

**Annotations are all about
that BAS.**

No treble the effort

Fábio Pagoti, OVLY
June 16th, 2021

UI5con ON AIR 

Session info

- What would you think of **creating an SAP Fiori elements app without the help of tools** like the annotation editor available in SAP Web IDE or the Guided Development provided in SAP Business Application Studio?
- If you think that seems very complicated, this talk is for you. Although such tools can make it easier to develop apps based on SAP Fiori elements, tools will always be behind recent features and will always contain some kind of limitations.
- In other words, we shouldn't rely 100% on them. **This talk will calmly explain the foundation behind Smart Controls and SAP Fiori elements (OData vocabularies and terms)**, focusing on the syntax of XML annotations. Finally, it will give a few examples of snippets (and their outcome) frequently found in standard apps to reinforce the concepts presented during the talk.
- The main objective is giving the listener more confidence of changing annotations frequently found in forums, IDE templates and extensions and in the standard documentation.

Agenda

Smart Controls and SAP Fiori Elements

Annotations and Developer Tools

Developer FAQ

- Where are annotations found?
- How are annotations organized?
- How to use an annotation?
- What are the available annotations?

Bonus information

Not in scope

CDS Annotations

Annotations created using ABAP code / SEGW

How to use plugins and extensions available in Web IDE or BAS

Smart Controls and **SAP Fiori Elements**



Smart Controls


Metadata-driven controls





Highlights





- OData Model dependent
 - Properties and aggregation values are based on \$metadata + annotations
- Found in namespace “sap.ui.comp”
- Not available in OpenUI5


Minimum Viable Code

- `<ns:SmartTable entitySet=“Documents“ />`

Standard ▾ Search  Go Hide Filter Bar Filters (1)

Company Code:* 2 More  Fiscal Year:  Fiscal Period:  Fiscal Year Period: 

Fiscal Quarter:  Fiscal Year Quarter:  Fiscal Week:  Fiscal Year Week: 



Fiscal Day Of Year: 



Line Items (54) Standard* ▾    ▾



<input type="checkbox"/>	my Bkrs	Fiscal Year	Customer	Name	Amount in LC	Currency	My Boolean
<input type="checkbox"/>	0001	2014	JP Morgan Chase (J001)	JP Morgan C...	11,370.47	EUR	Yes
<input type="checkbox"/>	0001	2014	JP Morgan Chase (J001)	JP Morgan C...	16.66	EUR	Yes
<input type="checkbox"/>	0001	2014	Oppert (TILL)	Oppert	-21,000.00	EUR	Yes
<input type="checkbox"/>	0001	2014	Oppert (TILL)	Oppert	19,780.00	EUR	Yes
<input type="checkbox"/>	0001	2014	Oppert (TILL)	Oppert	-2,500.00	EUR	Yes



Product Details Save Cancel

Product **Supplier** **Specification**



Product:  Supplier: 

Category:  Status: 

Description: Quantity:  PC 

Price:  EUR 

Size (cm): x x

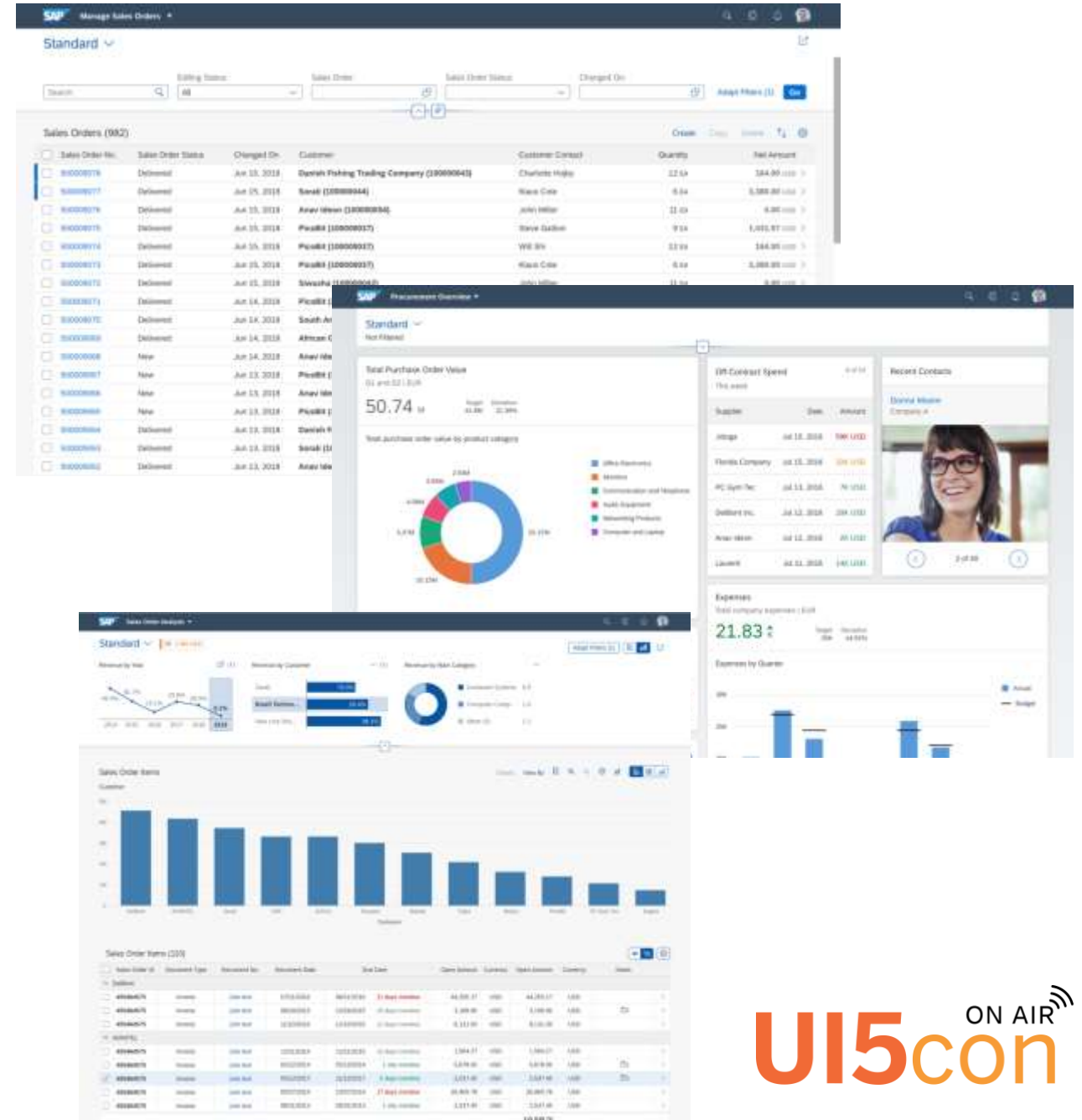
Weight:  g 

SAP Fiori Elements

Metadata-driven apps

Highlights

- manifest.json defines general structure of the app
- OData Model dependent
 - Properties and aggregation values are based on \$metadata + annotations
- Namespaces:
 - sap.fe
 - sap.suite.ui.generic.template
 - sap.ovp
- The less JavaScript Code the less you change the predefined layout



Annotation and Developer Tools



Developer Tools

Managing annotations

SAP Web IDE

- Annotation Modeler

SAP Business Application Studio (BAS) / VS Code

- SAP Fiori tools
 - Service Modeler – Visualization of OData service including backend and location annotations
 - XML Annotation Language Server – code completion, snippets, error-checking, etc
 - Guided Development – wizards to perform common tasks in Fiori elements apps

Developer **FAQ**



Developer FAQ

Relevant in this session

Where are annotations found?

How are annotations organized?

How to use an annotation?

What annotations are available?

What are the most used annotations?

Where are annotations found?



Where are annotations found?

Option 1: as part of the service metadata (backend)

```
<EntityType Name="Bank"
  sap:content-version="1">
  <Key>
    <PropertyRef Name="BankCountry"/>
    <PropertyRef Name="BankInternalId"/>
  </Key>
  <Property Name="BankCountry"
    Type="Edm.String"
    Nullable="false"
    MaxLength="3"
    sap:display-format="UpperCase"
    sap:unicode="false"
    sap:label="Bank Country"
    sap:value-list="standard"/>
  <Property Name="BankInternalId"
    Type="Edm.String"
    Nullable="false"
    MaxLength="15"
    sap:display-format="UpperCase"
    sap:unicode="false"
    sap:label="Bank Key"/>
</EntityType>
```

```
<edmx:Edmx Version="1.0"
  xmlns:edmx="http://schemas.microsoft.com/ado/2007/06/edmx">
  <edmx:DataServices m:DataServiceVersion="2.0">
    <Schema Namespace="FCLM_BM_SRV">

      <EntityType Name="Bank" />

      <EntityContainer Name="FCLM_BM_SRV_Entities">
        <EntitySet Name="BankSet"
          EntityType="FCLM_BM_SRV.Bank" />
      </EntityContainer>

      <Annotations Target="FCLM_BM_SRV.Bank"
        xmlns="http://docs.oasis-open.org/odata/ns/edm">
        <Annotation Term="com.sap.vocabularies.UI.v1.HeaderInfo">
        </Annotation>
      </Annotations>

      <Annotations Target="FCLM_BM_SRV.Bank/BankCountry"
        xmlns="http://docs.oasis-open.org/odata/ns/edm">
        <Annotation Term="com.sap.vocabularies.Common.v1.ValueList">
        </Annotation>
      </Annotations>

    </Annotations>
  </Schema>
</edmx:DataServices>
</edmx:Edmx>
```

Where are annotations found?

Option 2: as part of front-end source code (local)



```
2 <edmx:Edmx xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx" Version="4.0">
3   <edmx:DataServices>
4     <Schema xmlns="http://docs.oasis-open.org/odata/ns/edm">
5       <Annotations Target="SD_OVP_SM.C_SalesManagerSelectionResult">
6         <Annotation Term="UI.SelectionFields">
7           <Collection>
8             <PropertyPath>SoldToParty</PropertyPath>
9             <PropertyPath>SalesOrganization</PropertyPath>
10            <PropertyPath>DistributionChannel</PropertyPath>
11            <PropertyPath>SalesOffice</PropertyPath>
12            <PropertyPath>SalesGroup</PropertyPath>
13          </Collection>
14        </Annotation>
15      </Annotations>
16
17      <Annotations Target="SD_OVP_SM.C_SalesManagerSelectionResult/to_SoldToParty">
18        <Annotation Term="UI.HiddenFilter"/>
19      </Annotations>
20
21      <Annotations Target="SD_OVP_SM.C_SalesOrderByMonthResult">
22        <Annotation Term="UI.Identification" />
23        <Annotation Term="UI.Chart" Qualifier="ISA">
24          <Record Type="UI.ChartDefinitionType"/>
25        </Annotation>
26
27        <Annotation Term="UI.SelectionVariant" Qualifier="IS">
28          <Record Type="UI.SelectionVariantType">
29            </Record>
30          </Annotation>
31
32        <Annotation Term="UI.PresentationVariant" Qualifier="IS">
33          <Record Type="UI.PresentationVariantType">
34            <PropertyValue Property="SortOrder">
35              <Collection>
36                <Record Type="Common.SortOrderType">
37                  <PropertyValue Property="Property" PropertyPath="YearMonth"/>
38                  <PropertyValue Property="Descending" Bool="false"/>
39                </Record>
39              </Collection>
39            </PropertyValue>
40          </Record>
41        </Annotation>
42      </Annotations>
43    </Schema>
44  </edmx:DataServices>
45 </edmx:Edmx>
```

How are annotations organized?

Vocabularies and terms



How are annotations organized?

Vocabularies - Definition

- Apart from Entity Types, Entity Sets, Properties, etc – the OData protocol defines Vocabularies.
- A **Vocabulary** is a collection or **Terms**
- Described as an XML or JSON file

How are annotations organized?

Vocabularies - Types

Standard vocabularies

- Managed by the OASIS Technical Committee
- <https://github.com/oasis-tcs/odata-vocabularies>
- Examples:
 - Org.OData.Core.V1
 - Org.OData.Measures.V1
 - Org.OData.Capabilities.V1
 - Org.OData.Aggregation.V1

SAP vocabularies

- Managed by SAP
- <https://github.com/SAP/odata-vocabularies>
- Examples:
 - com.sap.vocabularies.UI.v1
 - com.sap.vocabularies.Communication.v1
 - com.sap.vocabularies.Common.v1

How are annotations organized?

Terms - Definition

Basic structure

- Name
- Type
 - Primitive (Edm.String, Edm, Int32, Edm.Date)
 - Structures (Defined using ComplexTypes)
 - Collections (of primitive values or structures)
- Where it can be applied
 - Entity Types
 - Entity Sets
 - Property
 - etc

```
<?xml version="1.0" encoding="utf-8" ?>
<edmx:Edmx Version="4.0"
  xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx">
  <edmx:DataServices>
    <Schema xmlns="http://docs.oasis-open.org/odata/ns/edm"
      Alias="UI"
      Namespace="com.sap.vocabularies.UI.v1">
      <Term Name="Placeholder"
        Type="Edm.String"
        Nullable="false"
        AppliesTo="Property" />
    </Schema>
  </edmx:DataServices>
</edmx:Edmx>
```

How are annotations organized?

Terms - Example

```
<?xml version="1.0" encoding="utf-8" ?>
<edmx:Edmx Version="4.0"
  xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx">
  <edmx:DataServices>

    <Schema xmlns="http://docs.oasis-open.org/odata/ns/edm"
      Alias="UI"
      Namespace="com.sap.vocabularies.UI.v1">

      <Term Name="GeoLocations" Type="Collection(UI.GeoLocationType)" Nullable="false" AppliesTo="EntityType" />

      <ComplexType Name="GeoLocationType">
        <Property Name="Latitude" Type="Edm.Double" Nullable="true">
          <Annotation Term="Core.Description" String="Geographic latitude" />
        </Property>
        <Property Name="Longitude" Type="Edm.Double" Nullable="true">
          <Annotation Term="Core.Description" String="Geographic longitude" />
        </Property>
        <Property Name="Location" Type="Edm.GeographyPoint" SRID="variable" Nullable="true">
          <Annotation Term="Core.Description" String="A point in a round-earth coordinate system" />
        </Property>
      </ComplexType>

    </Schema>
  </edmx:DataServices>
</edmx:Edmx>
```

How are annotations organized?

Terms – Type Inheritance

```
<Schema xmlns="http://docs.oasis-open.org/odata/ns/edm" Alias="UI" Namespace="com.sap.vocabularies.UI.v1">

  <Term Name="LineItem" Type="Collection(UI.DataFieldAbstract)" Nullable="false" AppliesTo="EntityType" />

  <ComplexType Name="DataFieldAbstract" Abstract="true">
    <Property Name="Label" Type="Edm.String" Nullable="true" />
    <Property Name="Criticality" Type="UI.CriticalityType" Nullable="true"/>
    <Property Name="CriticalityRepresentation" Type="UI.CriticalityRepresentationType" Nullable="true" />
    <Property Name="IconUrl" Type="Edm.String" Nullable="true" />
  </ComplexType>

  <ComplexType Name="DataField" BaseType="UI.DataFieldAbstract">
    <Property Name="Value" Type="Edm.PrimitiveType" Nullable="false"/>
  </ComplexType>

  <ComplexType Name="DataFieldWithAction" BaseType="UI.DataField">
    <Property Name="Action" Type="Common.QualifiedName" Nullable="false" />
  </ComplexType>

  <ComplexType Name="DataFieldWithIntentBasedNavigation" BaseType="UI.DataField">
    <Property Name="SemanticObject" Type="Edm.String" Nullable="false"/>
    <Property Name="Action" Type="Edm.String" Nullable="true" />
  </ComplexType>

  <ComplexType Name="DataFieldWithUrl" BaseType="UI.DataField">
    <Property Name="Url" Type="Edm.String" Nullable="false" />
    <Property Name="UrlContentType" Type="Edm.String" Nullable="true" />
  </ComplexType>

</Schema>
```

How to use an annotation?



Vocabulary Reference

Found inside back-end and location annotations

Service Metadata

- Vocabulary references (yellow)
- Service Schema (green)
 - Entity Types
 - Entity Sets
 - Associations
 - Etc

```
<?xml version="1.0" encoding="utf-8"?>
<edmx:Edmx Version="1.0"
  xmlns:edmx="http://schemas.microsoft.com/ado/2007/06/edmx"
  xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata"
  xmlns:sap="http://www.sap.com/Protocols/SAPData">
  <edmx:Reference >
    <edmx:Include Namespace="Org.OData.Capabilities.V1" Alias="Capabilities"/>
    <edmx:Include Namespace="Org.OData.Aggregation.V1" Alias="Aggregation"/>
    <edmx:Include Namespace="Org.OData.Measures.V1" Alias="CQP"/>
    <edmx:Include Namespace="Org.OData.Core.V1" Alias="Core"/>
    <edmx:Include Namespace="com.sap.vocabularies.Common.v1" Alias="Common"/>
    <edmx:Include Namespace="com.sap.vocabularies.Communication.v1" Alias="Communication"/>
    <edmx:Include Namespace="com.sap.vocabularies.UI.v1" Alias="UI"/>
  </edmx:Reference>
  <edmx:DataService >
    <Schema Namespace="SchemaName" >
      <!-- Entity Types and Associations -->
      <EntityContainer Name="ContainerName" >
        <!-- Entity Sets and Association Sets -->
      </EntityContainer>
    </Schema>
  </edmx:DataService>
</edmx:Edmx>
```

Purchase Requisition App (F1640)

Purchase Requisitions (188)

Standard



Purchase Requisition	Requester	Requisition date
10000000		10/06/2017 >
10000010		10/09/2017 >
10000011		10/09/2017 >
10000020		10/16/2017 >

View Settings

Columns


Sort


Filter

Group

(none)

Ascending





Purchase Requisition App (F1640)

Org.OData.Aggregation.V1

```
<Schema xmlns="http://docs.oasis-open.org/odata/ns/edm"
  Namespace="Org.OData.Aggregation.V1"
  Alias="Aggregation">

  <Term Name="ApplySupported"
    Type="Aggregation.ApplySupportedType"
    AppliesTo="EntityType ComplexType EntityContainer">
  </Term>

  <ComplexType Name="ApplySupportedType">
    <Property Name="Transformations"
      Type="Collection(Edm.String)"
      Nullable="false"/>
    <Property Name="CustomAggregationMethods"
      Type="Collection(Edm.String)"
      Nullable="false"/>
    <Property Name="Rollup"
      Nullable="false"
      DefaultValue="MultipleHierarchies"
      Type="Aggregation.RollupType"/>
    <Property Name="PropertyRestrictions"
      Nullable="false"
      DefaultValue="false"
      Type="Edm.Boolean"/>
  </ComplexType>

</Schema>
```

OData Service

```
<edmx:Reference>
  <edmx:Include Namespace="Org.OData.Aggregation.V1"
    Alias="Aggregation"/>
</edmx:Reference>

<edmx:DataServices>

  <Schema Namespace="C_PURREQUISITION_FS_SRV">
    <!-- Entity Types and Associations -->
    <EntityContainer Name="C_PURREQUISITION_FS_SRV_Entities">
      <!-- Entity Sets and Association Sets -->
    </EntityContainer>

    <Annotations Target="C_PURREQUISITION_FS_SRV.C_PURREQUISITION_FS_SRV_Entities">

      <Annotation Term="Aggregation.ApplySupported">
        <Record>
          <PropertyValue Property="Transformations">
            <Collection>
              <String>aggregate</String>
              <String>groupby</String>
              <String>filter</String>
            </Collection>
          </PropertyValue>
          <PropertyValue Property="Rollup"
            EnumMember="None"/>
        </Record>
      </Annotation>

    </Annotations>

  </Schema>
</edmx:DataServices>
```


Purchase Requisition App (F1640)

Org.OData.Capabilities.V1

OData Service

```
<Term Name="FilterRestrictions"
  Type="Capabilities.FilterRestrictionsType"
  AppliesTo="EntitySet"/>

<ComplexType Name="FilterRestrictionsType">
  <Property Name="NonFilterableProperties"
    Type="Collection(Edm.PropertyPath)"
    Nullable="false"/>

  <Property Name="Filterable"
    Type="Edm.Boolean"
    Nullable="false"
    DefaultValue="true"/>
</ComplexType>
```

```
<Schema Namespace="C_PURREQUISITION_FS_SRV">
  <!-- Entity Types and Associations -->
  <EntityContainer Name="C_PURREQUISITION_FS_SRV_Entities">

    <EntitySet Name="C_PurRequisitionItemFs"
      EntityType="C_PURREQUISITION_FS_SRV.C_PurRequisitionItemFsType" />

  </EntityContainer>

  <Annotations
    Target="C_PURREQUISITION_FS_SRV.C_PURREQUISITION_FS_SRV_Entities/C_PurRequisitionItemFs">

    <Annotation Term="Capabilities.FilterRestrictions">
      <Record>
        <PropertyValue Property="NonFilterableProperties">
          <Collection>
            <PropertyPath>PurReqnItmConfidenceLevelDesc</PropertyPath>
            <PropertyPath>PurReqnApprvlRank1FeatureDesc</PropertyPath>
            <PropertyPath>PurReqnApprvlRank2FeatureDesc</PropertyPath>
          </Collection>
        </PropertyValue>
      </Record>
    </Annotation>

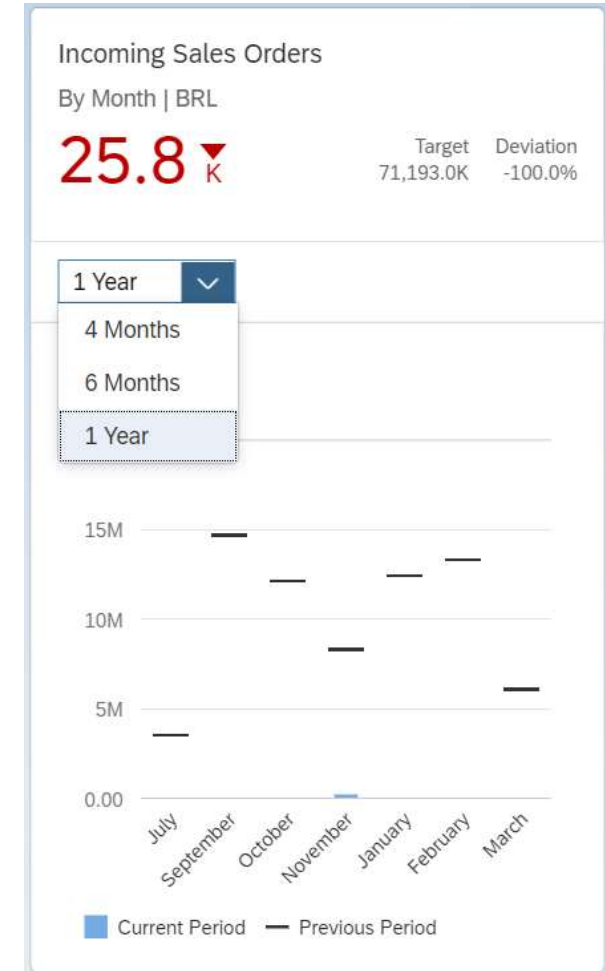
  </Annotations>
</Schema>
```

My Sales Overview (F2200)

Incoming Sales Orders card

- Entity Set: C_MonthlySalesRevenue_F2200Result
- 3 pre-defined filters:
 - 4 months
 - 6 months
 - 1 year

This scenario requires a **qualifier** because the same term is applied on the same entity.



My Sales Overview (F2200)

com.sap.vocabularies.UI.v1

```
<Term Name="SelectionVariant"
  Type="UI.SelectionVariantType"
  AppliesTo="EntitySet EntityType"/>

<ComplexType Name="SelectionVariantType">
  <Property Name="Parameters"
    Type="Collection(UI.ParameterAbstract)"
    Nullable="false"/>
</ComplexType>

<ComplexType Name="ParameterAbstract"
  Abstract="true">
</ComplexType>

<ComplexType Name="Parameter"
  BaseType="UI.ParameterAbstract">
  <Property Name="PropertyName"
    Type="Edm.PropertyPath"
    Nullable="false"/>
  <Property Name="PropertyValue"
    Type="Edm.PrimitiveType"
    Nullable="false"/>
</ComplexType>
```

OData Service

```
<Annotations Target="FCLM_BAM_ACCOUNTOV_SRV.C_BankAcctProfilesType">
  <Annotation Term="UI.SelectionVariant"
    Qualifier="IS4">
    <Record Type="UI.SelectionVariantType">
      <PropertyValue Property="Parameters">
        <Collection>
          <Record Type="UI.Parameter">
            <PropertyValue Property="PropertyName"
              PropertyPath="P_NumberOfMonths">
              <PropertyPath>P_NumberOfMonths</PropertyPath>
            </PropertyValue>
            <PropertyValue Property="PropertyValue"
              String="4"/>
          </Record>
        </Collection>
      </PropertyValue>
    </Record>
  </Annotation>

  <Annotation Term="UI.SelectionVariant"
    Qualifier="IS6">
    <!-- Same as above with PropertyValue = 6 -->
  </Annotation>

  <Annotation Term="UI.SelectionVariant"
    Qualifier="IS12">
    <!-- Same as above with PropertyValue = 12 -->
  </Annotation>
</Annotations>
```

What are the available annotations?



Available annotations

API Reference inside the docs

“Annotations” tab

- Sample annotations are available in a specific tab inside smart controls documentation
- Hints:
 - Smart Controls are used internally in Fiori elements apps
 - If the sample is not complete, just grab Term and search for its detailed structure inside the right vocabular

class sap.ui.comp.smartchart.SmartChart

Control Sample: [sap.ui.comp.smartchart.SmartChart](#)

Module: sap/ui/comp/smartchart/SmartChart

Application Comp

Documentation: [Smart Chart](#)

Visibility: public

Extends: [sap.m.VBox](#)

Available since: N/A

The screenshot shows the SAPUI5 API documentation for the `sap.ui.comp.smartchart.SmartChart` class. The 'Annotations' tab is selected, displaying a list of supported annotations. The list includes: Summary, Chart, DataPoint, FieldControlType, IsCalendarYear, IsCalendarYearMonth, IsCalendarYearQuarter, IsCalendarYearWeek, IsFiscalYear, IsFiscalYearPeriod, PresentationVariant, SemanticObject, Text, and TextArrangement. The 'Summary' annotation is highlighted.

Overview Constructor Properties Aggregations Associations Events Methods Annotations

The SmartChart control creates a chart based on the OData metadata and the provided configuration. To use the control, you need to fetch the metadata, from which the chart UI will be generated. Based on the `chartType` property, this control will render initially the corresponding chart. **Note:** Most of the properties are not dynamic and cannot be changed once the control has been initialized. **Important:** Keep in mind that SmartChart, like all SAPUI5 smart controls, retrieves and analyzes the metadata and these OData services are not part of the SAPUI5 framework and are usually maintained by the backend developer. With time, SmartChart can evolve and acquire new features. This means that its behavior or functionalities may change based on the backend metadata. To benefit from the new functionalities, your application should be able to adapt the backend metadata to control over the metadata of your application. A detailed description of the OData annotations handled by this control is available [here](#). Annotation Restrictions: Qualifier support for entity types is limited for this control.

Constructor

Constructor for a new SmartChart instance.

Accepts an object literal `mSettings` that defines initial property values, aggregated and associated objects as well as a general description of the syntax of the settings object.

```
new sap.ui.comp.smartchart.SmartChart(sId?, mSettings?)
```

Param	Type	Default Value	Description
-------	------	---------------	-------------

Bonus: What are the most used annotations?



What are the most used annotations?

Check my newest blog post on SAP Community

<https://people.sap.com/fabioluiz.esperatipagoti#content:blogposts>



Thank you!

Fábio Pagoti

Fiori Instructor @ OVLY

fabio.pagoti@ovly.com.br

<https://ovly.com.br>



UI5con^{ON AIR}