
**Extending the PersInfo SAP Apps (Fiori 2.0)
by Customer-specific Fields
Version 2
2019-11-11**





TABLE OF CONTENTS

A	BACKEND	3
1	General Guidelines	3
2	Extending an OData Entity.....	6
2.1	<i>Extending an OData Entity via Customer Include.....</i>	6
2.2	<i>Extending an OData Entity via Extending the Entity Structure</i>	6
3	Gateway Test Client.....	12
B	FRONTEND	15
1	Extending the Fiori country screen	15
1.1	<i>Extending the Available Screen by Using the Extension Point.....</i>	15
1.2	<i>Creating a New Screen to Replace the Existing One</i>	18

This document covers a guideline for customers how to extend the *PersInfo* SAP Fiori (2.0) OData services *My Addresses*, *My Bank Details*, *My Communication Data*, *My Family Members*, *My Internal Data* and *My Personal Data* with **customer-specific entity fields**.

The mentioned OData services can be found in the *SAP NetWeaver GatewayService Builder* (transaction **SEGW**) in your backend SAP system.

The PersInfo projects delivered by SAP are:

Project	Name of PersInfo SAP Fiori App
HCMFAB_MYADDRESSES	My Addresses
HCMFAB_MYBANKDETAILS	My Bank Details
HCMFAB_MYCOMMUNICATION	My Communication
HCMFAB_MYFAMILYMEMBERS	My Family Member
HCMFAB_MYINTERNALDATA	My Internal Data
HCMFAB_MYPersonalDATA	My Personal Data

Note

In this document the *My Personal Data* SAP Fiori app will be taken as an example to concretize the explanations.

A special case is the extension of one of the mentioned apps by fields already available in the corresponding UI structure HCMT_BSP_PA_<CC>_R<nnnn> but not available in the display and edit UI screen provided by SAP:

All fields covered by UI structures are available in the properties of the corresponding OData entity (e.g. *PersonalData10* of project HCMFAB_MYPersonalDATA). Therefore, it's not necessary to extend the corresponding OData service as described in chapter "Backend". To add these fields to the UI screens, please proceed with chapter "Extending the Fiori Country Screen".

A BACKEND

1 General Guidelines

A general guideline how to extend an OData service can be found in SAP Note [1919388](#) – *How to extend OData Services in Service Builder*. You can download the detailed description attached to this note.

For all changes to be applied to an OData service owned by SAP, you have to redefine this service by your own using the redefine technique of the *Service Builder* as described in the SAP Help Portal: https://help.sap.com/saphelp_gateway20sp12/helpdata/en/e3/cf9c0e0b234be08f0b4ae4a0af16f6/frameset.htm

To redefine the *My Personal Data* related OData service, you must perform the following steps:

1. Create a new project in your customer namespace.

Note

In our example the name of the new project is ZHCMFAB_MYPersonalDATA.

2. Right-click on the *Data Model* and select *Redefine -> OData Service (SAP GW)*.

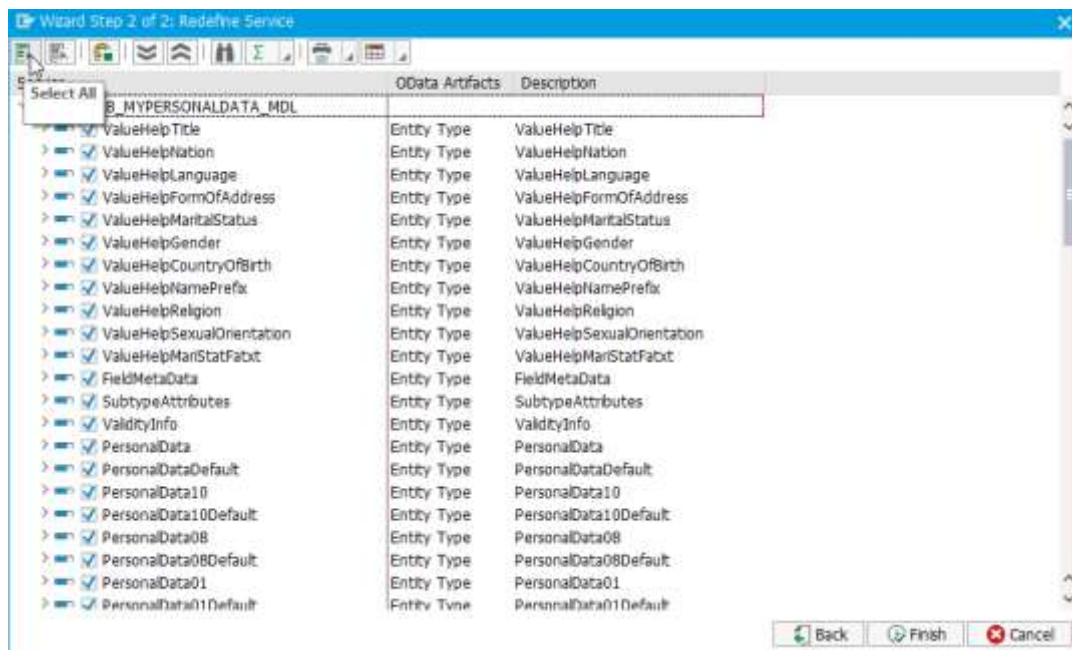


3. Enter the correct *Technical Service Name* and *Version* or choose it from the list of input help values.
In our example it's HCMFAB_MYPERSOALDATA_SRV.

4. Select the *OData Artifacts* to be used by your app.

Note

To be on the save side *select all* and click 'Finish'.



5. Check and generate your project.

Model and Service Definition

Model Provider Class

Class Name
ZCL_ZHCMFAB_MYPERSO_01_MPC_EXT

Base Class Name
ZCL_ZHCMFAB_MYPERSO_01_MPC

Data Provider Class

☒ Generate Classes

Class Name
ZCL_ZHCMFAB_MYPERSO_01_DPC_EXT

Base Class Name
ZCL_ZHCMFAB_MYPERSO_01_DPC

Service Registration

Technical Model Name
ZHCMFAB_MYPERSONALDATA_MDL_01

Model Version
1

Technical Service Name
ZHCMFAB_MYPERSONALDATA_SRV_01

Service Version
1

Service Extension

☒ Overwrite Base/Extended Service
Base service will be inaccessible!

Technical Service Name
HCMFAB_MYPERSONALDATA_SRV

Service Version
1

☒ ☐

In the redefined service model, you can now proceed with adding you customer-specific entity fields as described in the following chapters.

In this document country-specific fields for US are added to the *My Personal Data* app. Throughout the document in our example <CC> means country code is **US** and the Version ID is **10**.

2 Extending an OData Entity

General Remark: SAP allows extension to main and default entities.

Depending on the service these entities are named as follows:

Service	Entities
HCMFAB_MYADDRESSES	Address<VI>, Address<VI>Default
HCMFAB_MYBANKDETAILS	BankDetail<VI>, BankDetail<VI>Detail
HCMFAB_MYCOMMUNICATION	Communication, CommunicationDefault
HCMFAB_MYFAMILYMEMBERS	FamilyMember<VI>, FamilyMember<VI>Default
HCMFAB_MYINTERNALDATA	InternalData, InternalDataDefault
HCMFAB_MYPersonalDATA	PersonalData<VI>, PersonalData<VI>Default

In our example the US-specific main entities *PersonalData10* and *PersonalData10Default* are extended.

SAP don't allow extensions to *ValueHelp* and *SearchHelp* entities.

In case you like to extend a *ValueHelp* or *SearchHelp* you must add a new (customer-specific) entity to the OData model and define the associations to the corresponding entities as well as adapt the XML UI screen.

After having redefined OData model HCMFAB_MYPersonalDATA as described in chapter [General Guidelines](#), you can extend an OData entity in two different ways:

2.1 Extending an OData Entity via Customer Include

Using the customer include attached to the corresponding HCMT_BSP_PA_<CC>_R<nnnn> structure, whereas <nnnn> has to be replaced by the corresponding infotype number (in our case it looks like HCMT_BSP_PA_US_R0002), enables you to display your customer-specific fields on the UI as well as handle them during *Create*, *Update* and *Delete* of the corresponding infotype record.

You can find a detailed documentation on how to do in the SAP Help Portal at:

https://help.sap.com/erp_sfi_addon10/helpdata/en/4f/d526cb575e11d189270000e8322f96/framest.htm

Be aware that you must implement BAdI *HRPAD00INFTYBL* to be able to perform checks during *Insert*, *Modify* and *Deletion* of a record and to handle customer-specific data during update of the data base.

Note

A detailed documentation can be found in the documentation of the BAdI in your ERP system.

2.2 Extending an OData Entity via Extending the Entity Structure

Using the extension include structure assigned to the corresponding DDIC structure the entity is based on, your customer-specific fields are only available for displaying purposes and corresponding database tables cannot be updated together with the UI structure itself.

In case you like to update additional fields together with the infotype record, you must implement the customer include structure attached to the corresponding HCMT_BSP_PA_<CC>_R<NNNN> structure as described in chapter '2.1 Extending an OData Entity via Customer Include'.

In case you only want to add customer-specific fields for displaying purposes to the UI, you can proceed as follows:

1. In your redefined OData service open folder *Entity Types* and double-click the corresponding main entity. In our example this is *PersonalData10*.

The screenshot shows the SAP Gateway Service Builder interface. On the left, a tree view shows the project structure: HCMFAB_MYPERSONALDATA, ZHCMFAB_MYPERSONALDATA, Data Model, and Entity Types. Under Entity Types, PersonalData10 is selected. On the right, a table lists the Entity Types and their corresponding ABAP Structures.

Name	ABAP Structure
FieldMetaData	HCMFAB_S_PERS_FIELDMETADATA
PersonalData	HCMFAB_S_PERS_PERSONALDATA
PersonalData01	HCMFAB_S_PERS_PERSONALDATA_01
PersonalData01Default	HCMFAB_S_PERS_PERSONALDATA_01
PersonalData08	HCMFAB_S_PERS_PERSONALDATA_08
PersonalData08Default	HCMFAB_S_PERS_PERSONALDATA_08
PersonalData10	HCMFAB_S_PERS_PERSONALDATA_10
PersonalData10Default	HCMFAB_S_PERS_PERSONALDATA_10
PersonalDataDefault	HCMFAB_S_PERS_PERSONALDATA
SubtypeAttributes	HCMFAB_S_PERS_SUBTYPEATTRIBS
ValidityInfo	HCMFAB_S_PERS_VALIDITY
ValueHelpCountryOfBirth	HCMFAB_S_PERS_VH_COUNTRY
ValueHelpFormOfAddress	HCMFAB_S_PERS_VH_F_O_ADDRESS
ValueHelpGender	HCMFAB_S_PERS_VH_GENDER
ValueHelpLanguage	HCMFAB_S_PERS_VH_LANGUAGE
ValueHelpMariStatFatxt	HCMFAB_S_PERS_VH_MARISTATFATXT
ValueHelpMaritalStatus	HCMFAB_S_PERS_VH_MARITALSTATUS
ValueHelpNameFormatI..	HCMFAB_S_PERS_VH_KNZNM
ValueHelpNamePrefix	HCMFAB_S_PERS_VH_TITLE
ValueHelpNation	HCMFAB_S_PERS_VH_NATION
ValueHelpReligion	HCMFAB_S_PERS_VH_KONFE
ValueHelpSexualOrienta...	HCMFAB_S_PERS_VH_SEXO
ValueHelpTitle	HCMFAB_S_PERS_VH_TITLE

2. Open transaction **SE11** (ABAP Dictionary) and display the attached ABAP structure – in our example this is HCMFAB_S_PERS_PERSONALDATA_10.

Double-click the corresponding extension include structure.

In our example this is HCMFAB_S_PERS_PERSDAT_10_INCL.

The screenshot shows the SAP Dictionary: Display Structure screen. The structure HCMFAB_S_PERS_PERSONALDATA_10 is active. The Components tab is selected, showing a list of components. The component HCMFAB_S_PERS_PERSDAT_10_INCL is highlighted with a red arrow.

Component	Type	Component Type	Data Type	Length	Dec...	Short Description	Group
INCLUDE	Types	HCMFAB_S_PERS_PSEKEY		0		0 Keys for HR Master Data	HCMFAB_PSEKEY
INCLUDE	Types	HCMFAB_S_PERS_UI0002_10		0		0 Single Screen for Infotype 0002 (Personal Data - USA)	UI_0002
INCLUDE	Types	HCMFAB_S_PERS_SUBTY_OPERATIONS		0		0 Subtype Operations (editable, deletable)	
INCLUDE	Types	HCMFAB_S_PERS_UI_SCREEN		0		0 PersInfo UI Screens	UI_SCREEN
INCLUDE	Types	HCMFAB_S_PERS_PERSDAT_10_INCL		0		0 My PersonalData (US version) extension include	HCMFAB_S_PERS_PERSDAT_10_INCL
HCMFAB_PERSDAT_10	Types	FUNCTION		1		0 Dummy function in length 1	

In the menu bar choose *Append Structure...* and enter the name of your customer append structure. A detailed documentation on append structures can be found in the SAP Help Portal at https://help.sap.com/doc/saphelp_crm700_ehp03/7.0.3.11/en-US/cf/21ebc9446011d189700000e8322d00/frameset.htm.

In our example you create append structure ZAPPEND_PERSONALDATA_10 appending a text field for communication language.

Dictionary: Change Append Structure

Append Structure: ZAPPEND_PERSONALDATA_10 Active

Short Description: Append Structure for HCMFAB_S_PERS_PERSDAT_10_INCL

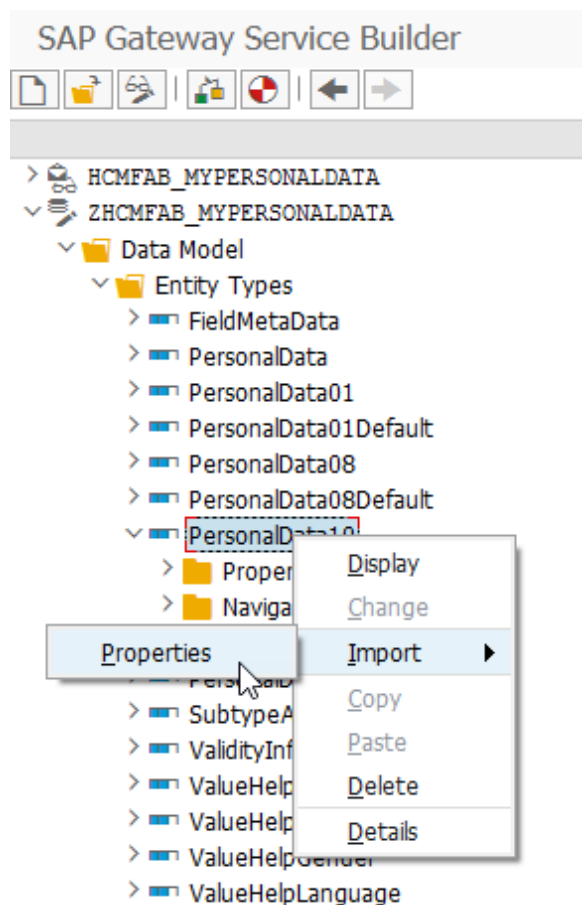
Attributes Components Input Help/Check Currency/quantity fields

Component	Typing Method	Component Type	Data Type	Length	Deci...	Short Description
ZZSPTXT	Types	SPTXT	CHAR	16		0 Name of Language

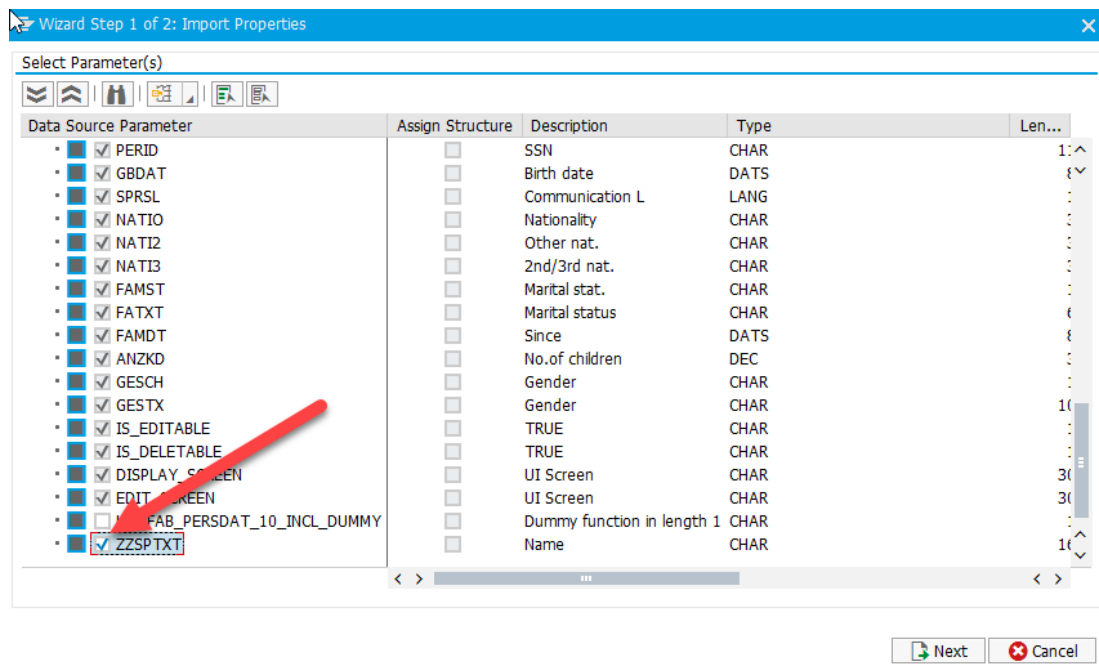
Select the correct enhancement category.

Save and activate your changes.

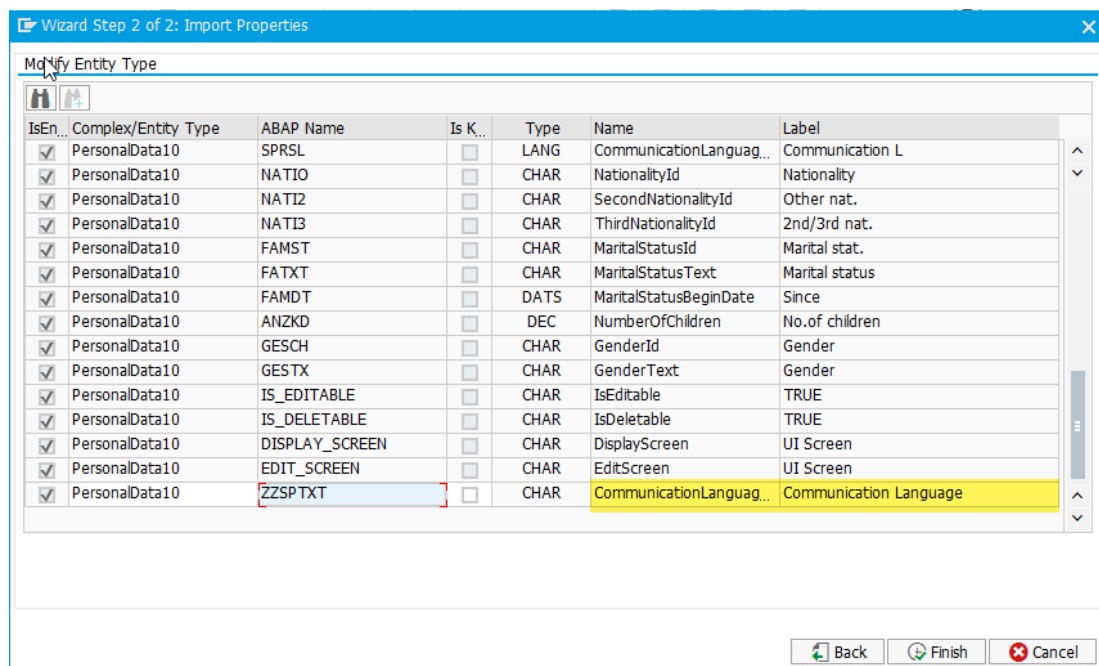
- Switch back to transaction **SEGW** and open your redefinition of the OData service.
- Navigate to the main *Entity Type* of the entity to be extended, in our example this is *PersonalData10*. Right-click on the entity name and choose *Import -> Properties*.



Select the properties of the append structure and click *Next*.

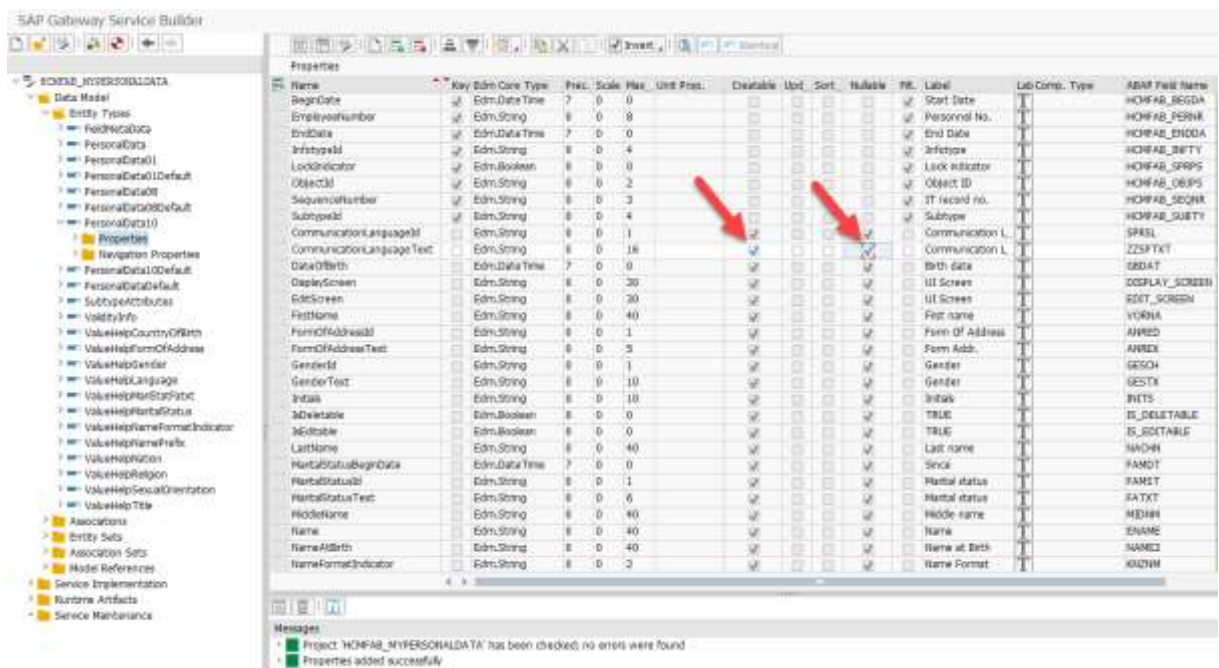


Enter an appropriate *Name* and *Label* and click *Finish*.



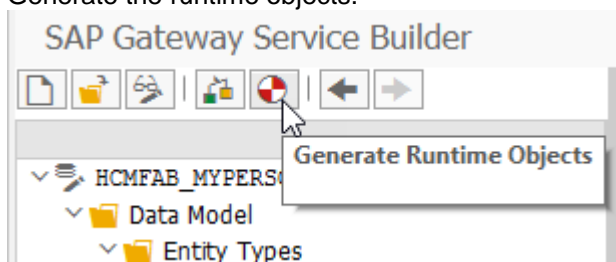
The new property is added to your entity now.

- Double-click the *Properties* folder of the corresponding main entity and flag the property as *Creatable* and *Nullable*.



- Save your changes.
Repeat steps (4) to (6) for the corresponding default entity.
In our example this is *PersonalData10Default*.

Generate the runtime objects.



Now the additional properties are added to your main and default entity.

The only thing left from a backend point-of-view is filling the properties with corresponding values during data retrieval.

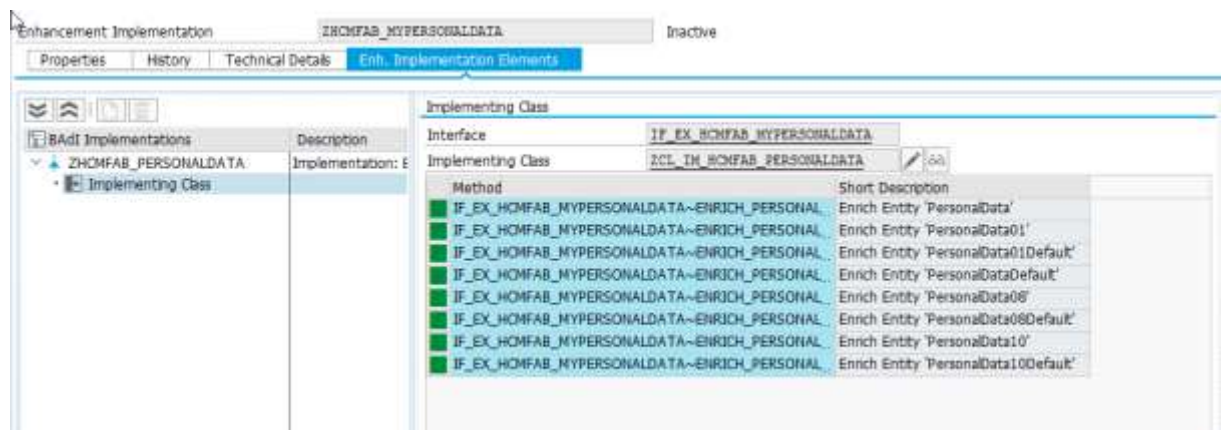
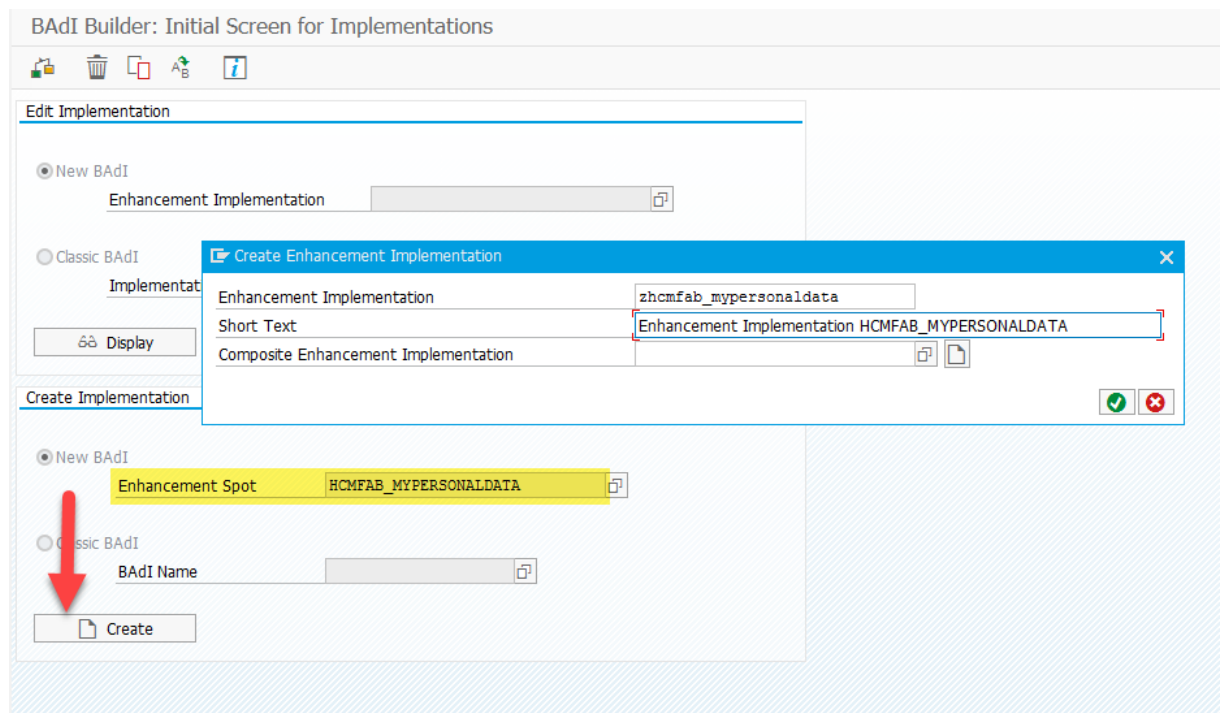
For this purpose, you must implement an Enhancement Spot.

Each OData service provides its own enhancement spot, see list below:

- HCMFAB_MYADDRESSES
- HCMFAB_MYBANKDETAILS
- HCMFAB_MYCOMMUNICATION
- HCMFAB_MYFAMILYMEMBERS
- HCMFAB_MYINTERNALDATA
- HCMFAB_MYPersonalData

In our example this is enhancement spot *HCMFAB_MYPersonalData*.

- Start transaction **SE19** and create an implementation for enhancement spot *HCMFAB_MYPersonalData*.



The BAdI interface implemented by your BAdI implementation class provides a method for each main and default entity of the corresponding OData service.

Create implementations for all methods related to main and default entities extended above.

In our case you must create implementations for methods

- `IF_EX_HCMFAB_MYPERSOALDATA~ENRICH_PERSONALDATA10`
- `IF_EX_HCMFAB_MYPERSOALDATA~ENRICH_PERSONALDATA10DEFAULT`

Check, save and activate your implementation.

Once you are done with this, the backend part of the enhancement is ready for use.

3 Gateway Test Client

To test the data retrieval without frontend client, logon to your gateway test system and proceed as follows:

1. Start transaction **/n/iwfnd/maint_service**.
2. Search for technical service name.

Technical Service Names

Name of PersInfo SAP Fiori App	Technical Service Name
My Addresses	ZHCMFAB_MYADDRESSES_SRV
My Bank Details	ZHCMFAB_MYBANKDETAILS_SRV
My Communication	ZHCMFAB_MYCOMMUNICATION_SRV
My Family Members	ZHCMFAB_MYFAMILYMEMBERS_SRV
My Internal Data	ZHCMFAB_MYINTERNALDATA_SRV
My Personal Data	ZHCMFAB_MYPERSONALDATA_SRV

In our example you must search for technical service **ZHCMFAB_MYPERSONALDATA_SRV**.

3. Double-click the service name.
4. Choose *SAP Gateway Client* to start the gateway test client.

Activate and Maintain Services

Service Catalog

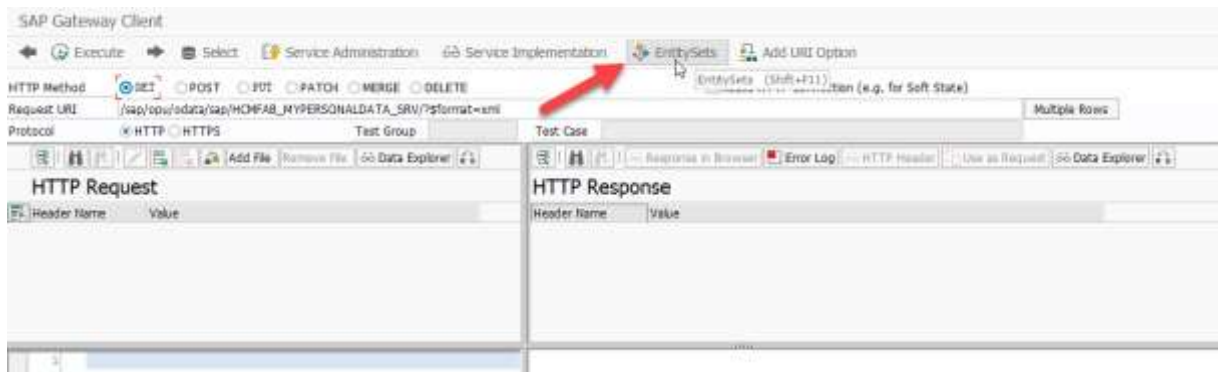
Type	Technical Service Name	V...	Service Description	External Service Name
BEP	ZHCMFAB_APR_TIMESHEET_SRV	1	Odata Service for Approve Timesheet Application	HCMFAB_APR_TIMESHEET
BEP	ZHCMFAB_COMMON_SRV	1		HCMFAB_COMMON_SRV
BEP	ZHCMFAB_EMPLOYEELOOKUP_SRV	1		HCMFAB_EMPLOYEELOOK
BEP	ZHCMFAB_LEAVE_REQUEST_APR_SRV	1		HCMFAB_LEAVE_REQUEST
BEP	ZHCMFAB_LEAVE_REQUEST_CR_SRV	1		HCMFAB_LEAVE_REQUEST
BEP	ZHCMFAB_MYADDRESSES_SRV	1		HCMFAB_MYADDRESSES
BEP	ZHCMFAB_MYBANKDETAILS_SRV	1		HCMFAB_MYBANKDETAILS
BEP	ZHCMFAB_MYBENEFITS_SRV	1	HCM My Benefits Fab fiori	HCMFAB_MYBENEFITS_SR
BEP	ZHCMFAB_MYCOMMUNICATION_SRV	1	Communication	HCMFAB_MYCOMMUNICAT
BEP	ZHCMFAB_MYFAMILYMEMBERS_SRV	1		HCMFAB_MYFAMILYMEMB
BEP	ZHCMFAB_MYINTERNALDATA_SRV	1	My Internal Data	HCMFAB_MYINTERNALDA
BEP	ZHCMFAB_MYPAYSTUBS_SRV	1		HCMFAB_MYPAYSTUBS_S
BEP	ZHCMFAB_MYPERSONALDATA_SRV	1		HCMFAB_MYPERSONALDA
BEP	ZHCMFAB_MYPROFILE_SRV	1		HCMFAB_MYPROFILE_SRV
BEP	ZHCMFAB_MYTIMEEVENTS_SRV	1		HCMFAB_MYTIMEEVENTS
BEP	ZHCMFAB_MYTIMESHEET_SRV	1	Fab Fiori My Time Sheet Application	HCMFAB_MYTIMESHEET_S
BEP	ZHCMFAB_MYTIMESTATEMENTS_SRV	1	My Timestatements	HCMFAB_MYTIMESTATEM
BEP	ZHCMFAB_TIMEEVENTS_APR_SRV	1		HCMFAB_TIMEEVENTS_AF
BEP	ZHCMFAB_TIMESHEET_MAINT_SRV	1	Fab Fiori Timesheet Manage	HCMFAB_TIMESHEET_MA
BEP	ILM_ARCH_VARIANT_DIST_SERVICE	1	Service for archiving distribution app	ILM_ARCH_VARIANT_DIST
BEP	ILM_JOB_MONITOR_SERVICE	1	ILM Job Monitor Service	ILM_JOB_MONITOR_SERV
BEP	ZINTEROP	1	Gateway Service of Interoperability	INTEROP
BEP	IRWC	1	ILM Reporting Work Center	IRWC
BEP	ZLAUNCHPAD	1	Launchpad Data Provider	LAUNCHPAD
	/IWFND/SG_MGW_NOTIF_STORE	1	ODATA Channel: Notification Store	NOTIFICATIONSTORE
BEP	ZPAGE_BUILDER_CONF	1	Pagebuilder - Configuration level	PAGE_BUILDER_CONF
BEP	ZPAGE_BUILDER_CUST	1	Pagebuilder - Customizing level	PAGE_BUILDER_CUST
BEP	ZPAGE_BUILDER_PERS		Pagebuilder - Personalization level	PAGE_BUILDER_PERS

ICF Node |
 Call Browser |
 SAP Gateway Client

ICF Nodes

Status	ICF Node	Session Time-out	Soft State	Description
OO	ODATA	00:00:00		Standard Mode

- In the menu bar of the *SAP Gateway Client* window choose *Entity Sets*.



- Choose the entity set you have enhanced above.

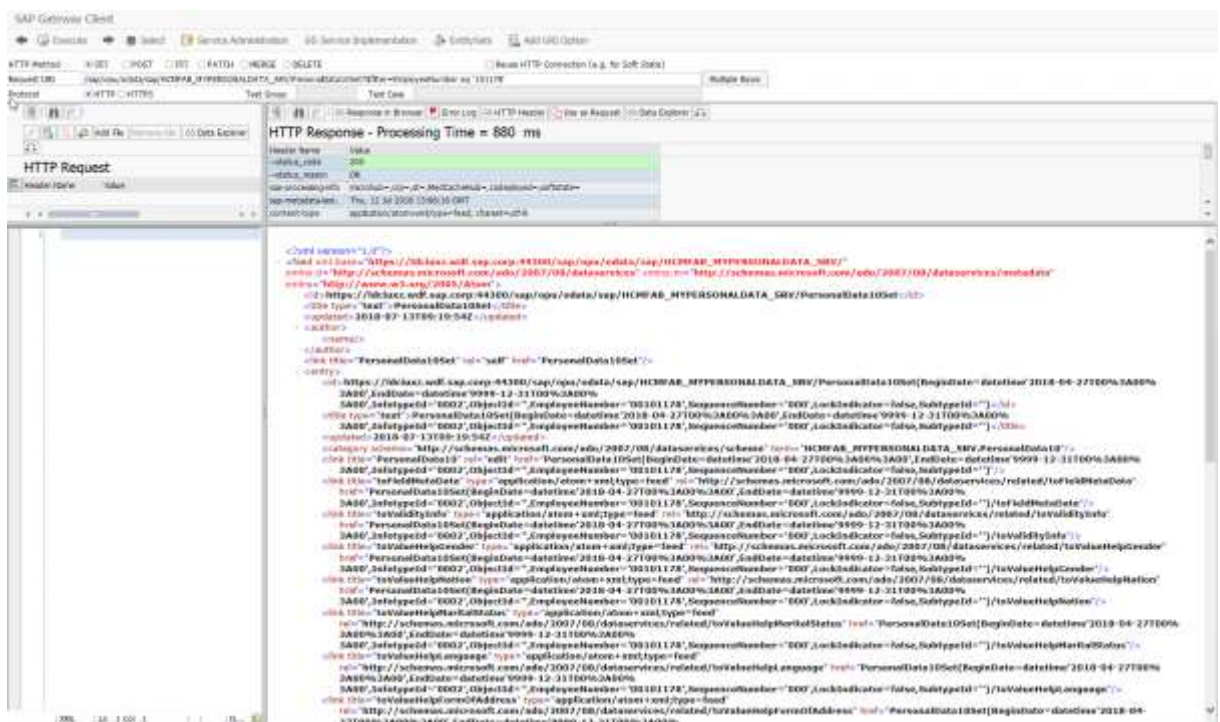
In our example this is *PersonalData10Set*.

- Add the following string to the request URL:

?\$filter=EmployeeNumber eq '<PERNR your user is assigned to in the backend system>', e.g.
?\$filter=EmployeeNumber eq '101178'

Executing the request results in fetching **all** (future) IT records for the corresponding infotype and PERNR.

In our example the result looks like this:



Your BAdI implementation should be called with the corresponding entity related method.

In our example **IF_EX_HCMFAB_MYPERSONALDATA-ENRICH_PERSONALDATA10** should be called.

In case you'd like to fetch only one specific record, you must pass the corresponding key fields by adding the following string to the Request URL:

(EmployeeNumber='PERNR',BeginDate=datetime'YYYY-MM-DDT00%3A00%3A00',EndDate=datetime'YYYY-MM-

DDT00%3A00%3A00',Infotypeld='0002',ObjectId='OBJID',SequenceNumber='SEQNR',LockIndicator=false,Subtypeld='SUBTY')

In our example it looks like this:

(EmployeeNumber='00101178',BeginDate=datetime'2018-04-27T00%3A00%3A00',EndDate=datetime'9999-12-31T00%3A00%3A00',Infotypeld='0002',ObjectId='',SequenceNumber='000',LockIndicator=false,Subtypeld='')

For debugging purposes, you can set an **external** break point in your implementation.

In case that one is not reached, you can set a break point in method /IWBEF/IF_MGW_APPL_SRV_RUNTIME~GET_ENTITYSET of the DPC_EXT-class of the corresponding OData service.

B FRONTEND

1 Extending the Fiori country screen

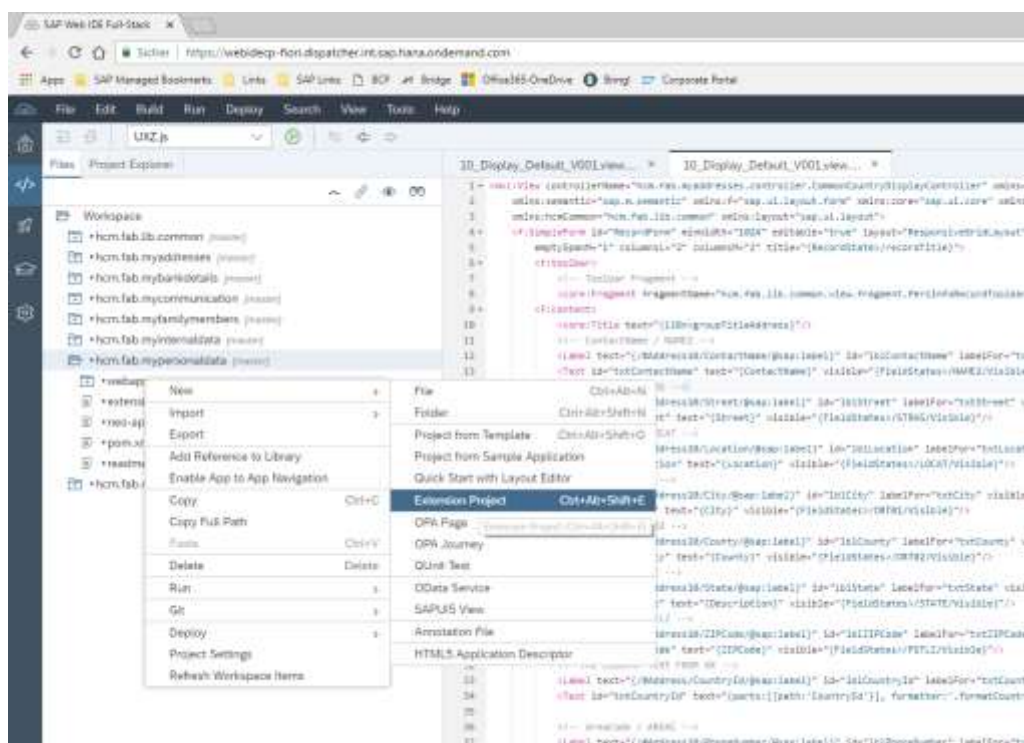
There are two options to include further properties from your entity on your screen. It is not relevant whether these fields were available already or were newly added by you as explained above.

The first option is to use the extension points available in every delivered screen version.

The second option is to create a completely new screen to replace the original one.

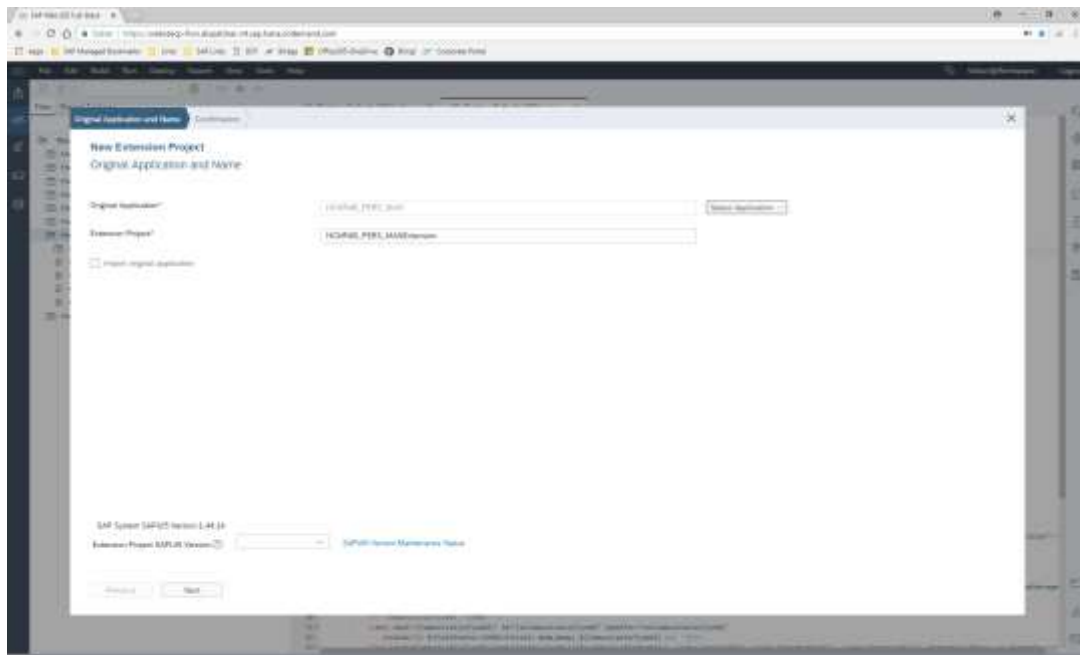
1.1 Extending the Available Screen by Using the Extension Point

1. First create an Extension Project for your app in the WebIDE.

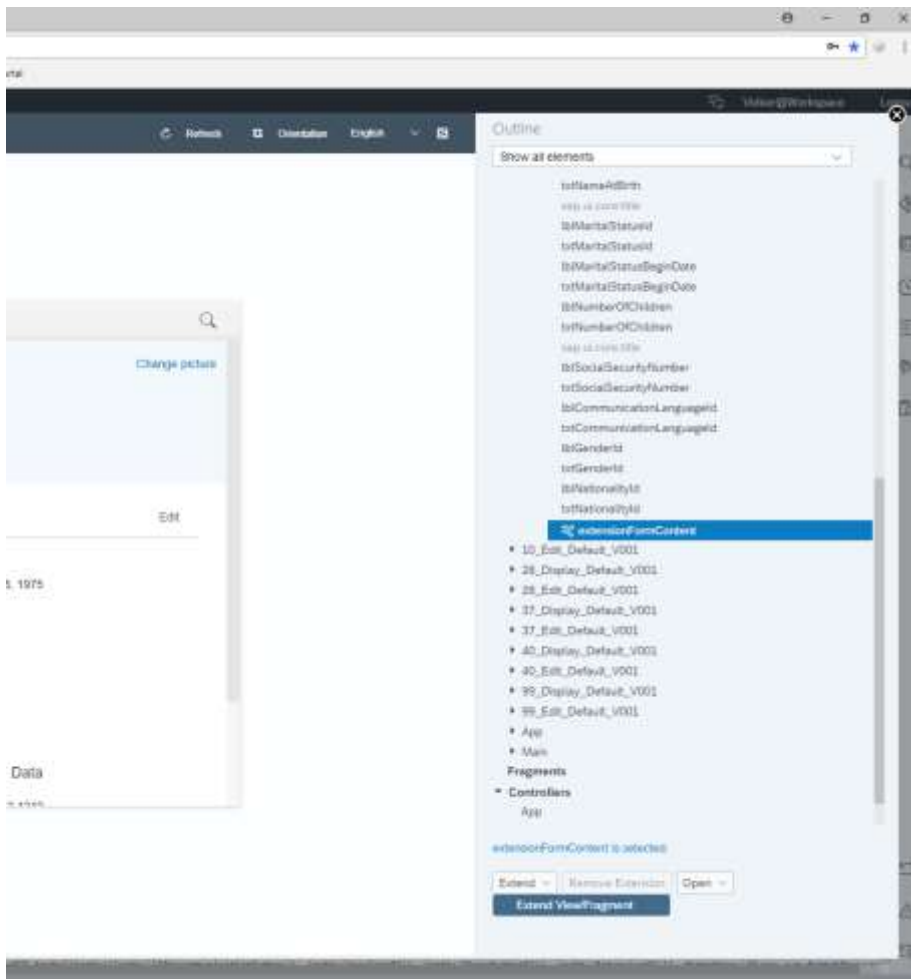


2. Find the corresponding BSP application from the SAPUI5 ABAP Repository.
In our example it is called HCMFAB_PERS_MAN for My Personal Data app.
The other Personal Information apps follow the same naming convention HCMFAB_*_MAN.

Keep the proposed name HCMFAB_PERS_MANExtension and click Next and then Finish.



3. In the Extension Pane on the righthand side find the relevant screen (you can open it via the “Tools” menu also when you want to come back to it later).
4. Choose 10_Display_Default_V002 to add a property to the display screen.
5. Expand the tree and find the extensionFormContent.
6. Select it and choose Extend->Extend View/Fragment.



7. Navigate to the extension Code. Do the same for the Edit screen if you want to add a field there.

Within this newly created fragment you can add your fields and they will show where the extension point was located in the original view which is at the end of the form. Alternatively, if you want to show it at a different location, you should go with the second option shown below.

Following the example above an added CommunicationLanguage property to the Display screen could look like this:

```

1 <core:FragmentDefinition xmlns:core="sap.ui.core" xmlns="sap.m" xmlns:mvc="sap.ui.core.mvc" xmlns:semantic="sap.m.semantic"
2   xmlns:f="sap.ui.layout.form" xmlns:footerbar="sap.ushell.ui.footerbar" xmlns:hcmCommon="hcm.fab.lib.common">
3   <!-- CommunicationLanguage / ZZSPTXT -->
4   <Label text="{/#Address10/CommunicationLanguage/@sap:label}" id="lblCommunicationLanguage" labelFor="txtCommunicationLanguage"
5     visible="{FieldStates}/ZZSPTXT/Visible"/>
6   <Text id="txtCounty" text="{CommunicationLanguage}" visible="{FieldStates}/ZZSPTXT/Visible"/>
7 </core:FragmentDefinition>

```

Accordingly, a corresponding Input field on the Edit screen could look like this:

```

1 <core:FragmentDefinition xmlns:core="sap.ui.core" xmlns="sap.m" xmlns:mvc="sap.ui.core.mvc" xmlns:semantic="sap.m.semantic"
2   xmlns:if="sap.ui.layout.form" xmlns:footerbar="sap.ushell.ui.footerbar" xmlns:hcmCommon="hcm.fab.lib.common">
3   <!-- CommunicationLanguage / ZZSPTXT -->
4   <Label text="{/#Address10/CommunicationLanguage/@sap:label}" id="lblCommunicationLanguage" labelFor="CommunicationLanguage"
5     visible="{FieldStates>/ZZSPTXT/Visible}" required="{FieldStates>/ZZSPTXT/Required}" />
6   <Input id="inpCommunicationLanguage" value="{CommunicationLanguage}" visible="{FieldStates>/ZZSPTXT/Visible}"
7     editable="{FieldStates>/ZZSPTXT/Editable}" required="{FieldStates>/ZZSPTXT/Required}"
8     maxLength="{=Number({/#Address10/CommunicationLanguage/@maxLength})}" fieldGroupIds="PersInfoValidation"/>
9 </core:FragmentDefinition>

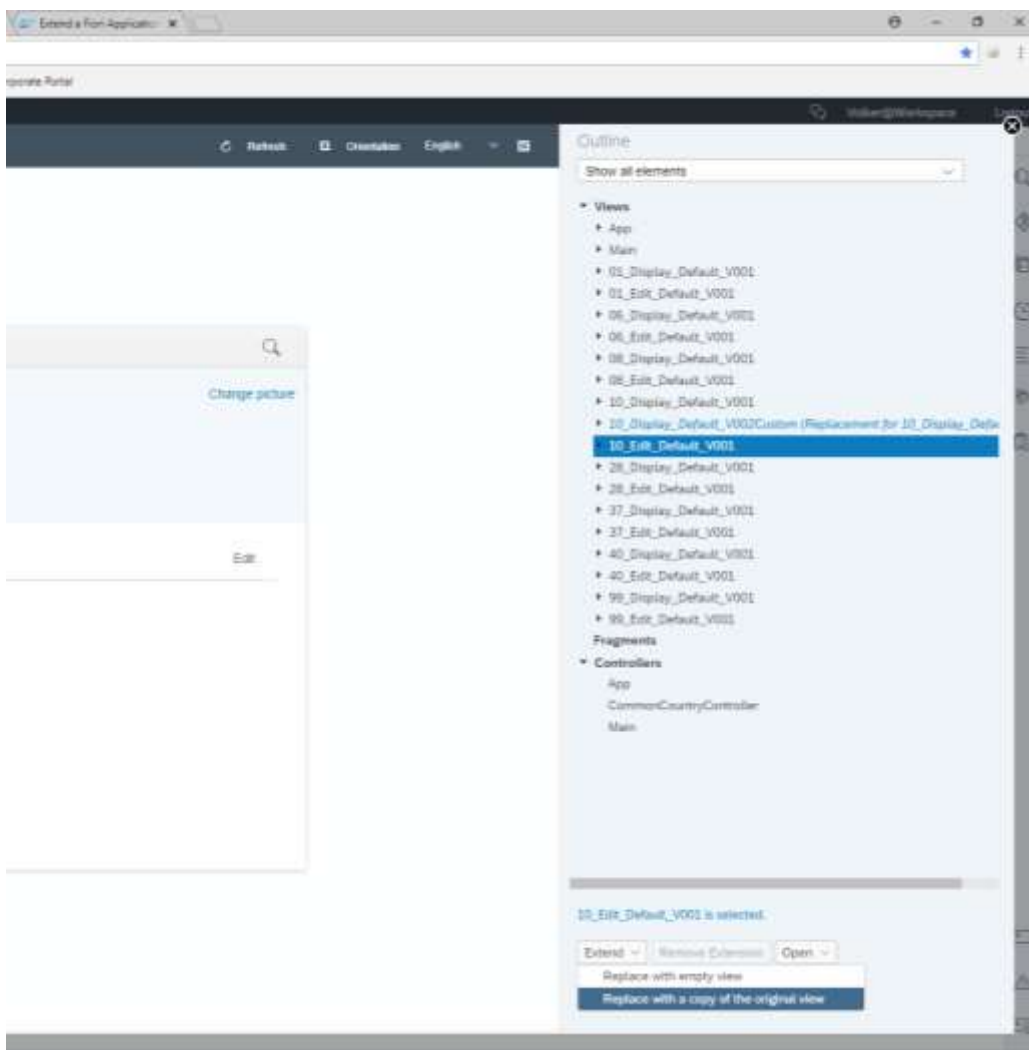
```

1.2 Creating a New Screen to Replace the Existing One

For this approach you need an extension project again. If you haven't created one, follow the steps mentioned above.

Find the view that you want to replace. In this example this is again the Edit and Display screens for the US version.

Select the screen and click Extend and then either one of the options. Replace with a copy of the original view will probably give you the best starting point to move around the existing properties, delete them or add new ones.



www.sap.com/contactsap

© 2018 SAP SE or an SAP affiliate company. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP SE or an SAP affiliate company.

The information contained herein may be changed without prior notice. Some software products marketed by SAP SE and its distributors contain proprietary software components of other software vendors. National product specifications may vary.

These materials are provided by SAP SE or an SAP affiliate company for informational purposes only, without representation or warranty of any kind, and SAP or its affiliated companies shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP or SAP affiliate company products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

In particular, SAP SE or its affiliated companies have no obligation to pursue any course of business outlined in this document or any related presentation, or to develop or release any functionality mentioned therein. This document, or any related presentation, and SAP SE's or its affiliated companies' strategy and possible future developments, products, and/or platform directions and functionality are all subject to change and may be changed by SAP SE or its affiliated companies at any time for any reason without notice. The information in this document is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. All forward-looking statements are subject to various risks and uncertainties that could cause actual results to differ materially from expectations. Readers are cautioned not to place undue reliance on these forward-looking statements, and they should not be relied upon in making purchasing decisions.

SAP and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP SE (or an SAP affiliate company) in Germany and other countries. All other product and service names mentioned are the trademarks of their respective companies. See <http://www.sap.com/corporate-en/legal/copyright/index.epx> for additional trademark information and notices.