

Use ABAP Cloud for SAP S/4HANA extensions

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PUBLIC

Agenda

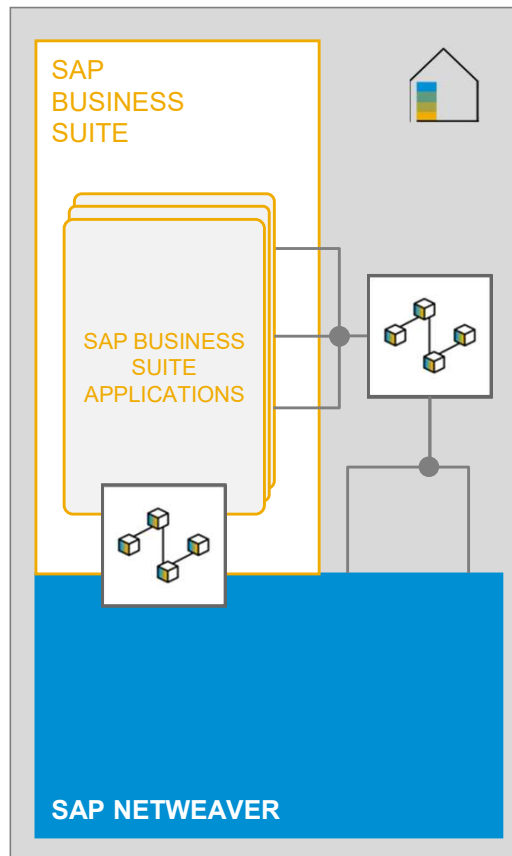
- 01** Classic custom **ABAP code** – What is the issue?
- 02** The **cloud extensibility model** used in SAP S/4HANA Cloud
- 03** **ABAP Cloud**
- 04** Reuse the cloud extensibility model in the **SAP S/4HANA private cloud and on-premise edition**

Classic custom ABAP Code

What is the issue?



Classic Extensibility: Classic custom ABAP code in on-premise



CLASSIC CUSTOM ABAP DEVELOPMENT

Use and modify all SAP objects

ALL SAP OBJECTS CAN BE USED IN CUSTOM CODE

```
10 data mtart type mara mtart.  
11  
12 select single mtart from mara into mtart when
```

SAP OBJECTS CAN BE MODIFIED

```
18 *  
19 *      This form is called from form FV45PF0P  
20 *  
21 *-----  
22 FORM USEREXIT_MOVE_FIELD_TO_KOMK.  
23 *{   INSERT      &&&&&&&&  
24 ▶ If...here I modify the SAP code ...*  
25 *}   INSERT  
26  
27 *   KOMK-zzfield = xxxx-zzfield2.  
28  
29 ENDFORM.|  
30 *eject  
31
```

PRO

No restriction for extensions ─ Extremely flexible and powerful

CON

There is no interface between SAP code and the extension
SAP software changes lead to high test and adaptation efforts

─ SAP upgrade effort increases and agility/innovation speed decreases

New rules for extensions to support smooth SAP software updates

In the **public cloud**, SAP software updates run automated and for all tenants in parallel

THERE IS NO CUSTOMER SPECIFIC UPGRADE PROJECT

RULE for smooth software updates

Extensions must be clearly separated from SAP code

No modifications to SAP objects allowed

Only stable public SAP APIs (local or remote) and SAP extension points can be used

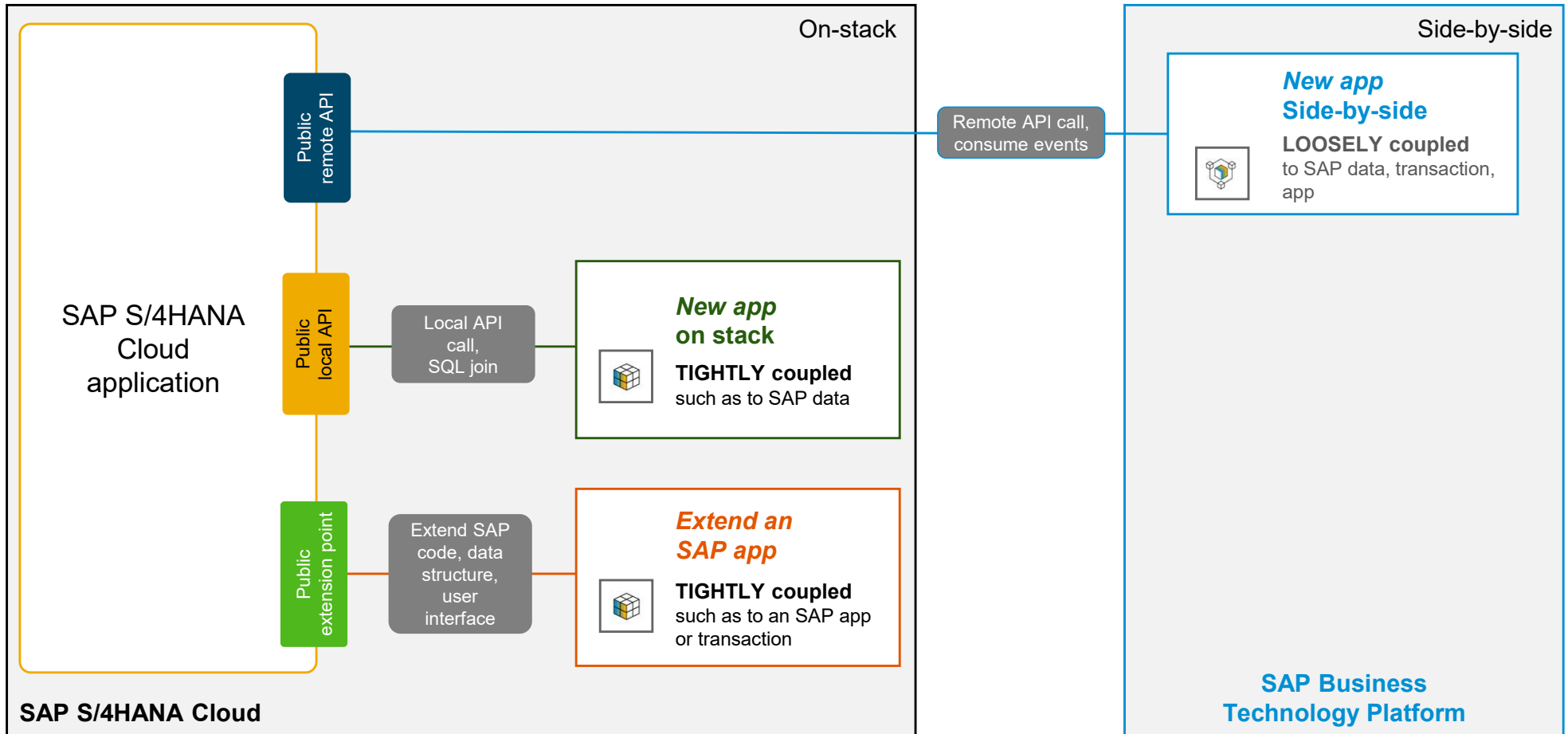
Mandatory in public cloud

Recommended in private cloud and on-premise

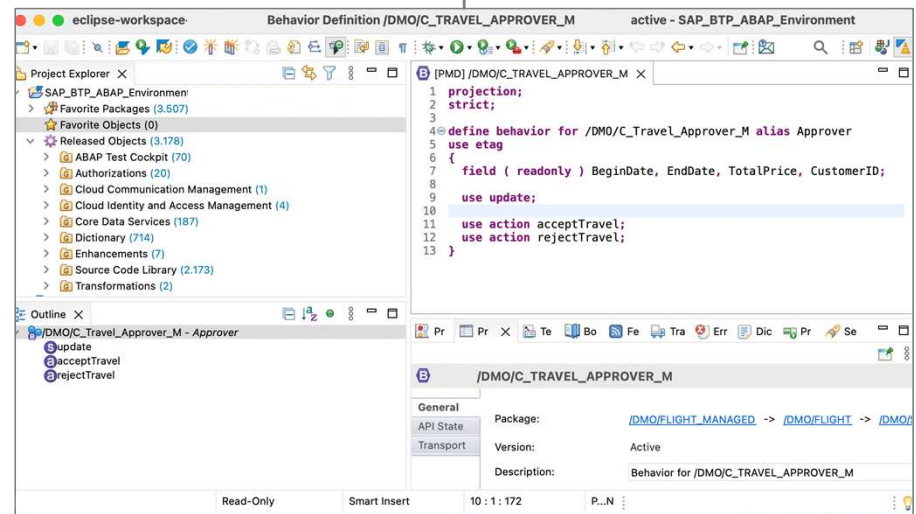
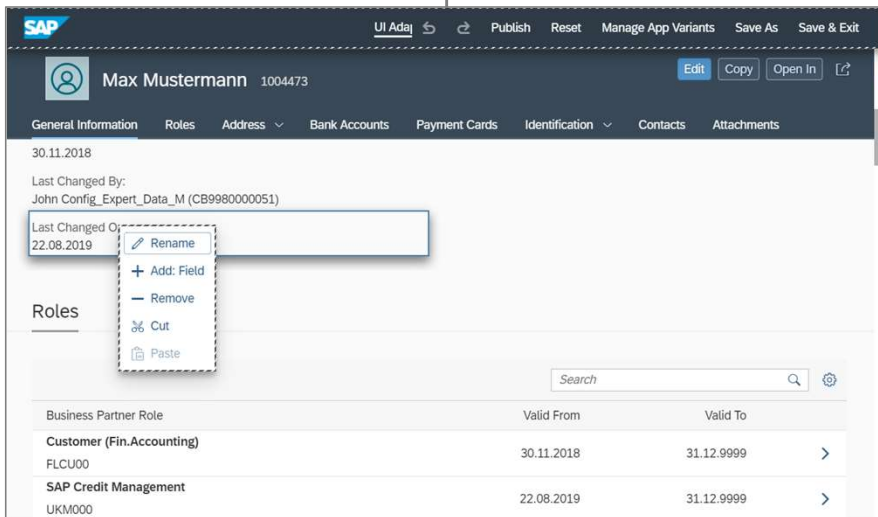
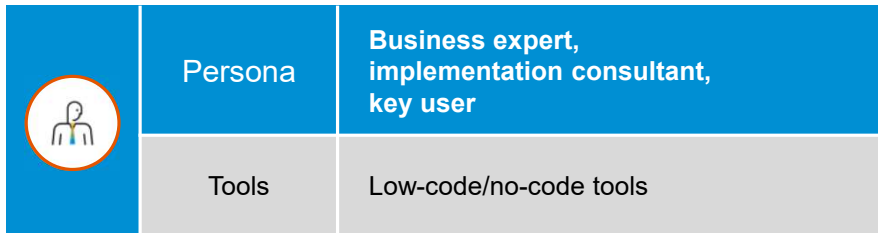
The cloud extensibility model used in SAP S/4HANA Cloud







SAP S/4HANA Cloud extensibility patterns



Extensibility personas







SAP S/4HANA Cloud extensibility portfolio

	On-stack extensions on SAP S/4HANA Cloud 	Side-by-side extensions on SAP BTP 
Business expert Key user 	SAP S/4HANA Cloud key-user tools	SAP Build
Developer 	SAP S/4HANA Cloud, ABAP environment	Java, Node.js, or the ABAP environment

All these extensibility options are built on released, stable SAP APIs and SAP extension points

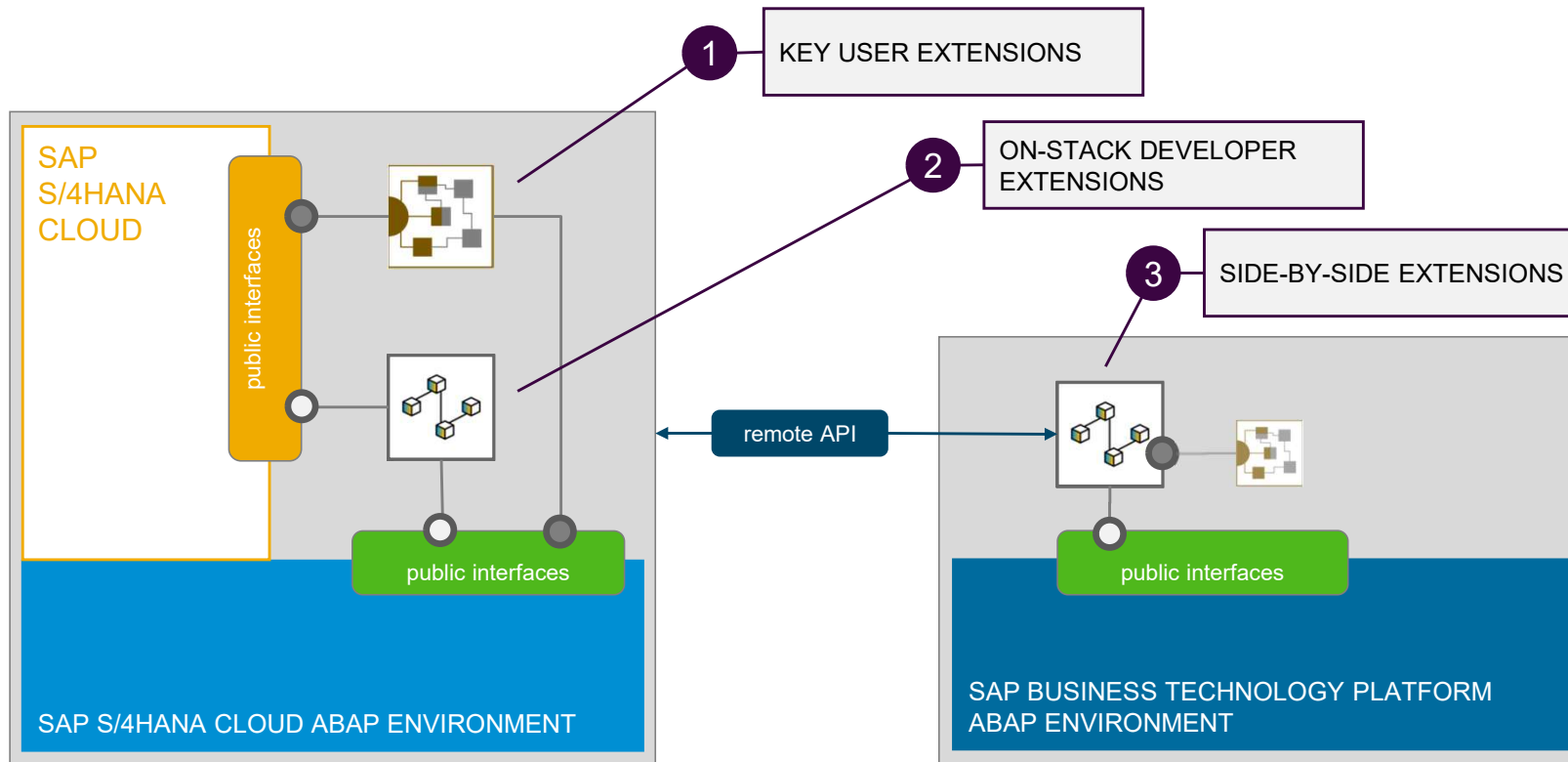
SAP S/4HANA Cloud extensibility portfolio


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
Only upgrade-stable and cloud-ready custom ABAP code is allowed



Use ABAP Cloud - no classic ABAP!

Overview of extensibility options

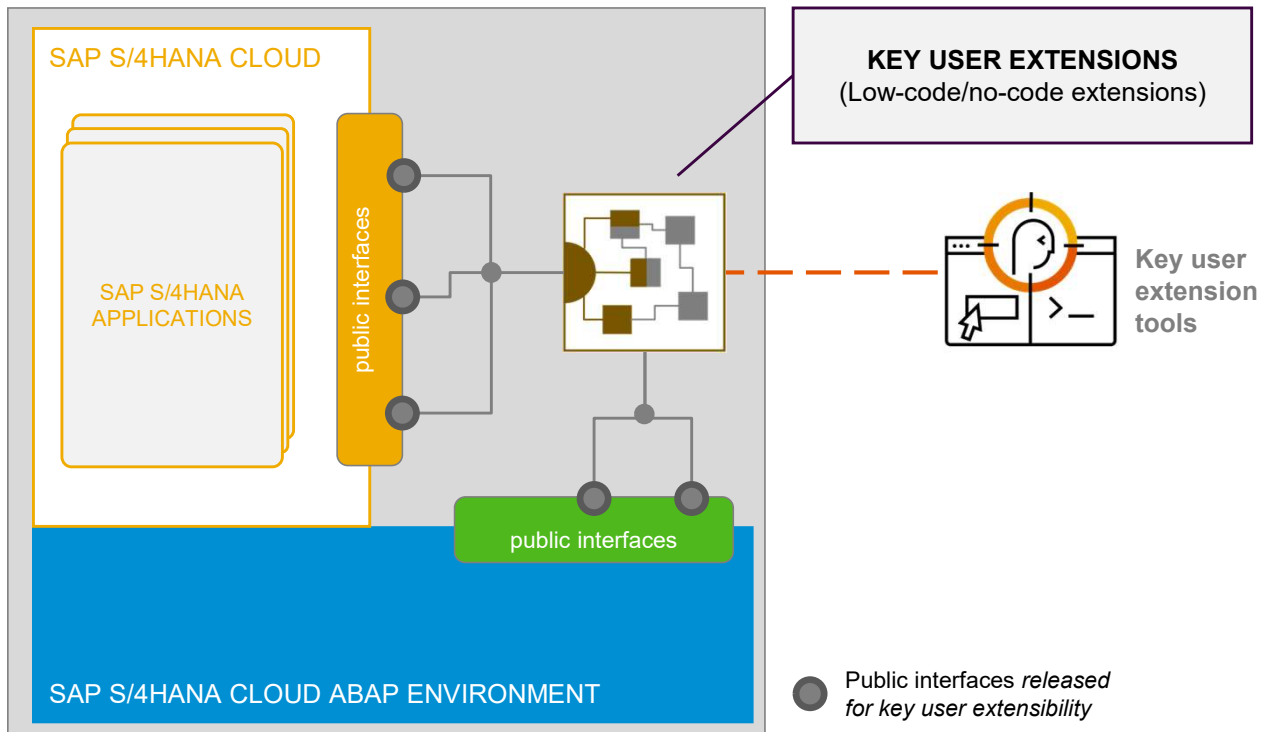


 Key-user extensions
low-code/no-code extensions

 ABAP Cloud custom code or partner extensions
following the cloud extensions model

 Public interfaces *released for developer extensibility*
 Public interfaces *released for key-user extensibility*

Key user extensibility 1



Key user extensibility example - Custom fields SAP Fiori App

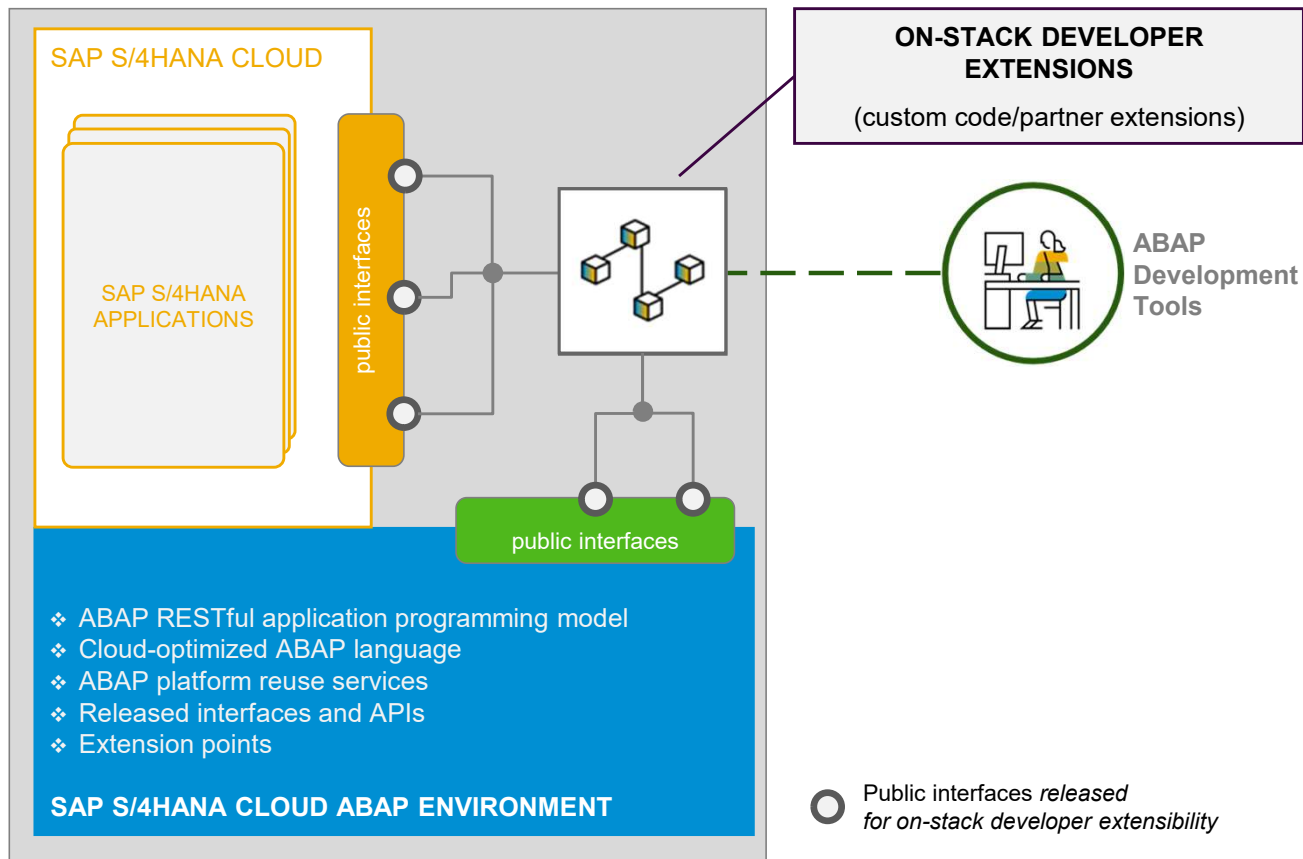
The screenshot displays the SAP Fiori 'Custom Fields and Logic' configuration tool. A 'New Field' dialog box is open, showing the 'Field Properties' section. The properties are as follows:

- Business Context: Business Partner Core View
- Label: Board Visibility
- Identifier: YY1_ BoardVisibility1
- Tooltip: Board Visibility
- Type: Select type
- Business Context Capacity: 50%

At the bottom of the dialog, there are three buttons: 'Create', 'Create and Edit', and 'Cancel'. The background shows a list of existing custom fields with columns for Name, Business Context, Data Type, and Status.

Field Name	Business Context	Data Type	Status
YY1_AddrLastCheckedOn	Business Partner Core View	Date	Published
YY1_Anotherprojectmang	Engagement Project	Association to Business Object	Published

On-stack developer extensibility 2



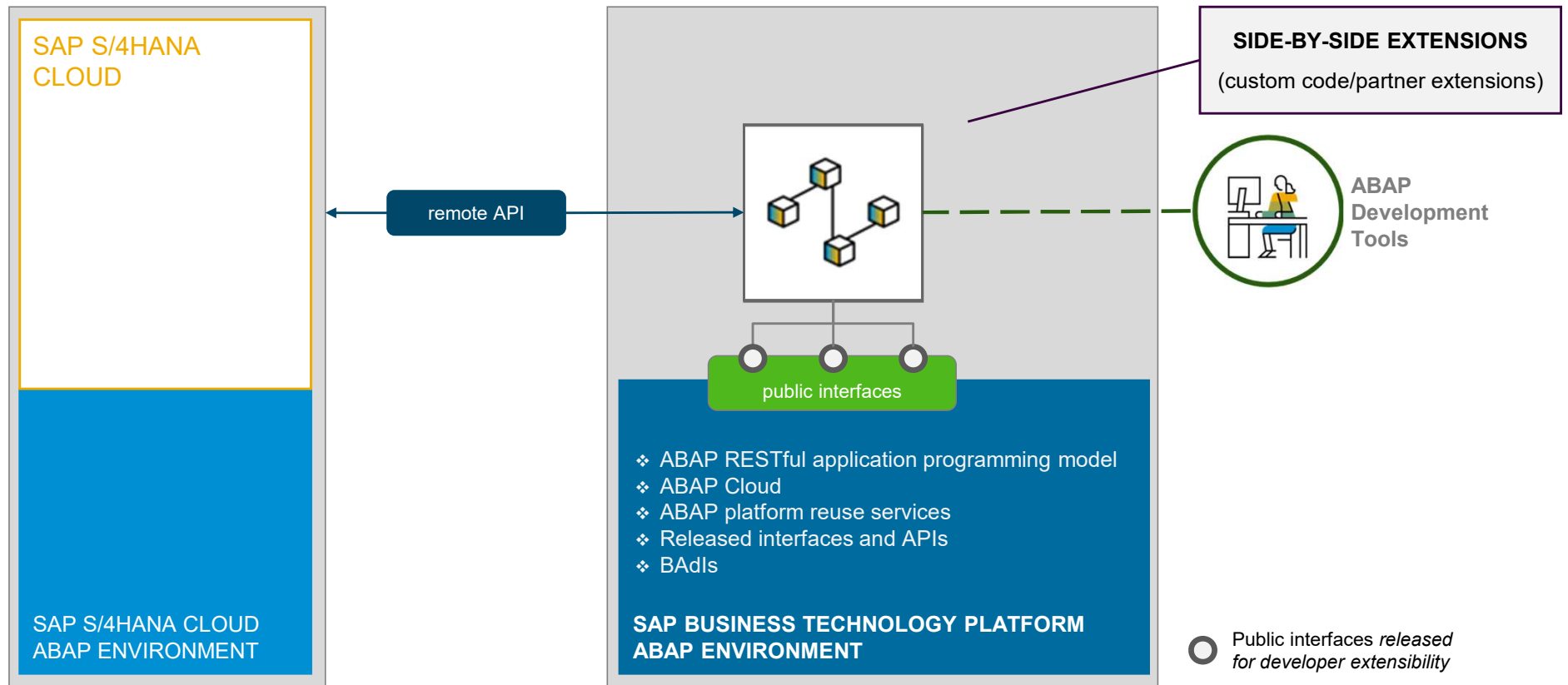
ABAP Development Tools (ADT)

The screenshot displays the Eclipse IDE interface for ABAP development. The main editor shows the source code for a method named `deductDiscount`. The code includes logic for handling invalid discount values, reporting them, and then processing valid discounts by reading travel entities and calculating reduced fees based on a discount percentage.




```
263* METHOD deductDiscount.  
264 DATA travels_for_update TYPE TABLE FOR UPDATE ZRAP100_R_TravelTP_000.  
265 DATA(keys_with_valid_discount) = keys.  
266  
267 " check and handle invalid discount values  
268* LOOP AT keys_with_valid_discount ASSIGNING FIELD-SYMBOL(<key_with_valid_discount>)  
269 WHERE %param-discount_percent IS INITIAL OR %param-discount_percent > 100 OR %param-discount_...  
270  
271 " report invalid discount value appropriately  
272 APPEND VALUE #( %tky = <key_with_valid_discount>-%tky ) TO failed-travel.  
273  
274 APPEND VALUE #( %tky = <key_with_valid_discount>-%tky  
275 %msg = NEW /dmo/cm_flight_messages(  
276 textid = /dmo/cm_flight_messages=>discount_  
277 severity = if_abap_behv_message=>severity-e...  
278 %element-TotalPrice = if_abap_behv=>mk-on  
279 %op-Action-deductDiscount = if_abap_behv=>mk-on  
280 ) TO reported-travel.  
281  
282 " remove invalid discount value  
283 DELETE keys_with_valid_discount.  
284 ENDOLOOP.  
285  
286 " check and go ahead with valid discount values  
287 CHECK keys_with_valid_discount IS NOT INITIAL.  
288  
289 " read relevant travel instance data (only booking fee)  
290 READ ENTITIES OF ZRAP100_R_TravelTP_000 IN LOCAL MODE  
291 ENTITY Travel  
292 FIELDS ( BookingFee )  
293 WITH CORRESPONDING #( keys_with_valid_discount )  
294 RESULT DATA(travels).  
295  
296* LOOP AT travels ASSIGNING FIELD-SYMBOL(<travel>).  
297 DATA percentage TYPE decfloat16.  
298 DATA(discount_percent) = keys_with_valid_discount[ KEY draft %tky = <travel>-%tky ]-%param-d...  
299 percentage = discount_percent / 100 .  
300 DATA(reduced_fee) = <travel>-BookingFee * ( 1 - percentage ) .
```

The right-hand pane shows the class browser for `ZRAP100_R_TravelTP_000`, displaying a list of associations and fields. The bottom pane shows the console output, including a critical assertion error: "Critical Assertion Error: 'overall status'".

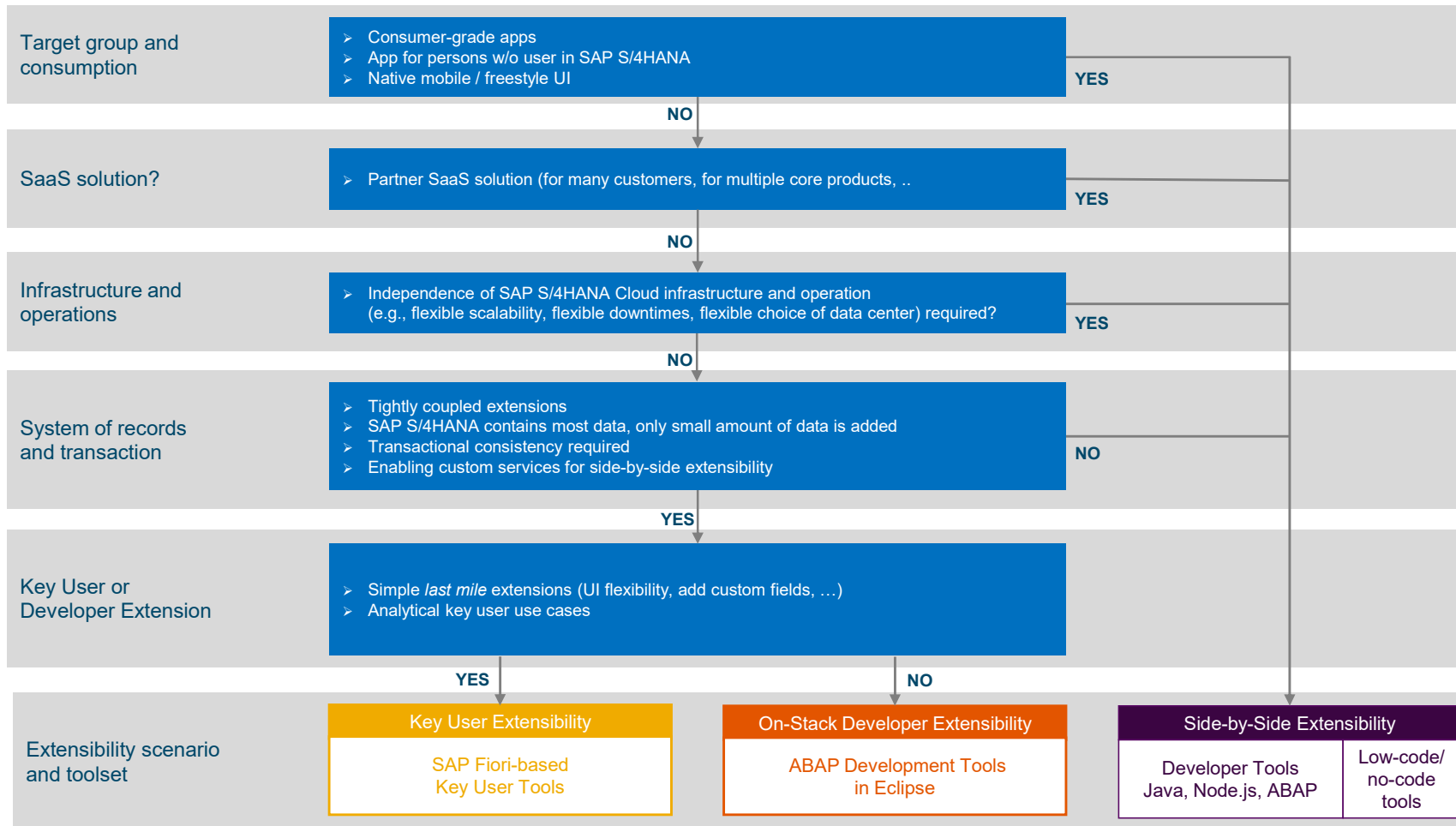
Side-by-side extensibility 3



Summary of ABAP-related extensibility options in SAP S/4HANA Cloud

	KEY USER EXTENSIBILITY  Business expert, implementation consultant, citizen developer, key user	ON-STACK DEVELOPER EXTENSIBILITY  ABAP developer	SIDE-BY-SIDE EXTENSIBILITY  ABAP developer
SCENARIO	Low-code/no-code adaptations and extensions of SAP S/4HANA applications	Custom ABAP development projects that need proximity or coupling to SAP S/4HANA data, transactions, or apps	Loosely-coupled applications and partner SaaS solutions
USE CASES	Adapting UIs, adding custom fields, adding custom business objects etc.	Custom applications with frequent or complex SQL access to SAP S/4HANA data Custom extensions running in the same logical unit of work (LUW) as SAP applications Tailored custom remote APIs or services which serve side-by-side SAP BTP apps	Custom applications for a separate target group (no ERP users) Custom application workload that shall run separated from ERP Custom applications needing proximity to intelligent SAP BTP services like machine learning, AI etc. Solutions integrating with several ERP systems and cloud services SaaS applications provided by partners
BENEFIT	Fully managed and integrated in SAP S/4HANA Cloud No or only very basic development skills required	Development of extensions inside the SAP S/4HANA Cloud system No remote access or data replication Use and extend released SAP S/4HANA Cloud objects	Decoupled extensions independent of SAP S/4HANA Cloud operation and lifecycle management
	On-stack extension domain		Side-by-side extension domain

Sequence diagram on how to find the right extensibility options



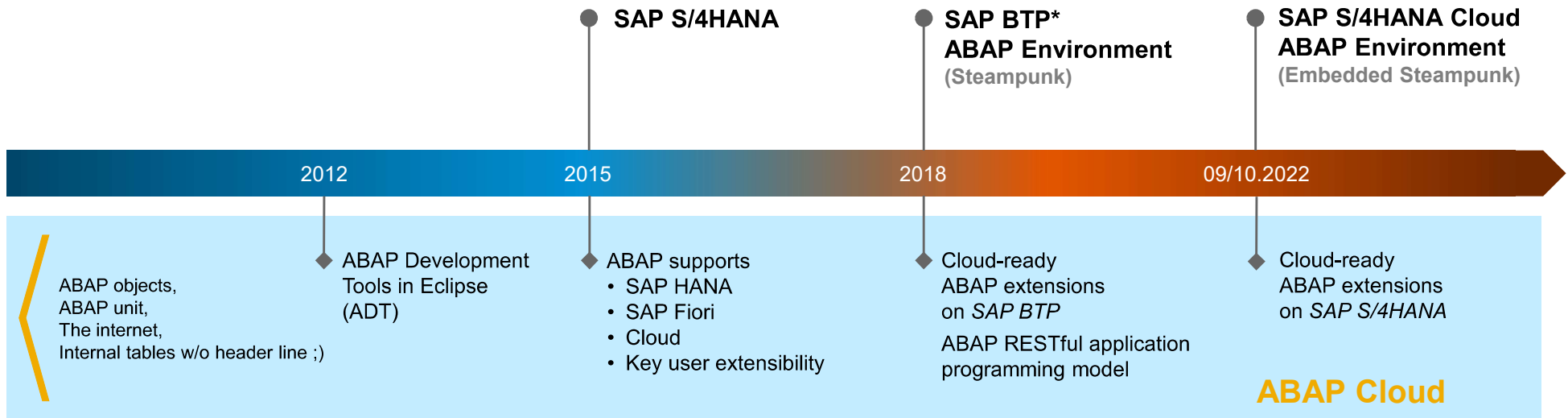
ABAP Cloud



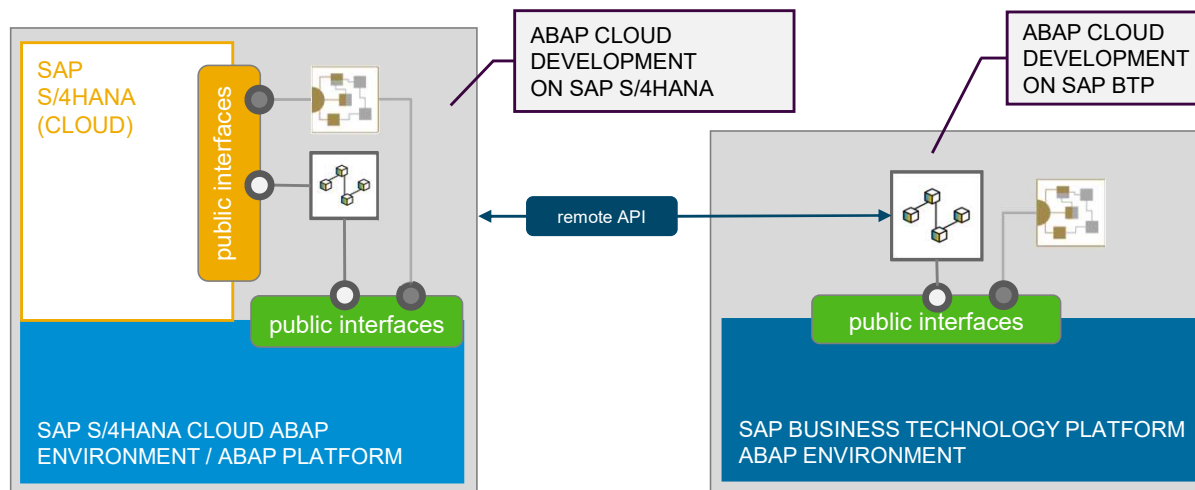
ABAP Cloud

- ... is the ABAP development model to build cloud-ready business apps, services or extensions
- ... comes with SAP BTP and SAP S/4HANA
- ... works with public or private cloud, and even on-premise

The evolution to ABAP Cloud



ABAP Cloud on SAP BTP and on SAP S/4HANA



ABAP Cloud

- ❖ Public SAP APIs and extensions points
- ❖ Cloud-optimized ABAP language
- ❖ ABAP Development Tools
- ❖ ABAP RESTful Application Programming Model

ABAP Cloud – IDE and API examples for on-stack development extensibility

Custom ABAP on SAP S/4HANA Cloud

ABAP development tools in Eclipse
Cloud-optimized ABAP language
Proven ABAP transport management

Access to public SAP APIs ONLY – otherwise, syntax error!

No access to old Dynpro APIs
No direct select on the MARA table from SAP

Local APIs from SAP S/4HANA

SELECT products from SAP S/4HANA tables using the public I_Product CDS view

```
1 CLASS zcl_bgtest DEFINITION
2 PUBLIC
3 FINAL
4 CREATE PUBLIC.
5
6 PUBLIC SECTION.
7 INTERFACES if_oo_adt_classrun.
8 PROTECTED SECTION.
9 PRIVATE SECTION.
10 ENDClass.
11
12
13 CLASS zcl_bgtest IMPLEMENTATION.
14
15 METHOD if_oo_adt_classrun~main.
16
17 SELECT CountryName FROM I_CountryText WHERE Language = @sy-langu ORDER BY CountryName INTO @DATA(l_countryname).
18   out->write( l_countryname ).
19 ENDSELECT.
20
21 CALL FUNCTION 'POPUP_TO_CONFIRM'.
22 SELECT matnr FROM mara INTO TABLE @DATA(l_matnr).
23
24 SELECT ProductExternalID FROM I_Product INTO TABLE @DATA(l_matnr_new).
25
26 ENDMETHOD.
27
28 ENDClass.
```

The screenshot shows the ABAP IDE with the following code and errors:

- Line 21: `CALL FUNCTION 'POPUP_TO_CONFIRM'.` - Error: The use of Function Module POPUP_TO_CONFIRM is not permitted.
- Line 22: `SELECT matnr FROM mara INTO TABLE @DATA(l_matnr).` - Error: Use of Table MARA is not permitted. See object documentation for replacement.
- Line 24: `SELECT ProductExternalID FROM I_Product INTO TABLE @DATA(l_matnr_new).` - This line is highlighted in green, indicating it is the correct approach for local APIs.

Description	Resource	Path	Location	Type
3 errors, 0 warnings, 0 others				
Errors (3 items)				
The use of Function Module POPUP_TO_CONFIRM is not permitted.	zcl_bgtest.aclass	/CWR_EN/.adt/classli...	line 21	ABAP Syntax C...
Use of Table MARA is not permitted. See object documentation for replacement.	zcl_bgtest.aclass	/CWR_EN/.adt/classli...	line 22	ABAP Syntax C...

From classic ABAP to ABAP Cloud

The screenshot shows the classic ABAP development environment. At the top, a code editor displays the following code:

```

18 *
19 *      This form is called from form FV45PF01A 0101
20 *
21 *-----
22 FORM USEREXIT_MOVE_FIELD_TO_KOMK.
23 *(   INSERT      &S&S&S&S
24 *If...here I modify the SAP code ...*
25 *)   INSERT
26
27 *   KOMK-zzfield = xxxx-zzfield2.
28
29 ENDFORM.
30 *eject
31

```

Below the code editor is a table titled "Organizational Data" with the following columns and rows:

Field	Value
Sales Organization	
Distribution Channel	
Division	
Sales Office	
Sales Group	
IDoc Number	

A data popup window is overlaid on the table, showing a table with two columns:

Column 1	Column 2
11	
12	

The popup window contains the following SQL code:

```

11 data mstart type mara mstart.
12 select single mstart from mara into mstart where

```



The screenshot shows the ABAP Cloud development environment. At the top, a window titled "BAdI Enhancement Spot: ES_SD_SLS_EXTEND" displays a list of BAdI definitions:

- SD_SLS_MODIFY_HEAD Sales Header Modification
- SD_SLS_MODIFY_ITEM Sales Item Modification
- SD_SLS_CHECK_HEAD Sales Header Check
- SD_SLS_CHECK_ITEM Sales Item Check
- SD_SLS_FIELDPROP_HEAD Sales Header Field Prop
- SD_SLS_FIELDPROP_ITEM Sales Item Field Prop
- SD_SLS_CHECK_BEFORE_SAVE Sales Document Ch
- SD_SLS_CHECK_DELETE_ITEM Sales Item Deletion
- SD_APM_SET_APPROVAL_REASON Set Approval Re
- SD_SLS_MODIFY_DELVSCHED Sales Scheduling As

On the right, the "BAdI Definition Details" window shows the configuration for "SD_SLS_MODIFY_HEAD":

- Name: SD_SLS_MODIFY_HEAD
- Description: Sales Header Modification
- Interface: IF_SD_SLS_MODIFY_HEAD
- Configuration: Creating New Instances
- Multiple use:

Below this, a code editor shows the following code:

```

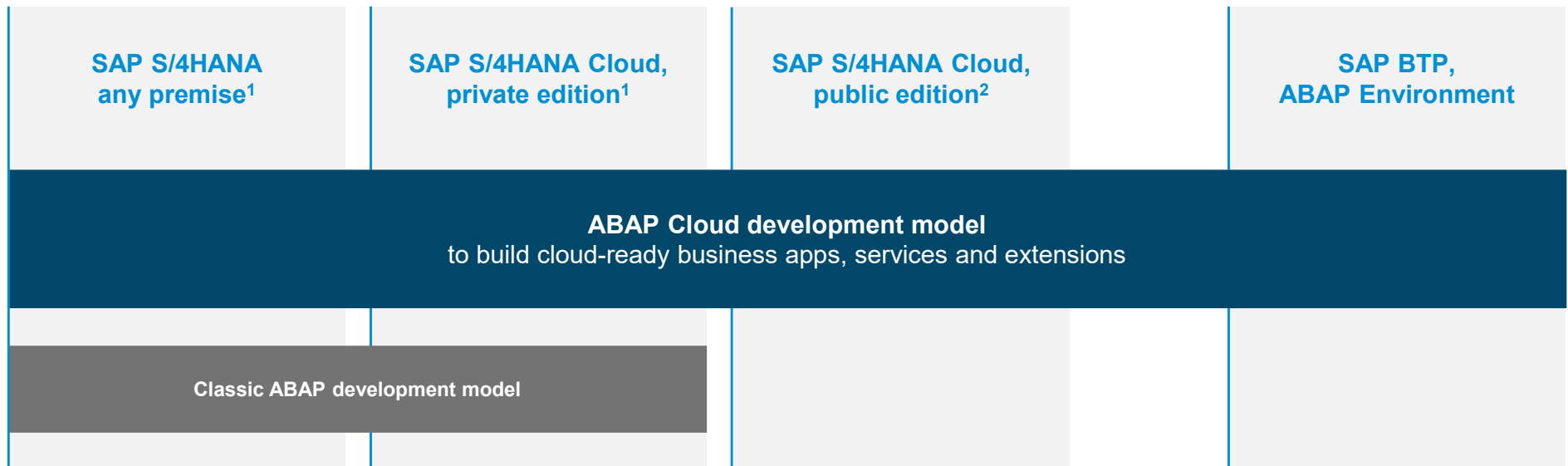
1 projection;
2 strict;
3
4 define behavior for /DMO/C_Travel_Approver_M alias Approver
5 use etag
6 {
7   field ( readonly ) BeginDate, EndDate, TotalPrice, CustomerID;
8
9   use update;
10
11   use action acceptTravel;
12   use action rejectTravel;
13 }

```

At the bottom, a window titled "[CWR] I_PRODUCT" shows the configuration for "Use System-Internally (Contract C1)":

- Release state: Released
- Visibility:
 - Use in Cloud Development
 - Use in Key User Apps

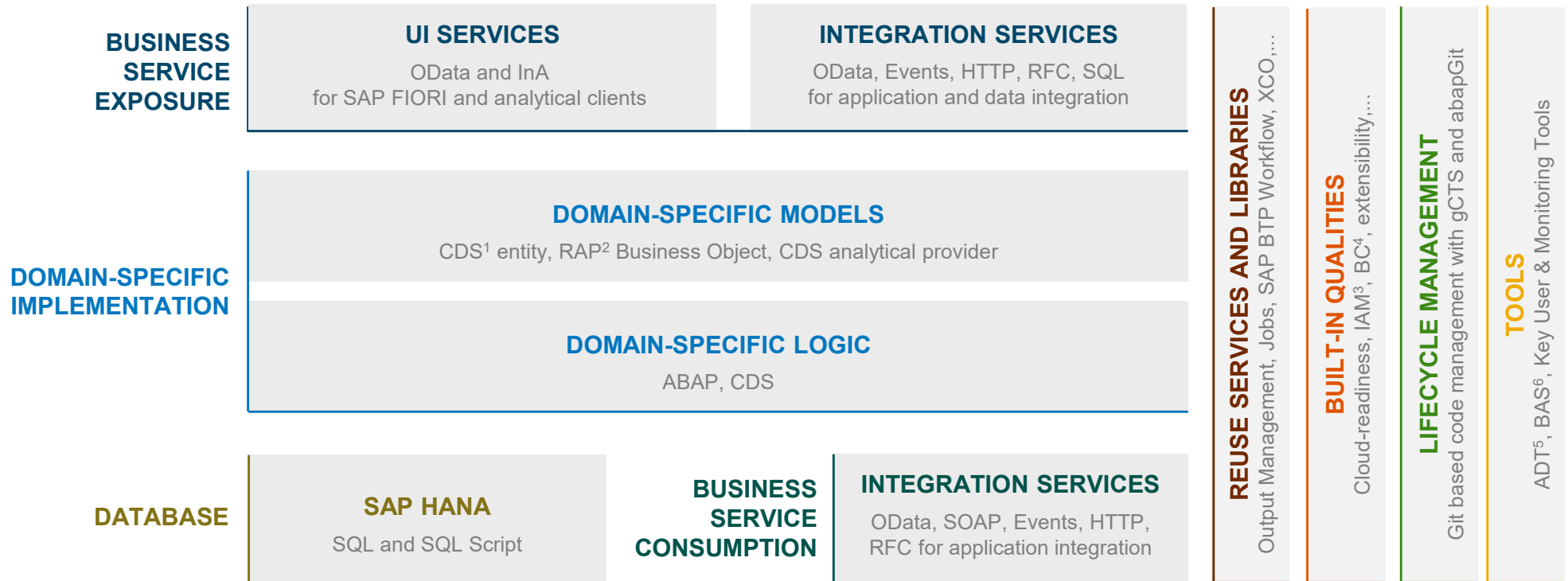
ABAP Cloud – One development model for SAP S/4HANA and for SAP BTP



¹ SAP S/4HANA any premise or SAP S/4HANA Cloud, private edition release ≥ 2022

² SAP S/4HANA Cloud, public edition release ≥ 2208, 3-system landscape required

ABAP Cloud map



¹ Core Data Services

² ABAP RESTful application programming model

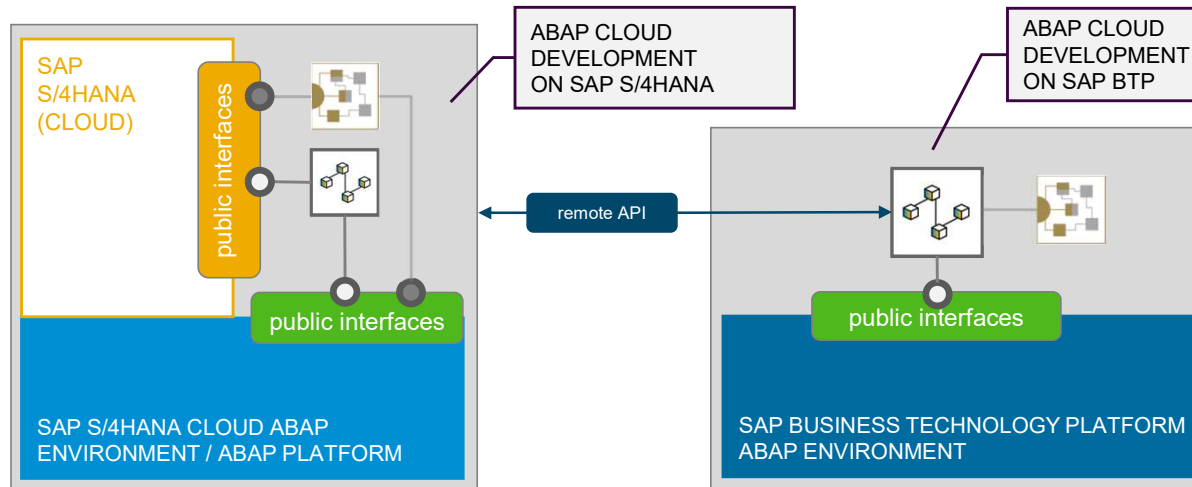
³ Identity & Access Management

⁴ Business Configuration

⁵ ABAP Development Tools

⁶ Business Application Studio

Availability of ABAP Cloud



ABAP CLOUD IS AVAILABLE IN THE FOLLOWING PRODUCTS

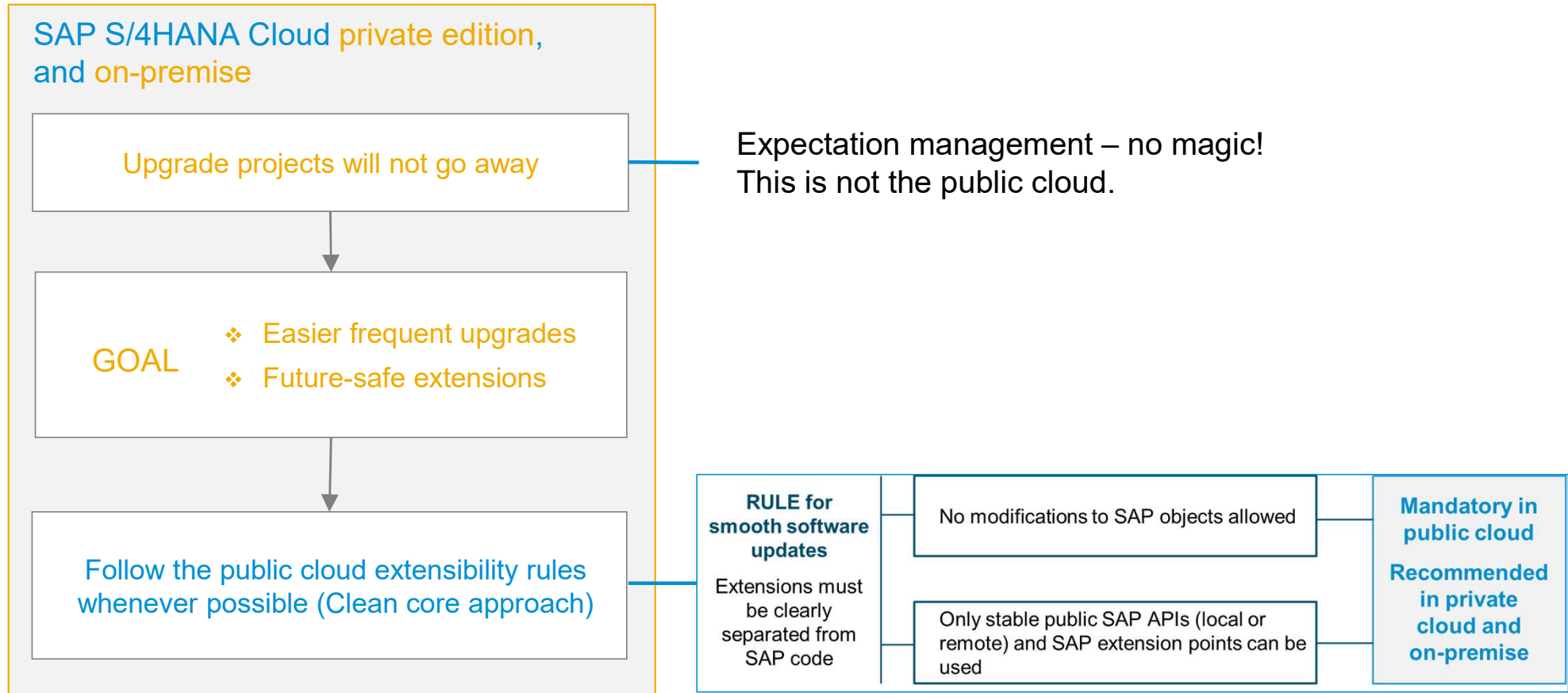
PRODUCT	RELEASE	ABAP CLOUD USAGE
SAP BTP ABAP Environment	All	Mandatory
SAP S/4HANA Cloud, public edition	≥ 2208 (new customers)	Mandatory
SAP S/4HANA Cloud, private edition and SAP S/4HANA on-premise	≥ 2022	Recommended *

* Classic ABAP can still be used

**What about the private cloud and on-premise editions of SAP S/4HANA?
Here we need smoother upgrades as well**

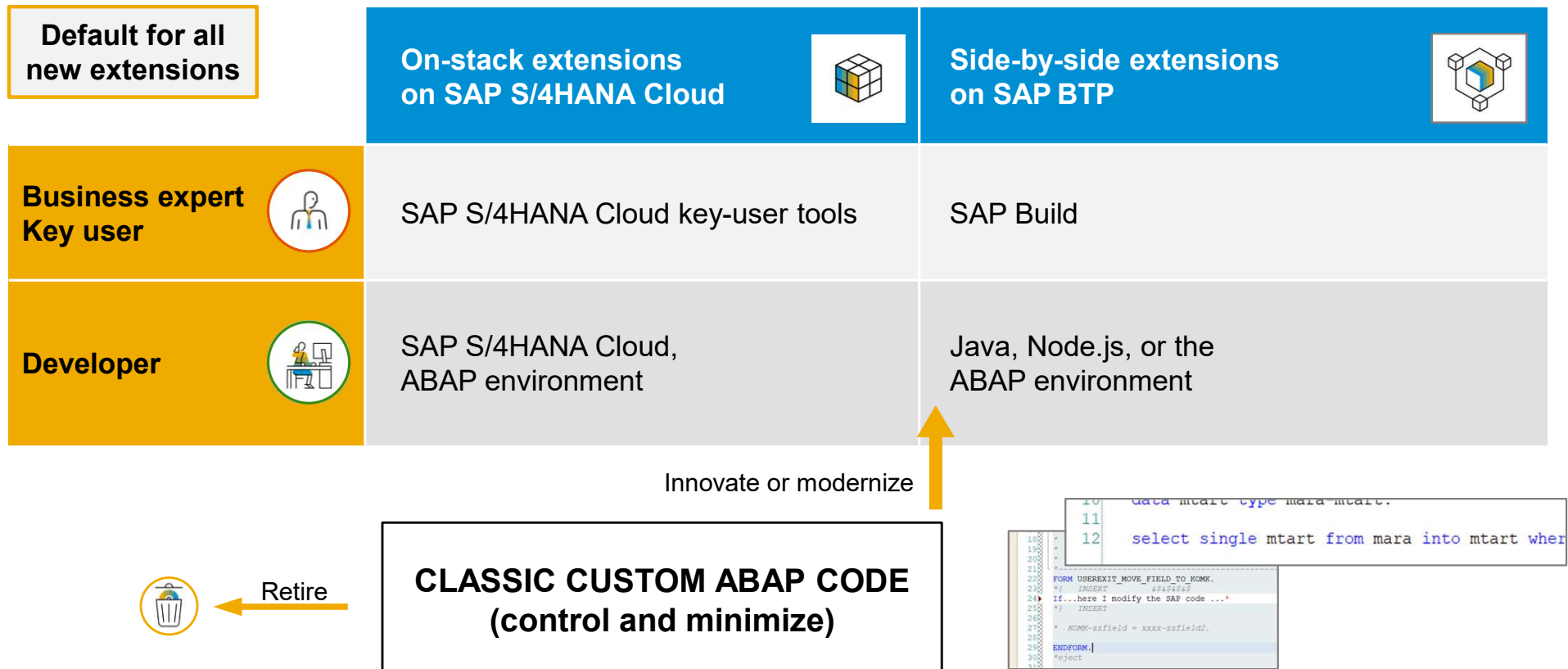


Clean core rules for extensions to support smoother SAP software updates



SAP S/4HANA, private cloud and on-premise editions

Reuse the SAP S/4HANA Cloud extensibility model

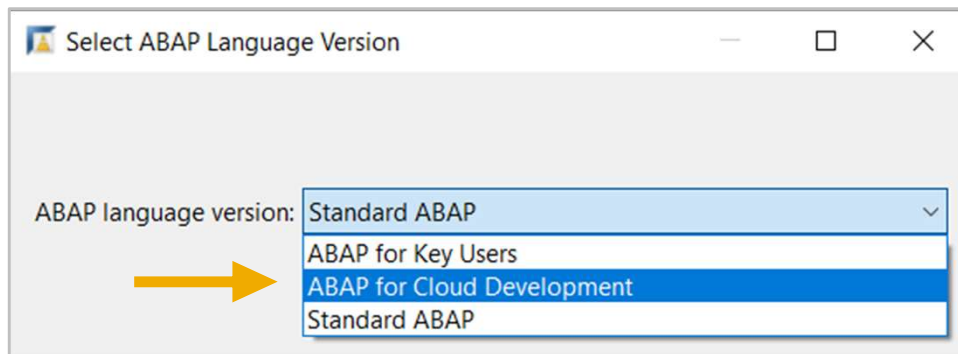


SAP S/4HANA, private cloud and on-premise editions

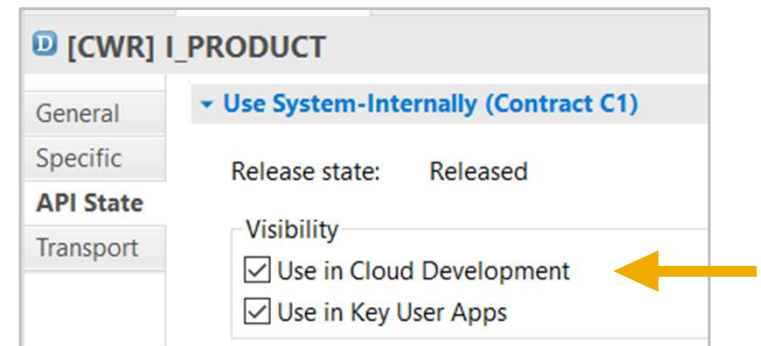
ABAP cloud development – ABAP language version and public SAP APIs

How will I use **ABAP Cloud** in the private cloud and on-premise editions of SAP S/4HANA?

- ❖ Switch on the strict ABAP Cloud syntax check for the selected custom ABAP objects (such as a new Z-class)
- ❖ Use the public APIs that SAP released for ABAP cloud development (such as the CDS view I_PRODUCT)

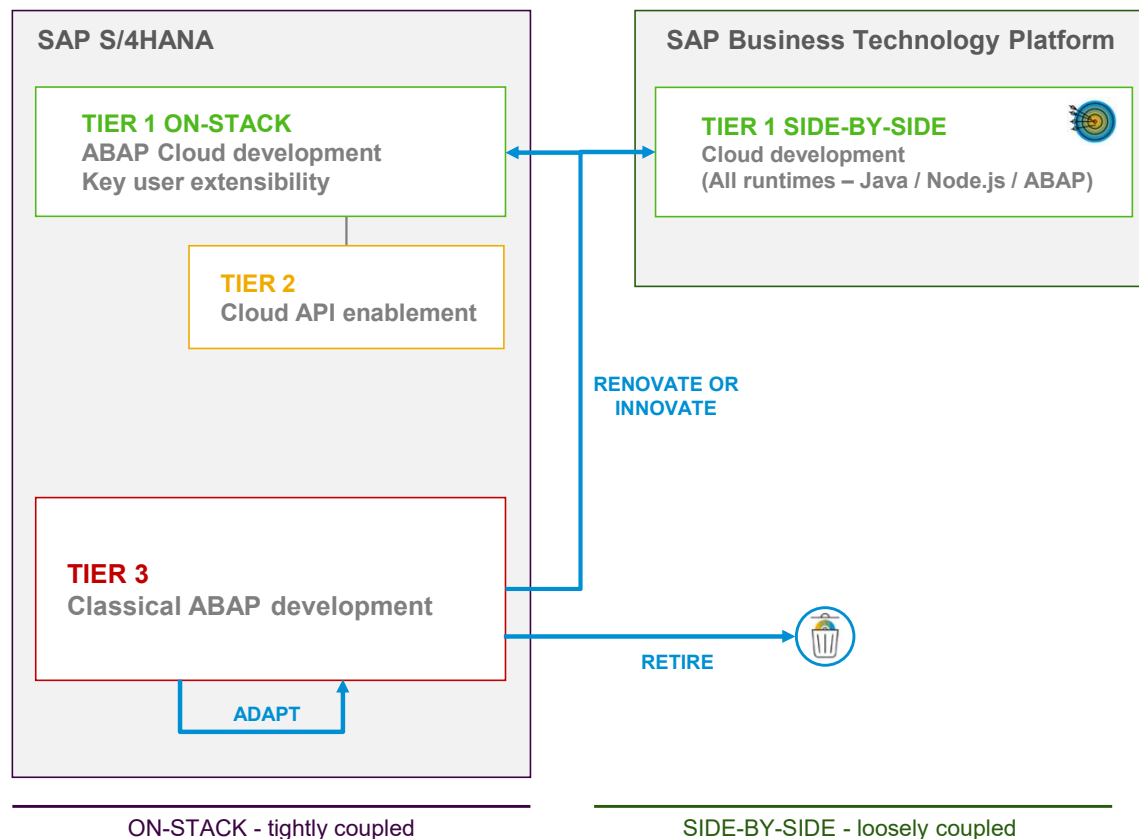


Switch from classic ABAP extensibility (Standard ABAP) to ABAP Cloud (ABAP for cloud development)



SAP released the CDS view for *ABAP Cloud development*

3-tier extensibility model for SAP S/4HANA private cloud and on-premise



TIER 1 – Cloud extensibility model

Development of cloud-ready and upgrade-stable applications and extensions

Same development model as used in SAP S/4HANA Cloud, public edition

Default for new extensions and custom apps

TIER 2 – Cloud API enablement

Extends and enables tier 1 for private cloud and on-premise
Mitigates missing public SAP APIs or extension points:

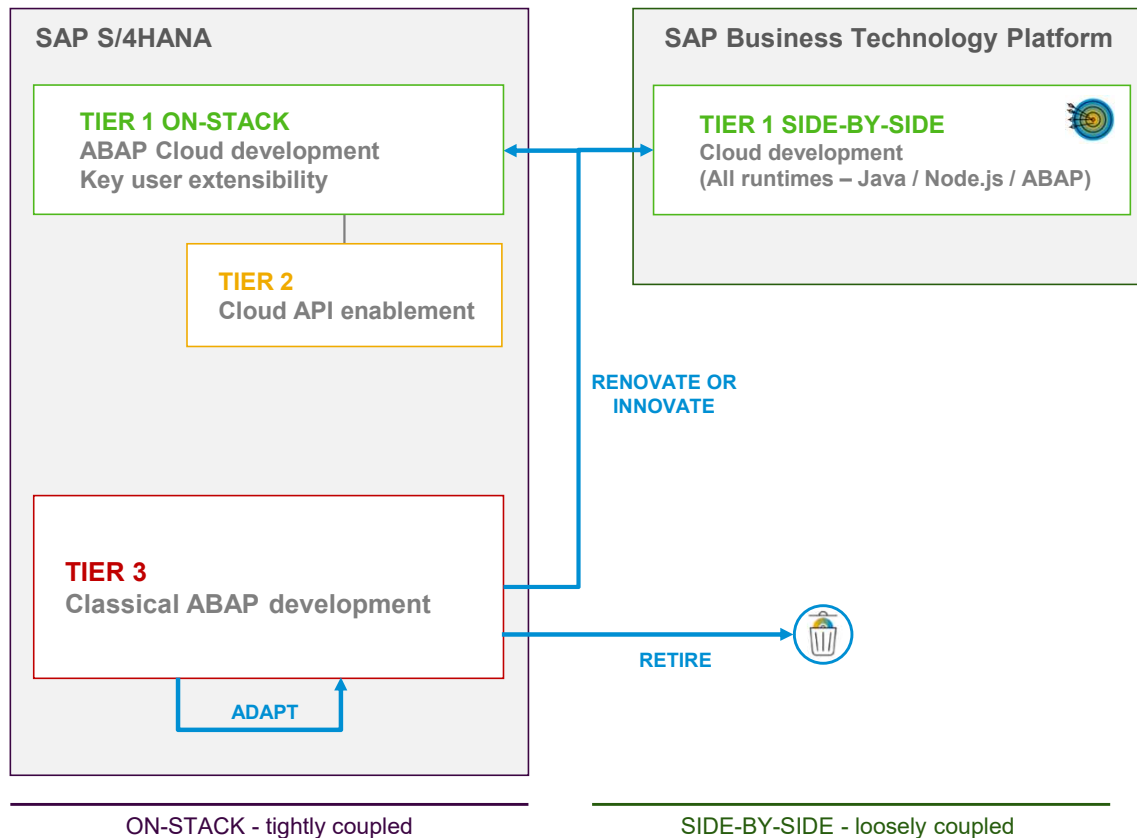
- Develop custom wrapper objects for not released SAP objects to be used in tier 1
- Retire wrapper once a released SAP API is available

TIER 3 – Classic ABAP extensions

Legacy/existing custom ABAP code or new on-stack extensions code that cannot follow the rules of tier 1 and 2

Avoid and reduce the content in tier 3

3-tier extensibility model for SAP S/4HANA private cloud and on-premise



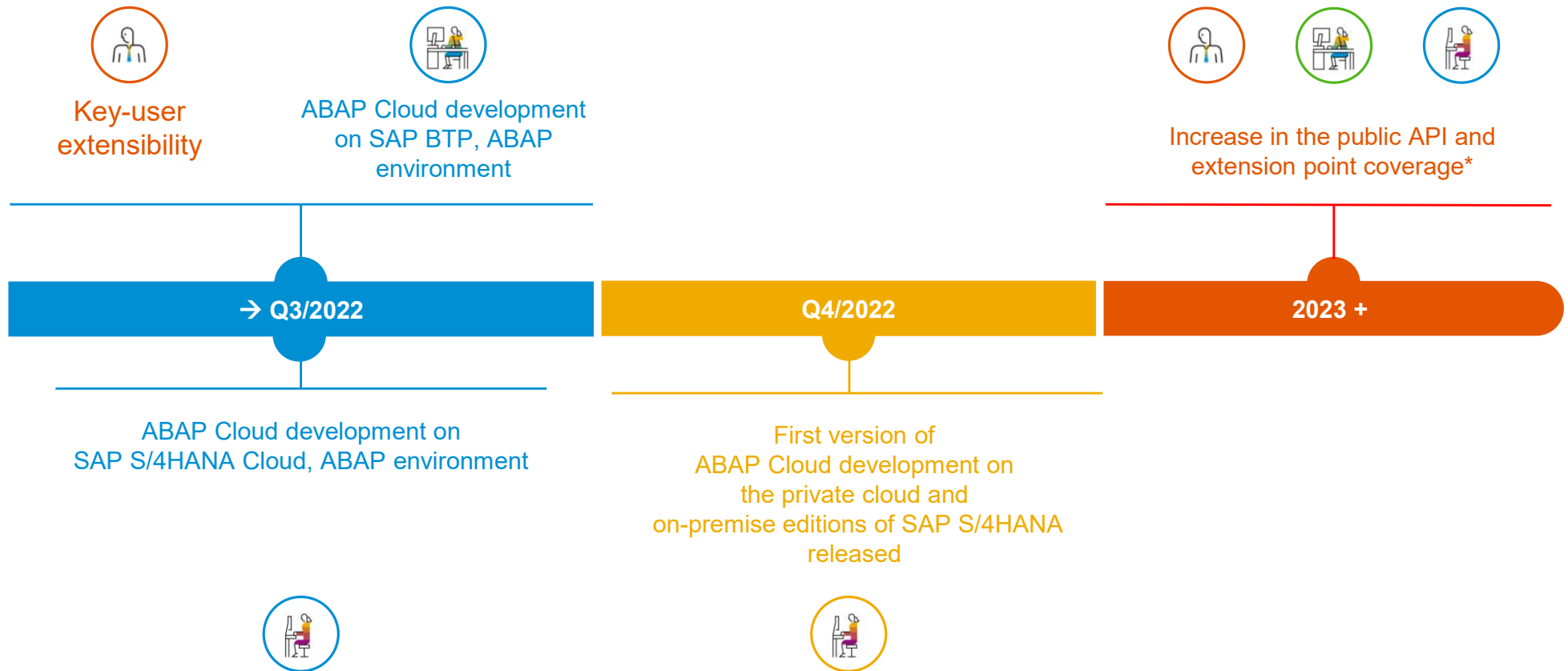
Benefits:

- ✓ Clean core using Tier 1, with clear technical guidance, cloud-ready
- ✓ Upgrade stability for Tier 1 extensions
- ✓ Exploit rich PCE/OP scope, mitigate missing public APIs
- ✓ Controlled violations of clean core principles (Authorizations, ATC)
- ✓ Enables stepwise cloud transformation
- ✓ Greenfield: Tier 3 empty, only use Tier 1 and 2
- ✓ Brownfield: Legacy in Tier 3, new extensions in Tier 1 and 2

Summary and Roadmap



Road map – ABAP extensibility options



Summary

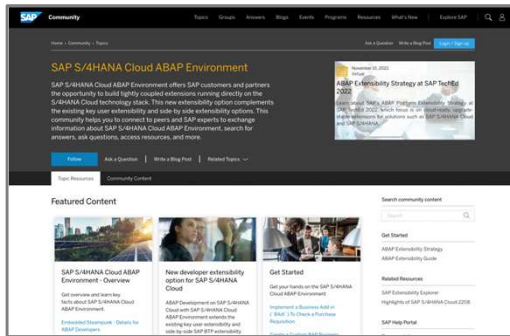
ABAP extensibility for SAP S/4HANA

- ... is crucial for the success of SAP, SAP customers and partners
- ... provides means for on-stack and side-by-side extensibility
- ... supports key-user and developer extensibility
- ... uses ABAP Cloud as development model

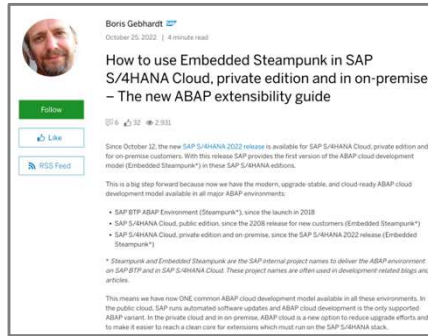
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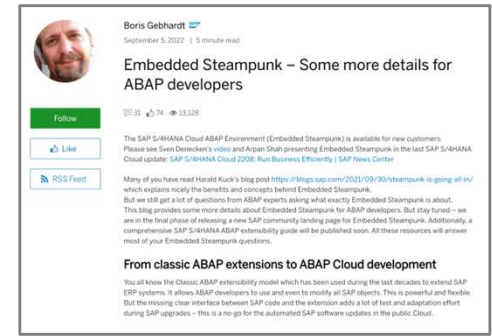
More information



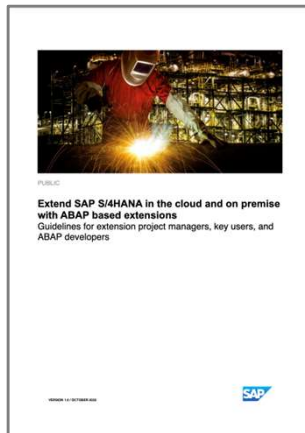
[SAP Community](#)



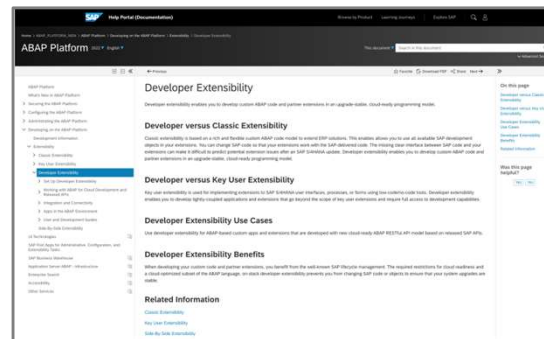
[How to use Embedded Steampunk in SAP S/4HANA Cloud, private edition and in on-premise – The new ABAP extensibility guide | SAP Blogs](#)



[Embedded Steampunk – Some more details for ABAP developers | SAP Blogs](#)



[The new ABAP extensibility guide](#)



[SAP documentation](#)



[Developer Discussion: ABAP Cloud](#)

Thank you.

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