the parent column, which in this case is the **Chain** column in the **Dimensions** overview. Click on the three dots at the end of the line and select **Convert to Property**, as shown in [Figure 4.29](#).

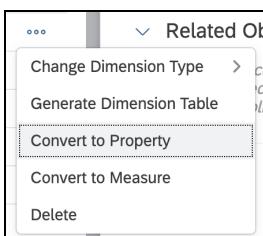


Figure 4.29 Converting a Dimension to a Property

Then select the **Target Dimension** as **Supermarket** and the **Type** as **Parent-Child Hierarchy**, as shown in [Figure 4.30](#). Confirm by clicking on **Next**.

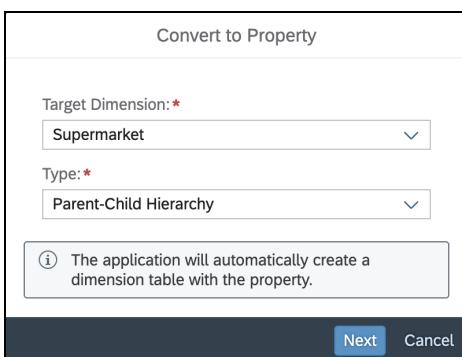


Figure 4.30 Selecting the Child Column

In the next dialog, you will see the results of your selection. Verify your outcome, as shown in [Figure 4.31](#), and confirm by clicking on **OK**.

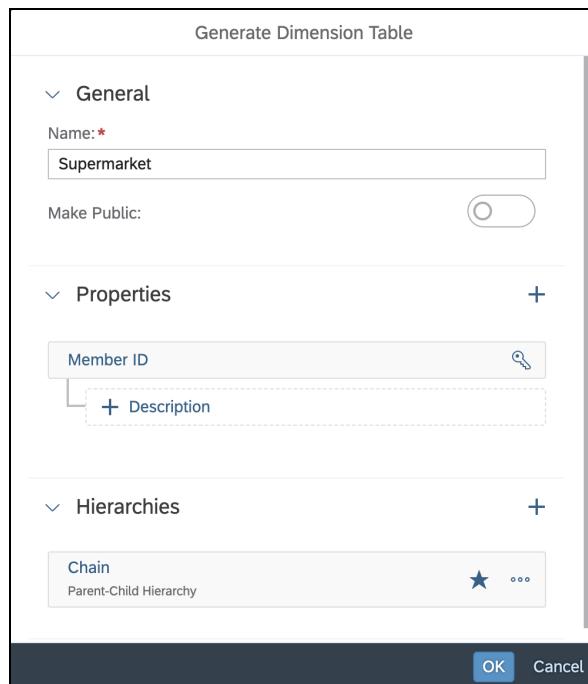


Figure 4.31 Preview of New Dimension

Creating another hierarchy Now, let's create a second hierarchy for the product dimension. Select the **Product Group** column and add the **Parent-Child Hierarchy** attribute to the dimension. Indicate that the **Product** column is the child of the **Product Group** column.

4.3.5 Creating Versions

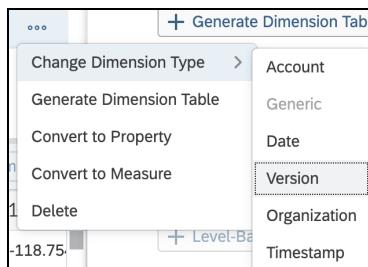
Versions The last column in the file has the title **Version**. The file doesn't only contain actual values for 2023 (**Actuals** version) but also forecasted values (**Forecast** version). This data can later be compared to check whether the forecasted values were met, for example. Therefore, the model has a specific data type called **Version**.

By default, if SAP Analytics Cloud doesn't find a **Version** column, it automatically creates a new **Version** column. In our case, the column **Version2** was created. Select the **Version2** entry in the dimensions overview, click on the three icons at the end of the line and click on **Delete** as shown in [Figure 4.32](#). Confirm the warning that appears by clicking on **Delete** again.

Type	Additional Details	Rights / Acc
Version2	1 - 50 1 16 1 0 0 0 0	Change Dimension Type > Generate Dimension Table Convert to Property Convert to Measure Delete Dimension Table Delete
Supermarket*	1 - 50 1 16 1 0 0 0 0	
Product*	1 - 50 1 16 1 0 0 0 0	
Dimension	0 0 0 0	

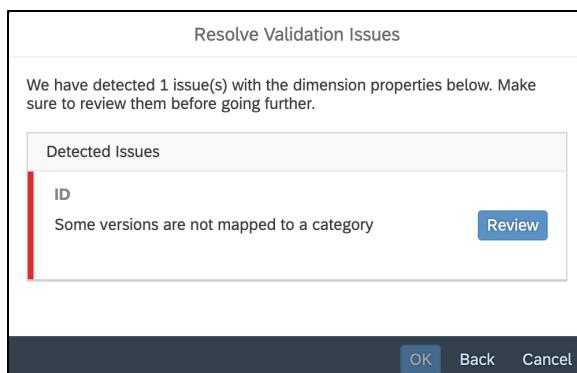
Figure 4.32 Deleting the Empty Version2 Column

Now you can change the type of the **Version** column. Select it in the **Dimensions** list, click on the three dots at the end of the lines and click on **Change Dimension Type • Version**, as shown in [Figure 4.33](#). Confirm the dialog that appears by clicking on **OK**.

**Figure 4.33** Changing the Dimension Type

Since we changed the dimension type, the versions need to be mapped correctly, as shown in [Figure 4.34](#). Correct version mapping is particularly important because SAP Analytics Cloud offers various functionalities for comparing different versions to each other. These functionalities include various display options, as well as calculations.

Version mapping

**Figure 4.34** Version Mapping Issues

Click on the **Review** button to open the version mapping dialog. Map the version as shown in [Figure 4.35](#) by matching **Actuals** to **Actual** and **Forecast** to **Forecast**. Confirm by clicking on **OK**.

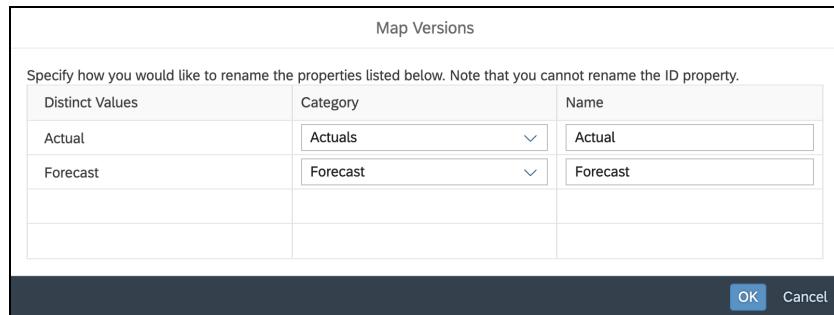


Figure 4.35 Version Mapping

Working with Versions

Versions are often irrelevant since they aren't captured in many scenarios outside of planning, where they are common. If your data contains version information, we strongly recommend you assign the data correctly, which will allow you to later compare versions or run calculations based on versions. You don't need to create a planning model just to analyze version data.

After editing the column types, you can perform additional operations within data wrangling to improve the quality of the data or to otherwise manipulate it.

Finalize model The data is now edited and ready for analysis, so now we want to save the final model. Click on the **Save** button in the top action bar of your screen. A validation process will check if the changes you've performed so far are valid for the whole dataset. If no errors or problems are detected, the model is saved.

Models are stored in folders like stories. A model can be later edited in the modeler, which is presented in detail in [Section 4.5](#).

4.4 Creating Models from Live Data Sources

When using live data sources, you still must create a model first if you want to analyze your data in SAP Analytics Cloud. In this scenario, however, SAP Analytics Cloud will technically create a reference that can be enriched with additional information. More information about the architecture of a live model can be found in [Section 4.2.2](#).

In the following example, a model will be built on top of a live connection to an SAP HANA instance. The data source is an SAP HANA view, which we'll enrich with date and geographical information. We'll also add version information to the model. The process is quite similar to connecting to other live data sources.

Live Connection Example

To follow the sample in this section, you must first establish a live connection to a supported data source. Because this can't be provided as downloadable material, we'll only demonstrate the procedure for your reference. Information about establishing and integrating live data source connection can be found in [Chapter 2, Section 2.3](#) and [Chapter 3, Section 3.4](#).

Similar to the procedure described in [Section 4.3](#), start by opening the model menu. Open the main menu and click on **Modeler**. Next, select the **Live Data Model** option, as shown in [Figure 4.36](#).

Selecting a data source

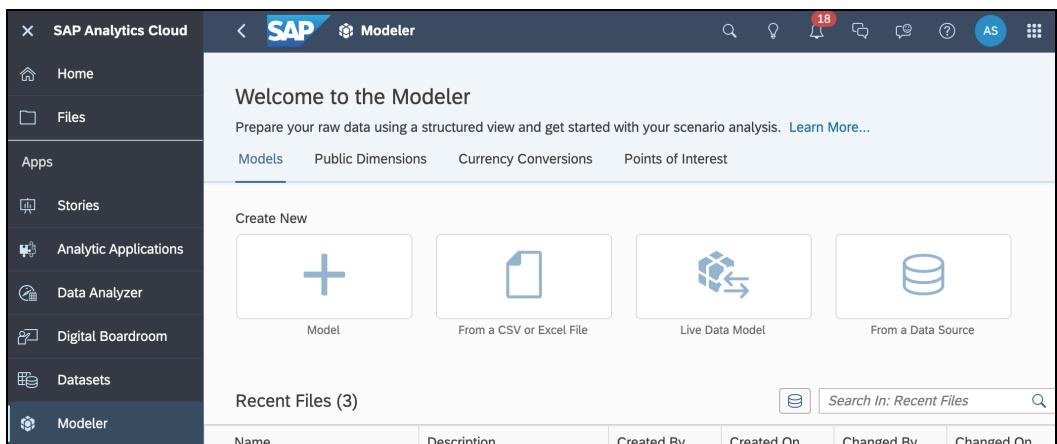


Figure 4.36 Selecting Data Sources

You'll now see a dialog box for selecting the system and data source, as shown in [Figure 4.37](#). In our scenario, we'll connect to the SAP HANA system called **DB3**. The data is provided in the **SUPERMARKET_CA_GEO_CALC** view. This view is similar to the Excel file described in [Section 4.3](#).

System selection

After clicking on **OK**, the SAP HANA view will be accessed and shown in the modeling view, which is also called the modeler, as shown in [Figure 4.38](#). In the modeler, you can define additional semantics or parameters. If you don't need to perform any additional tasks here and the data source already provides the final model, you can directly proceed with saving and analyzing the model.

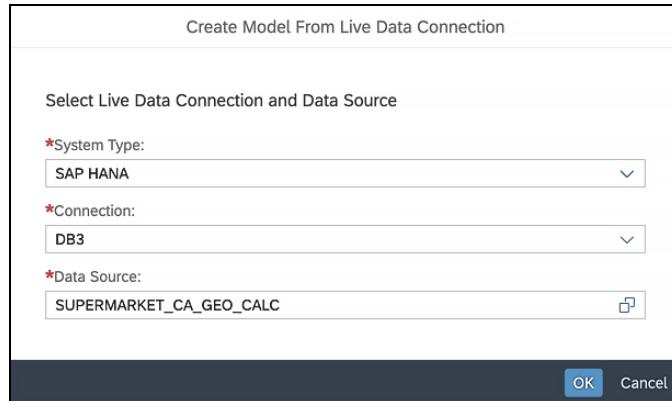


Figure 4.37 Selecting an SAP HANA View

ID	Description	Aggregation Ty...	Exception Agg...	Exception Ag...
1 Piece_Price	Piece_Price	SUM		
2 Quantity	Quantity	SUM		
3 Revenue	Revenue	SUM		
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				

Selected Account

- Hierarchy
- Formula
- Sample Value
882.89

Figure 4.38 Modeler for Live Data Source

Settings and changing the data source

The action bar at the top of the screen provides direct access to commonly used functionalities, as shown in Figure 4.39. By clicking on the wrench icon ①, you can open various dialog boxes. Besides adjusting model settings, you can also configure parameters, including changing the data source. Specifically, you can select a new SAP HANA view. This step is required if you want to change a model from using nonproductive to using productive data, for example.



Figure 4.39 Action Bar in Modeler for Live Data Sources

Click on the **Save** icon ② to save the model. The other icons allow you to map versions ③, enrich a geolocation ④, or create a date dimension based on a text column ⑤. You can also view all dimensions ⑥ and all measures ⑦.

First, we'll enrich the model with additional information to unlock further functionalities. A version mapping, as shown in [Figure 4.40](#), allows you to map data to actual values (**Actuals**) or forecasted values (**Forecast**). This allocation later can be used in visualizations to compare versions to each other. After opening the dialog box, you must first indicate which column contains the version information. Then, you map all unique values in this column to versions.

Version mapping

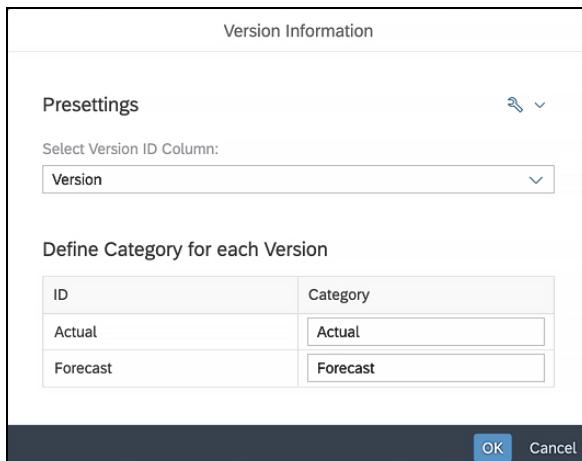


Figure 4.40 Mapping Versions

If the data model also contains geographical data and SAP Analytics Cloud supports the feature for the data source, you can enrich the model with geographical information. Click on the (**Location**) icon to open the dialog box for creating a location dimension. Now, indicate the **View Name** that contains the geographical information, as shown in [Figure 4.41](#). You also must indicate which column should be used to match records from the SAP HANA view to the view that contains the geographical information (**Location Identifier** and **Identifier for Mapping**).

Geolocation

Geolocations from Live Data Sources

When using geolocation data from live data sources, you must meet various requirements up front. First, you must verify if SAP Analytics Cloud supports geolocations for your data source. Based on the data source, you may have to prepare the data model as documented in the product help of SAP Analytics Cloud in detail for each data source.

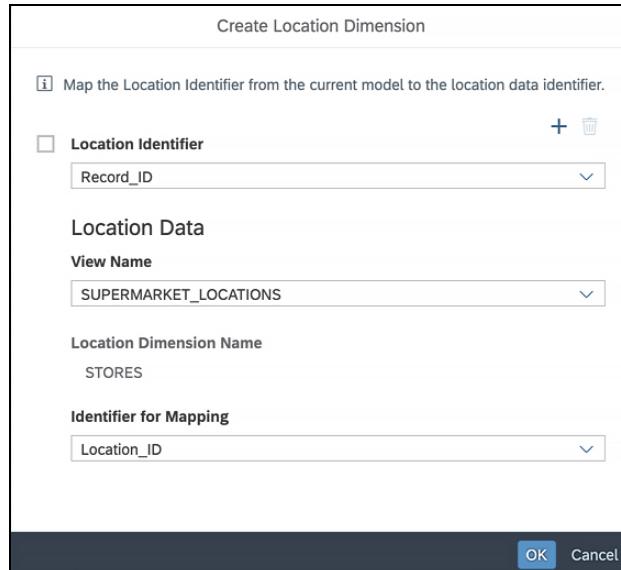


Figure 4.41 Creating Location Dimensions for an SAP HANA View

Date hierarchies from text columns Another feature for live connections to SAP HANA views is the conversion of text columns to date columns. In general, you can also directly model date columns in an SAP HANA view. However, in some scenarios (when connecting to external data sources in SAP HANA, for example), date information is only stored as text.

Creating time dimensions If you want to use some of the date features in SAP Analytics Cloud, you must convert the text columns into date columns. You can either perform this conversion in the data source itself or use the modeler in SAP Analytics Cloud. In the latter approach, click on the **Create Time Dimension** icon  to open the dialog box shown in [Figure 4.42](#).

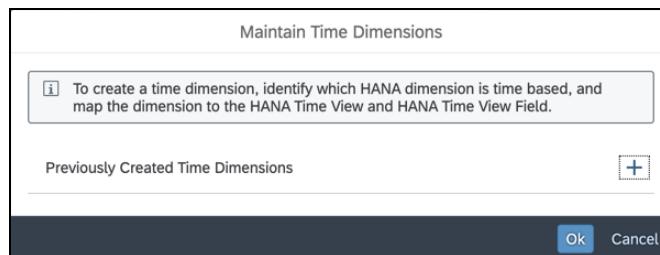


Figure 4.42 Maintaining Time Dimensions

Because you can convert multiple columns into dates, you must click on the plus icon  to create a new date hierarchy. Afterwards, select the column in your SAP HANA view that contains the date information.

Prerequisites for Date Columns

A text column in the SAP HANA view must carry the data type NVARCHAR for SAP Analytics Cloud to correctly recognize it as a potential date column. Also, the column length is used to determine the date level: 4 characters indicate year information, 6 characters are recognized as a combination of year and month, and 8 characters are interpreted as full days.

Once selected, you can determine which date level (year, day, or month) is represented by the column, as shown in [Figure 4.43](#). You can also define which levels the generated date hierarchy should contain.

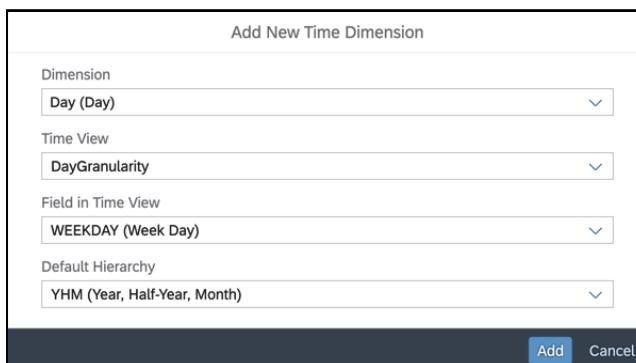


Figure 4.43 Creating Time Dimensions

Besides enriching a model with additional hierarchies or date columns, you can also create additional measures or modify existing measures. To create a new measure, you must navigate to the measure overview by clicking on **Measures** in the top bar. Now, you can create new measures by simply entering values in an empty row for the **ID** and **Description** columns, as shown in [Figure 4.44](#). Afterwards, enter a formula into the **Formula** field to calculate the new measure.

Measure overview

ID	Description	Aggregation Ty...	Exception Agg...	Exception Aggregation ...	Required Dimensi...	Scale	Decimal Pl...	Formula
1	Piece_Price	Piece_Price	SUM				2	
2	Quantity	Quantity	SUM				2	
3	Revenue	Revenue	SUM				2	
4	OptimalForecast	Optimal Forecast					2	[Revenue]*1.5

Figure 4.44 Creating New Calculated Measures

[Figure 4.44](#) shows a newly created measure called **Optimal Forecast**. This measure is calculated by multiplying the **Revenue** measure by a factor of 1.5, as indicated in the **Formula** column. The measure will now be available to all users in SAP Analytics Cloud that have access to this model.

Additional calculated measures

Additional Measures for Live Connections

When accessing data from a live data source, you can create additional calculated measures in a model or in a story, as described in [Chapter 5, Section 5.8](#). Although these calculations are defined in SAP Analytics Cloud, they're still pushed down to the data source for execution and calculation.

Measure attributes [Table 4.2](#) shows all attributes of measures that can be defined in the modeler.

Column Name	Description
ID	Unique ID of a measure. If the measure is already modeled in the data source, the ID can't be changed in the modeler.
Description	Description of the measure that is shown to the user. This value can be changed for existing and new measures.
Aggregation Type	Determines the aggregation type applied to the measure.
Exception Aggregation	Allows the definition of an exception aggregation.
Exception Aggregation Dimension	Determines which dimension is used for the exception aggregation.
Required Dimension	If a dimension is selected in this column, the measure can be only used in a story if the dimension is also part of the chart or table.
Scale	Determines the scale of a measure (e.g., thousands or percentages).
Decimal Places	Determines the number of decimal places shown for the measure.
Formula	If you create a new measure, you must provide a formula for the calculation in this column.
Hide	If you want to hide a measure, turn this option on. This option will make the measure invisible in all stories and applications.
Threshold	Can be used to define global thresholds for the measure.

Table 4.2 Options to Extend and Modify Measures

The *exception aggregation* concept isn't widely known and therefore confuses many users of SAP Analytics Cloud. While normal aggregations are usually performed on the row level, exception aggregations are performed on the dimension member level of the indicated dimension. In this way, you can compare aggregated values against single values in the same table, for example.

Exception aggregation

Exception aggregations should only be used if your use case requires them. Otherwise, they are irrelevant for most users.

The model also allows you to rename or hide dimensions. Click on **All Dimensions** to open the dimension overview, as shown in [Figure 4.45](#). Now, you can enter individual texts into the **Description** field. If you want to group multiple dimensions into one group, enter a group name into the **Group** field.

Modifying dimensions

ID	Description	<input type="checkbox"/> Hide	Group	Search
Prod_Hier	Prod Hier	<input type="checkbox"/>		
Record_ID	Record_ID	<input type="checkbox"/>		
Year	Year	<input type="checkbox"/>		
Supermarket	Supermarket	<input type="checkbox"/>		
Chain	Chain	<input type="checkbox"/>		
Street	Street	<input type="checkbox"/>		
City	City	<input type="checkbox"/>		
State	State	<input type="checkbox"/>		
Region	Region	<input type="checkbox"/>		
Version	Version	<input type="checkbox"/>		
Product	Product	<input type="checkbox"/>		
Product_Group	Product_Group	<input type="checkbox"/>		

Figure 4.45 Overview of Dimensions

Once you start entering values into the **Group** field, you'll see a live preview in the sidebar on the right, as shown in [Figure 4.46](#).

Saving the model

Once you're done, you must save the model to make the model accessible to other users. As for imported models, the model will be stored as an object in the folder structure of SAP Analytics Cloud.

The authorization concept of SAP Analytics Cloud controls which models are visible to which users. However, the visibility of data within a live

Authorizations

connection data model is completely controlled by the data source itself. SAP Analytics Cloud is not able to override any authorizations defined in a data source.

The screenshot shows the SAP Analytics Cloud Modeler interface. On the left, there is a table titled 'All Dimensions' with columns for 'ID', 'Description', 'Hide' (checkbox), 'Group' (dropdown), and 'Search'. The table lists various dimensions: Prod_Hier, Record_ID, Year, Supermarket, Chain, Street, City, State, Region, Version, Product, and Product_Group. Most dimensions have their 'Hide' checkbox checked. The 'Group' dropdown for most dimensions is set to 'General', except for Record_ID which is 'General', Year which is 'Date', and Product_Group which is 'Product'. A search bar and a magnifying glass icon are at the top right of the table. To the right of the table is a sidebar titled 'All Dimensions' under 'Model'. It shows a tree structure of dimensions: General, Record_ID, Version, Date, Year, Supermarket, Supermarket, Chain, Region, Street, City, State, Region, Product, Product, and Product_Group. The 'General' node is expanded, showing its children: Record_ID, Version, Date, Year, Supermarket, Supermarket, Chain, Region, Street, City, State, Region, Product, Product, and Product_Group. The 'Record_ID' node is also expanded, showing its child: Version. The 'Supermarket' node is expanded, showing its child: Supermarket. The 'Chain' node is expanded, showing its child: Supermarket. The 'Region' node is expanded, showing its child: Region. The 'Street' node is expanded, showing its child: Region. The 'City' node is expanded, showing its child: Region. The 'State' node is expanded, showing its child: Region. The 'Version' node is expanded, showing its child: General. The 'Product' node is expanded, showing its child: Product. The 'Product_Group' node is expanded, showing its child: Product.

Figure 4.46 Grouped Dimensions

4.5 Editing Models in the Modeler

The *modeler* is the central tool for editing models in SAP Analytics Cloud. However, for models based on a live connection, only limited functionality is available in the model, as documented in [Section 4.4](#). In this section, we'll modify the model we created in [Section 4.3](#).

The modeler Using the modeler is the final but important step in the process of creating and maintaining models. The modeler provides tools, not only for maintaining master data but also for activating additional functionality or add additional data sources. You can also always jump back to the data wrangling step in the modeler if you forgot to perform a data manipulation or a quality fix. The modeler is explicitly designed to maintain models and shouldn't be considered equal to a table editing tool.

Opening the modeler To open the modeler, simply click on a model in the folder structure. Afterwards, the modeler will be opened with the model automatically. To open the model we created in [Section 4.3](#), navigate to the **Sales Data** folder where we saved the model, as shown in [Figure 4.47](#).

Alternatively, you can open the modeler from the main menu. The modeler will list all your recently edited and created models.

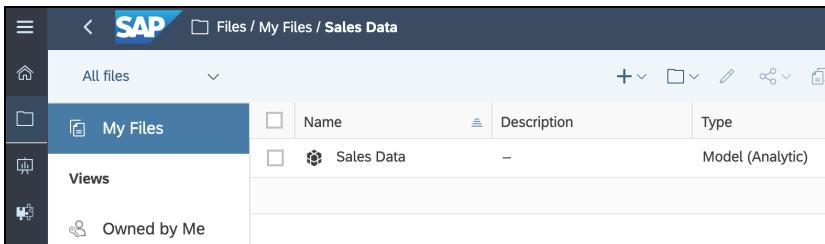


Figure 4.47 Sales Data Folder

After you click on a model name, the modeler will open. Initially, the modeler shows an overview of the model and its content, as shown in [Figure 4.48](#).

The screenshot shows the SAP Modeler interface with the title bar 'SAP Modeler | Sales Data'. The left side features a 'Workspace' panel with sections for 'Model Structure' and 'General'. Under 'Measures', there are five entries: Longitude, Latitude, Unit_price, Revenue, and Quantity. Under 'Dimensions', there are six entries: Version (selected and highlighted in blue), Supermarket, Product, ID, Date, and Street. The right side has tabs for 'Dimension' and 'Version'. The 'Version' tab is active, showing a 'General' section with fields for 'Name' (set to 'Version') and 'Description' (set to 'Version'). Below that is a 'Dimension Table' section with a table titled 'Version' containing one row. At the bottom, there's a data foundation table with columns: Supermarket, Product, ID, Date, Street, City, and Location. The table shows data for Fresh Tasters across various categories like White Wine, Champagne, etc. A message at the bottom says 'Results: 19,175'.

Figure 4.48 Modeler Overview and Content

To provide quick access to commonly used functionalities, the modeler is separated into several areas. At the bottom, the **Data Foundation** area shows a preview of the data in the model. In the following sections, we'll first describe the various areas of the modeler before modifying the model itself to demonstrate each functionality.

4.5.1 Areas of the Modeler

Action bar [Figure 4.49](#) shows the action bar of the modeler, which is the central point to access each area of the modeler. To toggle between the model overview, calculation management, and data management, click on the **Workspace** dropdown menu ①. When you click on **Data Management**, you'll open the data management interface, where you'll see all the data sources of the model. You can also access the **Calculations** overview here. There, you can create calculations on top of the existing data.



Figure 4.49 Modeler Action Bar

The **Save** icon ② saves all changes that you've applied to the model. The model's settings can be opened by clicking the wrench icon ③. To share a model with other users or teams, click on the **Share** icon ④. Changes can be undone ⑤ or repeated ⑥. Click on the plus icon + ⑦ to create a new dimension and click on the **Remove** icon ⑧ to delete a dimension.

The **Variables** icon ⑨ allows you to add variable prompts to the model. The **Locking** icon ⑩ is only activated for planning models and can be used to introduce data locks. Data locks are used to prevent the data in planning models from getting changed or overwritten.

If you want to clear all transactional data from a model, click on the eraser icon ⑪. This icon allows you to empty the model without deleting master data. To turn off the data preview on the bottom of the model overview, use the **View** icon ⑫.

The **Validation** section ⑬ displays issues and problems, if they exist. If these issues are not resolved, you won't be able to save the model.

The **Model View** ⑭ dropdown allows you to toggle between a list view and a graphical view of the model. The **Search** function ⑮ can be used to search the model.

New Model Type

In 2021, SAP introduced a new model type for SAP Analytics Cloud. This model type introduces new features that are specifically important for planning scenarios. However, at the time of this writing, the new model type is still limited by some restrictions.

Major limitations include the missing link formula feature between models, as well as cross-model copy steps in data actions if models from both the classical type and the new type are used. This can be resolved by using the link function. Also, blending and table thresholds are not supported within the story if models contain an account dimension. Enrichment of areas for geo maps are also not currently supported. Since 2024, all models uploaded from flat files are automatically created as new models.

For more information about the new model type, more details are available in the official product help: <http://s-prs.co/v218503>. In addition, Pravin Datar published *Introducing the New Model in SAP Analytics Cloud* with SAP PRESS that contains detailed examples on the new model: <https://www.sap-press.com/5470>.

The dimension overview shown in [Figure 4.50](#) provides a quick overview of all dimensions and their attributes. The number of members and the number of hierarchies in each dimension are also shown on this overview screen. If additional properties are activated for a dimension, these properties will be shown on this screen as well.

Dimension overview

Dimensions		Additional Details		
Name	Description	Type	Members	Hierarchies
Version	Version	Version	2	1
Supermarket	Supermarket	Supermarket	50	1
Product	Product	Product	16	1
ID	ID	Dimension	0	0
Date	Date	Dimension	0	0
Street	Street	Dimension	0	0
City	City	Dimension	0	0

Figure 4.50 Dimension Overview

Dimensions can be shown both in a list and graphically to easily distinguish among different dimension types.

Sidebar The sidebar of the model shows contextual information that either refers to the model itself or to a dimension, as shown in [Figure 4.51](#). If you click on a dimension in the overview, the sidebar automatically adjusts.

If no dimension is selected, the sidebar shows general information about the model. In the sidebar, now, you can also see which data sources are feeding the model. Stories or applications using the model are shown in the **Related Objects** area. If a model is used in a story or application, that model cannot be deleted.

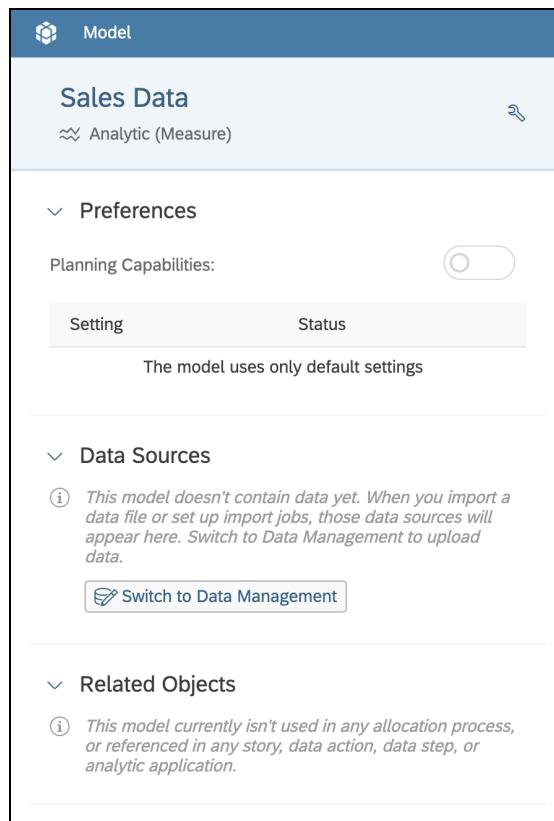


Figure 4.51 Sidebar for Model

Data management The **Data Management** workspace, shown in [Figure 4.52](#), shows all data sources that are feeding the model and also allows you to add more data sources, maintain existing import jobs, and track historical data activities. You can also export a model or create a regular export job.

The **API Subscriptions** tab allows external application to consume data from models on a regular basis. This way, data can be extracted to other tools or written back into source systems.

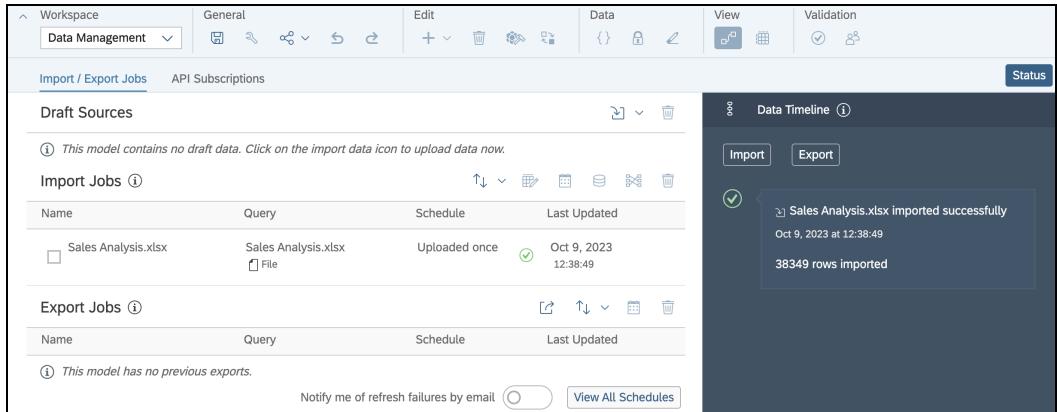


Figure 4.52 Data Management Interface

4.5.2 Editing Models

In this section, we'll change some model settings slightly to demonstrate the functionalities of the modeler. Switch back to the overview to follow these instructions.

First, let's modify the measures. The measures are directly shown in the model overview, as shown in [Figure 4.53](#). If you want to bulk edit multiple measures at once, you can use the check boxes to select them.

Measures

Measures			
Name	Description	Data Type	Additional Details
<input type="checkbox"/> Longitude	Longitude	Decimal	...
<input type="checkbox"/> Latitude	Latitude	Decimal	...
<input type="checkbox"/> Unit_price	Unit price	Decimal	...
<input type="checkbox"/> Revenue	Revenue	Decimal	...
<input type="checkbox"/> Quantity	Quantity	Integer	...

[Switch to Calculation Management](#)

Figure 4.53 Measures Overview

To add a new calculated measure, click on **Switch to Calculation Management**. Click on the plus icon + next to **Calculated Measures** at the top of the screen to create a new measure. Enter “RevenueForecastFixed” in the **Member ID** field and “Fixed Revenue Forecast” in the **Description** field in the sidebar on the right, as shown in [Figure 4.54](#).

Creating a new measure

The screenshot shows the 'Calculated Measures' section of the Power BI service. A new measure, 'RevenueForecastFixed*', has been created and is selected. The properties pane on the right shows the following details:

- Name:** RevenueForecastFixed
- Description:** Fixed Revenue Forecast
- Calculated Measure**
- General** section with the same name and description.

Figure 4.54 Creating New Measure

Formula editor Now, click on the **Formula Editor** button in the sidebar to open the formula editor, as shown in [Figure 4.55](#). Enter the formula “[Revenue] * 1.5.” The formula editor allows for the creation of complex calculations. More details on this tool can be found in [Chapter 5, Section 5.8](#).

Confirm the formula by clicking on **OK**, then click on the left arrow at the top of the account list to return to the model overview. Save your current progress.

The screenshot shows the 'Formula Editor' dialog. The formula `[Revenue] * 1.5` is entered in the 'Formula:' field. The left sidebar lists various functions under 'Conversion'. At the bottom, there are 'OK' and 'Cancel' buttons.

Figure 4.55 Formula Editor

Let's say that, after we created the model, we got news that a supermarket brand was sold from one chain to another chain. Now, we need to adjust the supermarket hierarchy to reflect this change. Open the **Supermarket** dimension by clicking on the  button in the **Type** column, which will show you all dimension members in a list. The sidebar also shows contextual information about the dimension. As long as you don't click on a specific dimension member, the sidebar will show general information about the dimension, as shown in [Figure 4.56](#).

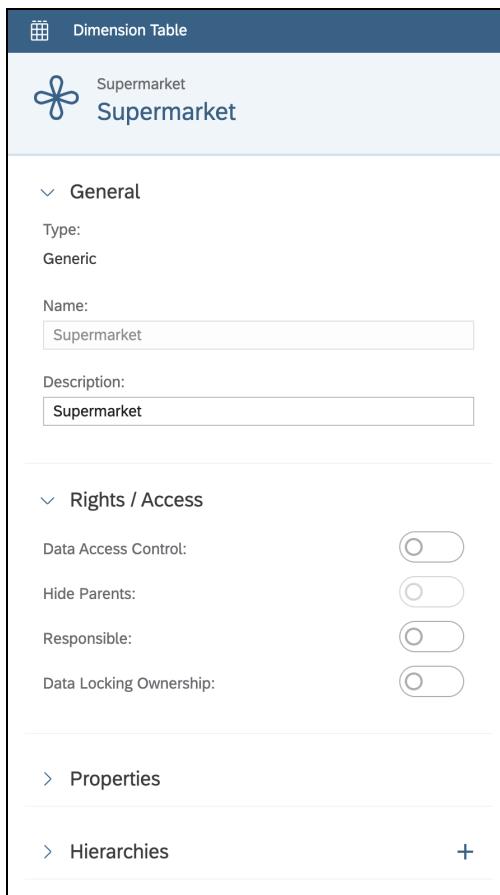


Figure 4.56 Sidebar of Dimension

You can see all available hierarchies or turn on currency conversion for this specific dimension. You can also turn on **Data Access Control**, hide parents, set responsible persons, or turn on **Data Locking Ownership**, which is relevant for planning scenarios.

To change the supermarket hierarchy, either click on the **Chain** hierarchy in the sidebar, as shown in [Figure 4.57](#), or click on the **Hierarchy** icon  at the top of your screens.

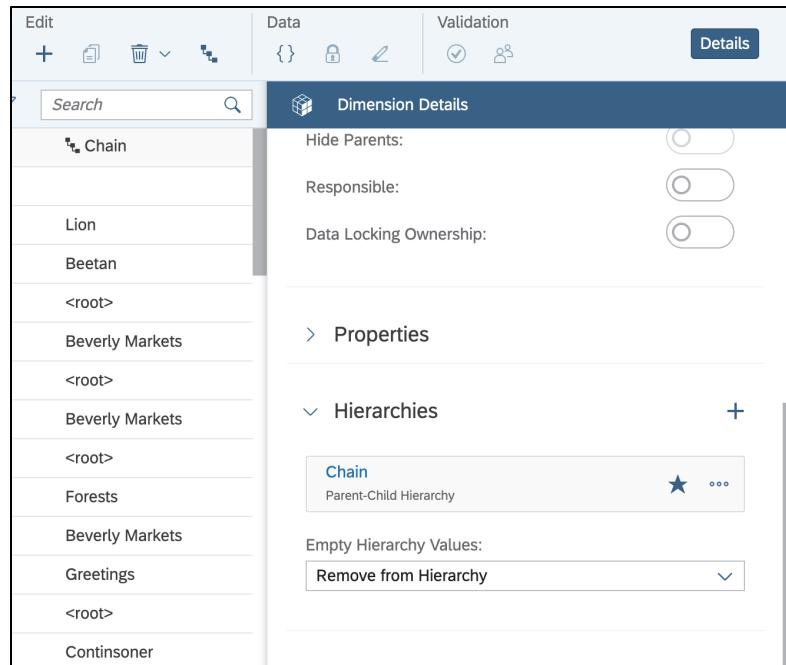


Figure 4.57 Options to Open Hierarchy Management

Hierarchy maintenance Hierarchy management is conducted in a separate interface where the hierarchy can be modified and new hierarchies can be created, as shown in [Figure 4.58](#). The interface can be used to maintain all hierarchies that belong to the dimension from which the interface was opened.

The sidebar on the left allows you to search through all dimension members. To see a specific member of the tree on the right, search for it in the list and then click on the **Hierarchy** icon  next to the dimension member.

Moving members As stated earlier, a supermarket brand was sold from one chain to another. In our scenario, the supermarket brand Cent Town was sold by the Beverly Markets chain to the Camill chain. Find the **Cent Town** entry by using the sidebar on the left and jump to the entry in the hierarchy view by clicking on the **Hierarchy** icon  next to the member name.

To move **Cent Town** to **Camill**, simply use drag and drop: Place your cursor on top of the **Cent Town** entry in the hierarchy view. Now, click the left mouse button and keep holding it down while moving **Cent Town** on top of **Camill**, as shown in [Figure 4.59](#). Then, release your mouse button. You'll see a live preview while moving the member.

The screenshot shows the Hierarchy Maintenance interface. On the left, there is a search bar and a list of nodes. On the right, there is a detailed view of the 'Chain' hierarchy.

Left Pane (Search Results):

- # Unassigned
- A.B. Markets
- Beeta
- Beetan
- Belair Shopping
- Beverly Markets
- Beverlys
- Camill
- Carl and Save
- Cent Town
- Class Center
- Continsoner
- Continsons
- Cordona

Right Pane (Hierarchy View):

- Chain
 - Beetan
 - Beverly Markets
 - Camill
 - Continsoner
 - Corny-marts
 - Forests
 - Greetings
 - Kranix
 - Lion
 - Ludo
 - N.E.W.S.
 - Tangents
 - Tasty Store

Figure 4.58 Hierarchy Maintenance

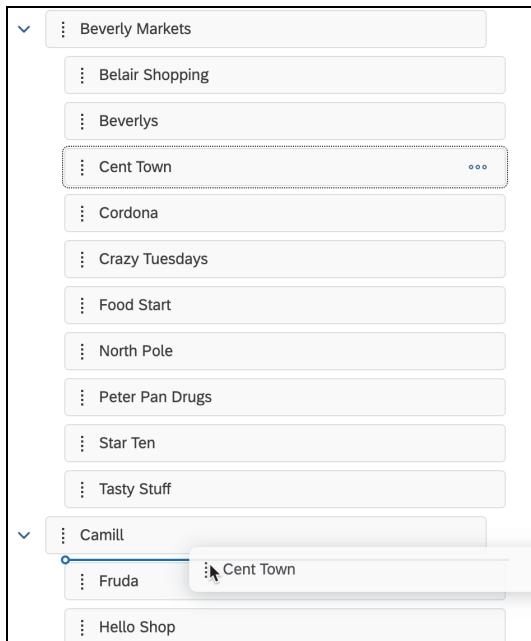


Figure 4.59 Moving Hierarchy Member

Once you're done, click on **Close** in the top left to return to the dimension overview. Then, save the model.

Authorizations for dimensions You also can use the modeler to maintain data authorizations on the dimension member level. In this way, you can ensure that users can only see the data they're allowed to see. For example, a European sales head should only be able to see European sales data. We'll now demonstrate how to set up data authorizations. However, since we don't need these authorizations for subsequent chapters, we won't save these settings.

Data access control First, you must activate *data access control* for the dimension that you want to use to control data access. This feature can be activated in the sidebar of a dimension. For our example, turn on **Data Access Control** for the **Supermarket** dimension, as shown in [Figure 4.60](#).

The screenshot shows the SAP BusinessObjects Modeler interface. On the left, there is a list of dimension members under the heading 'Type'. The 'Supermarket' member is selected and highlighted with a blue background. To the right of the list is a sidebar titled 'Rights / Access' with the following options:

- Data Access Control: A toggle switch that is currently off (gray).
- Hide Parents: A toggle switch that is currently off (gray).
- Responsible: A toggle switch that is currently off (gray).
- Data Locking Ownership: A toggle switch that is currently off (gray).

Figure 4.60 Enabling Data Access Control

After you activate data access control, open the dimension itself by clicking on its name. Now, click on a dimension member (e.g., **A.B. Markets**). The sidebar will now display information for this specific dimension member. You'll see dedicated fields that allow you to specify which users are able to read data and write data, although writing data is only possible for planning models, as shown in [Figure 4.61](#). You can enter users and teams in this sidebar.

After you've finished all model edits, the model is ready for use in stories and applications. Especially when creating models for broader usage, you should plan enough time for detailed configuration, which can be quite time consuming. You can still adjust your models afterwards, but doing so may heavily impact existing stories or applications.

The screenshot shows a split-screen interface. On the left is a table titled 'Supermarket' with columns 'Member ID', 'Description', and 'Chain'. The table lists various dimension members like 'Unassigned', 'Lion', 'Beetan', etc. On the right is a 'Member Details' dialog. It has a 'Member ID' field containing 'A.B. Markets', a 'Description' field, and a 'Hierarchies' section where 'Lion' is listed under 'Chain'. Below that is a 'Rights / Access' section with 'Read:' and 'Write:' fields.

Member ID	Description	Chain
#	Unassigned	<root>
A.B. Markets		Lion
Beeta		Beetan
Beetan		<root>
Belair Shopping		Beverly Markets
Beverly Markets		<root>
Beverlys		Beverly Markets
Camill		<root>
Carl and Save		Forests
Cent Town		Camill
Class Center		Greetings
Continsoner		<root>
Continsons		Continsoner
Cordona		Beverly Markets
Corny-mart		Corny-marts
Corny-marts		<root>

Figure 4.61 Applying Data Access Control to Dimension Member

4.6 Summary

Models are the central data layer in SAP Analytics Cloud. Besides containing data, data models contain semantics and are therefore the interface between users and data sources. SAP Analytics Cloud operates with datasets, analytical models, planning models, and embedded models. Based on the acquired licenses, not all model types will be available to all users. While datasets simply represent tables, models allow adding semantics and settings.

Although data modeling is considered a complex task by many users, models can unlock a lot of potential. Data models allow not only the preparation of data but also fixing quality issues and adding semantics. Depending on the data source, the modeling process can be lengthy in SAP Analytics Cloud. While imported data models offer full functionality, live data models are usually built in the data source already.

In either case, a good story or application is heavily dependent on high-quality and correct data. Therefore, data modeling should be taken seriously and given enough time.

You've now learned why models are important and how to create them. In the next chapter, you'll build your first story based on this data model.

Chapter 5

Business Intelligence: Visualizations and Dashboards

At this point, you've successfully set up SAP Analytics Cloud, integrated some data sources, and created some data models. Now, you're ready to analyze and visualize data. The story is the central point for reporting and provides a broad set of functionalities to create and publish reports.

The business intelligence (BI) area is a particularly important component of SAP Analytics Cloud and includes the widely used scenario of visually analyzing data.

To provide a unified and homogenous user experience (UX) across the product, a story allows you to run through almost all workflows in the areas of BI, planning, and some of the smart assist functionality. In this chapter, we'll present the story concept in detail and explain how the terminology around reports and dashboards interacts with stories.

Unified experience

The main part of this chapter will be a detailed presentation of all story functionalities. This demonstration will be based on the Sales Data model that we created in [Chapter 4, Section 4.3](#) and finalized in [Chapter 4, Section 4.5](#).

This chapter closes with a presentation of additional BI workflows that can be relevant to, but are independent from, a story.

Requirements to Complete This Chapter

To successfully walk through [Section 5.2](#) and [Section 5.5](#), you must first create the Sales Data model, which is demonstrated in [Chapter 4, Section 4.3](#) and [Chapter 4, Section 4.5](#). You'll also need the *Blending Data.xlsx* file, which is included in the demo data package download at www.sappress.com/5753. You can find all information regarding the package download, the version of SAP Analytics Cloud used, and supported browsers in [Chapter 1](#). The *Checkpoints.zip* archive contains PDF exports to help you verify your stories throughout the chapter.

5.1 What Are Stories?

Reports and dashboards The *story* is the central working environment for all activities related to analyzing data or creating reports and dashboards. Within BI terminology, as a flexible concept, a story can cover both use cases, reporting and dashboards. Figure 5.1 shows an example story in SAP Analytics Cloud.

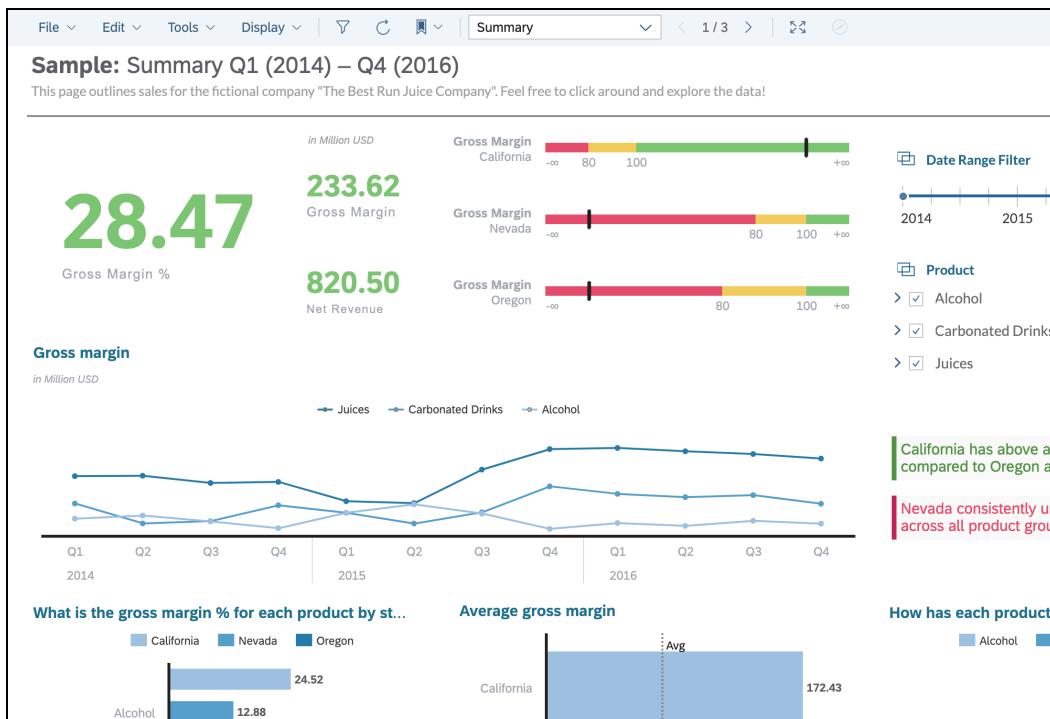


Figure 5.1 Sample Story in SAP Analytics Cloud

Reports or Dashboards?

In current language, the words *report* and *dashboard* are used quite differently. Usually, the presentation style of the information determines which term is used. While reports can consist of simple graphics or tables, dashboards usually have a more complex structure. Dashboards are designed to present a great amount of information in a compact way and offer various options for users to interact with the data and get detailed insights.

Applications In SAP Analytics Cloud, no clear differentiation exists between reports and dashboards. The story allows you to create simple reports and complex dashboards. In addition, you can also create *applications* in SAP Analytics Cloud. However, applications are more complex and require expert knowledge to be created. Applications will be presented in detail in Chapter 8.

On top of that, SAP recently introduced the unified story, a concept in which the story environment is enriched by functionalities from the analytics designer. While this chapter will focus on the story itself, the more complex functionalities will be described in [Chapter 8](#).

A story offers creators and viewers a lot of freedom and can be adjusted to a rather high degree. A story also allows creators to determine the degree of interactivity and which functionalities are made available to viewers of a specific story.

Creators and viewers

Story Viewers and Creators

SAP Analytics Cloud differentiates between story creators and viewers. In general, a story can be designed to be rather interactive for viewers. This interactivity can be seen in dashboards, which require high interactivity. Therefore, no strict separation exists between story creators and viewers.

Although technically you can limit the ability to create a story to only a few users, you can also use authorizations and folders to individually steer the story creation process. You can determine on both the story level and the folder level who is able to see specific stories or whole folders and who can edit the content.

More information about distributing stories and the authorization concept can be found in [Section 5.10](#). Information about the folder structure and authorizations that can be assigned within that framework are presented in [Chapter 3, Section 3.3.5](#).

Components of a story

A story consists of *pages*, which can be of different types and therefore properly serve the desired use cases. We'll describe pages in more detail in [Section 5.2.1](#). Each page can carry tables, charts, pictures, texts, or various other elements from different data sources. Technical limitations on data sources, elements, or pages doesn't exist in a story.

Besides the graphical creation of reports and dashboards, a story also offers elements to make charts and tables interact with each other or to link data from different models (called *blending*). In general, stories retrieve data from models, but users can also directly upload files into a story and use that data for analysis. This relationship is shown in [Figure 5.2](#). (The difference between embedded models and public models is described in [Chapter 4, Section 4.2](#).)

Stories in other components

Because the story will also interact with other functionality within SAP Analytics Cloud or is even embedded partially, clear borders cannot be drawn between stories, BI, and other components. However, to keep this book well structured, we'll reference the story throughout multiple chapters whenever necessary. Nevertheless, each chapter will have its own focus. (In this chapter, our focus is BI.)

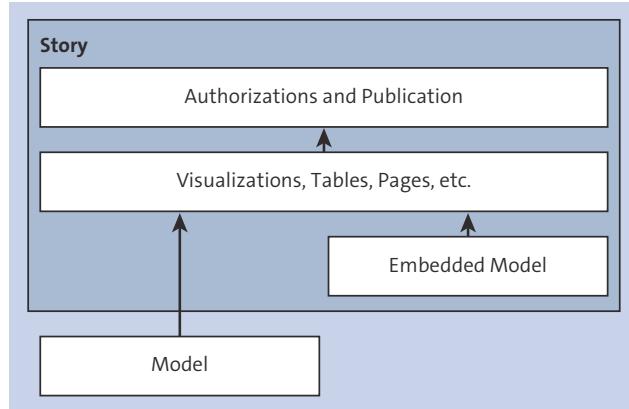


Figure 5.2 Simplified Story Architecture

5.2 Creating Stories

In this section, we'll present each story functionality step by step. Therefore, we'll create a story from scratch and extend it throughout the whole chapter. First, we'll present the different site types available in a story.

Optimized and Classic Design Experience

In 2021, SAP first introduced the optimized story design experience. The optimized story marked a major change in the evolution of SAP Analytics Cloud. Due to its new underlying concept, it allows SAP Analytics Cloud to deliver innovative functionality and better performance.

To protect existing work, SAP currently offers two experiences during story creation: the optimized design experience and the classic design experience. While not all functionality of the classic story is available in the optimized story, it is equipped with an additional functionality set that is not available within the classic mode. Therefore, in this chapter, we will primarily focus on the optimized story. If functionalities are only available in classic mode, they will be marked as such.

New story You can create a new story either in the folder view or via the main menu. Open the main menu and choose **Stories • Create**, which will launch the starting page of a story, as shown in [Figure 5.3](#).

To initiate a story, multiple options are available, such as the following:

- If available, you can use predefined templates. Templates can be defined to contain design guidelines as well as to contain multiple page layouts. Templates ensure that color and design guidelines can be enforced. We'll present templates in detail in [Section 5.11.2](#).

- Besides running smart discovery (more details can be found in [Chapter 7, Section 7.2.1](#)), you can also create your first page by directly choosing a page type. You can choose from responsive, canvas, and grid pages. Then, you can immediately add charts, tables, pictures, or other elements.

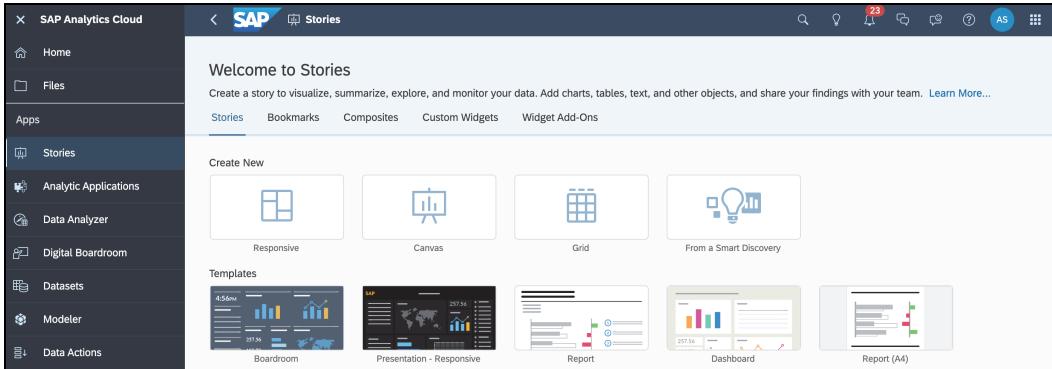


Figure 5.3 Creating New Stories

We'll describe these elements in detail in the following sections and provide examples of how to use them.

5.2.1 Pages

Stories can consist of one or more pages that can be filled with content. A story can contain multiple page types. Before creating your first story, you become familiar with each page type.

In general, page types can be described in the following ways:

Page types

- **Canvas pages**

Canvas pages allow the freeform creation of pages that can contain charts, tables, or other elements. You're basically working on a virtual canvas, which can be filled with any content. You can also overlap charts or mix different graphical elements together.

- **Responsive pages**

When using responsive pages, you're giving up some degree of freedom. For example, you won't be able to overlap charts anymore, and you must follow some arrangement rules, which are enforced automatically. However, responsive pages can be opened on all kinds of devices (mobile phone, laptop, 4K TV, etc.) and automatically adjust themselves.

- **Grid pages**

The grid page is based on a tabular grid and only supports tables. This page type is mainly used in planning workflows because a grid can be used, for example, for side calculations next to tables. The grid page is only available in the classic story design experience.

Canvas pages The canvas page behaves like a virtual canvas and is useful in most scenarios since it allows the free placement of all elements (charts, tables, pictures, texts, widgets, etc.) and can be adjusted in detail. [Figure 5.4](#) shows a simple example of a canvas page.

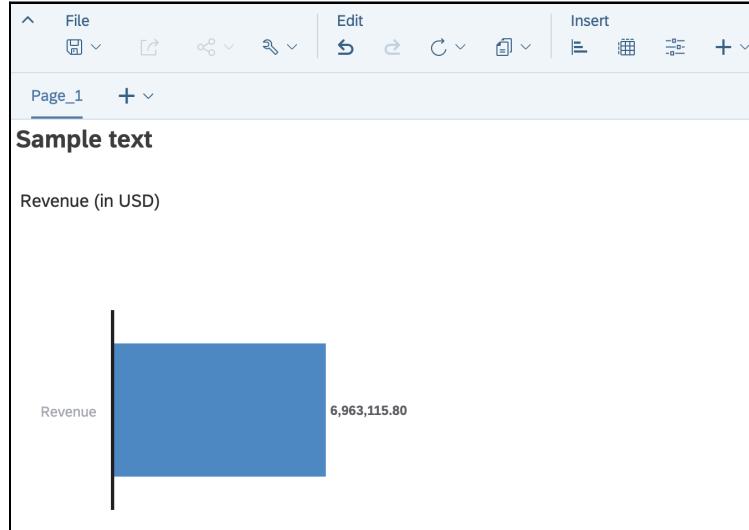


Figure 5.4 Simple Canvas Page

A canvas page is suitable for most scenarios: Its creation follows an intuitive concept, and its flexibility allows for broad usage across multiple scenarios. Also, a canvas page can be freely formatted and adjusted in size so that reports can be optimized and exported for printing.

Canvas pages are not very flexible, however, and therefore can only be accessed in browsers on desktop PCs. If you want to be able to view your stories on multiple device types, a canvas page may not suit your use case.

Responsive pages If your use case scenario explicitly requires that your story be accessed on different device types, like smartphones or big screens, you should consider using responsive pages. In general, the handling is quite similar to canvas pages, but the content is spread across multiple *lanes*. Charts, tables, and other elements are structured into these lanes. A lane can contain multiple elements, which are either next to or below/above each other. However, elements cannot overlap. [Figure 5.5](#) shows a responsive page with two lanes.

Once a story is opened on a device, SAP Analytics Cloud will automatically adjust it to fit the screen size properly. The screen width determines in that moment if the lane ordering is respected or is changed. If necessary, even the layout within lanes is displayed differently.

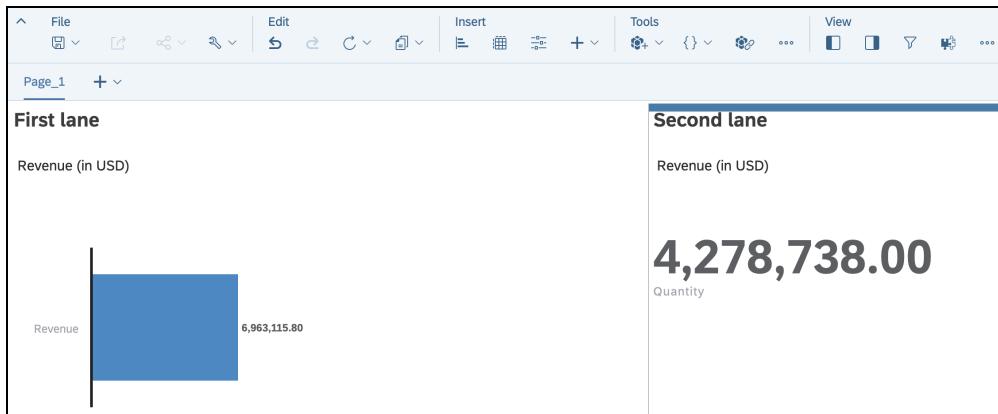


Figure 5.5 Responsive Page with Two Lanes

To see how a story looks on each device, SAP Analytics Cloud offers a built-in device preview to simulate different device types. [Figure 5.6](#) shows an example of a story previewed for a smartphone. Besides changing the element order, SAP Analytics Cloud also adjusts text sizes and some other elements based on the device.

Device preview

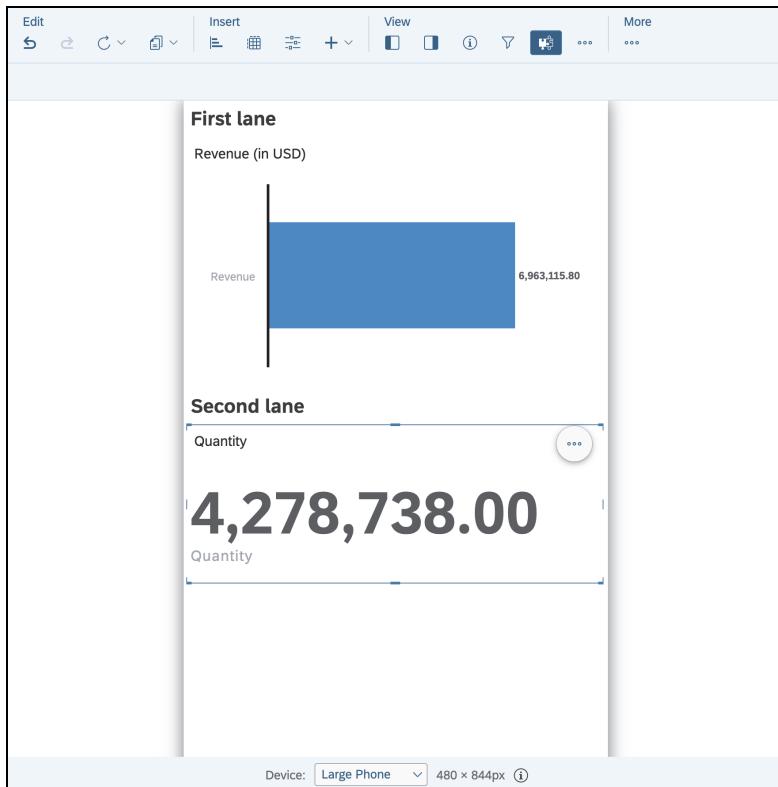


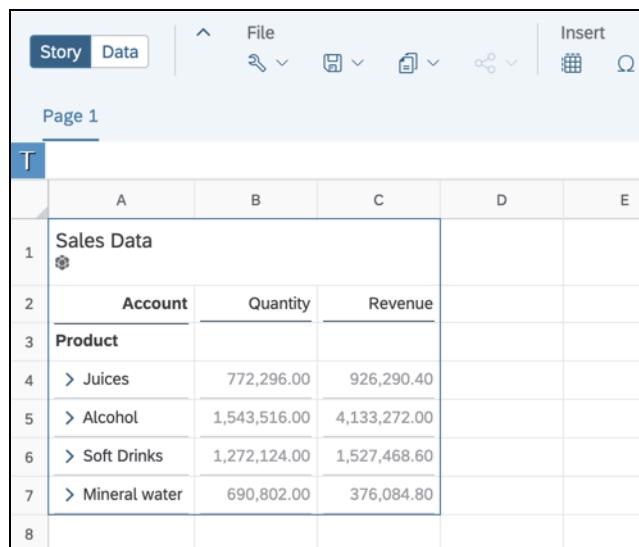
Figure 5.6 Device Preview

Instructions on how to build a story with responsive pages are presented in [Section 5.10.2](#).

Grid pages Both canvas and responsive pages support displaying tables to analyze data. However, the table is used as a chart and can be surrounded by other elements, like charts or texts. If you need a full tabular view that allows, for example, additional cell operations or side calculations, you should consider using grid pages.

This page type supports displaying multiple tables below each other and referencing single cells in formulas. Especially in planning scenarios, this capability can be quite helpful to create calculations on the side.

The grid page solely supports displaying tables and is not responsive, so it doesn't adjust itself automatically to different device types. Therefore, grid pages aren't used often in BI scenarios. More details on this page type can be found in [Chapter 6, Section 6.3](#). [Figure 5.7](#) shows a grid page with a table.



The screenshot shows a SAP Story application interface. At the top, there's a navigation bar with tabs for 'Story' and 'Data'. Below the tabs are icons for search, file, and insert. The main area is labeled 'Page 1'. A table titled 'Sales Data' is displayed. The table has columns labeled A, B, C, D, and E. Row 1 contains the header 'Sales Data' and a small icon. Row 2 contains the columns 'Account', 'Quantity', and 'Revenue'. Rows 3 through 7 contain data for 'Juices', 'Alcohol', 'Soft Drinks', and 'Mineral water' respectively, with their respective account numbers, quantities, and revenues. Row 8 is empty.

	A	B	C	D	E
1	Sales Data				
2	Account	Quantity	Revenue		
3	Product				
4	> Juices		772,296.00	926,290.40	
5	> Alcohol		1,543,516.00	4,133,272.00	
6	> Soft Drinks		1,272,124.00	1,527,468.60	
7	> Mineral water		690,802.00	376,084.80	
8					

Figure 5.7 Grid Page

5.2.2 Classic Data Exploration and Your First Charts

Now that we've discussed the different page types, it's time for your first data analysis. We'll use the *data exploration mode* of a story. Our example story will be completely built on canvas pages. Instructions for responsive page design can be found in [Section 5.10.2](#).

Data exploration mode is only available in classic mode. Since this mode is no longer recommended by SAP, the rest of the chapter will be based on the optimized mode. To launch the story in optimized mode, head to [Section 5.2.3](#).

To start the data exploration mode, open the **Stories** section of the main menu and select any page type (e.g., **Canvas**). Once asked, make sure to choose **Classic Design Experience**. Then, click on **Add data** on the left side of the story launch screen, as shown in [Figure 5.8](#).

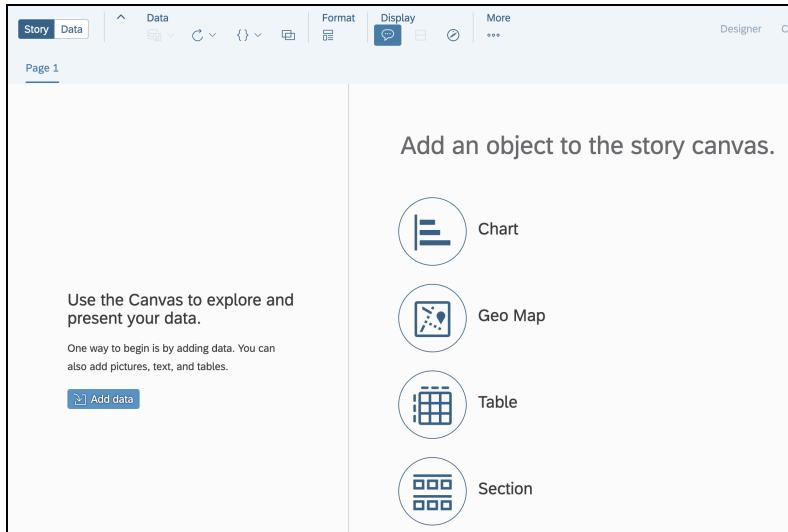


Figure 5.8 Launching Data Exploration Mode

Next, you'll choose the data source you want to access. Three options are available, as shown in [Figure 5.9](#):

Selecting a data source

- ① Uploading a flat file (Microsoft Excel or CSV)
- ② Connecting to a data source
- ③ Using an existing model or dataset

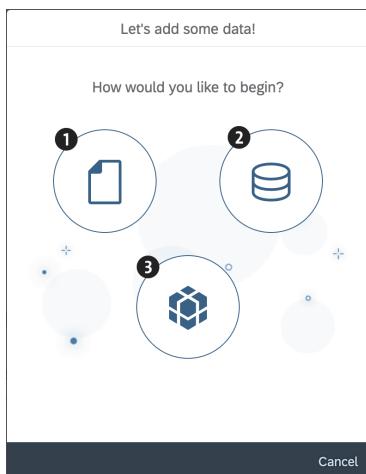


Figure 5.9 Selecting Data Sources

Because we already created our data model in [Chapter 4](#), select the **Data from an existing dataset or model** button ❸. Now, open the **Sales Data** model. You can either navigate to the subfolder or use the search function in the top right of the dialog box. Your screen should now match the screen shown in [Figure 5.10](#).

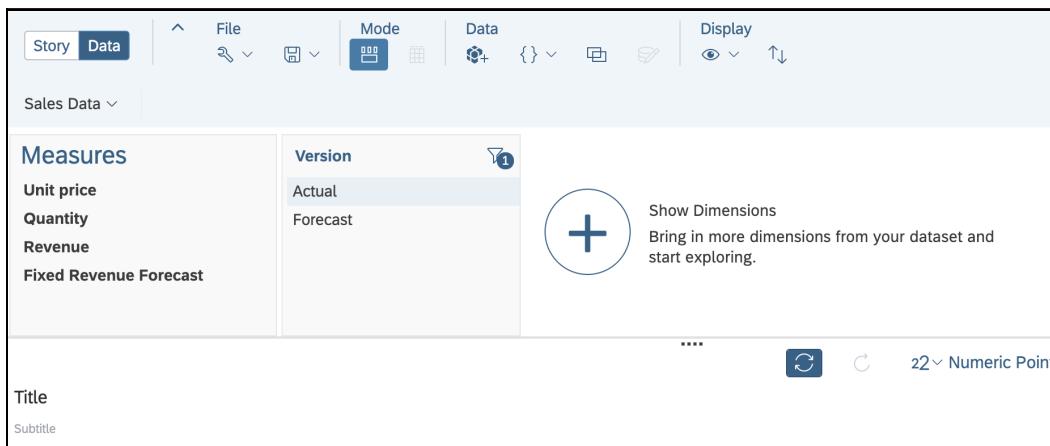


Figure 5.10 Initial View in Data Exploration Mode

Visualizing data The data exploration mode offers a quick overview of all measures, dimensions, and data in the model. You can also create your first chart in just a few clicks. To see all dimensions, click on the + button next to the **Show Dimensions** text. Then, select the **Show All** option to add all dimensions at once, as shown in [Figure 5.11](#).

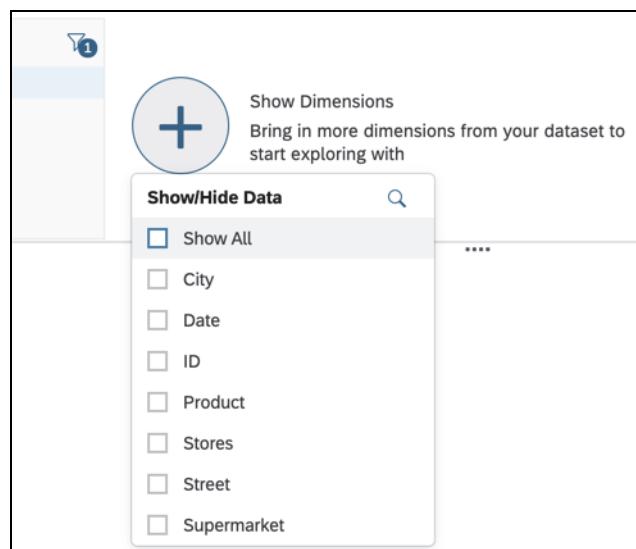


Figure 5.11 Showing All Dimensions

To create your first chart, simply click on the desired dimensions and features. The first chart should show the revenue for each chain. Therefore, click on the **Revenue** measure and the header of the **Supermarket** column, as shown in [Figure 5.12](#).

[Creating a chart](#)

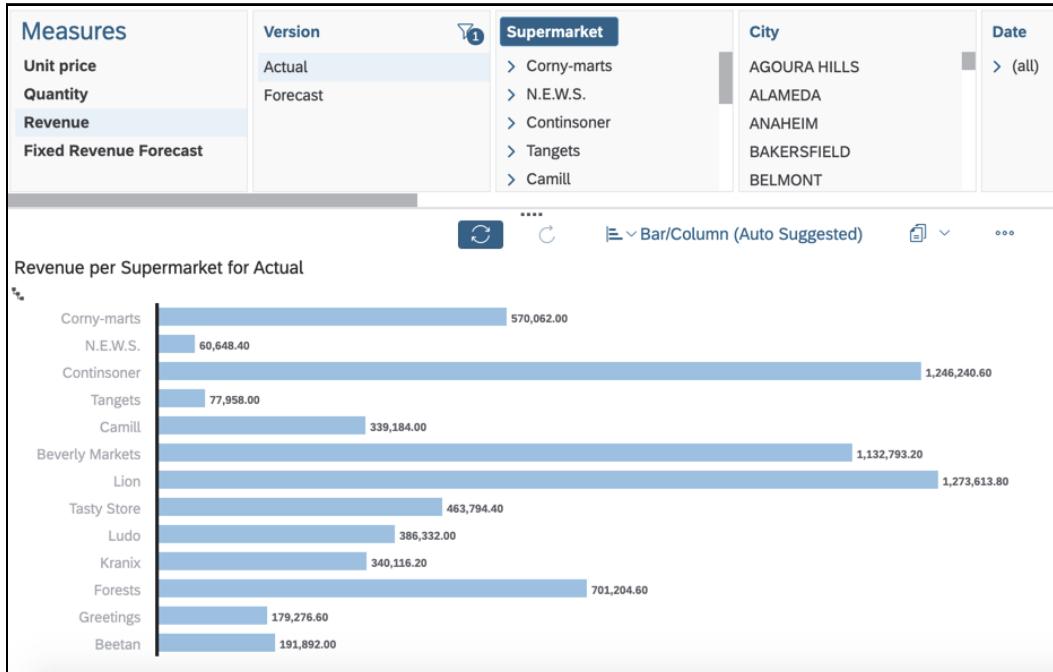


Figure 5.12 Creating Your First Chart

By selecting an entry in one of the dimension columns, you can add filters to the chart. Click, for example, on **Ludo** (in the **Supermarket** column) to see how the filter is applied. However, we want to use this chart as an overview chart, so click again on **Ludo** to remove the filter. More information about filters is presented in [Section 5.7.1](#).

[Filters](#)

The chart type selection in data exploration mode is not random. SAP Analytics Cloud recommends a chart type based on the selected data. If you want to change the chart type, you can explicitly select another one. The chart type can be adjusted at any point in time.

[Changing the chart type](#)

To change the chart type, click on the text showing the current type, which is displayed in the top right of the chart, as shown in [Figure 5.13](#). You can select another chart type. However, the bar chart is well suited for our data, so don't change the chart type for this example.

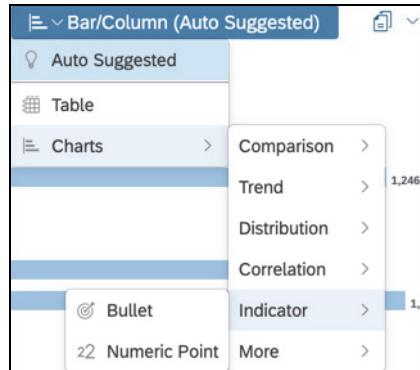


Figure 5.13 Selecting Chart Types

Display options Finally, you can adjust the display options for the chart. Because the revenue analysis should show which chain had the highest revenue, sort the chart by revenue in descending order, as shown in [Figure 5.14](#).

In general, all display and sorting options are still available later when editing the chart in the story. Detailed descriptions of these options can be found in [Section 5.3](#).

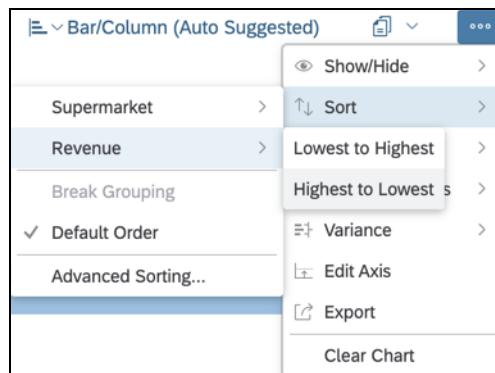


Figure 5.14 Sorting Charts

Copying to a story To continue using the chart you just created, the data exploration mode allows you to copy the chart into the story. Click the **Copy** button in the top right and select the **Copy to New Canvas Page** option, as shown in [Figure 5.15](#). Alternatively, you can just copy the chart without determining a target. The chart will then be stored in your clipboard, from which you can paste it later into the story. You can also choose to copy the chart to a new responsive page.

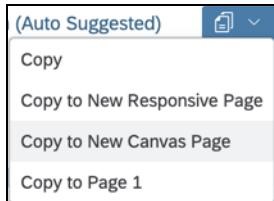


Figure 5.15 Copying Charts

The chart will automatically be pasted into the top-left corner of the new page, as shown in [Figure 5.16](#). After copying the chart, you can still fully edit and modify it.

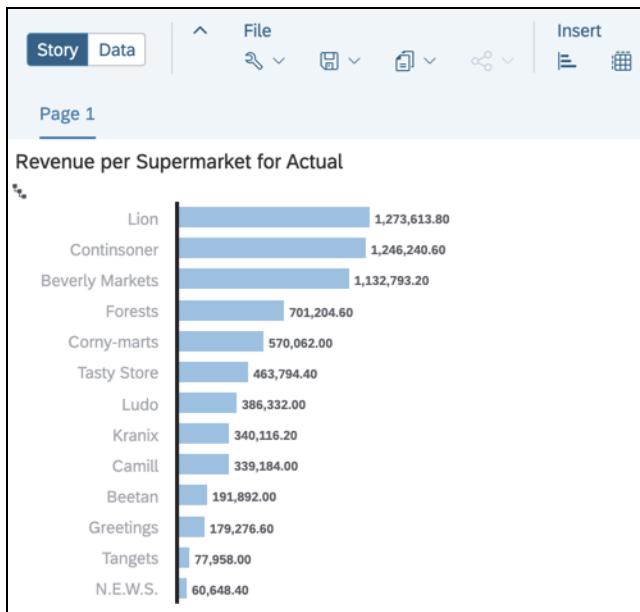


Figure 5.16 First Story Chart

Data exploration mode can be opened as often as desired. To access data exploration mode from a story, click on the **Data** button in the top left.

Accessing data exploration mode

5.2.3 Launch a New Story

To launch a new story, open the **Stories** section in the main menu and choose the page type **Canvas**. Alternatively, you can launch the story creation by clicking the + symbol in the files overview.

Then choose **Optimized Design Experience** (see [Figure 5.17](#)). Afterwards, an empty story will be launched.

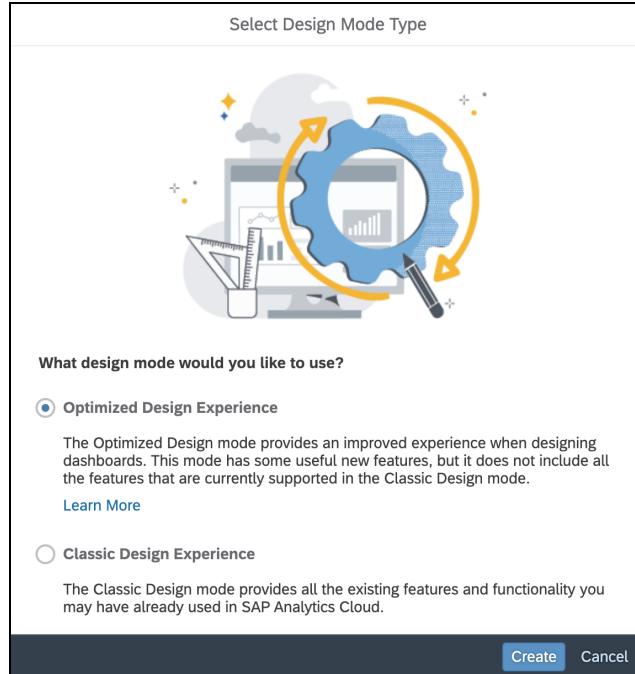


Figure 5.17 Choosing the Design Experience

In the following sections, we will only use the optimized design experience. However, some functionality is presented which is only supported in the classic design experience. The functionality will be marked as such and can be applied by creating a second story in the classic design mode.

5.2.4 Story Interface

Now that you've created the first page of your story, you'll see the full story interface, as shown in [Figure 5.18](#). At this stage, you can access all functionalities and tools of a story.

Main area In general, as shown in [Figure 5.18](#), the story interface can be separated into four areas:

- ❶ The top bar provides access to all tools.
- ❷ The buttons in the top right allow you to switch between the **Edit** mode and **View** mode of the story.
- ❸ The left sidebar contains an overview of all widgets that can be added to the story. You can simply drag the elements from this list to the canvas.
- ❹ The charting area contains the actual content of the story. Depending on the page type, this area may look different. More information about page types can be found in [Section 5.2.1](#).

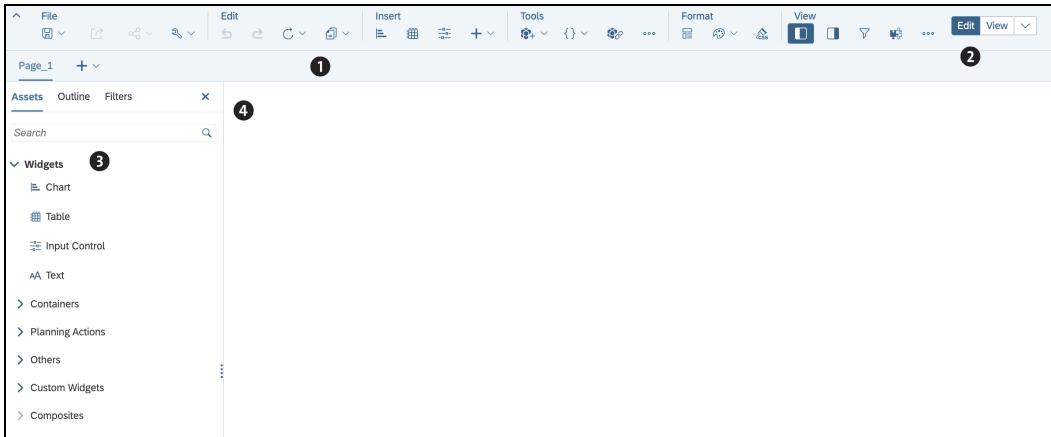


Figure 5.18 Story Interface

The top bar is separated into multiple sections, which are used to group functionalities that belong together. We'll list these sections ahead and explain them in the following sections.

The **File** section provides access to some general functionalities, as shown in [Figure 5.19](#):

- ❶ With the **Save** icon, not only can you save a story, but you can also create templates.
- ❷ With the **Export** icon, you can export the story as a PDF file. This button is only available in view mode.
- ❸ The **Sharing** button offers access to the sharing interface. In view mode, you can also schedule publications here to be regularly created.
- ❹ The wrench icon provides access to story details, preferences, and query settings for live data connections.

Top bar

File section

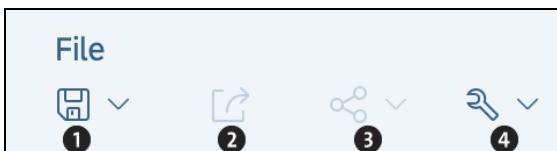


Figure 5.19 File Section

Next, the **Edit** section contains elements which are helpful in edit mode, as shown in [Figure 5.20](#):

Edit section

- ❶ By clicking on this button, you can jump one step back and revert the last change.
- ❷ This button restores a previously undone change.
- ❸ With this option, you can refresh the data from the data source and configure automatic and regular refreshes.

- ④ The **Copy** icon can be used to copy an object to the clipboard or directly to another page. It also can be used to paste content.



Figure 5.20 Edit Section

Insert section The **Insert** section contains all buttons that are used to add new elements to a story, as shown in [Figure 5.21](#):

- ① Adds a chart.
- ② Adds a table.
- ③ Adds an input control.
- ④ Further elements: **Panel**, **Geo Map**, **Image**, **Shape**, **Text**, **RSS Reader**, **Web Page**, **Value Driver Tree**, **Data Action Trigger**, **Multi Action Trigger**, **BPC Planning Sequence Trigger**, **Custom Widgets**, **Composites**, **R Visualization**, and **Symbol**.



Figure 5.21 Insert Section

Tools section The **Tools** section contains several workflows that are only necessary in some workflows, as shown in [Figure 5.22](#):

- ① By clicking on this icon, you can add additional data models and sources to the story.
- ② If the data model contains any prompts, they can be accessed with this option.
- ③ Linked dimensions can be used to link two data models which carry the same column to each other.
- ④ Chart scaling makes it possible to set fixed scales for specific measures.
- ⑤ Conditional formatting can be used to define thresholds which define how measures are colored based on their value.
- ⑥ The formula bar can be used in tables and the grid pages to fill specific cells.

In addition, you can access interfaces for value lock management ⑦, marking and unmarking cells as read-only ⑧, and showing cell references and formulas in cells ⑨. However, these tools are mainly used in planning scenarios.

Last, the linked widgets diagram ⑩ shows which widgets are in a relationship to each other. Smart discovery ⑪ can be used to automatically generate complete stories. It's only available in classic mode.

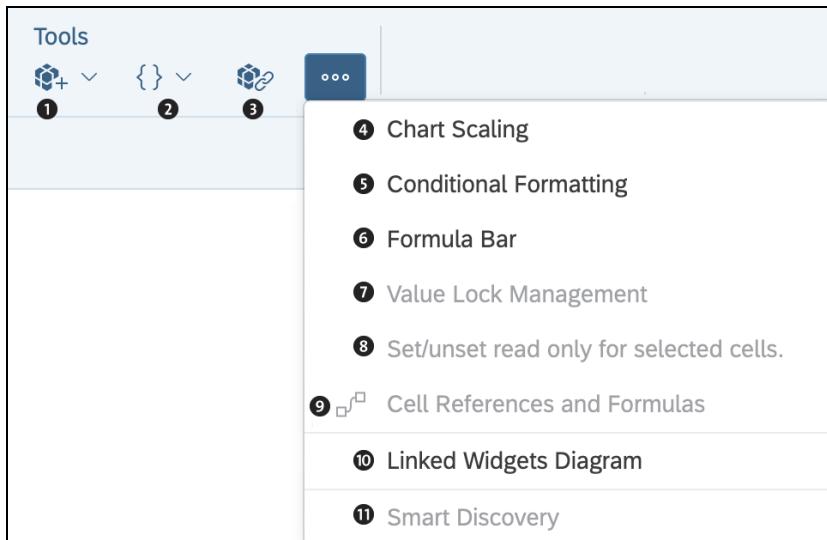


Figure 5.22 Tools Section

Finally, the **Format** and **View** sections allow you to apply layouts or toggle between different views, as shown in [Figure 5.23](#).

Format & View

- ① The **Layouts** icon opens the layout sidebar in which you can select among predefined layouts and apply them to your story.
- ② The **Theme** icon allows you to toggle between various story themes.
- ③ The **CSS** icon provides access to manipulate the story appearance by inserting CSS code. This requires deeper knowledge.
- ④ This icon opens the left sidebar from where you can access all available widgets that can be added to the story.
- ⑤ By clicking on this icon, the right sidebar can be shown or hidden. It is used to modify elements of the story.
- ⑥ With this icon, you can configure all story filters and prompts that are used in the story.
- ⑦ This icon toggles the advanced mode which enables more complex functionality. This mode will be presented in [Chapter 8](#).
- ⑧ By turning off and on this setting, the device preview bar in the bottom can be shown or hidden.
- ⑨ This option allows you to turn off and on the comment mode.



Figure 5.23 Format and View Section

More buttons Based on your screen resolution, SAP Analytics Cloud may move some elements into a list at the end of the top bar.

In the top right of the action bar, you'll find additional buttons, as shown in [Figure 5.24](#), that allow you to toggle between **Edit** and **View** mode. One of the key concepts of SAP Analytics Cloud is the intuitive user interface (UI). The **View** button allows story creators at any point in time to preview their current story from a story viewer's perspective.

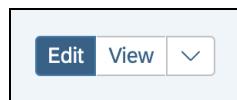


Figure 5.24 More Buttons

Saving a story In general, you can always save a story to continue working on it later. Click on the **Save** button in the top bar and choose the **Save** option. Store the story in the **Sales Data** subfolder we created earlier and name it, as shown in [Figure 5.25](#).

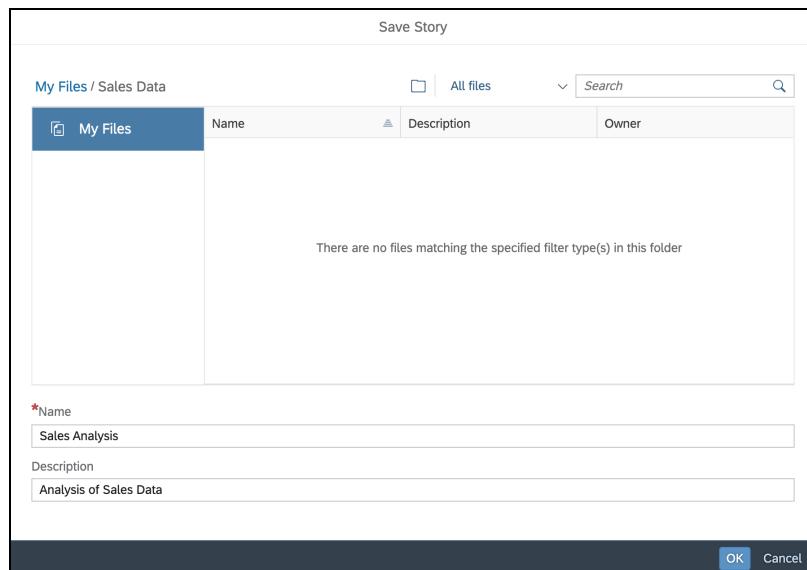


Figure 5.25 Saving Stories

5.3 Creating, Editing, and Formatting Charts

Let's now continue editing the story we created in [Section 5.2.2](#). First, let's add some charts. Then, we'll extend them via various display options and format them. Finally, we'll go over how to interact with hierarchies in the chart.

5.3.1 Creating a New Chart

By clicking on the **Chart** icon in the **Insert** section of the top menu bar, you'll add a new chart to your story, as shown in [Figure 5.26](#). The chart will automatically connect to the most recently used data model in this story. However, the model can be exchanged immediately with another one.

Advanced Mode: Unified Story

This section will only focus on functionality of the basic mode. Please deactivate the advanced mode (button 7 in [Figure 5.23](#)) for now.

The advanced mode will be presented in detail in [Chapter 8](#). There, we will work in the story which we create in this chapter.

If no data source was selected before, you are asked to choose one. In our case, choose our data model Sales Data which we created in [Chapter 4](#).

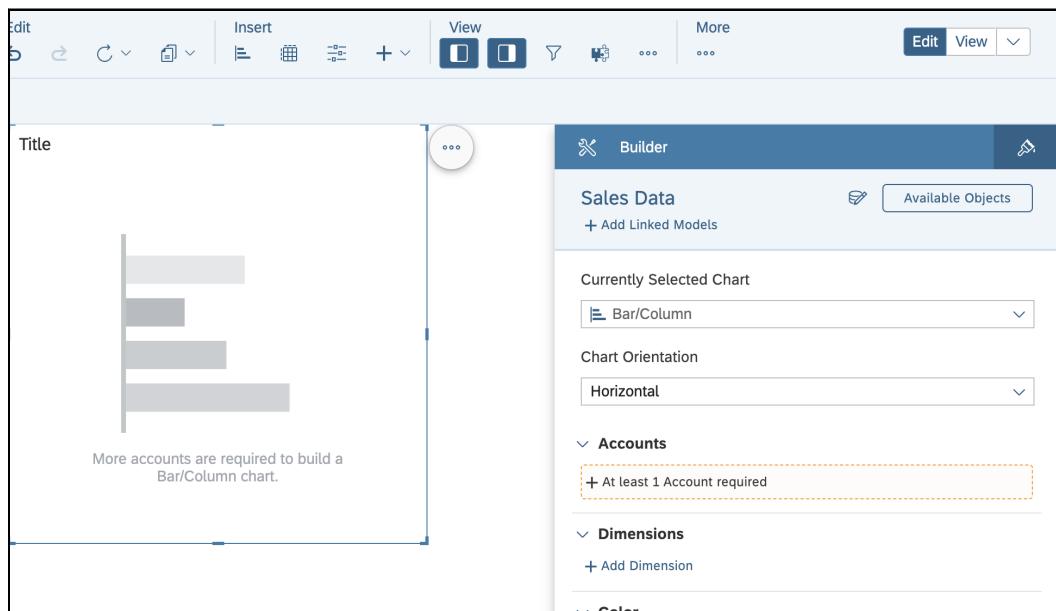


Figure 5.26 Editing New Chart in Builder

Builder The **Builder** panel will automatically open so that you can start editing and designing your first chart in the sidebar on the right, as shown in [Figure 5.26](#). The **Builder** provides the most important tools and utilities to configure a chart and format it. You can also activate various interactions and filters here. You can always access and close the builder by clicking on the right sidebar panel icon.

If not explicitly deactivated in the settings for the data model, each change in the builder will be applied immediately to the chart. You can perform the following actions in the builder, as shown in [Figure 5.27](#):

- ❶ You can change the data source from which the chart retrieves its data or add a second model via blending. More information about blending can be found in [Section 5.11.3](#).

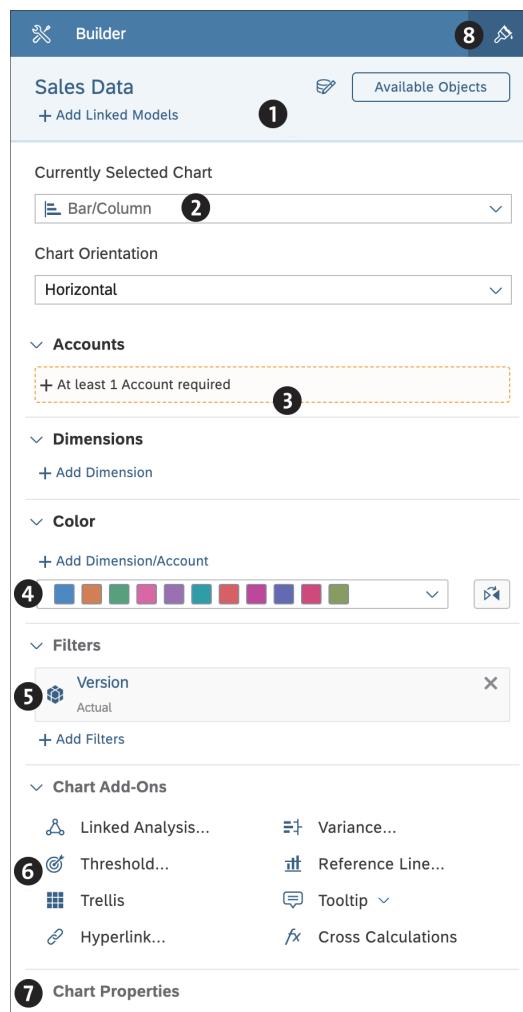


Figure 5.27 Builder Panel

- ❷ The **Currently Selected Chart** and **Chart Orientation** area can be used to change the chart type. Charts are grouped into clusters for better organization. A list of all chart types is shown in [Table 5.1](#). If you select a chart type, you'll see what information is required to display the chart.
- ❸ Dimensions and measures can be added by clicking on the **Add Measure** and **Add Dimension** buttons. These buttons will open dropdown lists of all available measures and dimensions from which to choose.
- ❹ Every chart can have its own coloring scheme, which is assigned in the **Color** area. More information can be found at the end of this section.
- ❺ To a limited extent, if you want to add a filter to the chart, you can do it in the **Filters** area. Because a story offers complex filtering functionality, we'll provide more details about this topic in [Section 5.7.1](#).
- ❻ This section allows you to extend the chart with additional elements and components (e.g., hyperlinks or variances).
- ❼ In this section, you can control various **Chart Properties**. You can activate the data analyzer for a specific chart by activating the **Enable Data Analyzer** option. The explorer can be accessed later by story viewers to individually adjust the chart to their needs without modifying the story itself.
- ❽ This button opens the **Chart Formatting** tab, with which you can design and format the chart.

[Table 5.1](#) shows a list of all available chart types shipped by default with SAP Analytics Cloud. Based on the chart type, the builder will show specific options and configurations. These settings will be discarded again if you change the chart type and the new chart type doesn't support those particular options.

Chart types

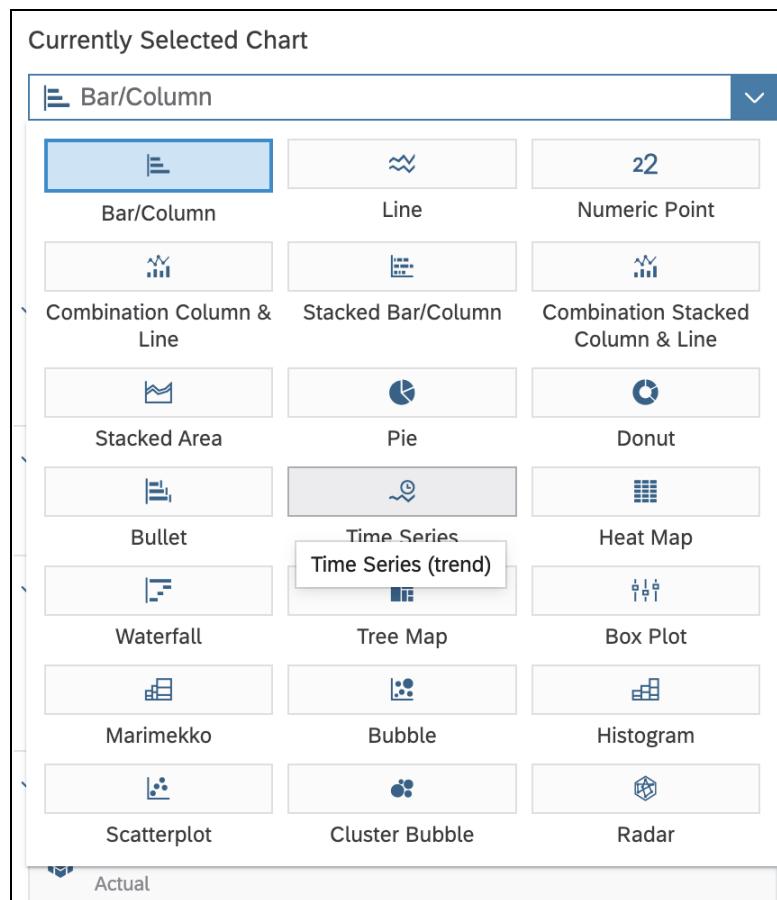
Category	Chart Types
Comparison	<ul style="list-style-type: none"> ■ Bar/column ■ Combination column and line ■ Combination stacked column and line ■ Stacked bar/column ■ Waterfall
Trend	<ul style="list-style-type: none"> ■ Stacked area ■ Line ■ Time series
Distribution	<ul style="list-style-type: none"> ■ Box plot ■ Heat map ■ Histogram ■ Radar ■ Tree map

Table 5.1 Supported Chart Types in SAP Analytics Cloud

Category	Chart Types
Correlation	<ul style="list-style-type: none"> ■ Bubble ■ Cluster bubble ■ Scatterplot
Indicator	<ul style="list-style-type: none"> ■ Bullet ■ Numeric point
More	<ul style="list-style-type: none"> ■ Donut ■ Marimekko ■ Pie

Table 5.1 Supported Chart Types in SAP Analytics Cloud (Cont.)

Time series Let's say we want to display a time series in the chart we just created. The chart should show the number of products sold over the year. Go the chart builder and select the **Time Series** chart type, as shown in [Figure 5.28](#).

**Figure 5.28** Selecting the Time Series Chart Option

Initially, the chart will show no data because you didn't select any dimension or measure. Select the **Revenue** measure and the **Date** dimension. The dimension selection automatically adjusts to the chart type. Because the time series chart requires a date dimension, only one entry is displayed, as shown in [Figure 5.29](#).

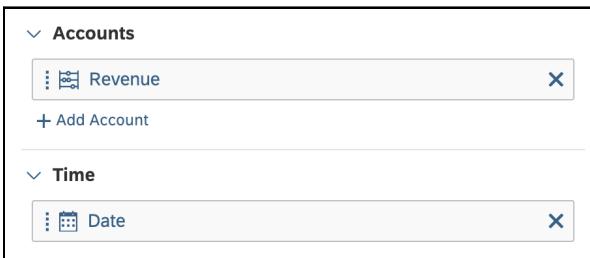


Figure 5.29 Selecting Measures and Dimensions

The Time Series Chart Is a Special Case

A time series chart is a special chart type because it only works with date dimensions. If your model doesn't contain any date dimension, the chart type can't be used.

Date hierarchies must be created during the creation of the model (see [Chapter 4, Section 4.3](#)). When using live data sources, hierarchies must either be enabled in the model or already exist in the data source itself.

Another special option for time series charts is the **Properties** tab, which shows up in the builder. This tab allows you to determine the time period is used in the diagram. You can either set your own selection and save these settings as the default view for all story viewers, or you can specify that the time series should always show the newest data. You can also collapse dates that carry no data, as shown in [Figure 5.30](#).

Additional options

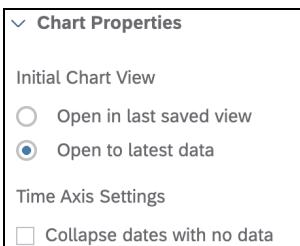


Figure 5.30 Additional Options for Time Series Charts

Because the default size of a new chart is too small to display our time series chart properly, we want to extend its width. Click on the time series chart so

Adjusting the chart size

that its blue frame is activated. Now, click in the middle of the right border, which appears thicker and keep the left mouse button pressed. Drag your mouse to the right and set the chart's width to approximately twice its initial size, as shown in [Figure 5.31](#).

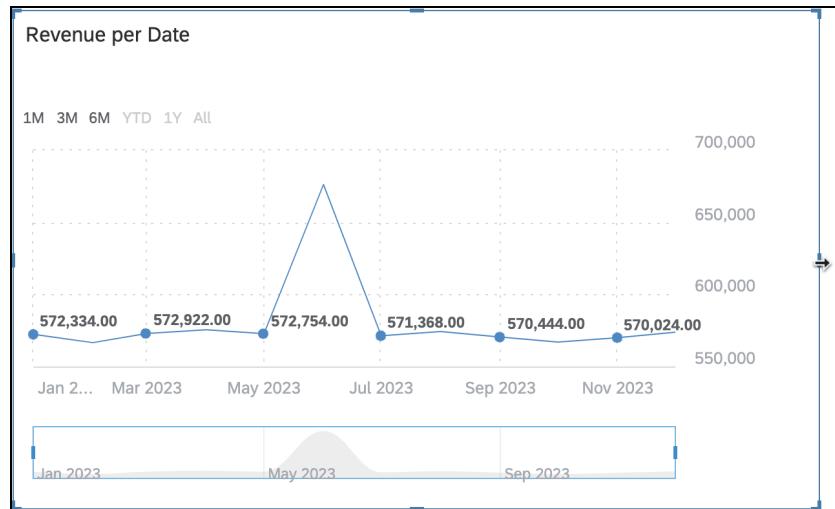


Figure 5.31 Adjusting the Chart Size

Adjusting the granularity

Time series charts offer various options for analyzing the time period in more detail. One option is to use the small chart below the data and adjust its size, time frame, and zoom level. Another option is to change the data level and show more granular data. Because our chart should only show data for each quarter, select **Drill • Date • Month**, as shown in [Figure 5.32](#).

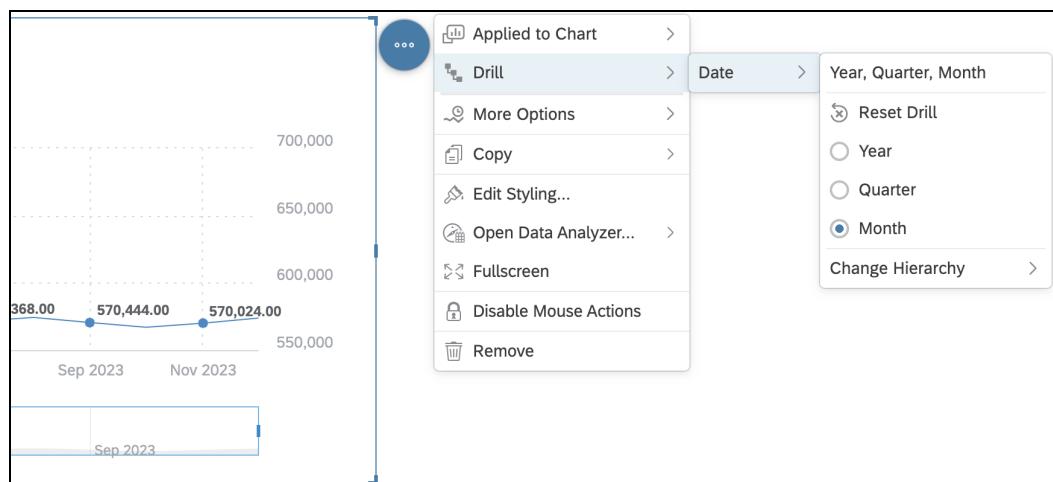


Figure 5.32 Selecting a Date Hierarchy Level

5.3.2 Adding More Charts

Let's add another chart to our sample story. This chart will be placed below the first chart. Click again on the button to add a new chart in the **Insert** section of the top bar.

By default, the chart will be placed below the first one. However, in some cases, it may appear somewhere else (e.g., next to the time series chart). You can easily move charts via drag and drop. Click anywhere on the border of the newly created chart and keep the left mouse button pressed down. Now, move the chart to the desired position. As shown in [Figure 5.33](#), the story automatically shows visual guidelines. These lines allow you to align charts exactly next to each other.

Moving charts

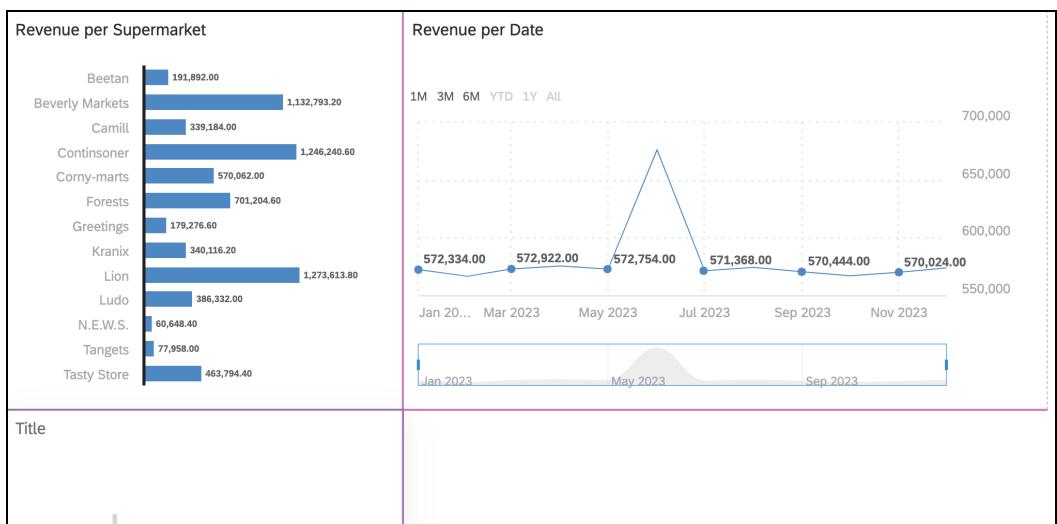


Figure 5.33 Moving Charts

Use the builder again to fill in the chart with content. For our example, you can build the following charts:

- First chart:
 - Chart type: **Bar/Column** (under the **Comparison** group)
 - Accounts: **Revenue**
 - Dimensions: **Supermarket**
- Section chart:
 - Chart type: **Numeric Point** (under the **Indicator** group)
 - Primary values: **Revenue**

5.3.3 Conditional Formatting

Now, let's say we want to extend our new chart by adding threshold-based coloring to it. This formatting can be used to change the colors of values or to show symbols based on the numbers they assume. Viewers can then immediately see if numbers are critical or not. For this feature, we must define thresholds that determine if a value is critical.

- Creating thresholds** To create rules for conditional formatting, click on the **Conditional Formatting** icon in **Tools** section of the top menu bar and then choose the **Add Threshold** option. Alternatively, you can open the builder for a chart and choose the **Create Threshold** option. Create a rule for the numeric point chart we just created, as shown in [Figure 5.34](#).



Figure 5.34 Creating Thresholds in the Builder

A new dialog box will open. Choose the **Revenue** measure and assign values for its conditional formatting, as shown in [Figure 5.35](#). Start entering the values and click on **Add Range** to add more range options. Define the thresholds as shown in [Table 5.2](#).

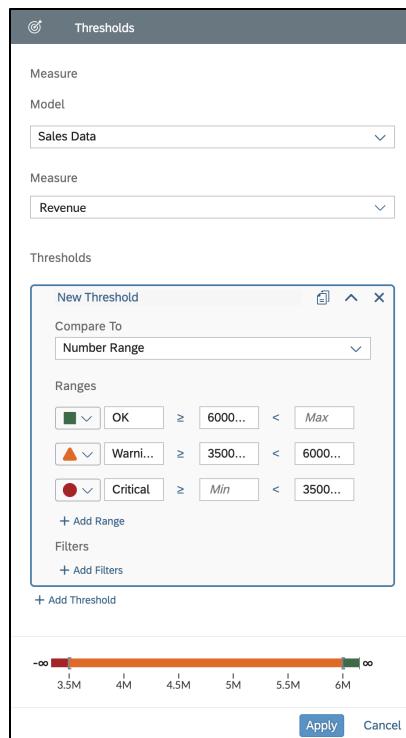


Figure 5.35 Definition of Thresholds

Range	Color	Minimum	Maximum
OK	Green	$\geq 6,000,000$	No value
Warning	Yellow	$\geq 3,500,000$	$< 6,000,000$
Critical	Red	≥ 0	$< 3,500,000$

Table 5.2 Thresholds for Our Example Numeric Point Chart

Now, click on the **Apply** button to save these thresholds, which will be applied automatically to the chart. The numeric point should now be green.

5.3.4 Showing Variances

Next, let's adjust the chart to show how the actual value compares to the forecasted value. To add variances to a chart, you can use the builder as shown in [Figure 5.36](#). Open the **Chart Add-Ons** section and then the **Variance...** option. The variance panel will open in the sidebar on the right, where you can now configure the comparison.

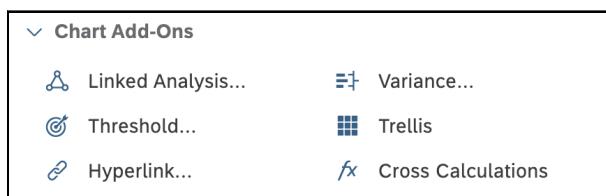


Figure 5.36 Adding Variances

You can create the following variance types, as shown in [Figure 5.37](#):

- Between two different measures
- Between two versions of a measure (e.g., actuals versus forecast)
- Between two time periods of a measure (e.g., previous year versus current year)

You also can specify the measure for which a similar variance should be calculated for each measure in the chart. You can also determine display options to indicate where and how the variance is shown.

Choose the **Revenue** measure for both **COMPARE (A)** and **TO (B)**. Afterwards, click on **Add Version/Time** and select **Version**. This step will automatically populate the **Actual** and **Forecast** versions to be compared against. Now, change the display option to show the variance in percentages instead of absolute numbers. Click on **OK** to confirm these settings.

Edit Variance (A-B)

COMPARE (A)

Account
All Accounts in Use (Dynamic)

Version
Actual

+ Add Version/Time

TO (B)

Account
All Accounts in Use (Dynamic)

Version
Forecast

Display Options

Name

Show Variance as
 Bar
 Data Label
 Integrated

Show Difference as Decimal Places
 Both Default
 Number Default
 Percentage Default

Absolute Base Value

General Display Options
 Scale with Base Chart
 Invert Colors
 No Data as Zero
 Show Integrated Label with Base Label

Variance Color

Positive <input type="button" value="▼"/>	Negative <input type="button" value="▼"/>	Null / 0 <input type="button" value="▼"/>
---	---	---

Figure 5.37 Creating Variances

The variance will automatically be shown in red if the value negative and green if positive, as shown in [Figure 5.38](#).



Figure 5.38 Numeric Point Chart with Variance

An alternative way to display variances is to follow International Business Communication Standards (IBCS), which were developed to establish common design guidelines in reporting for charts and tables. These standards are fully implemented in SAP Analytics Cloud and can be used throughout the whole solution.

IBCS

International Business Communication Standards

IBCS provides various recommendations and rules for coloring and designing charts, tables, and reports and uses patterns within charts to make common information more recognizable and easier to spot. SAP Analytics Cloud is officially IBCS-certified and supports the standards within its product out of the box. More information about the IBCS certification can be found at the following URL: <http://s-prs.co/v218504>.

The IBCS also includes recommendations on how to compare versions of measures against each other (e.g., actual versus forecast). With a new example chart, let's now apply IBCS.

Applying IBCS

Create a new chart with the following properties:

- **Chart Type:** Bar/column
- **Measure:** Quantity
- **Dimension:** Product

Place the new chart next to the numeric point we created earlier. To activate an IBCS-compliant variance, open the builder for the chart and add a **Version** dimension to the **Color** selection. Then, click on **Add Version** and select the **Forecast** version, as shown in [Figure 5.39](#).

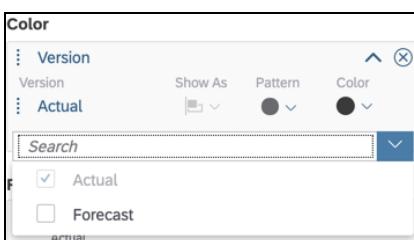


Figure 5.39 Adding Second Version

If versions are mapped correctly in the model, SAP Analytics Cloud will automatically assign patterns based on the IBCS, as shown in [Figure 5.40](#). If you want to change these patterns, use the **Show As** and **Pattern** dropdown lists in the builder.

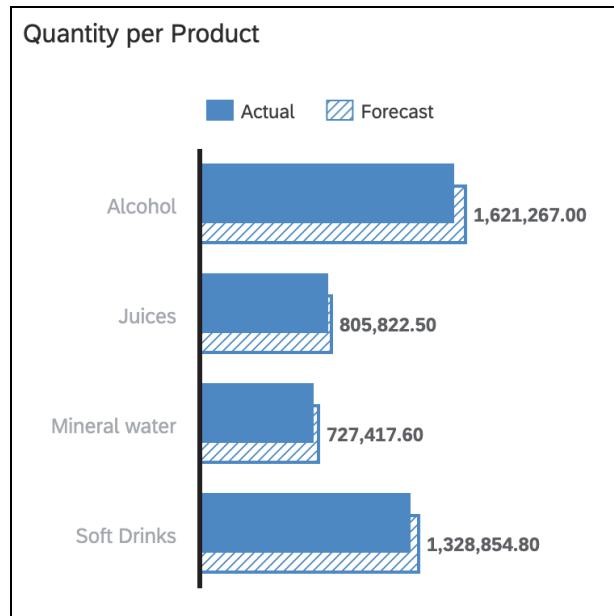


Figure 5.40 IBCS-Compliant Chart

Examples of International Business Communication Standards-Compliant Charts

You can find more examples of IBCS-compliant charts in SAP Analytics Cloud at <http://s-prs.co/v218505>.

5.3.5 Other Chart Functionalities

You can use either the builder or the action bar of a chart to further customize and configure the chart. To show the action bar, simply click on a chart and then the three dots icon appearing right next to the chart. Alternatively, you can also right-click anywhere in the chart.

- Action bar** To access other chart functionalities, open the action bar, as shown in [Figure 5.41](#).

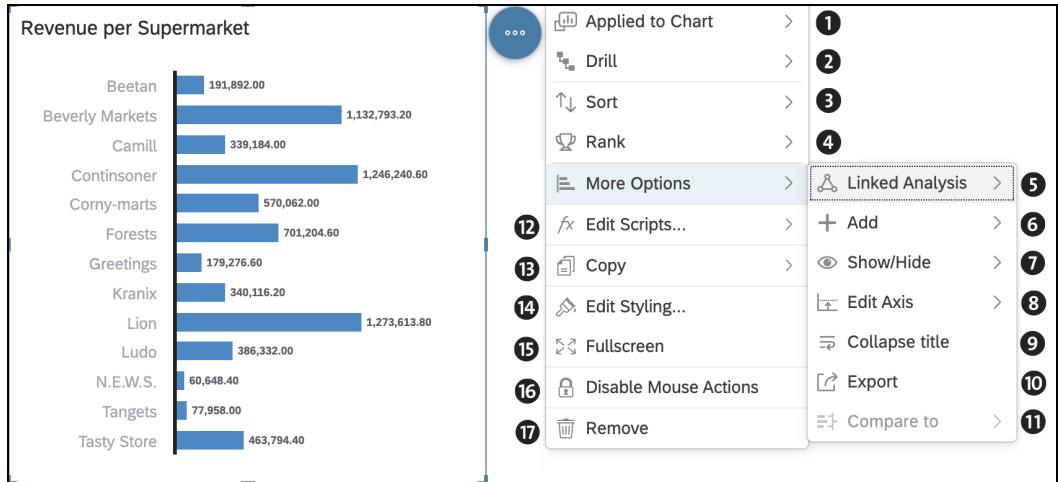


Figure 5.41 Chart's Action Bar

You can use the action bar to access various tools and functions that directly influence the chart, such as the following:

- ① This option shows all controls and filters that are applied to this chart.
- ② If a hierarchy is present, it can be drilled down here. Alternatively, you can toggle between different hierarchies if more than one are available for a dimension.
- ③ Sorting options can be used to influence the sorting behavior of the chart. You can use complex sorting functionality to adjust the sorting order to meet your individual needs.
- ④ This option allows you to activate various ranking features. You display only the top or bottom N entries of a chart (e.g., top 20 supermarkets by revenue) for example.
- ⑤ With this option, you can activate the **Linked Analysis** feature. More information about **Linked Analysis** can be found in [Section 5.7.3](#).
- ⑥ This submenu provides various elements that can be added to a chart, including thresholds, reference lines, and tooltips.
- ⑦ Use this submenu to show and hide specific elements of a chart like its title, subtitle, or legend.
- ⑧ With this option, you can configure the axis settings of a chart.
- ⑨ If the chart's title is too long, you can collapse the title with this option.
- ⑩ The **Export** option allows you to export the data used to render the chart either as a Microsoft Excel or CSV file.

- ⑪ With this option, you can activate comparisons and variances between measures in a chart. In optimized mode, it can currently only be accessed via the builder.
- ⑫ If a script is used to modify the chart's behavior, it can be edited here.
- ⑬ This option is identical to clicking the **Copy** button in the top bar. You can copy the chart to the clipboard or to a specific page.
- ⑭ This option opens the formatting sidebar for the chart.
- ⑮ To see a chart in detail, you can open the fullscreen view with this button.
- ⑯ If you want to block all interactions for a chart in view mode, you can activate this option.
- ⑰ This option deletes the chart. Alternatively, you can simply select a chart by clicking on it and press **Delete** or **Backspace**.

The context menu may change in look and behavior depending on the chart type currently in use.

Reference lines Now, let's add a reference line to the chart. Open the action bar and choose the **More Options • Add • Reference Line** options. Reference lines provide an immediate comparison of measures in a chart to a reference value. You can define either a fixed value or dynamic value. Switch the reference line **Type** to **Dynamic** in the right sidebar. Choose the **Revenue** measure and **Average** for the **Aggregation** method, as shown in [Figure 5.42](#). Alternatively, you can choose to use the maximum or minimum value.

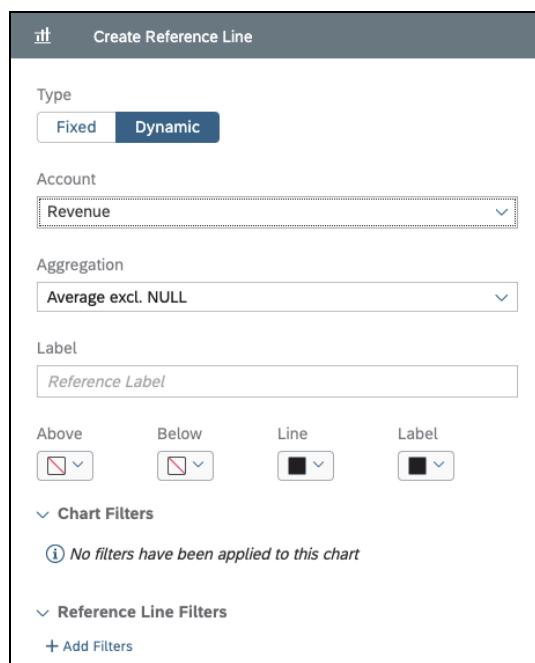


Figure 5.42 Creating Reference Lines

The other settings can be used to modify the label and appearance of the reference line. Also, a filter can be set to calculate the reference line for specific dimension members only. Leave those settings in their default state and confirm the creation of the reference line by clicking on **OK**. The result should match the chart shown in [Figure 5.43](#).

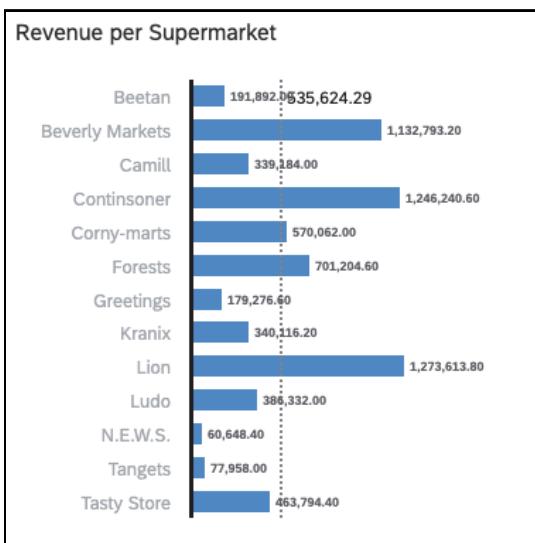


Figure 5.43 Chart with Reference Line (Average)

In addition, we can add a *tooltip* to the chart. A tooltip is shown when a user hovers the mouse over a data point in a chart. Tooltips can show additional measures or dimensions.

Tooltip

Use either the builder or the chart action bar to create a new tooltip. Choose the **More Options • Add • Tooltip • Dimension** options in the action bar of the first chart we created. This step will add a new entry to the builder in which you can select the **Tooltip Dimensions**. Click on **Add Dimension** and choose the **City** dimension, as shown in [Figure 5.44](#).



Figure 5.44 Adding Tooltip Dimensions

If you now hover your mouse over one of the bars in the chart, you'll see a tooltip listing all cities in which this specific store is represented, as shown in [Figure 5.45](#). Alternatively, you can also show additional measures in a tooltip.

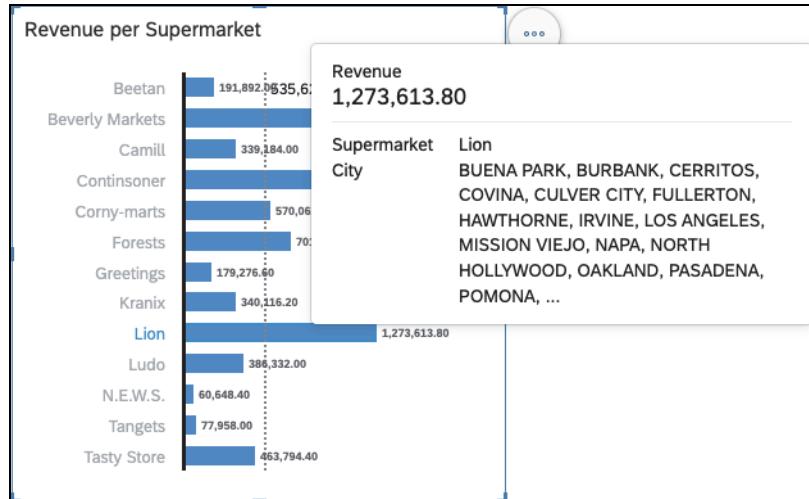


Figure 5.45 Tooltip for Lion Chain Cities

- Top 5** We described sorting options earlier in [Section 5.2.2](#), but now let's add a ranking to the chart. In this example, we only want to see the five strongest chains by revenue. Select the **Top 5** option from the **Rank** menu of the action bar, as shown in [Figure 5.46](#).

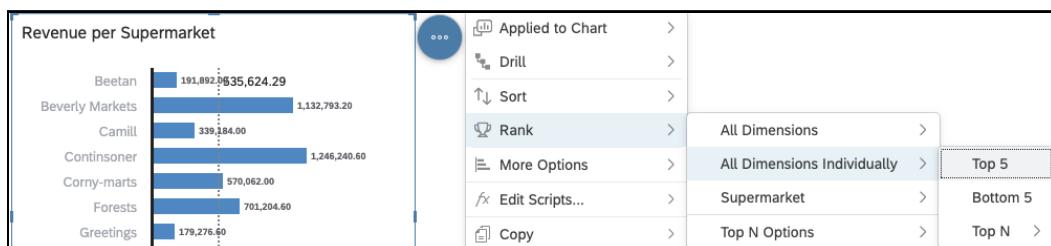


Figure 5.46 Selecting Top 5 Option

If you want to customize the rank settings to show the top ten, for example, select **Top N Options**. You can also show the lowest-performing supermarkets.

Additional elements The action bar or the builder provides various other elements that can be added to charts to extend their insights, which we'll present briefly.

Trellis A *trellis* can be enabled to show a chart multiple times per dimension for each member of each dimension. If you base a trellis on a time dimension, you'll see multiple charts of the same type, with each chart representing a specific period, as shown, for example, in [Figure 5.47](#).

The **Error Bar** menu adds a thin line to each data point that can be used to display potential error values. These error values can be either determined

by using fixed deviations (e.g., 10% above and below) or by indicating another measure from the model. [Figure 5.48](#) shows a chart with an error bar ranging 10% above and below the actual value. The error bar is currently not supported in optimized mode.

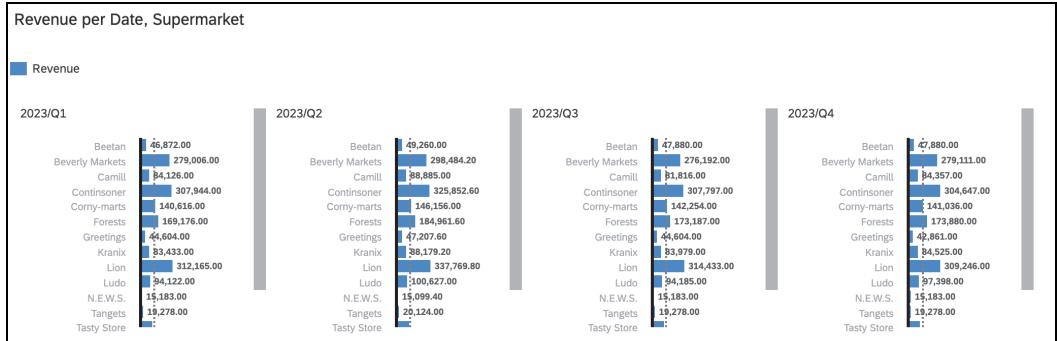


Figure 5.47 Trellis for Date Dimension

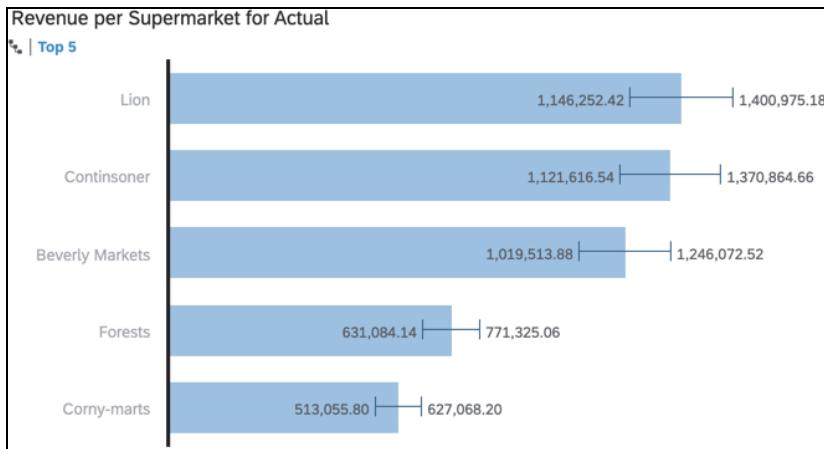


Figure 5.48 Chart with Error Bar

The **Hyperlink** option can be used to define jumps to other stories or pages. This option is described in detail in [Section 5.7.3](#). Hyperlinks are also used in SAP Digital Boardroom (see [Chapter 9](#)).

Hyperlinks

5.3.6 Defining Colors

You can also adjust the coloring of a chart and further customize it. The builder provides a set of predefined color palettes, as shown in [Figure 5.49](#). These color palettes are applied when a chart carries more than one dimension or measure to provide optical separation.

Color palettes

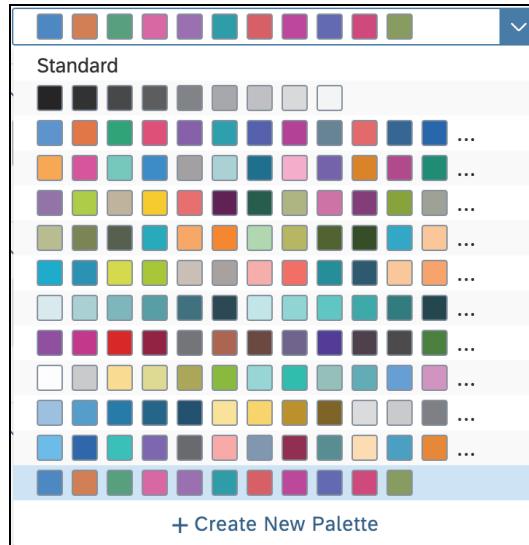


Figure 5.49 Color Palettes

Customer color palettes In addition to using the default color palettes, you can also create your own custom color palettes. Click on **+ Create New Palette** to open the color palette. In this dialog box, you can define up to nine custom colors. You can define each color either by moving your mouse over a color palette or entering specific color codes (in RGB, HSV, or hex formats). In addition, you can also use the conditional formatting feature, described in [Section 5.3.3](#), to define specific colors for individual dimension members.

5.3.7 Formatting Charts

The formatting engine of SAP Analytics Cloud is quite detailed and can be accessed either via the action bar of the chart (**Edit Styling...**) or by clicking the **Brush** icon in the top right of the builder, as shown in [Figure 5.50](#).



Figure 5.50 Accessing Chart Formatting Options

Formatting options The formatting options automatically adjust to the object that you're formatting. Based on the chart type, you'll see the following options, as shown in [Figure 5.51](#):

■ Generic Properties

Here, you can rename the ID of the chart and assign it to a CSS class.

■ Quick Menus

This allows you determine which options are available for viewers in the chart.

■ Size and Position

If you want to adjust the size and position of the chart manually, you can enter the values here.

■ Widget

You can change the color of the chart background with this option. You can also activate a partial or full frame around the chart.

■ Actions

If you're working on a canvas page, objects can overlap each other. These buttons allow you to arrange objects and determine which objects are put in the foreground and background.

■ Boardroom Properties

These properties are described in detail in [Chapter 9](#). This option is only available in classic mode.

■ Data Points

This option fills the data points with a color if desired.

■ Font

With these properties, you can change the font, text size, color, and text styles. You can also change these settings for specific elements of the chart.

■ Number Format

With these properties, you can change the scale settings and scale format for all or specific measures. You can also determine how many decimal places are shown and how signs are shown.

■ Legend

This option lets you change the placement and alignment of the chart legend.

■ Labels

This option allows you to change the direction and truncation of axis labels. You can also specify whether data labels can overlap each other and whether their values should be rounded or not.

■ Axis

You can change the color of the axis line.

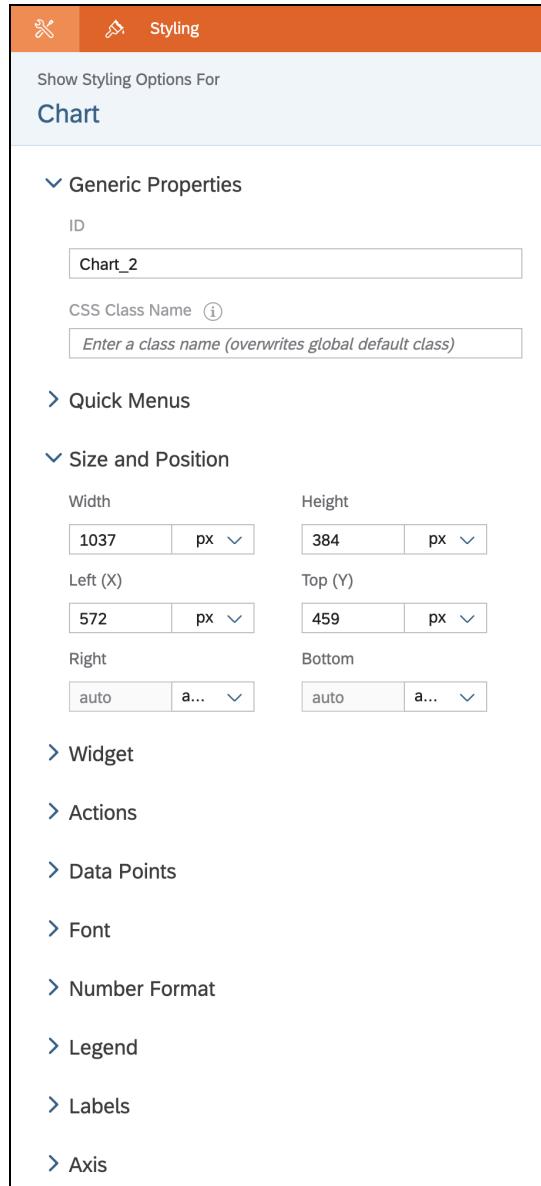


Figure 5.51 Formatting Options

Try out the various formatting options with the chart we created earlier and observe how the chart changes. Extend this knowledge to other charts you've created and get familiar with the different formatting options for each chart type.

- Chart titles** You can also edit the chart's title and its subtitle. Double-click on the title or subtitle so that the text is selected. Now, you can enter any text you want.

5.3.8 Hierarchies

SAP Analytics Cloud supports the creation and display of hierarchies from selected data sources (both live connections and import connections). If the chart contains a hierarchical dimension, you can expand this dimension, as shown in [Figure 5.52](#) by either clicking on the **Hierarchy** icon in the action bar or right-clicking on a data point ① and then selecting the **Drill Down** option ②. When drilling down into a hierarchy, the chart will automatically only show the children of the previously selected node. If you want to display all children of all nodes, select the **Expand** option ③.

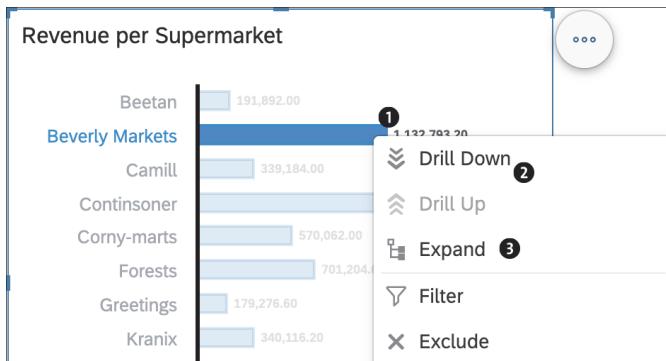


Figure 5.52 Drilling Down into Hierarchies

Save Current Status

Feel free to save your progress throughout this chapter anytime you want, which also allows you to continue working through the examples later. More information on saving can be found in [Section 5.2.4](#). To validate your progress and for a template on renaming your charts, open the *Checkpoint 1 – Section 5.3.8.pdf* file from the demo data package at www.sappress.com/5753.

5.4 Creating, Editing, and Formatting Tables

In addition to charts, tables are another commonly used element in stories. If a table is added to a canvas or responsive page, it will be treated like a chart but still support the full table functionality. It can be placed and resized freely within the page.

Create a new page by hovering your mouse next to **Page 1** in the page bar. A **+** button will appear. Click on it and select **Canvas**. Then, click on the **Table** button in the **Insert** section of the top bar. The table will initially show a small amount of data, as shown in [Figure 5.53](#). If you create a table based on

Creating a
new table

a live data source that already provides a table layout, for instance, a query layout in an SAP Business Warehouse (SAP BW) query, that table will be automatically shown on this canvas page.

Sales Data	
Account	Unit price
	32,661.90

Figure 5.53 A New Table

- Builder** As with charts, tables are also edited in the builder (see [Section 5.3.1](#)). Use the builder to add the **Product** and **Supermarket** dimensions to the rows in the table. Then, sort the dimensions so that supermarkets are shown first. To change the dimension order, hover over the four dots shown to the left of the dimension in the builder, as shown in [Figure 5.54](#). Then, drag and drop the dimension to the desired position.

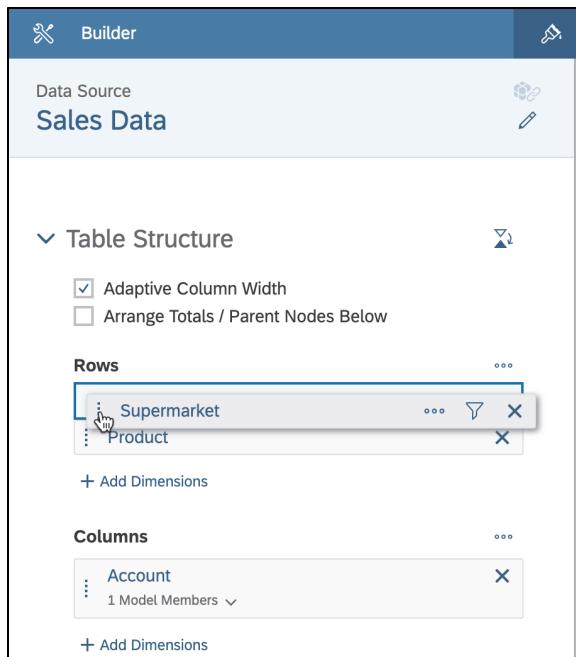


Figure 5.54 Dragging Dimensions in the Builder

- Measures** Let's say we also want to see other measures in this table. Remove the **Unit price** measure and show the **Revenue**, **Quantity**, and **Fixed Revenue Forecast** measures. Click on the filter icon shown to the right of the **Account** dimension, as shown in [Figure 5.55](#).



Figure 5.55 Account Dimension in the Builder

Now, choose the measures, as shown in [Figure 5.56](#). To display hierarchies (depending on their availability) or the IDs of each measure, click on the up arrow icon, next to the magnifying glass.

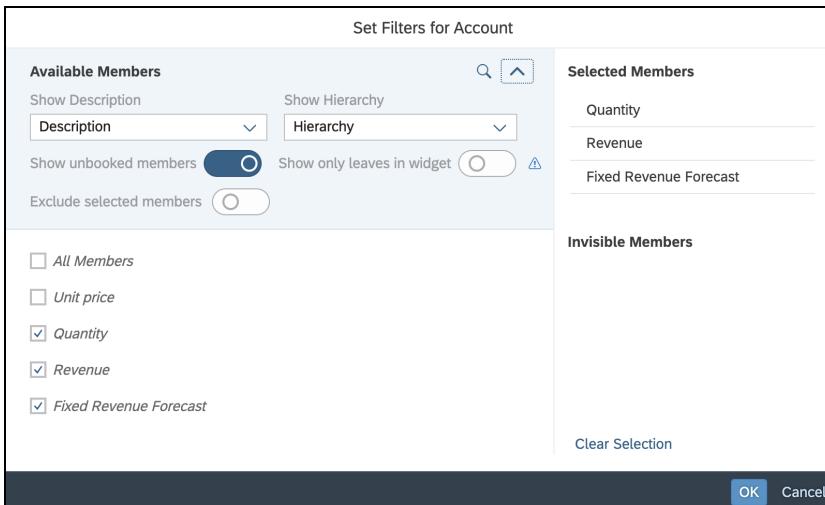


Figure 5.56 Selecting Measures

Now, extend the size of the table so that it shows enough data, as shown, for example, in [Figure 5.57](#). Like charts, tables also have an action bar that you can access either to the right of the chart or by right-clicking the table (see [Section 5.3.5](#)). The following actions are available in tables only:

- **Drill**

If a hierarchy is available in a table, you can drill down into it.

- **Freeze**

You can freeze the table up to a specific row or column so that those rows or columns are always displayed.

- **Swap Axis**

This functionality swaps the row and column axes.

- **Resize Table to Fit Content**

This functionality automatically resizes the table to show the current content.

■ Mass Data Entry

If a planning model is shown in the table and the mass data entry functionality is activated, users can enter multiple data points before the data is changed.

Sales Data				
	Account	Quantity	Revenue	Fixed Revenue Forecast
Supermarket	Product			
> Beetan	> Alcohol	42,549.00	115,648.00	173,472.00
	> Juices	21,532.00	25,687.20	38,530.80
	> Mineral water	17,080.00	9,378.60	14,067.90
	> Soft Drinks	34,286.00	41,178.20	61,767.30
> Beverly Markets	> Alcohol	249,662.00	662,837.00	994,255.50
	> Juices	134,155.00	160,041.00	240,061.50
	> Mineral water	126,924.00	69,799.80	104,699.70
	> Soft Drinks	199,934.00	240,115.40	360,173.10
> Camill	> Alcohol	74,841.00	200,073.00	300,109.50
	> Juices	42,644.00	50,786.40	76,179.60
	> Mineral water	31,430.00	17,119.20	25,678.80
	> Soft Drinks	59,346.00	71,205.40	106,808.10

Figure 5.57 Extended Table

By right-clicking on a specific data cell, you can call data-related functionalities.

Formatting and IBCS The formatting of tables is quite similar to charts. Special settings, however, are grouped under **Table Properties**. With these options, you can select a table template and change how thresholds are shown. If you choose the **Report-Styling** template, as shown in [Figure 5.58](#), for example, the table will automatically comply with IBCS, as described in [Section 5.3.4](#).

You can also format individual cells or rows and columns of the table. Click on the specific object you want to format. The sidebar will automatically adjust and show you all available options. Close the formatting panel by clicking on the **Designer** button or return to the builder to continue editing the table.

In-cell charts You can also add further elements to the table. First, let's improve how single cell values are compared by adding a chart to each row. Right-click on the header of the **Revenue** column and activate **In-Cell Chart**, as shown in [Figure 5.59](#).

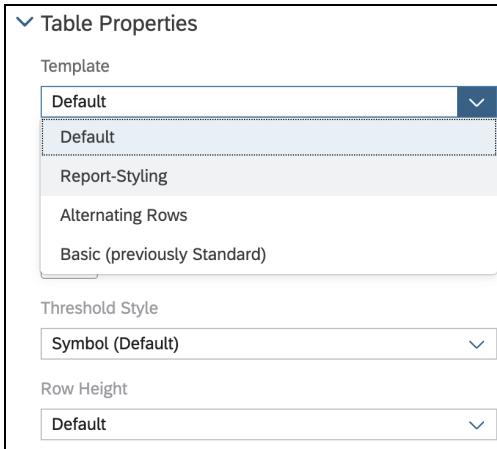


Figure 5.58 Selecting a Table Template

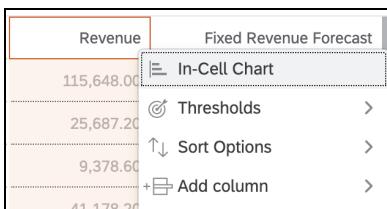


Figure 5.59 Activating In-Cell Charts

Now, in-cell charts will be automatically generated and displayed. [Figure 5.60](#) shows the in-cell charts we just created in our table. By using the builder, you can configure these charts as well.



Figure 5.60 In-Cell Charts in Table

By using the action bar, you can add additional elements to the table or perform additional configurations. You can define thresholds or sorting options and even insert new rows and columns. In addition, SAP Analytics Cloud delivers predefined calculations that you can apply to a table. Right-click on the header of the **Revenue** column and select **Add client calculation • Rank Number • Single**, as shown in [Figure 5.61](#). A new column will be added that

Additional elements

assigns a rank to each row. If you select the **Single** option, the ranks are calculated for each combination of dimension member separately. If you select **Repeating**, the calculation will be repeated for each occurrence of the dimension member.

Revenue	
115,648.00	
25,687.20	
9,378.60	
41,178.20	
662,837.00	
160,041.00	
69,799.80	104,699.70
240,115.40	360,173.10
200,073.00	300,109.50
50,786.40	76,179.60
17,119.20	25,678.80
71,205.40	106,808.10
755,906.00	1,133,859.00

Figure 5.61 Calculating Ranks

Hierarchies Tables also support displaying hierarchies. To expand these hierarchies, either select the **Hierarchy** option in the action bar or click on one of the arrows next to each supermarket chain or product group, as shown in [Figure 5.62](#). An arrow indicates that the entry has children.

Sales Data				
		Quantity	Revenue	Fixed Revenue Forecast
	> Alcohol	42,549.00	115,648.00	173,472.00
	> Juices	21,532.00	25,687.20	38,530.80
	> Mineral water	17,080.00	9,378.60	14,067.90
Beeta	> Soft Drinks	34,286.00	41,178.20	61,767.30
	> Alcohol	42,549.00	115,648.00	173,472.00
	> Juices	21,532.00	25,687.20	38,530.80
	> Mineral water	17,080.00	9,378.60	14,067.90
Beetan	> Soft Drinks	34,286.00	41,178.20	61,767.30
	> Alcohol	249,662.00	662,837.00	994,255.50
	> Juices	134,155.00	160,041.00	240,061.50
	> Mineral water	126,924.00	69,799.80	104,699.70
Beverly Markets	> Soft Drinks	199,934.00	240,115.40	360,173.10
	> Alcohol	74,841.00	200,073.00	300,109.50

Figure 5.62 Hierarchies Displayed in a Table

Because we want to have the total at the end of the table, open the builder and activate the **Arrange Totals/Parental Nodes Below** option. Now, all totals and parental nodes will be displayed below their children.

Save the story and validate your progress by comparing your story to the *Checkpoint 2 – Section 5.4.pdf* file from the demo data package.

5.5 Geo Maps

An especially useful feature of SAP Analytics Cloud is its embedded geo map functionality. Shipped by default with the product, the data model must include geographical information (see [Chapter 4, Section 4.3.2](#)). A geo map is inserted into a story as a separate object but is treated like any normal chart.

Let's add a third page to our story of the type **Canvas**. Then, click on the + button in the top bar and choose **Geo Map**. Extend the size of the geo map.

[Creating geo maps](#)

The geo map generally follows a content layer-based concept. Starting with the base layer, you can add multiple layers to one geo map, with which you can visualize geographical data. The base layer is used to determine the map shown in the background. The content layers then retrieve data from models and show the location dimension members on the map.

[Content layers](#)

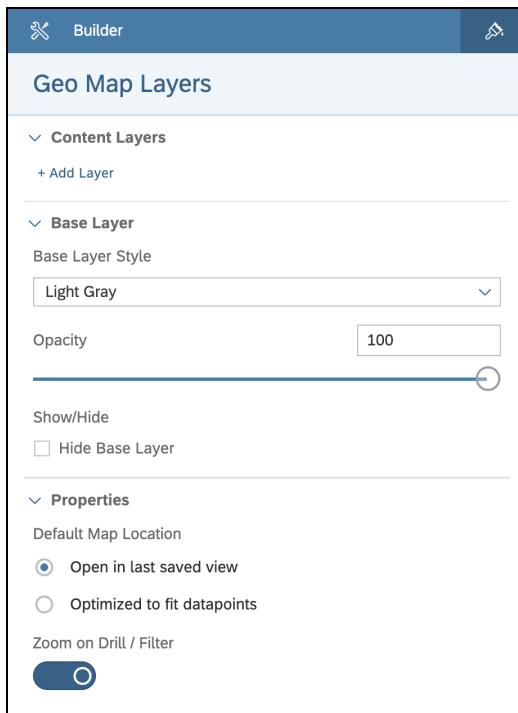


Figure 5.63 Builder for Geo Maps

- Builder** The builder for a geo map is different from the one used for charts and tables, as shown in [Figure 5.63](#). You can create all content layers in the builder and choose which map is used for the base layer. You can also configure which zoom level should be shown by default. If a filter is set, the map can automatically zoom in on the filtered data.
- Creating content layers** First, we'll change the base layer map. Click on the map icon next to **Base map** and select the **Streets** map. Then, click on **Add Layer** to add a new content layer. The newly created content layer will be empty, which means you must select a model first. Click on the pen button and select the **Sales Data** model. Next, you must select the layer type. An overview of all layer types is shown in [Table 5.3](#). Leave the default settings so that the **Bubble Layer** type is selected.

Layer Type	Use Case
Bubble Layer	Shows individual points at specific locations that can differ in color and/or size based on measures.
Point of Interest Layer	Shows locations without measures. This layer is only available in classic mode.
Heat Map Layer	Shows the distribution of values around individual locations and how high or low they are.
Choropleth/Drill Layer	Supports displaying geographical hierarchies.
Feature Layer	This layer can embed external shapefiles provided by an Esri ArcGIS server. These files can be used to show roads, specific regions, or streets, for example. This layer is only available in classic mode.
Flow Layer	Shows flows between two locations. The thickness and color of each line can be driven by a measure. This layer is only available in classic mode.

Table 5.3 Layer Types for Geo Maps

Select the **Stores** dimension and select **Quantity** for the **Bubble Color** option and **Revenue** for the **Bubble Size** option. Compare your screen to the screen shown in [Figure 5.64](#). In the builder, you can further define how bubble colors and sizes are affected by a measure.

- Cluster properties** Under **Cluster Properties**, you can turn **Location Clustering** off and on. Clustering will automatically group locations that are close to each other to reduce the number of data points on a map. This option also greatly improves the loading time for a story if many data points are shown on the map. Let's keep this option activated and confirm the content layer by clicking on **OK**. The

resulting map should match the screen shown in [Figure 5.65](#). Rename the map's title to "Supermarkets."

Double-click anywhere on the map to zoom in or use your mouse's scroll wheel to zoom in and out of the map. You can move around the map by clicking on it and then holding the left mouse button down while moving around the mouse.

Zooming and moving

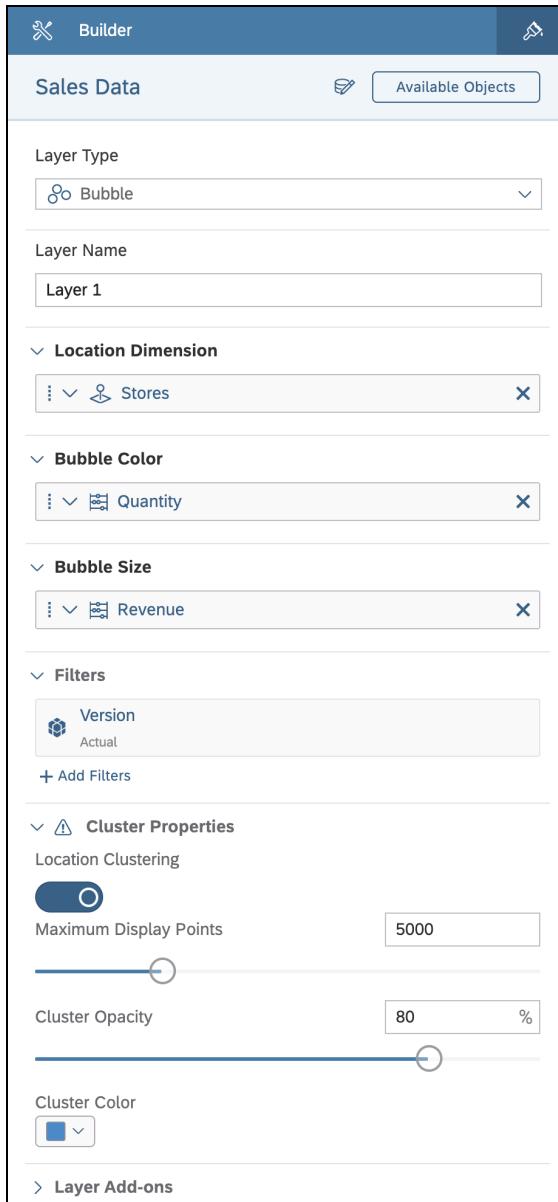


Figure 5.64 Creating New Content Layer

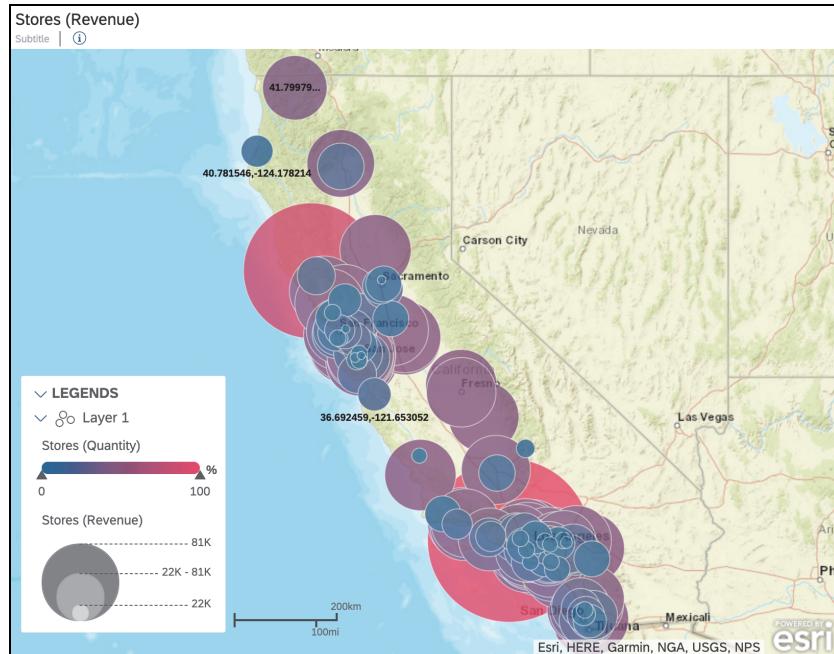


Figure 5.65 Geo Map

When you're done exploring the map, save the story and verify your current progress against the *Checkpoint 3 – Section 5.5.pdf* file from the demo data package.

5.6 Texts, RSS Readers, and Other Elements

Other elements Charts, tables, and geo maps are not the only elements you can add to a story. A list of all additional elements and their use cases is shown in [Table 5.4](#). We'll only take a detailed look at the text box and RSS reader in this section; the other objects are fairly easy to understand.

Element	Use Case
Image	You can upload pictures (e.g., company logos) to SAP Analytics Cloud and show them in a story.
Shape	Shapes are based on vectors and can therefore be extended without quality loss. You can also upload your own shapes as SVG files.

Table 5.4 Overview of Other Elements in Stories

Element	Use Case
Text	Texts can be static or dynamic and fully formatted.
Clock	The clock shows the current date, the time, and a logo. All elements can be configured and adjusted.
RSS reader	The RSS reader can be used to display RSS feeds directly within a story.
Web page	This function allows you to embed external websites in a story.
Value driver tree	This is a planning tool that visualizes relations between measures.
SAP Business Planning and Consolidation (SAP BPC) planning sequence	This is a planning tool used to trigger a planning workflow created in SAP BPC.
R visualization	R visualizations can be used to create custom charts. More information can be found in Chapter 7, Section 7.2.4 .
Symbol	Shows a symbol palette. Once a symbol is selected, that symbol is copied into the clipboard and can be pasted into texts.
Composite	Composites are reusable widgets that can be created by expert users.
Panel	A panel can be filled with multiple widgets and is treated as a widget itself.

Table 5.4 Overview of Other Elements in Stories (Cont.)

Images and shapes can be added via a dialog box or uploaded to SAP Analytics Cloud. Click on the + button in the **Insert** section of the top bar in the story. The clock can be formatted with the formatting options in the sidebar to show less information or to hide the logo.

Let's now add a text element to the story. Navigate back to the first page of the story and create a new text element by clicking the + button in the **Insert** section of the top bar and selecting **Text**. You can fill the box in manually or use dynamic text. To create dynamic text, select **Add • Dynamic Text** from the action bar of the text box, as shown in [Figure 5.66](#).

Creating texts



Figure 5.66 Adding Dynamic Text

- Dynamic texts** The dialog box provides many options when creating dynamically changing texts, as shown in [Figure 5.67](#). These texts can, for example, show information about the current story or display the current date and time as well as show selected filters and prompts. For now, choose the **Page Number** option and click on **Create**.

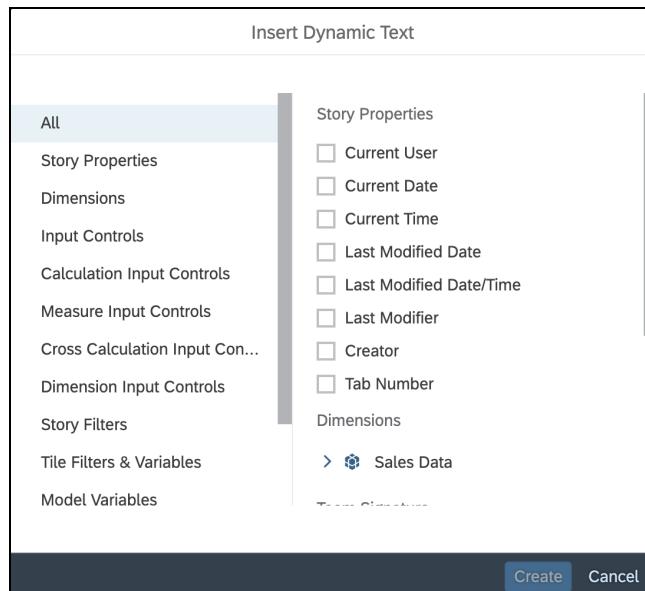


Figure 5.67 Creating Dynamic Text

Now, add the text “You’re on page” to the beginning of the dynamic text. The text box now shows **You’re on page** followed by the current page, as shown in [Figure 5.68](#).

You are on page 1

Figure 5.68 Dynamic Text

- RSS reader** The RSS reader element can be used to embed RSS feeds into a story. RSS readers can, for example, be used to show the latest news or market developments. Many websites provide RSS feeds, which always show their latest

publications. Special URLs are provided, usually with the *.rss* extension, to access a list of news or announcements. These URLs can also be used in SAP Analytics Cloud.

Click on the **+** button in the top bar of the story and select **RSS Reader**. The builder will now open. Click on **Add Another RSS URL**. Enter “SAP News” into the **Title** field. Then, enter the URL <https://news.sap.com/feed/> into the **RSS URL** field. The configuration of the reader is shown in [Figure 5.69](#).

The screenshot shows the SAP Analytics Cloud Builder interface. On the left, there's a preview area titled "RSS Feeds" showing news items from "SAP News". One item is visible: "Innovate with Agility: SAP BTP with Premium Pl...". On the right, the "Builder" tab is active, showing the "Manage RSS Feeds" section with a feed titled "SAP News" and a "Properties" section where the "Batch Load Number of Articles" is set to 10. Under "Properties", there are checkboxes for "Show Time Stamp", "Show Title", "Truncate Long Articles", and "Allow Hyperlinking on Article Title", all of which are checked.

Figure 5.69 RSS Reader

Save the story and use the *Checkpoint 4 – Section 5.6.pdf* file from the demo data package to verify your progress.

5.7 How Viewers Interact with Stories

Data can become quite large and complex, and sometimes, insights can only be gained by applying filters. In addition, chart interactions can help users access additional information or better understand the whole. So far, all the features we've presented required you to be the story creator or at least have rights to edit a story. In this section, we'll discuss various tools that can be activated by story creators so that viewers can interact with stories. The following features will be discussed:

Filters and interactions

- Filters
- Input controls for dimensions and measures
- Linked analysis
- Hyperlinks
- Explorer
- Edit and view modes

Note that these tools are activated in the story editing mode, but they can be tested immediately by switching into view mode. How you navigate between the edit mode and the view mode is shown in [Section 5.2.4](#). In the following sections, we consider story owners as any user authorized to edit the story.

5.7.1 Filters

- Filter types** The filtering capabilities in stories in SAP Analytics Cloud are quite strong. You can use filters to represent a specific context or identify single data points. A story can contain three different filter types:
- Chart filters
 - Input controls
 - Story filters

Let's make sure you understand these types so that you can apply the correct filters.

Chart Filters

A chart filter is created on the chart level and initially only affects the chart for which it is created. However, you can extend its scope to include other charts by turning on **Linked Analysis**, which we'll describe in [Section 5.7.3](#).

Chart filters can be used by story creators and story viewers. If the filter is set by a story creator, that filter will be saved with the story and set for all people accessing the story. To create a chart filter as a story creator, you can either enter the chart itself or the builder. Use the first page of the story we created earlier to follow along with the next examples.

- Filtering in a chart** To filter a chart based on a specific data point, click on the data point and then select the filter icon, as shown in [Figure 5.70](#). The chart will be reduced to show the selected data point only. Story viewers can apply a similar filter in the same way.

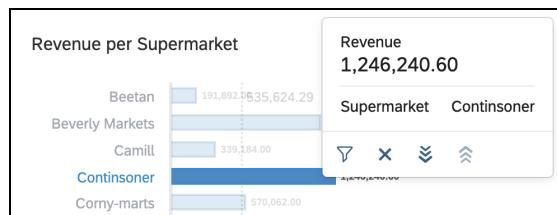


Figure 5.70 Applying Filters to Charts

To find out if a filter has been applied to a chart, check the chart's action bar, which will show additional information, as shown in [Figure 5.71](#). To remove the filter, click on the X symbol.

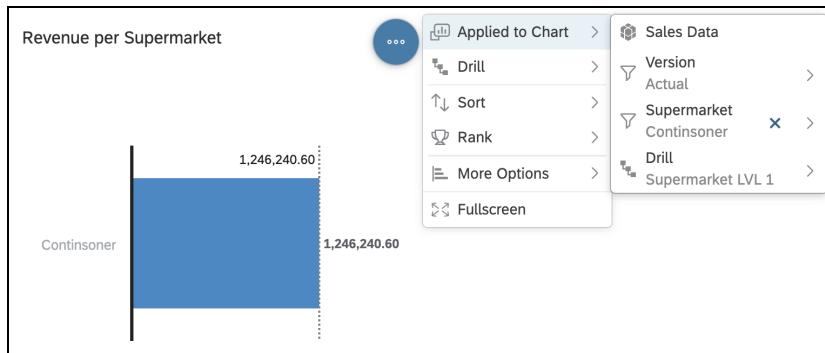


Figure 5.71 Removing Chart Filters

In addition, story creators can use the chart builder to create filters. Open the builder and click on **Add Filters** in the **Filters** section, as shown in [Figure 5.72](#). Select the **Product** dimension.

Filtering charts
in the builder



Figure 5.72 Creating Chart Filters in the Builder

The filter dialog box will open. Select the **Juices** and **Alcohol** entries. You can also indicate whether the filter should exclude the selected items instead of including them. By default, this setting is turned off so that the filter only keeps the items you selected. When you turn on this setting, all items that are selected will be excluded while the remaining will appear in the chart. You can also specify if story viewers can modify the filter and if the filter allows multiple or single selections only, as shown in [Figure 5.73](#).

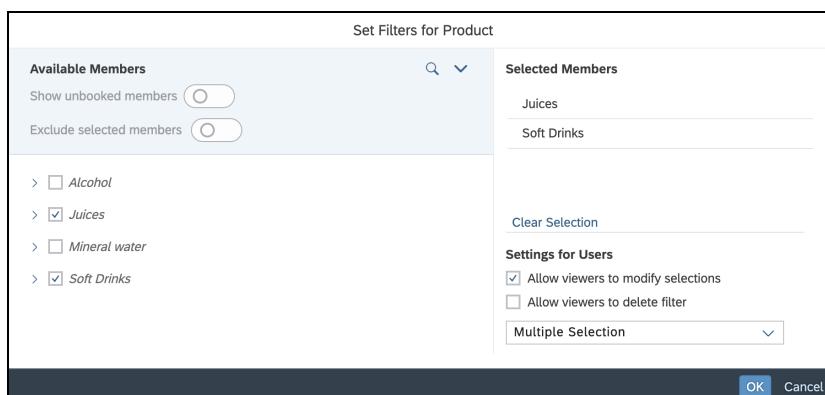


Figure 5.73 Selecting Items to Be Filtered

After you create the filter, you can later delete it by clicking the X icon to the top right of the filter in the builder, as shown in [Figure 5.74](#).



Figure 5.74 Deleting Chart Filters

The chart filter should only be used if the chart is designed to meet a specific context and the filter is applicable to this context only. Furthermore, chart filters are more relevant for story viewers who can use them to drive their own filtering workflows, which we'll describe in detail in [Section 5.7.3](#).

Page Filters

Page filters are recommended to filter entire pages or to provide story viewers with an intuitive filtering experience. These filters are added as objects to story pages and are therefore directly visible.

Story creators can fully steer the extent to which a story viewer can use the input controls. Also, the scope of the input control can be limited to affect only a selection of charts on the same page. If models are linked, the filter will also be applied to linked models.

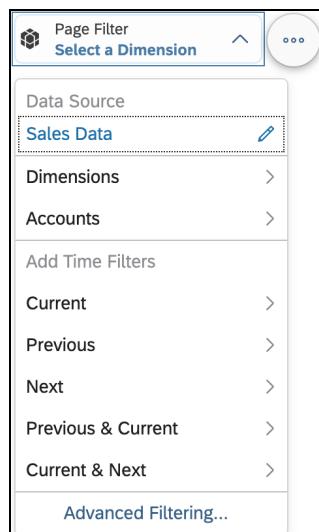


Figure 5.75 Creating New Input Controls

Click on the  icon to add a new input control in the **Insert** section of the top bar. The input control can be created for dimensions and measures. Click on the newly-created input control and choose the **Product** dimension, as shown in [Figure 5.75](#).

[Creating a new page filter](#)

Now, the filter dialog box will open. As a story creator, you must decide which dimension members will be available to the story viewer for filtering. Choose **All Members** so that story viewers can decide for themselves if they want to see all products or only specific ones, as shown in [Figure 5.76](#). Also make sure that story viewers are allowed to modify the selection and that the **Multiple Selection Hierarchy** option is activated. You also can use these options to forbid viewers from making changes to the filter criteria.

Member selection

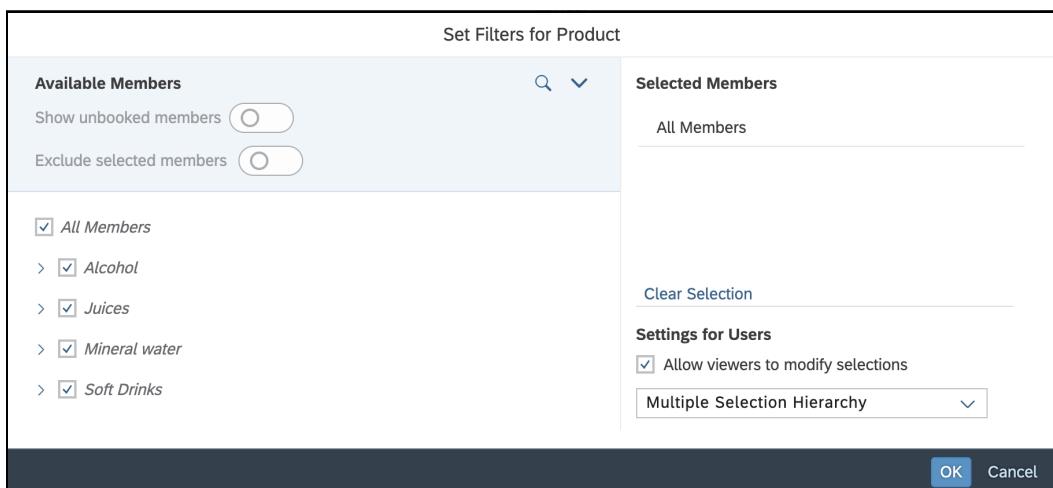


Figure 5.76 Member Selection for Input Controls

Confirm the creation of the input control by clicking on **OK**. Afterwards, extend the size of the input control to show it completely, as shown in [Figure 5.77](#).

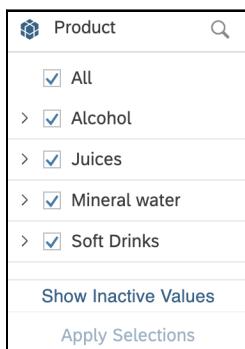


Figure 5.77 Input Control

Using input controls Now, switch to the view mode (click on **View** at the top right of your screen) and try out the filter. Observe how the charts start changing and showing additional or fewer dimensions. In the end, set the filter to show all values again.

Configuration options Return to the edit mode. Click on the input control to open the action bar either by clicking on the three dots icon or right-clicking anywhere on the input control, as shown in [Figure 5.78](#).

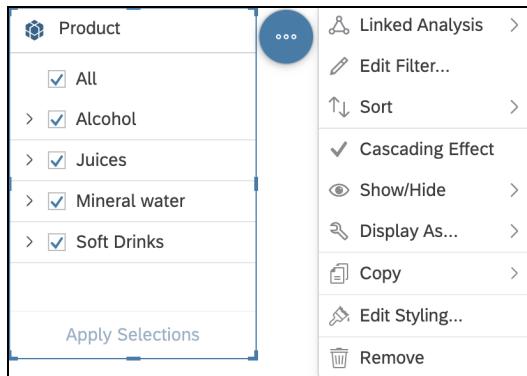


Figure 5.78 Action Bar of Input Control

The action bar of the input control provides various options to modify the input control. You can determine the selection of charts that are affected by the filter (**Linked Analysis**). However, the input control can only affect charts and tables on the same page. The **Edit Input Control** option can be used to modify the filter itself and return to the dialog box shown earlier in [Figure 5.76](#). When the **Cascading Effect** option is activated, the input control can react to other story filters or input controls. If they already reduce the amount of data, the input control will automatically only show available values if this option is turned on. An input control can only affect the page it's placed on, but you can use **Convert to Story Filter** to transform the input control into a filter applied to all pages of the story. However, this option will make the input control disappear from the page and move it to the filter bar of the story.

Input control for date dimensions When creating an input control for a date dimension, a different layout is available as an alternative to the checkboxes. This layout uses date ranges and can be either fixed or dynamic. Create a new input control and select **Dimensions • Date • Filter by Range....**

Fixed date filters When you create a fixed date dimension filter, you must provide specific date ranges, as shown in [Figure 5.79](#). The deeper your date hierarchy goes (in our example, we have monthly data), the more granular the filter can become. You can also allow the story viewer to change the selection.

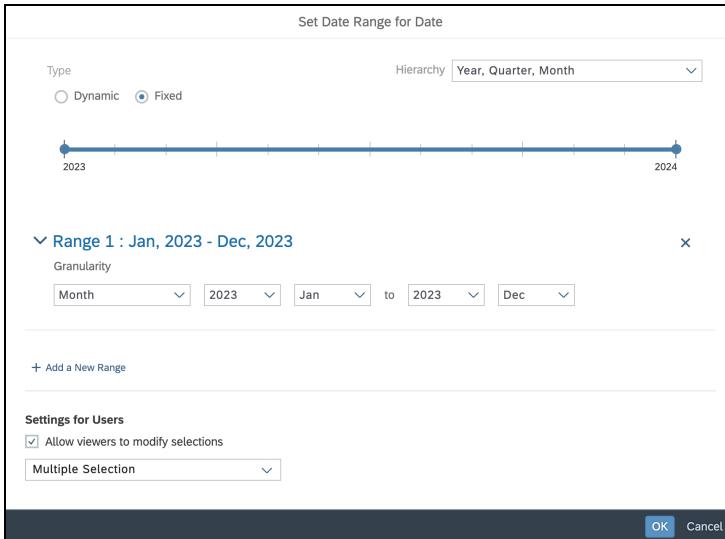


Figure 5.79 Fixed Date Filter

While fixed date filters require you to choose dates in all fields, dynamic filters allow your viewers to reference a current or custom date. Viewers then define how many days, weeks, months, quarters, or years before and after the date should be displayed, as shown in [Figure 5.80](#). In addition, you can also set filters to just use data from the current day, week, month, quarter, or year.

Dynamic date filters

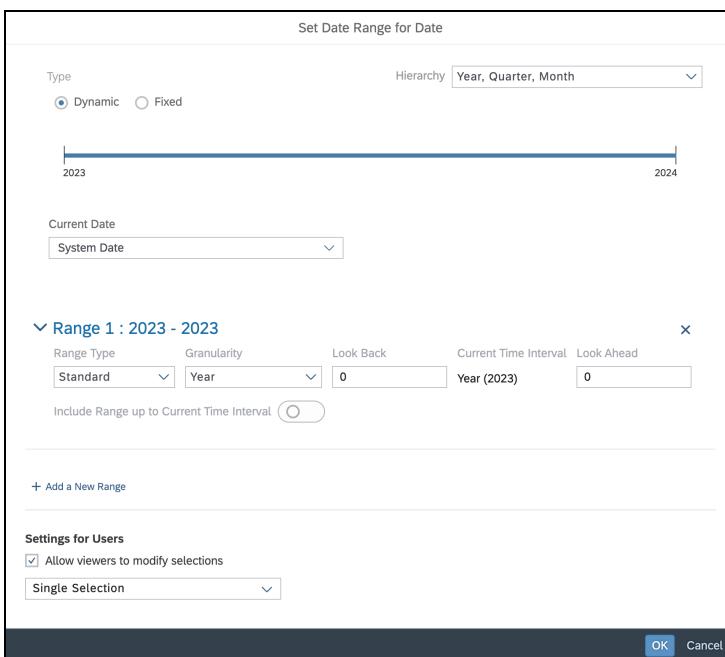


Figure 5.80 Dynamic Date Filter

Current date By default, the dynamic filter will use the current system date as a reference. If you want to use a custom date, you can use the **Current Date** dropdown box to create an additional input control that allows the user to set a custom reference date. Create a fixed time filter on the month level for the period from January 2023 to December 2023 and make sure that the viewer is allowed to modify the selection. Afterwards, extend the filter's size so that it's shown completely. The result should match the screen shown in [Figure 5.81](#).

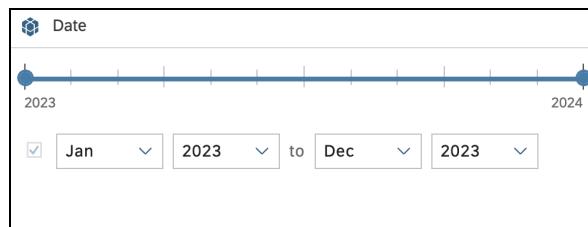


Figure 5.81 Date Input Control

Input controls for measures Another filter criterion for input controls can be a measure. In this case, the filter will not be driven by a selected dimension member but by the value of a measure (e.g., all supermarkets that have a revenue of USD 300,000 and more). Create a new input control and click on it. Select **Measure • Quantity** to open the filter creation dialog box. Define the first range to span from 0 to 1,000,000 and allow story viewers to modify the filter. The **Dimension Context** option is useful for restricting the aggregation behavior to a specific dimension. Select the **Version** and **Supermarket** dimensions from this dropdown list, as shown in [Figure 5.82](#).

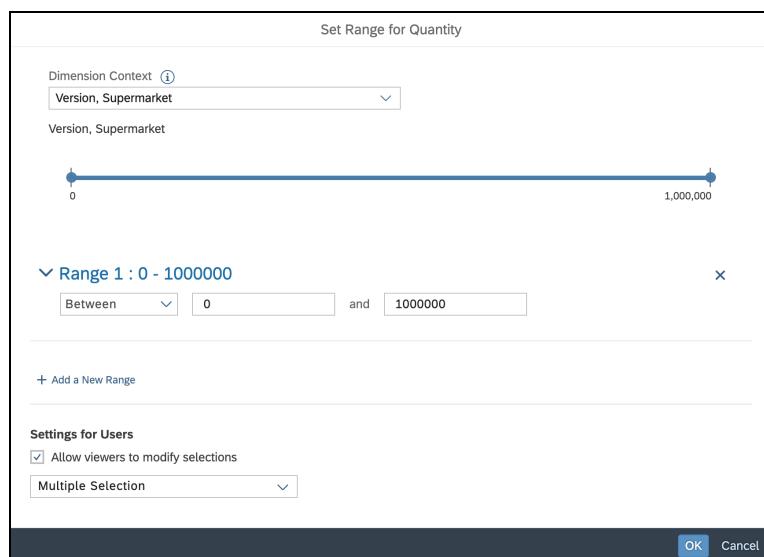


Figure 5.82 Input Control for a Measure

Confirm the input control by clicking on **OK**. Extend its size so that it becomes fully visible. This filter can be used now to only show supermarkets where the selected value lies within the selected range.

The input control also supports more complex scenarios, including combining multiple filter conditions with AND and OR relationships. Create a new input control and choose the **Advanced Filtering...** option.

Advanced filters

First, choose which operator should connect both filter criteria. Click on the arrow icon to see the available options. You can also specify whether viewers are allowed to change the relation. The following options are available:

- **Filter: AND**

All values that meet all criteria are included.

- **Filter: OR**

All values that meet at least one of the criteria are included.

- **Exclude: AND**

All values that meet all criteria are excluded.

- **Exclude: OR**

All values that meet at least one of the criteria are excluded.

Advanced filters can become quite complex and be nested (one criteria can again consist of multiple criteria). Nesting allows you to create multiple criteria in a tree structure, which are checked level by level. For our example, create a filter with an **AND** relation. Set the filter to show the **Actual** member for the **Version** dimension and **Soft Drinks** for the **Product** dimension, as shown in Figure 5.83.

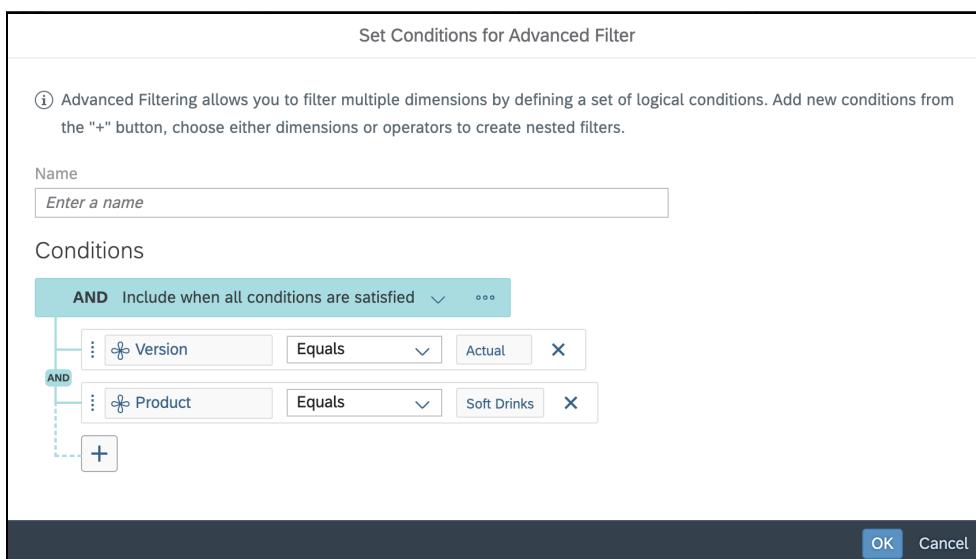


Figure 5.83 Advanced Filter

After you create the filter, try it out and see how it changes the charts. Delete the filter when you're done; we won't use it in later examples.

Story Filters

If a filter should be applied to all pages of a story, we recommend using story filters, which are created in the side bar of the story. Open the story filter bar by clicking on the **Filter** icon.

A story filter supports the same features as an input control, as shown in [Figure 5.84](#). The only difference is that story filters are always applied to all charts on all pages of a story that are using the same model or a linked model. For more on input controls, refer to the previous section on page filters.

Save the story again and validate your progress against the *Checkpoint 5 – Section 5.7.1.pdf* file from the demo data package.

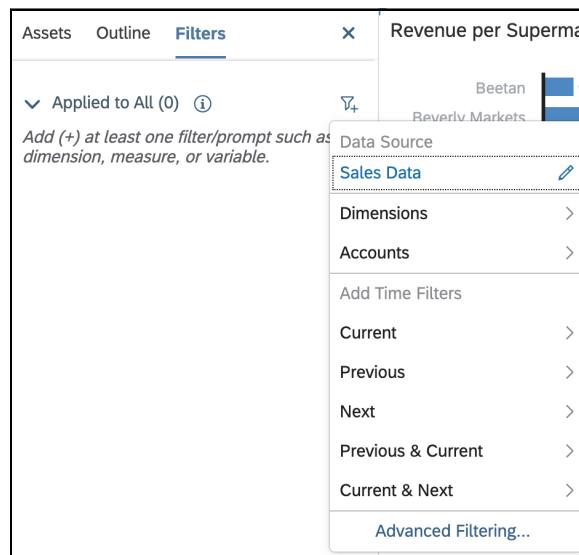


Figure 5.84 Creating New Story Filters

5.7.2 Dimension and Measure Input Controls

Another important feature of dashboards is the compact display of greater amounts of information. Often charts are created multiple times to show different dimensions. To avoid a high number of charts, the story offers dimension and measure input controls. These controls allow the story viewer to dynamically choose the measure or dimension shown in a chart. These input controls do not filter the data; they just exchange the dimension or measure in a chart.

Open the builder for the **Quantity by Product** chart you created earlier. Click on **Add Dimension** below **Dimensions** and select **Add Dimension Input Control**, as shown in Figure 5.85.

Creating a dimension input control

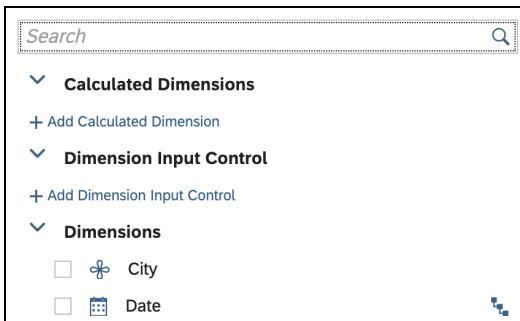


Figure 5.85 Creating Dimension Input Controls

Now, you can specify which dimensions will be available for story viewers to choose from. Choose the **Product**, **Supermarket**, and **Street** dimensions. Now, click on **OK**.

Because the chart is now showing the same dimension (**Product**) twice, you'll see an error message. Remove the **Product** dimension from the chart in the builder so that it only contains the **New Dimension Input Control** dimension. The input control is now used as a placeholder and will show the dimension selected by the viewer.

Showing the same dimension again

You'll now see a new object on the page that contains the input control. Move this option next to the chart to which it belongs (you may need to move away the other input controls) and extend its size to make it completely visible, as shown in Figure 5.86.

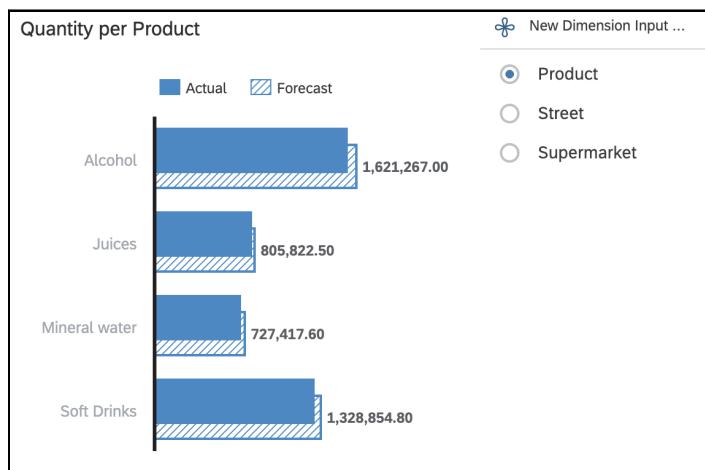


Figure 5.86 Chart with Dimension Input Control

- Measure input controls** Measure-based input controls can be created as well to switch measures in a chart. The procedure is quite similar. However, in the builder, you must add a new measure (click on **Add Measure**) and select **Create Measure Input Control**. The procedure is otherwise identical to the previous example, so we won't repeat these steps.
- Save the story and validate your progress by against the *Checkpoint 6 – Section 5.7.2.pdf* file from the demo data package.

5.7.3 Chart Interactions

- Linked analysis** Reports are usually designed to show a high-level overview first before more details are exposed. Simple diagrams provide a current overview of the data. However, data will need to be filtered down to provide more details. To support this workflow graphically, SAP Analytics Cloud provides the *linked analysis* feature. To access this feature, you must first select a chart or table (we'll use the **Revenue by Supermarket** chart created earlier) and then select **Linked Analysis** in the chart action bar.
- Scope** The panel offers various options to drive the filtering behavior of the chart, as shown in [Figure 5.87](#). If the chart shouldn't interact with any other object, select the **Only this Widget** option. The chart can also be used to automatically filter down all objects in a story that use the same or a linked data model (**All Widgets in the Story**). The same is applicable for the same page only (**All Widgets on the Page**).

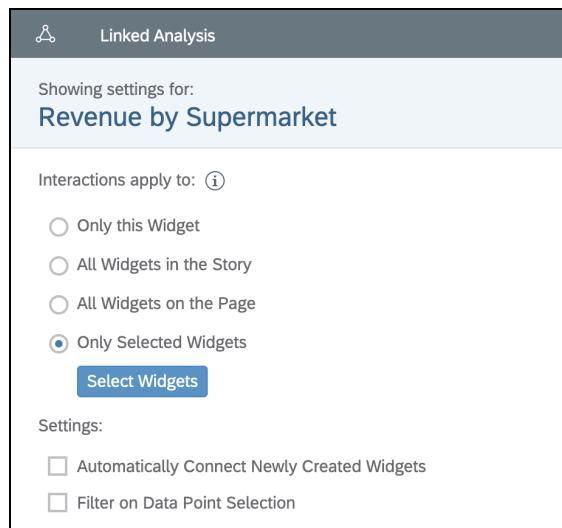


Figure 5.87 Linked Analysis

- Individual selection** If you want to specify which widgets should be affected by a filter applied to the chart, select the **Only Selected Widgets** entry. Besides selecting the

specific widgets, you can also activate the **Automatically Connect Newly Created Widgets** setting. Once activated, every new chart or table that is created thereafter will also be affected by this chart. If you activate the **Filter on data point selection** option, viewers only need to click on a data point to filter down all the other charts.

Choose the **All Widgets on the Page** option and select the **Filter on Data Point Selection** checkbox. Confirm these settings by clicking on **Apply** and try them out afterwards by clicking on any data point in the chart.

Hyperlinks can be added to charts and tables to allow viewers to navigate to other pages, stories, or external websites from the chart. To create a new hyperlink, click on the **Revenue by Supermarket** chart and select **More Options • Add • Hyperlink...** in the action bar, as shown in [Figure 5.88](#).

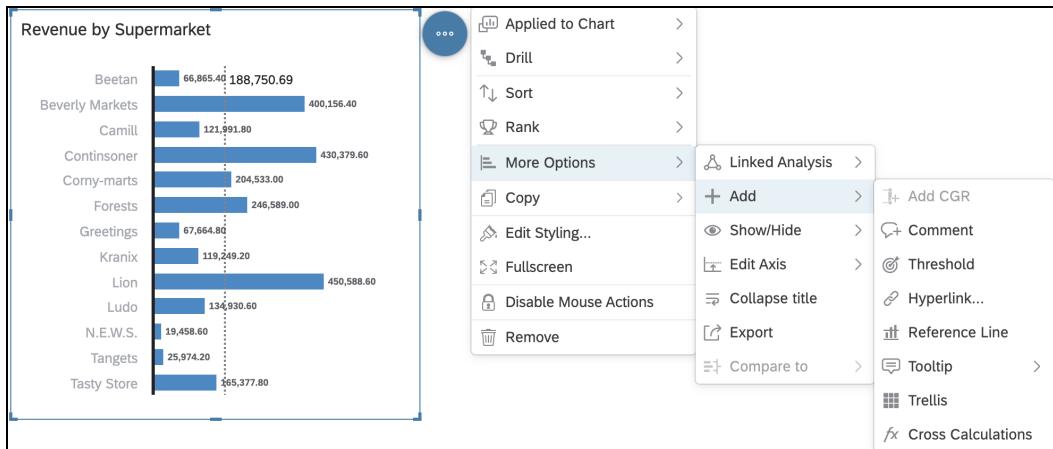


Figure 5.88 Adding Hyperlinks

As shown in [Figure 5.89](#), multiple types of hyperlinks can be added to a chart, as follows:

- The **Mobile App URL** type defines hyperlinks to other mobile apps if the story is opened on a mobile device.
- The **External URL** type navigates to an external website. In addition, you can use the contents of the chart to parameterize the URL. If you click on a specific supermarket in a chart that contains hyperlinks, for example, the URL can be configured to contain the name of the supermarket and thus lead to that supermarket's specific website.
- With the **Page** and **Story** types, you can create navigation to other pages or stories within SAP Analytics Cloud. You can also choose to use the dimension as a filter in the other story or page. However, in this scenario, the charts or tables on the page must use the same data model.

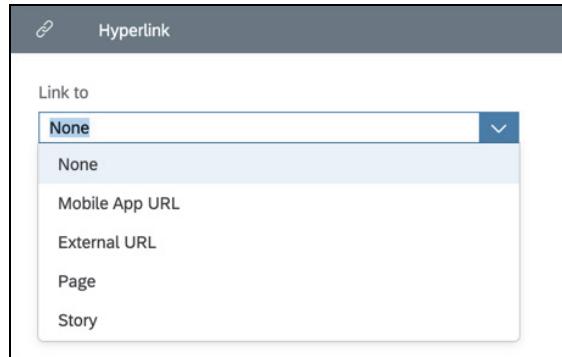


Figure 5.89 Hyperlink Types

For our example, choose the **Page** option and create a hyperlink to **Page 2**. Activate the **Apply Selected Dimension as a Filter** option, as shown in [Figure 5.90](#), and click on **Done** to confirm the configuration.

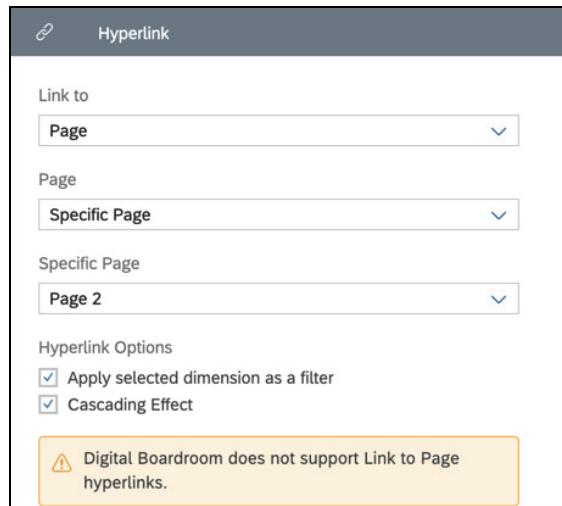


Figure 5.90 Creating Hyperlink to Another Page

- Explorer** Another option to provide more flexibility to story viewers is the *explorer*. This mode allows viewers to modify the chart or table on their own without modifying the original story. The story creator determines which dimensions and measures are available via the explorer.
- Enabling the explorer** To activate the explorer in our example story, open the builder for the **Revenue by Supermarket** chart. Then, activate the **Enable Explorer** option, as shown in [Figure 5.91](#). Explorer mode is only available in classic mode. In optimized mode, you can enable the data analyzer. However, no further configuration is possible as of right now.

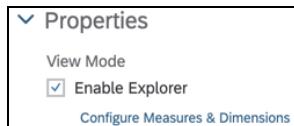


Figure 5.91 Enabling the Explorer

Next, click on **Configure Measures & Dimensions**. A dialog box will open where you can specify which measures and dimensions should be available to story viewers in the explorer. Select all the measures and dimensions and confirm these settings by clicking on **OK**, as shown in [Figure 5.92](#).

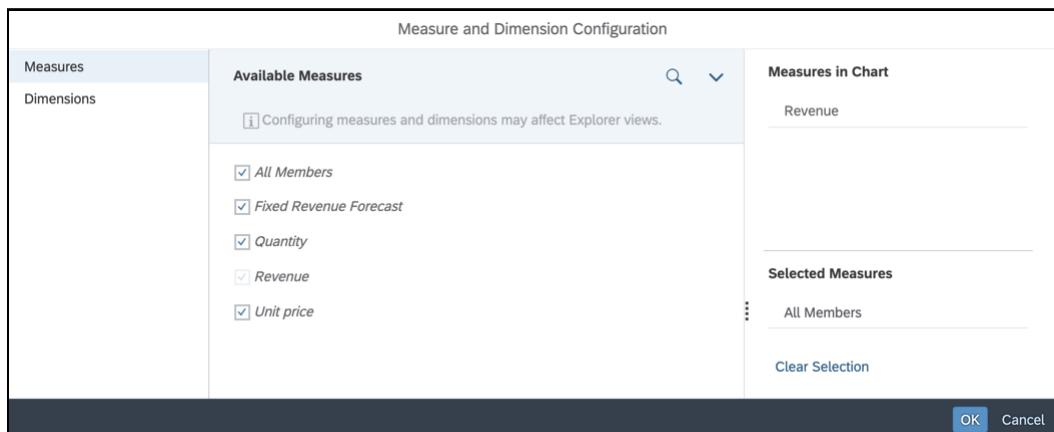


Figure 5.92 Setting Up the Explorer

Viewers will see the **Explorer Available** note for every configured chart. To open the explorer, open the action bar and click on **Open Explorer**, as shown in [Figure 5.93](#).

Accessing the
explorer

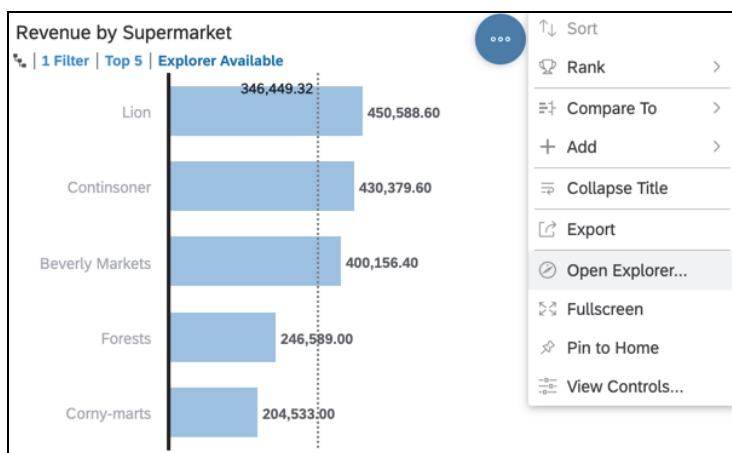


Figure 5.93 Opening the Explorer

Using the explorer The explorer is quite similar to the data exploration mode described in [Section 5.2.2](#). However, viewers can't copy the charts to a new story. They can, however, save their customizations as new explorer views and open these views later again. Viewers don't need any edit rights for the story for this feature.

5.8 Calculations

Calculated measures and dimensions In self-service scenarios, business users often express a desire to create additional *calculations* on top of the measures or to create *calculated dimensions*. These features can be used to easily create new elements in a chart or reflect individual business requirements. Both calculated measures and dimensions can be created during the modeling process. More information can be found in [Chapter 4](#), [Section 4.3](#) and [Section 4.4](#).

In this section, we'll cover various examples of calculated measures and dimensions. Feel free to create your own calculations to experiment with these features.

Creating calculations Calculations in a story are created within the builder. Open the builder for a chart or table and click on **Add Account • Add Calculation**, as shown in [Figure 5.94](#).

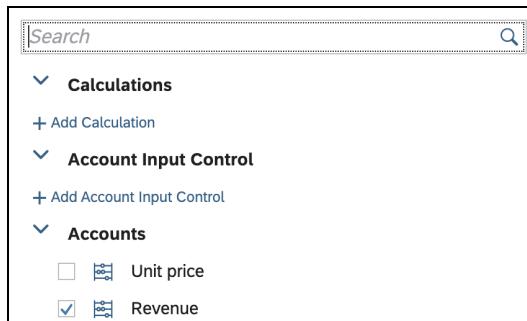


Figure 5.94 Adding New Calculated Measure

Calculation types The following calculation types can be created via this dialog box:

- **Calculated Account**

Allows the creation of a new measure by applying a formula.

- **Restricted Account**

Restricts a measure by one or more dimensions.

- **Difference From**

Calculates the difference between two dates.

- **Aggregation**

Used for calculations based on aggregation.

- **Dimension to Account**

Converts a dimension that contains numeric values into a measure.

- **Running Total**

Accumulates a number while running through a dimension and its dimension members. For each dimension member, the measure is added to the previous one.

5.8.1 Calculated Accounts

A calculated account is created in the **Calculation Editor**, which offers a formula editor and various operators, as shown in [Figure 5.95](#).

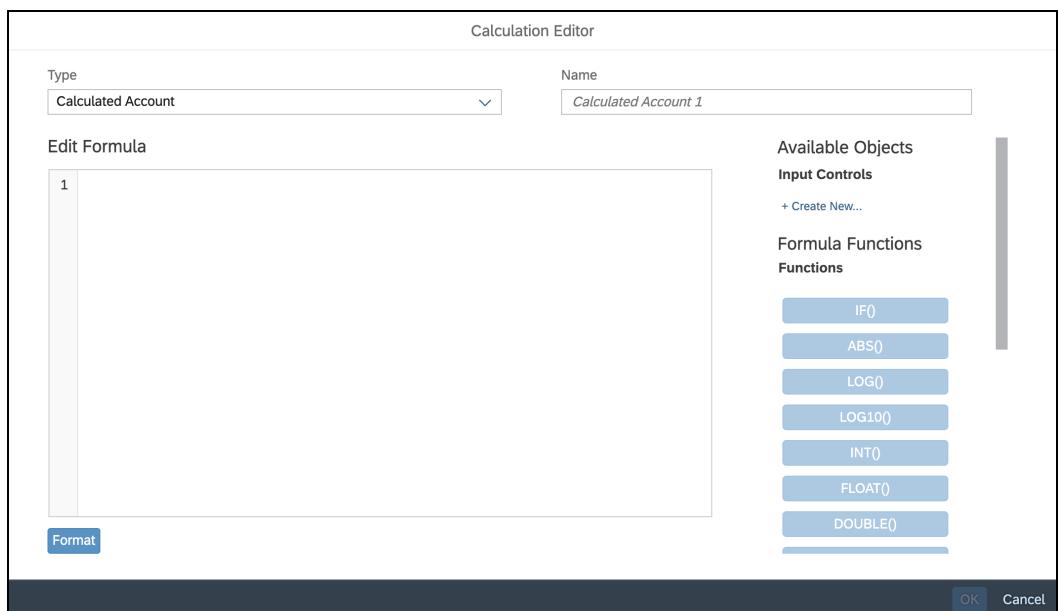


Figure 5.95 Calculation Editor

Formulas can be typed in directly and include various mathematical operations and functions. The calculation editor automatically recognizes some inputs and offers visual help to accelerate the formula creation and support you in selecting measures and functions, as shown in [Figure 5.96](#). On the right, all available functions, operators, and conditions can be accessed directly.

Creating formulas

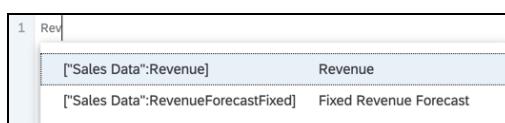


Figure 5.96 Automatic Recognition of Entered Text

You can also add an input control to the formula to act as a placeholder for a value. With the input control, story viewers can influence a calculated measure.

- Formula help** To access the formula help, to help you find all the applicable functions and elements of your model, press **Ctrl** + **Space** on a PC or **Command** + **Space** on a Mac. The formula help shows examples for each function to help you better understand them, as shown in [Figure 5.97](#).

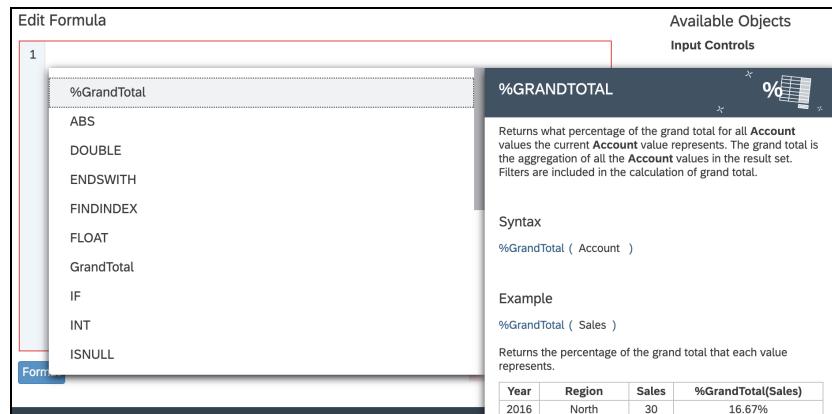


Figure 5.97 Formula Help

- Syntax check** The syntax check feature automatically checks the formula and shows potential errors immediately, along with providing information on how to resolve these errors.

- Restricted measures** The **Restricted Account** calculation type allows you to restrict a measure based on one or more dimensions. Dimension members can be either pre-selected or dynamically chosen by an input control while in view mode. [Figure 5.98](#) shows an example where we've restricted the **Unit price** measure by the **City** dimension.

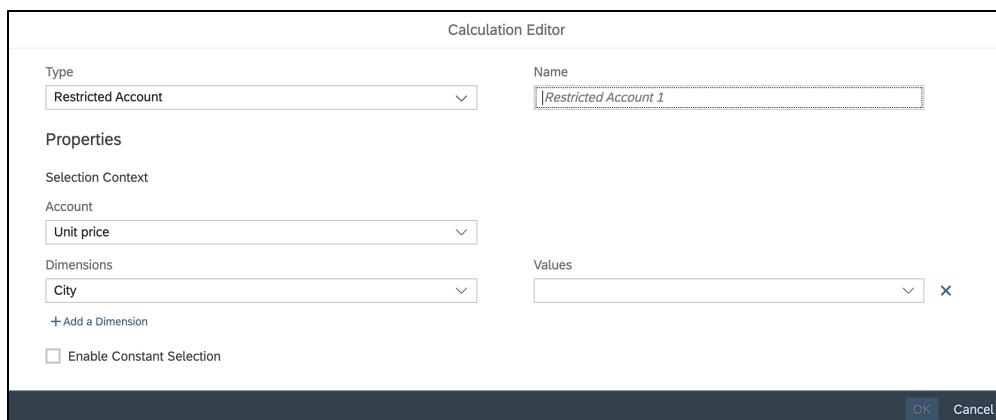


Figure 5.98 Creating Restricted Accounts

If you select the **Constant Selection** checkbox, the measure will always show the restriction that was defined for this formula. Even if a filter is applied that further restricts the dimension, the measure will ignore this filter and keep its original definition.

If you want to calculate how a measure deviates over time, select the **Difference From** option. You can, for example, calculate how a measure has changed in comparison to a period in the previous year. You can also define which measure should be compared. Differences can be compared dynamically (e.g., last quarter) or by using fixed dates, as shown in [Figure 5.99](#).

Difference from

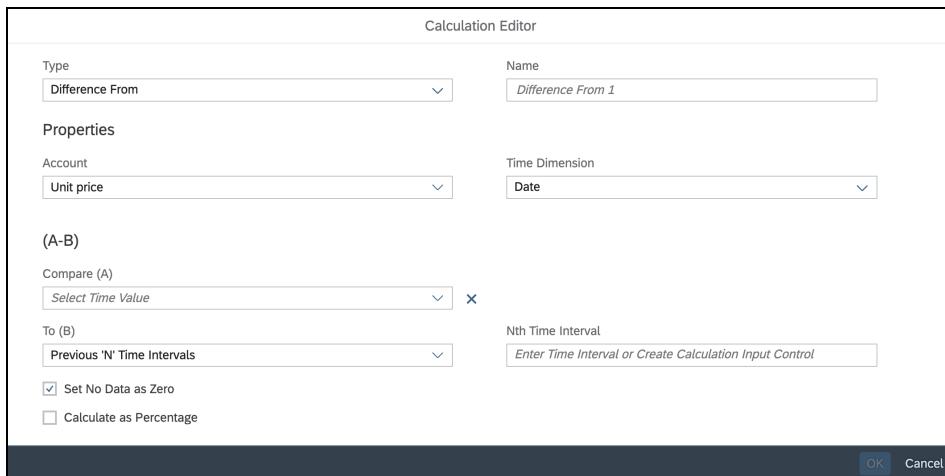


Figure 5.99 Calculating Deviations

The **Aggregation** calculation provides various aggregation options for measures, including, for example, summing up a measure based on a specific dimension or counting all the members of a dimension. This calculation supports the **SUM**, **COUNT (DIMENSIONS)**, **COUNT (excl. 0, NULL)**, **MIN**, **MAX**, **AVERAGE (excl. 0, NULL)**, **FIRST**, and **LAST** operations, as shown in [Figure 5.100](#).

Aggregations

The **Aggregation Dimensions** dropdown list determines which dimensions are used for the aggregation of the measure. If you select the **Use conditional aggregation** checkbox, you can add additional conditions. With this option, you can, for example, specify that the aggregation is only applied to dimension members that are indicated explicitly.

Aggregation options

Sometimes, a measure is erroneously created as a dimension, or a dimension contains only numeric values. In this case, you can use the **Dimension to Account** calculation type to convert dimensions to measures, as shown in [Figure 5.101](#). If a dimension contains non-numeric values, those values will be ignored.

Dimension to account

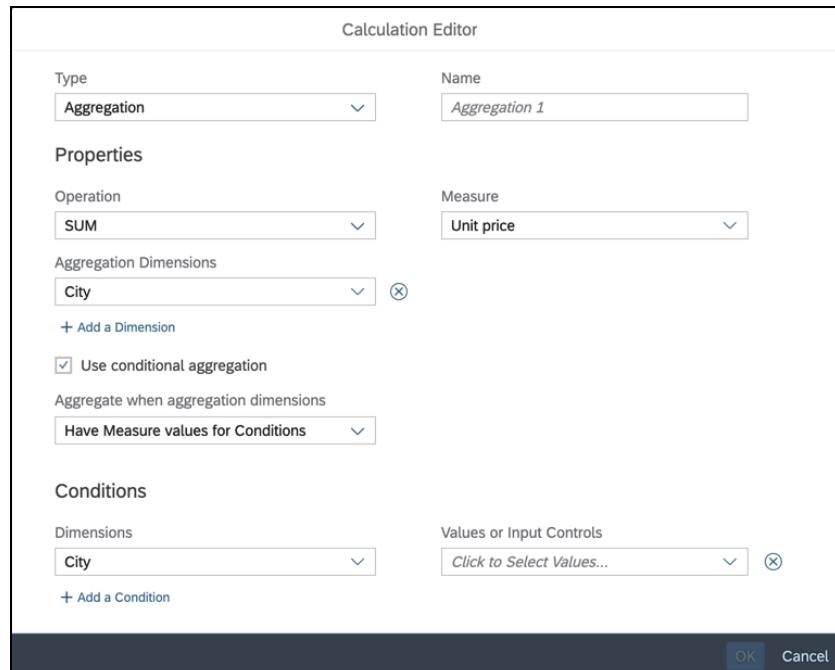


Figure 5.100 Creating Aggregations

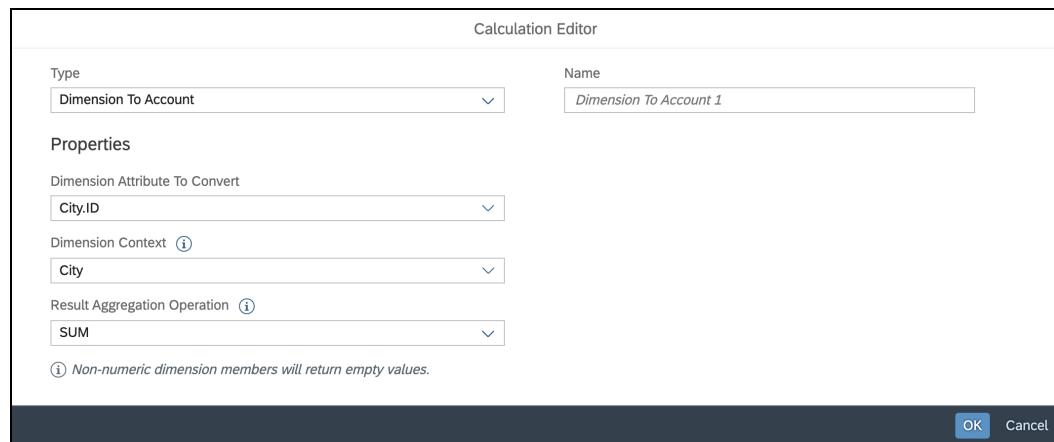


Figure 5.101 Converting Dimensions to Accounts

5.8.2 Calculated Dimensions

Similar to calculated measures, you can create calculated dimensions in the builder. Click on **Add Dimensions** and choose **+ Add Calculated Dimension**, as shown in [Figure 5.102](#).

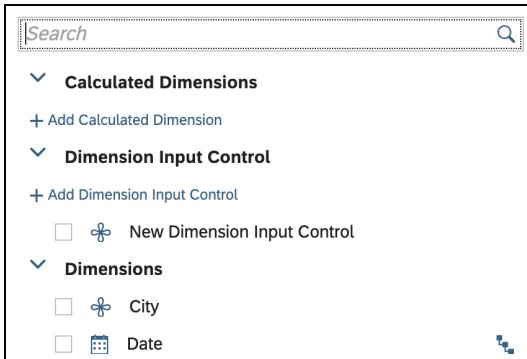


Figure 5.102 Adding Calculated Dimensions

A calculated dimension is based on a formula that you define through text operations. Text operations can be used to analyze, modify, or create text columns. The editor provides various functions, conditions, and operators to define the calculation, as shown in [Figure 5.103](#).

Text operations

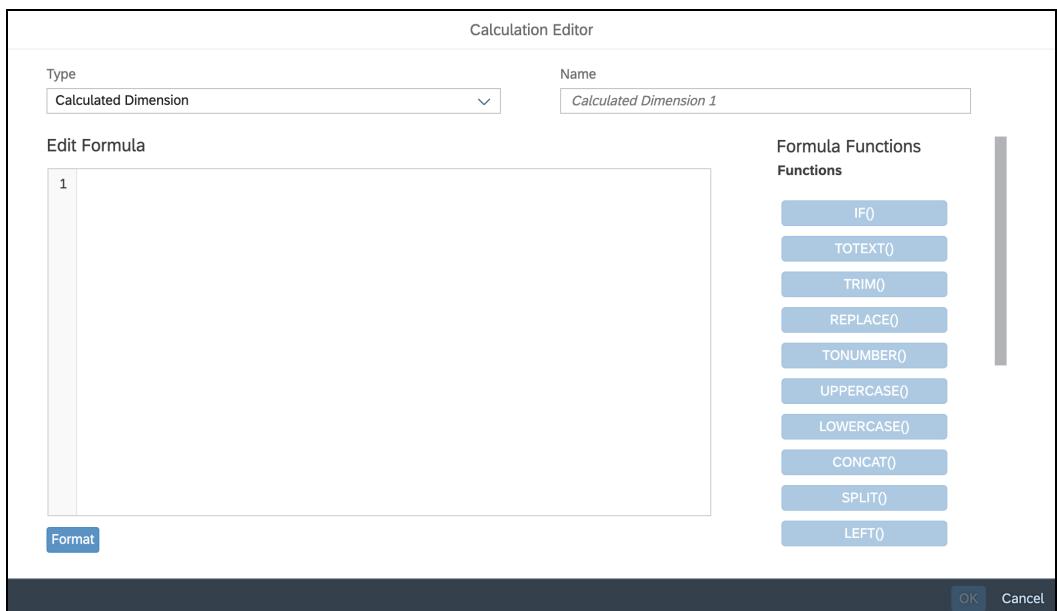


Figure 5.103 Using Formulas to Create Calculated Dimensions

Alternatively, the **Account-Based Dimension** calculation type can define thresholds for measures. You can also convert a measure to a dimension. [Figure 5.104](#) shows an example in which supermarkets are grouped by revenue. The supermarkets that generate a revenue higher than 50,000 are tagged as **High**; the others are tagged as **Low**.

Measure-based dimensions

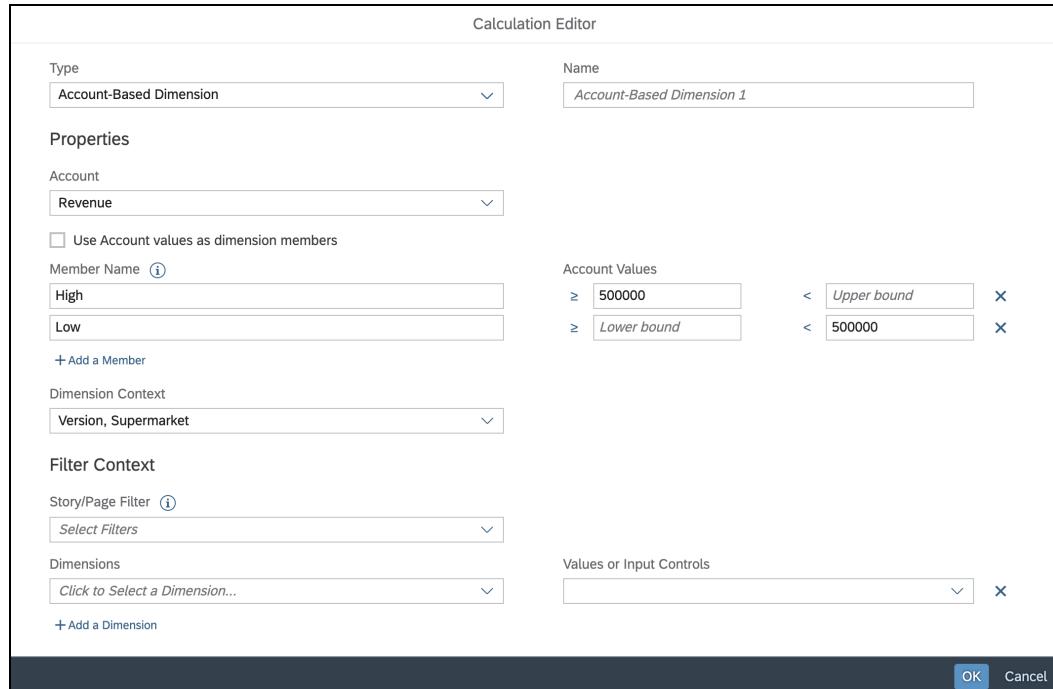


Figure 5.104 Creating Account-Based Dimensions

5.9 Story Design

Now that we've taken a close look at the story interface, this section will focus on clear story design and discuss some best practices. We also want to validate what you've learned so far, and you'll also see how templates can be used to create a new story.

Prerequisites for This Section

We won't include any references to other sections in this section to facilitate the flow of reading. In general, we'll apply functionality that's been demonstrated from [Section 5.2](#) through [Section 5.8](#).

- | | |
|---------------------------|---|
| Formatting pages | Every page in a story can be formatted separately. To access the pages, simply click on any empty space of a page and open the formatting interface by clicking on Designer in the top right, as shown in Figure 5.105 . |
| Formatting options | You can change the Background Color of a page completely and activate Show Grid option to see the alignment grid. By using the grid, you can align charts, tables, and other elements on a page easily. When using canvas pages, you can define a fixed Page Size (e.g., Letter) to make the story printer friendly. |

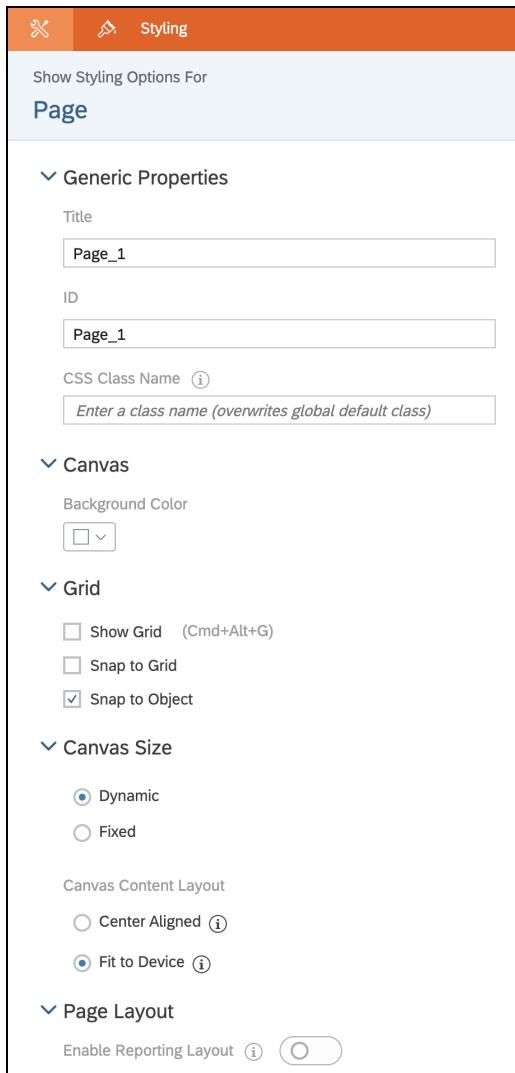


Figure 5.105 Formatting Pages

You also can define story-wide settings and coloring guidelines. Open the **Theme Preferences** from the **Format** section in the top bar. You can define default values for color palettes, text sizes, or other graphical elements, as shown in [Figure 5.106](#), and in this way implement your company's design guidelines. Theme preferences can also be configured afterwards and then applied to all existing elements.

Let's now create a new story and use formatting options to make it clean and intuitive. However, for this section, you'll be only provided with the final story as a PDF file. Refer to the *Checkpoint 7 – Sales Analysis 2023 – Section 5.9.pdf* file from the demo data package for orientation and try to

rebuild the story. Feel free to try out all the functionalities and add your own flavor to the story.

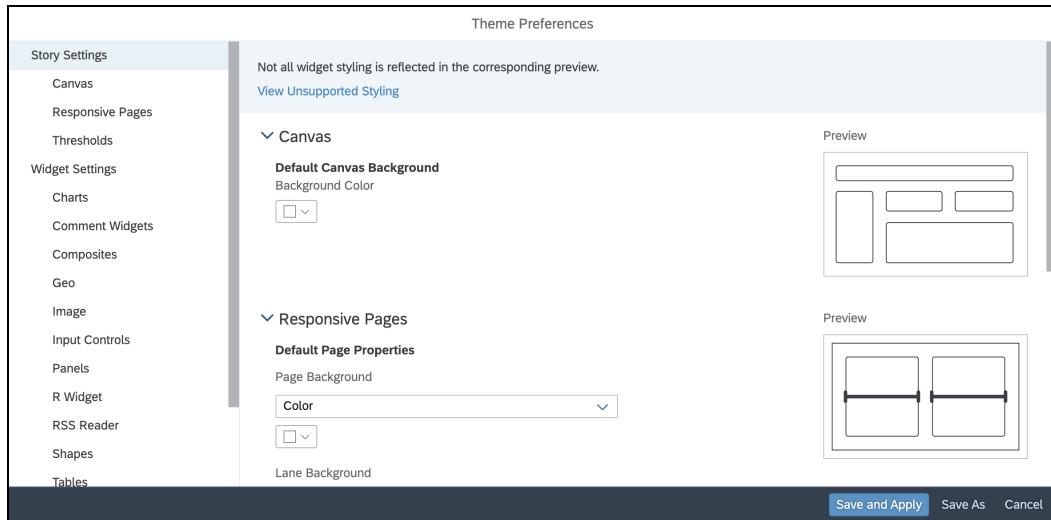


Figure 5.106 Theme Preferences

Our example story, called Sales Analysis 2023, contains three pages with charts, tables, and input controls. We won't explicitly mention text elements or shapes. Go ahead and try out the formatting options to get familiar with their impact. All pages are canvas pages and have a fixed size (letter). This story uses the Sales Data model.

Let's break down the three pages of this story next:

■ Page 1: Overview

- Two input controls (filters) for the **Product** and **Supermarket** dimensions.
- Two numeric point charts for the **Revenue** and **Quantity** measures, with a variance based on the version.
- A bar chart that shows the **Revenue** measure and **Product** dimension. The version is colored based on IBCS.
- A pie chart with the **Revenue** measure and **Product** dimension.
- A waterfall chart to show the **Revenue** measure based on the **Date** dimension and the ability to drill down into the date hierarchy.

■ Page 2: Geospatial Analysis

- Two input controls (filters) for the **Product** and **Supermarket** dimensions.
- A geo map using the **OpenStreetMap** base layer and a content layer of type **Heat Map**. Shows the **Revenue** measure by **Stores**.

■ **Page 3: Detailed Analysis**

- Two input controls (filters) for the **Product** and **Supermarket** dimensions.
- A date filter on the month level.
- A table with the **Quantity** and **Revenue** measures and the **City**, **Supermarket**, and **Product** dimensions.

In addition, we've defined the **Revenue Forecast** (variable) calculated measure, which multiplies the **Revenue** measure by an input control created within the formula editor. The input control is based on a static list of values and ranges from 0.5 to 2 with intervals of 0.1.

5.10 Sharing and Publishing Stories

Once you've completed a story, now, we're ready share and publish it. You can either use the folder structure described in [Chapter 3, Section 3.3.5](#), or publish stories outside of SAP Analytics Cloud. In this section, we'll first discuss sharing and publishing stories in general and then focus on publishing to mobile devices. (Refer to [Section 5.2.4](#) to recall how stories are saved.)

5.10.1 Sharing, Exporting, and Publishing Stories

To share a story stored in your private folder or to a folder where you want to assign individual access rights, use the sharing engine of the story. Click on the **Share** button in the action bar of the story and select **Share...**, as shown in [Figure 5.107](#).

Sharing stories

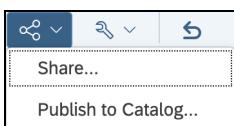


Figure 5.107 Sharing Stories

The sharing dialog box will open, as shown in [Figure 5.108](#), where you'll find the story URL, which you can use to directly access the story. The URL can also be customized in this dialog box. You can also add users or teams and directly assign them story rights. In addition, you can turn off email notifications for newly added users and determine if the global bookmark should be applied by default (see [Section 5.11.5](#)). Users or teams must be added in this dialog box to get access to the story. Simply having the link is not sufficient for access.

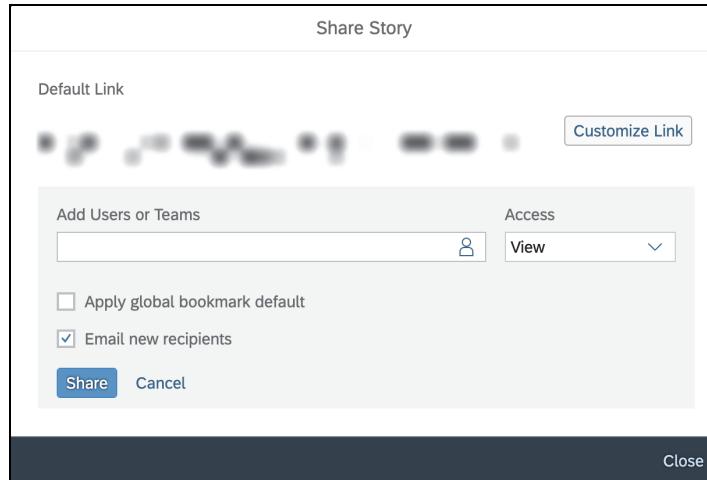


Figure 5.108 Sharing Interface

Embedding Stories

In general, stories built in SAP Analytics Cloud can also be embedded into external websites. With embedding, pages can also be parameterized to set filters or prompt values while loading the page. More information on how to embed stories and which requirements must be met can be found at <http://s-prs.co/v502619>.

- Exports** If your audience is not using SAP Analytics Cloud or you want to print out the report, you can also export the story as a PDF file. In classic mode, you can also export to a PowerPoint file or to Google Slides. However, the report will not be interactive in those formats. Click on **Export...** in the **Save** menu of the story, as shown in Figure 5.109. This option is only available in view mode.

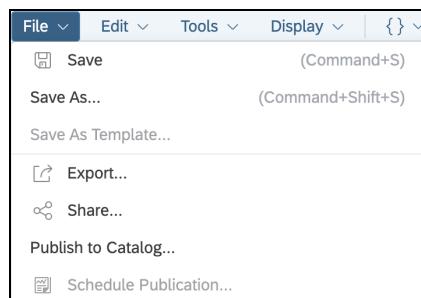


Figure 5.109 Exporting Stories

- Export options** A dialog box will open where you can define the export settings, as shown in Figure 5.110. Besides setting the export format, you can indicate whether

all or only selected pages should be exported. If you activate background exporting, you don't have to wait until the export is completed. The appendix, which is optional, contains a list of all filters applied in the story and the URL to access the story.

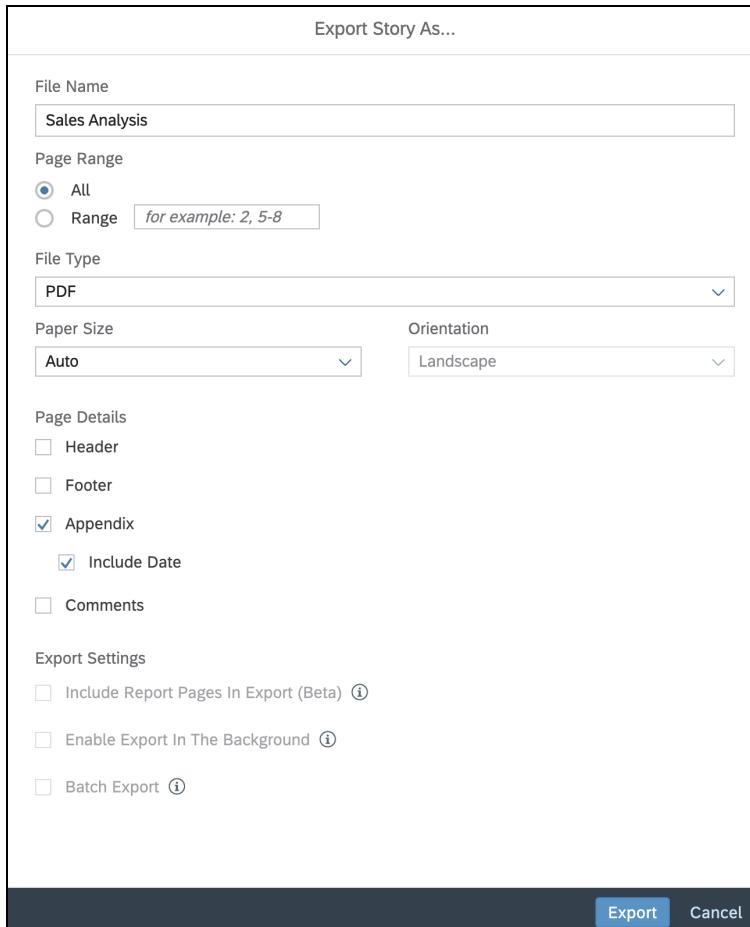


Figure 5.110 Export Options

If the story contains a story filter, you can also perform batched exports. This option will use the selected story filter to create an export for each dimension member. If you use a country dimension, for example, the story can be exported for each country separately.

Batch exporting

Sharing or exporting a story is done manually, but you can also automate the exporting process. Story export scheduling can be accessed in a story via the **Files** menu (**Schedule Publication...**) in view mode. Once selected, a dialog box lets you create one-time or recurring schedules, as shown in [Figure 5.111](#). The story exports can be distributed as links or as PDFs or PowerPoint files via email to a specified audience.

Scheduled publications

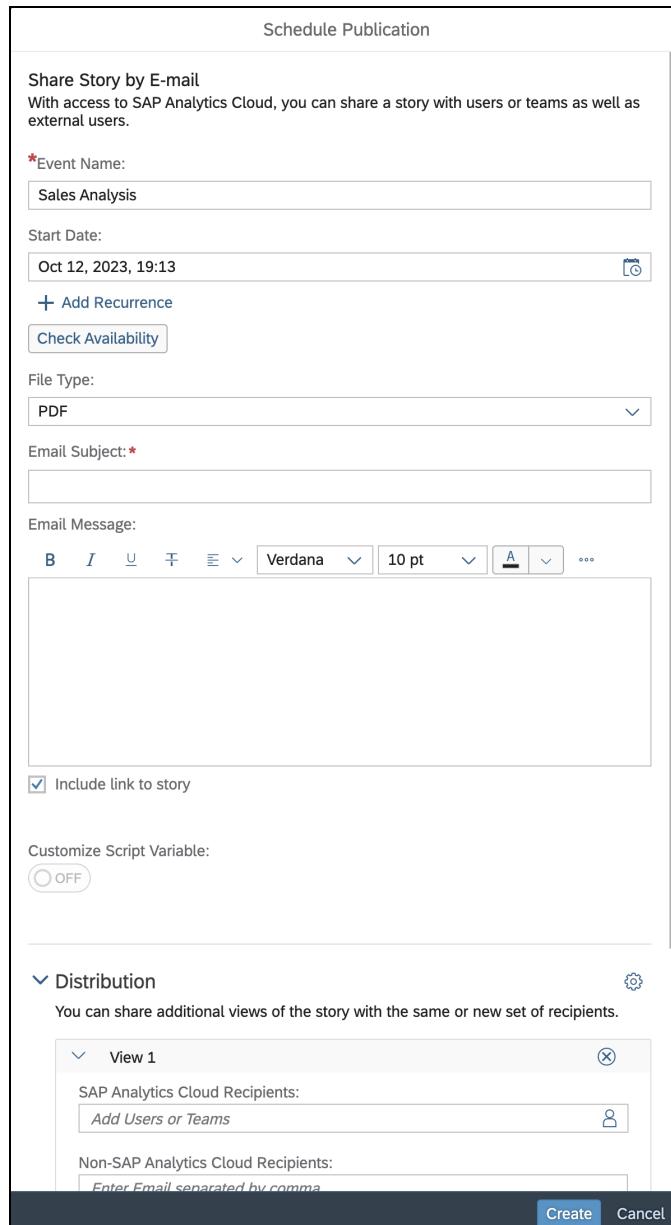


Figure 5.111 Scheduling Publication

In addition, the publication process can be adjusted to apply individual filters and control authorizations.

Since the number of publications per hour is limited by SAP, users can click on **Check Availability** to see if scheduling slots are free within their desired timeframes.

The sharing menu also includes the **Publish to Catalog...** option. This dialog box can be used to create an analytics catalog for SAP Analytics Cloud asset for this story, as shown in [Figure 5.112](#). You can control who will see this card by assigning teams. The published card will be previewed and can be customized by clicking on **Edit details....** where you can modify the title and description. Screenshots, pictures, or even more links to other stories or assets can be added as well. More information about the analytics catalog can be found in [Chapter 10, Section 10.3](#).

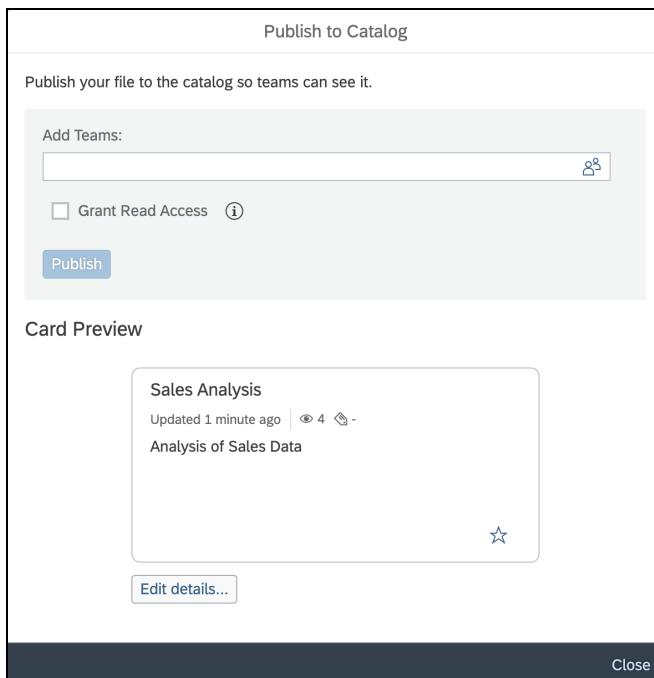


Figure 5.112 Publishing Stories to Catalogs

5.10.2 Publishing to Mobile Devices

SAP Analytics Cloud offers a mobile app as an alternative to the desktop version of its interface. This app is compatible with smartphones and tablets and can be installed on iOS and Android devices. You can download the app either in Google Play (for Android) or the App Store (for iOS).

Mobile app

To make a story accessible on a mobile device, the story must contain responsive pages. In general, a responsive page is quite similar to a canvas page. However, responsive pages use a lane concept to group and arrange content; the lanes automatically adjust themselves to the mobile device screen. More information about responsive pages can be found in [Section 5.2.1](#). Now, let's create a story based on responsive pages, which we'll also need for [Chapter 9](#) when we create a digital boardroom.

Requirements

Converting stories To quickly convert an existing story based on canvas pages into a mobile-friendly story, you can create new responsive pages in your story. You can then either recreate the charts or use copy and paste to copy existing charts to it.

To select multiple objects at once, hold the **Ctrl** key down while clicking on objects. Then, copy and paste these objects to the responsive page and rearrange them as needed.

Use the device preview at the bottom of the story to simulate what the story looks like on a mobile device, then save the story. The mobile app will automatically show all stories that contain responsive pages and are shared with you.

Example story We'll create a story that contains responsive pages only. These pages provide less freedom when it comes to arranging elements. We'll use the Sales Data model created in [Chapter 4](#), [Section 4.3](#) and [Section 4.5](#).

Lanes In general, you can add the same elements to a responsive page as you can on a canvas page. The story interface is almost identical ([Section 5.2.4](#)). The lane concept helps group charts, tables, and other elements and lets you choose which charts should be shown together if possible. Lanes can differ in height and width and are not limited in quantity. They can be placed to the left, to the right, on top of, and below each other.

Formatting lanes When you right-click on the header of a lane (the top strip with four dots in the middle), the lane's context menu is shown, as shown in [Figure 5.113](#). With this menu, you can add new lanes, copy a lane, or remove a lane.

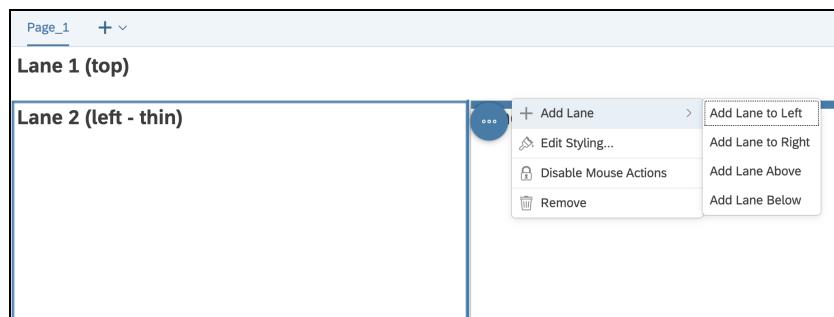


Figure 5.113 Responsive Page with Three Lanes

You can adjust a lane's size by clicking on its border and holding the left mouse button down while dragging. SAP Analytics Cloud will automatically show a grid to visually support aligning lanes, as shown in [Figure 5.114](#). This grid is also shown when you move individual objects on the page.

Responsive page Let's create a new story and add a responsive page to it. To start, the story contains two lanes. However, we want three lanes, so we'll add a third lane

right next to the second lane by clicking on the lane header and selecting **Add Lane • Add Lane to Right**, as shown earlier in [Figure 5.113](#).



Figure 5.114 Grid to Adjust Lanes

Rename the title of the first lane to “Overview.” Create the following charts, referring to the screen shown in [Figure 5.115](#) to verify your progress:

First lane

- A numeric point chart for the **Revenue** measure. Add a variance for the version dimension.
- A numeric point chart for the **Quantity** measure.
- A bar/column chart for the **Quantity** measure and the **Product** dimension.

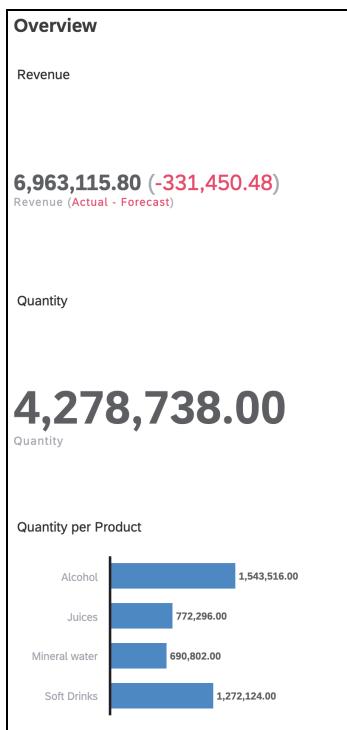


Figure 5.115 First Lane

Second lane Rename the title of the second lane to “Time Series.” Create the following charts and refer to the screen shown in [Figure 5.116](#) to verify your progress:

- A waterfall chart for the **Revenue** measure and the **Date** dimension. You may need to drill into the date hierarchy.
- A time series chart for the **Quantity** measure and the **Date** dimension.

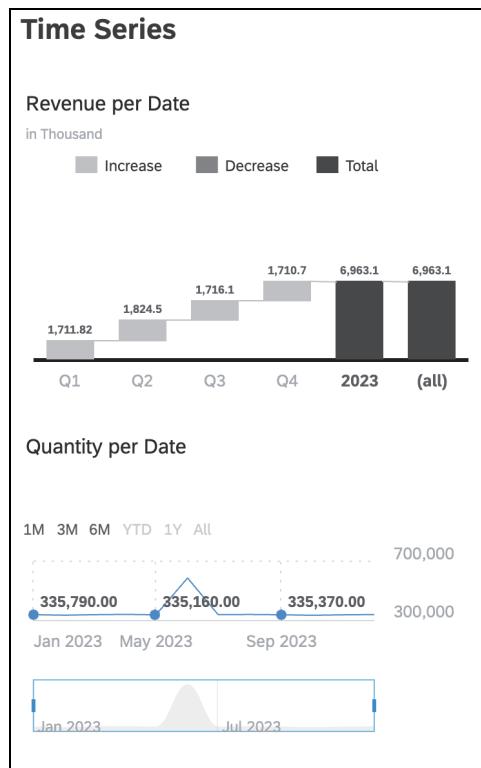


Figure 5.116 Second Lane

Third lane Change the title of the third lane to “Geo map.” Add a geo map and refer to the screen shown in [Figure 5.117](#) as a template. Add a bubble layer showing the **Stores** dimension. Use the **Revenue** measure for the bubble color and **Quantity** for the bubble size.

Rename the whole page to “Overview.” Validate your progress against the *Checkpoint 8 – Section 5.10.2.pdf* file from the demo data package.

Second page Now, create a second responsive page with two lanes. Rename the page to “Detail.”

Call the first lane “Tabular Analysis” and add the following elements:

- Three input controls (filters) for the following dimensions (always add all elements):

- Product
 - Supermarket
 - Version
- A table with the **Revenue** measure and **Quantity** as well as the **City**, **Supermarket**, and **Product** dimensions.
 - Enable the explorer for the table and include all dimensions and measures.

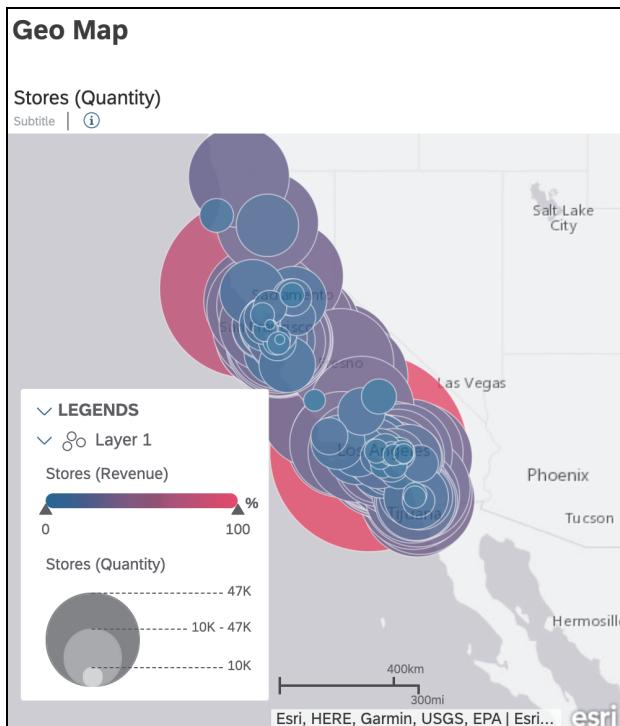


Figure 5.117 Third Lane

Rename the title of the second lane to “Dynamic Analysis” and add the following elements to it:

- A new bar/column chart that contains a dimension and measure input control.
- The measure input control that includes the **Quantity**, **Unit Price**, and **Revenue** measures.
- A dimension input control that includes the **Date**, **Product**, **Street**, and **Supermarket** dimensions.

Validate your progress against the *Checkpoint 9 – Section 5.10.2.pdf* file from the demo data package.

Third page Now, create a third responsive page and rename it to “More.” This page only has one lane, so remove the second lane.

Rename the lane title to “More information” and add the following elements:

- A heat map with **Product** on the X axis and **Supermarket** on the Y axis. Use the **Revenue** measure to determine the colors.
- A radar chart with the **Revenue** measure and the **Supermarket** dimension. Use the **Product** dimension for the color.

Save the story as “Sales Analysis (responsive)” in the **Sales Data** folder. Validate your progress against the *Checkpoint 10 – Section 5.10.2.pdf* file from the demo data package.

Finally, install the mobile application on your own smartphone or tablet. After connecting to your SAP Analytics Cloud tenant, open the story and explore it.

5.11 Additional Story Functionalities

Other workflows Since a story can provide a vast amount of functionality, not all of these functionalities could be covered in this chapter. In this section, we’ll present additional workflows that are part of the BI field. Similar to [Section 5.2](#), we’ll again use the demo files downloaded from the publisher’s website.

5.11.1 Creating an Embedded Model within a Story

In [Chapter 4, Section 4.3](#), we covered the use case of creating a model in the modeler, but another option is creating a model directly within a story. This procedure is recommended for workflows in which business users want to visualize small amounts of data on their own but don’t need to create a full model and/or don’t have the necessary permissions for this task (see [Chapter 4, Section 4.2.4](#)). Models that are embedded into a story can only be used within that story or can be published into a public model.

Creating a model within a story Create a new story (as described in [Section 5.2.2](#)). Click on the **Add New Data** icon in the top bar in the **Tools** section, choose **Add New Data...** and click on the **Data Uploaded from a File** button, as shown earlier in [Figure 5.9](#) ①.

After you’ve uploaded the file successfully, you’ll see the data wrangling interface. Now, you can clean or enrich the data (see [Chapter 4, Section 4.3](#)). An embedded model can always be manipulated by returning to the data view of the story.

5.11.2 Story Templates

As described in [Section 5.2.2](#), stories can also be built by using templates. The template contains all story settings, as well as pictures and texts. Instead of charts, a template has placeholders, which can be either replaced by the recommended chart (e.g., geo map and bar/column chart shown in [Figure 5.118](#)) or any other chart type.

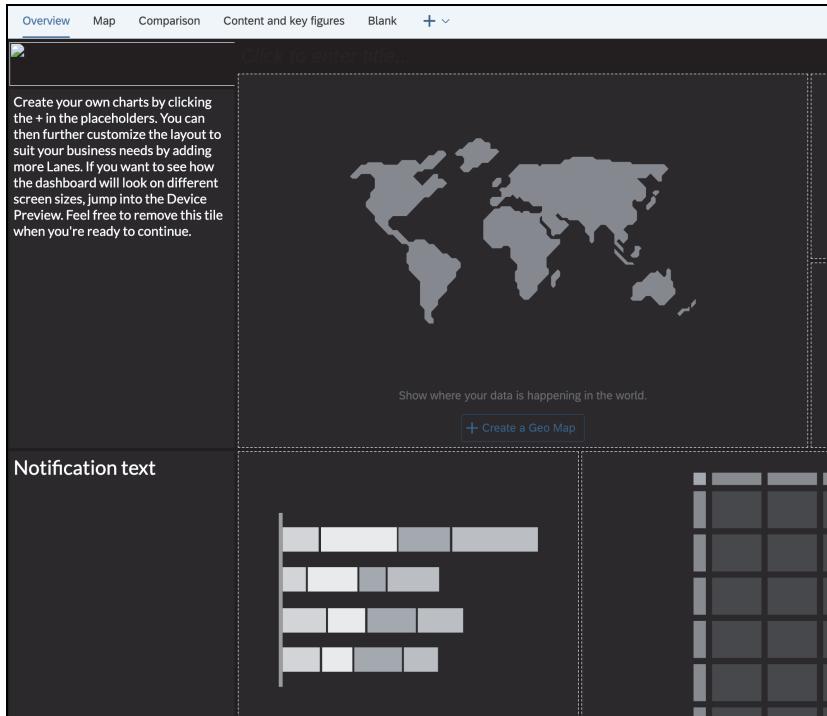


Figure 5.118 Story Template

Story templates can contain multiple pages. To create a new template, first create a story and fill it with content. Then, apply all desired story settings. Selecting the **Save as Template...** option will save the story as template. In the saved template, all charts, tables, and input controls will be replaced by placeholders.

Creating templates

5.11.3 Blending

Another important BI workflow is blending. When performing a blend, two data models will be linked by a common dimension so that data can be combined and shown in a single chart or table. An important distinction to keep in mind is that *blending* is always performed on the aggregation level currently defined in the charts, while *joins* always happen on the lowest possible data level.

Blending and joining

Performing a blend Let's perform a blend using the Sales Data model created in [Chapter 4, Section 4.3](#) and [Section 4.5](#). In addition, we'll use the *Blending-Data.xlsx* file from the demo data package. Blending is currently only supported in classic mode. Create a new story in **Classic Design Experience** mode and add a canvas page. Add a new table to the page that retrieves its data from the Sales Data model. Add the **Quantity** and **Revenue** measures to the columns and the **City** dimension to the rows. Switch over to the data (click on the **Data** button in the top left) and select **+ Add New Data...**, as shown in [Figure 5.119](#).

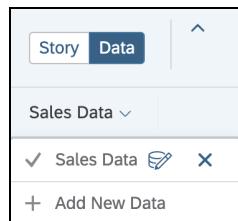


Figure 5.119 Adding New Data

Now, choose the **Data Uploaded from a File** option and upload the *Blending-Data.xlsx* file. Make sure that the **Potential Customers** column is recognized as a measure (see [Chapter 4, Section 4.3](#)). Click on **Story** in the top left to return to the story. Now, open the **Link Dimensions** interface from the top bar of the story. Link both models on the **City** dimension. Make sure that the ID of the city is used, as shown in [Figure 5.120](#). Confirm the blend by clicking on **Set**.

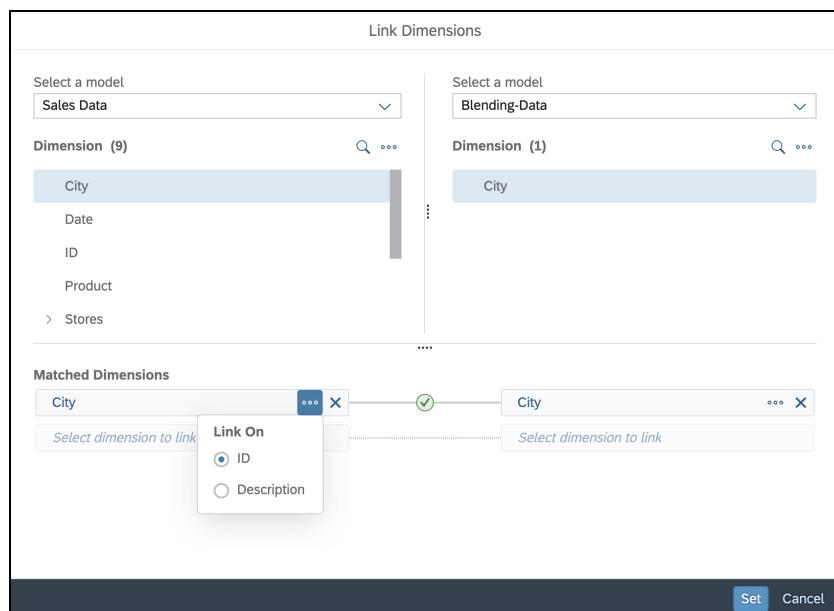
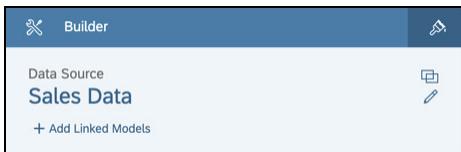


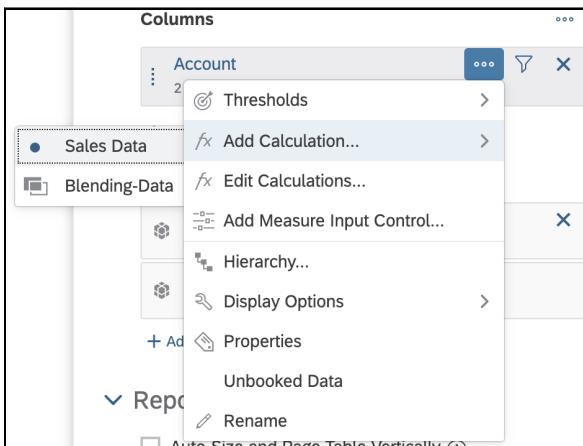
Figure 5.120 Linking Dimensions

Open the builder of the table and click on **Add Linked Models**, as shown in [Figure 5.121](#). Select the *Blending-Data.xlsx* model.

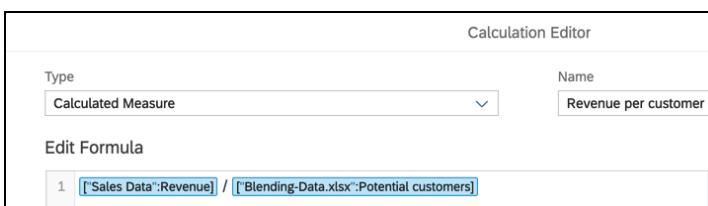


[Figure 5.121](#) Adding Linked Models

Now, create a new calculated measure in the builder, as shown in [Figure 5.122](#). Enter the formula “Revenue/Potential customers” manually and make sure you select the proposed values with the value help. While typing, the proposals appear automatically. Confirm these selections by pressing **Enter**. Call the measure “Revenue per customer,” as shown in [Figure 5.123](#).



[Figure 5.122](#) Adding Calculations to Tables



[Figure 5.123](#) Calculations in Editor

The table now shows a new column that contains the calculation (for example, as shown later in [Figure 5.125](#)).

If desired, blending options can be configured in the builder, as shown in [Figure 5.124](#). You can change the link type (**All Primary Data**, **All Data**, or

Blending settings

Intersecting Data Only) and change various parameters to control the blending behavior.

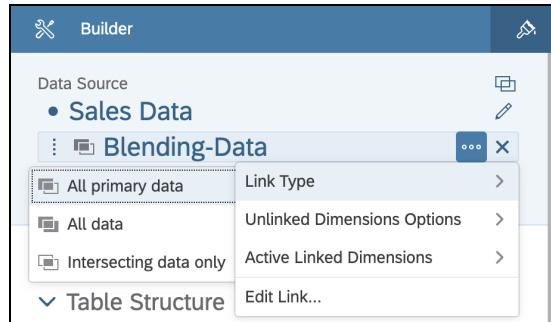


Figure 5.124 Blending Settings

Blending

Blends can only be created within a story, but blending isn't available for all live data sources. You can use more than one dimension to define a blend if your unique key can only be achieved in this way. Also, you can create more than one blend, which allows you to create triangular or square relationships between models, for example.

5.11.4 Comments

Users can also leave comments on the charts, tables, and pages of a story. This feature is available to all story viewers.

To create a comment, click on chart and open the action bar. Select **Add • Comment** to open the comment form. Users can enter any text and place the comment, as shown in [Figure 5.125](#).

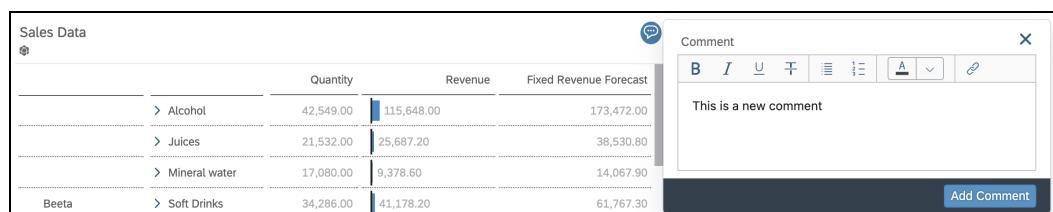


Figure 5.125 Placing New Comments

- Page comments** Comments will be stored with the date and time of their creation as well as the name of the person who wrote the comment. You can also place comments on pages by clicking on the page title and selecting the **Comment** entry.

When using planning models, you can also comment on specific data cells in a table. Similar to the normal commenting workflow, right-click on a data cell in a table and choose **Add Comment**.

Data point comments

Comments placed on a specific data point will be stored along with the context. Thus, a comment placed on the revenue for a specific product, for example, will only be shown if that context is shown in the table. If the value changes, the comment will show the value at the time the comment was placed.

5.11.5 Bookmarks

Especially in scenarios with multiple people accessing a story, each person may have different requirements for setting up filters and hierarchies. If a story viewer sets those views once, that user ideally wants to see this view again the next time the story is opened.

Views

Bookmarks can store the current view of a story, including its filters, input controls, prompts, and explorer views. Bookmarks have a significant advantage in that a story viewer can create them on top of a story without replicating the original story. The viewer can even define a bookmark to be shown by default when the viewer opens the story. [Figure 5.126](#) shows the bookmark menu in the action bar of the story. Story viewers can create multiple views and select a default one. Also, story creators can create global bookmarks that are available to all users (European view, North American view, etc.).

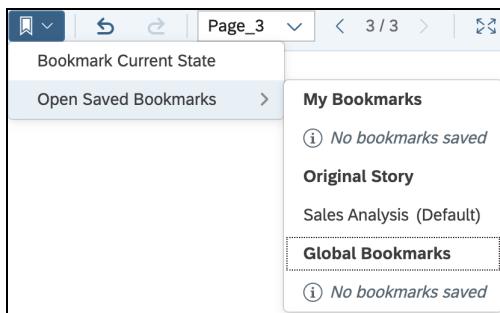


Figure 5.126 Bookmarks

5.12 Optimized Story View Mode

SAP introduced *optimized story view mode* to improve the performance of the SAP Analytics Cloud's story for viewers and to deliver new functionality. Although you can follow various recommendations in story design and content selection, story loading times can still become long if many charts are used.

Performance improvements To tackle this challenge, SAP incorporated a feature called *active viewport rendering*. This technology first loads the contents in the focus of the viewer before proceeding with content in the background. In this way, a story viewer can quickly get the first numbers and then navigate through the story as before.

In addition, SAP introduced various other optimizations, including persisted queries, which cache common requests into the data model until a change to the data structure or story design is introduced. Since many viewers usually open the same context in a story, this feature can reduce loading times significantly.

A full list of optimizations are documented in a blog post published by SAP, available at <http://s-prs.co/v218506>.

Activating optimized view mode The optimized view mode for stories must be activated explicitly for each story in classic mode. When designing stories in optimized mode, they are automatically viewed in optimized mode as well.

To begin, open a story which was built in classic design mode and switch to edit mode in the top right. Then, open the **Story Details** menu under **File**, as shown in [Figure 5.127](#).

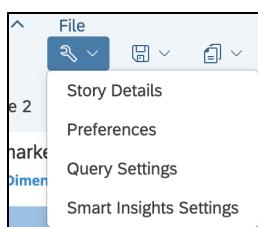


Figure 5.127 Opening the Story Details

On this screen, you can define various settings, including the **View Time Optimization**. Turn on the switch to **Enable Optimized Mode**, as shown in [Figure 5.128](#).

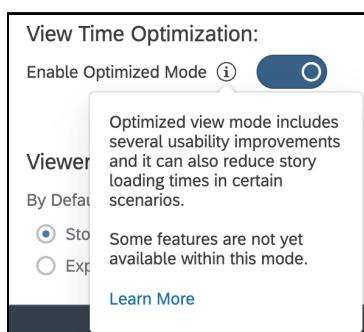


Figure 5.128 Enabling Optimized View Mode

This menu can also be accessed again to disable the optimized view mode. After enabling the optimized view mode, the story must be saved first before it can be opened again in view mode. Click on **View** in the top right to see how the story performs in the optimized mode.

Since this feature is a recent introduction, not all story functionalities are supported by it. SAP is continuously extending its support but affected charts have been deactivated in the meantime, as shown in [Figure 5.129](#). When hovering above the chart, more details will be shown regarding why the chart is not supported right now.

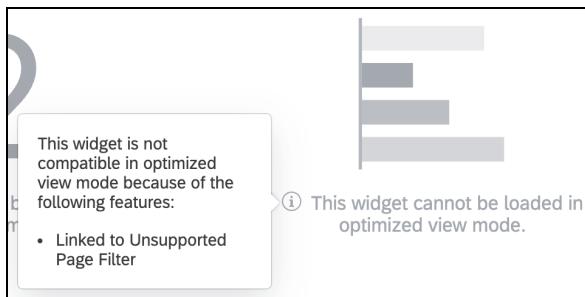


Figure 5.129 Unsupported Chart in Optimized View Mode

If you can't perform the necessary changes to support the chart, you must turn off optimized view mode. Switch back to edit mode in the top right and perform the same steps earlier when enabling the mode. However, this time deactivate the switch and save the story again to open it without further optimizations.

5.13 Summary

A story provides a lot of functionality and workflows to perform tasks in the area of BI. As the main working environment for most users of SAP Analytics Cloud, a story features a flexible toolkit for creating complex reports and dashboards.

In addition to reporting, a story can link data, feature comments, and even access external resources. Stories can be shared, published, and exported into various formats.

Now that you've seen the BI perspective, the next chapter will show you how planning workflows can be resolved within SAP Analytics Cloud, especially within the story.

Chapter 6

Planning

Another component of SAP Analytics Cloud is the planning engine, which provides various tools and functionalities to establish full planning processes. In this chapter, you'll learn more about planning in SAP Analytics Cloud, and we'll walk through an example for you to better understand each functionality.

An almost impossible (or at least quite hard) task is to correctly estimate how a business will develop and to then meet this forecast exactly, and thus, planning is especially important for businesses. However, as this field is rather complex, planning is often perceived as its own science. In many businesses, the controller is responsible for ensuring that budgets, goals, and long-term strategies are maintained correctly and ideally are met by the business. To support a tabular planning process with visual and intuitive functionalities, SAP Analytics Cloud offers a full-fledged planning component to establish planning processes and track their execution.

In this chapter, we'll take a detailed look at the planning component in SAP Analytics Cloud. We'll show you a selection of important functionalities through examples and cover how they influence the planning process. Then, you'll perform selected basic planning tasks to make you familiar with the toolset. But first, you'll create a new planning model, which we'll then use to walk through the exercises.

Requirements to Complete This Chapter

We'll create a new planning model in this chapter and work within the story. For our examples, you must be familiar with the contents of [Chapter 4](#), [Section 4.2.3](#), [Section 4.3](#), and [Section 4.5](#).

Also be aware that the planning functionality requires an extra license in SAP Analytics Cloud that isn't included in the business intelligence license.

6.1 Planning in SAP Analytics Cloud

The area of planning is often seen as its own world. Challenges and tasks are mostly resolved by a small group of employees in a company, like

controllers or other financial workers. These users have high expectations for planning solutions, which are often complex and go above simple data entry.

Planning models Planning in SAP Analytics Cloud either requires a planning model (see [Chapter 4, Section 4.2.3](#)) or a model based on a live connection to embedded SAP Business Planning and Consolidation (SAP BPC; see [Chapter 2, Section 2.1](#)). Planning models can only be created by users who carry the necessary license and must be created as planning models from the beginning. Note that you cannot convert an analytical model into a planning model after the model is created.

In the following sections, we'll go over several prominent planning tools and functionalities and describe how they're integrated with a story.

6.1.1 Data Entry and Version Management

Data entry The grid shown in [Figure 6.1](#) displays an account dimension with a hierarchy of key figures across a date dimension. This normal table chart was created within a story and shows data from a planning model.

Operating Income						
	Measures	SignedData				
	Version	Actual		Forecast		
	Date	(all)	>	2022	>	2023
OP_Accounts						
▼ Finance						
▼ Operating Income	-18,234.72 Million	-12,034.29 Million	-6,200.44 Million	-23,669.36 Million	-11,205.93 Million	-12,463.43 Million
▼ Gross Profit	-14,538.65 Million	-9,525.73 Million	-5,012.92 Million	-18,965.73 Million	-8,857.31 Million	-10,108.41 Million
➤ Net Revenue	-10,441.91 Million	-6,845.46 Million	-3,596.45 Million	-13,578.59 Million	-6,349.56 Million	-7,229.03 Million
➤ Cost of Goods Sold	4,096.74 Million	2,680.27 Million	1,416.47 Million	5,387.14 Million	2,507.75 Million	2,879.38 Million
▼ Operating Expenses	3,696.08 Million	2,508.56 Million	1,187.52 Million	4,703.63 Million	2,348.62 Million	2,355.01 Million
➤ Sales and Marketing	301.37 Million	205.67 Million	95.71 Million	386.57 Million	192.37 Million	194.20 Million
➤ Personnel Costs	1,782.03 Million	1,142.40 Million	639.63 Million	2,210.28 Million	1,069.38 Million	1,140.90 Million
➤ IT Expenses	335.82 Million	231.21 Million	104.62 Million	443.14 Million	217.11 Million	226.03 Million
➤ Other Expenses	1,276.85 Million	929.29 Million	347.56 Million	1,663.63 Million	869.76 Million	793.87 Million
▼ Key Performance Indicators	-3.49 Percentage	-3.52 Percentage	-3.45 Percentage	-3.49 Percentage	-3.53 Percentage	-3.45 Percentage
Gross Margin %	139.2%	139.2%	139.4%	139.7%	139.5%	139.8%
Operating Profit %	174.6%	175.8%	172.4%	174.3%	176.5%	172.4%
Operating Exp Ratio	-35.4%	-36.6%	-33.0%	-34.6%	-37.0%	-32.6%

Figure 6.1 Table with Plan Data

Not only can the data in a planning model be analyzed, it can also be directly modified within a table in a story. These changes would be directly applied to the data in the model.

This task is performed by clicking on the value in the table that you want to change. Then, simply type in a new value or add or subtract a value, as shown in [Figure 6.2](#).

Measures		SignedData
Version		Actual
Date	(all)	2022
OP_Accounts		
▼ Finance		
▼ Operating Income		
-18,234.72 Million		-12,034.29 Million
▼ Gross Profit		-14,538.65 Million
		-1 Million

Figure 6.2 Entering Data into Tables

Now that you've seen how data is entered, note that this feature isn't restricted to previously created versions. Another important feature of the planning component is version management, which is directly integrated into a story and can be accessed quickly. Not only can you edit existing versions (if you have the necessary rights); you can also create private versions, as shown in [Figure 6.3](#). In this process, you can have multiple options, which include changing the currency or selecting a category for the new version.

You can also indicate if the new version should copy all the data from another version or be created blank. You can also specify a scope to copy only a selection of data.

Initially, private versions are only visible to their creators who alone can modify, without fear of interference from other users. However, a private version can also be shared with selected colleagues so that they can support you in the process. You can also differentiate between read and write access.

Private versions

As shown in [Figure 6.4](#), the new version will appear in the table, like every other version of the model, and can be modified the same way. Once all activities in the version are completed, this version can be published and converted into a public version. A full workflow can be established to govern this process, including a validation step that requires the version to be checked first before it is published. We'll describe this in more detail in [Section 6.3.1](#).

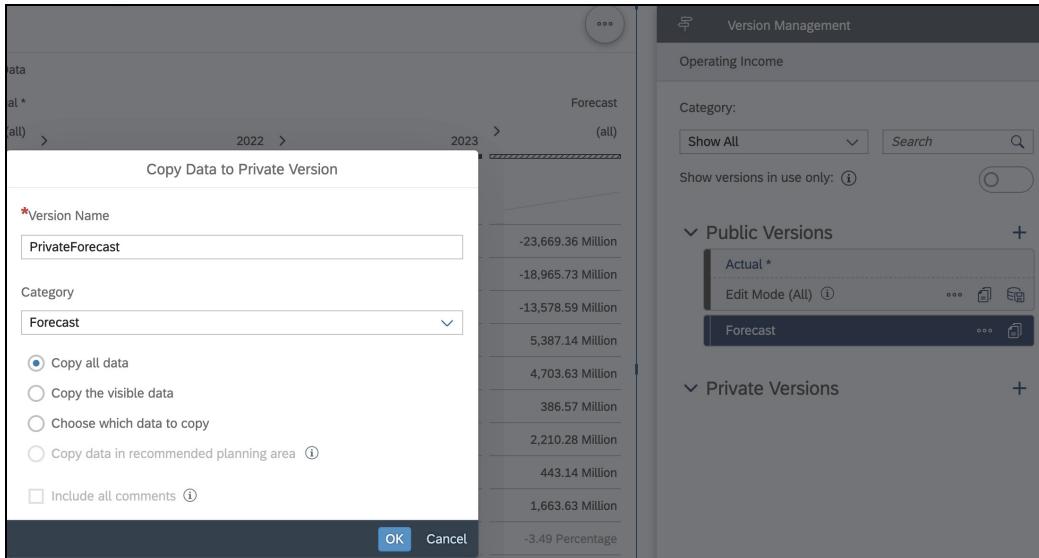


Figure 6.3 Creating Private Versions

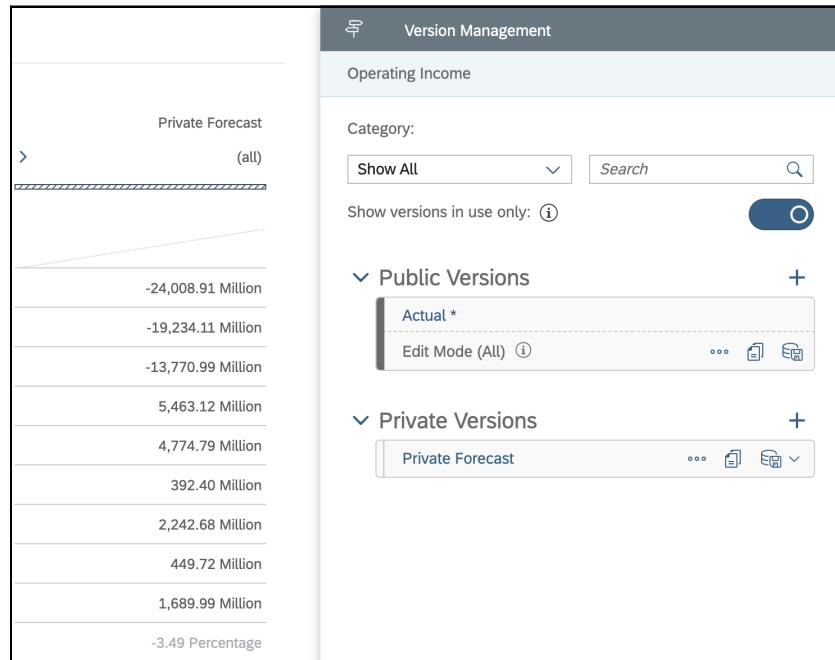


Figure 6.4 New Private Version

6.1.2 Planning within Stories

Distribution Within a story, several functionalities support users during planning processes. With the *distribution* functionality, you can, for example, distribute

values from a hierarchy node to its children and assign weights to determine how the value is spread. Before opening the interface, you must first select the value you want to distribute. This process is described in detail in [Section 6.3.2](#).

[Figure 6.5](#) shows how the **-6,718,911,705.11** value is distributed proportionally across all quarters of a year. The weights can be used to specify how much of the total value is assigned to each quarter without changing it. The weights can be entered as either absolute values or as ratios (e.g., “1, 1, 1, 1” for an equal distribution).

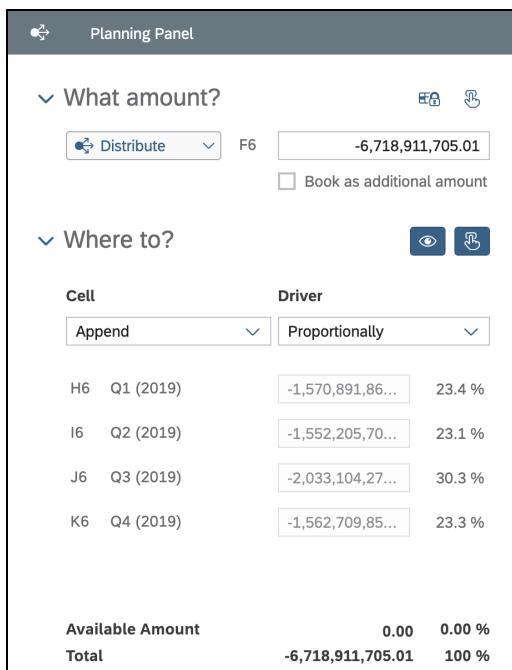


Figure 6.5 Spreading Values

Values are usually distributed across a hierarchy (in our case, the **Date** hierarchy of the following year) and can be performed at every level of the hierarchy.

Another common workflow in planning scenarios is increasing or decreasing the overall outlook. The interface also allows you to enter a number and assign it to each dimension member based on a weight or absolute values. Again, you must select the target hierarchy that you want to increase in the table.

Assigning

[Figure 6.6](#) shows an example in which we want to add the **-500,000** value to the operating income for both years. While 10% of this total is assigned

to 2018, the other 90% is assigned to 2019. The dialog box shows clearly how your assignments will look once finished.

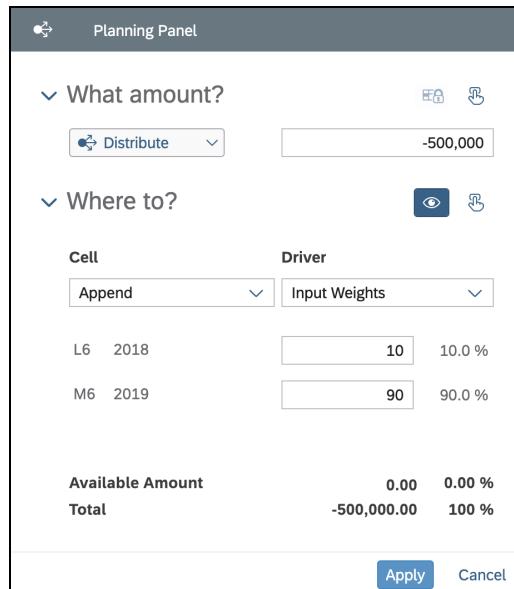


Figure 6.6 Assigning Values

6.1.3 Planning Tools

Value driver trees In addition to the planning tools available within a story, which are presented in detail in [Section 6.3](#), additional tools are available for planning and simulation workflows that make these processes easier and faster. The value driver tree is one such tool. Like a chart, a value driver tree can be embedded as an object in a story.

[Figure 6.7](#) shows an excerpt of a value driver tree. In general, this tool allows you to split a key figure down into its individual components. In this case, the value driver tree displays the **Profit** measure and some of its components. The tree can become rather big and complex, you can use your mouse to zoom in and out of and navigate through it. The window in the bottom left shows the current position of the tree and which part is covered by the view.

Simulation However, value driver trees do not just display dependencies. You can also run simulations and access a broad set of functionalities. Simply click on a value in one of the drivers and change it (by either using absolute values or a percentage), as shown in [Figure 6.8](#).

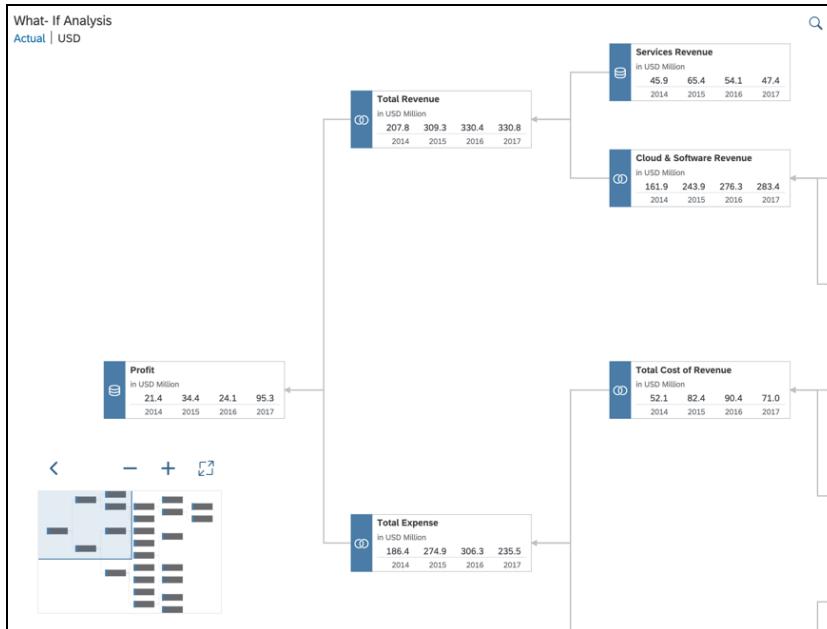


Figure 6.7 Excerpt of a Value Driver Tree

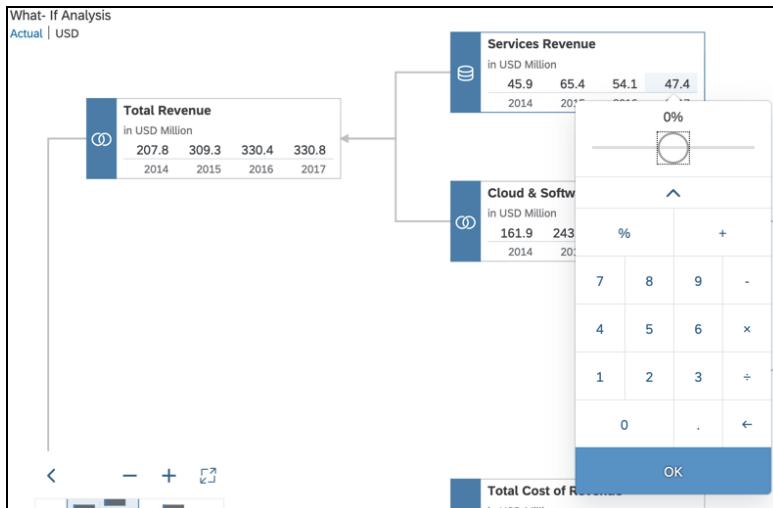


Figure 6.8 Changing Individual Values

If a value has been modified, it will be colored yellow, as shown in Figure 6.9. In addition, you can implement calculation rules in a value driver tree that influence how a change in one value affects other values along the tree. The value driver tree therefore provides instant feedback on proposed changes or their impacts on estimations. All values that change because of the modified entry will be marked in yellow as well.

Calculation rules

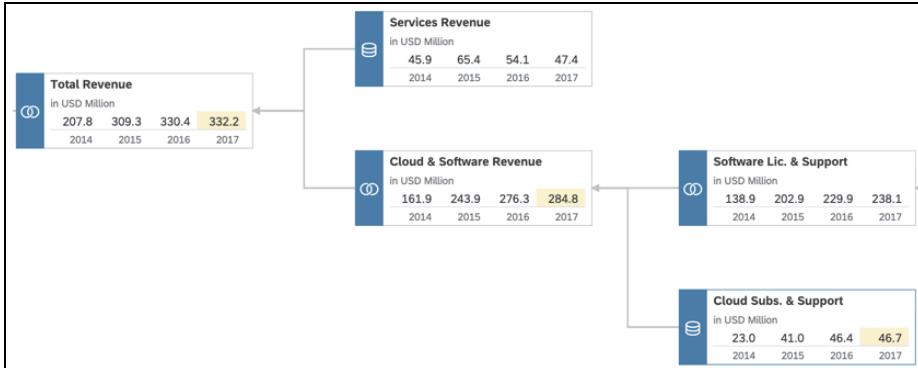


Figure 6.9 Values Marked after Modification

Because planning processes are often rather complex and usually involve multiple people, SAP Analytics Cloud provides an embedded calendar that is directly accessible from the main menu. This calendar allows you to create specific tasks, as shown in [Figure 6.10](#), which can have start and end dates. You can also assign these tasks to specific users and enrich them with additional information, related processes, validation steps, reminders, and notes.

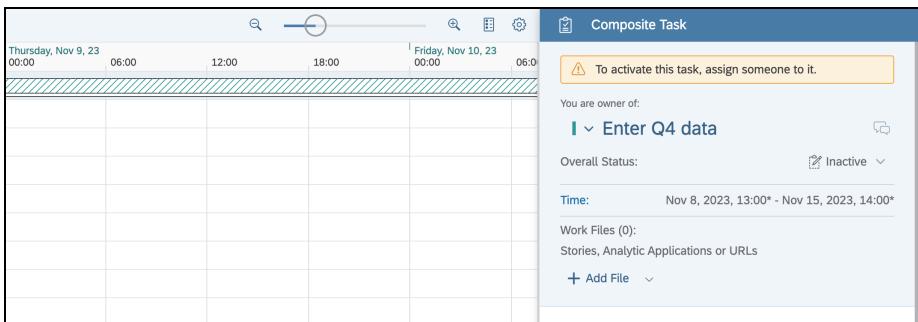


Figure 6.10 Tasks in Calendar

The functionalities we described in this section only reflect a small portion of the available functionalities. We tried to show how planning tools are tightly integrated in SAP Analytics Cloud. In the next section, we'll create a new planning model. Afterwards, we'll walk you through a selection of planning functionalities.

6.2 Creating and Setting Up a Planning Model

Planning workflows can only be established when using planning models as data sources. For a better understanding of various model types, consult [Chapter 4, Section 4.2](#). Now, in this section, we'll create a new planning

model from scratch. First, we'll create a currency table with conversion rates. Then, we'll create the data model by using master data. The process will conclude with uploading transactional data for the actuals and forecast versions of the model.

Demo Data Package

In this section, we'll go through the model creation process. You'll need to download the demo data package from the publisher's website at <https://www.sap-press.com/5753>. You'll find a compressed archive at the bottom of the page in the **Product supplements** section. All three files required for this section can be found in the **Planning Data** folder.

The planning model we'll build in this section is based on sales data for various sporting goods (clothes and accessories). The planning process will be performed for regions and products on a monthly granularity.

Data for the planning model

The files with the sample data contain the following contents:

- **Operating Income Master Data.xlsx**

This file contains the master data for the planning model and the currency conversion table. Both tables are essential for the initial model creation. This workbook contains four sheets:

- **Accounts**

This sheet contains all accounts and their attributes.

- **Region**

This sheet defines the regional hierarchy of sales regions.

- **Product Groups**

This sheet contains the product hierarchy.

- **Currency**

This table contains currency conversion rates, which we'll use to create a currency table.

- **Operating Income Actuals (2023).csv**

This file contains actual transactional data for 2022 and 2023.

- **Operating Income Forecast (2023).csv**

This file contains forecasted transactional data for 2022 and 2023.

Note that you'll need a program like Microsoft Excel to open XLSX files.

6.2.1 Creating a Currency Conversion Table

To establish our planning workflow, we first need to create a currency conversion table. This table will be used later within planning models to show values in other currencies.

Creating a currency conversion table Open the main menu and select **Modeler • Currency Conversions • Currency Conversion Table**, as shown in [Figure 6.11](#).

Select the **New Currency Conversion Table** entry and enter the title, as shown in [Figure 6.12](#): "OperatingIncome_Currency". Then, click on **Create**.

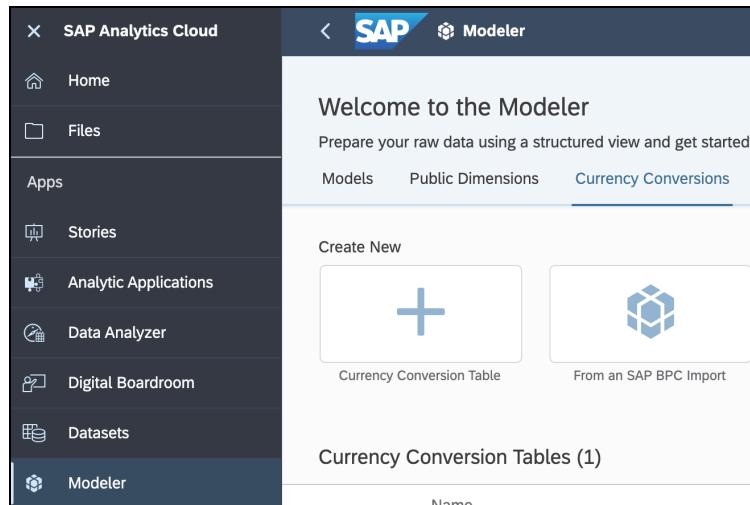


Figure 6.11 Creating a New Currency Conversion Table

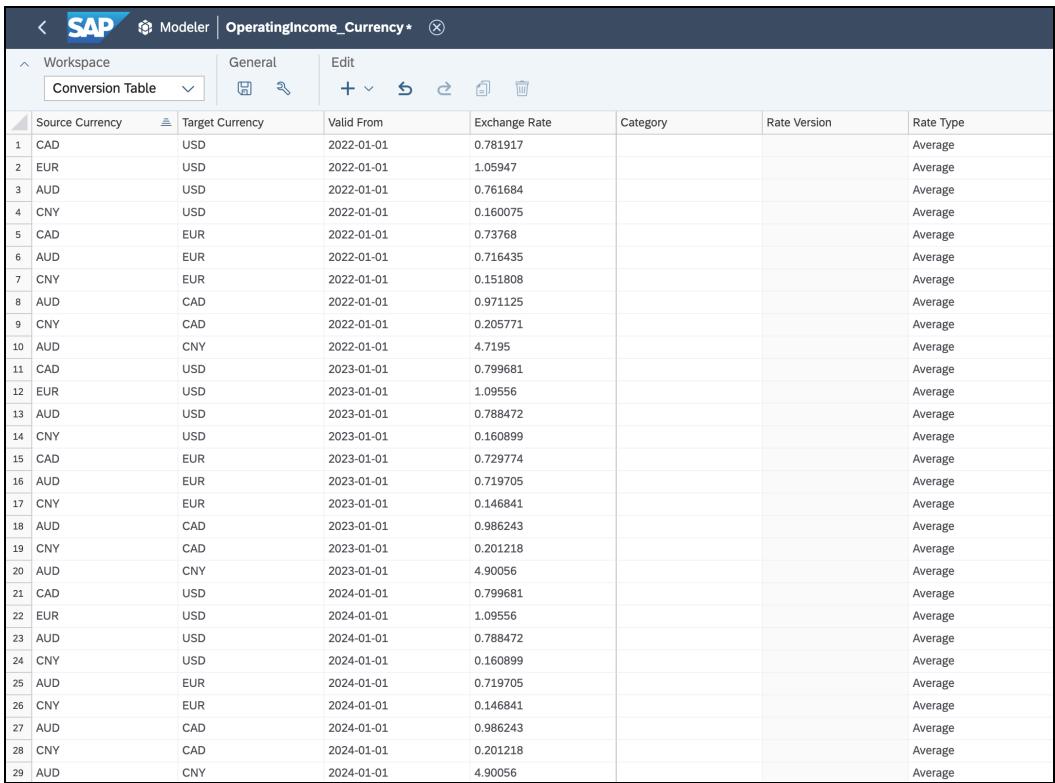
 A screenshot of a 'Create Currency Conversion Table' dialog box. It has fields for 'Name' (containing 'OperatingIncome_Currency') and 'Description' (containing 'Conversion rates for the Operating Income model'). At the bottom are 'Create' and 'Cancel' buttons.

Figure 6.12 New Table Name and Description

Adding conversion rates You'll be automatically redirected to an empty table in which you can enter conversion rates line by line. For each entry, you must maintain the **Source Currency**, **Valid From**, **Target Currency**, **Rate Type**, and **Exchange Rate** fields. You also can maintain different exchange rates for different versions.

Enter the values from the **Currency** sheet from the *Operating Income Master Data.xlsx* Excel file. To make this process easier for you, the sheet already matches the structure of the table in SAP Analytics Cloud so that you simply copy and paste the rates. However, make sure you do not copy the header line.

The results should match the table shown in [Figure 6.13](#). Now, click on the Save icon  to save the table.



The screenshot shows a SAP Modeler interface with a dark header bar. The title bar displays 'SAP Modeler | OperatingIncome_Currency*' with a close button. Below the header is a toolbar with icons for 'General' (document), 'Edit' (pencil), and other functions. A dropdown menu shows 'Conversion Table' is selected. The main area is a table with the following columns: 'Source Currency', 'Target Currency', 'Valid From', 'Exchange Rate', 'Category', 'Rate Version', and 'Rate Type'. The table contains 29 rows of data, each with a row number from 1 to 29. The 'Rate Type' column consistently shows 'Average'.

	Source Currency	Target Currency	Valid From	Exchange Rate	Category	Rate Version	Rate Type
1	CAD	USD	2022-01-01	0.781917			Average
2	EUR	USD	2022-01-01	1.05947			Average
3	AUD	USD	2022-01-01	0.761684			Average
4	CNY	USD	2022-01-01	0.160075			Average
5	CAD	EUR	2022-01-01	0.73768			Average
6	AUD	EUR	2022-01-01	0.716435			Average
7	CNY	EUR	2022-01-01	0.151808			Average
8	AUD	CAD	2022-01-01	0.971125			Average
9	CNY	CAD	2022-01-01	0.205771			Average
10	AUD	CNY	2022-01-01	4.7195			Average
11	CAD	USD	2023-01-01	0.799681			Average
12	EUR	USD	2023-01-01	1.09556			Average
13	AUD	USD	2023-01-01	0.788472			Average
14	CNY	USD	2023-01-01	0.160899			Average
15	CAD	EUR	2023-01-01	0.729774			Average
16	AUD	EUR	2023-01-01	0.719705			Average
17	CNY	EUR	2023-01-01	0.146841			Average
18	AUD	CAD	2023-01-01	0.986243			Average
19	CNY	CAD	2023-01-01	0.201218			Average
20	AUD	CNY	2023-01-01	4.90056			Average
21	CAD	USD	2024-01-01	0.799681			Average
22	EUR	USD	2024-01-01	1.09556			Average
23	AUD	USD	2024-01-01	0.788472			Average
24	CNY	USD	2024-01-01	0.160899			Average
25	AUD	EUR	2024-01-01	0.719705			Average
26	CNY	EUR	2024-01-01	0.146841			Average
27	AUD	CAD	2024-01-01	0.986243			Average
28	CNY	CAD	2024-01-01	0.201218			Average
29	AUD	CNY	2024-01-01	4.90056			Average

Figure 6.13 New Currency Conversion Table

The currency conversion table is not automatically used but must be explicitly referenced in a planning model, which we'll set up during the model creation process.

6.2.2 Creating a Master Data Model

First, we'll create the model and master data manually. We'll create the model and all dimensions first and upload any transactional data later. This modeling procedure is common in planning workflows and will also show you how to create a model manually.

Creating a model manually

Follow the initial steps described in [Chapter 4, Section 4.3](#). Create a new model by opening the main menu and clicking on **Modeler • Model**, as shown in [Figure 6.14](#).

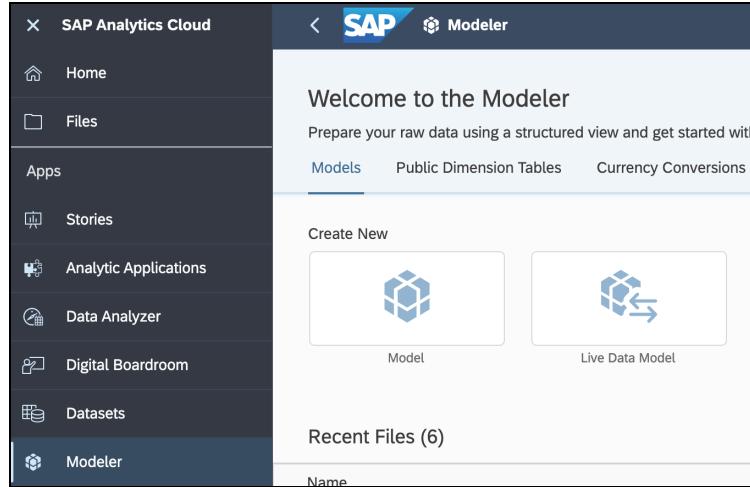


Figure 6.14 Creating New Models

- Start with empty model** Choose the **Start with an empty model** option, as shown in [Figure 6.15](#). SAP introduced a new data model type in 2021. However, since this model was introduced after the product launched, some restrictions apply. Some features are also only supported in the new model. More information about this topic can be found in [Chapter 4, Section 4.5.1](#).

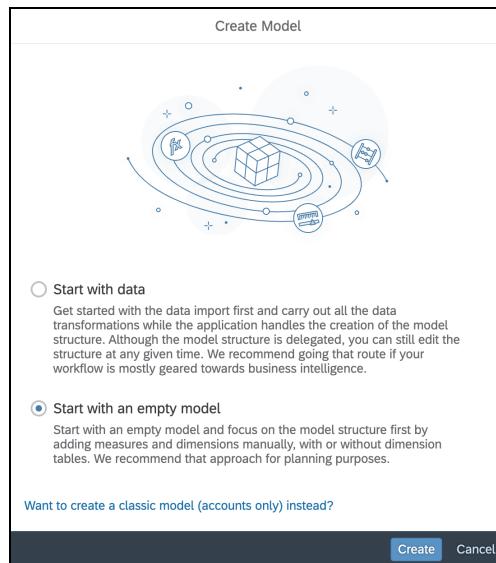


Figure 6.15 Choosing a Model Type

The empty model initially has a version dimension and a date dimension, as shown in [Figure 6.16](#). These dimensions must be maintained first before you can upload any data to the model.

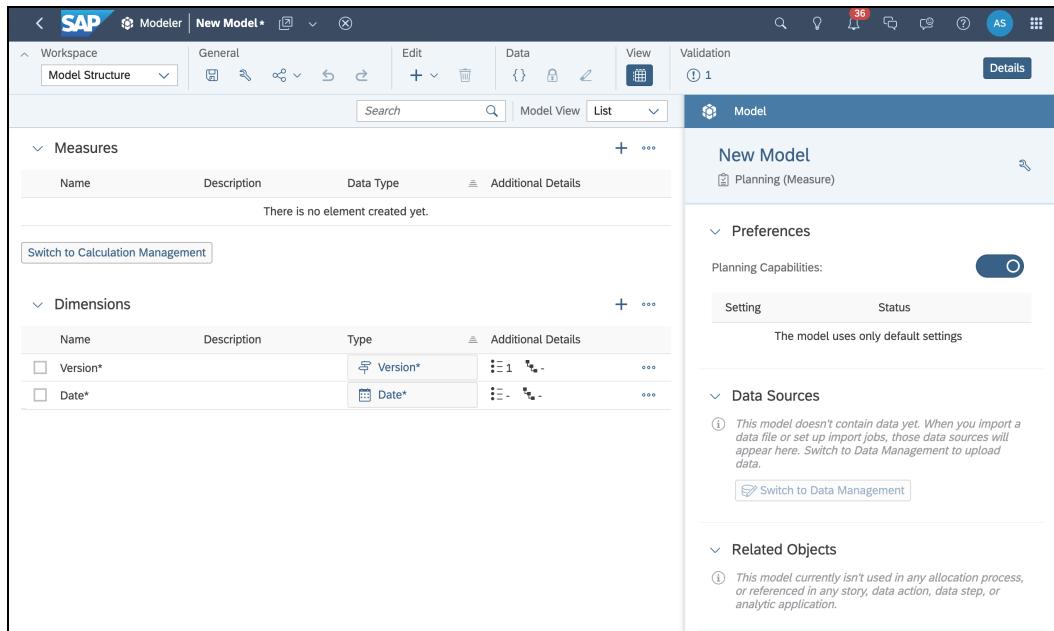


Figure 6.16 New Model with Version and Date Dimensions

Initially, we want to activate the currency conversion and validate the date settings. Click on the **Model Preferences** icon and click the **Planning** tab. Ensure that the **Planning Capabilities** slider is on and the **Date Dimensions used for Planning** dropdown has **Date** selected, as shown in [Figure 6.17](#).

Model preferences

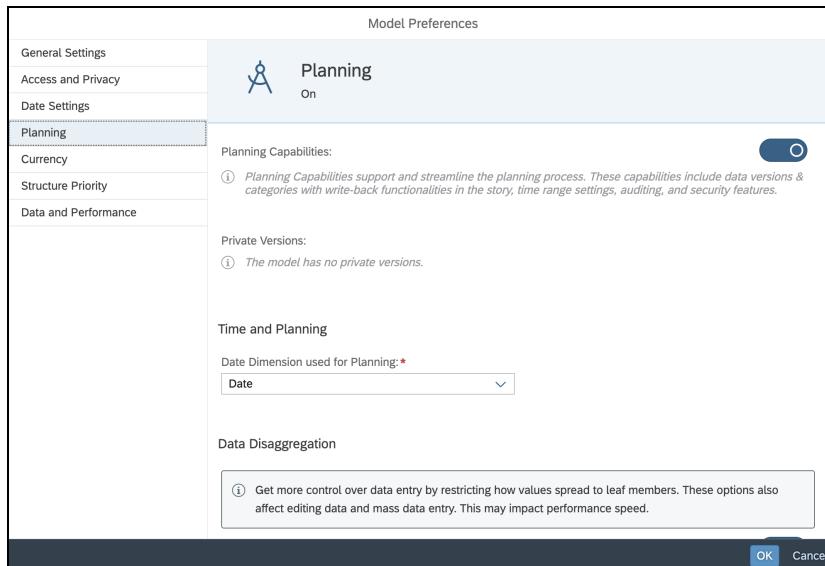


Figure 6.17 Planning

Enabling currency conversion Switch to the **Currency** tab and activate the **Currency Conversion** option, as shown in [Figure 6.18](#). Make sure that the **Currency Rate Tables** field shows your previously created table, **OperatingIncome_Currency** and confirm these settings by clicking on **OK**.

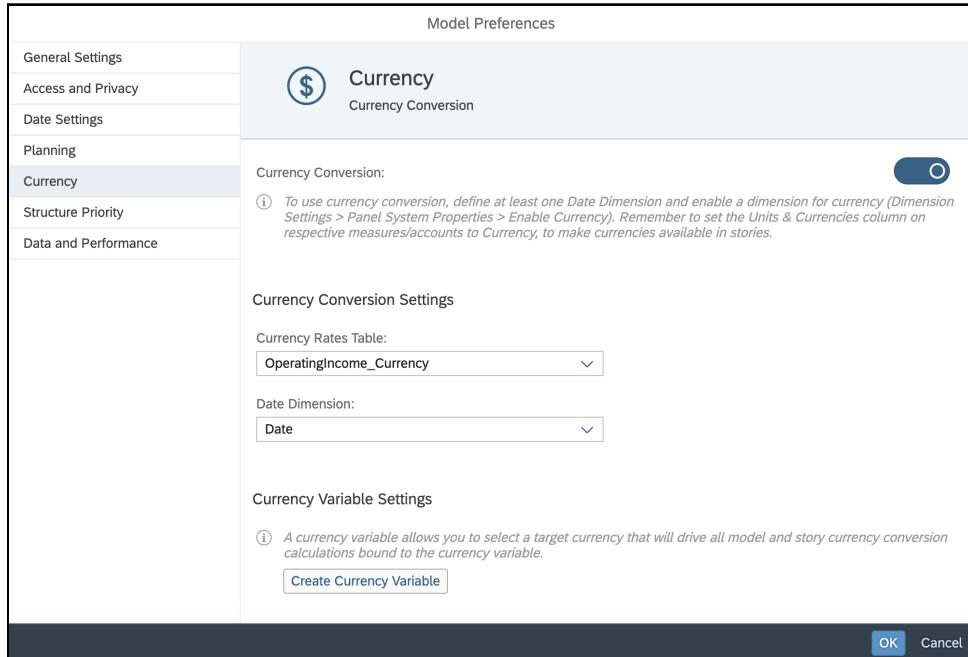


Figure 6.18 Enabling Currency Conversion

Adding an account dimension Now, click on the **+** button and select the **Add New Dimension** entry. Rename the title of the dimension to “**OP_Accounts**” and make sure that the **Type** field is set to **Account** and confirm these settings by clicking on **Add**, as shown in [Figure 6.19](#).

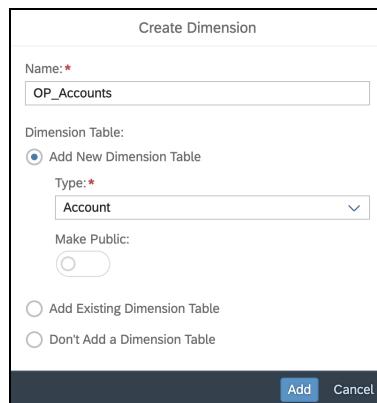


Figure 6.19 Adding New Account Dimensions

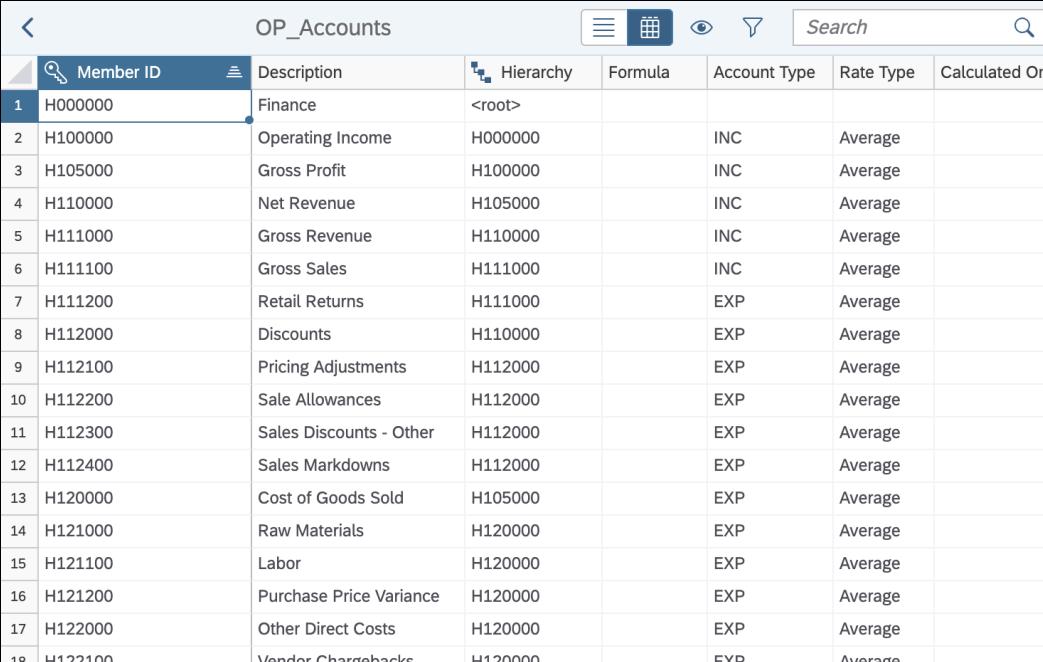
Public Dimensions

A public dimension is saved independently from its model and thus can be used across multiple models. One advantage of a public dimension is that it is maintained centrally and thus reduces maintenance effort. Public dimensions only contain master data; the necessary transactional data must be provided in each model separately. These dimensions are suitable for account structures or real-world structures like organizations, regions, or products.

In the new model type, not every dimension type can be set as a public dimension. In this case, the setting is greyed out.

A new dimension will now be added to the list. Open the dimension by clicking on the  icon in the **Type** column and switch to the grid view by clicking on the  icon in the top right, as shown in [Figure 6.20](#). Open the *Operating Income Master Data.xlsx* Excel file and switch to the **Accounts** sheet. Select the contents of this sheet (except for the first line, which contains the headers) and copy this data. Then, paste this data into the grid view of the account dimension in SAP Analytics Cloud. The result should match the table shown in [Figure 6.20](#).

Dimension overview



	Member ID	Description	Hierarchy	Formula	Account Type	Rate Type	Calculated On
1	H000000	Finance	<root>				
2	H100000	Operating Income	H000000	INC	Average		
3	H105000	Gross Profit	H100000	INC	Average		
4	H110000	Net Revenue	H105000	INC	Average		
5	H111000	Gross Revenue	H110000	INC	Average		
6	H111100	Gross Sales	H111000	INC	Average		
7	H111200	Retail Returns	H111000	EXP	Average		
8	H112000	Discounts	H110000	EXP	Average		
9	H112100	Pricing Adjustments	H112000	EXP	Average		
10	H112200	Sale Allowances	H112000	EXP	Average		
11	H112300	Sales Discounts - Other	H112000	EXP	Average		
12	H112400	Sales Markdowns	H112000	EXP	Average		
13	H120000	Cost of Goods Sold	H105000	EXP	Average		
14	H121000	Raw Materials	H120000	EXP	Average		
15	H121100	Labor	H120000	EXP	Average		
16	H121200	Purchase Price Variance	H120000	EXP	Average		
17	H122000	Other Direct Costs	H120000	EXP	Average		
18	H122100	Vendor Chargebacks	H120000	EXP	Average		

Figure 6.20 Account Dimension

Click on the **Back** icon  in the top left to navigate back to the model overview. Now, create another public dimension with the following parameters:

- **Name:** “OP_Region”
- **Type:** Organization
- **Make This a Public Dimension:** No

Creating a hierarchy Open this new dimension by clicking on its name in the list. Click on the **+ Create Hierarchy** button in the sidebar and choose the **Parent-Child Hierarchy** option. Enter “Hierarchy” into the **ID** field and leave the **Description** field empty.

Again, switch to the grid view (via the  icon). Similar to the account dimension, the *Operating Income Master Data.xlsx* Excel file contains the necessary data. Open the file and navigate to the **Region** tab. Then, copy its content (except the header info in the first line) and paste it into SAP Analytics Cloud. The view should match the table shown in [Figure 6.21](#).

		OP_Region		
	Member ID	Description	Hierarchy	Currency
1	#	Unassigned	<root>	USD
2	ENTERPRISE	Enterprise		USD
3	REG0002	Southeast	HREG0001	USD
4	REG0001	Northeast	HREG0001	USD
5	HREG0001	East US	HALL_COMPANY	USD
6	HALL_COMPANY	United States	<root>	USD
7	HREG0003	West US	HALL_COMPANY	USD
8	HREG0004	Overseas	<root>	EUR
9	REG0005	Midwest	HREG0003	USD
10	REG0004	Pacific	HREG0003	USD
11	REG0006	EMEA	HREG0004	EUR
12	REG0003	Asia Pacific	HREG0004	CNY

Figure 6.21 OP_Region Dimension

Creating a generic dimension Return to the dimension overview and create a new dimension with the following parameters:

- **Name:** “OP_Product”
- **Type:** Generic
- **Make This a Public Dimension:** No

Similar to the dimension before, open the dimension by clicking on its name. Create a new parent-child hierarchy with the ID “Hierarchy.” Again, the *Operating Income Master Data.xlsx* Excel file provides the contents. Open this file, navigate to the **Product** tab, and copy all contents (except the first line of header info) into the grid view of SAP Analytics Cloud. The result should match the table shown in [Figure 6.22](#).

OP_Product			
	Member ID	Description	Hierarchy
1	#	No Product	<root>
2	ALL_PRODGROUP	Product Group	
3	ALL_PRODUCTS	All Products	<root>
4	HPRD0001	Apparel	ALL_PRODUCTS
5	HPRD0002	Footwear	ALL_PRODUCTS
6	PRD0001	Athletic Shirts	HPRD0001
7	PRD0003	Athletic Shorts	HPRD0001
8	PRD0004	Caps	HPRD0001
9	PRD0005	Tennis Shoes	HPRD0002
10	PRD0006	Running Shoes	HPRD0002
11	Glasses	Glasses	HPRD0001

Figure 6.22 OP_Product Dimension

Return to the model overview and open the sidebar of the OP_Region dimension by clicking on the dimension title in the **Type** column on the left side of the screen. Check the **Properties** section. It should show the **Currency** entry, as shown in [Figure 6.23](#).

**Figure 6.23** Currency Property

Since the new model requires at least one measure, we need to create an empty measure which we won't use during our planning activities. Switch to the **Calculations** overview by clicking on the dropdown on the top left of the modeler (below **Workspace**).

Creating a measure

Click on the + icon next to **Measures** to add a new measure. Name the measure "SignedData" as shown in [Figure 6.24](#).

The screenshot shows the 'Calculations' workspace with a toolbar at the top. The 'Properties' tab is selected on the right. In the 'Measures' section, a new measure named 'SignedData' is listed. The properties for 'SignedData' are shown on the right, including 'Name: SignedData' and 'Description:'.

Figure 6.24 Creating a New Measure

Measures and accounts in one model The new model type allows models to carry both single measures and account dimensions. This can lead to conflicting situations where measures and accounts have inconsistent properties. To prevent issues caused by this, you can open the model preferences and determine if properties and calculations are prioritized either from measures or the account dimension. Depending on which you select, the properties of the selection will be respected first. In our case, there is no potential for conflict as we don't apply any properties here.

- Date dimension** Last, we need to validate the **Date** dimension. By default, it is set to a specific range which may not match our data. Click on the **Date** dimension in the **Type** column to open the dimension settings in the right sidebar. Scroll down to the **Date** settings and make sure to set the **From/To Year** setting to **2022** to **2023** as shown in [Figure 6.25](#). Otherwise, the data upload will fail as our data is mapped from 2022 to 2023.

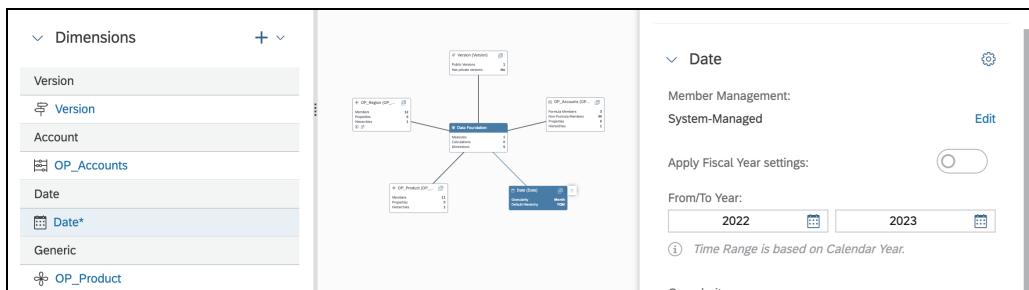


Figure 6.25 Setting the Date Range

We're now done with the initial steps for creating our planning model, so let's save it by clicking on the **Save** icon. Now, create a new subfolder called **Sales Planning** and save the model with the title "Operating Income." Validate your model against the screen shown in [Figure 6.26](#).

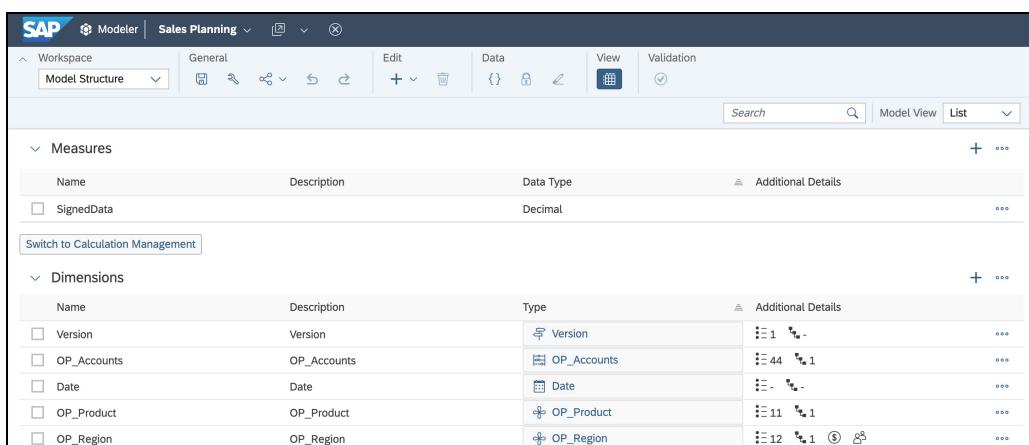


Figure 6.26 Final Model

6.2.3 Uploading Transactional Data to the Model

After creating the model, now is the time for uploading transactional data to it. The demo data package contains two files in the **Planning Data** folder that contain those numbers.

Make sure that you're on the model overview screen and click on **Data Management** in the top left. This area can be used to import new data. You can also set up scheduled imports and exports, as shown in [Figure 6.27](#).

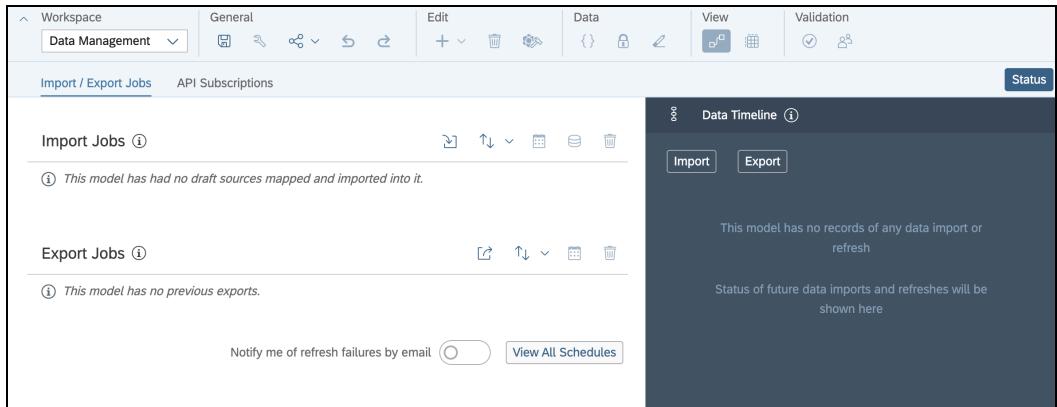


Figure 6.27 Data Management

In the following sections, we'll first upload actual data and then forecast data.

Actual Data

First, let's import the actual data. Click on the **Import** icon in the **Import Jobs** section. There, select **File (Local File or File Server)**, as shown in [Figure 6.28](#). Click on **Select Source File** and select the *Operating Income Actuals (2023).csv* file on your computer. Confirm by clicking on **Import**.

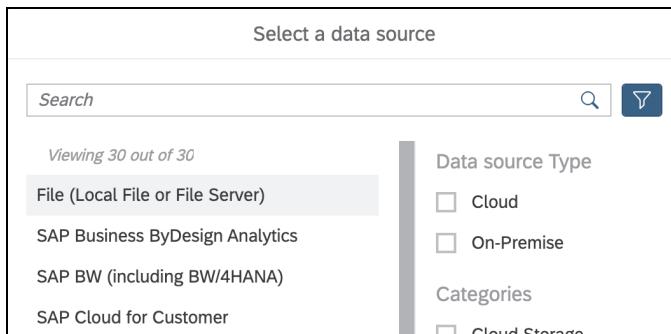


Figure 6.28 Uploading New Data

Data mapping After you've successfully uploaded the file, it will be displayed under the **Import Jobs** tab. Click on **Set Up Import** and then click on **Next** to skip the data wrangling step and open the mapping dialog, as shown in [Figure 6.29](#), where you can define how the uploaded file should be mapped to the model.

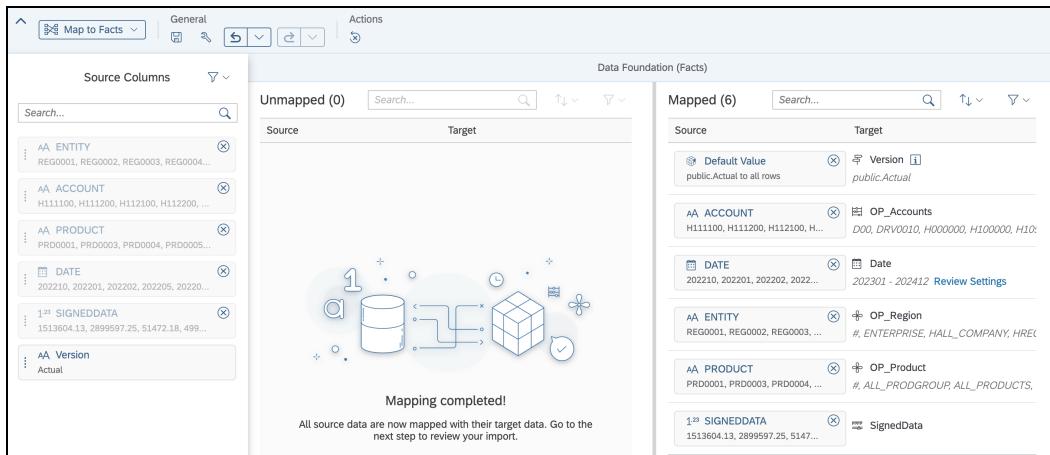


Figure 6.29 Data Mapping

Because the file's structure is very similar to the model, SAP Analytics Cloud automatically recognizes almost all columns. If a column can't be mapped automatically, you'll be notified in the left sidebar. You then must map this column to an account dimension by using drag and drop. The dimensions are shown in the card view in the middle of the screen. The **Version** column on the left will stay unmapped as the version values on the right side are filled out with default values.

The import preferences, which can be accessed from the bar on the top, offer various options, as shown in [Figure 6.30](#), to further configure the data import job. As new values are added, you can click on **View All Options** to determine how data is treated that doesn't match the master data.

Import method The **Import Method** section allows you to choose among four options:

- **Update**

Updates all existing records with the uploaded ones. New entries will be added to the model.

- **Append**

Adds all uploaded records to the model, including new entries.

- **Clean and replace selected version data**

Deletes existing data and replaces it with imported records. This process only applies to the indicated version. New entries will be added to the model.

■ **Clean and replace subset of data**

Deletes a subset of existing data defined using either versions or dimensions. Then, the data is replaced with the newly uploaded data. New entries will be added to the model.

Make sure that the **Update** option is selected.

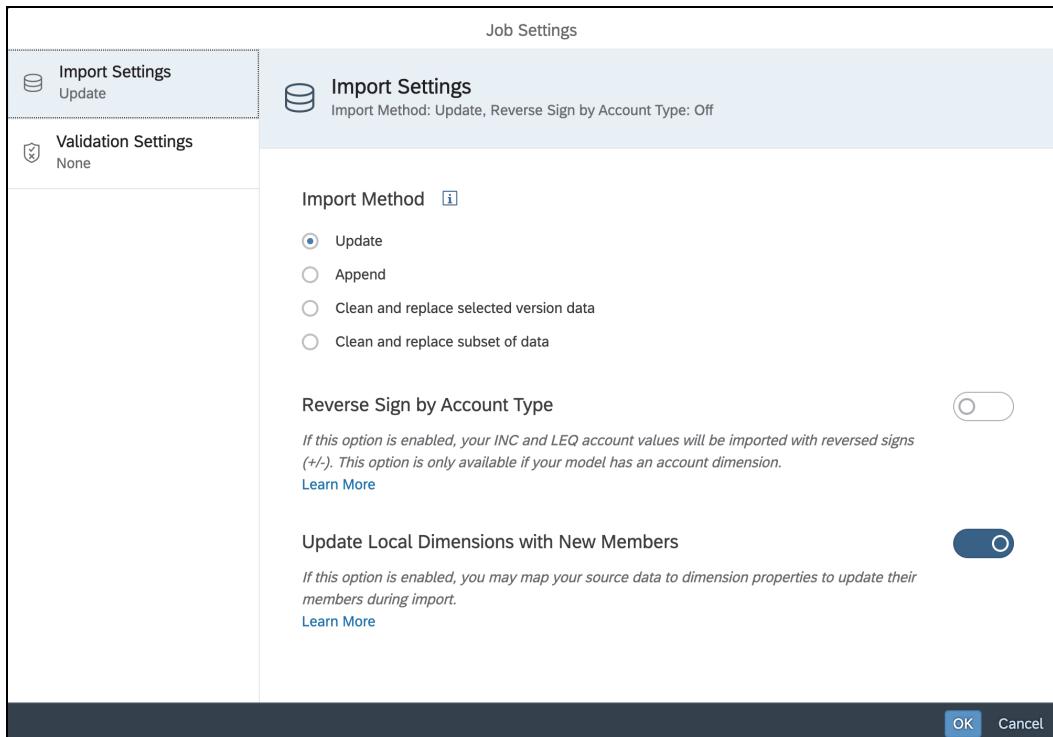


Figure 6.30 Import Settings

By default the **Version** column is set to a default value. In our case, this is **public.Actual** which is correct for this step. Later, we will upload our forecast data. We will then adjust this setting.

Mapping versions

Finalize the mapping by clicking on the **Next** button on the bottom right twice. SAP Analytics Cloud will now validate the data. After this step is completed successfully, click on the **Run Import** button to complete the import job. Finally confirm by clicking on **Finish**. After some time, the upload will finish and you will receive a success confirmation.

Forecast Data

Now, we want to import the forecasted data. For now, the new model in SAP Analytics Cloud does not support the creation of new versions directly in the modeler. A workaround is necessary in which we will open a story and

create a version there. Then we will return to the modeler to upload the forecast data. Once SAP delivers this functionality, the workaround can be skipped and you can directly upload the second file.

Leave the modeler and head to the stories overview. Create a new **Canvas** page in optimized mode and add a new table which populates its data from the **Operating Income** model we just created. Now open the **Version Management** interface from the **Tools** section in the top bar (see [Figure 6.31](#)).

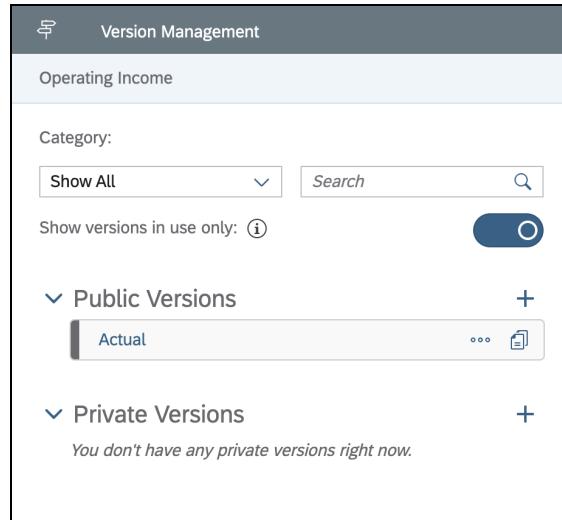


Figure 6.31 Version Management

Click on the + next to **Public Versions** to create a new version. Set the **Version Name** to “Forecast” and the **Category** to **Forecast** as shown in [Figure 6.32](#). Confirm by clicking on **Create**.

 A screenshot of the "Create Blank Public Version" dialog. It has fields for "Version Name" (containing "Forecast") and "Category" (containing "Forecast"). At the bottom are "Create" and "Cancel" buttons.

Figure 6.32 Creating a New Public Version

Afterwards, leave the story without saving it. Return to the modeler and open the **Operating Income** model again. Switch back to the **Data Management** screen.

Again, click on the **Import** icon  and select the **File (Local File or File Server)** option. Click on **Select Source File** and choose the *Operating Income Forecast (2023).csv* file from your computer. Start the upload process by clicking on **Import**.

Open the file by clicking on **Set Up Import**. Skip the data wrangling step again by clicking **Next** to reach the **Mapping** screen. First, in the **Job Settings** that can be accessed by clicking on the  icon in the top bar, under **Import Method**, select the **Append** option, as shown in Figure 6.33.

Appending data

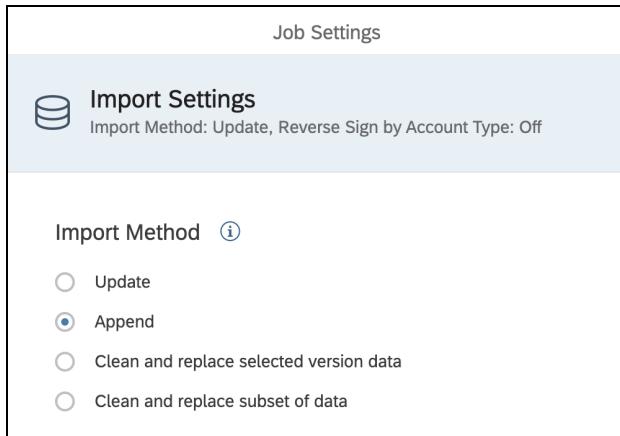


Figure 6.33 Changing Import Methods

Again, we must make sure that all dimension are mapped correctly.

By default, the **Version** dimension is mapped to a default value. Therefore, we will again leave the **Version** column on the left side unassigned. First click on the **X** next to **Default Value** in the right sidebar as shown in Figure 6.34.

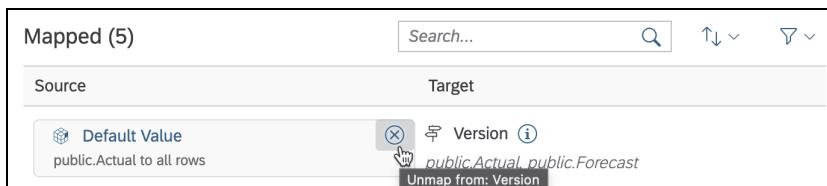


Figure 6.34 Unmapping Versions

Now, the **Version** will appear as **Unmapped** in the middle. Click on the three dots as shown in Figure 6.35 and choose **Set default value....** In the newly-appearing dialog, select the **public.Forecast** version.

Unmapped (1)		Search...	↑↓	▼
Source	Target			
<i>Drop a column</i>	...	Version ⓘ		iblic.Forecast
		Set default value...		

Figure 6.35 Unmapped Targets

Mapped (6)		Search...	↑↓	▼
Source	Target			
Default Value public.Forecast to all rows	☒ Version ⓘ public.Actual, public.Forecast	(X)		
AA ACCOUNT H111100, H111200, H112100, H112200, H1...	☒ OP_Accounts D00, DRV0010, H000000, H100000, H105000, H11000...	(X)		
DATE 202201, 202202, 202203, 202206, 202207, 2...	☒ Date 202201 - 202312 Review Settings	(X)		
AA ENTITY REG0001, REG0002, REG0003, REG0004, R...	☒ OP_Region #, ENTERPRISE, HALL_COMPANY, HREG0001, HREG0...	(X)		
AA PRODUCT PRD0001, PRD0003, PRD0004, PRD0005, P...	☒ OP_Product #, ALL_PRODGROUP_ALL_PRODUCTS, Glasses, HPRI...	(X)		
1 ²³ SIGNEDDATA 1050823.06, 2142124.81, 75669, 31207202....	☒ SignedData	(X)		

Figure 6.36 Mapped Columns

The **Mapped** column should now match Figure 6.36. Again, click on **Next** two times to complete the import job. After successful validation, click on **Run Import** and **Finish** to upload the data to the model. The model is now filled with data and ready to use.

6.2.4 Setting Up a Planning Model

In addition to the settings described in Chapter 4, Section 4.5, the modeler provides specific settings that only apply to planning models and enable you to further configure planning models. These settings will be presented in this section.

- Model preferences** Open the modeler for any planning model (you can use the Operating Income model we just created) and open the model preferences . The model preferences screen provides various options to further configure the model.

Access and Privacy

The **Access and Privacy** tab combines all functionality for managing the security and privacy of a model and prevents unauthorized access, as shown in [Figure 6.37](#).

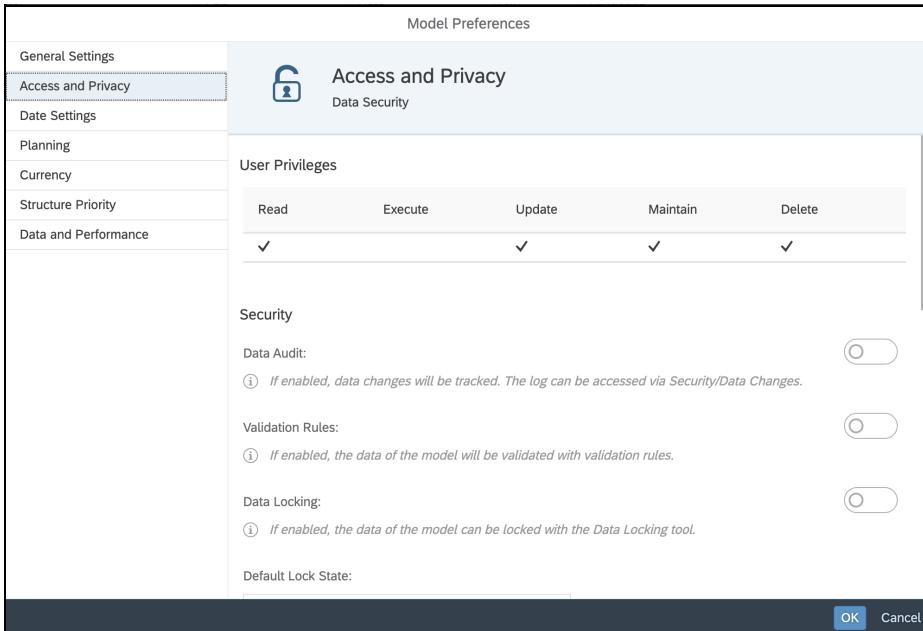


Figure 6.37 Model Preferences: Access and Privacy

If you turn on the **Data Audit** option, all data changes performed in the model (e.g., through data entry) are captured in a log file. More information on this topic can be found in [Chapter 3, Section 3.3.1](#).

Data audit

The **Data Locking** switch can be turned on to lock the values in a model. Once the option is activated, users can lock individual values in the planning process so that these values can't be modified by other users. This feature is helpful for ensuring that data entries are not accidentally overwritten by others. You must indicate whether values are generally locked automatically or only locked manually (**Default Lock State**).

Data locking

Turning on the **Restricted Export** option will disable the exporting functionality of all charts and tables that use this model. This option can be used to protect sensitive data from being easily exported to other systems.

Restricted export

The **Access and Privacy** section also provides options to steer data access, as shown in [Figure 6.38](#). Once the **Model Data Privacy** switch is enabled, the model is only visible to the owner and users that carry the necessary role. However, this option shouldn't be selected if possible since model visibility can also be controlled by using the folder structure, as described in [Chapter 3, Section 3.3.5](#).

Model data privacy

Data access control The **Data Access Control in Dimensions** tab can be used to turn on data access control for single dimensions. When this option is activated, you can restrict data access by using individual dimension members. More information on this topic can be found in [Chapter 4, Section 4.5.2](#).

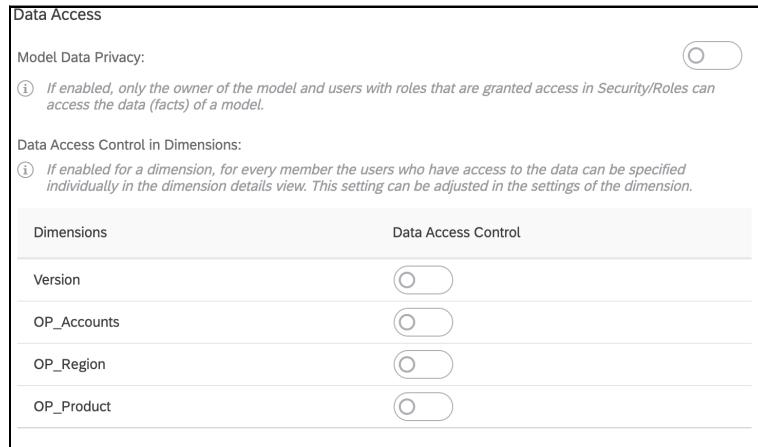


Figure 6.38 Access and Privacy: Further Options

Date Settings

The **Date Settings** tab provides options for defining a fiscal year that deviates from the calendar year, as shown in [Figure 6.39](#). To use this function, you must first enable the **Apply Fiscal Year Settings** switch for the date dimension. Then, you can determine individual start and end dates.

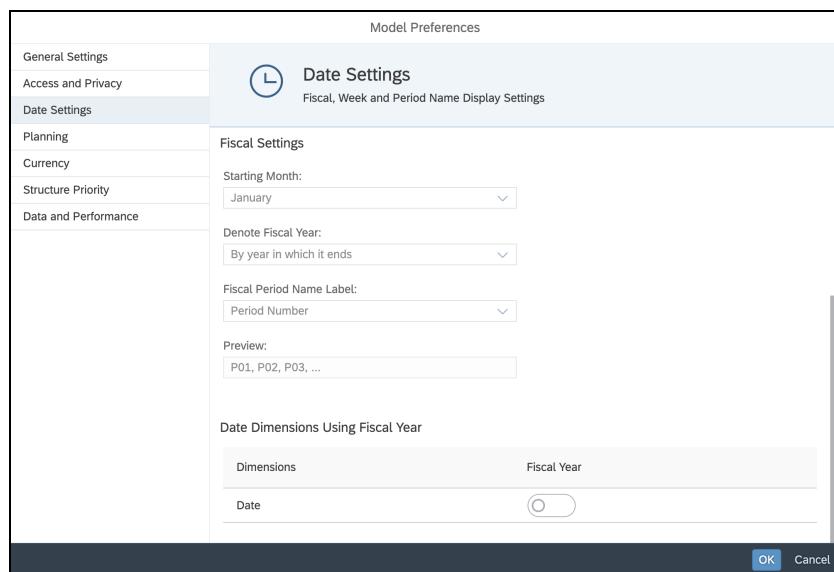


Figure 6.39 Date Settings

6.3 Planning-Specific Functionality

Because the planning component of SAP Analytics Cloud is not always separated from other areas of the product (especially the story), this section will cover all functionalities specific to planning. General story functionality is described in detail in [Chapter 5](#), which is also required reading to follow along with the examples in this section.

All examples in this section are demonstrated using the Operating Income model created in [Section 6.2](#). By using this model, we'll walk through various planning workflows for establishing planning processes.

6.3.1 Versions and Data Entry

Version management and data entry are two crucial tools to solve planning tasks. Ahead, we'll first create a model based on the planning model. Then, we'll create a private version and manipulate the data in it.

First, create a new, story as described in [Chapter 5, Section 5.2](#). For this example, create a new canvas page in optimized mode. Add a table to the page and use the **Operating Income** model. Open the builder and add the **Date** dimension to the columns. Expand the hierarchies for **Finance** and **Date** so that these tables match the screen shown in [Figure 6.40](#). Be aware that revenues have a negative sign and costs carry a positive sign in our scenario.

[Creating a table](#)

Operating Income							
Measures		SignedData					
Version	Actual						
Date	(all)	2022	>	Q1 (2022)	>	Q2 (2022)	>
OP_Accounts							
▼ Finance							
▼ Operating Income	-18,234.72 Million	-12,034.29 Million	-2,497.66 Million	-2,484.93 Million	-3,731.23 Million	-3,320.46 Million	-6,200.44 Million
> Gross Profit	-14,538.65 Million	-9,525.73 Million	-1,979.52 Million	-1,964.71 Million	-2,975.85 Million	-2,605.65 Million	-5,012.92 Million
> Operating Expenses	3,696.08 Million	2,508.56 Million	518.15 Million	520.22 Million	755.38 Million	714.81 Million	1,187.52 Million
> Key Performance Indicators	-3.49 Percentage	-3.52 Percentage	-3.56 Percentage	-3.48 Percentage	-3.49 Percentage	-3.54 Percentage	-3.45 Percentage

Figure 6.40 Finance Table

Open the version management dialog box by clicking the icon in the top bar, as shown in [Figure 6.41](#). The interface shows all versions currently available in this model and allows you to create private versions. You may need to disable the **Show versions in use only** option to show all versions. Private versions are initially only visible to their creator. They can be shared with selected users, however, or published for general usage by all users who also have access to the model.

[Version management](#)

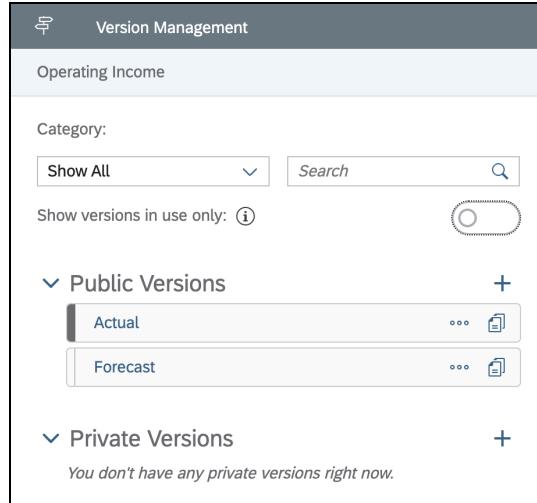


Figure 6.41 Version Management

Copying the forecast

Now, let's create a copy of the **Forecast** version, which we'll then use to execute our planning workflow. Click on the **Copy** icon  next to the **Forecast** version. A new dialog box will open where you should change the **Version Name** to "Private Forecast".

You can also select the category to which the new version belongs. The dialog box also offers multiple options for defining precisely what data is copied to the new version. Alternatively, the new version can be blank. Leave the settings as shown in [Figure 6.42](#) and confirm these settings by clicking on **OK**. Afterwards, close the version management dialog box by clicking on **Close**.

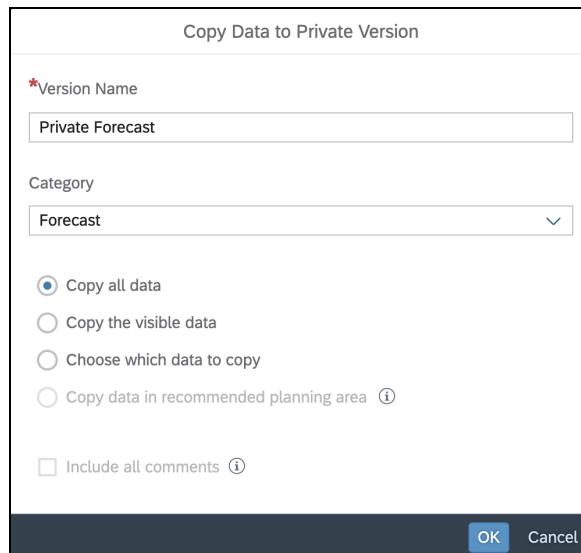


Figure 6.42 Copying Versions

If you want to share a version, view all changes that are performed on the version, or delete a version, click on the three dots icon next to it. Versions can be published by clicking on the icon.

Publishing versions

The version will be automatically added to the table and will carry a copy of the forecast values. Drill into the date hierarchy for the new version (**Private Forecast**) to quarter level for the year **2022**, as shown in [Figure 6.43](#). If the version isn't visible in the table, you may need to first change the **Version** dimension filter in the builder (see [Chapter 5, Section 5.7.1](#)).

Operating Income						
Measures		SignedData				
Version	Actual	Private Forecast				
Date	>	(all)	>	(all)	>	2022
OP_Accounts						
↳ Finance						
↳ Operating Income	-18,234.72 Million	-23,669.36 Million	-11,205.93 Million	-2,324.56 Million	-2,299.07 Million	-3,487.43 Million
↳ Gross Profit	-14,538.65 Million	-18,965.73 Million	-8,857.31 Million	-1,840.93 Million	-1,810.18 Million	-2,779.23 Million
↳ Operating Expenses	3,696.08 Million	4,703.63 Million	2,348.62 Million	483.63 Million	488.88 Million	708.20 Million
↳ Key Performance Indicators	-3.49 Percentage	-3.49 Percentage	-3.53 Percentage	-3.56 Percentage	-3.51 Percentage	-3.51 Percentage

Figure 6.43 Private Forecast in a Table

Click on a cell to enter data into the model. New values can be entered as absolute changes (e.g., +30,000,000) or percentage changes (e.g., +1%). Alternatively, you can just enter the new value directly. Click on the value showing the **Operating Income** key figure for the year **2022** and type in “+1%” as shown in [Figure 6.44](#). Confirm the entry by pressing the **Enter** key.

Data entry

Private Forecast						
↳ (all)	↳ (all)	2022	>	Q1 (2022)	>	Q2 (2022)
-23,894.59 Million	+1%	-2,371.29 Million	-2,345.28 Million	-3,557.53 Million	-3,157.07 Million	
-19,143.76 Million	-9,035.35 Million	-1,877.94 Million	-1,846.57 Million	-2,835.09 Million	-2,475.75 Million	
4,750.83 Million	2,395.82 Million	493.35 Million	498.71 Million	722.44 Million	681.32 Million	
-3.49 Percentage	-3.53 Percentage	-3.56 Percentage	-3.51 Percentage	-3.51 Percentage	-3.55 Percentage	

Figure 6.44 Entering Data into a Table

After you've entered the data, the value is increased by 1%. Also, as this table has two hierarchies, the change is propagated down both hierarchies and applied accordingly. SAP Analytics Cloud keeps the weights of each child

identical (in this case, each quarter is a child) and raises their values accordingly. The changed values are marked in yellow, as shown in [Figure 6.45](#).

Private Forecast												
(all)		2022	>	Q1 (2022)	>	Q2 (2022)	>	Q3 (2022)	>	Q4 (2022)	>	2023
-24,008.91 Million	-11,545.48 Million	-2,395.00 Million	-2,368.73 Million	-3,593.10 Million	-3,188.64 Million	-12,463.43 Million						
-19,234.11 Million	-9,125.70 Million	-1,896.72 Million	-1,865.03 Million	-2,863.44 Million	-2,500.51 Million	-10,108.41 Million						
4,774.79 Million	2,419.78 Million	498.29 Million	503.70 Million	729.66 Million	688.13 Million	2,355.01 Million						
-3.49 Percentage	-3.53 Percentage	-3.56 Percentage	-3.51 Percentage	-3.51 Percentage	-3.51 Percentage	-3.45 Percentage						

Figure 6.45 Yellow Background for Changed Values

6.3.2 Distributing Values

Planning area If you want to distribute values across a hierarchy (e.g., over the course of year) by using different weights, you can use the *distribution* functionality. This functionality is always context based, which means that the interface for this action is always based on a specific cell in the table.

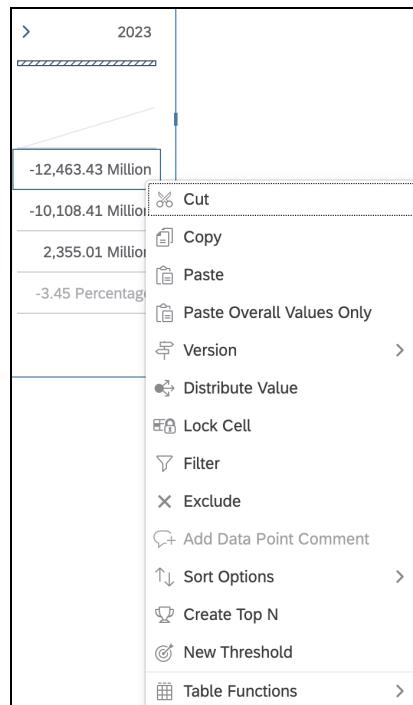


Figure 6.46 Opening the Planning Interface

Right-click on the **Operating Income** value for the year **2023** in the table. Select the **Distribute Value** option to open the planning interface, as shown in [Figure 6.46](#), which will open the dialog box shown in [Figure 6.47](#).

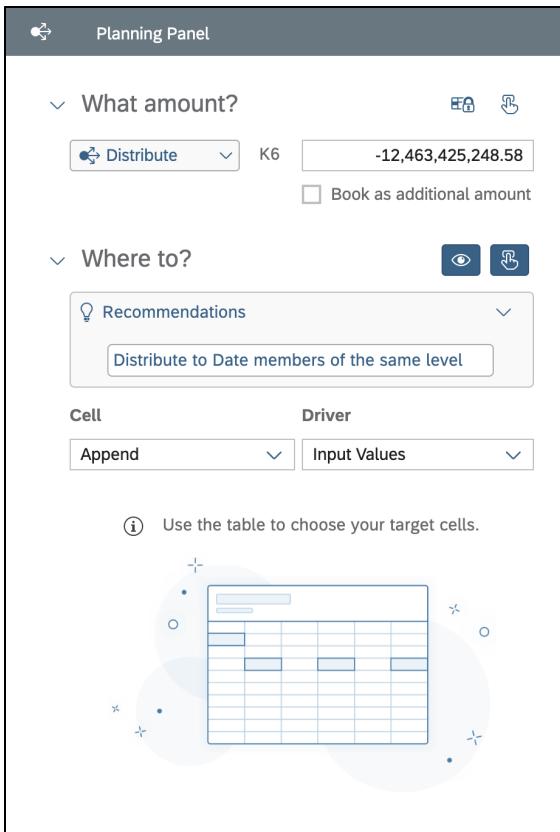


Figure 6.47 Distributing Values

The planning interface allows you to perform several planning processes in a single environment. Commonly used or suggested processes are displayed to you as **Recommendations**. If you click on a recommendation, it is applied automatically.

To distribute values across a hierarchy (for example, across a year) using individual weightings, you must use the **Distribute** functionality. To determine which targets should be used for the value distribution, you must select them directly in the table. In our example, we selected the cells **Q1 (2023)** to **Q4 (2023)** for the **Operating Income** measure. The planning interface will then automatically adjust itself, as shown in [Figure 6.48](#).

Recommendations

Distributing values

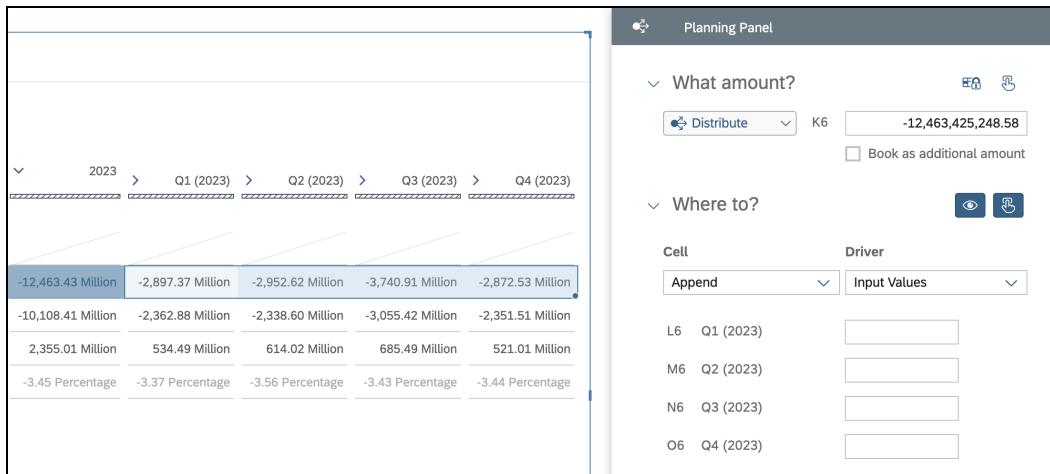


Figure 6.48 Distributing Values

You can use the **Driver** dropdown menu to determine how the weights are determined. The following options are available:

- **Input Values**

You enter the values manually. For this step, you'll simply type in the value into the fields.

- **Input Weights**

Note that, instead of absolute values, you can enter percentages for the weights.

- **Equally**

The value will be divided by the number of targets (in our example, four) and distributed among those targets.

- **Proportionally**

The existing weighting of the current values will be used to distribute the new value accordingly.

Choose one of these four options and enter values for the quarters accordingly, if required. Then, click on **Apply** to perform the distribution.

Moving values

Besides distributing values, you can also move values. In this scenario, we want to move values from one dimension member to another. This scenario may arise, for example, when a projected deal for the current year is delayed to the next year and your revenue forecasts need to be adjusted.

To move the **Operating Income** for 2022, first click on this value in the table and open the planning interface again as before. Now, we want to move the value across the **Date** dimension. Since we selected the value for 2022, we can only move it to other years, in this case 2023. Therefore, click on the

2023 value for **Operating Income** so that the planning interface adjusts itself, as shown in [Figure 6.49](#).

The screenshot shows the SAP Planning Panel. On the left, there's a grid titled "Private Forecast" with columns for "Year" (2022, 2023) and rows for "Value" and "Percentage". The value for 2022 is highlighted in blue. On the right, the "Planning Panel" sidebar has a section titled "What amount?" with an input field for "F6" containing the value "-11,545,480,999.05". There's also a checkbox for "Book as additional amount".

	2022	2023
-24,008.91 Million	-11,545.48 Million	-12,463.43 Million
-19,234.11 Million	-9,125.70 Million	-10,108.41 Million
4,774.79 Million	2,419.78 Million	2,355.01 Million
-3.49 Percentage	-3.53 Percentage	-3.45 Percentage

Figure 6.49 Assigning Values

Now, click on the empty input field and enter the value that you want to move from one dimension member to the other. In this case, we want to move the value **-200,000,000** from the year 2022 to the year 2023. After entering the value, you'll be immediately presented with a preview of the changes, as shown in [Figure 6.50](#). After clicking on **Apply**, the changes will be performed.

The screenshot shows the SAP Planning Panel after entering the value. The "What amount?" section now shows "-200,000,000" in the F6 input field. The "Where to?" section shows "G6" selected. A preview table at the bottom shows the "Available Amount" and "Total" for both 2022 and 2023. The "Apply" button is visible at the bottom right.

	2022	2023
-24,008.91 Million	-11,345.48 Million	-12,663.43 Million
-19,234.11 Million	-9,125.70 Million	-10,108.41 Million
4,774.79 Million	2,419.78 Million	2,355.01 Million
-3.49 Percentage	-3.53 Percentage	-3.45 Percentage

	2022	2023
Available Amount	-11,345,480,999.05	-11,345,480,999.05
Total	-200,000,000.00	-200,000,000.00

Figure 6.50 Preview of Moved Values

To assign new values (if you're expecting a revenue increase, for example), [Assigning values](#) you can perform this task in the planning interface as well. In this scenario,

you'll enter a value and have it added to one or more dimension members in the table.

Select the **Operating Income** values for the years 2022 and 2023 in the table. Then, open the planning interface as before by right-clicking on the selected values and selecting **Redistribute values**.

Now, enter the value “-500,000,000” to both years. Next, change the distribution method to **Distribute source amount to targets**, as shown in [Figure 6.51](#), by clicking on the dropdown menu below the **What amount?** heading. Enter the value “-500,000,000” into the empty cell next to the dropdown menu.

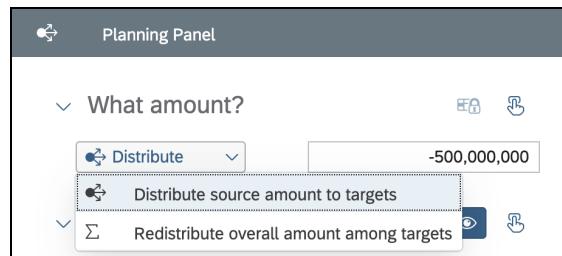


Figure 6.51 Changing the Distribution Method

For our example, we want to distribute the new value equally. Enter the value “-250,000,000” for each target. The table will provide an immediate preview of your changes, as shown in [Figure 6.52](#). Click on **Apply** to submit these changes.

Cell	Driver		
F6 2022	-250,000,000	50.0 %	
G6 2023	-250,000,000	50.0 %	

Available Amount	0.00	0.00 %
Total	-500,000,000.00	100 %

Figure 6.52 Preview of the Assignment

6.3.3 Allocations

The allocations tool is a powerful functionality to allocate a total value into multiple values by using drivers. For a better understanding of this procedure, we'll create a basic allocation to allocate our **IT Expenses**, which is a single total value that applies to multiple products. The allocation should be driven by the **Gross Sales** for each product.

Creating Allocation Steps

Previously, allocations were created in the allocations interface. This is no longer recommended by SAP. Going forward, SAP recommends creating allocation steps within data actions.

For this example, we will create a data action. More information on data actions can be found in [Section 6.3.6](#).

Although allocations are executed within stories, they must first be created as processes. Click on the main menu and then select **Data Actions • Create New • Data Action**. Rename the data action to “IT Expenses” and select the **Operating Income** model as the **Default Model**, as shown in [Figure 6.53](#).

Creating allocation processes

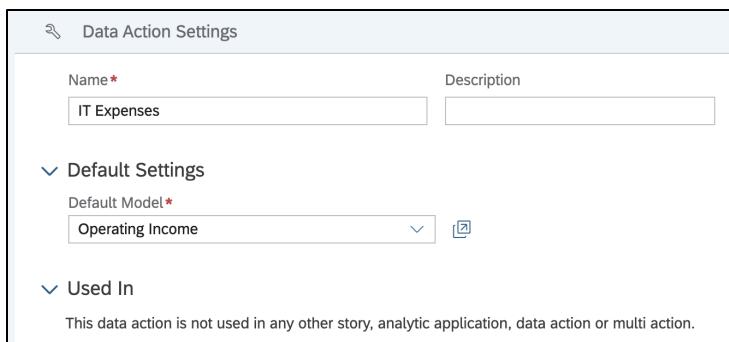


Figure 6.53 Creating New Data Actions

Now click on the **Add Allocation Step** icon in the top bar. The allocation processes consist of allocation steps that are executed when performing the allocation process in a story. These steps can be reused across multiple data actions once they're created. Alternatively, you can create a new allocation step directly within the data action interface. The new empty step is shown in [Figure 6.54](#). Rename the new allocation step “IT Expense” and select the **OP_Accounts** dimension from the **Source Dimension** dropdown list and the **OP_Product** dimension from the **Target Dimension** dropdown list. As **Driver Dimension** choose **OP_Accounts**, as shown in [Figure 6.55](#). Confirm the allocation step by clicking on the **Save** icon in the top bar and save the data action into the **Sales Planning** folder.

Creating an allocation step

The screenshot shows the 'Allocation' step configuration screen. At the top, a message box asks if an existing allocation should be used instead. Below it, the 'Name' field is empty, and the 'Description' field is also empty. The 'Source Context' section includes a 'Data Source' dropdown set to 'Operating Income' and a 'Filters' section with a dropdown for 'Version'. Under 'Write Mode', the 'Keep Source' checkbox is unchecked. The 'Driver Context' section has a 'Reference Dimension' dropdown set to 'Date (Year, Quarter, Month)'. The 'Target Context' section includes a 'Booking Account' dropdown and a 'Write Mode' section with an 'Overwrite Target' checkbox. The 'Allocation Rules' section contains a table with three columns: 'Source Dimension', 'Driver Dimension', and 'Target Dimension'. The first row of the table is empty.

Figure 6.54 Empty Allocation Step

This screenshot shows the same Allocation Step configuration screen as Figure 6.54, but with some data entered. The 'Name' field now contains 'IT Expense'. In the 'Source Context' section, the 'Data Source' is still 'Operating Income'. The 'Filters' section shows a dropdown for 'Version'. Under 'Write Mode', the 'Keep Source' checkbox is checked. The 'Driver Context' and 'Target Context' sections are collapsed. The 'Allocation Rules' section contains a table with three columns. The first row has 'Source Dimension' set to 'OP_Accounts (Hierarchy)', 'Driver Dimension' set to 'OP_Accounts (Hierarchy)', and 'Target Dimension' set to 'OP_Product (Hierarchy)'. The second row is empty.

Figure 6.55 Creating New Allocation Steps

After you've created the allocation step, you must define its allocation rules. Click on the value helper icon  below **Source Dimension**, which will open a new dialog box, as shown in [Figure 6.56](#). Select the **IT Expenses** member in the hierarchy.

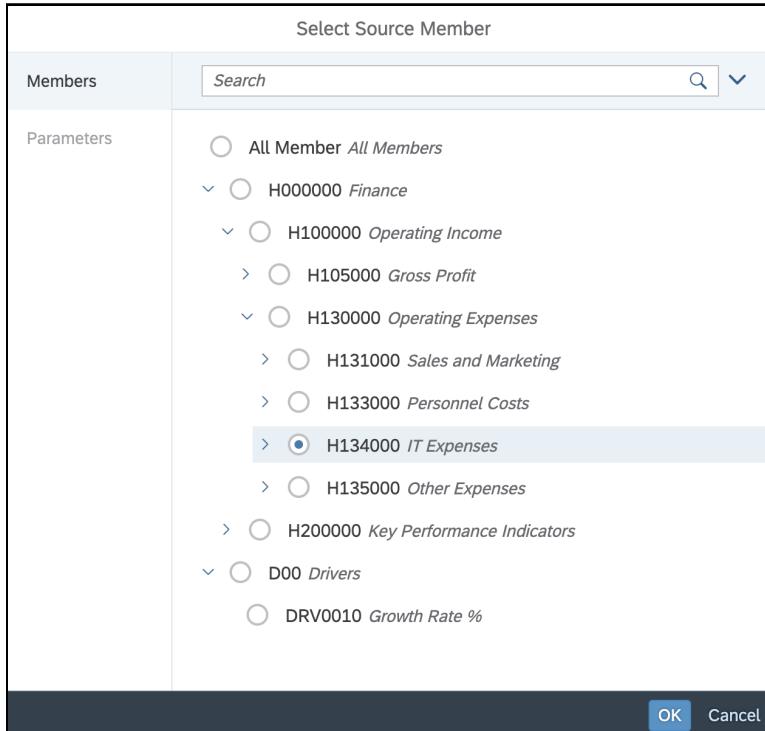


Figure 6.56 Selecting a Source Member

Under **Driver Dimension**, select the **Gross Sales** measure by using the value helper, and under **Target**, choose the **All Products** dimension as shown in [Figure 6.57](#). Save the data action by clicking on the **Save** icon .

		Source Dimension	+	Driver Dimension	+	Target Dimension	+
<input type="checkbox"/>		OP_Accounts (Hierarchy)		OP_Accounts (Hierarchy)		OP_Product (Hierarchy)	
<input checked="" type="checkbox"/>		IT Expenses		Gross Sales		All Products 	

Figure 6.57 Allocation Rules

To execute the allocation process, you must create a new story (or use an existing one). Add a new canvas page in optimized mode with a table using

Executing allocations

the **Operating Income** model. Modify the **Version** filter in the builder to show the **Private Forecast** version only, which we created in [Section 6.3.1](#). Then, add the dimension to the columns and drill into the accounts and product hierarchy, as shown in [Figure 6.58](#).

Operating Income				
Measures	SignedData			
Version	Actual			
OP_Product	No Product	All Products	Apparel	Footwear
OP_Accounts				
Finance	3,696,078,294.17			
Operating Income	-3,696.08 Million	-14,538.65 Million	-7,505.24 Million	-7,033.40 Million
Gross Profit	-	-14,538.65 Million	-7,505.24 Million	-7,033.40 Million
Operating Expenses	3,696.08 Million	-	-	-
Sales and Marketing	301.37 Million	-	-	-
Personnel Costs	1,782.03 Million	-	-	-
IT Expenses	335.82 Million	-	-	-
Other Expenses	1,276.85 Million	-	-	-
Key Performance Indicators	-	-2.78 Percentage	-2.78 Percentage	-2.79 Percentage

Figure 6.58 New Canvas Page with a Table

In the table shown in [Figure 6.58](#), the **IT Expenses** aren't maintained for individual products right now. We want to fix this problem by executing an allocation.

Executing allocations In previous version of SAP Analytics Cloud, you used to click on the **Allocate Values** icon in the top bar of the story and select **Execute Allocation**. This method is still supported but is no longer recommended by SAP. Also, since we created our allocation step within a data action, we need to add a data action to the story to access it.

Choose **Data Action Trigger** from the **Insert** area in the top bar to add it to the page. Label it as "Execute Allocation Step" and select our previously-created data action. Confirm the entries as shown in [Figure 6.59](#). The other settings allow to you determine if the executed changes should be directly published to the version and if you want set a fixed target version or let the user choose it upon execution.

The new data action trigger can be placed freely around the table. It can be executed in **Design** and **View** mode. Click on the data action to execute it. You will be then prompted to select the version as shown in [Figure 6.60](#). Select the **Private Forecast** and confirm by clicking on **Run**.

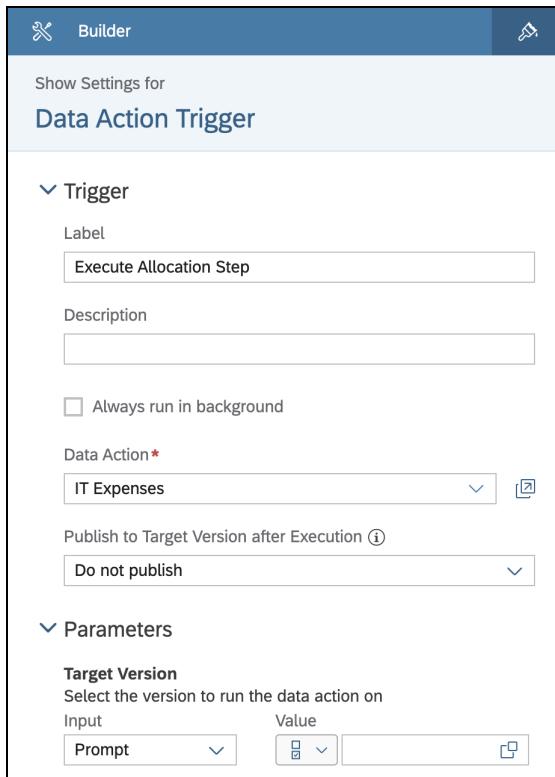


Figure 6.59 Creating a New Data Action Trigger

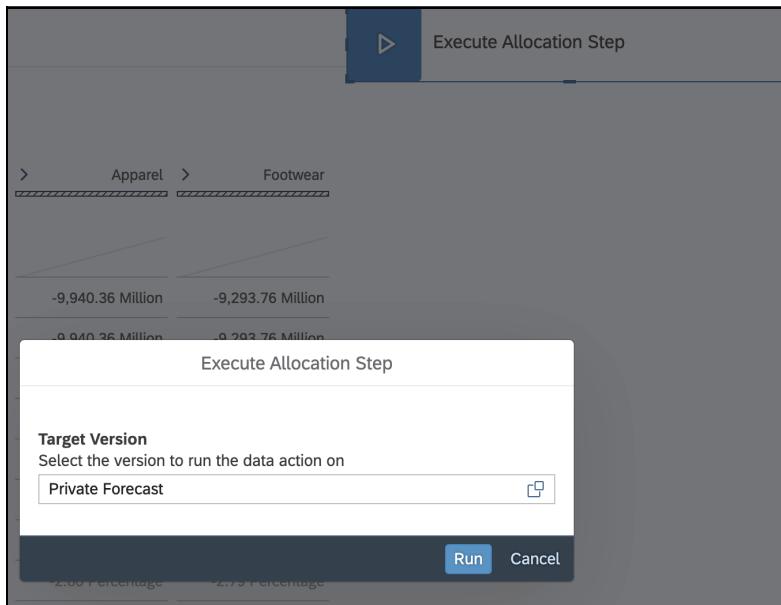


Figure 6.60 Executing a Data Action

SAP Analytics Cloud now executes the allocation process and allocates IT expenses to each product using the gross sales for each product as drivers. Once the allocation process is completed, you'll see IT expenses for individual products in the table as well, as shown in [Figure 6.61](#).

Operating Income				
	Measures	SignedData		
	Version	Private Forecast		
OP_Product	No Product	All Products	Apparel	Footwear
OP_Accounts				
↳ Finance	4,325,070,510.56			
↳ Operating Income	-4,325.07 Million	-19,683.84 Million	-10,172.74 Million	-9,511.10 Million
↳ Gross Profit	–	-19,234.11 Million	-9,940.36 Million	-9,293.76 Million
↳ Operating Expenses	4,325.07 Million	449.72 Million	232.38 Million	217.34 Million
↳ Sales and Marketing	392.40 Million	–	–	–
↳ Personnel Costs	2,242.68 Million	–	–	–
↳ IT Expenses	0.00 Million	449.72 Million	232.38 Million	217.34 Million
↳ Other Expenses	1,689.99 Million	–	–	–
↳ Key Performance Indicators	–	-2.86 Percentage	-2.86 Percentage	-2.86 Percentage

Figure 6.61 Results of Allocation Process

6.3.4 Grid Pages

As described in [Chapter 5, Section 5.2.1](#), a story also offers the grid page type. This page type allows you to work with a grid view of your data. The grid page is only available in classic design mode.

Creating a table This page type is especially helpful for planning workflows. Create a new story and select the **Grid** page type. Click on the **Insert** icon in the top bar and choose the **Operating Income** model. Add the **OP_Product** dimension to the columns and drill down into the hierarchies, as shown in [Figure 6.62](#).

Grid pages can only show tables. However, you can add multiple tables from different data sources to one grid page, and they're automatically put below each other. Interactivity with a table on a grid page is similar to a table on a canvas or responsive page. However, a grid page allows you to use all cells that are not used by a table for calculations.

T	A	B	C	D	E
1	Operating Income in Million USD ⚙				
2	Version	Actual			
3	OP_Product	No Product	▼ All Products	> Apparel	> Footwear
4	OP_Accounts				
5	▼ Finance				
6	▼ Operating Income	-2,790.19	-11,017.21	-7,346.49	-3,670.72
7	▼ Gross Profit	—	-11,017.21	-7,346.49	-3,670.72
8	> Net Revenue	—	-7,920.11	-5,271.57	-2,648.54
9	> Cost of Goods Sold	—	3,097.11	2,074.92	1,022.18
10	> Operating Expenses	2,790.19	—	—	—
11	> Key Performance Indicators	—	—	—	—

Figure 6.62 Grid Page with Table

Click on the **Cost of Goods Sold** measure for the product group **Apparel** (cell E9) and copy the value of the cell by pressing **Ctrl+C** on a PC or **Command+C** on a Mac. Now, click into an empty cell (e.g., cell G2) and paste the value by pressing **Ctrl+V** on a PC or **Command+V** on a Mac. The G2 cell should now show same the value as E9, as shown in [Figure 6.63](#).

Cell references

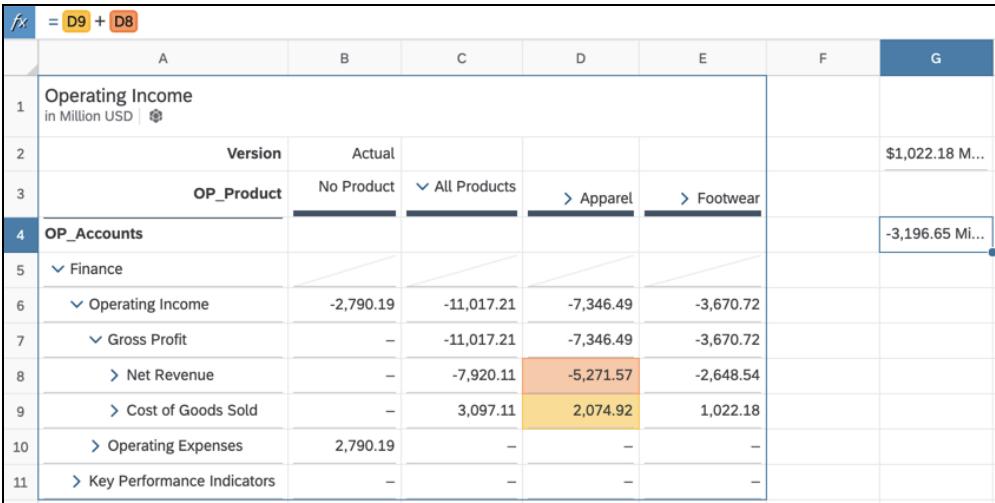
D	E	F	G
			\$1,022.18 M...
> Apparel	> Footwear		
-7,346.49	-3,670.72		
-7,346.49	-3,670.72		
-5,271.57	-2,648.54		
2,074.92	1,022.18		
—	—		
—	—		

Figure 6.63 Copied Value in G2

Instead of simply copying the value into the new cell, you've created a *cell reference* by performing this action. With a cell reference, the value itself is not copied, but instead a context is pasted into the cell that leads to the original value. Specifically, the G2 cell will now always show the value for **Cost of Goods Sold** for the product group **Apparel**.

Formulas In addition to cell references, you can also enter formulas into empty cells. Double-click on an empty cell (e.g., G4) and type in a formula. The formula bar at the top automatically shows all available functions. You also can directly reference cells by entering their addresses. Type the formula “=D9+D8” in, as shown in [Figure 6.64](#).

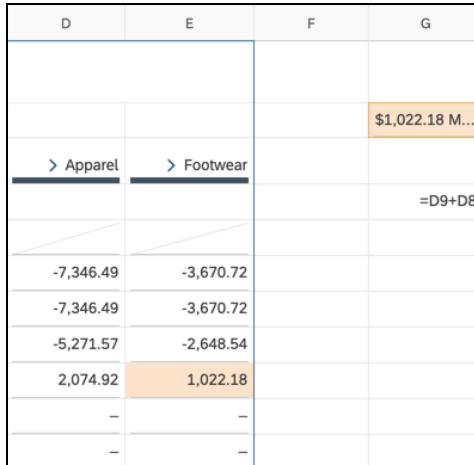
Because both functionalities can quickly lead to a high number of cell references, keeping track of all of them can become difficult. However, the story interface offers a way to display cell references. Click on the **Cell References and Formulas** icon  in the top bar and select **Show References** and **Show Formulas**. While cell references will be highlighted in color, formula-based cells will simply show the raw formula, as shown in [Figure 6.65](#).



The screenshot shows a software interface with a formula bar at the top containing the text `= D9 + D8`. Below the formula bar is a table with several rows and columns. Row 1 contains the header "Operating Income" and "In Million USD". Row 2 has columns for "Version" and "Actual". Row 3 shows "OP_Product" categories: "No Product", "All Products", "Apparel", and "Footwear". Row 4 is for "OP_Accounts". Rows 5 through 11 contain detailed financial data. The cell `G11` is highlighted in orange, indicating it contains a formula. The formula `=D9+D8` is visible in the formula bar.

	A	B	C	D	E	F	G
1	Operating Income In Million USD 						
2	Version	Actual					\$1,022.18 M...
3	OP_Product	No Product	All Products	> Apparel	> Footwear		
4	OP_Accounts						-3,196.65 Mi...
5	✓ Finance						
6	✓ Operating Income	-2,790.19	-11,017.21	-7,346.49	-3,670.72		
7	✓ Gross Profit	-	-11,017.21	-7,346.49	-3,670.72		
8	> Net Revenue	-	-7,920.11	-5,271.57	-2,648.54		
9	> Cost of Goods Sold	-	3,097.11	2,074.92	1,022.18		
10	> Operating Expenses	2,790.19	-	-	-		
11	> Key Performance Indicators	-	-	-	-		

Figure 6.64 Entering Formulas



The screenshot shows the same software interface as Figure 6.64, but with a different setting for the "Cell References and Formulas" icon. The cell `G11` now displays the raw formula `=D9+D8` instead of the calculated result `$1,022.18 M...`. The rest of the table remains the same, showing the financial data for apparel and footwear.

D	E	F	G
			\$1,022.18 M...
> Apparel	> Footwear		=D9+D8
-7,346.49	-3,670.72		
-7,346.49	-3,670.72		
-5,271.57	-2,648.54		
2,074.92	1,022.18		
-	-		
-	-		

Figure 6.65 Showing Cell References and Formulas

6.3.5 Value Driver Tree

The value driver tree, which we mentioned in [Section 6.1.3](#), is a powerful tool for visualizing complex relationships among key figures and run simulations on them.

In the following section, you'll create a value driver tree to learn its basic functionalities. For this process, we'll visualize a subset of the measure relations that are stored in the model. Value driver trees are directly created within stories.

Creating a value driver tree

Create a new story in optimized mode and add a new **Canvas** page. Now, click on the plus + icon in the **Insert** area of the story toolbar and select the **Value Driver Tree** option. Choose the previously-created **Operating Income** model in the **Based on** section, as shown in [Figure 6.66](#).

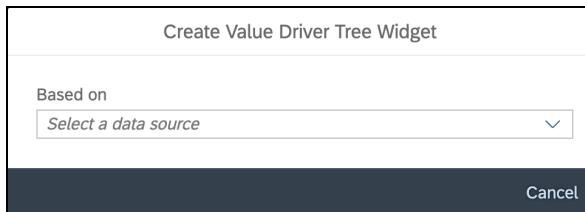


Figure 6.66 Creating a Value Driver Tree

[Figure 6.67](#) shows our newly created and empty value driver tree.

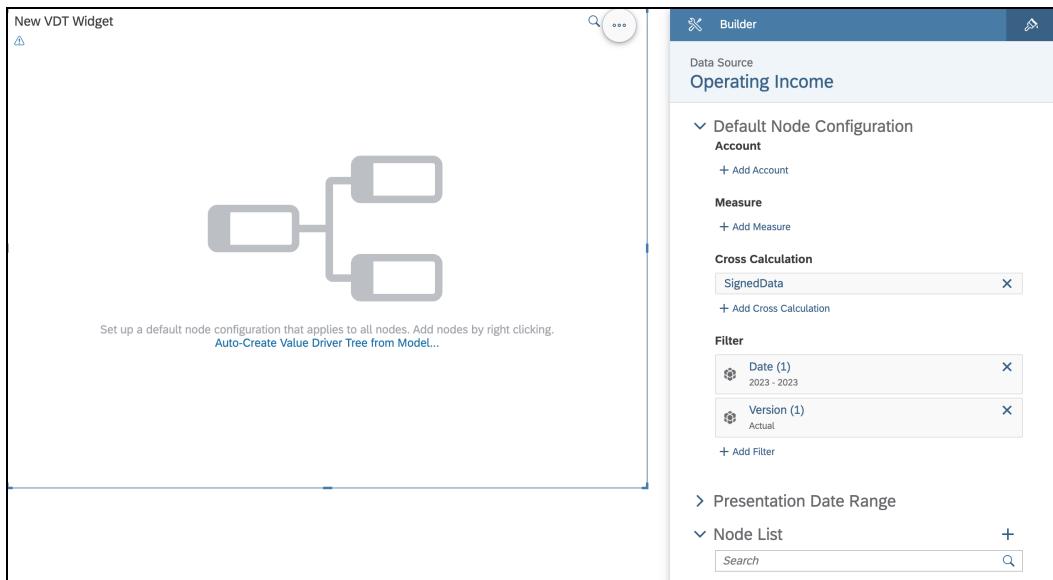


Figure 6.67 Empty Value Driver Tree

Creating Value Driver Trees

Until SAP released the Q3 2020 version of SAP Analytics Cloud, value driver trees could only be designed in a dedicated environment, which can still be accessed by opening the main menu and clicking on **Value Driver Trees**. Although this path is still supported, SAP is officially recommending the new value driver tree designer found within stories. Therefore, we'll only demonstrate how to create a value driver tree in a new story.

Filling the value driver tree with data

Click on the blue **Auto-Create Value Driver Tree from Model...** text in the middle of the new value driver tree. You can now directly choose which parts of the model you want to visualize. To keep it simple, only choose the account **Gross Revenue** (under **Finance • Operating Income • Gross Profit • Net Revenue**, as shown in [Figure 6.68](#)).

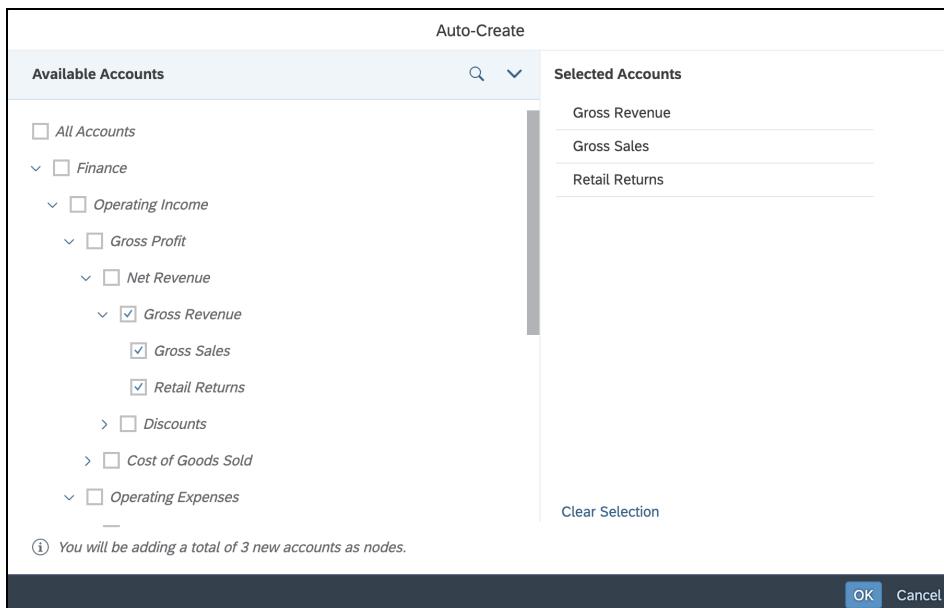


Figure 6.68 Account Selection

After you selected the account, the sidebar will automatically adjust and reflect the selection only. Click on **OK** to confirm the selection. Afterwards, add a new **Measure** on the sidebar of the value driver tree. Here, choose the **SignedData** measure.

SAP Analytics Cloud now automatically creates a new value driver tree to visualize the relationships between the selected accounts, as shown in [Figure 6.69](#). Based on the node type, you may need to add additional information like the data source or calculation method.

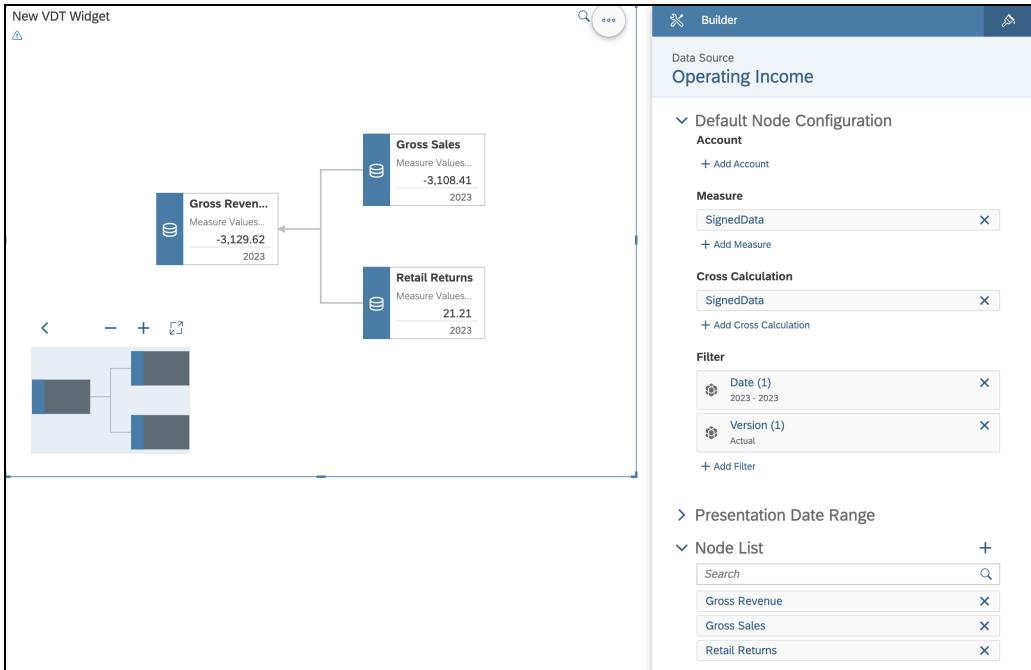


Figure 6.69 Automatically Generated Value Driver Tree

The sidebar now allows you to adjust the dates and versions that should be used by the value driver tree and the simulations. You can also adjust the planning horizon. Adjust the **Version** filter to **Private Forecast** and the **Date** filter to reflect the years **2022** to **2023**, as shown in [Figure 6.70](#). You may need to click on the **Fit to Screen** icon on the bottom left to rearrange the value driver tree and make it fully visible again.

Date and version

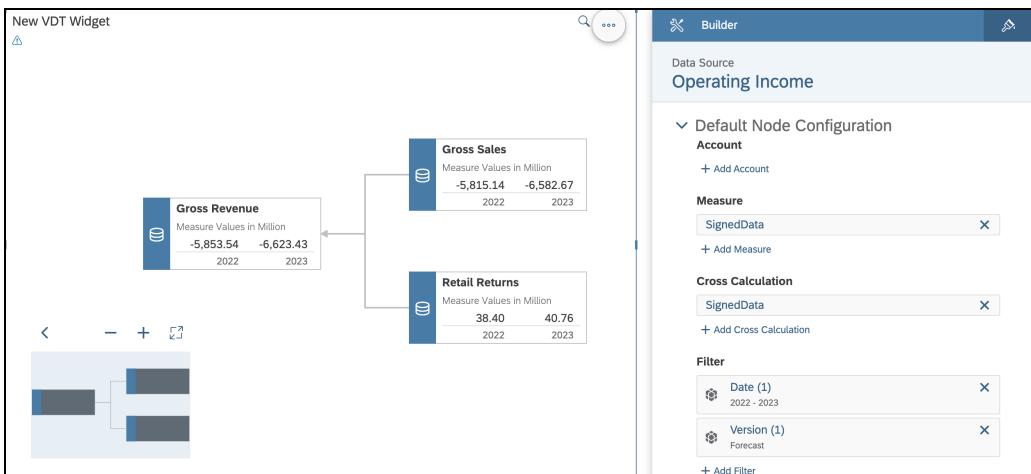


Figure 6.70 Adjusted Value Driver Tree

Further configurations By using the **Builder**, as shown in [Figure 6.71](#), you can configure the value driver tree further. Not only can you base the value driver tree on measures from the model; you can also show calculated measures. This feature can be quite helpful if you want to extend existing simulations with your own simulation calculations. These calculations can be created in the **Account** and **Cross Calculation** sections if required.

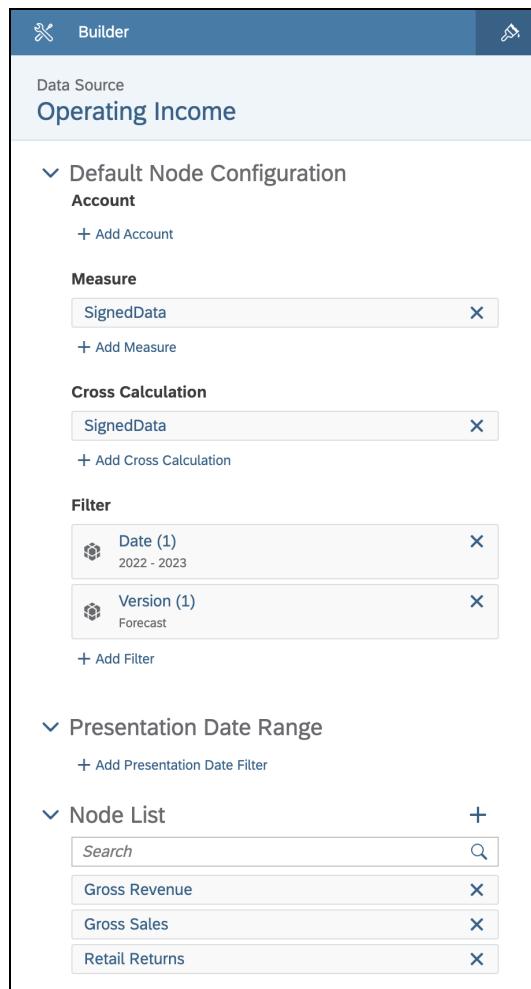


Figure 6.71 Value Driver Tree Builder

Cross-calculations

Cross-calculations are especially useful the compare key figures with each other. These calculations are also created in the builder and allow you to access additional functionalities. Cross-calculations can, for example, include currency conversions or rolling forecasts.

The **Presentation Date Range** area provides options for restricting the visualized date range further. In our case, such a filter would still keep the simulation running across our selected years (2018 to 2021) but would only visualize the years that are specified within the **Presentation Date Range Filter**. This feature allows you to hide years that you need for simulation purposes but don't want to be displayed.

The **Node List** allows you to search for every single node of the tree and configure each node individually. You can also create new nodes in this list manually which, for example, can form unions with other nodes by adding or multiplying their values.

The value driver tree is directly executed within the story in which it was created.

Once you've maintained the node creation settings, save the value driver tree by clicking the **Save** icon .

To use the value driver tree, you must add it to a canvas or responsive page of a story. The usage of the value driver tree is described in [Section 6.1.3](#).

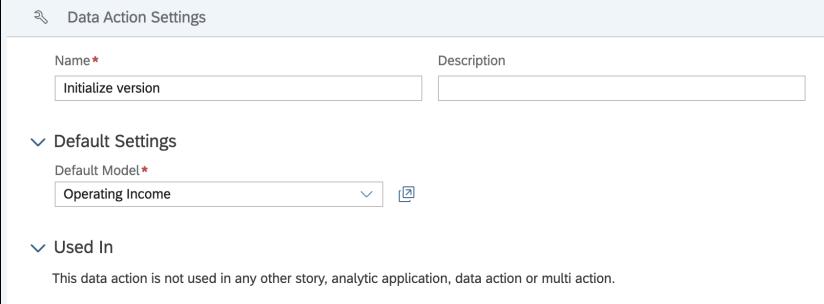
Using value driver trees

6.3.6 Data Actions

Data actions are helpful tools for accelerating planning processes and automating routine tasks. A data action is designed within its own interface but executed within a story.

Open the main menu and select **Data Action • Create New • Data Action** to create a new data action. Assign the name “Initialize version” and select the **Operating Income** model as the **Default Model**, as shown in [Figure 6.72](#). Save the data action by clicking on the **Save** icon .

Creating data actions



The screenshot shows the 'Data Action Settings' dialog box. At the top left is a back arrow icon. The title bar says 'Data Action Settings'. Below the title, there are two input fields: 'Name*' containing 'Initialize version' and 'Description' which is empty. Underneath is a section titled 'Default Settings' with a collapsed arrow. Inside this section, 'Default Model*' is set to 'Operating Income'. Below this is another collapsed arrow labeled 'Used In'. A note at the bottom states: 'This data action is not used in any other story, analytic application, data action or multi action.'

Figure 6.72 Creating New Data Actions

You can create various types of data actions and access them through the top bar of the interface. The following types are available:

Data action types

-  **Copy action**

This action allows users to copy data within a dimension from one dimension member to one or more other members and apply aggregations or filters. You can, for example, create a routine that copies the data for 2023 automatically to the years 2024 to 2026.

-  **Cross-model copy action**

This action can be used to copy data from one model into another model, set filters, and assign dimensions so that the copy workflow can be executed without any manual effort.

-  **Allocation action**

This action can be used to execute an allocation step directly within a story and set all required parameters and filters up front.

-  **Embedded data action**

This action can be used to embed an existing data action directly into the data action you're actively creating. This action allows you to create basic steps and later reuse them.

-  **Currency conversion**

This action can be used to convert accounts from one currency to another.

-  **Advanced formulas action**

This data action provides users an interface to define transformation scripts (visual scripting and coding are supported) to transform your data. Various functions can be called to cover complex scenarios.

Creating a copy action

Now, let's say we want to create a copy action: Click on the  icon to add a copy action. Name the action "Copy to next year" and click on **Add Copy Rule**. Choose the **Date** dimension and select the **2022** value for the **From** field. Select **2023** for the **To** field, as shown in [Figure 6.73](#).

The **Filters** and **Aggregate To** options can be used to further define whether only a specific set of data should be used and whether you want to perform any aggregations while copying. **Write Mode** determines if existing values are overwritten or if new values are appended. Save the copy action by clicking on the **Save** icon .

Using data actions

Data actions must be executed within a story or application. Add a new table based on the **Operating Income** model and add the **Date** dimension to either rows or columns. Add the data action to the page as well and place it next to the table. If you now execute the data action, you'll observe that the year 2023 will be automatically filled in with the values from 2022.

Multi Actions

When opening the main menu, you'll also find the **Multi Actions** section. In this area, you can create multi actions that include data actions and

version management steps across multiple models and versions. Like data actions, multi actions can be triggered within a story and provide a powerful tool to establish your planning process.

Multi actions are helpful if you want to first build small data actions that you'll reuse across multiple workflows. You can create data actions to perform single steps (e.g. create a new version or copy data) and then create multi actions to reuse them in separate scenarios and orders.

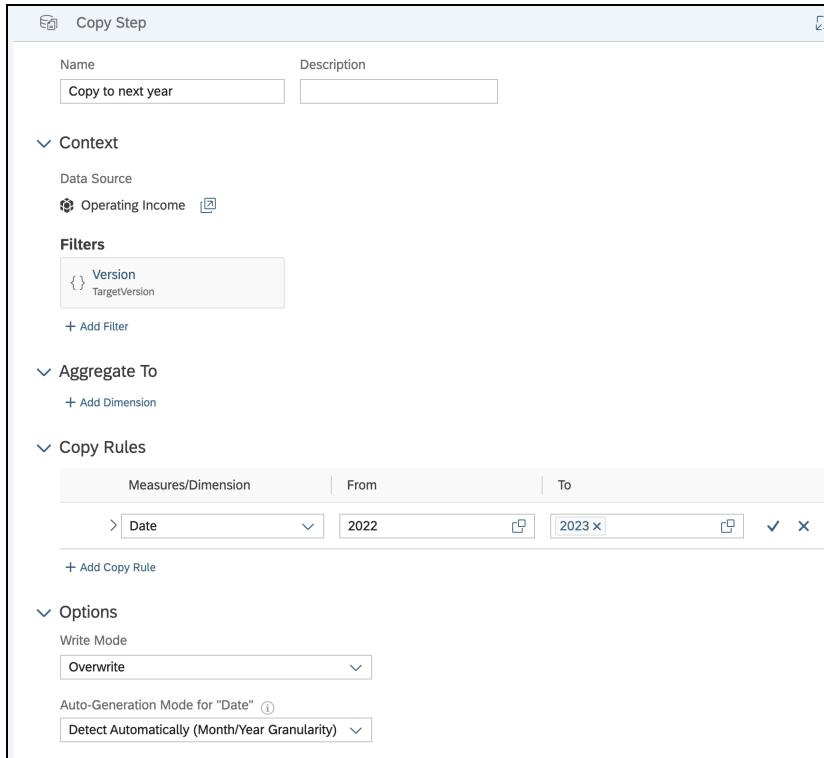


Figure 6.73 Creating Copy Actions

6.3.7 Calendar

Introduced in [Section 6.1.3](#), the calendar is another tool for establishing planning workflows. This tool is helpful for tracking planning tasks and reminding users of open activities. Open the main menu and click on **Calendar**. Within the calendar, you can switch between displaying the day, week, or month or show a list or Gantt view of all tasks (using the options shown in [Figure 6.74](#), in the top left). The Gantt view represents the timelines of tasks as bars in a list, which provide an immediate overview of all ongoing projects.

Accessing
the calendar

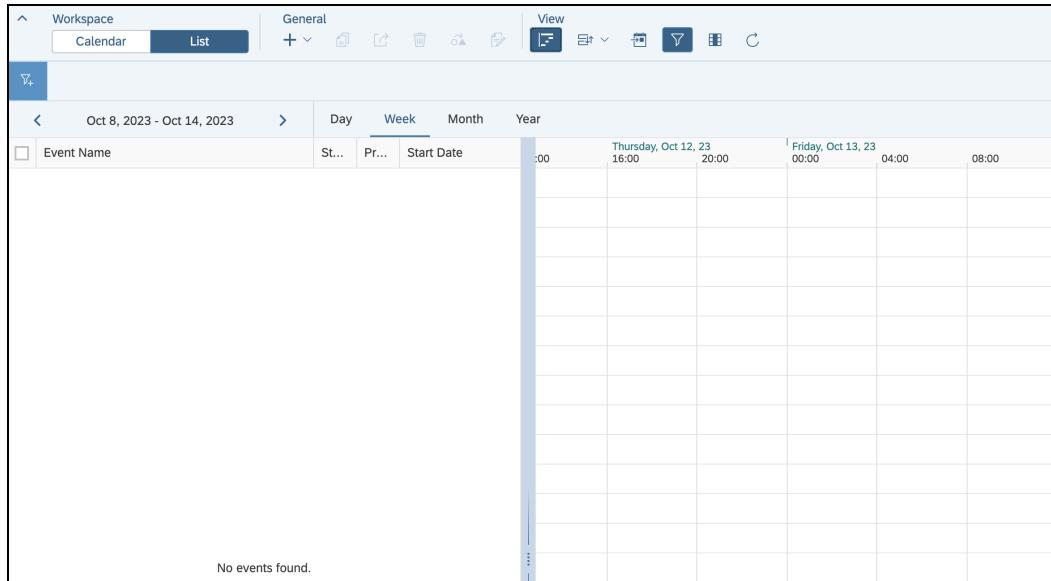


Figure 6.74 Calendar

Within the calendar, you can create tasks and events, which again can be used to govern and establish planning workflows. To create a new task, click on the plus icon in the top bar. You must first select the task type, then name the task and provide start and end dates, as shown in [Figure 6.75](#). You can also add a recurrence to the task (e.g., every month) or add a parent process if this tasks belong to a larger task.

Create Composite Task	
Event Name:*	<input type="text" value="Enter Q4 data"/>
Start By:	<input type="button" value="Time"/>
Start Date:	<input type="text" value="Nov 8, 2023, 13:00"/>
End Date:	<input type="text" value="Nov 15, 2023, 14:00"/>
+ Add Recurrence	
Parent Process	
+ Add Parent Process	
Create Cancel	

Figure 6.75 Creating a New Task

Within a task, many options exist for maintaining its contents, as shown in [Figure 6.76](#). You can add a description to a task and add links to all relevant stories, applications, or files that are needed to complete the task (**Work Files**).

Task settings

The screenshot shows the 'Composite Task' maintenance interface. At the top, a message says 'To activate this task, assign someone to it.' Below this, it states 'You are owner of:' followed by a dropdown menu. A section titled 'Enter Q4 data' is expanded, showing 'Overall Status: Inactive'. Under 'Time:', the start date is Nov 8, 2023, 13:00* and the end date is Nov 15, 2023, 14:00*. The 'Work Files (0)' section is collapsed. The 'Description' section is expanded, containing a placeholder 'Add more information, instructions, or notes you'd like to share.' and a note from 'Abassin Sidiq'. The 'Time' section is also expanded, showing 'Start By: Time', 'Start Date: Nov 8, 2023, 13:00', and 'End Date: Nov 15, 2023, 14:00'.

Figure 6.76 Maintaining a Task

In addition, you'll need to specify an owner in the **Owner** field who will be responsible for the task, as shown in [Figure 6.77](#). The **Assignee** is also mandatory and defines the user who must actually complete the task. You can also add a **Reviewer** who validates the task before the task is considered complete. If the task is part of a bigger planning process, you can indicate that in the **Hierarchy** section.

Owners, assignees, and reviewers

In addition, you can maintain reminders, add more files, or leave private notes that are only visible to you. Once a task is created and published,

Working with tasks

notifications will automatically be sent to all affected users. Users can also pin tasks to their home screens to keep track of them.

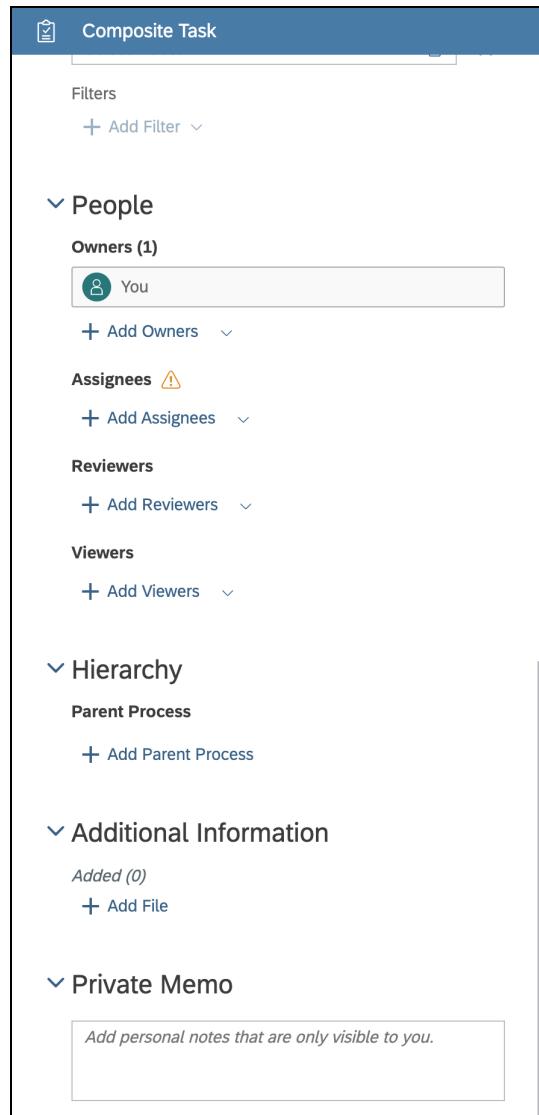


Figure 6.77 Additional Settings for Tasks

6.4 Summary

The planning component of SAP Analytics Cloud can be used to perform rather complex enterprise-wide planning workflows. While some of these processes are designed in a separate environment, they are mainly executed in a story or an application.

Because the planning component is deeply integrated with the story, synergies are created that allow controllers, for example, to first analyze data and then perform their own analyses immediately by using planning tools in the story.

Now that you've seen how to use historical data and establish classic planning workflows, the next chapter will describe how predictive analytics can be used to automate future estimations and calculations.

If you want to gain deeper insights into the topic of financial planning and analysis, we recommend reading the book *SAP Analytics Cloud: Financial Planning and Analysis* (<https://www.sap-press.com/5486/>) which was published by SAP PRESS.

Chapter 7

Predictive Analytics

While most analytics use cases focus on analyzing historical data, predictive analytics aims to forecast potential future developments. To facilitate this process, various practices like machine learning are embedded in SAP Analytics Cloud.

When analyzing historical data, you can often observe patterns that occurred in the past or learn from decisions that were made. However, this data can also be used to gain insights about future developments or relationships between data points that may not be visible at first.

SAP Analytics Cloud offers a dedicated predictive analytics component that provides various functionalities to support users in performing these kinds of analyses. Those functionalities are either automated (*smart assist*) or require users to define explicit predictive scenarios (*smart predict*).

Smart assist and
smart predict

In this chapter, you'll first learn about both smart assist and smart predict; then, we'll offer examples of their functionality. Smart predict allows users to create complex scenarios that can't be covered in detail in this book. However, a sample time series analysis will be created throughout this chapter. Section 7.3 describes how to access more information about smart predict.

Requirements for This Chapter

All examples in this chapter are based on previously created stories and datasets. If you want to follow along with the examples in this chapter, you first must create the dataset, model, and stories as described in these chapters:

- [Chapter 4, Section 4.2.1](#)
- [Chapter 4, Section 4.3](#)
- [Chapter 5](#)

7.1 What Is Predictive Analytics?

This section will focus on *predictive analytics* and its differentiation from the classic analytics field. Because the area of data science is rather big and can

be separated into a lot of different fields, we won't focus on this topic in this chapter. SAP Analytics Cloud supports users by providing easy access to machine learning algorithms and tools. Machine learning algorithms are mathematical methods that can, for example, recognize patterns in data or relationships among data points. Those algorithms are usually applied automatically within SAP Analytics Cloud and can't be influenced by a user. However, for some cases, a special environment is available where extended analyses can be created.

We'll explore all functionalities that belong to predictive analytics through practical examples.

Smart assist The term *smart assist* groups all functionalities that support users by automatically applying algorithms and functions to enable the analysis of data for patterns and highlights. Smart assist includes the following functionalities:

Smart discovery ■ Smart discovery

With smart discovery, you can create an automated analysis of a model, as shown in [Figure 7.1](#), which can be used to determine key influencers for a specific dimension or measure.

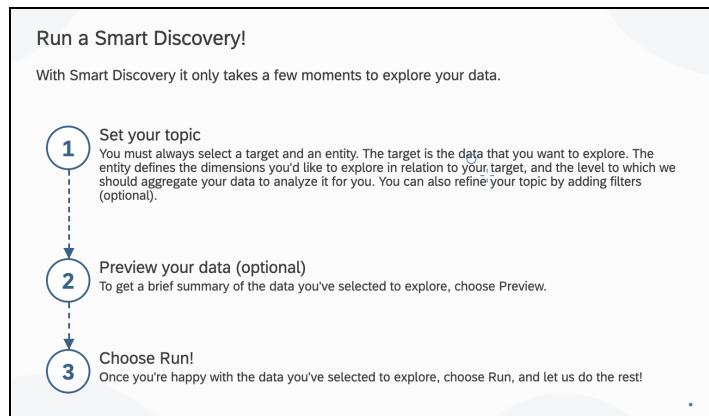


Figure 7.1 Smart Discovery

This function will automatically generate a story that contains various charts and tables showing highlights and relationships. In addition, all values that don't fit the automatically recognized relationships (outliers) will be shown. Finally, smart discovery also provides a simulation model that allows you to change individual dimensions and measure the effect of the change.

Smart insights ■ Smart insights

This functionality can be activated for each chart in a story and provides explanations for specific data points, as shown in [Figure 7.2](#). Once you click on a data point in a chart (e.g., a bar in a bar/column chart), smart insights

can be launched to find out which influencers contribute to this data point. Smart insights must be activated for each chart or table manually.

Smart Insights

Gross Margin in California

How has this changed?

- The total so far for **Dec 2016** is 5.72 Million \$. The total for **Nov 2016** was 5.38 Million \$, a decrease of 1% (0.05 Million \$) compared to **Oct 2016** (5.43 Million \$).

What are the top contributors?

- Orange with pulp** is the top **Product** contributor. The top 10 values contribute 150.65 Million \$ (87%) overall.
- Kiran Raj** is the top **Sales Manager** contributor, 133% above average.
- Los Angeles** is the top **Location** contributor, 126% above average.
- W-Mart** is the top **Store** contributor. The top 10 values contribute 22.50 Million \$ (13%) overall.
- 65** is the top **Store_GEOID** contributor. The top 10 values contribute 22.50 Million \$ (13%) overall.

Figure 7.2 Smart Insights

Search to insight is another functionality to quickly access data and explore relationships between data points. This function can be launched from the home screen or within the story. With this functionality, you can type in natural language questions, as shown in [Figure 7.3](#).

Search to insight

Show Revenue by Product 4 other results...

in Thousand

Product	Revenue (in Thousand)
Alcohol	4,133.27
Soft Drinks	1,527.47
Juices	926.29
Mineral water	376.08

Next actions

Choose a model... Show suggested models...

Search all available models

Show Revenue by Product

Figure 7.3 Search to Insight

Search to insight uses various machine learning algorithms to determine which data model you want to search and which information you request. The generated chart can be copied into a story.

- R visualizations** Although R visualizations are part of the story and behave like charts, they'll be covered in this chapter because they also allow you to apply algorithms to forecast data. An example R visualization is shown in [Figure 7.4](#).

What Is R?

R is a programming language commonly used in statistics. This open-source language is maintained by a large community. The language allows extensive data operations and is extended by packages.

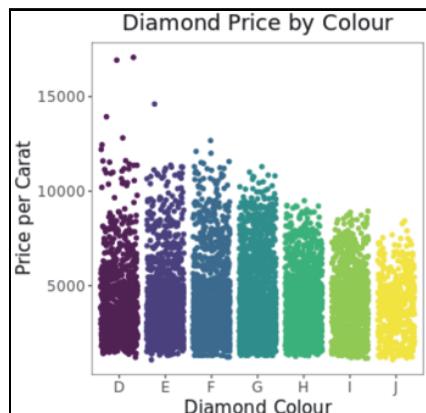


Figure 7.4 Sample R Visualization

- Data transformations in R** R can only be used in SAP Analytics Cloud to create visualizations that aren't included in the standard portfolio of elements used in stories. However, you'll require knowledge of R. Data operations or transformations that are performed within an R script can be executed, but the resulting data can't be stored in a data model. Instead, the result can be shown in a chart or table by using R.

- Automatic forecast** When using a time series chart, you can activate the automatic forecast feature, which extends the time series chart by adding a forecast of how the values may develop in the future, as shown in [Figure 7.5](#). The parameters of an automatic forecast can only be slightly adjusted.

- Smart predict** In addition to the smart assist functionalities, SAP Analytics Cloud also offers an extended working environment for power users called *smart predict*. In general, users create predictive scenarios based on datasets trained on their own contents, as shown in [Figure 7.6](#). Smart predict supports the following predictive scenarios:

- Classification
- Regression
- Time series



Figure 7.5 Time Series Chart with Forecast

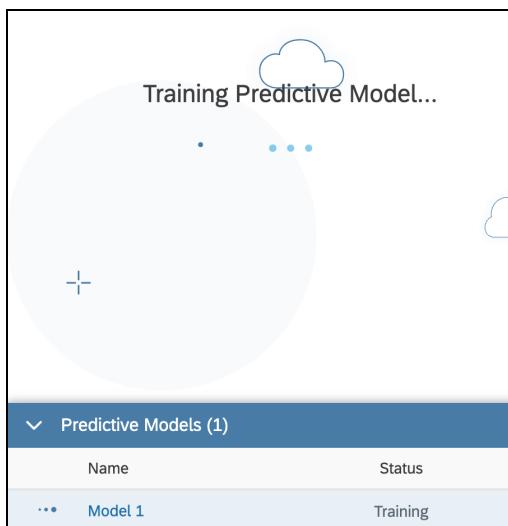


Figure 7.6 Training Predictive Scenarios

Based on the use case, these scenarios can answer various questions and conduct analyses, including, for example, customer churn analysis, time series forecasts, or future developments. A detailed description of these scenarios can be found in [Section 7.3](#).

7.2 Smart Assist

This section covers all functionalities of the smart assist area in detail. Some of our examples may use models or stories that we created in previous chapters. Of course, you can also use the features we present with your own data. Be aware that our demonstrations are based on fictional data from the demo data package, which may not always lead to useful results.

7.2.1 Smart Discovery

Now, let's use smart discovery to determine what factors most influence the **Revenue** measure in our Sales Data model. Smart discovery is only available for stories in classic mode, not for optimized story mode.

Create a new story and choose **Run a Smart Discovery**. Instructions on how to create a story can be found in [Chapter 5, Section 5.2](#). Choose the **Sales Data** model we created in [Chapter 4, Section 4.3](#) and [Section 4.5](#).

- Configuring smart discovery** You'll now see the smart discovery sidebar, where you can further configure some parameters, as shown in [Figure 7.7](#). For instance, you can specify which target variable (measure or dimension) you want to explore in more detail. Click on **Select a dimension or a measure** below **Target** and select the **Revenue** measure. For the **Entity**, choose the dimensions **Product**, **City**, and **Supermarket**.

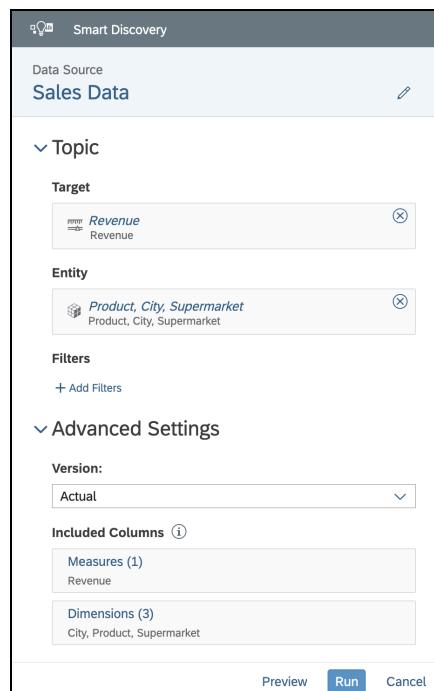


Figure 7.7 Setting Up Smart Discovery

Leave the **Version** dropdown list set to **Actual**. Remove all measures so that only **Revenue** remains. Then, remove the **ID**, **Stores**, and **Street** dimensions because they provide no value for our analysis and are directly related to revenue. (Both **ID** and **Street** are dimensions with a close relation to their respective data points. One value can exist per ID, and only a few values can exist for a street, which would result in a rather high mathematical influence on the revenue. However, this insight has no real-world value.) Initiate the process by clicking on **Run**.

Wait a few seconds until the automatic story generation process is completed. Smart discovery will generate four pages in total:

- **Overview**
- **Key Influencers**
- **Unexpected Values**
- **Simulation**

If smart discovery is executed for a dimension instead of a measure, only the first two pages are generated.

The **Overview of Revenue for Product, City, Supermarket** page shows general information about the analyzed measure and includes overview charts and texts that outline strong relationships that have been found within the data, as shown in [Figure 7.8](#).

Advanced settings

Automatically generated story

Overview

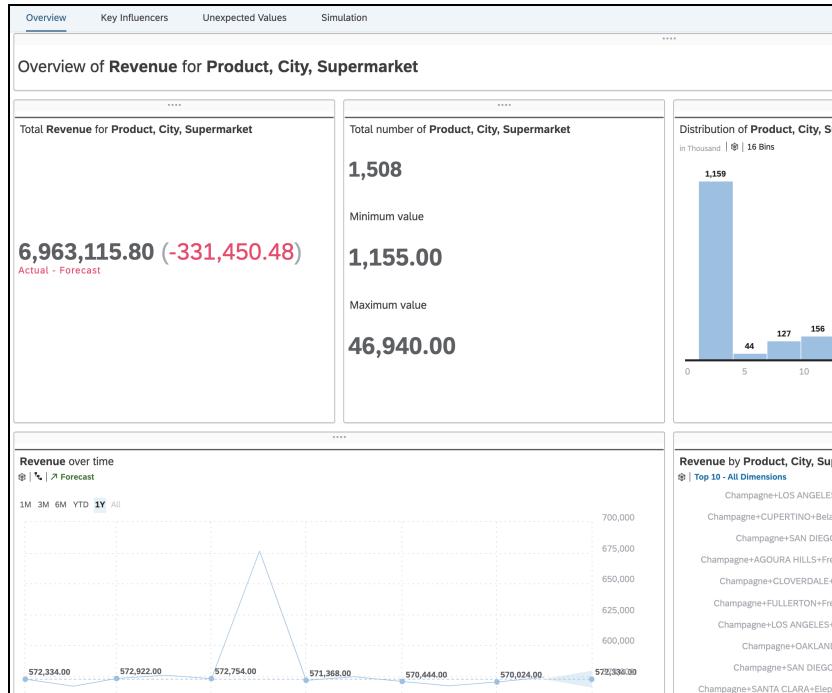


Figure 7.8 Excerpt of Overview Page

In general, the overview page offers a high-level overview of your data and highlights how several factors contribute to the measure. Some charts are interactive and allow you to generate further analyses.

- Key influencers** On the **Key Influencers** page, you'll find information about all the prominent relationships that were found in your data, accompanied by automatically generated texts that provide explanations of the results of the analysis and their quality, as shown in [Figure 7.9](#).

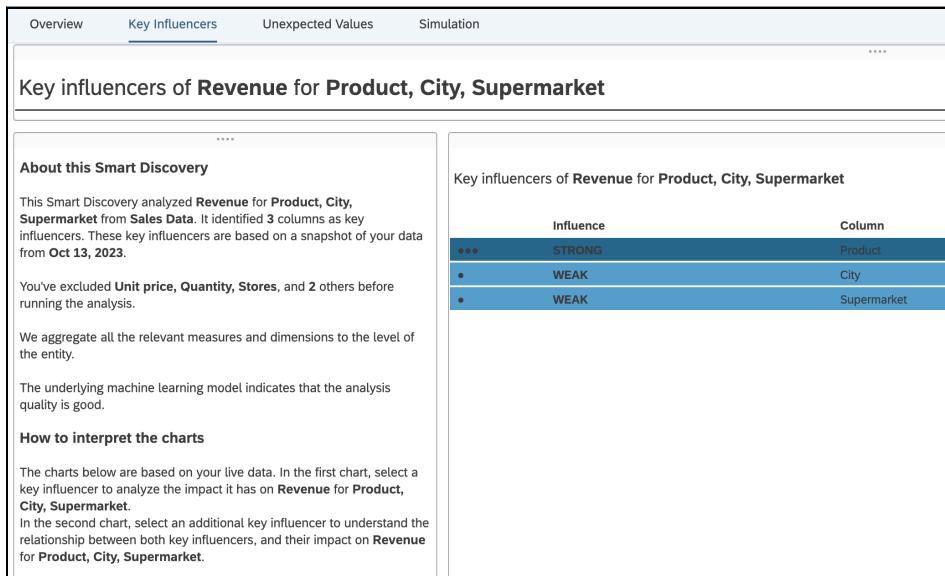
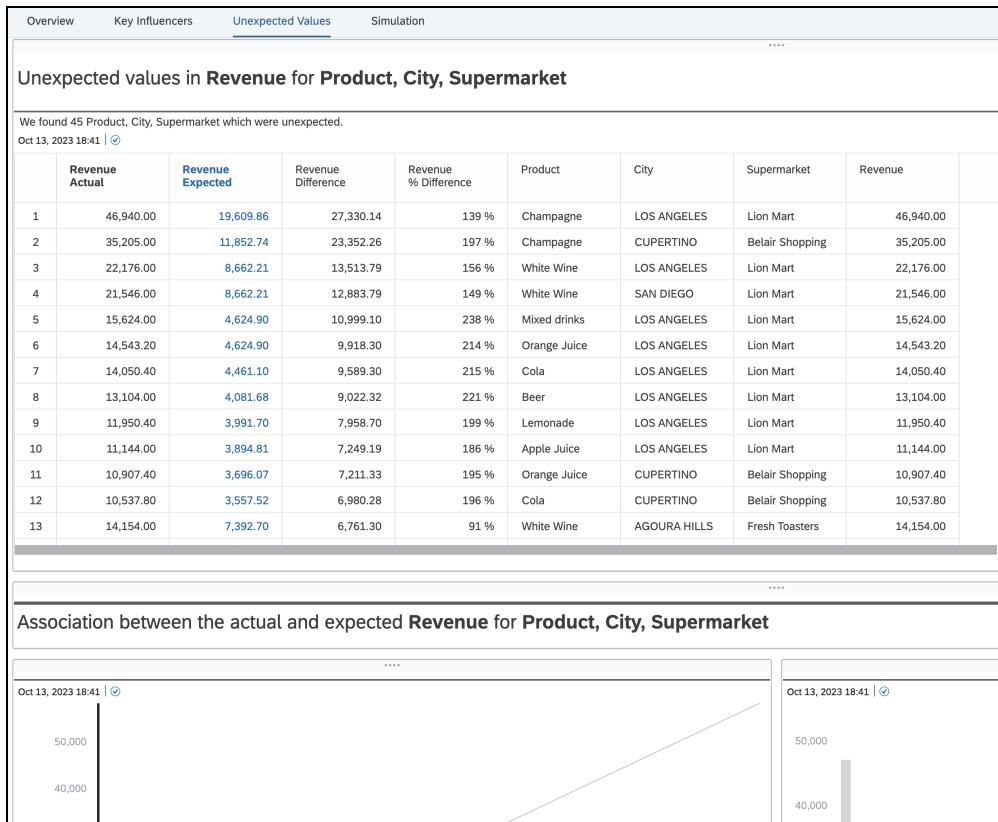
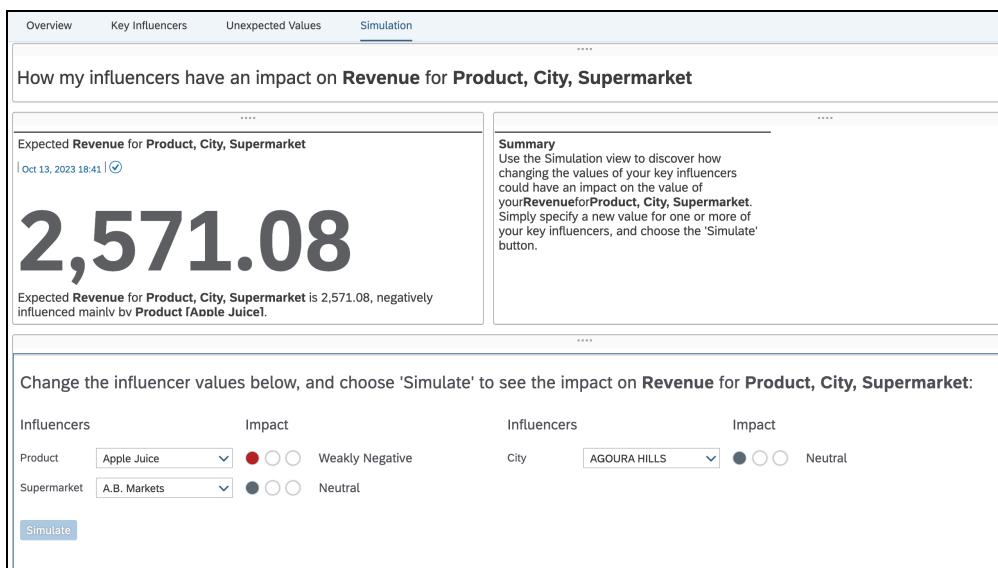


Figure 7.9 Key Influencers

Based on the results of the analysis, this page may show additional charts, which focus on one or more key influencers. Every individual chart allows you to select the key influencers to manually adjust them.

- Unexpected values** Smart discovery also generates a model in the background, which it uses to measure the relationships within the data and determine the influence of each dimension. This background model is only an approximation of reality, however, and thus, the model cannot explain all the values that occur in the dataset. The **Unexpected Values** page shows a list of all values that don't fit the model, as shown in [Figure 7.10](#). These values are displayed in a table and then again in more detail in the charts. If you click on a value, the charts will automatically adjust.
- Simulation** The final page, **Simulation**, provides a powerful tool where you can adjust individual influencers and directly measure their influence on the measure. For each influencer, you can change the dimension member, and the revenue will change based on your decision, as shown in [Figure 7.11](#). In addition, the **Simulation** page directly shows the size of the impact of a dimension.

**Figure 7.10** Unexpected Values**Figure 7.11** Simulation

Simulating a change Change the parameters by using the input controls of one of the dimensions to start a simulation, as shown in [Figure 7.12](#). Choose another product, for example, and click on **Simulate** to see the effects of the change.

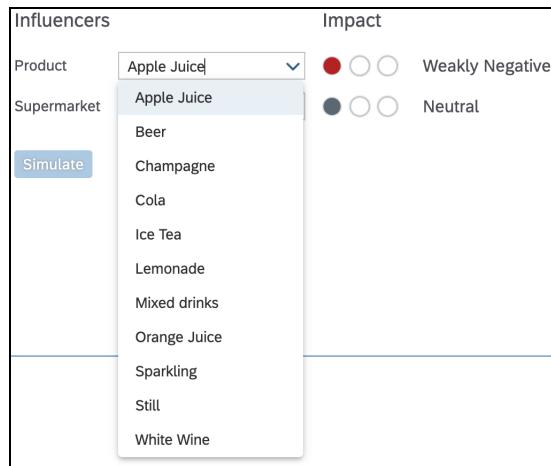


Figure 7.12 Adjusting Simulations

7.2.2 Smart Insights

While smart discovery analyzes a measure or dimension in general, smart insights helps you find out more about a specific data point. In general, smart insights can be activated for every chart built on a supported data source. If the amount of data is insufficient or if the context is too detailed, smart insights may fail to produce results. Smart insights are only available in stories in classic mode. Therefore, to use the functionalities, you have to create a story in classic design mode.

Open a new story in classic design experience mode and create a new numeric chart. Let the chart show the revenue measure and add a variance as shown in [Figure 7.13](#). Click on the chart and open the action bar by clicking on the three dots icon. Now, select **Add Smart Insights**, as shown in [Figure 7.13](#).

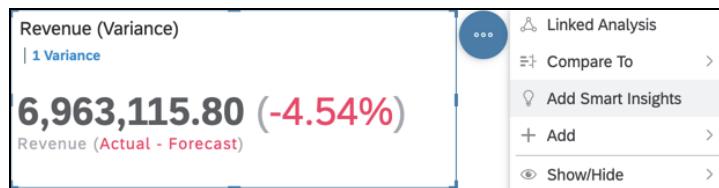


Figure 7.13 Adding Smart Insights

Accessing smart insights Smart insights are automatically added as text below the chart showing the most prominent finding, as shown in [Figure 7.14](#). You can either access the

smart insights by right-clicking on the chart or by clicking on **View more...** at the end of the text.

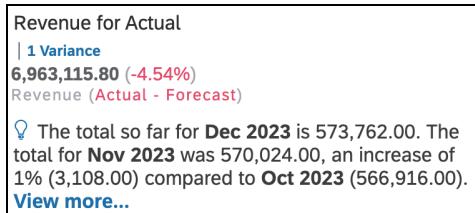


Figure 7.14 Chart with Smart Insights

After you open smart insights, a sidebar will appear on the right, as shown in [Figure 7.15](#). This sidebar contains details about all findings that lead to the data point. You can click on each finding to see more details and related charts.

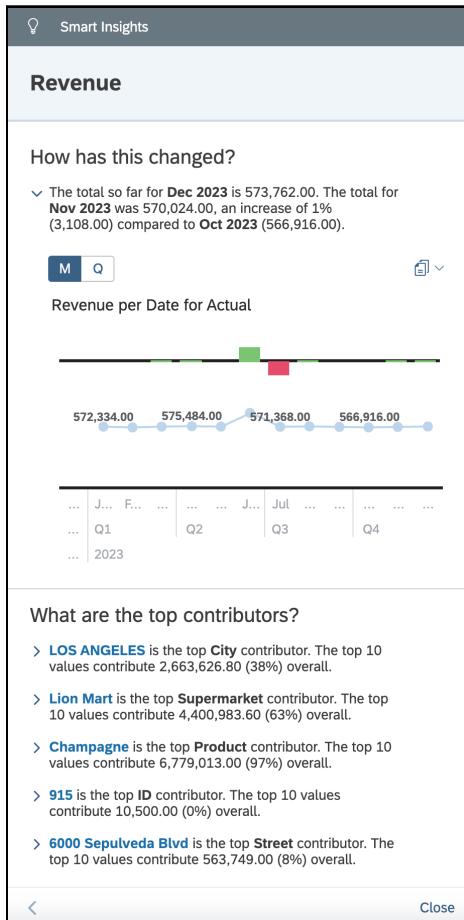


Figure 7.15 Smart Insights Sidebar

7.2.3 Search to Insight

- Explore data** Smart assist functionalities are designed to provide easy and intuitive access to data. While the data exploration mode already eases this process (see [Chapter 5, Section 5.2.2](#)), search to insight allows you to use natural language to analyze data.
- Opening the search** Search to insight is directly called from the home screen (see [Chapter 3, Section 3.1](#)). Navigate to your home screen, click on **Ask a Question**, and click on **Go to Search to Insight**, as shown in [Figure 7.16](#). You can also access search to insight within a story by clicking the **Search** icon  at the top.



Figure 7.16 Opening Search to Insight

After you open search to insight, the search screen shown in [Figure 7.17](#) appears. You can directly enter your question in the bottom, but the interface also proposes some searches and actions you can perform.

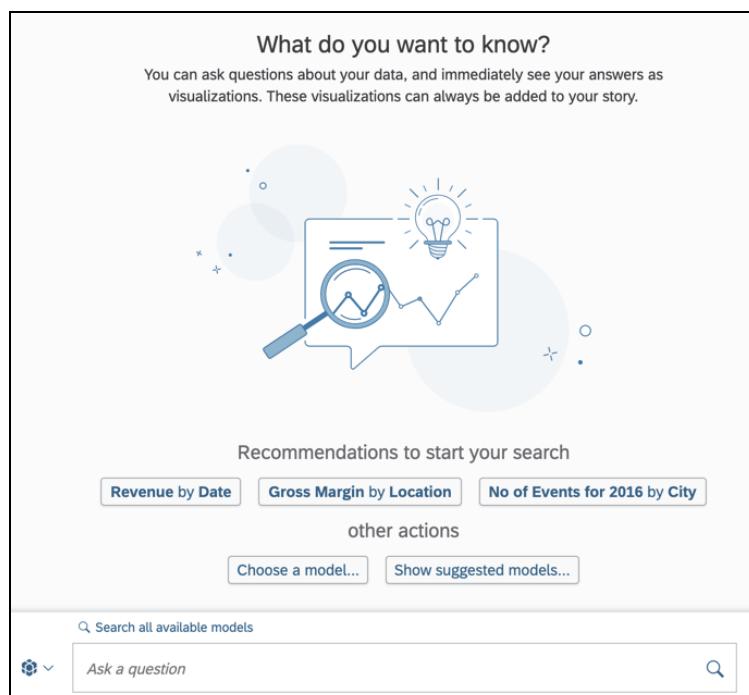


Figure 7.17 Search to Insight

SAP Analytics Cloud automatically indexes all models so that search to insight can search through them. Enter the search term “Show Revenue by Supermarket” and press **Enter**. You’ll also see automatic recommendations while entering the question. Especially when you have many models in your system, these proposals can be helpful for finding the right model. Once you’ve submitted the search query, a chart will be generated, as shown in Figure 7.18.

Searching for data

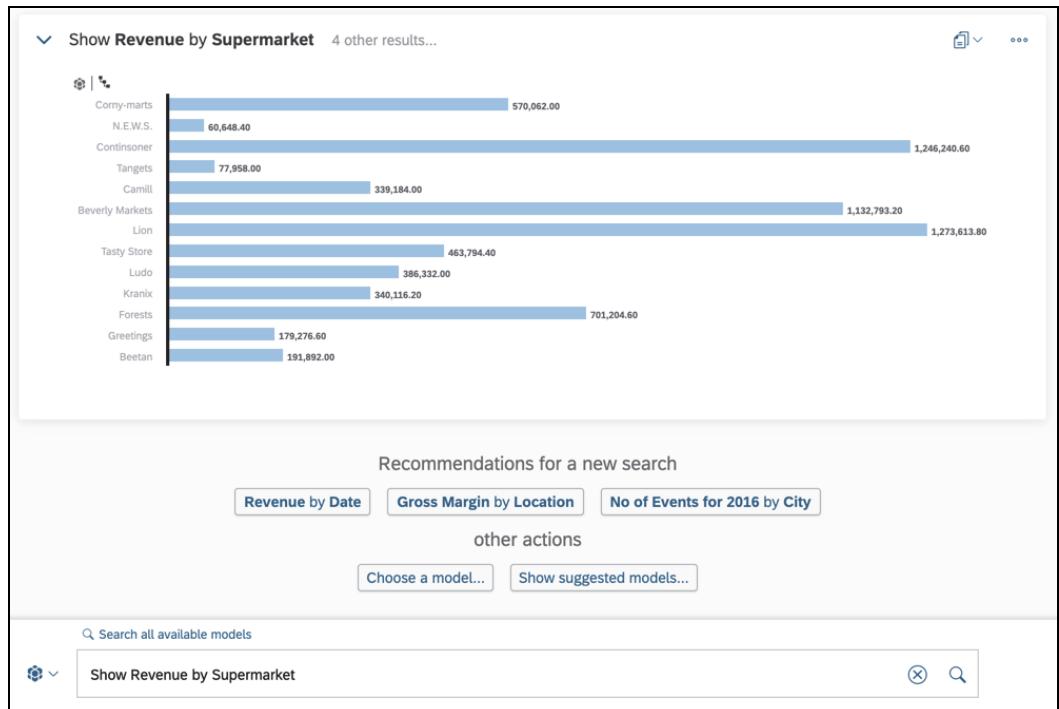


Figure 7.18 Generated Chart

You can extend the search by adding filter criteria (e.g., “for last year”) or by clicking the buttons below a chart to submit a proposed question. If you want to use the chart within a story, you can directly copy it from this screen by clicking the **Copy** icon and selecting **Copy**.

Filter criteria

7.2.4 R Visualizations

If you’re missing a chart in the standard portfolio or if you want to perform individual statistical transformations before visualizing a specific context, R visualizations can be used to overcome this challenge. By using the open-source programming language R, you can create individual charts. *R servers* provide packages that include predefined charts and functions to manipulate and visualize data.

Scope	In general, you can use R to transform your data and implement data science scenarios. Because R can be used to generate charts and graphical elements, R components can also be used within a story. An R component in a story also can be used to manipulate and transform data, but the results can only be visualized and cannot be stored in a data model.
Differences from standard charts	R visualizations are also not interactive. Although R allows you to create interactive charts, this process must be performed completely in R script and isn't compatible with other charts in the story. You also cannot use the builder or formatting options in R visualizations (see Chapter 5, Section 5.6). R visualizations are created in their own builder, which is only available for this scenario.

R Server

R scripts must be processed by an R server. SAP Analytics Cloud provides an R landscape by default that allows you to create R visualizations without hosting your own R server. However, if you want to use your own server (e.g., when the SAP landscape is missing the required packages), you must set it up beforehand. More information can be found in [Chapter 3, Section 3.3.4](#).

Requirements	Because R is a statistical programming language, some knowledge is required to use it properly. SAP Analytics Cloud only provides a limited number of examples, which can't be applied easily to your own data.
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More Information about R

The following links provide more information about R and further resources to learn the language:

- **R Project**, <https://www.r-project.org/>

You'll find general information about R at this website as well as download R for your own desktop computer. This software is not required to use R in SAP Analytics Cloud.

- **R for Beginners**, <http://s-prs.co/v218502>

This tutorial can help you get started learning R and performing your first steps.

R visualizations	The following example will demonstrate how to create R visualizations. We'll use a simple script to get familiar with R in SAP Analytics Cloud and the working environment. To start, create a new story in optimized mode and add a canvas page to it. Click on the plus icon + in the top bar and select R Visualization , as shown in Figure 7.19 .
-------------------------	---

Builder	The builder for R visualizations, shown in Figure 7.20 , will appear in the sidebar to the right of the story.
----------------	--

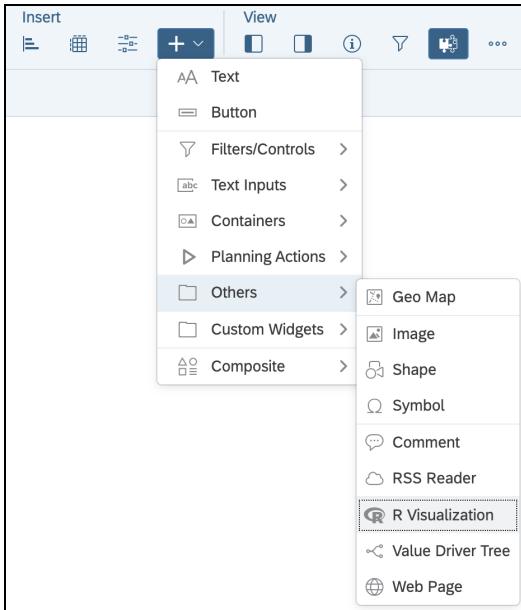


Figure 7.19 Adding R Visualizations

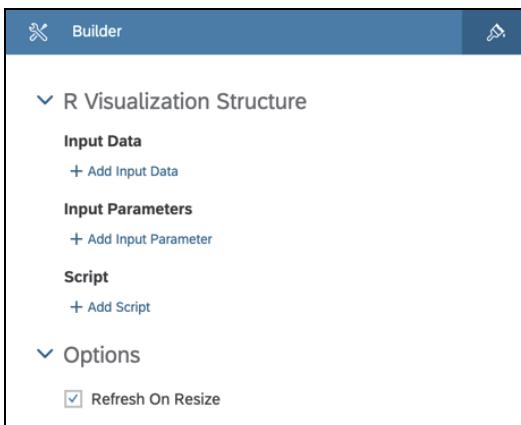


Figure 7.20 Builder for R Visualizations

Because R can only work with data in flat tables, you must first select a set of data that then will be made available for the R script. Click on **Add Input Data** in the builder to start the data selection process. Select the **Sales Data** model and select all dimensions for the rows. Confirm the selection by clicking on **OK**.

Adding input data

Then, click on **Add Script** to start the script editor. Go into full screen mode by clicking on the **Expand** icon in the top-right corner of the builder. The screen should now match the screen shown in [Figure 7.21](#).

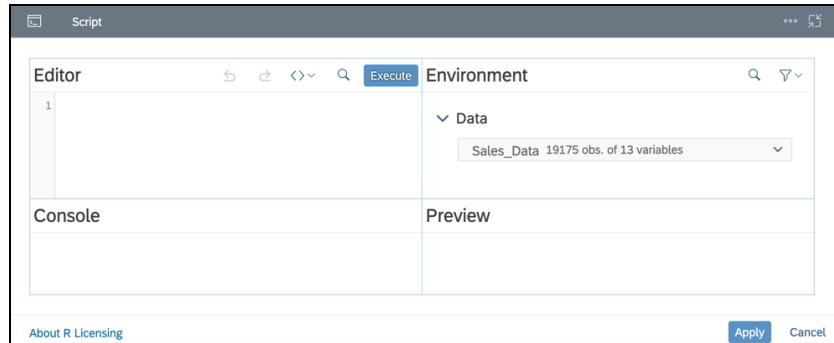


Figure 7.21 Script Environment

- Script environment** The script environment is separated into four main parts:
- **Editor**
All R scripts are entered into this field. You can also access code snippets in this area or search through the code.
 - **Environment**
This area lists all available datasets. By clicking on the three dots icon next to each entry, you'll see a preview of the included data.
 - **Console**
Because R can also return console entries (e.g., error messages), these messages are shown in this area.
 - **Preview**
This section previews the visualization that will later be added to the story.

- List all packages** First, we need to find out which packages are installed on the R server. Enter the following script into the **Editor** area and click on **Execute**:

```
installed.packages(lib.loc = NULL, priority = NULL,
                    noCache = FALSE, fields = NULL,
                    subarch = .Platform$r_arch)
```

This code shows a list of all packages installed on the R server, which will be returned in the console. By going through this list, you can find out if the necessary R packages are available to solve your challenge. If you're missing a package, you must install it first, which, however, is only possible on your own R servers. To use a dataset in an R script, you must first attach the dataset. Enter and execute the following code:

```
attach(Sales_Data)
```

From now on, you can directly reference dimensions and measures by simply writing their names.

Remove all code from the script editor and then paste in the code shown in Listing 7.1.

Creating a word cloud

```
# This code loads the required libraries.  
library(wordcloud)  
library(RColorBrewer)  
library(tm)  
library(NLP)  
# Attaches the dataset.  
attach(Sales_Data)  
# Creates the word cloud.  
wordcloud(Supermarket, rot.per=0.6, use.r.layout=FALSE)
```

Listing 7.1 Example R Script

This script will create a word cloud for the **Supermarket** dimension. A *word cloud* visualizes the words in a dimension in the shape of a cloud and can use a measure to determine which words occur most. You can ignore all lines in the code that start with a hash (#), which are just comments that won't be processed by the R server.

After clicking on **Execute**, a preview of the chart will be displayed, as shown in Figure 7.22. To use the chart in a story, click on the **Apply** button.



Figure 7.22 Word Cloud

R scripts will always be re-executed when opening a story. If the script contains random functions (like in our example), different outcomes should occur each time the story is opened. In our case, the word cloud function randomly defines the final layout.

Script execution

7.2.5 Automatic Forecasts for Time Series

You can extend a time series chart by activating the automated forecast. This functionality is only available in classic mode.

Creating a time series forecast

Create a new story in classic mode with a new canvas page and add a new chart of the type **Time Series**. Select the **Sales Data** model. Add the Date

dimension and the **Revenue** measure. You can also use the time series chart we created in [Chapter 5, Section 5.3.1](#).

Open the action bar of the chart and select **Add • Forecast • Automatic Forecast**, as shown in [Figure 7.23](#). The time series forecast for the chart will be immediately activated, and the projected values (shown earlier in [Figure 7.5](#)) will be displayed. In addition, you can change the forecast method (under **Advanced Options**).

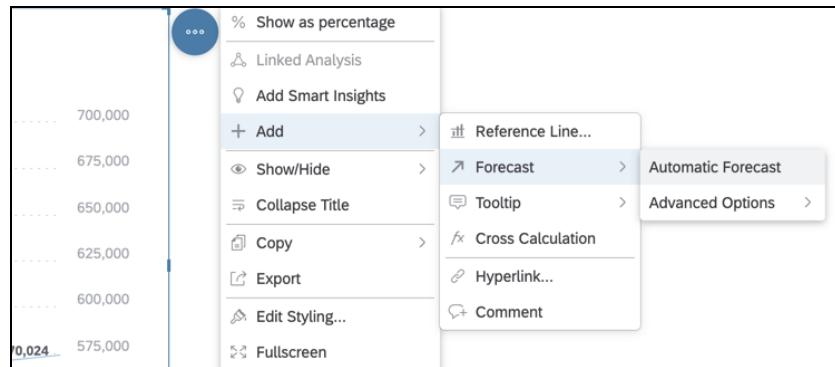


Figure 7.23 Adding Automatic Forecasts

The projected forecast will be added to the end of the time series automatically, as shown in [Figure 7.24](#). The forecast will be shown in a blue area, which indicates the upper and lower bounds of possible future developments. The projected values are shown in the middle of that area on a dotted line.

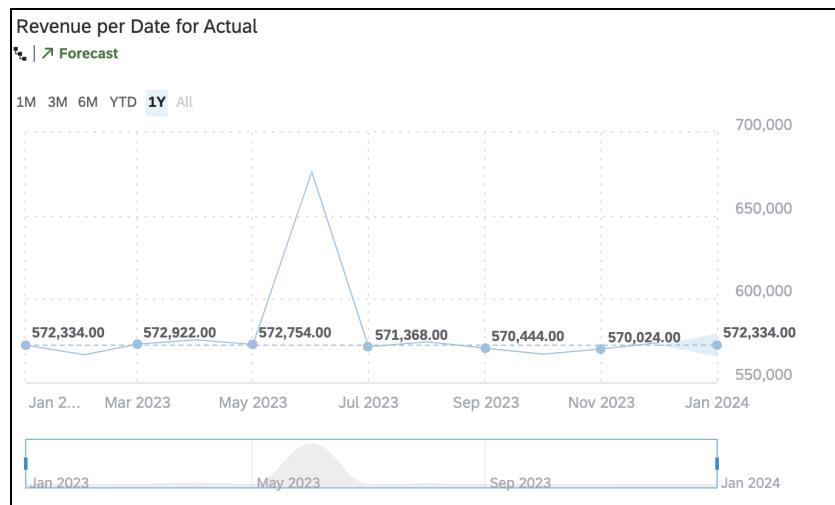


Figure 7.24 Time Series with Forecast

7.2.6 Smart Grouping

When using the bubble diagram or scatterplot chart type in a classic story, you can activate an additional function to group values. An algorithm is executed in the background to check which data points are similar to each other, and these data points are grouped together automatically and assigned different colors. You can compare this procedure to a K-means algorithm. This algorithm works in a similar way by searching through the dataset for values that are similar to each other and that can be put in groups.

Supported chart types

You can activate and configure smart grouping in the builder of a chart. Specify the number of groups and custom labels and optionally include tooltip measures, as shown in [Figure 7.25](#).

Enabling smart grouping

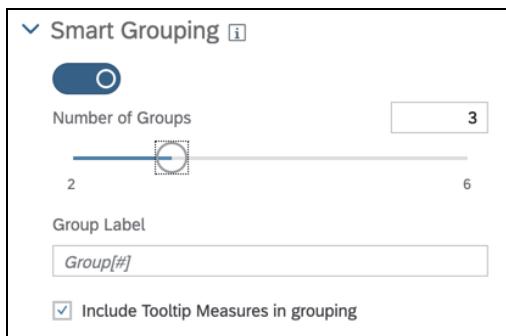


Figure 7.25 Smart Grouping

The algorithm then automatically calculates groups of data points and colors the data points in the chart accordingly. In addition, a legend will be displayed, as shown in [Figure 7.26](#).

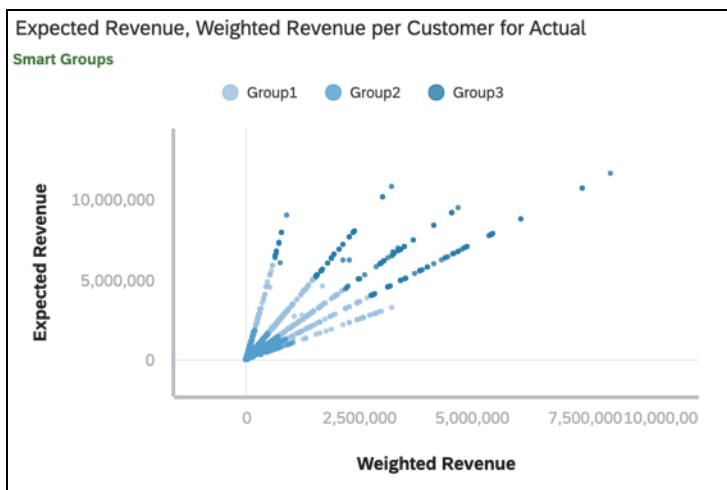


Figure 7.26 Scatterplot with Smart Grouping

7.3 Smart Predict: Predictive Scenarios

Smart predict can extend predictive scenarios, which can become rather complex. We'll create an example time series forecast in this section again using the Sales Data dataset uploaded in [Chapter 4, Section 4.2.1](#).

Then, we'll briefly elaborate on regression and classification scenarios. However, our focus will be on use cases and requirements. In general, we recommend consulting the product help when creating predictive scenarios, which contains extensive information about using smart predict and about creating scenarios.

7.3.1 Time Series

While the automatic time series forecast described in [Section 7.2.5](#) can't be modified, the predictive scenario can be used to create extended forecasts. These forecasts allow you to set your own variables and return statistical evaluation criteria.

Creating a predictive scenario Let's start by creating a new predictive scenario. Open the main menu and click on **Predictive Scenario**. This step will prompt you to select a predictive scenario type. Choose the **Time Series Forecast** option, as shown in [Figure 7.27](#). Enter the name "Revenue Forecast" and click on **Save**.

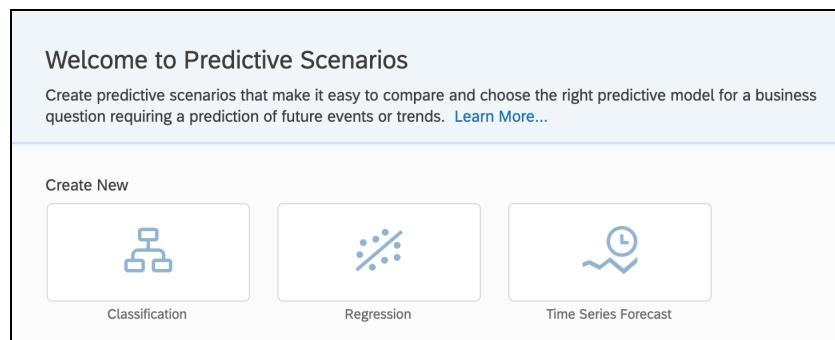


Figure 7.27 Selecting Predictive Scenarios

Selecting a dataset A message will remind you to configure the predictive model before training it. Use the sidebar on the right to configure the predictive model. Click on the **Time Series Data Source** field to open the dataset selection dialog box. Now, select the **Sales Data** dataset, which will prompt the sidebar to show additional settings, as shown in [Figure 7.28](#).

The **Predictive Goal** section is where you'll specify the role of each column in the dataset. The **Target** field should contain the measure for which you want projected values for the future. For our example, select the **Revenue** measure.

Select **Date** for the **Date** field. The **Entity** field specifies the column with which the measure should later be aggregated. Select **City** for the **Entity** field.

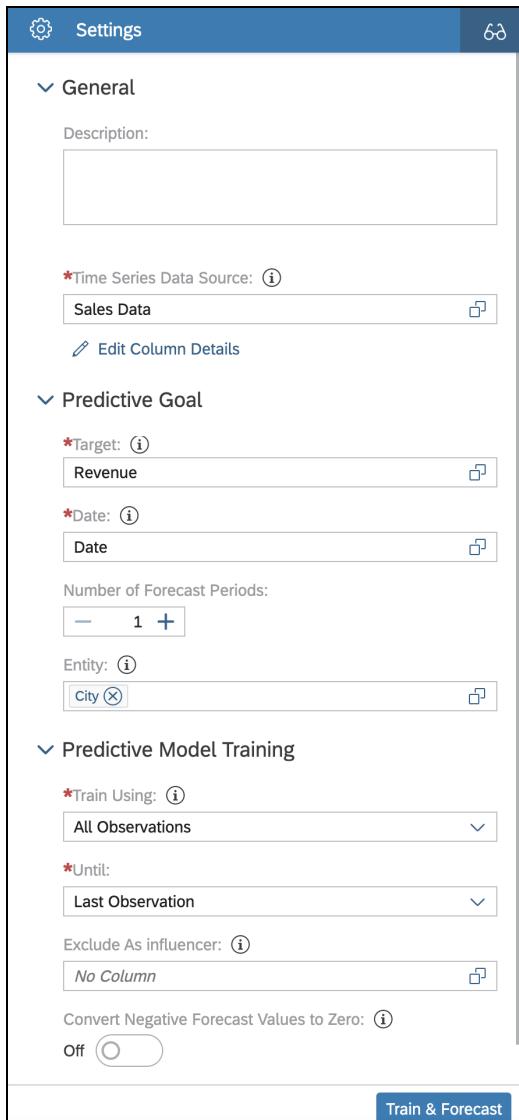


Figure 7.28 Dataset Selection and Configuration

In the **Predictive Model Training** section, you can exclude variables and change further parameters. You can restrict the amount of data used for the training and convert negative forecasted values to zeros. Let's leave the standard settings in place and start the model training process by clicking on **Train & Forecast** as shown in [Figure 7.29](#).

[Training the model](#)

The screenshot shows a configuration panel titled "Training & Forecast". It is divided into two main sections: "Training" and "Forecast".

Training:

- *Process: A dropdown menu set to "All Observations".
- *Until: A dropdown menu set to "Last Observation".

Forecast:

- *Number Of Forecasts: A numeric input field set to "1".
- Generate Positive Forecasts Only: A checkbox that is unchecked.

Figure 7.29 Training and Forecast Settings

The model training process may require several minutes to finish. However, the process performed in the background will result in a new predictive model generated for the time series forecast.

During the training process, you can view a list of available **Predictive Models** at the bottom of the page (as shown in Figure 7.30). This list includes all active predictive models and errors if they occur. You'll also see other predictive models that are part of the predictive scenario, if others are included.

The screenshot shows a progress indicator for training a predictive model, followed by a list of existing models.

Training Predictive Model...

A large circular progress bar with a plus sign in the center, showing a progress of approximately 50%.

Predictive Models (1)

Name	Status
Model 1	Training

Figure 7.30 List of Predictive Models

After the model training process has been completed, you'll see the results, which you can use to evaluate the prediction, as shown in [Figure 7.31](#). The overview focuses on the **Average Expected MAPE** value. The mean absolute percentage error (MAPE) value indicates the probability of an erroneous forecast. The lower this value, the lower the probability of an error occurring if the model is used to forecast values.

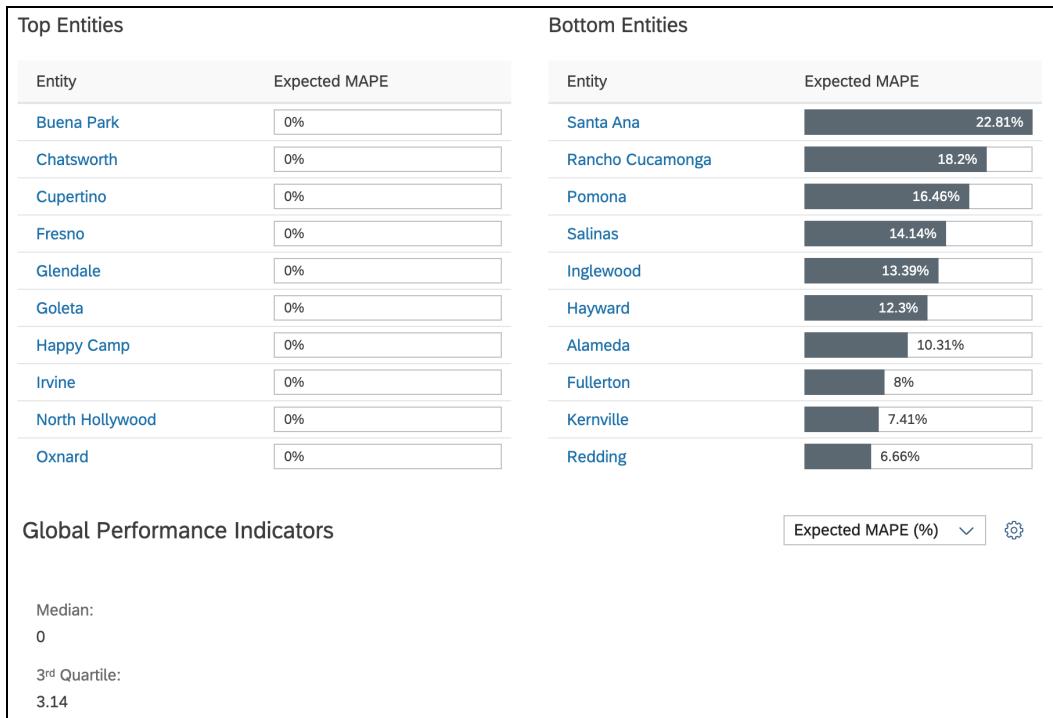


Figure 7.31 Model Evaluation

MAPE Value

MAPE provides a good indication of a forecast's quality. Although a low MAPE value usually means that the model is sound, you should still check its results and evaluate if these results are realistic. This evaluation should be performed by analyzing the segments in detail.

If you run the training process on your own system, note that your results may not exactly match the examples in this book.

By looking at the **Top Entities** and **Bottom Entities** lists, you'll see for which cities the model created good (or bad) forecasts. In general, a MAPE value of 2.3% indicates high model quality.

- Detailed analysis** To evaluate the model in detail, you can analyze each segment (in this case, each city) separately. Either click on a city in the **Top Entities** and **Bottom Entities** list or scroll down to a table of segments and their MAPE values.
- Forecast versus actual** Select the city **Salinas** for our example. As shown in [Figure 7.32](#), the interface will now provide a chart to compare the forecasted values with the actual data. The chart will also show the calculated value for the future (in this case, January 2024).

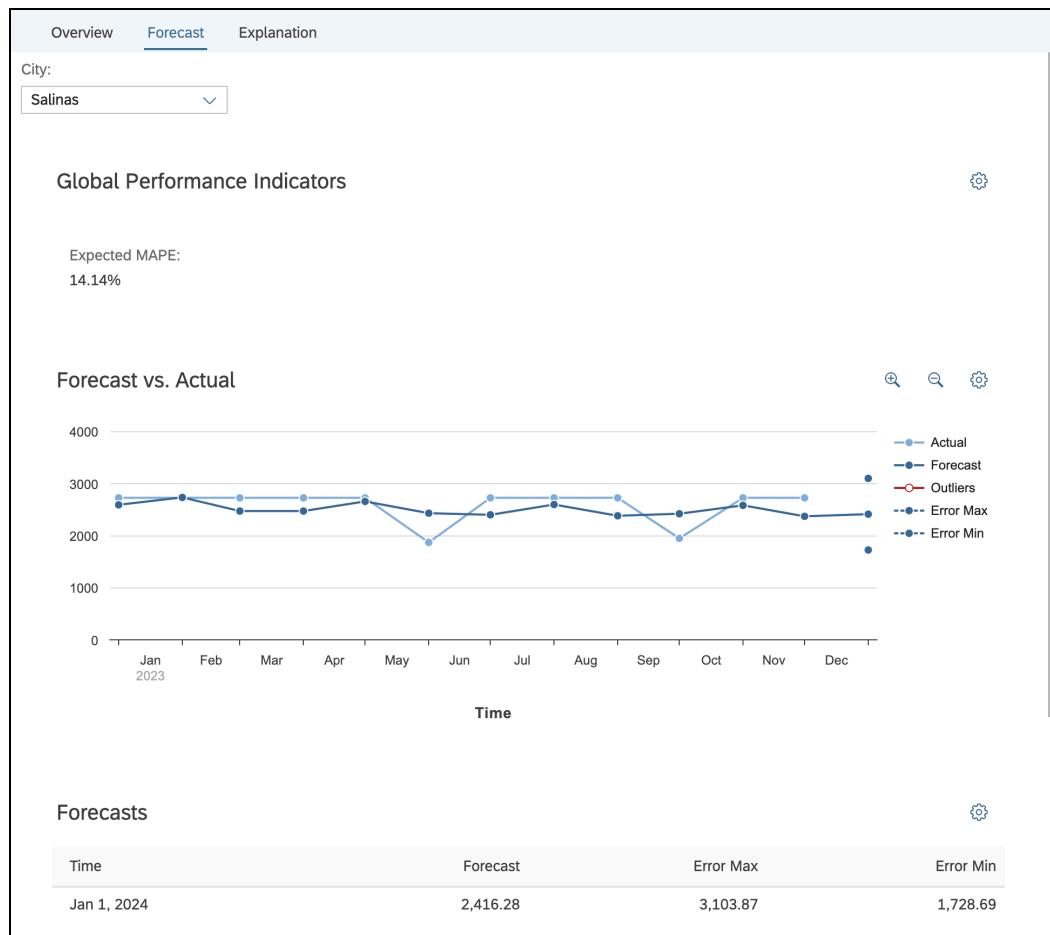


Figure 7.32 Detailed Analysis of Salinas

- Forecasts** The **Forecasts** area on the same page shows the exact values that were calculated. Next to the **Forecast** column, you'll also see the upper and lower bounds of potential developments (**Error Max** and **Error Min**). Based on historic developments, SAP Analytics Cloud estimates the revenue in Salinas to range somewhere between these values.

The **Explanation** tab provides more statistical information about the analysis of each segment. The **Time Series Breakdown** graph shows how values develop over time and is especially interesting when conducting multiple forecasts, as shown in [Figure 7.33](#). The **Target Statistics** highlight statistical key figures that were calculated during the model training process, as shown in [Figure 7.34](#).

Time series breakdown



Figure 7.33 Time Series Breakdown for Salinas

Target Statistics

Validation

Minimum:
1,953

Maximum:
2,730

Mean:
2,471

Standard Deviation:
366.28

Publishing the
model

Figure 7.34 Target Statistics

After you've finished evaluating the model, you can publish the results into a new dataset, which can be also visualized in a story. Click on the **Save Forecast** icon at the top. A new dialog box will open you can enter a name, for instance, "Sales Data (Forecast)." Click on **OK** to confirm you want the

dataset to be created. The model will now be applied and published as a dataset.

Because this process can take some time, you won't receive direct feedback. However, you can again track the status of the model. Once completed, the model should have the **Applied** status, as shown in [Figure 7.35](#).

Predictive Models (1)		
	Name	Status
<input checked="" type="checkbox"/>	Model 1	Applied

Figure 7.35 Model Status

- Dataset** Open the dataset we just created. During the model application process, three new columns were added to the original dataset, as shown in [Figure 7.36](#). The **Forecast** column shows the forecasted value for each data point as generated by the model. Each segment (in this case, each city) was extended by one additional line for the date January 1, 2024. This line contains the forecasted value and a lower bound and upper bound.

☰	Date	Revenue	City	Forecast	Error Min	Error Max
1	2023-01-01	6825	Agoura Hills	6719.5559068624	null	null
2	2023-02-01	6825	Agoura Hills	6639.0326190846	null	null
3	2023-03-01	6825	Agoura Hills	7105.7634654061	null	null
4	2023-04-01	6825	Agoura Hills	6714.2338421093	null	null
5	2023-05-01	5880	Agoura Hills	6633.715227753	null	null
6	2023-06-01	7754	Agoura Hills	7100.394151253	null	null
7	2023-07-01	6195	Agoura Hills	6708.9075785201	null	null
8	2023-08-01	6825	Agoura Hills	6628.331815765	null	null
9	2023-09-01	6825	Agoura Hills	7095.0991116831	null	null
10	2023-10-01	6825	Agoura Hills	6703.5348330461	null	null
11	2023-11-01	6825	Agoura Hills	6623.0074558111	null	null
12	2023-12-01	6825	Agoura Hills	7089.7570436981	null	null
13	2024-01-01	null	Agoura Hills	6698.2107014911	6297.0868060341	7099.3345969491

Figure 7.36 Extended Dataset

This dataset can now be used in a story as a data source and visualized. More information about creating stories can be found in [Chapter 5, Section 5.2](#).

7.3.2 Regressions and Classifications

You can also use smart predict to classify datasets or create regressions. For these analyses, the following two scenarios are available:

- The *classification* scenario can be used to ask business-related questions that have a binary response set (e.g., yes or no). You can, for example, create forecasts that predict whether your customer will make an order with you within the next 3 months.
- If you want to analyze how a measure is influenced by individual factors and find out more about their impact, you can use the *regression* scenario. You can, for example, analyze which factors mainly influence your revenue and determine if their impact is positive or negative.

Which predictive scenario?

This book will not cover these scenarios in detail. In general, they follow the same procedure as described in the previous section, and most steps will be identical or similar. After you select a dataset, simply choose the target variable to be analyzed and exclude obvious influencers up front. After the model training process, smart predict will automatically generate an overview to evaluate the model. To use the results from the model, you can export the results into a dataset, which can then be visualized in a story.

7.4 Summary

SAP Analytics Cloud offers various functionalities to provide business users with easy access to machine learning capabilities. While smart assist tools do most of the work automatically, you can use the smart predict interface to create advanced predictive scenarios.

The smart assist functionality is tightly integrated into SAP Analytics Cloud and can be launched either in a story or from the home screen. For smart predict, users will work in a dedicated environment focused primarily on advanced users or experts.

Now, with this chapter, you've seen the third pillar of SAP Analytics Cloud. The next chapter will cover another pillar: the analytics designer. Similar to smart predict, this functionality targets more advanced users and enables them to create their own extended reports and dashboards.

Chapter 8

Advanced Development Environment

The advanced capabilities in SAP Analytics Cloud stories allow power users to create advanced reports extended by scripting. This chapter will introduce you to the concept of applications and provide simple examples to help you learn to create your own applications.

In addition to stories, SAP Analytics Cloud provides another user interface (UI) to develop complex reports. The *analytics designer*, which was released in the second quarter of 2019, provides tools to create rather complex applications that meet individual needs by using scripting and programming. Starting in 2023, SAP began merging both environments into the optimized story. This concept is also called the unified story.

The advanced development environment, however, exclusively targets advanced users who have programming or scripting expertise. Applications are developed by using a programming language that's similar to JavaScript. Developers who've already developed reports in SAP Lumira, designer edition (formerly known as SAP BusinessObjects Design Studio) can easily adapt to the environment in SAP Analytics Cloud. In this chapter, you'll first learn more about the differences between a simple story and an application/advanced story and when to use what. Then, the advanced development environment will be presented, where we'll develop a small basic application. This chapter will conclude with an outlook of future developments and resources.

Requirements

Goals of This Chapter and Requirements

This chapter isn't designed to teach you how to write application code or scripts. These examples are quite basic and meant to illustrate how the analytics designer works. Our examples in this chapter are based on the Sales Data model created in [Chapter 4, Section 4.3](#) and [Section 4.5](#).

8.1 The History of Stories and Applications

While stories are covered in detail in [Chapter 5](#), this chapter will introduce you to the concept of *applications*.

Story scope A story primarily focuses on reporting and interactivity. By providing a wide range of tools to create visualizations and interactive controls for viewers, stories are flexible and can be used for many complex use cases.

The story environment guides the creator through most of the process. By using guided dialog boxes and automatic functionalities, story creators can easily add input controls or filters to a story, which can be used interactively by viewers, for instance, the input controls shown in [Figure 8.1](#).

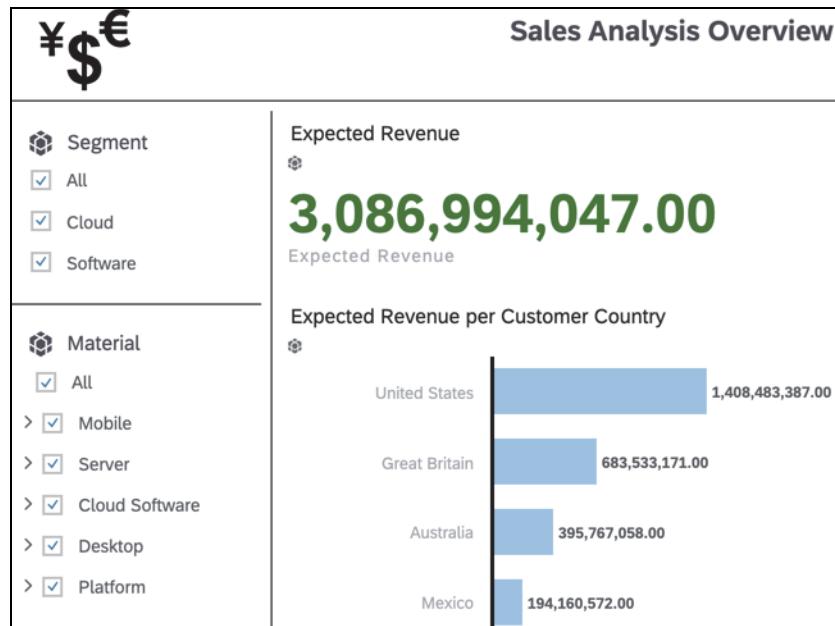


Figure 8.1 Example Story Input Controls

Application scope The application, however, offers a significantly higher degree of freedom but follows a less guided approach. The original analytics designer was based on a separate development environment, shown in [Figure 8.2](#), in which a developer could use various tools and functions to create a complex dashboard.

Development environment Similar to developing computer programs, application developers can implement their own algorithms and logic by writing code in SAP Analytics Cloud. However, developers are still supported by graphical interfaces to create charts and tables or to apply simple formatting. Developers can use the standard tools for simple tasks and invest their time and effort mainly into crafting complex scenarios.

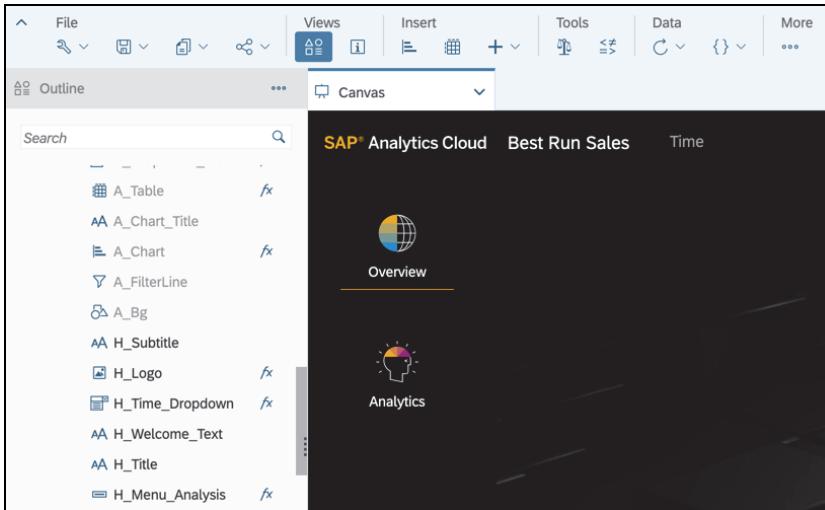


Figure 8.2 Development Environment for Applications

Applications are usually executed by users in the business units of your company. These users interact with applications in the same way they interact with stories. Some users may not even notice the difference. The application shown in [Figure 8.3](#) is separated into two views. The overview shows various key performance indicator (KPI) tiles, which a user can click to access more details about each KPI. Users can also click on the **Analytics** button on the left to launch another view, which contains interactive elements and charts.

Executing applications

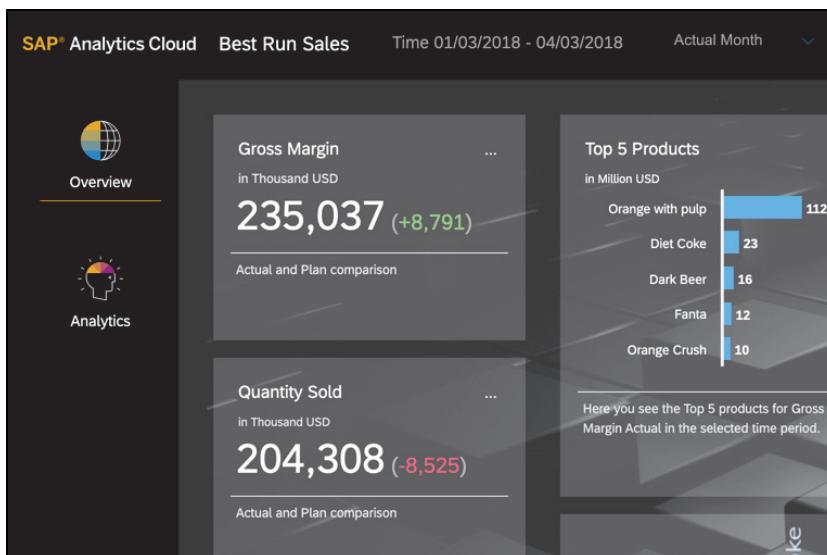


Figure 8.3 Executed Application

Limitations of the analytics designer	The analytics designer was made generally available to subscribers of SAP Analytics Cloud since the second quarter of 2019. In 2023, SAP introduced the concept of the unified story and started to add functionality from the analytics designer directly into the story. Once you turn on the advanced mode of the story, the widgets become visible.
--	---

Where to Design Applications Going Forward

Since SAP officially recommends using the optimized story whenever possible, this book will develop all samples in the new optimized story with the advanced mode turned on. See [Chapter 5, Section 5.2.4](#) for more information on where to turn on and off the advanced mode in a story.

Since the development interface in the legacy analytics designer only looks slightly different, you can also use it to run through the following examples. Some of the buttons may differ in look and feel but the code samples are fully working in both environments.

8.2 Creating Applications

Accessing the development environment	As stated at the beginning of this chapter, applications have historically been developed in a dedicated development environment. For legacy applications (and if necessary functionality is not available in the optimized story), you can access this environment from the main menu via Analytic Application • Create New Application , as shown in Figure 8.4 .
--	--

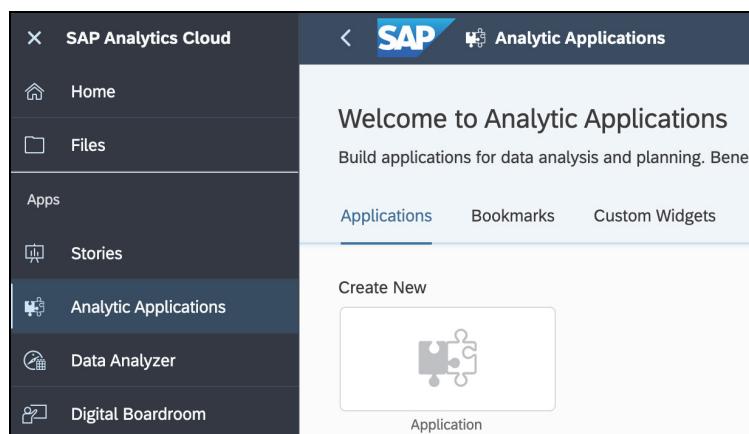


Figure 8.4 Creating New Applications in the Legacy Environment

However, for this this section, we'll create some basic workflows within the optimized story environment. Therefore, switch to the **Stories** menu which was already introduced in [Chapter 5](#) and create a new canvas page in

Optimized Design Experience mode. Although we will technically build a story again, we will refer to it as an application in this chapter. By default, the story launches in advanced mode.

API Reference

Although the analytics designer mainly relies on the syntax of the programming language JavaScript, it doesn't support all of JavaScript's functionality. Therefore, SAP provides its own official documentation for the syntax called the API Reference. An *application programming interface (API)* is an interface for programmers to call specific functions in code. The API Reference documents all available functions and can be accessed at <http://s-prs.co/v502621>. An example entry in the API Reference is shown in Figure 8.5. Some of the API calls are only available in the legacy analytics designer and can't be accessed in the optimized story.

The screenshot shows a detailed API documentation page for the `ArrayUtils` function. At the top, it says "Type library standard". The main title is **ArrayUtils**. Below the title is a **Method Summary** section. Under "Name and Description", there is a static method `create` which creates and returns an empty array of the specified type. The "Method Detail" section contains the same information for the `create` method. It also includes sections for "Parameters" (with `type: Type`) and "Returns" (`<empty array of type type>`). The entire documentation is presented in a clean, structured table format.

Figure 8.5 Documentation for the ArrayUtils Function

8.2.1 Development Environment

The development environment for applications, shown in Figure 8.6, is the same as the story development environment. However, in this case, the extended mode is turned on, enabling more widgets to be added to the story. The main additions are the Info Panel, various widgets which we will discuss on the following pages and the Scripting overview in the **Outline** sidebar on the left. This area will show a list of all scripts that are added to the application.

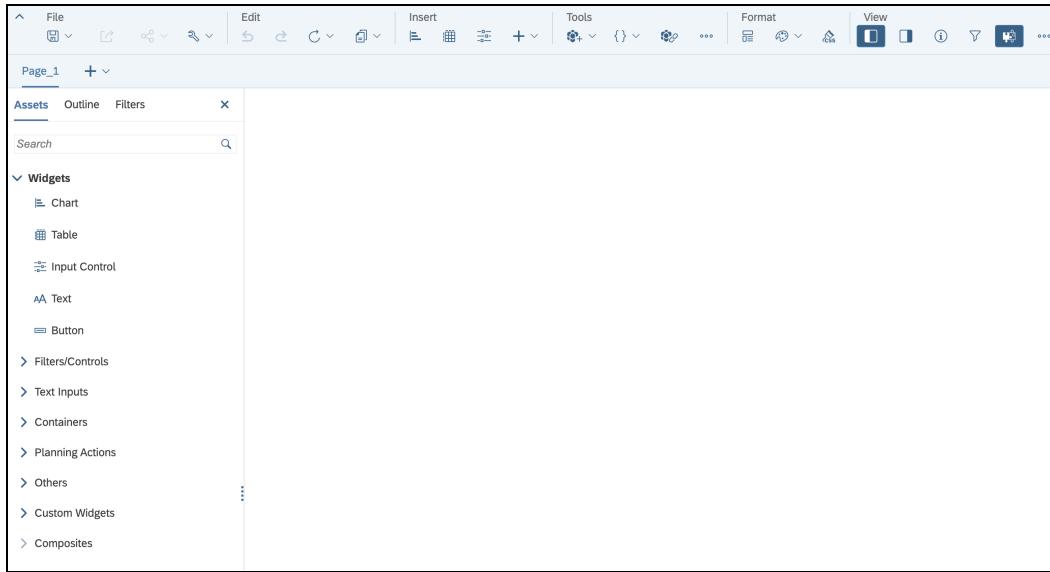


Figure 8.6 Story Environment in Advanced Mode

- Info panel** The visibility of the **Info Panel** can be toggled by clicking on the **Show/Hide Info Panel** icon . This panel shows all script errors under the **Errors** tab and shows a list of references under the **Reference List** tab. The reference list shows which objects or functions are used by the application's elements, as shown in [Figure 8.7](#).



Figure 8.7 Info Panel

Because applications can be compared to computer programs in general, they're executed separately. Applications are launched by clicking on the **View** button located in the top right. The **Edit** buttons can be used to unlock the configuration and allow modification of elements in the application.

- Script editor** Scripts can be inserted into almost every element on the canvas of an application and even into the application itself. The script editor for each object can be opened by clicking on the icon next to a chart or table on the canvas or an entry under **Outline**, as shown in [Figure 8.8](#).

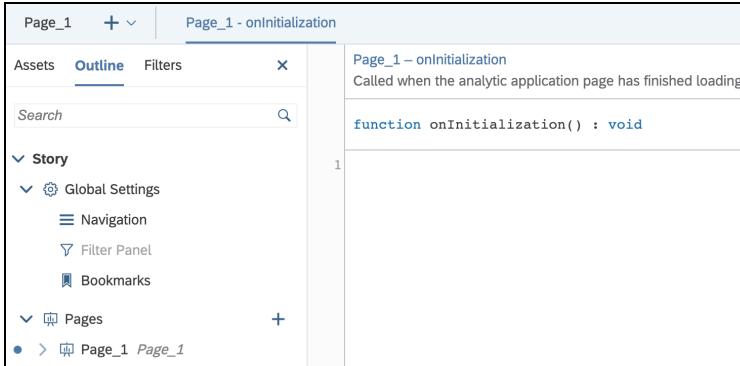


Figure 8.8 Script Editor

The script editor both allows for freeform code entry and provides graphical support while entering code. When entering code that contains errors, errors are highlighted and explained if possible (via a syntax check). [Figure 8.9](#) shows a scenario in which the same code is entered two times in line 1 and line 3. The editor adds a red background to all line numbers that may contain erroneous code (here line 1 and line 3). When hovering the mouse above a line number (as shown in [Figure 8.9](#), line 3), a detailed error message will be displayed.

Syntax check

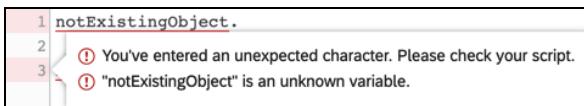


Figure 8.9 Erroneous Code

Another helpful feature in the script editor is the built-in formula help, shown in [Figure 8.10](#), which can be called from any position by pressing **Ctrl**+**Space** on a PC or **Control**+**Space** on a Mac.

Formula help

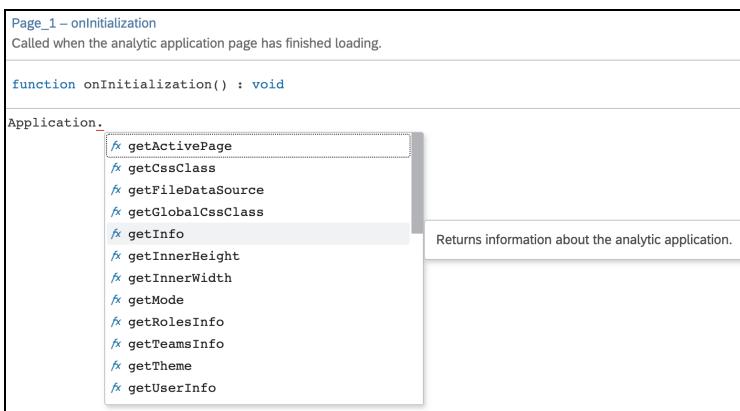


Figure 8.10 Formula Help

The formula help displays all available functions and properties, including descriptions, and allows you to quickly browse through all the available options. When working with dimensions or measures, you can also open member selectors with the help set to specific filter criteria, for example.

8.2.2 Creating New Application Elements

While some elements of the story were already introduced in [Chapter 5](#), other elements are only available in advanced mode, as shown in [Figure 8.11](#). We therefore won't cover all elements again in this chapter.

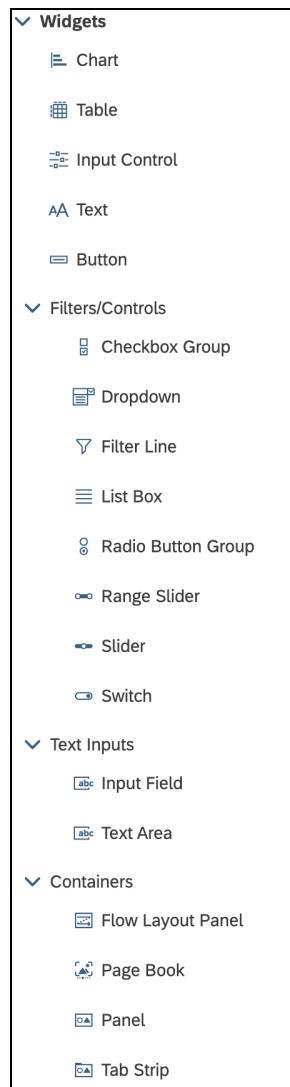


Figure 8.11 Elements of Applications

Review

Read the following sections to become more familiar with the story elements that are also available for your applications:

- [Chapter 5, Section 5.3](#)
- [Chapter 5, Section 5.4](#)
- [Chapter 5, Section 5.6](#)
- [Chapter 6, Section 6.3](#)
- [Chapter 7, Section 7.2.4](#)

In this section, we'll create some application elements through some simple examples. Then, we'll introduce you to some additional elements and provide references to further information. Because of the vast number of possibilities in the advanced mode of the story, we will only display a selection of widgets. This will help us to gain a basic understanding of the concepts of scripting.

First, let's create a standard table based on the Sales Data model we created earlier in [Chapter 4, Section 4.3](#) and [Section 4.5](#). Show the **Revenue** and **Quantity** measures and add the **Supermarket** and **Product** dimensions. Increase the table's size so that its contents are visible, as shown in [Figure 8.12](#). The table will be now called **Table_1**, under **Outline**, on the left.

Account	Quantity	Revenue
Beetan	42,549.00	115,648.00
	21,532.00	25,687.20
	17,080.00	9,378.60
	34,286.00	41,178.20
Beverly Markets	249,662.00	662,837.00
	134,155.00	160,041.00
	126,924.00	69,799.80
	199,934.00	240,115.40
Camill	74,841.00	200,073.00
	42,644.00	50,786.40
	31,430.00	17,119.20
	59,346.00	71,205.40

Figure 8.12 Table and Outline

Dropdown

A **Dropdown** element can be added to the canvas and contain a dropdown list of customized elements. If the user clicks on the dropdown list and selects an entry, an *action* will be executed.

Creating dropdown lists

Click on the plus icon  in the **Insert** area of the top menu bar, shown earlier in [Figure 8.11](#), to add a new dropdown element. This element type has its own builder, which provides an interface to define the values that are available for selection in the dropdown list, as shown in [Figure 8.13](#).

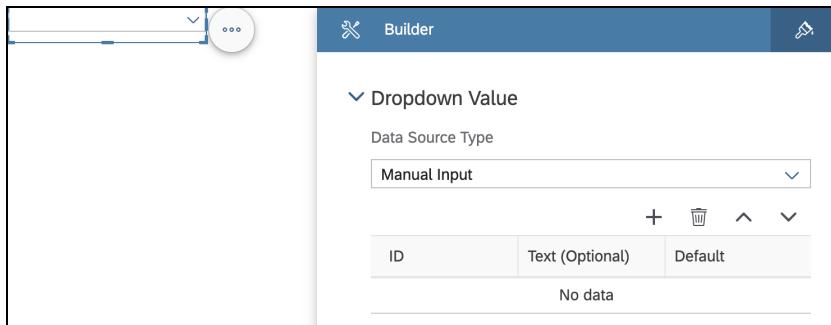


Figure 8.13 Configuring Dropdowns

Adding values

Create two entries and insert the contents shown in [Table 8.1](#). Click on the plus icon  at the top of the table in the builder to add new values. Once you've entered all these values, verify the values in the dropdown list, as shown in [Figure 8.14](#).

Value	Text (Optional)	Default
Hide	Hide	No
Show	Show	Yes

Table 8.1 Dropdown Values

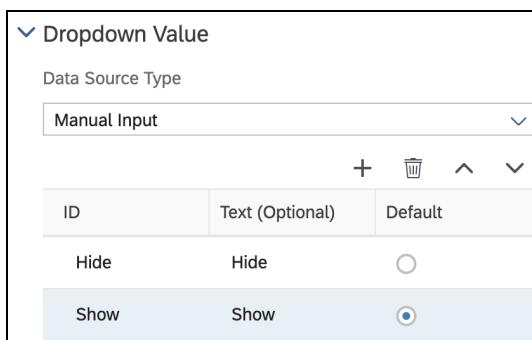


Figure 8.14 Adding Values to Dropdowns

Open the script editor for the dropdown element to attach actions to each entry in the list. Click on the dropdown element on the canvas and click on the three dots icon next to it. Then, select **Edit Scripts...**, as shown in [Figure 8.15](#).

Accessing the script editor

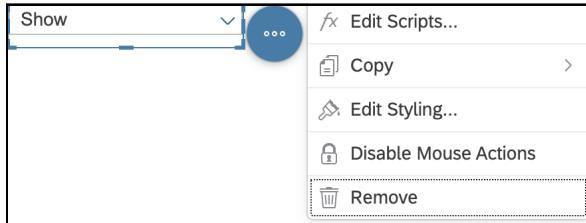


Figure 8.15 Opening Script Editor

The script editor will open, indicating when the actions defined in the script are executed. In our example shown in [Figure 8.16](#), the selection of an entry by the user (`onSelect`) will cause the execution of the script.

Creating scripts

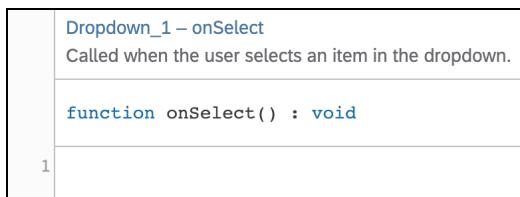


Figure 8.16 Script Editor for a Dropdown Element

Now, insert the code snippet shown in [Listing 8.1](#). The script will show or hide the table when selecting the **Hide** or **Show** entries in the dropdown list.

```
// Defines the variable sel which contains the values
// of the dropdown.
var sel = Dropdown_1.getSelectedKey();

// Hides the table.
if (sel === "Hide") {
    Table_1.setVisible(false);
}

// Shows the table.
if (sel === "Show") {
    Table_1.setVisible(true);
}
```

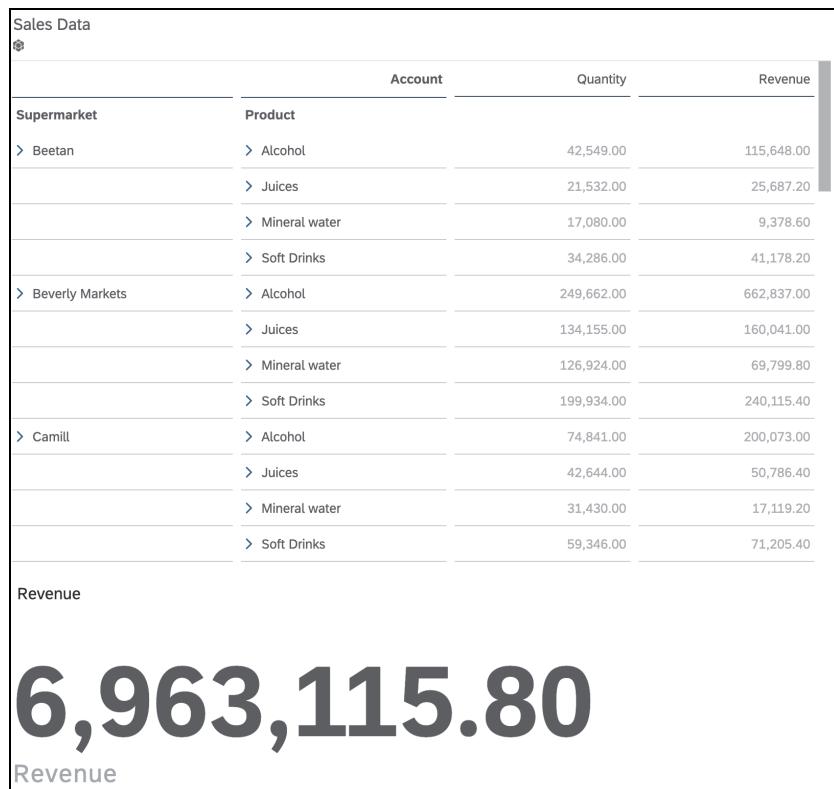
Listing 8.1 Sample Script to Show and Hide Tables

Launching the application Save the application with a name of your choice. Save the story and launch the application by clicking on the **View** button in the top right. Try out the dropdown list options for hiding and showing the table.

Checkbox Group

A checkbox group offers the ability to provide multiple selections to users, who can check one or more boxes. Each combination of selections can follow a different logic.

We must extend our application to demonstrate this functionality. Create a new chart with the **Numeric Point** type that shows the **Revenue** measure. Place this chart below the table, as shown in [Figure 8.17](#).



[Figure 8.17](#) Table and Chart on Canvas

Creating checkbox groups Click on the plus icon in the **Insert** section in the top menu bar and add a new checkbox group to the canvas. As with the dropdown element, a checkbox group has its own builder in which all entries can be defined, as shown in [Figure 8.18](#).

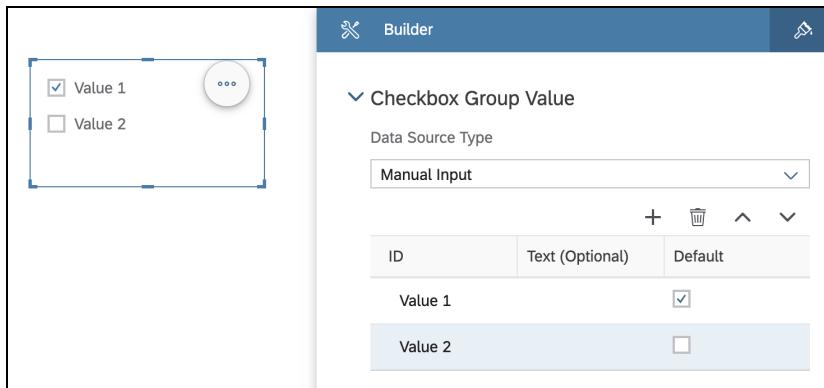


Figure 8.18 Configuring Checkbox Groups

Create two entries and insert the contents shown in [Table 8.2](#). Select the checkboxes in the **Default** column for both entries. Once you've entered all these values, verify the checkbox group, as shown in [Figure 8.19](#).

Value	Text (Optional)	Default
Tab	Show Table	Yes
Cha	Show Chart	Yes

Table 8.2 Checkbox Group Values

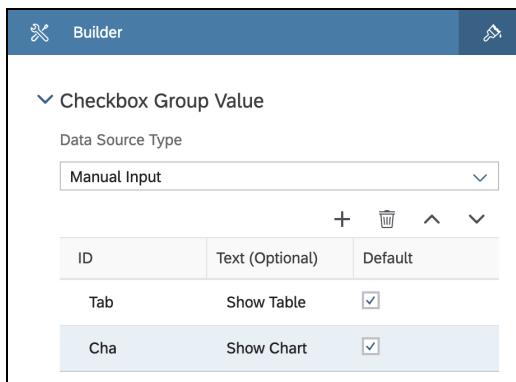


Figure 8.19 Adding Values to Checkbox Groups

Open the script editor for the checkbox group to attach actions to each selection in the list. Click on the checkbox group on the canvas and click on the three dots icon next to it. Then, click on **Edit Scripts...**, as shown in [Figure 8.20](#).

Accessing the
script editor



Figure 8.20 Opening Script Editor

Insert the script shown in [Listing 8.2](#). Based on which checkbox the user selects, the chart, the table, or both will be shown or hidden.

```
// Defines the variable sel which contains the values  
// of the checkbox group.  
var sel = CheckboxGroup_1.getSelectedKeys();  
  
// Checks which boxes are set  
// in the checkbox group.  
var isChartSelected = sel.includes("Cha");  
var isTableSelected = sel.includes("Tab");  
// Shows the chart and/or table.  
Chart_1.setVisible(isChartSelected);  
Table_1.setVisible(isTableSelected);
```

Listing 8.2 Sample Script to Show or Hide Tables and/or Charts

- Launching the application** Save the application with a name of your choice. Save the story and launch the application by clicking on the **View** button in the top right. Try out the checkbox for hiding and showing the table/chart.

Radio Button Group

A radio button group allows you to provide your users multiple options from which they can only select one. This element is similar to a dropdown element but all entries are displayed immediately.

The following example requires the table we created at the beginning of [Section 8.2.2](#).

- Creating radio button groups** Click on the plus icon + in the **Insert** section in the top menu bar and add a new radio button group to the canvas. Like the dropdown element, a radio button group has its own builder in which all entries can be defined, as shown in [Figure 8.21](#).

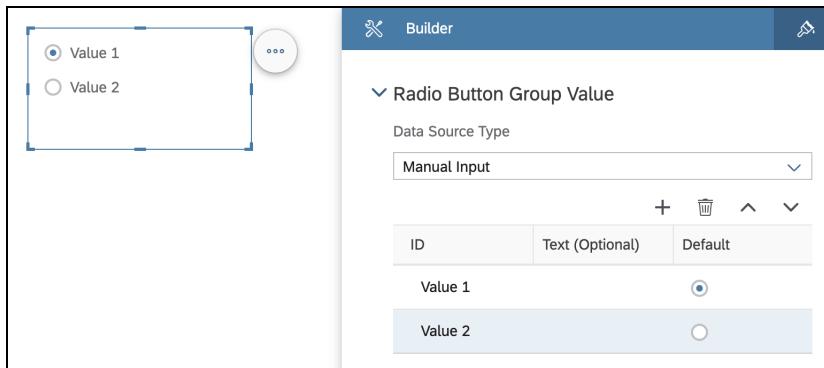


Figure 8.21 Configuring Radio Button Groups

Create two entries and insert the contents shown in [Table 8.3](#). Select the checkboxes in the **Default** column for both entries. Once you've entered all values, verify the radio button group, as shown in [Figure 8.22](#).

Value	Text (Optional)	Default
All	All Products	Yes
NoAlc	Non-Alcoholic	No

Table 8.3 Radio Button Group Values

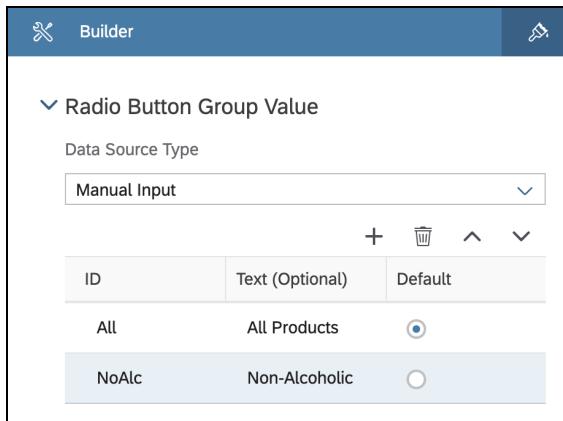


Figure 8.22 Adding Values to Radio Button Groups

Open the script editor for the radio button group to attach actions to each selection in the list. Click on the radio button group on the canvas and click on the three dots icon next to it. Then, click on **Edit Scripts...**, as shown in [Figure 8.23](#).

Accessing the
script editor

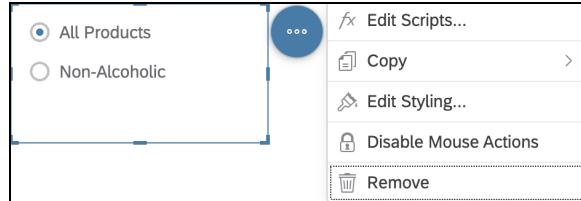


Figure 8.23 Opening Script Editor

Insert the script shown in [Listing 8.3](#). This radio button group allows the user to filter down all data in the table to nonalcoholic products only (basically by applying a filter). In addition, a user can switch back to showing all products.

```
// Defines the variable sel which contains the values
// of the radio button group.
var sel = RadioButtonGroup_1.getSelectedKey();

// Removes all filter for the dimension "Product".
if (sel === "All") {
    Table_1.getDataSource().removeDimensionFilter("Product");
}

// Selects all products that are nonalcoholic.
if (sel === "NoAlc") {
    Table_1.getDataSource().setDimensionFilter("Product", "[Product].[Product_Group].&[Juices]", "[Product].[Product_Group].&[Soft Drinks]",
    "[Product].[Product_Group].&[Mineral water]");
```

Listing 8.3 Sample Script to Filter Product Dimension

Using the Formula Help

In this sample script, a filter is applied to the **Product** dimension. To reduce the workload involved with entering the filter values manually, press **[Ctrl]+[Space]** on a PC or **[Command]+[Space]** on a Mac once you've arrived at the position where you must indicate the dimension name. The value help will then show a list of all dimensions. You can also use the formula help to open the member selector and select the values you want to filter.

- | | |
|----------------------------------|---|
| Launching the application | Save the application with a name of your choice. Save the story and launch the application by clicking on the View button in the top right. Try out the radio button to filter the values. |
|----------------------------------|---|

Button

A button is a prominent element on the screen and an often used functionality in applications: Developers can create buttons through which users can execute all kinds of actions. Buttons can be designed to hide elements or modify elements while analyzing the current context. Buttons can also be used to execute just about any action.

The following example requires the table we created at the beginning of [Section 8.2.2](#). Click on the plus icon + in the **Insert** section in the top menu bar and add a new button to the canvas.

Creating buttons

A button has no builder but can be formatted. The **Formatting** tab can be launched from the story sidebar on the right and can be used to rename the button, as shown in [Figure 8.24](#). For our example, enter “Show City” into the **Text** field.

Labeling buttons

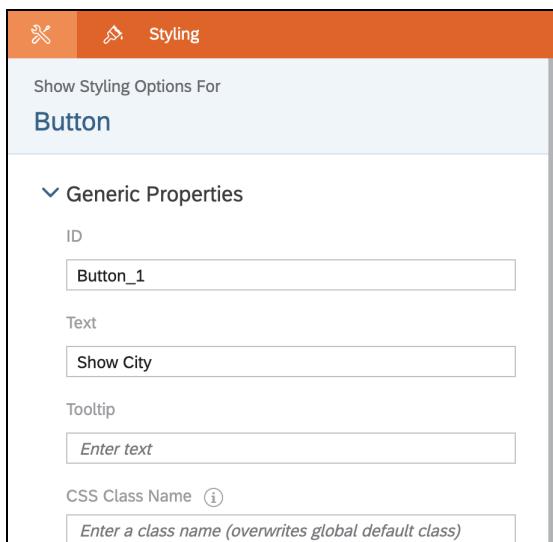


Figure 8.24 Formatting Buttons

Open the script editor for the button to attach an action to it. Click on the button on the canvas and click on the three dots icon next to it. Then, click on **Edit Scripts...**, as shown in [Figure 8.25](#).

Accessing the script editor

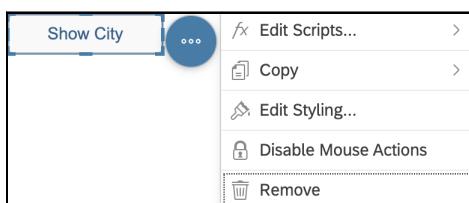


Figure 8.25 Opening Script Editor

Insert the script shown in [Listing 8.4](#). Whenever a user clicks on the button, the **City** dimension will be added to the table. The button automatically changes its label and can be clicked again to remove the **City** column.

```
// Defines a variable that contains the text
// of the button.
var buttonText = Button_1.getText();

// Adds the City dimension if it doesn't
// exist in the table yet and adjusts the button.
if (buttonText === "Show City") {
    Table_1.addDimensionToRows("City");
    Button_1.setText("Hide City");
}

// Hides the City dimension if it exists
// in the table and adjusts the button.
if (buttonText === "Hide City") {
    Table_1.removeDimension("City");
    Button_1.setText("Show City");
}
```

Listing 8.4 Sample Script to Implement Button Action

- Launching the application** Save the application with a name of your choice. Save the story and launch the application by clicking on the **View** button in the top right. Try out the button to hide and show the **City** column.

Filter Line

Creating buttons or other fields like dropdown lists for a simple filter may become too time consuming, so the *filter line* can be used to quickly enable filters for charts and tables. The filter line itself can't be extended or manipulated by scripting, however, and is therefore only feasible for filtering charts and tables on the canvas.

- Creating filter lines** The following example requires the table created in [Section 8.2.2](#). Click on the plus icon **+** in the **Insert** section in the top menu bar and add a new filter line to the canvas. The filter line has its own builder, which can be used to add dimensions to it, as shown in [Figure 8.26](#).

- Setting up the filter line** Before you add dimensions to the filter line, you must first select a **Source Widget** (a chart or table). Select the table (in our case, **Table_1**) that should be influenced by the filter line. Now, add some dimensions (e.g., **Product**, **City**, **Street**, and **Supermarket**), as shown in [Figure 8.27](#). By selecting the **Mode**, you can determine if the filter bar is only applied to one widget or a group of widgets.

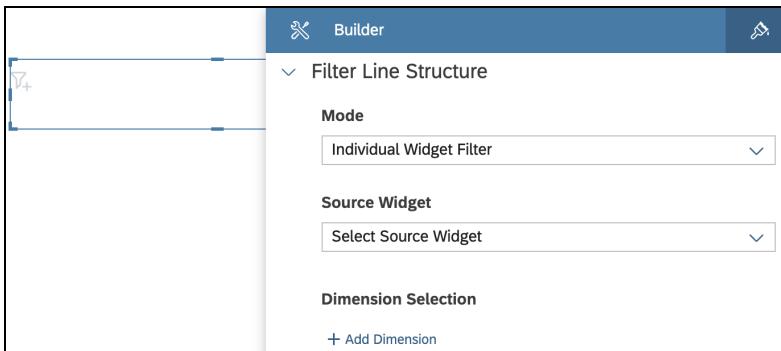


Figure 8.26 Configuring Filter Lines

The filter line won't show any content right away, which is purposeful since application viewers should be able to later click on the **Filter** icon to specify their own dimension filters.

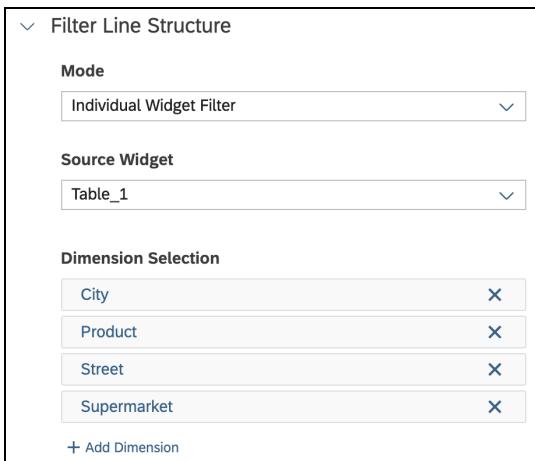


Figure 8.27 Creating Filter Line for Table_1

Save the application with a name of your choice. Save the story and launch the application by clicking on the **View** button in the top right. The filter line initially shows only the icon. Once you click on this icon, you can select the dimensions to be filtered, as shown in Figure 8.28.

Launching the application

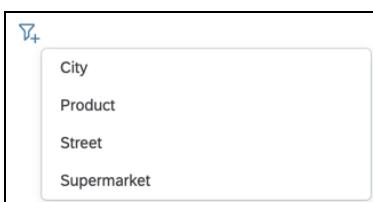


Figure 8.28 Using Filter Lines

Other Elements

The application interface also provides additional programmable elements that we won't present in detail. In this section, we'll offer a brief description just a few and describe how they work.

- Input field** An *input field* is a programmable text field, shown in [Figure 8.29](#), that can be filled in by the application viewer while working with the application.

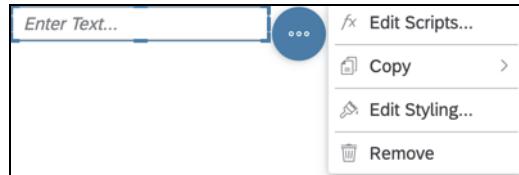


Figure 8.29 Input Field

The contents of an input field can be read via code modified during the application runtime. Therefore, these fields can also be used as parameters or sent to other applications via OData services. The script behind an input field is executed every time a user enters any text into the field and clicks somewhere outside of the field.

- Slider** A *slider* can be added to the canvas so that an application viewer can select values. The slider can be again referenced in a script. A slider element and its builder are shown in [Figure 8.30](#).

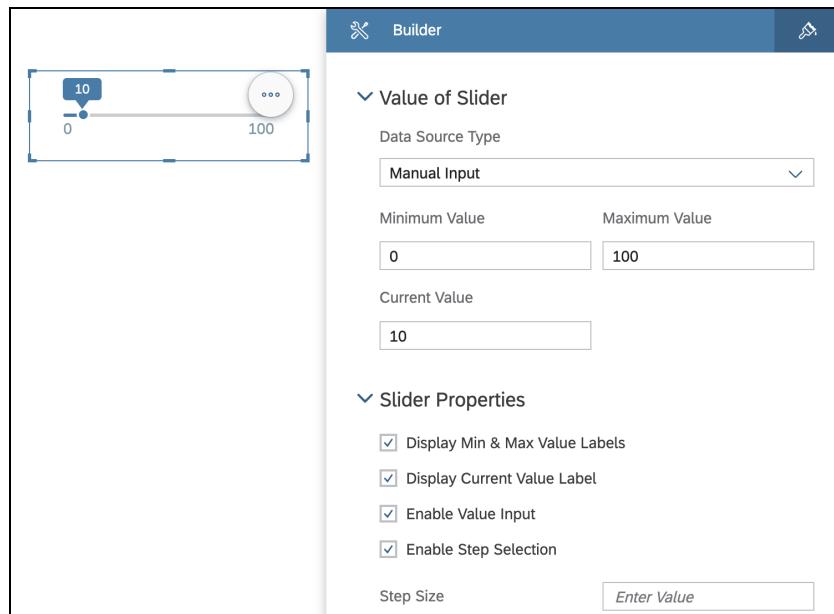


Figure 8.30 Slider

You can define the range in the slider (**Min Value** and **Maximum Value**) and which value is selected by default (**Current Value**). The **Options** section allows you to modify its display settings and input behaviors.

The script added to the slider will always be executed once a user sets a value and clicks anywhere outside of the slider.

In addition, a *range slider*, shown in Figure 8.31, is available. This element is almost identical to a slider but allows users to select a value range instead of selecting a single value.

Range slider

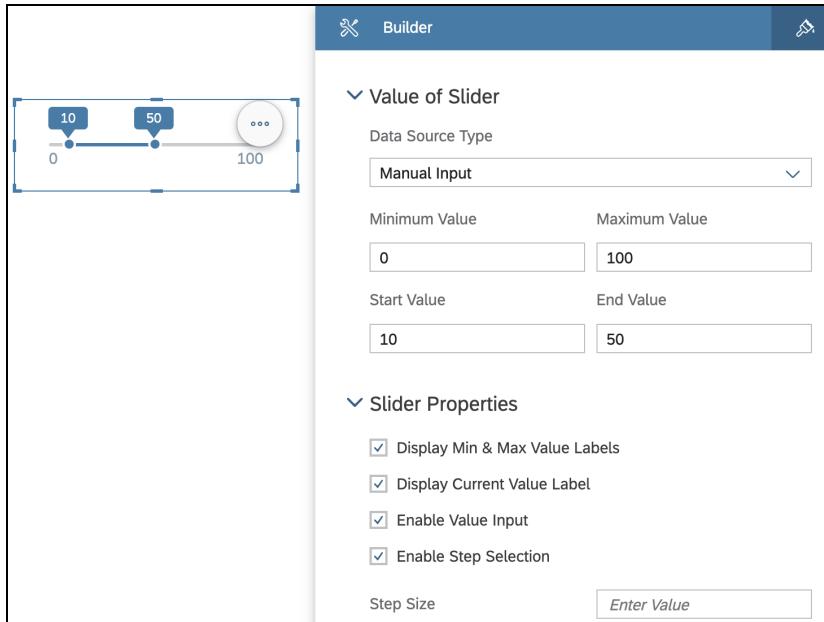


Figure 8.31 Range Slider

A new *OData service* can be created by clicking on the plus icon next to **OData Services** under **Outline** on the left. The builder for this service will open on the right side of the screen, as shown in Figure 8.32. OData services are only available in the legacy analytics designer.

Creating OData services

You must create a connection to an OData service and provide the endpoint URL for the service. Both are provided by your OData application.

After entering the information, you must click the **Refresh** button  to check if the service is available and which functions it exposes. Those functions will be displayed in the **Metadata** section and can be accessed within the application via scripts.

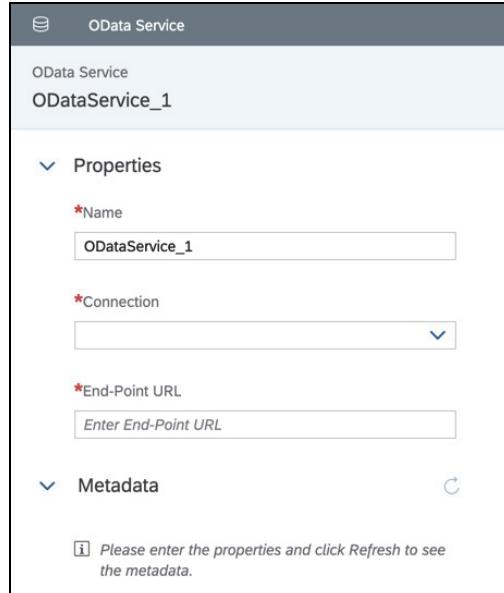


Figure 8.32 OData Service Configuration

Further Resources

Because the analytics designer is a development environment that provides endless possibilities, we can't cover it in full in this book. However, SAP provides extensive and free documentation offering a great collection of code samples and use cases.

You can download the Analytics Designer Handbook for free at <http://sprs.co/v218507> as a PDF file. The document is updated regularly and is the recommended resource for all information about the analytics designer and supported functionalities.

8.3 Custom Widgets

Because applications can become rather unique and the need for customization is quite high in some use cases, SAP Analytics Cloud provides a custom widget software development kit (SDK). With this SDK, you can create your own JavaScript widgets and integrate them into your applications.

- Custom Widgets** A custom widget is a chart or other data visualization element which was built custom and is not delivered out-of-the-box. It is very useful for individual use cases in which the standard charts are not sufficient. An example for a custom widget is shown in [Figure 8.33](#). It shows the seatmap of an airplane for a specific flight and the airplane's seating capacity.

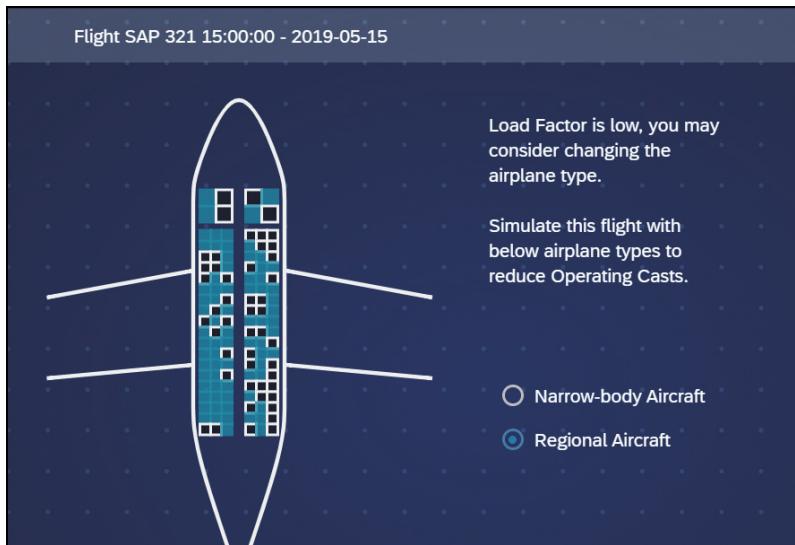


Figure 8.33 Custom Widget Example

Creating custom widgets requires advanced programming knowledge, but custom widgets are powerful because they behave like any other widget on the canvas and can even expose endpoints, which can be called by any other script in the application. To create widgets, you must be familiar with HTML, CSS, and JavaScript. On top of that, you must be able to host parts of the widget code on servers that you own and that are reachable for your end users.

Requirements

Using Custom Widgets

Custom widgets are developed outside of SAP Analytics Cloud and are only embedded within SAP Analytics Cloud. You can use any development environment compatible with JavaScript to create them. The code must then be uploaded to your own web server, which must be publicly reachable from the internet. If you have access to such an environment, you can follow the examples in this chapter.

In general, a custom widget contains the following elements, which you must provide when creating them:

- **Custom widget as a JSON file**

This file contains the metadata of the custom widget (such as name, ID, version, etc.)

- **Web component as a JavaScript file**

This is the actual widget implementation. You can provide multiple files for complex widgets.

- **Web component as a JavaScript file for the builder (optional)**

If you want your users to be able to modify the custom widget in the builder, you can implement these settings in this file.

- **Web component as a JavaScript file for the Formatting tab (optional)**

Similar to the JavaScript file for the builder, this file defines the contents for the **Formatting** tab for a custom widget.

- **Icon file**

This is the icon that appears for the custom widget in the overview.

Code samples for this section

Creating a custom widget also requires additional resources. We will now go through an example of this. You can find all code elements in the SAP Help Portal at <http://s-prs.co/v502620>. In this example, we will create a colored box chart. All code elements are described in detail in the SAP Help Portal.

Preparing custom widgets

First, create the files *coloredbox.js*, *coloredbox_styling.js*, and *coloredbox_builder.js* on your server. You can find the contents of each file in the SAP Help Portal. On top of that, you need the file *icon.png*. That file must be stored on the server as well. For the icon, you can use any image with a size of 16x16px. A sample file can be found within the downloadable material on the publisher's website at www.sap-press.com/5753 under **Product supplements**.

You also have to create the *coloredbox.json* file on your own computer based on the sample code in the product help. Replace all URLs in the code that contain "sample.com" with the URL or IP address of your own web server. The relevant part of the file is shown in [Listing 8.5](#).

```
{  
  "id": "com.sap.sample.coloredbox",  
  "version": "1.0.0",  
  "name": "Colored Box",  
  "description": "A colored box",  
  "newInstancePrefix": "ColoredBox",  
  "icon": "https://www.sample.com/customwidgets/coloredbox/icon.png",  
  "vendor": "SAP",  
  "eula": "",  
  "license": "",  
  "webcomponents": [  
    {  
      "kind": "main",  
      "tag": "com-sap-sample-coloredbox",  
      "url": "https://www.sample.com/customwidgets/coloredbox/  
              coloredbox.js",  
      "integrity": ""  
    }  
  ]  
}
```

```

"ignoreIntegrity": true
},
{
"kind": "styling",
"tag": "com-sap-sample-coloredbox-styling",
"url": "https://www.sample.com/customwidgets/coloredbox/coloredbox_
styling.js",
"integrity": "",
"ignoreIntegrity": true
},
{
"kind": "builder",
"tag": "com-sap-sample-coloredbox-builder",
"url": "https://www.sample.com/customwidgets/coloredbox/coloredbox_
builder.js",
"integrity": "",
"ignoreIntegrity": true
}
],

```

Listing 8.5 Excerpt from the Coloredbox.json File

After adjusting this file and uploading the other files to your webserver, you can embed the custom widget into SAP Analytics Cloud. Open the main menu and navigate to **Analytic Applications • Custom Widgets** and click on the Plus button on the top right. Click on **Select File** and choose the *coloredbox.json* file from your computer, then click on the **OK** button as shown in [Figure 8.34](#).

Embedding custom
widgets

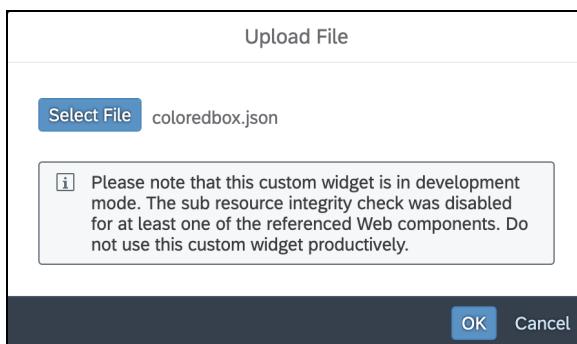


Figure 8.34 Uploading the JSON File

After successfully embedding the file, the list of custom widgets will contain a new entry (see [Figure 8.35](#)). The yellow triangle indicates that the custom widget is not yet available for productive usage.

Custom Widgets			
	Name	Description	Version
<input type="checkbox"/>	Colored Box ⚠	A colored box	1.0.0

Figure 8.35 Overview of Custom Widgets

- Using custom widgets** To use the custom widget, you have to first create a new story. Open the main menu and click on **Stories • Canvas**. Within the story, open the **Insert** menu in the top bar and navigate to the **Custom Widgets** entry, where you can find and add your newly created widget (see [Figure 8.36](#)).

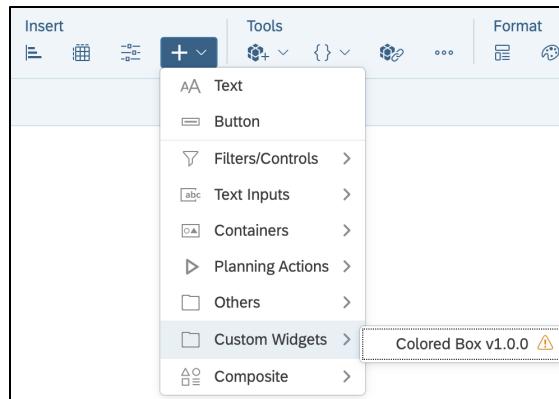


Figure 8.36 Inserting the New Custom Widget

The widget behaves like a normal chart. It can be filled with data and positioned within the application. If the developer of a widget provides JavaScript files for the builder and **Formatting** tab, those can be accessed here, too.

More Information about Custom Widgets

The SAP Community has a number of blogs that demonstrate the development and creation of custom widgets. A great example can be found here: <http://s-prs.co/v218509>.

8.4 Summary

- Strategy** In general, SAP is investing a great deal into the development of advanced capabilities for the story and is adding more functionality over time. The examples in this chapter only show a small preview of its possibilities.

The application capabilities clearly focus on developers and power users with scripting knowledge. This allows them to create dashboards that solve individual and complex requirements. Therefore, SAP wants to integrate all standard functionality of the other components, such as business intelligence (BI), planning, and predictive analytics, into this development environment.

You've seen now how applications can resolve complex scenarios. In the next chapter, we'll show you how SAP Digital Boardroom can be used to make information easily accessible for executive-level decision-making.

Chapter 9

SAP Digital Boardroom

The story is the central environment to create interactive reports and dashboards. SAP Digital Boardroom extends the story component with an additional layer focused on interactivity.

Although SAP Digital Boardroom was initially designed to target executives and make report and dashboard access easier for them, this solution has become valuable for many use cases.

SAP Digital Boardroom Strategy

SAP has decided to no longer offer SAP Digital Boardroom for sale. Therefore, you may not be able to access SAP Digital Boardroom in your system.

This chapter is still applicable for systems where SAP Digital Boardroom is available due to a prior purchases. Some of the functionality is only available when using stories that were created in classic design experience mode.

Both stories and applications provide a high level of interactivity but require a user sit in front of a laptop, a PC with a mouse and keyboard, or a mobile device. In addition, stories are often focused only on one area of a company. If a story gets too big, viewers quickly lose the overall view, which makes extending stories indefinitely difficult. SAP Digital Boardroom can be therefore seen as an additional visualization layer that can combine stories from multiple sources and areas into one holistic presentation.

Extending the story

In this chapter, you'll learn about SAP Digital Boardroom in detail and how it integrates with SAP Analytics Cloud. We'll create two simple boardrooms to demonstrate the process. The chapter will conclude with hardware recommendations and a summary.

Requirements for This Chapter

If you want to follow the examples in this chapters as closely as possible, you must first create the story described in [Chapter 5, Section 5.10.2](#) in the book. In general, you can also use any other story to follow along with these examples. However, the story you use must contain responsive pages. Also, SAP Digital Boardroom requires a dedicated license and may not be available in your system.

9.1 What Is SAP Digital Boardroom?

- Boardrooms** SAP Digital Boardroom is integrated into SAP Analytics Cloud as an add-on and extends it by adding another presentation layer. This layer enables you to combine multiple stories or multiples pages from stories into a single presentation. These presentations are called *boardrooms* and must be created manually. In general, boardrooms are designed to be viewed on big screens or displays that provide touch-based input. These devices must be connected to computers and pass touch inputs from the screen to the computer.
- Boardroom pages** [Figure 9.1](#) shows a small excerpt of a boardroom developed by SAP for demonstration purposes. The demo scenario shows a dashboard used by a city to centrally monitor the current state of affairs and evaluate potential situations.

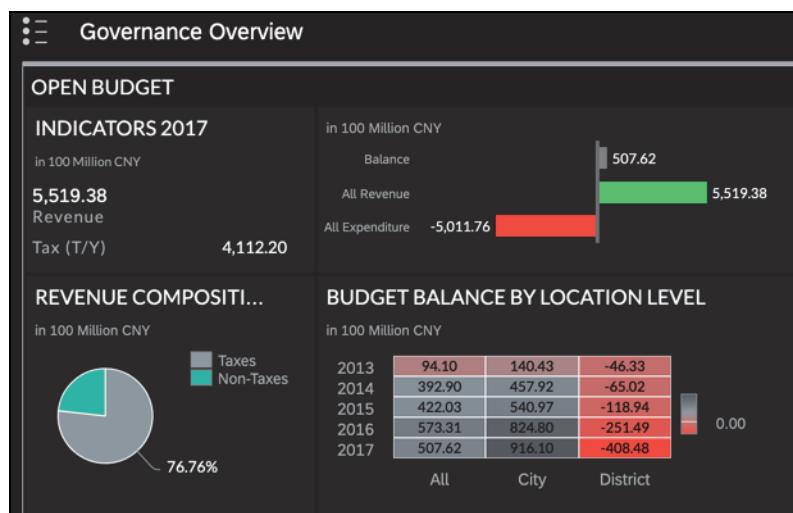


Figure 9.1 Boardroom Overview Page

The idea of the boardroom is to consolidate stories from multiple areas of a company (or in this case a public authority) into a holistic view. For this reason, boardrooms are usually designed to launch with an overview page that shows the current situation. This overview provides a quick summary and helps viewers evaluate the overall situation within a few seconds. [Figure 9.2](#) shows an excerpt of an overview page.

- Responsive pages** All pages in the boardroom (including the overview page) are created within stories in SAP Analytics Cloud and are then consolidated in a dedicated environment. SAP recommends using responsive pages because they automatically adjust themselves to different display sizes. Nevertheless, SAP Digital Boardroom also supports canvas and grid pages. However,

using these kinds of pages may result in unexpected display behaviors on big screens and/or make the boardroom not accessible on mobile devices.

CITY WIDE ALERT	
<ul style="list-style-type: none"> • Earthquake Warning: A 4.0 earthquake occurred at 10:55 a.m. on the fault line. • Flash Flood Advisory: Issued at 7:08 a.m. around the Future Avenue. Travel may be impacted. 	
24,152,700 Total Population (Person)	REV 5,519.38
14,327,336 Employment Population (Person)	Governance Revenue
Unemployment % 4.10%	EXP
Workforce Population (Person) 14,938,570	-5,011.76
Workforce Level 61.85%	Governance Expense

Figure 9.2 Excerpt from an Overview Page

A boardroom can be shown on multiple displays simultaneously. During boardroom design, you can explicitly specify which content is shown on which screen. No limitation exists on the number of screens. [Figure 9.3](#) shows a picture from a product brochure for SAP Digital Boardroom demonstrating what a typical boardroom setup with multiple screens might look like.

Multiple screens



Figure 9.3 Advertisement for SAP Digital Boardroom

If you're using fewer screens than the boardroom design was initially designated for, you can still access the boardroom. In this case, all pages are shown at the top of the boardroom, and you can use swipe interactions to move among the pages. You can also click on each page's title to access it

Navigation

directly. Navigation buttons in the bottom left are also available, as shown in [Figure 9.4](#).

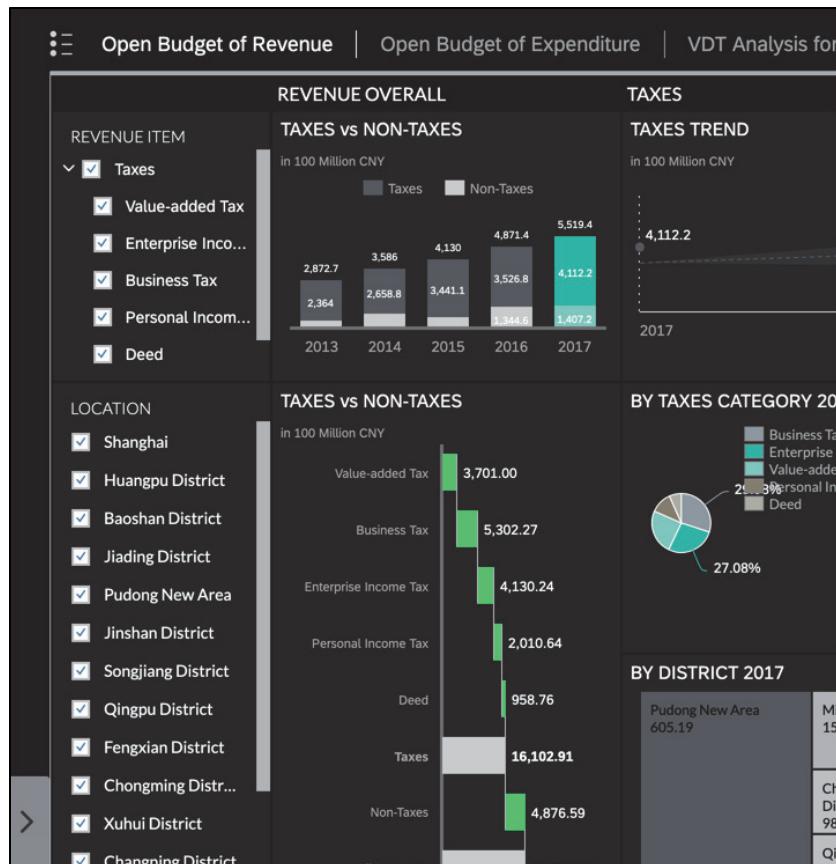


Figure 9.4 Sample Boardroom with Multiple Pages

This navigation method is especially suitable for boardrooms shown on single large screens on which only one page is shown at a time. You can still design the boardroom to show multiple pages so that you can access them faster.

Jumps However, more ways exist for navigating within a boardroom. The most important functionality is the *jump*, with which you can jump from one page in the boardroom to any other page and optionally apply filters. Jumps must be configured in the boardroom design up front, which ensures that jumps are only available when desired by the boardroom creator.

Jumps are defined on the chart, table, or widget level so that a clear relationship can be defined. Especially when using overview pages, jumps can be immensely helpful. Overview pages can contain charts for each section of the boardroom and provide initial insights. If the viewer then wants to

access a detailed view, the user can directly jump from each chart to its related section.

Most of the action in the boardroom is performed within the context menu, which can be opened with a long press on a chart or any other element in the boardroom and provides various ways to interact with the boardroom, as shown in [Figure 9.5](#).

Context menu

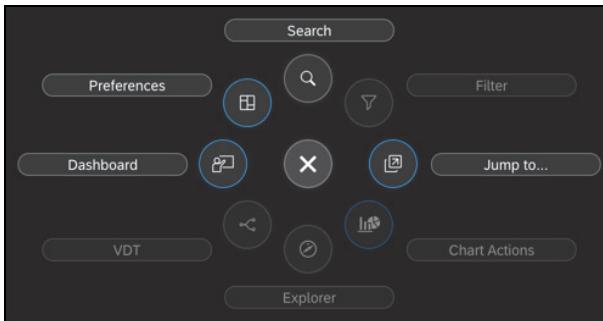


Figure 9.5 Boardroom Context Menu

The context menu provides access to the following functionalities:

- The boardroom content structure can be opened by clicking on **Dashboard**.
- All display settings can be changed under **Preferences**.
- The boardroom can be searched through by clicking on the **Search** button.
- If the context menu is opened for a specific chart of a data point in a chart or table, the **Filter** button can be used to set this value as a filter.
- If a jump is defined for a specific widget, this jump will be listed behind the **Jump To...** button.
- If the story designer activated chart actions for a specific chart or table, these actions can be opened by clicking on **Chart Actions**.
- The **Explorer** can also be used in the boardroom. More details about this tool can be found in [Chapter 5, Section 5.7.3](#).
- If the context menu is open for a value driver tree, the **VDT** button will provide additional interactions.

Another navigation method in the boardroom is the **Tree Structure**, which contains a table of contents of all pages in the boardroom. The **Tree Structure** can be shown and hidden anywhere in the boardroom and provides direct access to all sections, as shown in [Figure 9.6](#). If some of the boardroom pages are used often or must be promoted, they can be highlighted accordingly, and then, these pages will show up in the **Featured Topics** list.

Tree structure

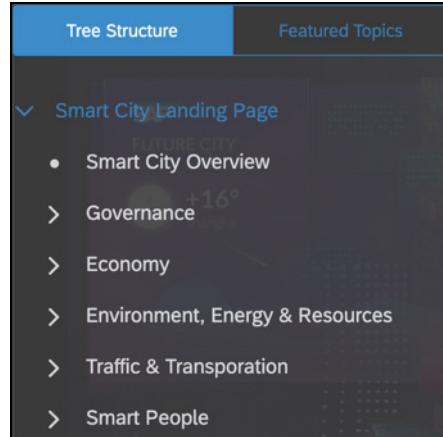


Figure 9.6 Boardroom Table of Contents

Boardroom design The boardroom is designed in a dedicated environment, as shown in [Figure 9.7](#). In this interface, all sections of the boardroom are defined and filled in with pages from different stories. Jumps are defined in this interface as well. In edit mode, you can graphically view all relations between the sections of a boardroom. You can extend these sections or add new sections to a boardroom here as well.

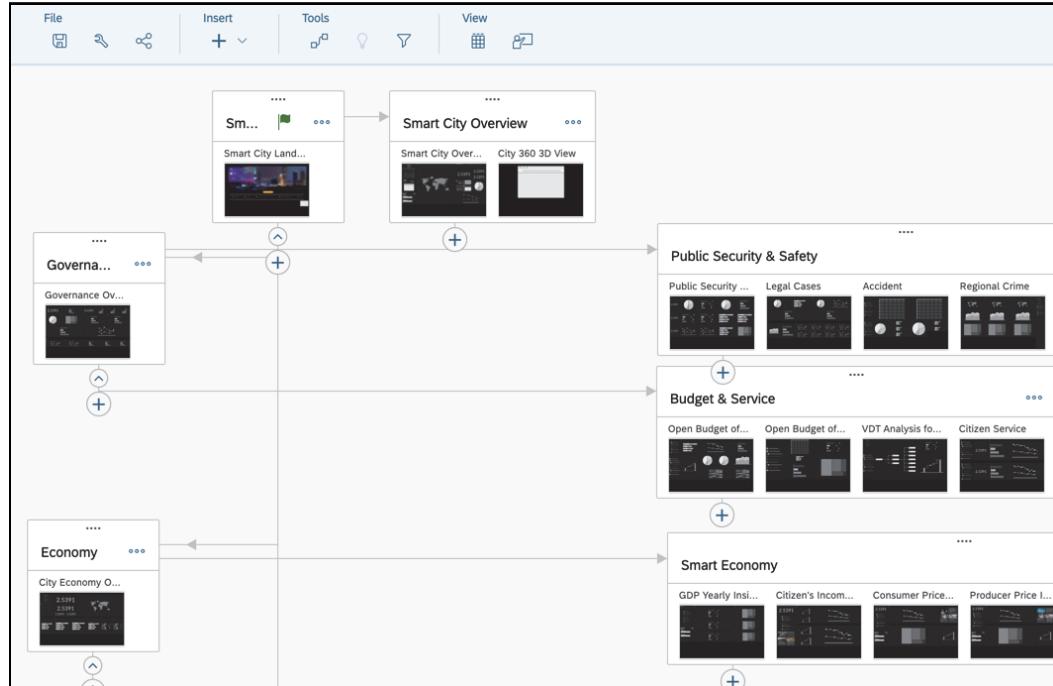


Figure 9.7 Boardroom in Edit Mode

9.2 Creating Boardrooms

In this section, we'll create some simple example boardrooms. These examples are designed to demonstrate all the important functionalities of SAP Digital Boardroom.

First, you'll learn about the differences between the two boardroom types: *agenda* and *dashboard*. Then, we'll create one boardroom of each type.

9.2.1 Boardroom Types

When creating a new boardroom, you'll choose either the **Agenda** type or the **Dashboard** type, as shown in [Figure 9.8](#). Both types allow you to combine pages from multiple stories into one presentation. However, these options are built to meet different use cases.

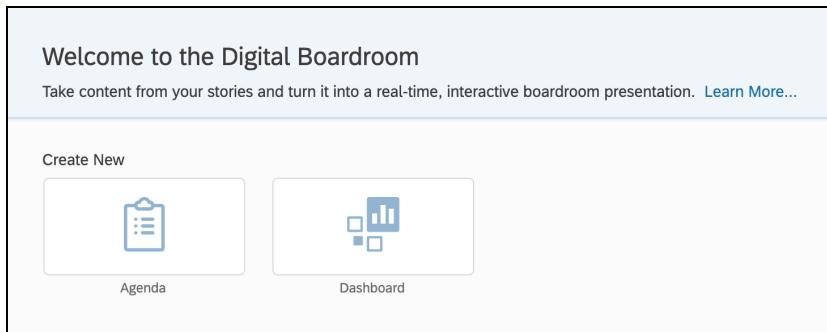


Figure 9.8 Boardroom Type Selection

The agenda type follows a designated order of topics and is suitable for meetings that are structured. The discussion of business activities is set up in a defined order.

Agenda

This boardroom type consists of agenda items, which can consolidate multiple subtopics into one meeting point. Each subtopic can be filled with one or multiple pages from one or multiple stories. [Figure 9.9](#) shows the structure of an agenda in boardroom edit mode.

The dashboard type, however, doesn't follow a chronological order and allows you to create boardrooms in which different subtopics can be linked to each other. No dedicated order is followed when opening this kind of boardroom. Dashboards rely on content relations, which make them flexible for boardroom viewers, as shown in [Figure 9.10](#).

Dashboard

Seeing all relations that are defined in a dashboard immediately may not be easy. Therefore, you should carefully analyze the contents while designing the boardroom and creating links between them.

Ambiguous relations Dashboards also allow you to create *ambiguous relations*. While an agenda defines a fixed order of topics, sections in the dashboard can be connected to each other individually and even be connected to multiple other sections simultaneously. Sections in dashboards are called *topics*, which are displayed as boxes, as shown in Figure 9.10. Each topic can contain one or more pages, which are spread across the available displays attached to the presentation device on which the boardroom is opened. If the hardware setup has fewer screens than the boardroom is designed for, navigation elements will be made available, as shown earlier in Figure 9.4. Within each topic, jumps can be defined for single charts, tables, or widgets, which again lead to other topics.

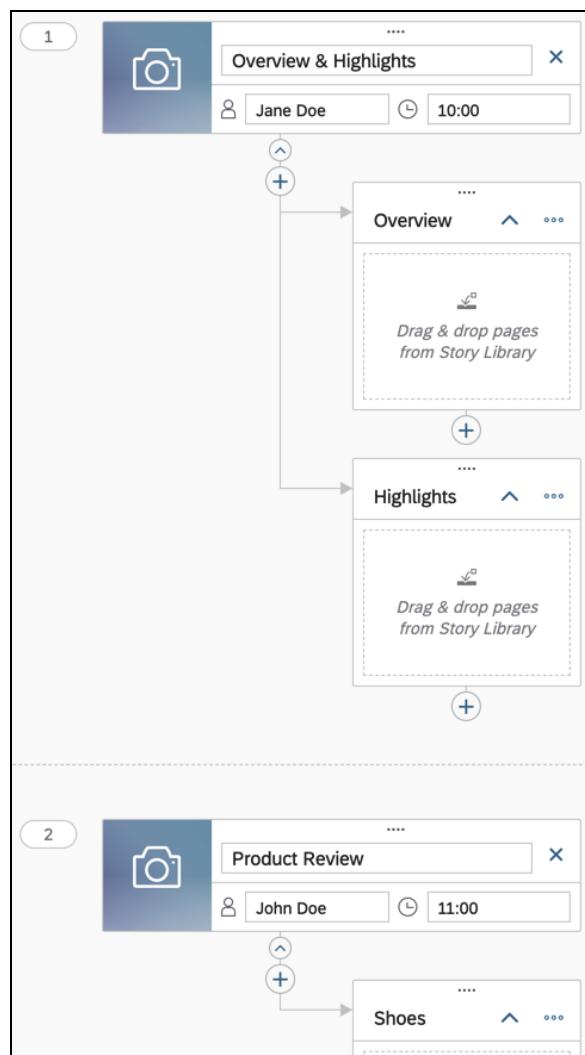


Figure 9.9 Agenda Structure

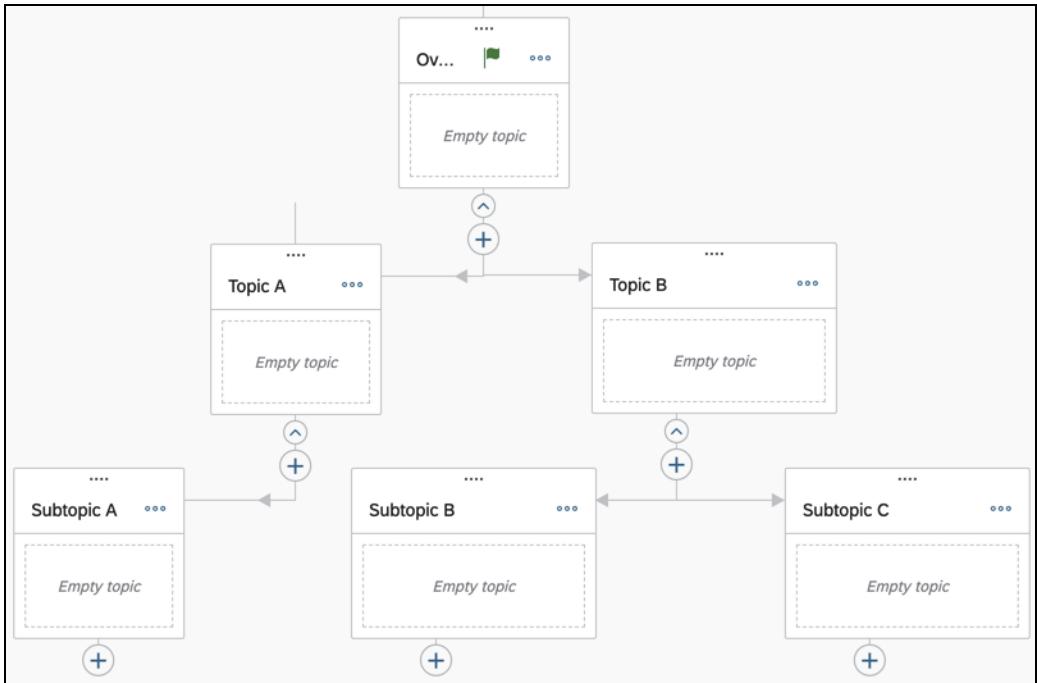


Figure 9.10 Dashboard Structure

Agenda or Dashboard?

If you don't know which boardroom type is right for you, verify your use case first by asking the following questions:

- If the boardroom is built to support a meeting that usually follows the same defined order of topics, choose an agenda.
- If the boardroom is built for exploring data and answering questions that change from meeting to meeting, a dashboard will provide the flexibility you need.

9.2.2 Using Charts in a Boardroom

Because SAP Digital Boardroom doesn't provide any dedicated environment to create stories, all charts, tables, and other elements are created within the story environment of SAP Analytics Cloud. A story provides a lot of functionality that can also be used in SAP Digital Boardroom. Story functionality is almost completely documented in [Chapter 5](#) and thus won't be described again in this chapter. However, in this section, we'll provide a quick overview of some story functionalities that are especially relevant for boardrooms.

Boardroom properties Within a story, each chart can be configured to provide additional functionalities in the boardroom view. Therefore, the formatting sidebar for each chart contains a **Boardroom Properties** section, as shown in [Figure 9.11](#). In these settings, you can specify, for each chart or table, whether the viewer is allowed to turn on sorting, enable a top N option for the chart, or show variances within the chart.

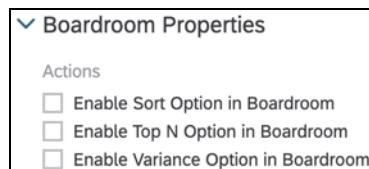


Figure 9.11 Boardroom Properties of Charts

Filters Because the boardroom is optimized for touch input, you should prefer using input controls over story or chart filters. These filters allow easy interaction and can be used without a keyboard if designed properly. Consult [Chapter 5, Section 5.7](#), for more information about filters.

In general, you should evaluate all filter concepts. Linked analysis in particular allows you to analyze data easily while interacting with charts or tables.

Explorer Initially, SAP designed the explorer for the boardroom only but added it to the story later. The explorer should be activated wherever possible so that boardroom viewers can easily manipulate charts or tables and answer additional questions. The explorer is documented in [Chapter 5, Section 5.7.3](#).

Predictive analytics You can also utilize predictive analytics in a boardroom. Both smart insights and smart discovery offer great value as they automatically point out highlights and outliers in the data (see [Chapter 7](#)).

Because almost all story functionality is available within the boardroom, you should consider its correct usage while designing the story.

9.2.3 Creating an Agenda

Creating a new boardroom Now, let's create a new boardroom, first of the agenda type. Either select **Create • Digital Boardroom** from the main menu or start within the file repository by clicking on the plus icon and selecting the **Digital Boardroom** option.

Let's call the boardroom "Agenda" and save it in the **Sales Data** folder. Select the **Agenda** boardroom type, as shown in [Figure 9.12](#). The agenda builder will open, as shown in [Figure 9.13](#).

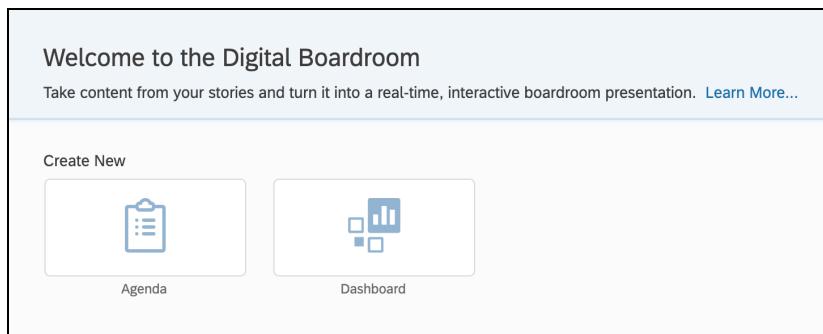


Figure 9.12 Selecting a Boardroom Type

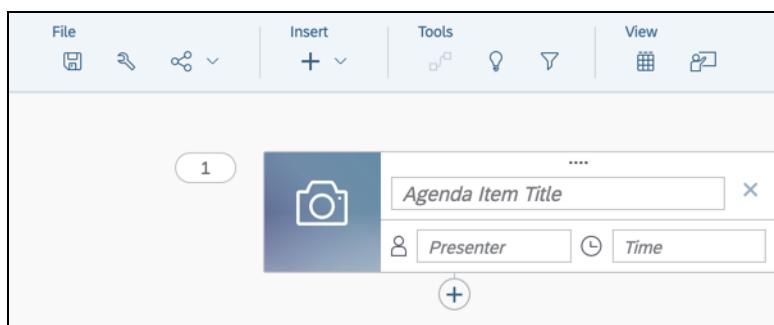


Figure 9.13 Agenda Builder

The agenda follows a defined structure. The structure is determined by the agenda elements, which again consist of topics. You must first import stories before you can use them to fill in topics. Click on the **Library** button in the top right to open the library, as shown in [Figure 9.14](#).

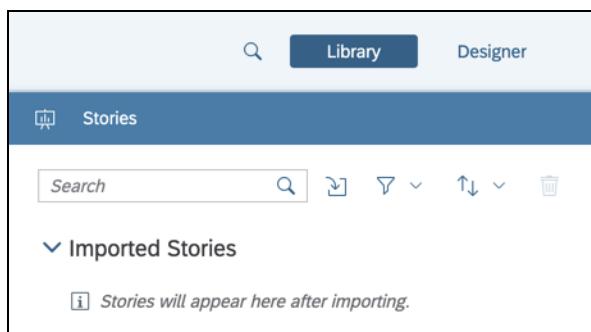


Figure 9.14 Library

To keep the boardroom designer easy to use and avoid overloading it with information, stories must be first imported into the library. In this way, boardroom creators only see the stories they need. Click on the **Import**

button  next to the **Search** field, as shown in [Figure 9.14](#). Now, choose the **Sales Analysis (Responsive)** story we created in [Chapter 5, Section 5.10.2](#). Click on **Expand** to show all pages. The outcome should match the view shown in [Figure 9.15](#).

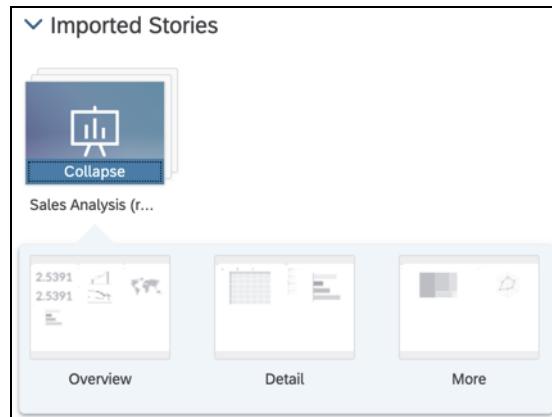


Figure 9.15 Imported Story in the Library

- | | |
|-----------------------------------|--|
| Creating an agenda element | Start creating the agenda. Rename the first agenda element “Overview” and enter any name as the presenter and any time. An agenda element can be understood as a topic area. Agenda elements should match the agenda of the actual meeting in which you want to present the boardroom. |
| Creating a topic | Click on the plus icon  to create a new topic. Name this topic “Introduction” so that your screen resembles the screen shown in Figure 9.16 . |

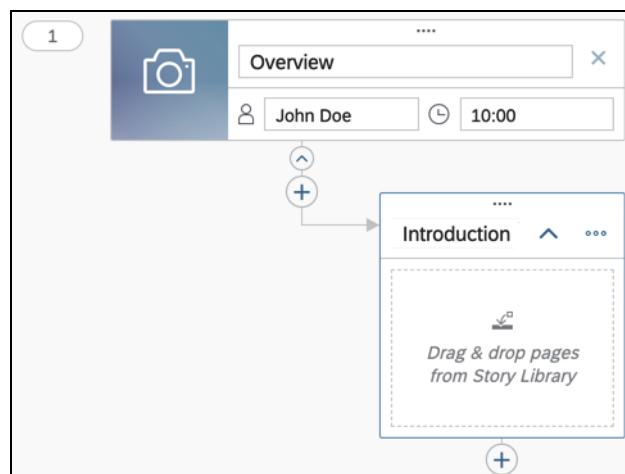


Figure 9.16 Agenda Element with Topic Added

To add content to a topic, you can insert single pages or whole stories from the library via drag and drop. Let's do this step for the overview page of our story. Click and hold on the **Overview** page in the library and drag the page onto the **Introduction** topic, as shown in [Figure 9.17](#), and then release your mouse button. Add the **Detail** page as well.

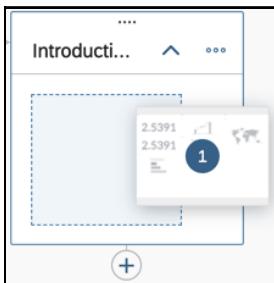


Figure 9.17 Adding a Page to a Topic

Now, create a second agenda element. Click on the plus icon in the **Insert** section of the top bar, as shown in [Figure 9.18](#). Select the **New Agenda Item** option.



Figure 9.18 Adding a New Agenda Item

Assign any name as the presenter and enter a time. Change the title to “More reports.” Then, add a new topic called “More” and add the **More** page via drag and drop. The result is shown in [Figure 9.19](#).

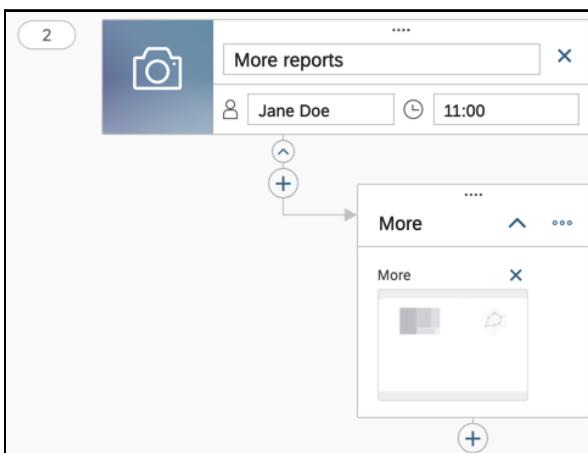


Figure 9.19 Adding a Second Agenda Item

Context menu You can change additional settings for each topic by opening the context menu for a topic, as shown in [Figure 9.20](#). The topic can be hidden in the presentation and mobile app. You can also promote it as a featured topic so that it's highlighted in the boardroom.

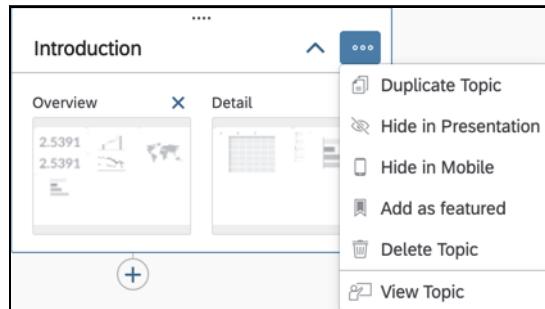


Figure 9.20 Context Menu for Topic

Topic filters Another way to make it easier for viewers to interact with the agenda is to use topic filters. To add a topic filter, click on the frame of the **Introduction** topic first so that the topic is highlighted in blue. Then, click on the **Topic Filter** button  in the top bar, which will open the filter sidebar. Add a topic filter for the **Product** dimension and select the **All Members** option to include all elements, as shown in [Figure 9.21](#).



Figure 9.21 Creating Topic Filters

Details Sometimes, you may be asked for additional information during a presentation. For this scenario, you can add additional pages to a page within a topic that are only shown when needed. Select any page and click on the **Details** button . The sidebar will open, where you can identify detail pages.

Launching the boardroom Save the boardroom and click on the **Start Presentation** button  to launch the boardroom. Try out the navigation features described in [Section 9.1](#). If you aren't working with a touch-based display, you can open the context menu of the boardroom by right-clicking it. The final agenda is shown in [Figure 9.22](#).

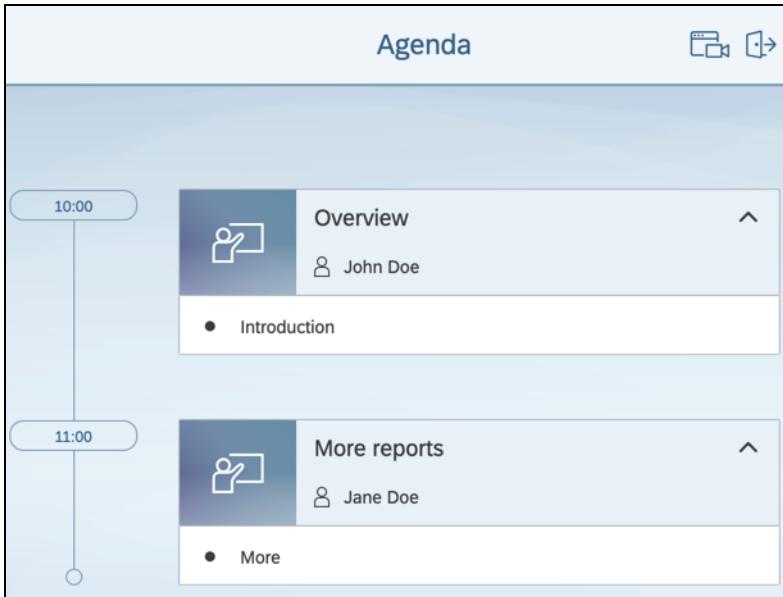


Figure 9.22 Boardroom Agenda

9.2.4 Creating a Dashboard

Let's create another boardroom, this time, a dashboard. Either click on **Create • Digital Boardroom** from the main menu or start within the file repository by clicking on the plus button and selecting the **Digital Boardroom** option.

Creating a new boardroom

Name the boardroom “Dashboard” and save it in the **Sales Data** folder. Select the **Dashboard** boardroom type, as shown earlier in [Figure 9.12](#). The agenda builder will open, as shown in [Figure 9.23](#).

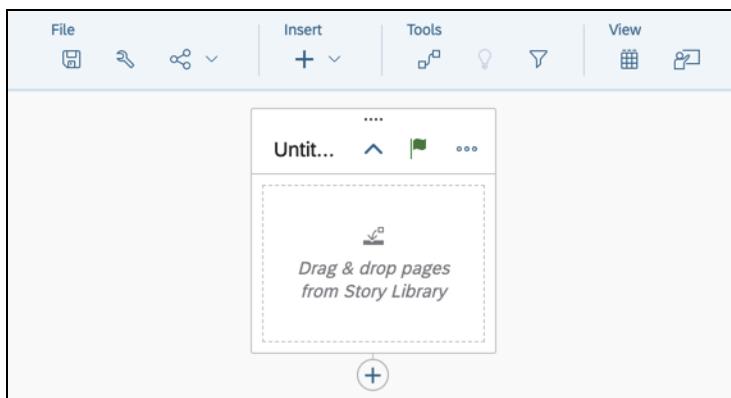


Figure 9.23 Dashboard Builder

Root topic The dashboard initially contains an empty topic, which is created as a root topic to provide a starting point for the boardroom. The root topic should contain pages that either provide a graphical structure for the boardroom or at least provide an overview of all information in the boardroom.

Library The dashboard doesn't follow any fixed order. Instead, you'll create topics that contain one or more pages. These pages are linked to each other, which creates relations between them. Stories first must be imported into the library before you can add them. Click on the **Library** button to open the library, as shown in [Figure 9.24](#).

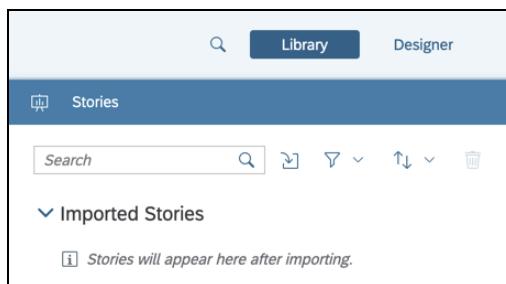


Figure 9.24 Library

To keep the boardroom designer easy to use and avoid overloading information, stories first must be imported into the library. Thus, boardroom creators only see the stories they need. Click on the **Import** button  next to the **Search** field, as shown in [Figure 9.24](#). Now, choose the **Sales Analysis (Responsive)** story we created in [Chapter 5, Section 5.10.2](#). Click on **Expand** to show all pages. The outcome should match the view shown in [Figure 9.25](#).

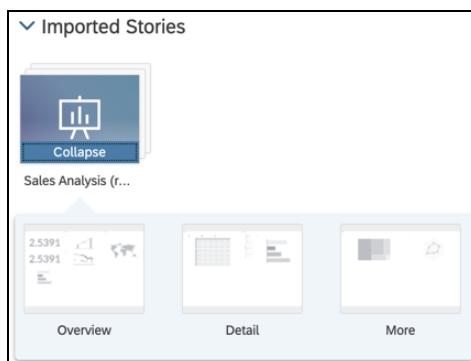


Figure 9.25 Imported Story in the Library

Start creating the boardroom by filling the automatically generated root topic with contents. Rename it to “Overview” and add the **Overview** page to it. Click and hold on the page in the library and drag it onto the root topic, as shown in [Figure 9.26](#).

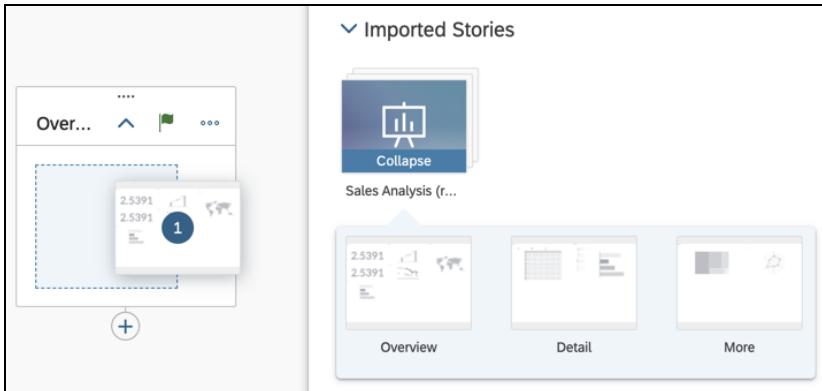


Figure 9.26 Adding Page to Root Topic

Topics can be moved around the boardroom designer freely—to improve graphical visibility, for example. Click on the header of a topic (the four dots on top) and move the topic around while keeping the left mouse button pressed. Because a topic can have multiple relationships to other topics, this feature can be quite helpful to keep track of the boardroom's structure. Each topic can contain one or more pages, which are shown on one or more displays if available. Moving topics around doesn't affect the relationships between them, which are defined separately and explicitly.

Now, create a new subtopic. Click on the plus icon below the root topic. Rename the new subtopic “Details” and add the **Detail** page from the library to it, as shown in [Figure 9.27](#).

Adding subtopics

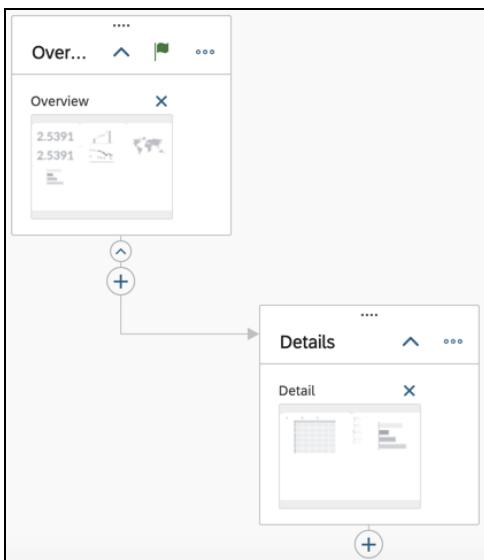


Figure 9.27 Subtopic in Dashboard

Creating new topics Next, create a new topic. However, this topic shouldn't be a subtopic; instead, this topic should act as an independent tile. This separation is later displayed in the tables of contents of the boardroom. Topics can be shown in a tree structure and expanded there. Click on the plus icon  in the **Insert** section of the top bar and choose **New Topic**, as shown in [Figure 9.28](#).

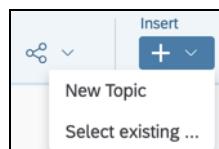


Figure 9.28 Creating New Topic

Rename the topic “More information” and add the **More** page from the library to it. The result should now match the screen shown in [Figure 9.29](#).

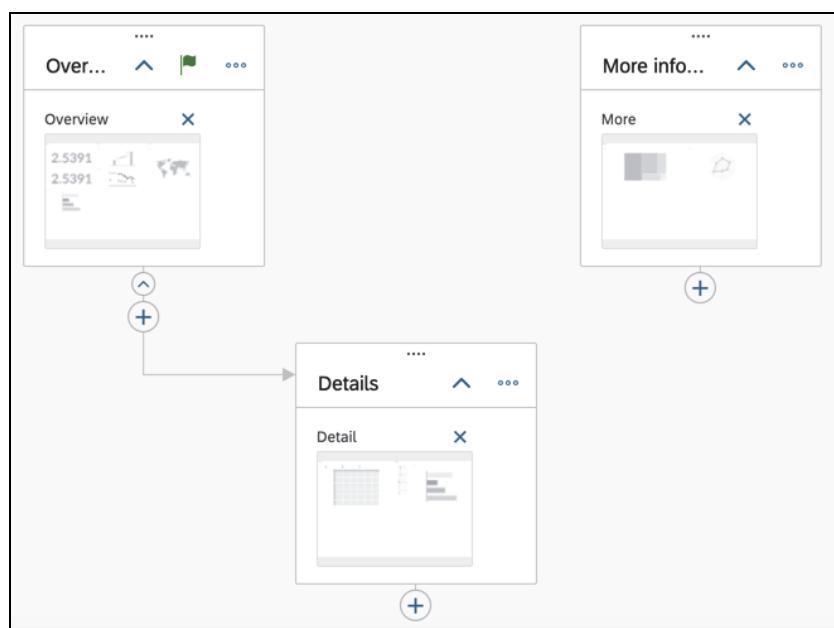


Figure 9.29 Dashboard with Two Topics and One Subtopic

Navigation Because the agenda was defined as a fixed order of presentation topics, you didn't model any jumps there. But in dashboards, jumps are defined on the widget level or the page level separately and must be activated for each chart, table, or page first.

Click on the **Overview** page in the dashboard so that the page is highlighted in blue. Then, click on the **Navigation** button  in the top bar, which will open the navigation sidebar for the page, as shown in [Figure 9.30](#).

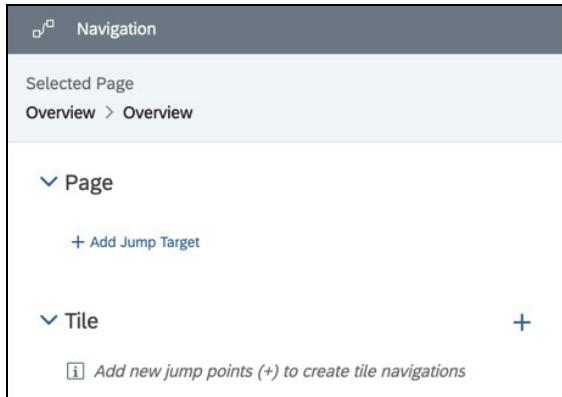


Figure 9.30 Navigation

Create a jump for the whole page first. Select **Details** from the **Topic** dropdown list and select **Detail** from the **Page** dropdown list as the navigation target. Assign the “Detailed view” label to the jump, as shown in [Figure 9.31](#). Whenever a viewer opens the context menu on the **Overview** page, the user will be offered the chance to jump to the **Detail** page.

Jump from
page to page

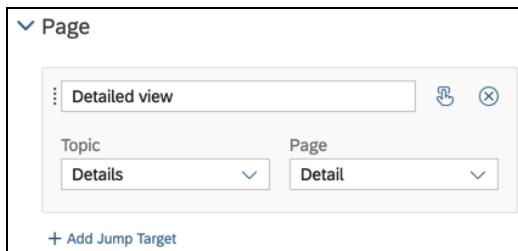


Figure 9.31 Creating Jump to Another Page

Let's also create a jump for a specific chart. Click on the plus icon **+** next to the **Tile** text in the navigation sidebar. The story preview will open, where you can select a widget. Select the **Quantity by Product** chart and click on **Add**. Define the **More information** topic and the **More** page as the jump target. Assign the “More information” label and activate the **Apply selected dimension as a filter** option, as shown in [Figure 9.32](#). If the context menu is opened for this chart in the boardroom, the jump will be offered to the viewer.

Jump from a widget

Like the agenda, the dashboard supports topic filters. This function behaves similarly to the agenda, as described in [Section 9.2.3](#). Each topic can be configured separately by using its context menu, which is also described in [Section 9.2.3](#).

Topic filters and
context menu

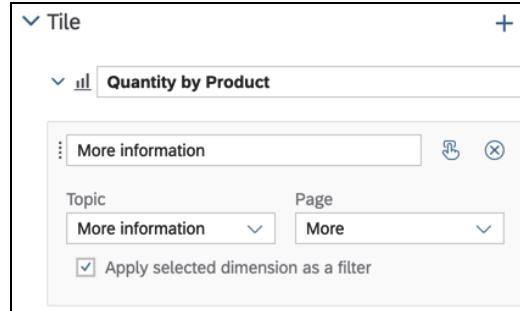


Figure 9.32 Creating Jump from Widget to Page

Launching the boardroom

Save the boardroom and click on the **Start Presentation** button to launch the boardroom. Try out the navigation features described in [Section 9.1](#). If you aren't working with a touch-based display, you can open the context menu of the boardroom by right-clicking it. [Figure 9.33](#) shows part of the boardroom we just created.

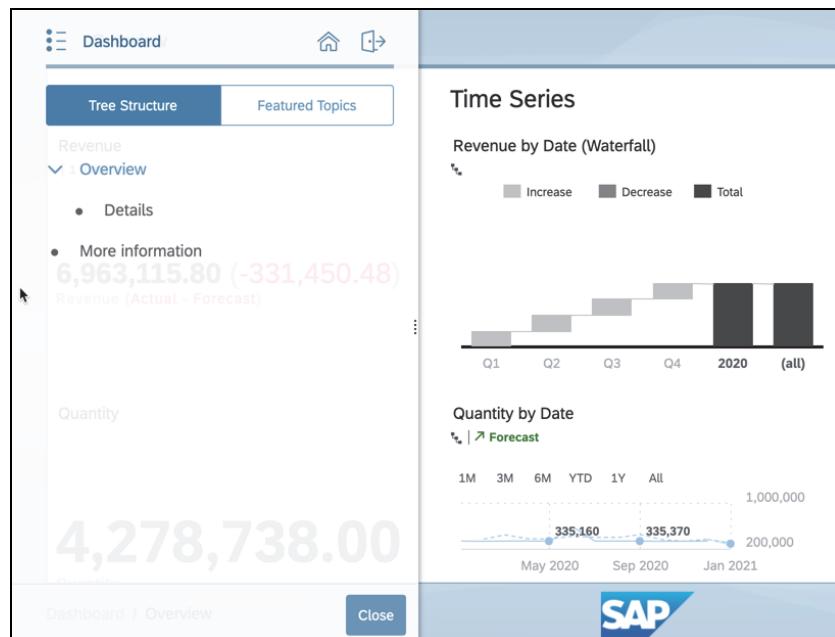


Figure 9.33 Boardroom Dashboard

9.3 Hardware Recommendations

Hardware requirements

In general, SAP Digital Boardroom can be launched on any laptop, PC, or mobile device for viewing. If the computer or laptop supports touch input, touch controls can be used natively in a boardroom as well.

Because boardrooms are designed to be viewed on big screens, however, they should also be able to handle touch inputs and have a minimum resolution of $1,920 \times 1,080$ pixels. The touch input feature should support a connected PC or laptop, which is still needed to open and display a boardroom. A number of vendors offer supporting hardware, but this book cannot provide a full list of these offerings.

Big screens

For more details about supported hardware and minimum requirements, refer to the product help at <http://s-prs.co/v502622>.

9.4 Summary

SAP Digital Boardroom is an add-on to SAP Analytics Cloud and acts as an additional presentation layer. This tool doesn't provide its own creation engine but fully relies on stories for its content. Ideally, stories are built with responsive pages to avoid display issues on big screens.

Boardrooms are designed in a dedicated environment in which users can select between two boardroom types, agenda or dashboard, and then populate stories to define the contents of the boardroom. Depending on the boardroom type, users can also create additional jumps to other topics within it.

In the next chapter, you'll learn more about SAP Analytics Hub and the analytics catalog for SAP Analytics Cloud, which you can use to create a repository to manage and organize all the elements we've discussed so far in this book.

Chapter 10

SAP Analytics Hub and the Analytics Catalog for SAP Analytics Cloud

As more users can access analytics solutions at work, the number of reports and dashboards grows exponentially. SAP Analytics Hub and the analytics catalog for SAP Analytics Cloud can be used to create a central repository of reports and to manage and promote content.

Life is often full of too many choices. Shopping in a big store, choosing the day's outfit, furnishing your apartment—the options are endless and impossible to overlook. The same experience can be found in the reporting landscapes of many companies, in all segments. Commonly in the past, a business would have central units developing and publishing reports, but this task has moved toward business units themselves now. With easy access to data, the number of reports created continues to grow, but this situation requires a well-defined content management strategy.

SAP Analytics Hub can be procured as an additional license for SAP Analytics Cloud and aims to solve this issue. This solution helps you create a repository of all the reports within your company, across all platforms. SAP Analytics Hub has its own user interface (UI) and can collect reports and content from all systems.

Differences between the solutions

SAP also released the analytics catalog in the second quarter of 2020 to SAP Analytics Cloud customers. The analytics catalog, which is built-in and requires no extra licenses, is shown on the home screen and is to some extent similar to SAP Analytics Hub.

In this chapter, we'll first discuss what SAP Analytics Hub is and how it works. Then, we'll look at the analytics catalog and its use cases.

Examples in This Chapter

In this chapter, we won't use any of the examples created earlier to demonstrate SAP Analytics Hub or to explore the creation and configuration of the analytics catalog. You'll see how content is created and maintained, but we won't add any of the content from the previous chapters. Feel free to use your own content to follow along with this chapter. Note, however, that SAP Analytics Hub requires a dedicated license and may not

be available to you. The analytics catalog is embedded into SAP Analytics Cloud and thus doesn't require any additional license.

Strategically, SAP recommends that you use the analytics catalog going forward. For some scenarios, SAP no longer offers SAP Analytics Hub for purchase. It may only be available to organizations who licensed it previously.

10.1 What Is SAP Analytics Hub?

In general, SAP Analytics Hub is an extension to SAP Analytics Cloud that offers the ability to create a holistic view of all the reports that exist across all systems in an organization. Although SAP Analytics Hub can be used independently, you'll need at least one license for SAP Analytics Cloud. For each report, only metadata is stored. This data contains the title, report information, descriptions, and screenshots, which are then stored in SAP Analytics Hub. The actual reports are stored as links and are still launched in their original solutions or engines.

- Report overview** As shown in [Figure 10.1](#), SAP Analytics Hub features a card-based view to organize all your reports.

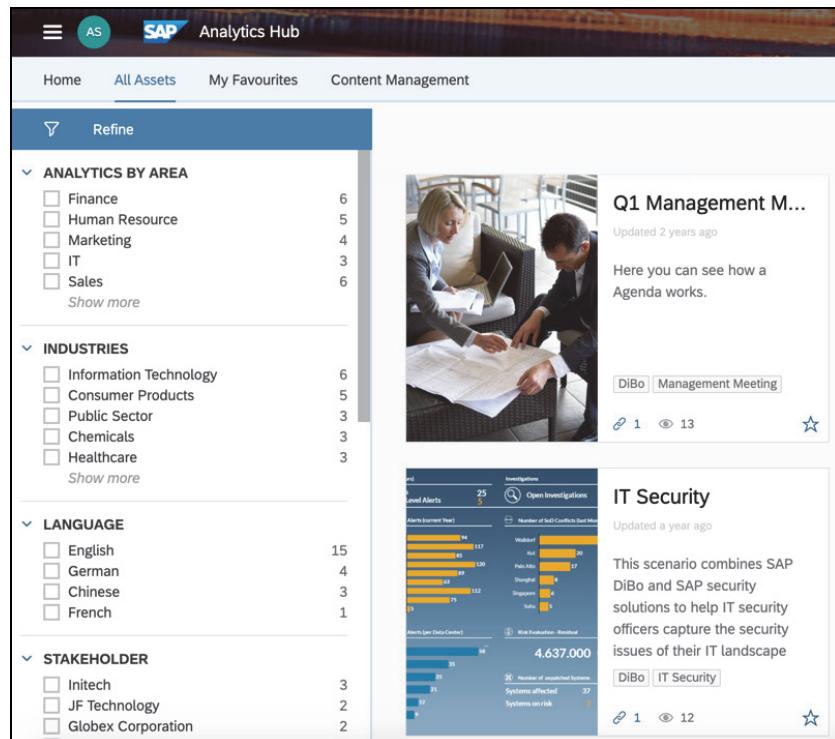


Figure 10.1 Overview of All Assets

These cards can be searched either using the text search field or by specifying filter criteria on the left. All filter criteria are completely customizable so that they can be provided to the users of SAP Analytics Hub.

Users can tag single assets as favorites and directly access them from the SAP Analytics Hub homepage, as shown in [Figure 10.2](#). The homepage also shows the most viewed assets and can feature centrally maintained content. In addition, the homepage proposes assets that might be interesting for each user.

[Homepage](#)

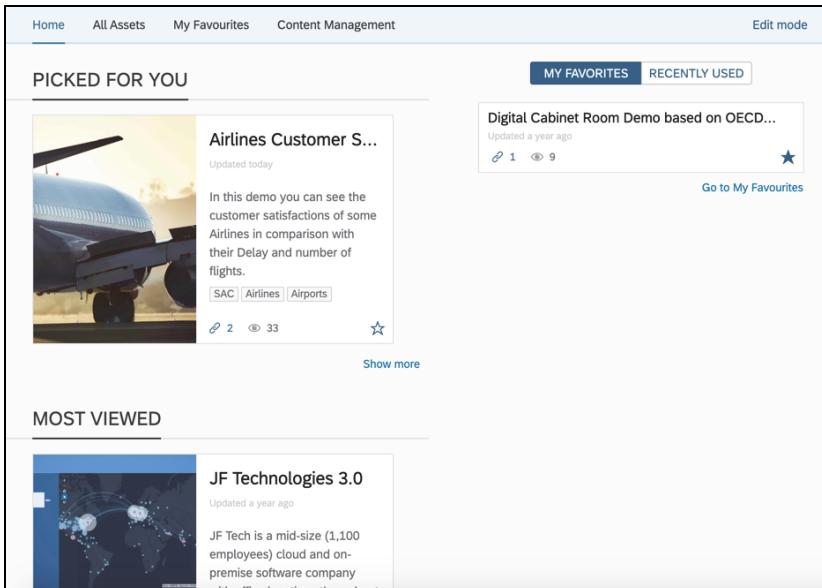


Figure 10.2 Homepage of SAP Analytics Hub

Clicking on an asset will open a new layer in which all information about a report is displayed, as shown in [Figure 10.3](#). For each asset, metadata is provided to create the asset (including its title, descriptions, screenshots, and customizable fields), which can contain tags. For example, a contact field can be configured to store information for the report's contacts.

[Metadata](#)

The **Links** area on the right shows all the hyperlinks that belong to the asset. Next to the hyperlink to the report itself, you can add additional information or documents that explain the report in detail. No requirements exist regarding these links. SAP Analytics Hub can also collect links to external websites or any other analytics solution.

[Links](#)

SAP Analytics Hub doesn't contain any reports itself since it's a pure catalog of links and metadata. Therefore, SAP Analytics Hub can't overwrite any authorizations in the reporting tool. Just because a user sees a report in SAP Analytics Hub doesn't mean that user can access it.

[Authorizations](#)

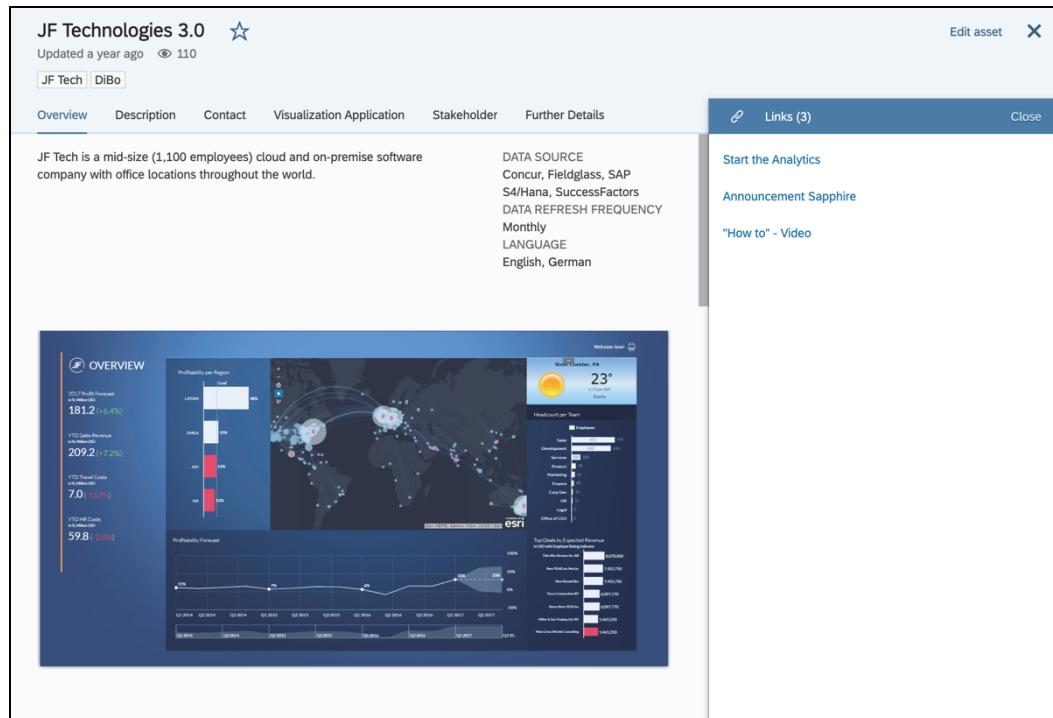


Figure 10.3 Single Asset in SAP Analytics Hub

All configurations and adjustments to SAP Analytics Hub itself are performed in its administration cockpit (see [Section 10.2.1](#)). The contents of the assets are managed within a dedicated interface (see [Section 10.2.2](#)). Users require a specific role to see both views. However, administrator rights are not needed to just create content for SAP Analytics Hub.

User management for SAP Analytics Hub is completely managed in SAP Analytics Cloud (see [Chapter 3, Section 3.3.1](#)). Within the user management interface, you can unlock SAP Analytics Hub for specific users or roles.

10.2 Setup and Content Creation

In this section, we'll set up SAP Analytics Hub and add content to it. If you want to follow along fully with this section, you'll need the Analytics Hub Admin role assigned (see [Chapter 3, Section 3.3.1](#)). Users who want to add content to SAP Analytics Hub need at least the Analytics Hub Content Creator role. For simple access to the hub, you must assign users the Analytics Hub Viewer role. In general, all users and roles are managed within SAP Analytics Cloud, as shown in [Figure 10.4](#). As this topic was covered in [Chapter 3, Section 3.3.1](#), in detail, we won't expand further here.

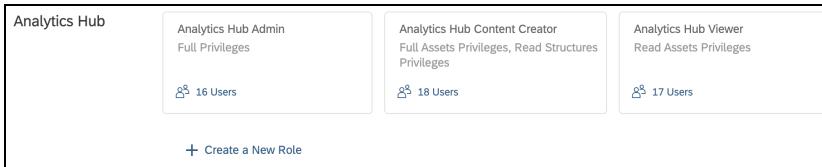


Figure 10.4 Roles for SAP Analytics Hub

SAP Analytics Hub can be accessed from SAP Analytics Cloud directly. Either use the app switch in the top right or select **Browse • Analytics Hub** from the main menu. If you can't see the entry, you may not have sufficient licenses or roles assigned to your user.

Launching SAP Analytics Hub

10.2.1 SAP Analytics Hub Cockpit

Click on the main menu of SAP Analytics Hub in the top left and select the **Cockpit** option, as shown in [Figure 10.5](#).

Opening the cockpit

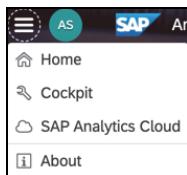


Figure 10.5 Main Menu of SAP Analytics Hub

The overview page of the cockpit provides quick access to all the settings and statistics for SAP Analytics Hub, as shown in [Figure 10.6](#). All these settings and dialog boxes can also be accessed from the navigation pane on the left.

Overview

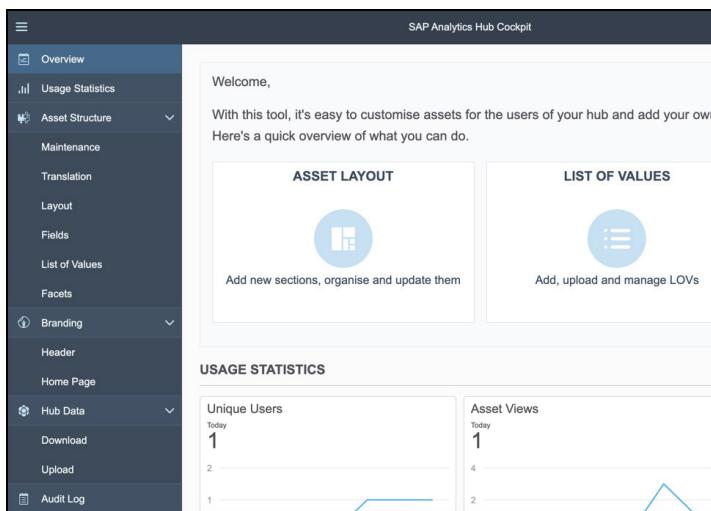


Figure 10.6 SAP Analytics Hub Cockpit

Usage statistics The statistics on the overview page provide initial insights about the usage of SAP Analytics Hub and the most viewed assets. The **Usage Statistics** page offers more details and shows all available data. Use this page to analyze SAP Analytics Hub usage in detail, as shown in [Figure 10.7](#).

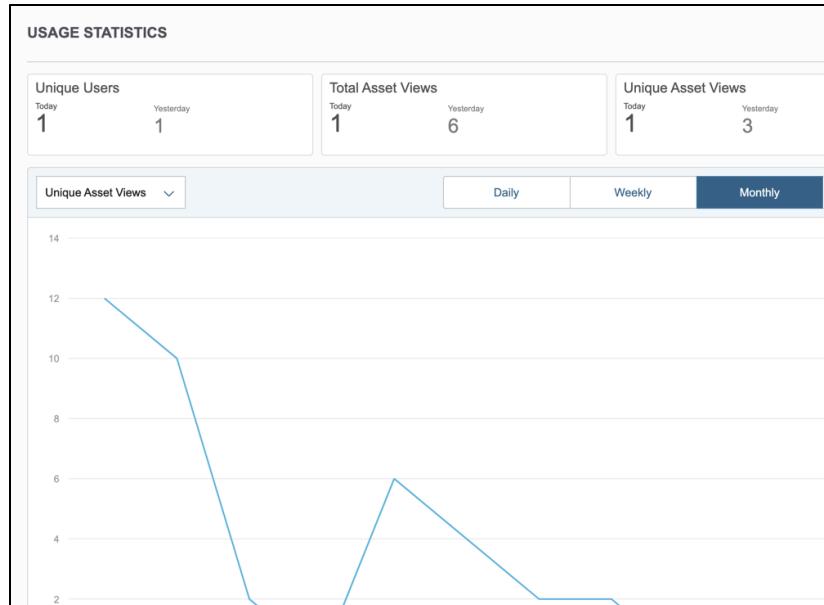


Figure 10.7 Usage Statistics

Maintenance SAP Analytics Hub must be put into maintenance mode before changing any essential elements like the asset structure. This screen can be accessed by clicking on **Maintenance** in the menu. On the maintenance page, you can set up how long the maintenance mode will last and which user groups should be affected, as shown in [Figure 10.8](#).

The screenshot shows the 'MAINTENANCE' page. It includes an 'Activate' switch (disabled), a note that maintenance can only be activated in planned timeslots, and edit, delete, and cancel buttons. Under 'Audience', 'Administrators & Content Editors' is selected. The 'Start date' is set to '1 May 2020, 10:00' and the 'End date' is set to '1 May 2020, 18:00'. A message box contains the text 'Asset updates'. At the bottom are 'Cancel' and 'Update' buttons.

Figure 10.8 Maintenance

You must first click on the **Edit** button to perform changes to the time-frame. All changes are saved after clicking on **Update**. The maintenance mode can be activated by clicking on the switch next to **Activate**.

By default, all assets in SAP Analytics Hub are stored in one language (e.g., English). If you want to provide your content in more than one language, you can activate the translation dashboard on the **Translation** page, as shown in [Figure 10.9](#). Note that all assets should be stored in one language before activating the translation feature.

Translation

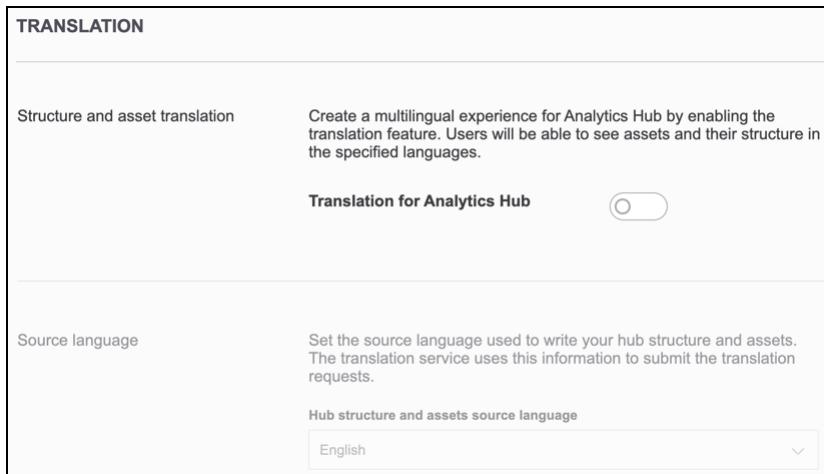


Figure 10.9 Translation

The general template for each asset in SAP Analytics Hub can be changed on the **Layout** page. You can move, edit, and remove fields, as shown in [Figure 10.10](#). All changes are made via a graphical interface that provides an instant preview of the template.

Layout

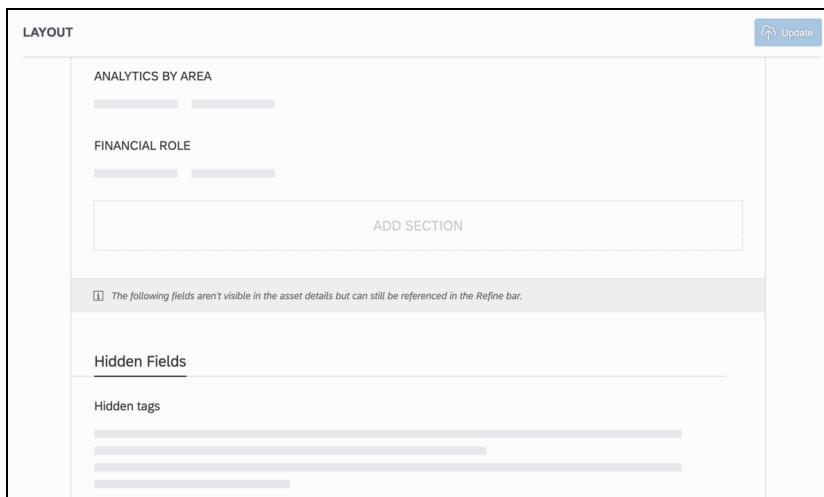


Figure 10.10 Editing Asset Layout

Adding sections New sections can be added below each section by clicking on **Add Section**. When hovering your mouse over any section, you'll see options for removing or replacing the section with another section. Those sections are later filled in with content by content creators.

You can also hide and show fields. These fields are not shown in the asset view but can still be used in searches and to refine filter selections in SAP Analytics Hub.

Fields All fields that are available in SAP Analytics Hub are maintained on the **Fields** screen, as shown in [Figure 10.11](#). Fields can contain texts, links, or a list of values defined separately.

The screenshot shows the SAP Analytics Hub interface with a modal dialog open. The main title is 'FIELDS (18)'. The table lists various fields like ANALYTICS, ANALYTICS BY AREA, Contact, Contact Link, DATA REFRESH FREQ, DATA SOURCE, Data Source Details, Description, FINANCIAL ROLE, Hidden tags, INDUSTRIES, and LANGUAGE. A modal dialog titled 'Create Field' is overlaid. It has input fields for 'Title' (e.g., Authorisation), 'Description' (e.g., Authorisation list to grant report access.), and a dropdown menu for 'Type' which is currently set to 'Select a field type'. There are also buttons for 'Text', 'Link', and 'List of Values'. A 'Cancel' button is at the bottom right of the modal.

Figure 10.11 Creating Fields

List of values If a field references a list of values, these values must be maintained on the **List of Values** screen, as shown in [Figure 10.12](#). The list of values can be used later within assets and provides a predefined selection to avoid typos or incorrect entries. When creating the list of values, you can automatically create a field based on this list (by selecting the **Create a field based on this LOV** checkbox).

Facets If the list of values should appear in the filter sidebar of SAP Analytics Hub, it must be activated as such on the **Facets** screen, as shown in [Figure 10.13](#). You can change the order of appearance and the order in which the values are sorted. The live preview on the right shows the effect of your changes immediately.

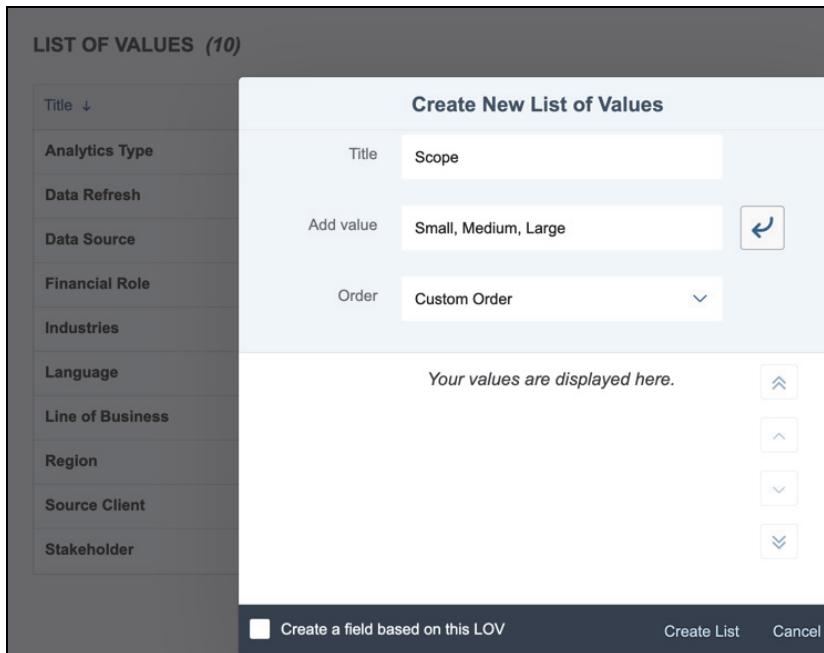


Figure 10.12 Creating List of Values

Facet	Description	Type
ANALYTICS BY AREA	Finance, Human Resource, Marketing...	Custom
DATA REFRESH FREQUENCY	Live, Hourly, Daily, Monthly, None	Occurrence
DATA SOURCE	SAP HANA, Excel Upload, SAP BW, ...	Occurrence
FINANCIAL ROLE	Budgeting, Accountancy, Investment ...	Occurrence
INDUSTRIES	Sports & Entertainment, Public Sect...	Occurrence
LANGUAGE	English, German, Chinese, French, ...	Custom
REGION	EMEA, NA, MEE, Global	Occurrence
STAKEHOLDER	JF Technology, Globex Corporation, I...	Occurrence
VISUALIZATION APPLICATION	SAP Analytics Cloud-App Design, S...	Occurrence

Figure 10.13 Facets

The **Branding** area gives you the ability to customize the design of SAP Analytics Hub and adjust it meet to your company's style guidelines. [Figure 10.14](#) shows the header management section where you can upload a custom logo and change the background of the header. If you select the **Use logo as favicon** option, the logo will also be shown in the address bar of the browser. Alternatively, you can upload a dedicated favicon.

Branding

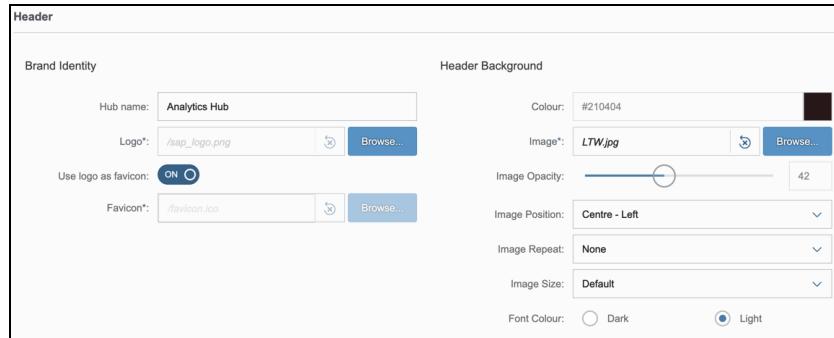


Figure 10.14 Adjusting Headers

Home screen The homepage layout can be modified as well. The process is quite similar to modifying the asset layout, as shown in [Figure 10.15](#).

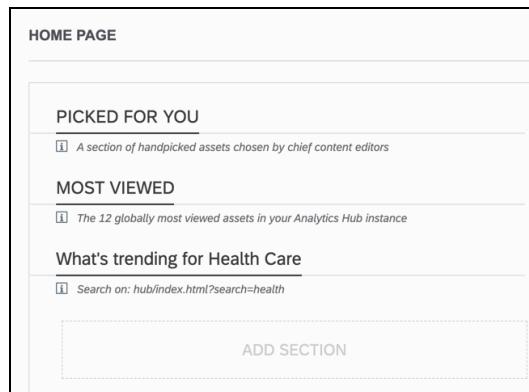


Figure 10.15 Adjusting Homepage

New sections can be added that contain either a fixed selection of assets or contain a search query to only show specific topics. All sections can be renamed, removed, or changed in their position.

Hub data and audit log The **Hub Data** and **Audit Log** menu items provide interfaces to export and import SAP Analytics Hub configurations and structures and to monitor all activities in SAP Analytics Hub.

You can switch back to the content view of SAP Analytics Hub by clicking on the **Go to Hub** button in the top right.

10.2.2 Edit Mode and Content Management

SAP Analytics Hub content is directly edited within the repository view. If a user has at least the Analytics Hub Content Creator role, that user can switch to edit mode for content and lifecycle management.

Go to **All Assets** and click on the **Edit mode** button in the top right to switch to **Edit mode**, as shown in [Figure 10.16](#). Then, click on any asset in the repository.



Figure 10.16 Editing Assets in Edit Mode

The buttons shown in [Figure 10.16](#) can be used to perform the following actions:

- ① By clicking on the plus icon +, you can add a new asset and fill it with contents of a new report. Once you save the asset, it will be saved as a draft that has to be validated in content management.
- ② The **Copy** icon can be used to copy an existing asset.
- ③ Click on the pencil icon to edit the currently selected asset.
- ④ If you don't want an asset to be shown in the list, you can hide it by clicking on the **Hide** icon.
- ⑤ The pushpin icon adds an asset to the homepage.

SAP Analytics Hub also provides lifecycle content management capabilities to validate new assets and make hidden assets visible again. Click on the **Asset Management** tab on the top to navigate to the content management area, as shown in [Figure 10.17](#). Make sure you're still in edit mode and select an asset.

Content management

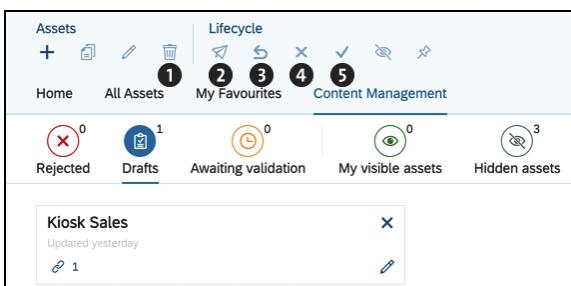


Figure 10.17 Content Management

Based on the current state of the selected asset, as shown in [Figure 10.17](#), the following actions can be performed:

- ❶ This icon can be used to delete rejected assets or drafts.
- ❷ If an asset is currently in draft mode, it can be validated by clicking on this icon. The asset will be moved into validation mode where it can be finally reviewed.
- ❸ This icon can be used to move an asset from validation mode back to draft mode without rejecting it.
- ❹ Click this icon to reject an asset currently in validation.
- ❺ This icon will publish items in validation mode.

On the content management screen, you can establish a multistep validation workflow. This screen can also be used to quickly update existing assets.

10.3 Analytics Catalog

The analytics catalog, which is directly integrated into the home screen, is shown in [Figure 10.18](#). This section will briefly cover the analytics catalog. The analytics catalog doesn't require an additional license but must be activated in the system settings first (see [Chapter 3, Section 3.3.4](#)). While SAP Analytics Hub has its own content management screen, content in the analytics catalog is directly published from within SAP Analytics Cloud.

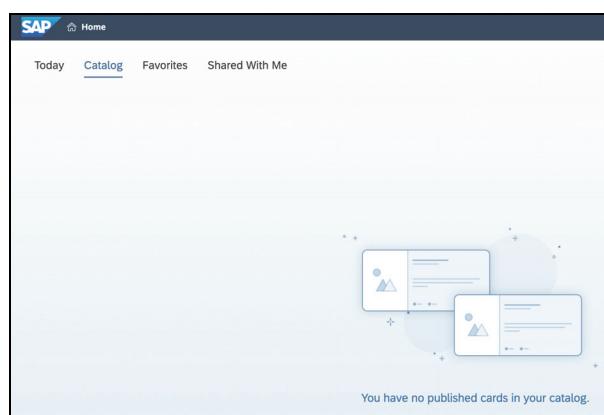


Figure 10.18 Empty Catalog

10.3.1 Adding Content to the Analytics Catalog

Adding objects

The analytics catalog can carry content from within SAP Analytics Cloud or external sources. When working with stories, applications, or boardrooms, they can be directly published to the catalog, as demonstrated in [Chapter 5, Section 5.10.1](#).

While creating content for the catalog, you always must indicate which teams are allowed to see which content. In this way, each team will have its own individual catalog that only contains those cards that have been published to them.

Visibility to teams

In addition, the analytics catalog can also be used to add external content. For this task, external content must be created first. Click on the main menu and select **Files**. There, click on the + icon in the top and select **Content Link**.

External content

By clicking on **+ Add**, you can add a hyperlink to the external content and enrich this entry with a **Title** and description, as shown in [Figure 10.19](#). When you're done with these settings, click on **Add**.

Asset creation

The screenshot shows a modal dialog titled "Add Link". Inside, there are two input fields: "Title:" with the value "SAP Analytics Cloud at SAP PRESS" and "URL:" with the value "https://www.sap-press.com/sap-analytics-cloud_5415/". At the bottom right of the dialog are two buttons: "Add" and "Cancel".

Figure 10.19 Adding a Link to the Asset

Now, a card view, similar to an asset in SAP Analytics Hub, will open where you can further enrich the hyperlink by adding more information, including additional links or pictures, as shown in [Figure 10.20](#).

The screenshot shows a card for the asset "SAP Analytics Cloud at SAP PRESS". The card includes the following details:

- Title:** SAP Analytics Cloud at SAP PRESS
- Views:** 0
- Add a tag:** + Add a tag
- Overview:** Overview
- Description:** Click here to find out more about this publication. (973 characters remaining)
- Thumbnail:** An image of the SAP Analytics Cloud book cover.
- File:** SAP Analytics Cloud at SAP PRESS (with edit icon)
- Add:** + Add
- Filters:**
 - Industry:** Choose a value
 - Analytics:** Choose a value
- Save:** Save | Cancel

Figure 10.20 Adding More Information to External Content

The process is finalized by clicking on **Save**. The content will be saved as an object in the file repository.

- Publishing external content** After you create external content, you must publish it to the analytics catalog. Select the content in the file repository, click on the **Share** button, and click on **Publish to Catalog** (see [Chapter 3, Section 3.3.5](#), for more information about the file repository). This step will open a sharing dialog box where you'll define which teams should see the asset in their analytics catalog interfaces, as shown in [Figure 10.21](#). You can also edit the asset again in this dialog box. Click on **Publish** to add the asset to the analytics catalog.

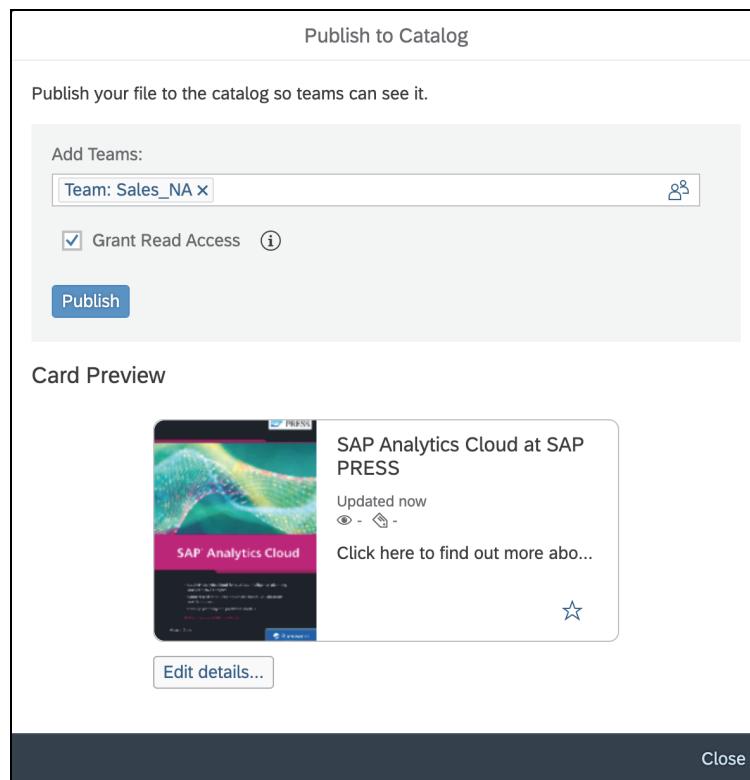


Figure 10.21 Publishing Asset to the Analytics Catalog

10.3.2 Browsing the Analytics Catalog

The analytics catalog can be accessed directly from the SAP Analytics Cloud home screen and shows all the assets that are visible to the teams to which your user belongs, as shown in [Figure 10.22](#).

- Finding content** The sidebar on the left provides predefined content type filters to automatically filter down the asset view to a specific content type. The text search field in the top right can be used to search asset titles and descriptions.

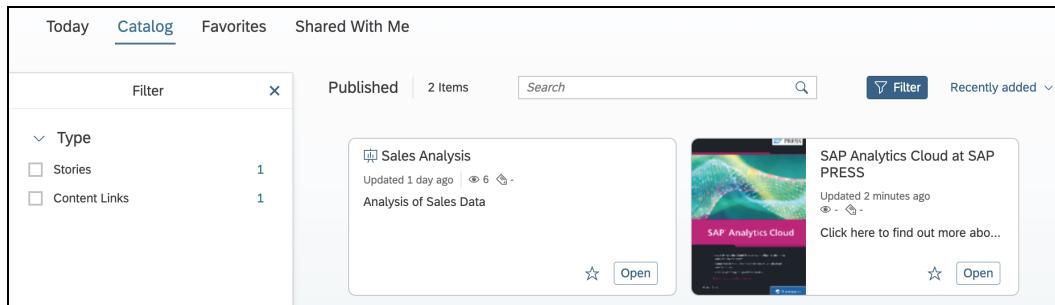


Figure 10.22 The Analytics Catalog with Assets

Administrators also can define filters (see [Chapter 3, Section 3.3.4](#)) that are exposed to viewers of the analytics catalog. These defined filters can be used to filter content by custom criteria efficiently.

10.4 Summary

In this chapter, you learned that SAP Analytics Cloud offers two options for creating a repository for all your reports and contents: SAP Analytics Hub and the analytics catalog. The analytics catalog has just been released with the version of SAP Analytics Cloud covered in this book, whereas SAP Analytics Hub has been on the market for some time. In addition, SAP Analytics Hub comes with its own dedicated interface and can be used almost independently of SAP Analytics Cloud.

Strategically, SAP recommends using the analytics catalog. SAP Analytics Hub may not be available for purchase for much longer and at that point will only be able to be used by organizations who bought licenses in the past. **Strategy**

Nevertheless, both SAP Analytics Hub and the analytics catalog are essential to a well-defined analytics strategy for your business. Thus, these solutions close this book and also signal the end of the reporting process. After you've successfully created a story, application, or digital boardroom and optimized it for your target audience, publishing and promoting it are the final steps.

Both SAP Analytics Hub and the analytics catalog are well suited for this purpose and can help you govern your organization's reporting landscape while providing your users with a seamless and insightful experience for accessing powerful analytics capabilities.

The Author



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Abassin regularly represents SAP at conferences such as the DSAG Annual Congress, DSAG Technology Days, and SAP TechEd, where he hosts sessions about analytics and associated topics. He studied economics and business informatics at Universität Mannheim and Technische Universität (TU) Darmstadt.

Index

A

Access 235
Account-based models 38
Action bar 116, 334
Active Directory 90, 99
Active viewport rendering 260
Actual data 281
Administration 85
 datasource configuration 111
 folder concepts 116
 interface 111
 object sharing 117
 SAP Analytics Hub 398
 system 109
 tools 96
 transport 106
Advanced formulas action 310
Agenda builder 382
Agendas 379
 create 382
 elements 384–385
 library 383
 structure 383
 topic filters 386
 topics 384
Aggregation calculation 239
Aggregation dimensions 239
Aggregations 64
Aggregation types 156
Allocating values 292
Allocation action 310
Allocations 39, 297
 confirm step 297
 create 297
 execute 299
 rules 299
 steps 297
Ambiguous relations 380
Analytical models 132
 components 132
 live connection 133
 model-wide settings 133
 structure 132
Analytics 17
 cloud vs. on-premise 21
 core pillars 19
 on-premise solutions 21

SAP's strategy 19
software-as-a-service 22
unified data and analytics portfolio 19
Analytics catalog 395, 406
 adding content 406
 authorizations 407
 browsing 408
 external content 407
 filters 409
 licensing 406
 publishing content 408
 text search 408
Analytics designer 25, 44, 345
 development environment 346
 further resources 366
 limitations 348
Apache Tomcat 52, 77
API Reference 349
APOS Live Data Gateway 53
Application programming interfaces (APIs) 82, 114
Applications 172, 345
 create 348
 create elements 352
 execution 347
 launch 350
 reference list 350
 scope 346
Application switch 87
Asset management 405
Assigning interface 267
Audit data 107
Audit log 404
Augmented analytics 18, 42
Authorizations 64, 92, 100, 168
 roles 103
Automated forecast 320, 333

B

Blending 173, 255
 settings 257
Boardrooms 374
 agenda 379
 charts 381
 context menu 377
 create 379
 design 378

edit mode	378	display options	182
featured topics	377	formatting	206
filters	382	granularity	194
multiple screens	375	IBCS	199
navigation	376	interactions	232
overview pages	374	legend	207
predictive analytics	382	moving	195
save and launch	386	ranking	204
types	379	reference line	203
Bookmarks	259	select type	181
Branding	403	sorting	201
Bubble layer	216	time series	192
Builder	190, 210	types	191
create filters	223	Checkbox groups	356
create tooltip	203	add values	357
geo maps	216	create	356
properties	193	script	358
Business analytics	17	Choropleth/drill layer	216
Business intelligence	18, 25, 29, 171	Classification scenario	343
workflow	37	Cloud connector	67, 75, 79, 112
Buttons	361	Cluster properties	216
create	361	Code libraries	61
label	361	Company network	64, 66
script	362	Comparison chart	191
Conditional formatting	196, 206	Conditional formatting	196, 206
rules	196	Connections	120
Content network	118	create	120
Content network storage	106, 108	interface	120
Content search	86	Context menu	377, 386
Context menu	377, 386	jumps	391
jumps	391	Conversion rates	272
Correlation chart	192	Copy action	310
Cross-origin resource sharing (CORS)	70	Correlation chart	192
configuration	72	Cross-origin resource sharing (CORS)	70
Currency conversion	275	configuration	72
table	271	Custom widgets	366
Custom widgets	366	embedding	369
example	368	example	368
Dashboards	18, 26, 171–172, 379	D	
create	387		
jumps	390		
launching	392		
library	388		

- topic filters* 391
- topics* 380, 388
- Data access control 165, 168, 288
- Data acquisition 29
- Data actions 41, 309
 - create* 309
 - types* 309
 - use* 310
- Data audit 287
- Data changes 105
- Data cleansing 142
- Data distribution 142
- Data entry 264, 289, 291
- Data exploration 33–34
- Data exploration mode 178, 180
 - access* 183
- Data import jobs 282
- Data integration 23, 49
 - connection types* 69
- Data locking 287
- Data management 162, 281
- Data mapping 282
 - finalize* 283
- Data models 125–126
 - authorizations* 157
 - blank* 138
 - create* 136, 151
 - data sample* 138
 - draft data* 138
 - editing* 163
 - export* 107
 - expose data* 94
 - finalize* 150
 - import* 68, 127, 135
 - justification* 126
 - live data sources* 150
 - sample data* 135
 - saving* 138, 157
 - scheduling* 127
 - transporting* 95
 - types* 126, 129
 - verify* 145
- Datasets 129
 - creation* 129
 - from SAP S/4HANA* 132
 - import* 130
 - name/location* 130
 - source* 130
- Data sources 49, 72, 82, 91
 - change* 190
 - import connections* 55, 60
 - import on-premise* 112
- live connections* 49, 54, 120, 151
- non-SAP* 59
- select* 137, 179
- Data transfer 63
- Data wrangling 29, 31, 127, 132, 135, 140
 - formulas* 30
 - screen areas* 141
- Date columns 154
 - prerequisites* 155
- Date hierarchy 154
- Demo files 125
- Development environment 345
 - applications* 349
- Dimensions 33, 133, 191, 274
 - add account* 276
 - change* 143
 - convert to measure* 239
 - data access* 168
 - details* 165
 - duplicates* 231
 - formula help* 360
 - generic* 278
 - group* 157, 161
 - input controls* 230
 - modify* 157
 - overview* 161, 277
 - required* 156
 - search* 166
- Distribution chart 191
- Dropdowns 354
 - add values* 354
 - create* 354
 - script* 355
- Dynamic date filters 227
- Dynamic text 220

E

- Elements 218, 352
 - button* 361
 - checkbox group* 356
 - create* 353
 - dropdown* 354
 - filter line* 362
 - other* 364
 - radio button* 358
- Embedded data action 310
- Embedded models 135
- Error bar 204
- Esri ArcGIS server 216
- Exception aggregation 156–157

Explorer	234, 382
enable	234
use	236
Export jobs	106
create	106
trigger	107

F

Facets	402
Feature layer	216
Files	115
Filter line	362
create	362
set up	362
use	363
Filters	181, 191, 203, 222
advanced controls	229
criteria	329
nested	229
Fiscal year settings	288
Fixed date dimension filter	226
Fixed time filter	228
Flat files	129–130, 137
Flat tables	331
Flow layer	216
Folder structures	91, 115–116
sharing	117
Forecasts	340
copy	290
data	283
vs. actual	340
Formula editor	164
Formulas	144, 304
actions	145
create	237
help	238, 351, 360
input control	238

G

Gantt view	311
Geographical hierarchy	143
Geolocations	153
<i>live data sources</i>	153
Geo maps	215
content layers	215
create layers	216
zoom	217
Global dimensions	133
Grid pages	39, 175, 178, 302
tables	302
Grid view	278

H

Heatmap	216
Hierarchy	209, 278
<i>tables</i>	214
Hierarchy management	166
<i>drag and drop</i>	166
<i>interface</i>	166
<i>moving members</i>	166
Hybrid solutions	20
Hyperlinks	205, 233
<i>pages</i>	234
<i>types</i>	233

I

Identity provider	73, 113
<i>requirements</i>	90
Import connections	66
<i>cloud</i>	81
<i>credentials</i>	123
<i>data sources</i>	55
<i>integration scenarios</i>	79
<i>on-premise</i>	79
<i>scenario</i>	66
<i>setup</i>	80, 82
Import jobs	108
In-cell charts	213
Indicator chart	192
Info panel	350
InfoSet queries	57
Input controls	226, 230
<i>data dimensions</i>	226
<i>measures</i>	228
Input field	364
International Business Communication Standards (IBCS)	199–200, 212

J

JavaScript	349
JDBC drivers	58
Joins	255
Jumps	376, 390
<i>page to page</i>	391
<i>to chart</i>	391

K

Key influencers	324
-----------------------	-----

L

Lanes	176, 250
<code>adjust size</code>	250
<code>create</code>	251–252
<code>formatting</code>	250
Level-based hierarchies	147
Library	383, 385, 388, 390
Licenses	101
<i>in use</i>	110
Lifecycle content management	405
Link dimensions	256
Linked analysis	201, 232
Live connections	61, 93
<i>advantages</i>	64
<i>analytical models</i>	133
<i>authorizations</i>	91
<i>cloud</i>	74
<i>credentials</i>	123
<i>data models</i>	128
<i>data sources</i>	49
<i>direct connection</i>	70
<i>example</i>	61, 122
<i>integration scenarios</i>	70
<i>limitations</i>	65
<i>measures</i>	156
<i>multiple instances</i>	93
<i>on-premise</i>	71
<i>recommended scenarios</i>	65
<i>reverse proxy</i>	77
<i>SAP HANA views</i>	154
<i>tunnel configuration</i>	76
<i>tunnels</i>	75
Logos	403

M

Machine learning	318
<i>algorithms</i>	320
Maintenance mode	400
Master data	132
Master data model	273
Mean absolute percentage error (MAPE)	339
Measure-based dimensions	241
Measures	146, 191, 210
<i>calculated</i>	155
<i>create</i>	155, 163
<i>deviation over time</i>	239
<i>edit</i>	163
<i>input controls</i>	230, 232
<i>select</i>	211

<i>smart discovery</i>	323
<i>variance</i>	197
Metadata	62, 113, 134, 365, 397
Modeler	29, 151, 158
<i>action bar</i>	152, 160
<i>areas</i>	160
<i>authorizations</i>	168
<i>data source</i>	152
<i>editing models</i>	163
<i>measures</i>	156
<i>open</i>	158
<i>overview</i>	159
<i>sidebar</i>	161
<i>validation</i>	160

N

Navigation	85
<i>home screen</i>	85
<i>main menu</i>	87
New planning model	161
Nodes	215
Notifications	28, 87, 114
NVARCHAR	155

O

OData	58
OData services	364
<i>create</i>	365
Open Connectors	57, 112
Operational concept	92
Optimized story view mode	259–260
<i>settings</i>	260–261
<i>turn off</i>	261
Organizational structures	91

P

Page filters	224
<i>create</i>	225
<i>member selection</i>	225
Pages	173, 175
<i>background color</i>	242
<i>comments</i>	258
<i>formatting</i>	242
<i>types</i>	175
Parent-child hierarchies	147, 278
<i>create</i>	147
Pareto principle	125
PATH	77
Permissions	103

Planning	18, 25, 37, 263
<i>calendar</i>	270
<i>edit models</i>	39
<i>functionality</i>	289
<i>integrations</i>	37
<i>licensing</i>	263
<i>multistep</i>	42
<i>tools</i>	268
<i>within stories</i>	266
<i>workflows</i>	38
Planning model	38, 134
<i>access and privacy</i>	287
<i>actual data</i>	281
<i>append data</i>	285
<i>comments</i>	259
<i>create</i>	270
<i>data</i>	264
<i>data import method</i>	282
<i>data mapping</i>	282
<i>data privacy</i>	287
<i>demo data</i>	271
<i>forecasted data</i>	283
<i>preferences</i>	275
<i>set up</i>	286
<i>upload transactional data</i>	281
<i>user data</i>	134
<i>writing data</i>	168
Point of interest	216
Predictive analytics	18, 25, 44, 317
<i>boardroom</i>	382
<i>overview</i>	317
Predictive model	
<i>configure</i>	336
<i>dataset</i>	342
<i>evaluate</i>	340
<i>list</i>	338
<i>status</i>	342
<i>train</i>	337
Predictive planning	18
Predictive scenario	336
Private dimensions	133
Private forecast	300
Private versions	265
Product help	28
Profile settings	87
Public dimensions	277–278
Public versions	265
Q	
Quarterly release cycle	23
Queries	128
R	
Radio button groups	358
<i>create</i>	358
<i>script</i>	360
Range slider	365
Reference lines	202
Regression scenario	343
Reports	34, 172
<i>links</i>	397
Responsive pages	176
Restricted export	287
Reverse proxy	77–78
Roles	92, 100
<i>assign</i>	104
<i>authorizations</i>	103
<i>create</i>	102
<i>custom</i>	103
<i>full data access</i>	104
<i>licenses</i>	100
<i>overview</i>	100
<i>permissions</i>	103
<i>requests</i>	105
<i>standard</i>	101
Root topics	388
R programming language	320, 330
R servers	114, 329–330
<i>packages</i>	332
RSS reader	220
R visualizations	42, 320, 329
<i>builder</i>	330
<i>create</i>	330
<i>dataset</i>	332
S	
SAML 2.0	73, 90
SAP Analytics Catalog	26
SAP Analytics Cloud	
<i>architecture</i>	45
<i>data integration</i>	46
<i>functional areas</i>	24
<i>home screen</i>	27
<i>initial activites plan</i>	89
<i>overview</i>	23
<i>user interface</i>	27
SAP Analytics Cloud agent	67, 79
<i>setup</i>	112
SAP Analytics Cloud Agent Simple Deployment Kit	80
SAP Analytics Cloud User and Team Provisioning API	99

SAP Analytics Hub	26, 395	SAP S/4HANA	51, 56
<i>adding sections</i>	402	SAP S/4HANA Cloud	74
<i>authorizations</i>	397	SAP SuccessFactors	57
<i>branding</i>	403	SAP Web Dispatcher	77
<i>cockpit</i>	399	Scheduling	68
<i>content management</i>	406	Script editor	331, 350, 355, 357,
<i>data</i>	404	<i>359, 361</i>	
<i>edit mode</i>	404	<i>environment</i>	332
<i>facets</i>	402	<i>formula help</i>	351
<i>favorites</i>	397	<i>syntax check</i>	351
<i>fields</i>	402	Search to insight	42, 87, 319, 328
<i>home page</i>	404	<i>open</i>	328
<i>language</i>	401	<i>search screen</i>	328
<i>launching</i>	399	Security	97, 113
<i>layout</i>	401	<i>data changes</i>	105
<i>licensing</i>	395	Self-service BI	24
<i>list of values</i>	402	Semantics	126–127
<i>maintenance</i>	400	<i>additional</i>	128
<i>overview</i>	396	Simulation	268, 324
<i>setup</i>	398	Single sign-on (SSO)	73, 89, 91, 97, 113
SAP Business Explorer query		Slider	364
<i>designer</i>	51	Smart assist	42, 317–318, 322
SAP BusinessObjects BI platform	21, 52	Smart discovery	42, 175, 318, 322
SAP Business Planning and Consolidation		<i>advanced options</i>	323
(SAP BPC)	21, 52, 81	<i>charts</i>	324
<i>version for SAP BW/4HANA</i>	57	<i>configure</i>	322
<i>version for the Microsoft platform</i>	57	<i>overview</i>	323
SAP Business Suite	51	<i>pages</i>	323
SAP Business Warehouse (SAP BW)	50,	<i>simulation</i>	326
93, 126, 128		<i>unexpected values</i>	324
<i>connectors</i>	53	Smart grouping	335
<i>data source</i>	79	<i>activate</i>	335
<i>queries</i>	51, 56	<i>scatterplot</i>	335
SAP BW/4HANA	51	Smart insights	42, 326
SAP Cloud Identity Services	90	<i>accessing</i>	326
SAP Datasphere	52	<i>add to story</i>	326
SAP Digital Boardroom	26, 373	<i>sidebar</i>	327
<i>example</i>	375	Smart predict	42, 317, 320, 336
<i>hardware recommendations</i>	392	<i>scenarios</i>	43
<i>navigation</i>	375	Software development kit (SDK)	366
<i>overview</i>	374	Statistical key figures	341
<i>responsive pages</i>	374	Storage consumption	110
SAP ERP	57	Story	31, 172
SAP HANA	50, 151	<i>add charts</i>	182
SAP HANA Live	52	<i>additional buttons</i>	188
SAP HANA smart data integration	53,	<i>back export</i>	247
113		<i>boardroom view</i>	382
SAP HANA views	151, 153	<i>catalog</i>	249
SAP Integration Suite	57	<i>collaboration</i>	36
SAP Java Connector	67	<i>comments</i>	258
SAP Lumira, designer edition	21, 44	<i>convert</i>	250
SAP Predictive Analytics	21	<i>create</i>	174

<i>design</i>	242
<i>device preview</i>	177
<i>dynamic text</i>	220
<i>embedded</i>	246
<i>embedded model</i>	254
<i>environment</i>	346
<i>example</i>	243
<i>export</i>	106, 246
<i>file section</i>	185
<i>filters</i>	230
<i>import into library</i>	383, 388
<i>insert section</i>	186
<i>interface</i>	184
<i>linking</i>	36
<i>live data</i>	62
<i>main area</i>	184
<i>models</i>	94
<i>overview page</i>	385
<i>pages</i>	32
<i>planning</i>	266
<i>preferences</i>	243
<i>publishing</i>	35
<i>publish to mobile</i>	249
<i>responsive page</i>	250
<i>SAP Digital Boardroom</i>	381
<i>save</i>	188
<i>schedule publication</i>	247
<i>scope</i>	346
<i>screen adjustments</i>	176
<i>share</i>	245
<i>templates</i>	255
<i>text box</i>	218
<i>text element</i>	219
<i>tools</i>	186
<i>top bar</i>	185
<i>URL</i>	245
<i>viewer interactions</i>	221
<i>viewers</i>	173
<i>Subtopics</i>	389
<i>Syntax check</i>	238
<i>System configuration</i>	111
<i>System landscape</i>	92, 96
<i>multiple systems</i>	93
<i>System monitor</i>	110
<i>System usage</i>	110
T	
<i>Tables</i>	209
<i>action bar</i>	211
<i>create</i>	209
<i>drilldown</i>	211
<i>expand</i>	211
<i>formatting</i>	212
<i>freeze</i>	211
<i>hierarchies</i>	214
<i>in-cell charts</i>	212
<i>mass data entry</i>	212
<i>measures</i>	210
<i>predefined calculations</i>	213
<i>sidebar</i>	212
Teams	99
<i>assign via SSO</i>	99
<i>create</i>	99
Templates	174, 255
Text operations	241
Threshold-based coloring	196
Time dimensions	154
Time series chart	193
Time series forecast	333, 336
<i>activate</i>	334
<i>example</i>	334
Tooltips	203
Topics	384
<i>add content</i>	385
<i>additional settings</i>	386
<i>create</i>	390
<i>details</i>	386
<i>filters</i>	386
<i>moving</i>	389
<i>relationships</i>	389
Tracing	110
Transactional data	281
Transformations	30, 140
<i>create</i>	144
<i>execution</i>	143
<i>history</i>	145
<i>R programming language</i>	320
Transform log	31, 145
Translation	401
Tree structure	377, 390
Trellis	204
Trend chart	191
U	
<i>Unexpected values</i>	324
<i>Unified story</i>	173, 345
Universes	52
Usage statistics	400
Users	89
<i>attributes</i>	97
<i>create</i>	98
<i>delete</i>	98
<i>import list</i>	99
<i>management</i>	97, 398

V

Value driver trees	39, 268, 305
<i>auto-create</i>	306
<i>builder</i>	308
<i>calculation rules</i>	269
<i>date range</i>	309
<i>node list</i>	309
<i>simulation</i>	268
<i>use</i>	309
Value lock management	186
Variances	197
<i>color-coding</i>	198
<i>types</i>	197
Version management	264–265, 289
<i>interface</i>	289
Versions	148
<i>add to table</i>	291

<i>filter</i>	300
---------------------	-----

<i>mapping</i>	149, 153, 283
----------------------	---------------

<i>publishing</i>	291
-------------------------	-----

<i>verifying</i>	149
------------------------	-----

Virtual private network (VPN)	71
-------------------------------------	----

Visualization layers	373
----------------------------	-----

Visualizations	31, 171
----------------------	---------

W

Weights	267
---------------	-----

Widgets	207, 232, 362, 390
---------------	--------------------

<i>requirements</i>	367
---------------------------	-----

<i>select</i>	391
---------------------	-----

Word cloud	333
------------------	-----

Workflows	348
-----------------	-----

Workspaces	119
------------------	-----

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