



# Introduction to **ABAP RESTful Application Programming Model (RAP)**

Carine Tchoutouo Djomo, SAP  
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PUBLIC




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# Agenda

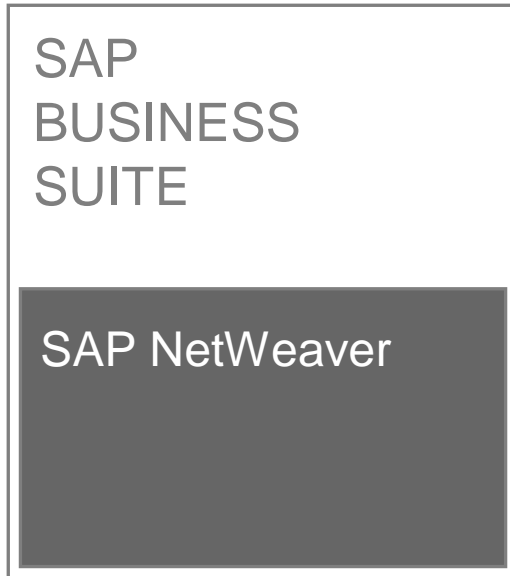
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- INTRODUCTION
  - BIG PICTURE
  - LIVE DEMO
  - SUMMARY



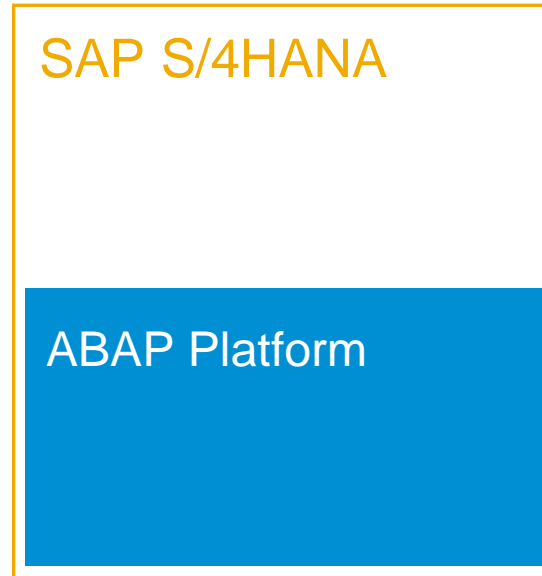
# INTRODUCTION



# ABAP Platform – Transformation to SAP S/4HANA and SAP BTP



On-premise  
Any DB  
Legacy  
(maintenance until 2027/2030)

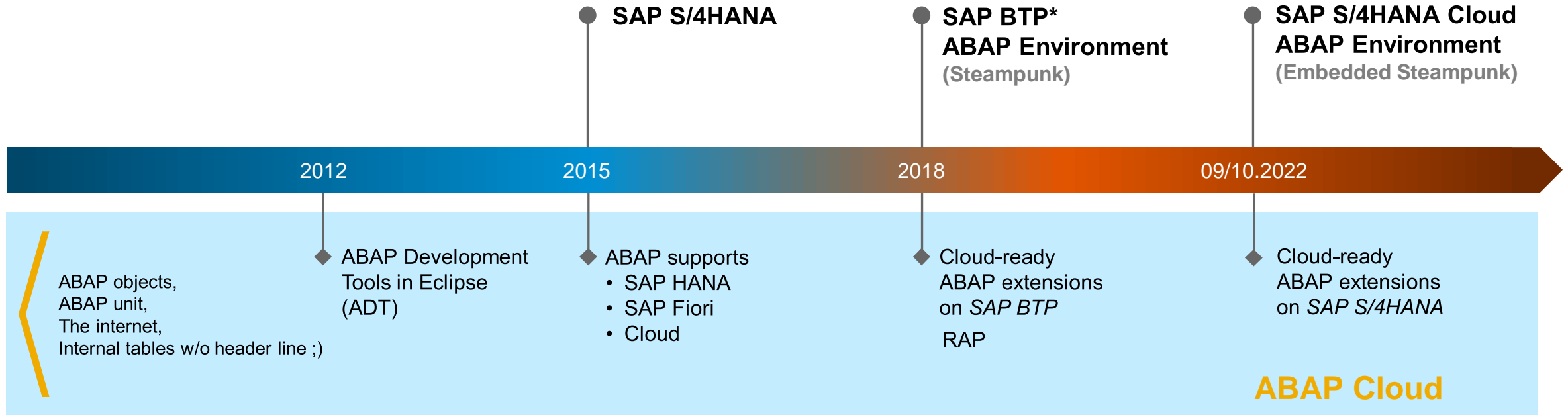


On-premise and Cloud  
SAP's strategic (Cloud) ERP  
SAP HANA  
SAP Fiori UX



SAP's strategic cloud platform  
SAP HANA  
SAP Fiori UX

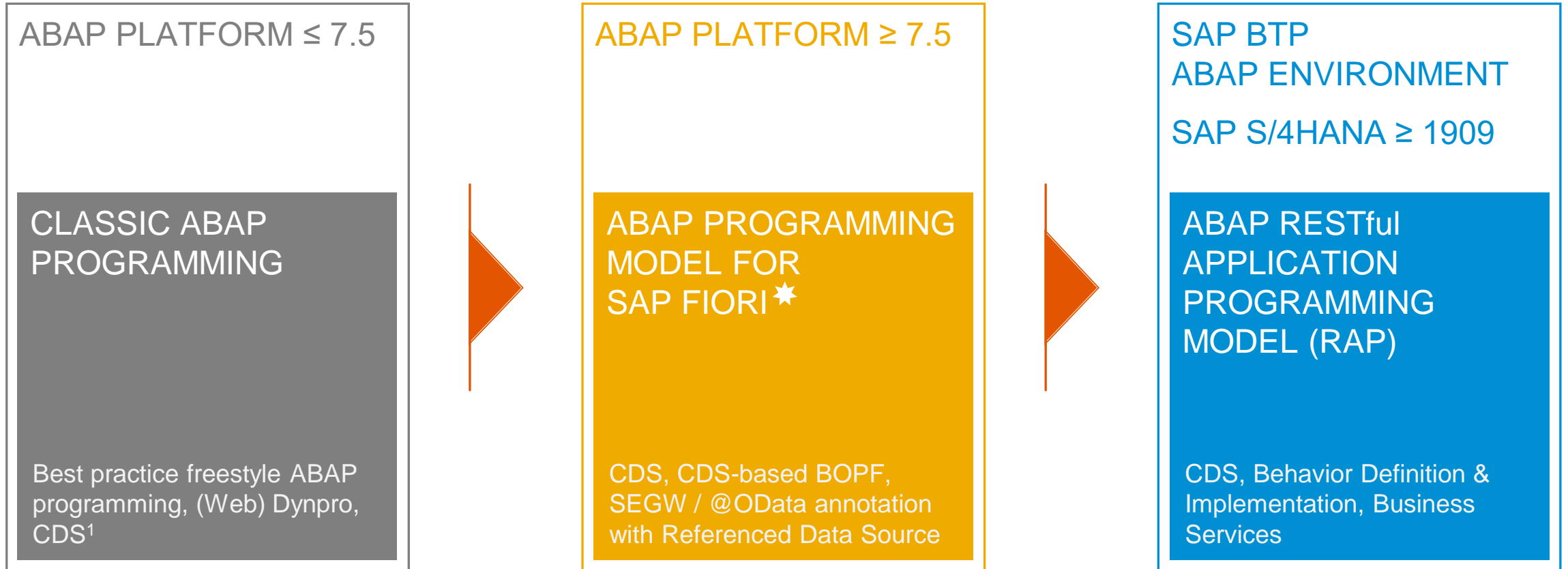
# The evolution towards ABAP Cloud



## ABAP Cloud

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

# Evolution of the ABAP programming model

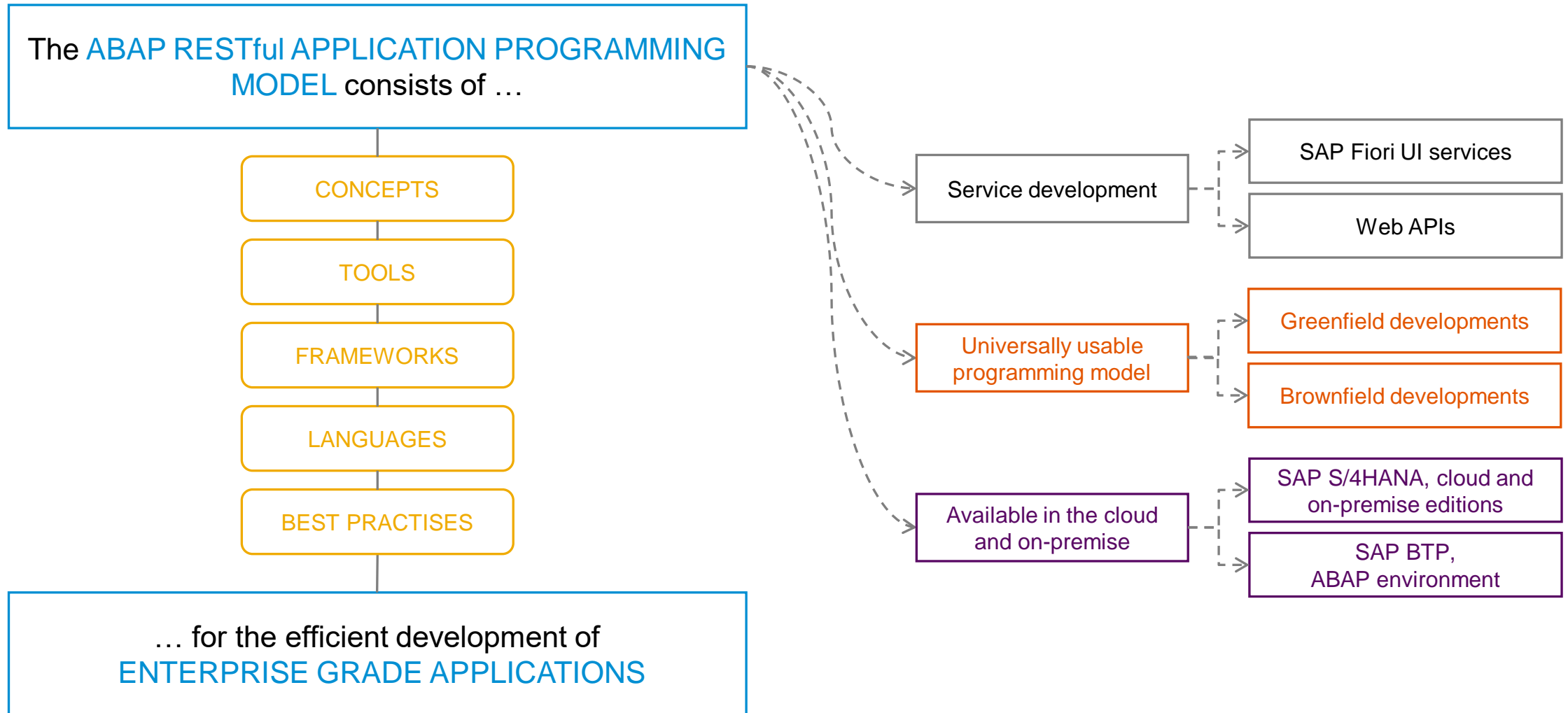


<sup>1</sup> starting with release 7.4 SPS05

★ Safe investments!



# ABAP RESTful Application Programming Model (RAP) at a glance





# The key players

**ABAP Development Tools in Eclipse** for all development tasks

Easy developer onboarding  
End-to-end development flow

**Languages: ABAP and Core Data Services (CDS)**

Standard implementation tasks via typed APIs supporting  
static code checks, auto-completion, element info

**Powerful frameworks**

Take over technical implementation tasks  
Business logic added in code exits on protocol-agnostic layers



# Efficient ABAP development in Eclipse<sup>®</sup>

**HIGH DEVELOPER PRODUCTIVITY WITH THE  
ABAP DEVELOPMENT TOOLS (ADT)  
ON-PREMISE AND IN THE CLOUD**

## MODERN DEVELOPMENT TOOLSET

Fully eclipse-based  
Syntax check, Code completion  
Navigation, Search, Quick Fixes  
Full support for the ABAP RESTful  
Application Programming Model and CDS

## QUALITY ASSURANCE

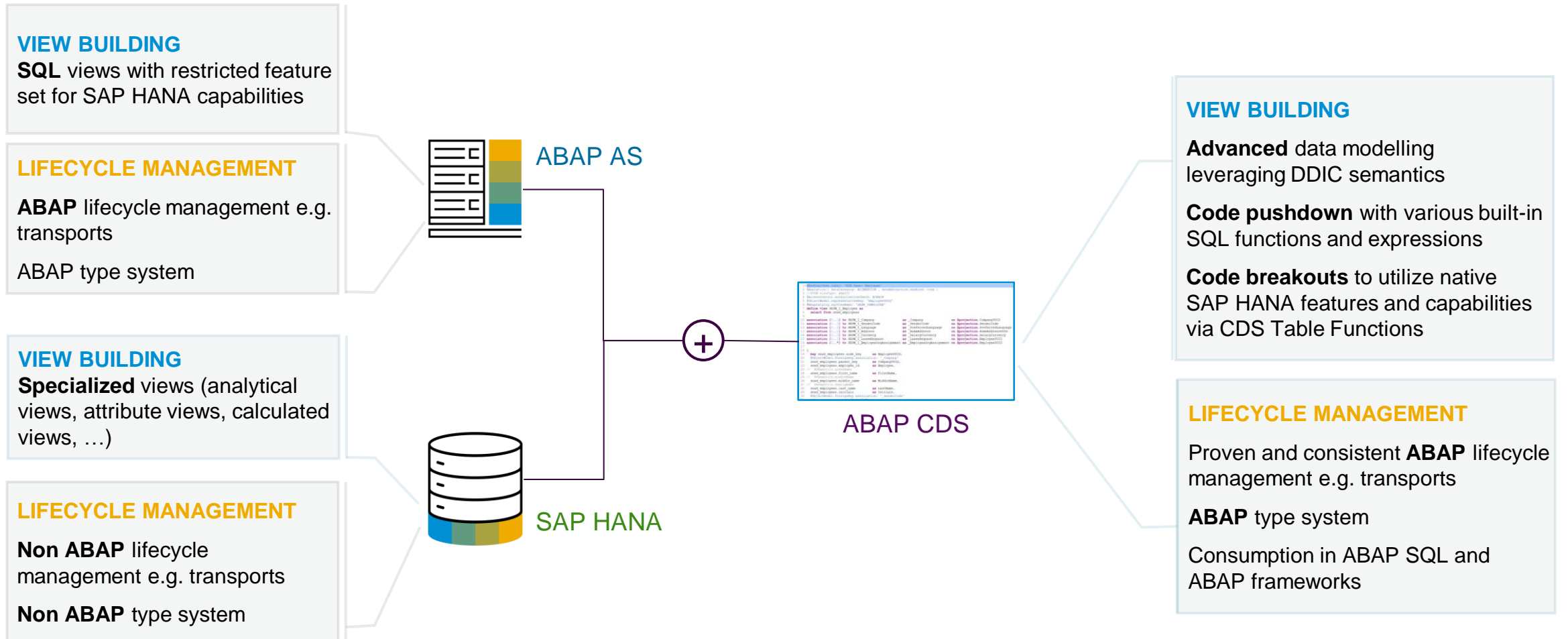
Static code checks (ATC, CVA) with  
remote and local scenarios  
Unit testing incl. isolation frameworks  
Test seams and injections

## SUPPORTABILITY

Debugging, profiling, tracing  
Static and dynamic logging  
Runtime monitoring and analysis

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 data declarations, a loop for processing travel instances, and a check for invalid discount values. Below the code editor, the ATC (Automatic Test Code) results are visible, showing a critical assertion error: `Critical Assertion Error: 'overall stat: 56 (C: CB9980000 CLAS ABAP Unit: ZRAP100_0`. The error details indicate an incomplete evaluation of a field. The interface also shows the project structure, including `ZRAP100_BP_TRAVELTP_000`, `ZRAP100_UL_TRAVEL_O4_000`, and `ZRAP100_R_TRAVELTP_000`.

# Next generation data modeling and access with ABAP CDS



# Next generation data modeling and access with ABAP CDS – Example

The diagram illustrates the mapping between CDS annotations and their corresponding code in an ABAP CDS view definition. The annotations are shown in colored boxes on the left, and the code is shown in a code editor on the right. Lines connect the annotations to the specific code elements they describe.

- View annotations** (blue box) points to the `@EndUserText` and `@AccessControl` annotations at the top of the code.
- View definition** (green box) points to the `define root view entity` and `as select from` statements.
- Associations** (orange box) points to the `composition` and `association` statements.
- Selection** (purple box) points to the `{` block containing the `key` and field definitions.
- Data source** (yellow box) points to the `as select from /dmo/a_travel_d` statement.
- Element annotations** (blue box) points to the `@Semantics` annotations on the `booking_fee` and `total_price` fields.

```
1 @EndUserText.label: 'Travel View Entity for Draft RefScen'
2 @AccessControl.authorizationCheck: #NOT_REQUIRED
3
4 define root view entity /DMO/I_Travel_D
5   as select from /dmo/a_travel_d
6
7   composition [0..*] of /DMO/I_Booking_D      as _Booking
8
9   association [0..1] to /DMO/I_Agency          as _Agency      on $projection.AgencyID = _Agency.AgencyID
10  association [0..1] to /DMO/I_Customer       as _Customer     on $projection.CustomerID = _Customer.CustomerID
11  association [1..1] to /DMO/I_Overall_Status_VH as _OverallStatus on $projection.OverallStatus = _OverallStatus.OverallStatus
12  association [0..1] to I_Currency            as _Currency     on $projection.CurrencyCode = _Currency.Currency
13
14 { //dmo/a_travel_d
15   key travel_uuid          as TravelUUID,
16
17   travel_id               as TravelID,
18   agency_id               as AgencyID,
19   customer_id             as CustomerID,
20   begin_date              as BeginDate,
21   end_date                as EndDate,
22   @Semantics.amount.currencyCode: 'CurrencyCode'
23   booking_fee             as BookingFee,
24   @Semantics.amount.currencyCode: 'CurrencyCode'
25   total_price             as TotalPrice,
26   currency_code           as CurrencyCode,
27   description             as Description,
28   overall_status          as OverallStatus,
29
30
31
32
33
34
35
36
37
38
39
40
41   //Local flag field
42   @Semantics.systemDateTime.lastChangedAt: true
43   last_changed_at         as LastChangedAt,
44
45   //Associations
46   _Booking,
47
48   _Agency,
49   _Customer,
50   _OverallStatus,
51   _Currency
52 }
```

[ABAP Flight Reference Scenario](#) -  
Example available in package /DMO/FLIGHT\_DRAFT

# Declarative and expression-oriented ABAP language

## MODERN ABAP

Simple and concise ABAP code through new language features like inline declarations, constructor expressions

Extensively expression-oriented syntax

Advanced table operations like CORRESPONDING( ) operator, grouping and filtering

Entity Manipulation Language (EML) to control the transactional business object behavior in the RAP context

JSON support in sXML library

Cloud-optimized ABAP language version available

ABAP Unit Testing with test doubles and test seams  
Inline code documentation with ABAP Doc

More information:  
[ABAP Keyword Documentation](#)



# BIG PICTURE



# RAP – The big picture

## CONSUMPTION

### DATA INTEGRATION

Consume SQL based services

### EVENTS

Consume business events

### SAP FIORI UIs & WEB APIs

Consume OData based services

### SAP ANALYTICS CLOUD

Consume InA based UI services for live data access



**SERVICE BINDING** – Bind to protocol version and scenario



**SERVICE DEFINITION** – Define scope to be exposed

## BUSINESS SERVICE PROVISIONING

### BUSINESS OBJECT PROJECTION AND INTERFACES



CDS: BO projection views



BDEF: Behavior projection



ABAP: Behavior implementation<sup>1</sup>

### ANALYTICAL QUERIES



CDS: Analytical projection views

EXTENSIBILITY

## DATA MODELING & BEHAVIOR

### CDS ENTITIES



CDS: Data modeling

### BUSINESS OBJECTS



CDS: Data modeling



BDEF: Behavior definition



ABAP: Behavior implementation

### ANALYTICAL MODEL



CDS: Analytical cubes



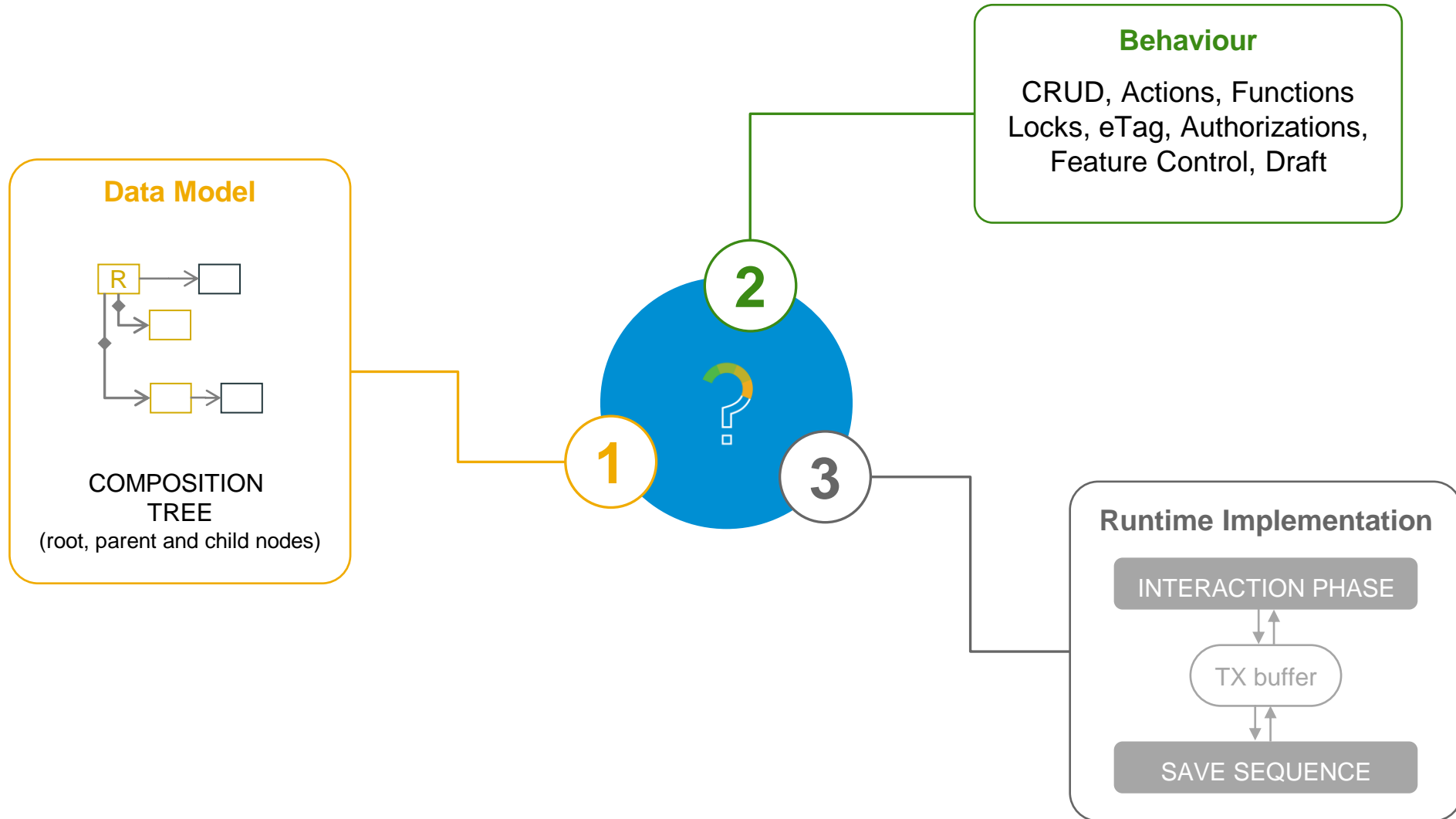
CDS: Analytical dimensions



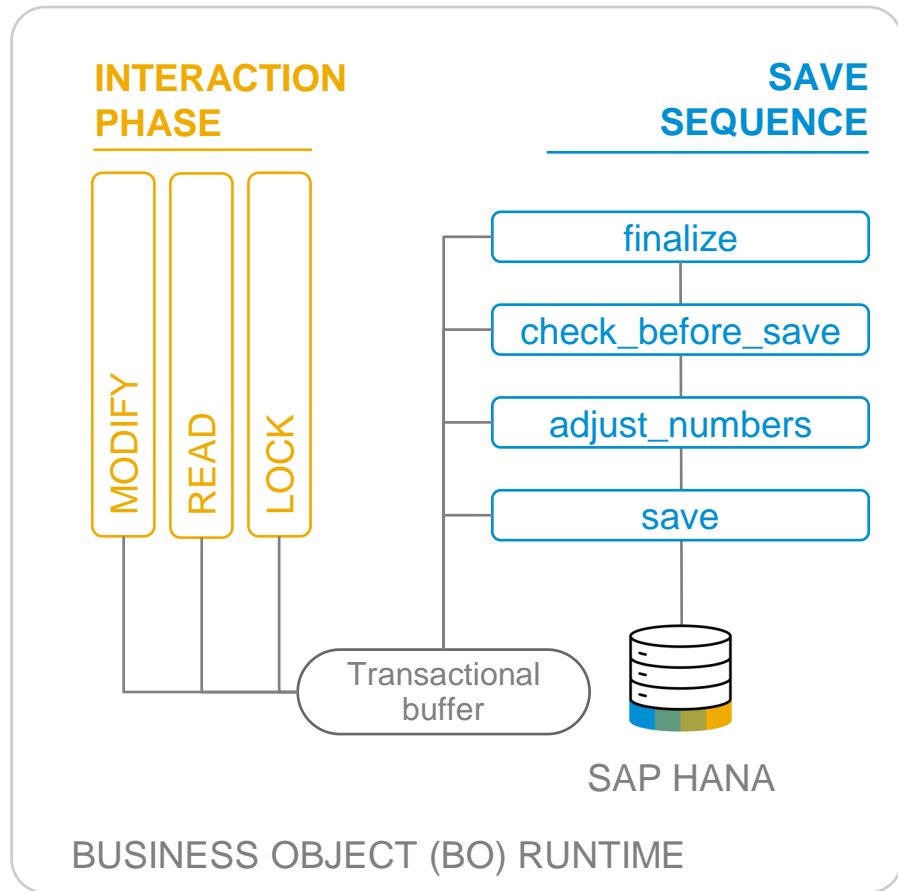
# BUSINESS OBJECTS



# What is a business object (BO) ?



# BO runtime implementation types



## UNMANAGED

For **brownfield developments** with available application code for interaction phase, transactional buffer, and save sequence

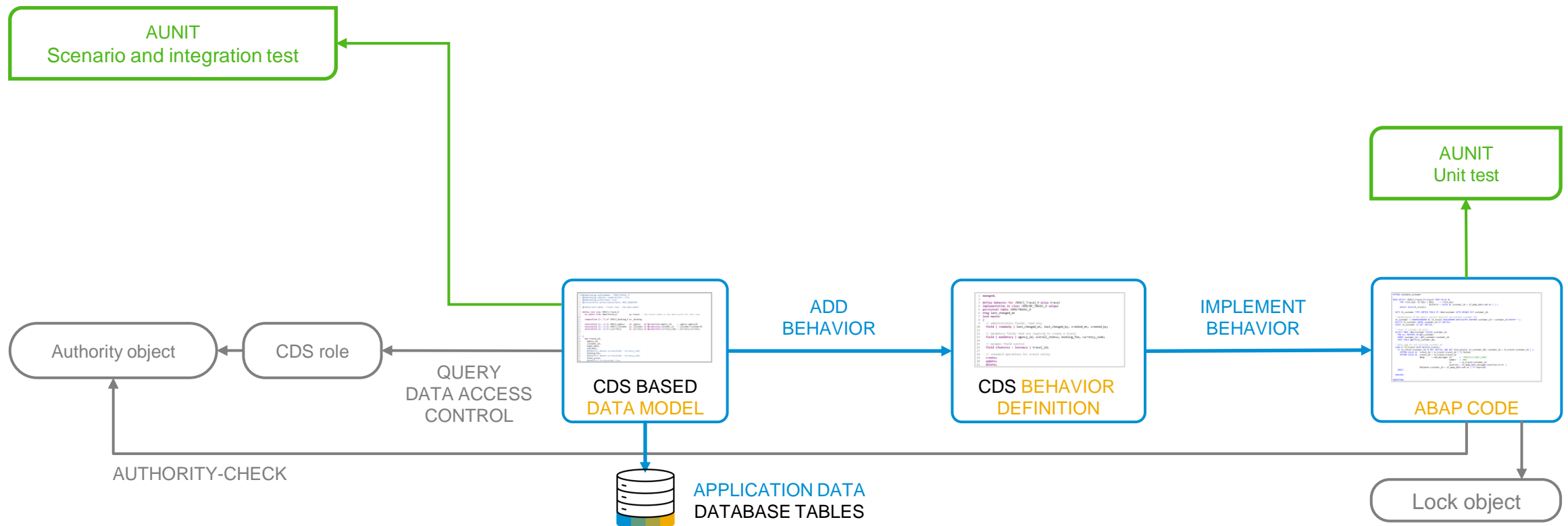
- ➔ Developers in charge of BO runtime: CRUD operations
- ➔ Adapters needed to integrate the existing code

## MANAGED

For **greenfield developments** with standard implementation  
(Opt. unmanaged appl. components: DB tables, lock/PFCG object, update task FM)

- ➔ Standard CRUD operations work out of the box
- ➔ Developers add BO-specific business logic

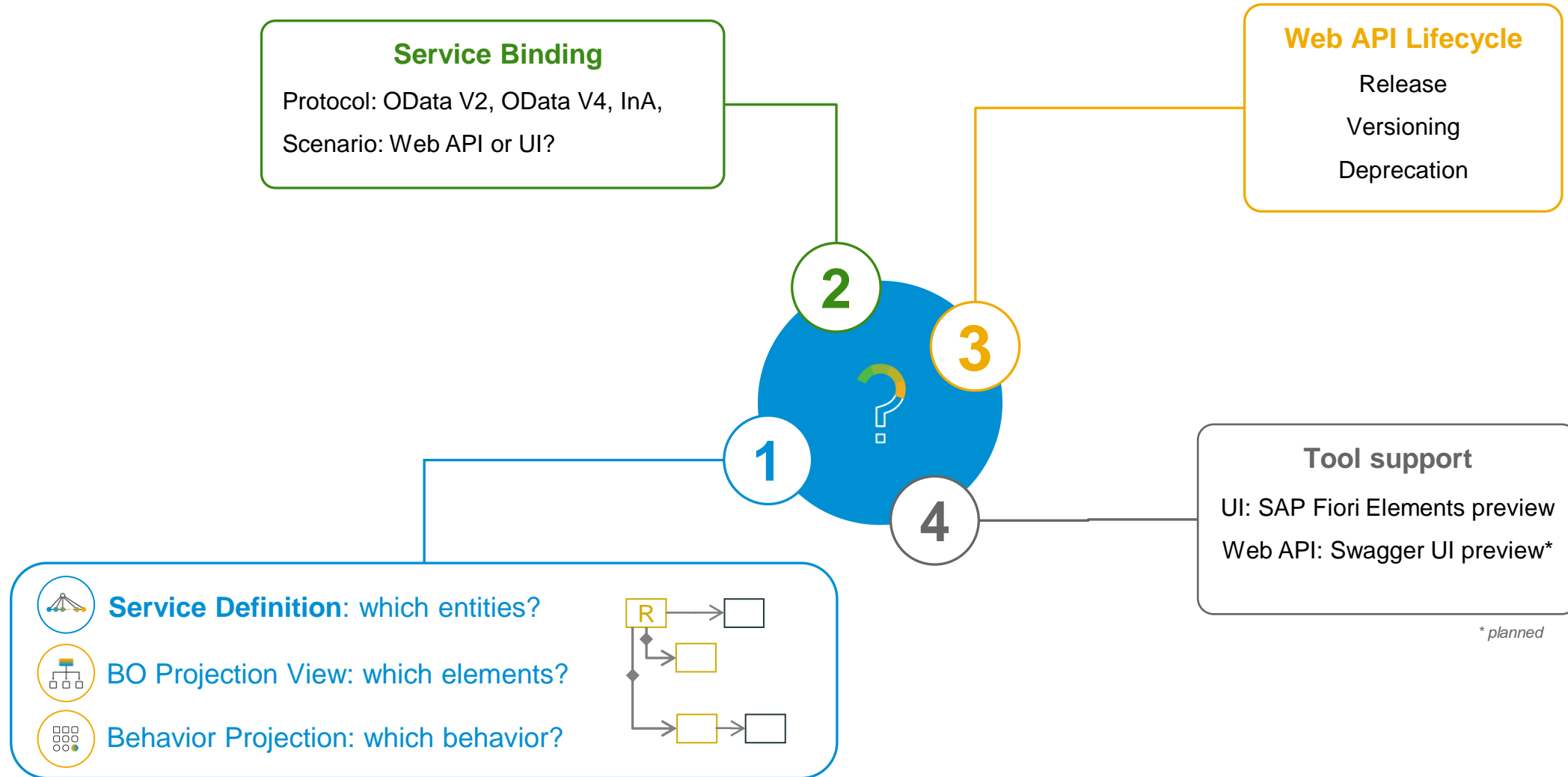
# The development flow



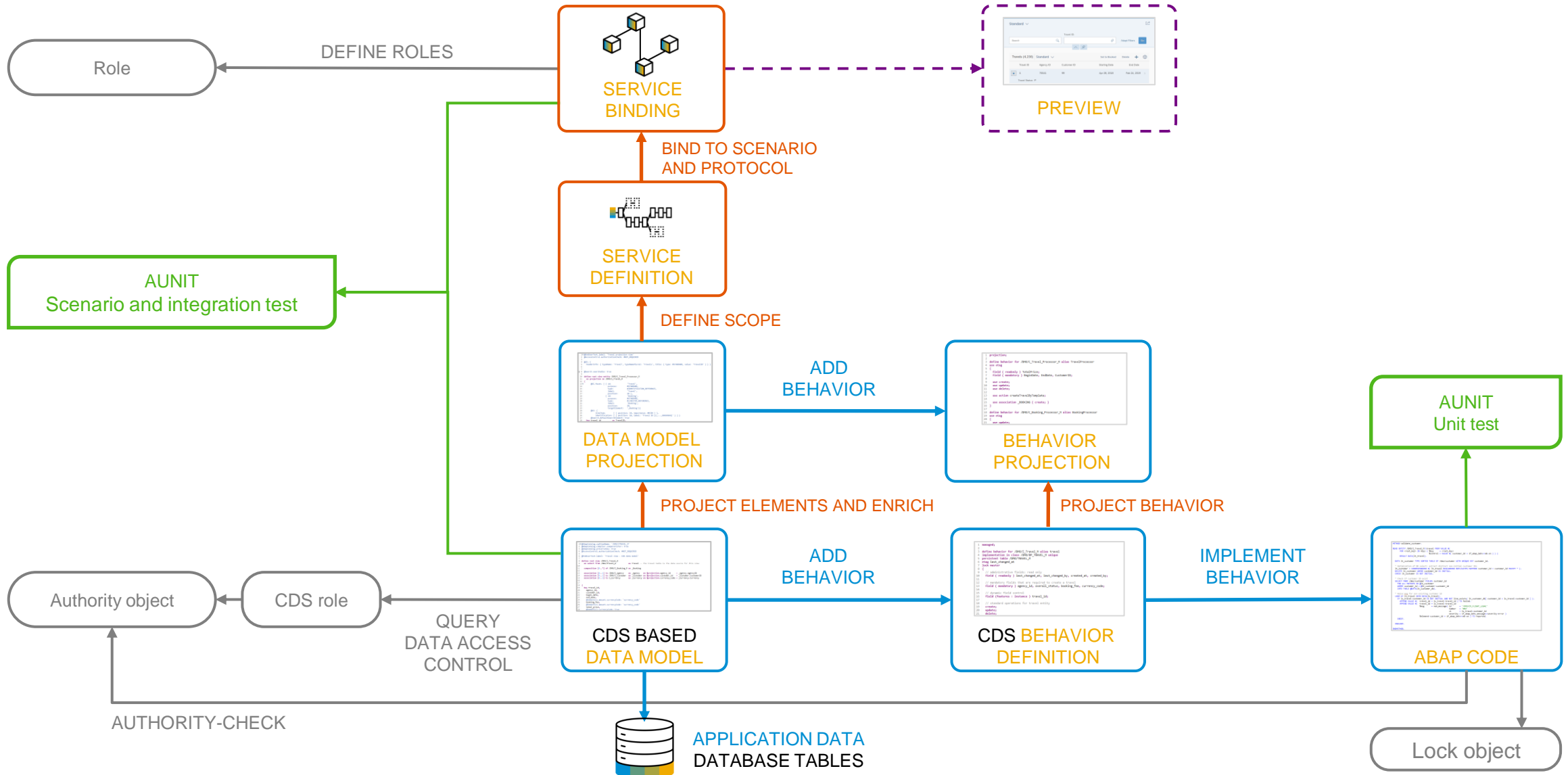
# BUSINESS SERVICES



# What is a business service



# The development flow





# DEMO

GET THE IDEA



# SUMMARY



# Wrap up – Key takeaways

The **ABAP RESTful Application Programming Model (RAP)** helps to efficiently and rapidly build enterprise-grade services with intrinsic built-in cloud qualities.

RAP best support **SAP HANA** and **SAP Fiori elements**.

RAP is **available** on **SAP BTP ABAP Environment**, **SAP S4HANA Cloud**, and **SAP S/4HANA** starting with edition 1909.

The RAP **feature scope** is enhanced on a **quarterly** basis on SAP BTP ABAP Environment, a **bi-yearly** basis on SAP S/4HANA Cloud ABAP Environment, and a **yearly** basis on SAP S/4HANA.



What's New: [SAP BTP ABAP Environment](#) | [SAP S/4HANA](#)



Take a look at the [interactive SAP Road Map Explorer](#) for updates.



# Sample implementations with the ABAP Flight Reference Scenario

**SAP Help Portal**

ABAP RESTful Application Programming Model

Learn

Start

Prerequisites

**Downloading the ABAP Flight Reference Scenario**

Developing an OData Service for Simple List Reporting

Generating a RAP Business Service with the Generate ABAP Repository Objects Wizard

Develop

Development Constraints

Develop Applications

Develop Web APIs

Develop APIs

Develop UI-Specifics

Develop Individual BO Capabilities

Develop Common Capabilities

Implementing an UI

Test

## Sample Services

The development guides for the ABAP RESTful Application Programming model are based on the sample data from the ABAP Flight Reference Scenario. That means that you can compare the documentation with the productive code that was used to build the documentation scenario. In addition, the ABAP Flight Reference Scenario also includes a demo package with the development objects that are created during the course of the development guides. That means, the whole demo scenario can be downloaded and tested. You obtain full demo services with code built by following conventions and best practices and you can use and reuse the delivered objects for your development.

The following demo scenarios are available for you:

- Developing Read-Only List Reporting Apps in the package /DMO/FLIGHT\_READONLY
- Developing Unmanaged Transactional Apps in the package /DMO/FLIGHT\_UNMANAGED
- Developing Managed Transactional Apps in the package /DMO/FLIGHT\_MANAGED
- Developing Transactional Apps with Draft Capabilities in the package /DMO/FLIGHT\_DRAFT

## Legacy Coding

The reference scenario also includes legacy coding. This legacy coding is based on function modules and exemplifies legacy applications that you can include in your new ABAP code. Above all, the legacy coding is relevant for the development guide, that explains how to build a new service on the basis of an existing application. It illustrates how you build an application with the unmanaged implementation type. The legacy coding that is used in this scenario is

- /DMO/FLIGHT (332) *Flight Reference Scenario*
- > /DMO/FLIGHT\_DRAFT (52) *Flight Reference Scenario: Draft Guide*
- > /DMO/FLIGHT\_LEGACY (128) *Flight Reference Scenario: Legacy Objects*
- > /DMO/FLIGHT\_MANAGED (46) *Flight Reference Scenario: TX managed E2E Guide*
- > /DMO/FLIGHT\_READONLY (7) *Flight Reference Scenario: Read-Only E2E Guide*
- > /DMO/FLIGHT\_REUSE (69) *Flight Reference Scenario: Reused Entities*
- > /DMO/FLIGHT\_UNMANAGED (30) *Flight Reference Scenario: TX unmanaged E2E Guide*

Demonstrate how to use different RAP capabilities concretely

Based on a simple to use and understand data model: SFLIGHT reloaded

Feature scope regularly enhanced

Downloadable from GitHub



Read more in the RAP documentation: [Cloud](#) | [SAP S/4HANA](#)





# FREE openSAP COURSE



## Building Apps with the ABAP RESTful Application Programming Model (RAP)



### Self-paced mode



- Week 1: Introduction
- Week 2: Developing a Read-Only List Report App
- Week 3: Enabling the Transactional Behavior of an App
- Week 4: Dealing with Existing Code
- Week 5: Service Consumption and Web APIs
- Week 6: Final Exam



**ENROLL NOW!**

<https://open.sap.com/courses/cp13>



# More information



## Further information

[Modern ABAP Development with the ABAP RESTful Application Programming Model \(RAP\)](#) (SAP Community)

[Modernization with RAP | SAP Blogs](#)

[Building Apps with RAP](#) (free openSAP course)

[Get Started with ABAP Programming on SAP BTP](#) (free SAP Learning Journey, also valid for SAP S/4HANA)

What's New in RAP: [SAP BTP ABAP Environment](#) | [SAP S/4HANA](#) | [SAP S/4HANA Cloud](#)

Outlook: [SAP BTP ABAP Environment on the interactive SAP Road Map Explorer](#)

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## Public SAP Web sites

ABAP Development Community: [www.sap.com/community/topic/abap.html](http://www.sap.com/community/topic/abap.html)

SAP BTP ABAP Environment Community: <https://community.sap.com/topics/btp-abap-environment>

SAP S/4HANA Cloud ABAP Environment Community: <https://community.sap.com/topics/s4hana-cloud-abap-environment>

ABAP Testing and Analysis Community: <https://community.sap.com/topics/abap-testing-analysis>

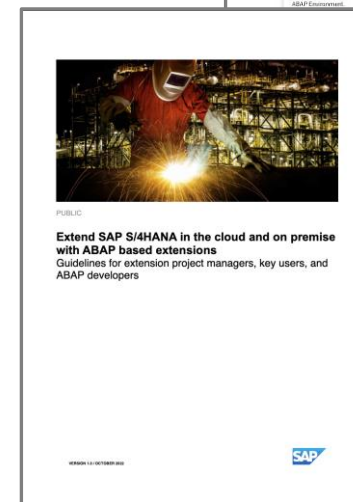
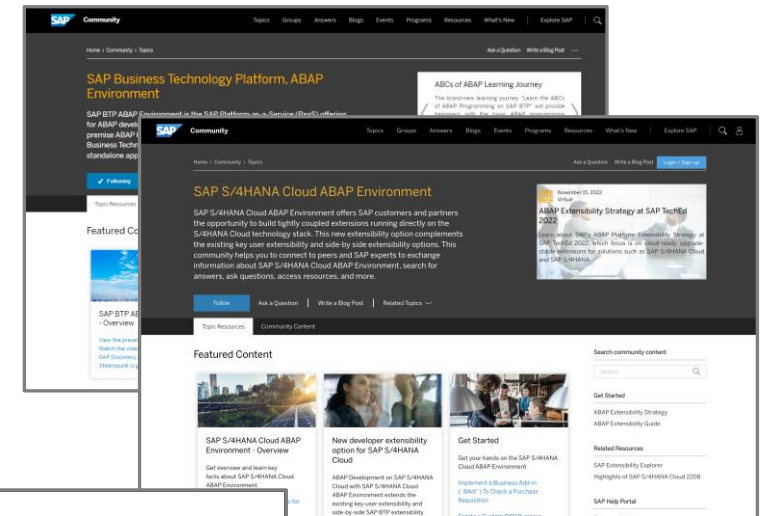
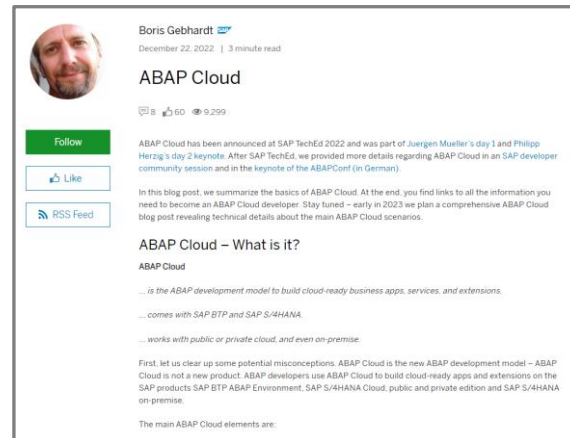
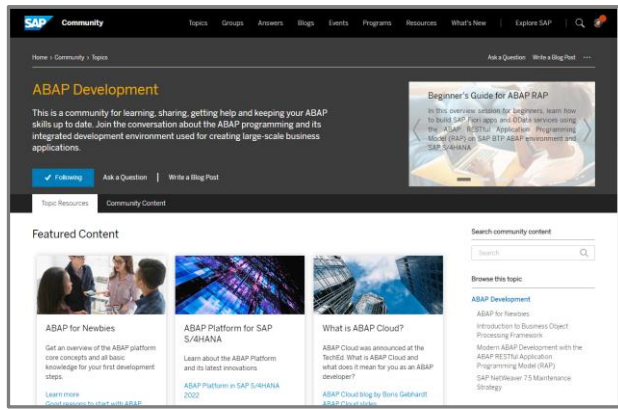
SAP products: [www.sap.com/products](http://www.sap.com/products)

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## SAP training and certification opportunities

[www.sap.com/education](http://www.sap.com/education) – e.g. trainings S4D437, S4D430, HA400, and S4D400

# More information on ABAP Cloud



[SAP S/4HANA Cloud ABAP Environment | SAP Community](#)  
[SAP BTP ABAP Environment | SAP Community](#)

[ABAP Cloud | SAP Blogs](#)

[Developer Discussion: ABAP Cloud](#)

[The new ABAP extensibility guide](#)

[ABAP Development | SAP Community](#)



# Thank you.

Contact information:

**Carine Tchoutouo Djomo**

Product Manager for ABAP Platform

SAP SE

[carine.Tchoutouo.djomo@sap.com](mailto:carine.Tchoutouo.djomo@sap.com)

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