ABAP Cloud & ABAP RESTful Application Programming Model (RAP)
Overview

ABAP Platform Product Management, SAP
May 2023

THE BEST RUN **SAP**

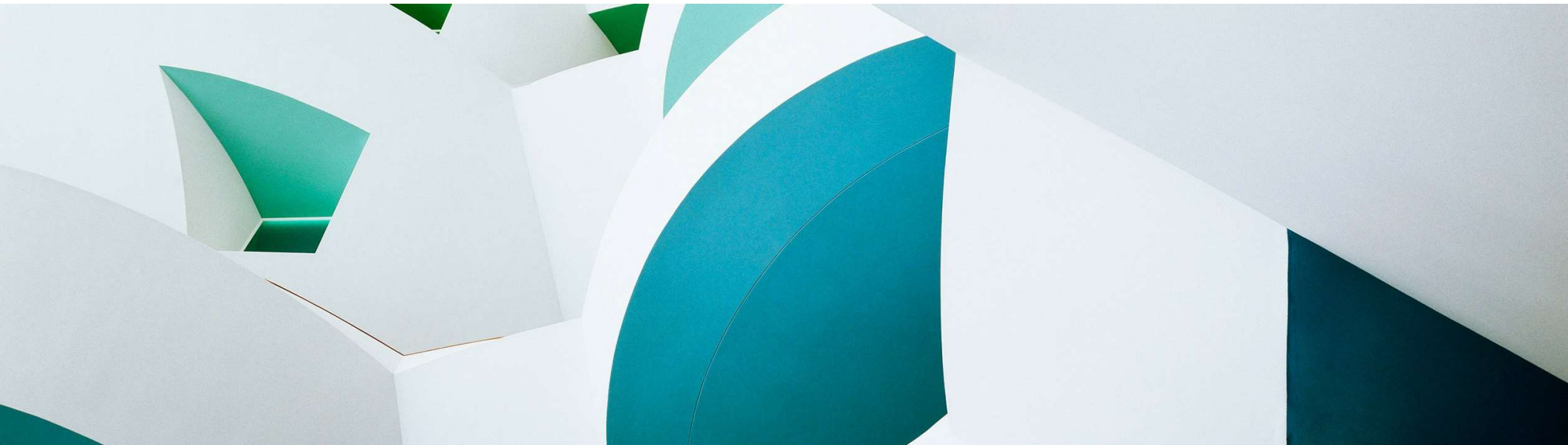# Agenda

- INTRODUCTION
- BIG PICTURE
- BUSINESS OBJECTS
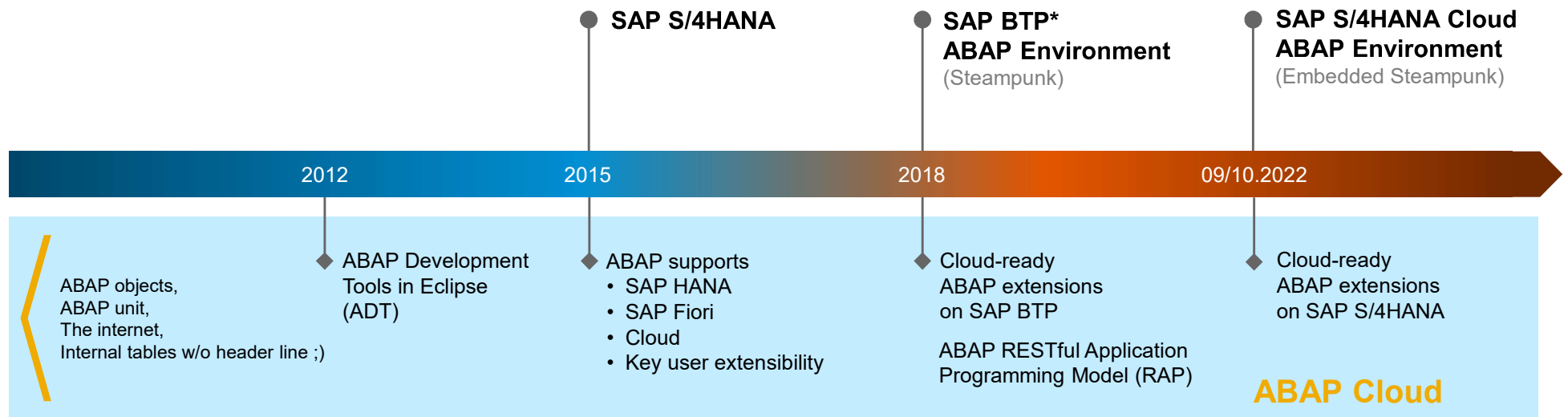- BUSINESS SERVICES
- SUMMARY

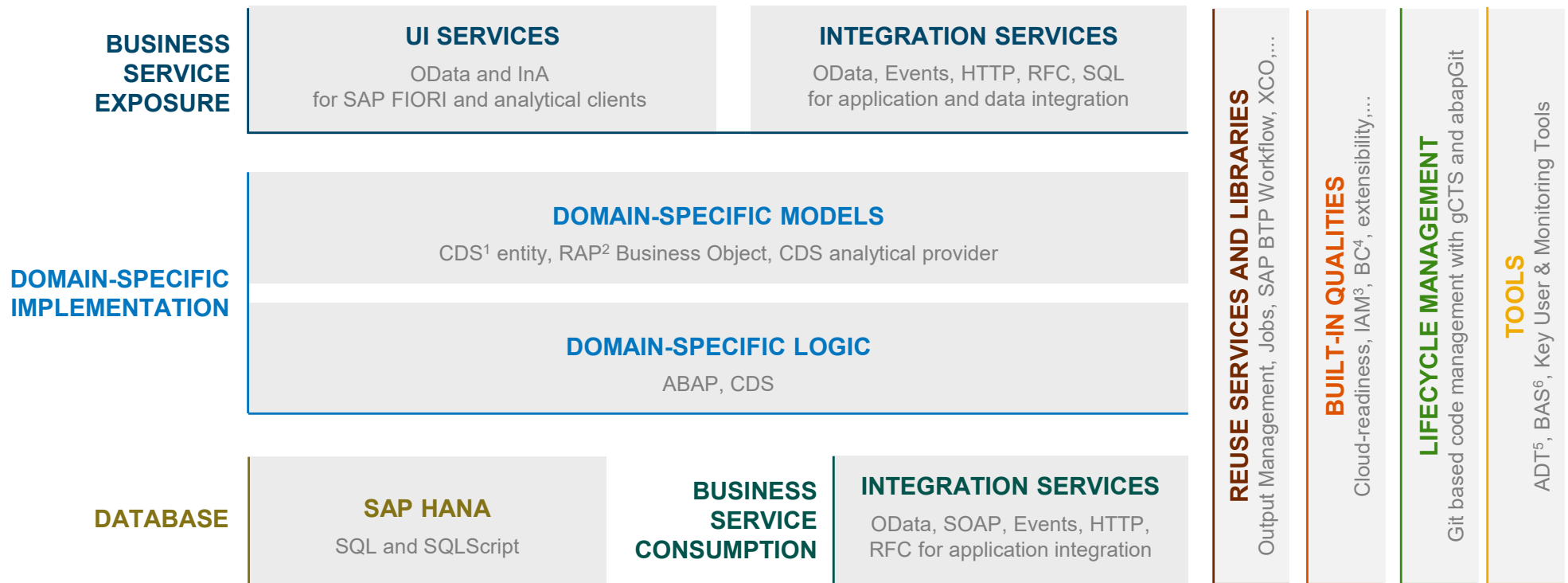# INTRODUCTION

Clean core with the ABAP cloud development model

ABAP Cloud

… is the ABAP **development model** to build cloud-ready business apps, services and extensions
… comes with SAP Business Technology Platform (BTP) and SAP S/4HANA
… works with public or private cloud, and even on-premise

The evolution to ABAP Cloud

SAP S/4HANA

SAP BTP*
ABAP Environment
(Steampunk)

SAP S/4HANA Cloud
ABAP Environment
(Embedded Steampunk)

| 2012 | 2015 | 2018 | 09/10.2022 |

ABAP objects,
ABAP unit,
The internet,
Internal tables w/o header line ;)

ABAP Development
Tools in Eclipse
(ADT)

ABAP supports
• SAP HANA
• SAP Fiori
• Cloud
• Key user extensibility

Cloud-ready
ABAP extensions
on SAP BTP

ABAP RESTful Application
Programming Model (RAP)

Cloud-ready
ABAP extensions
on SAP S/4HANA

ABAP Cloud

ABAP Cloud at a glance

BUSINESS SERVICE EXPOSURE

UI SERVICES	INTEGRATION SERVICES
OData and InA for SAP FIORI and analytical clients	OData, Events, HTTP, RFC, SQL for application and data integration

DOMAIN-SPECIFIC IMPLEMENTATION

DOMAIN-SPECIFIC MODELS

CDS[1] entity, RAP[2] Business Object, CDS analytical provider

DOMAIN-SPECIFIC LOGIC

ABAP, CDS

DATABASE

SAP HANA	BUSINESS SERVICE CONSUMPTION	INTEGRATION SERVICES
SQL and SQLScript		OData, SOAP, Events, HTTP, RFC for application integration

REUSE SERVICES AND LIBRARIES — Output Management, Jobs, SAP BTP Workflow, XCO,...

BUILT-IN QUALITIES — Cloud-readiness, IAM[3], BC[4], extensibility,...

LIFECYCLE MANAGEMENT — Git based code management with gCTS and abapGit

TOOLS — ADT[5], BAS[6], Key User & Monitoring Tools

[1] Core Data Services
[2] ABAP RESTful application programming model
[3] Identity & Access Management
[4] Business Configuration
[5] ABAP Development Tools
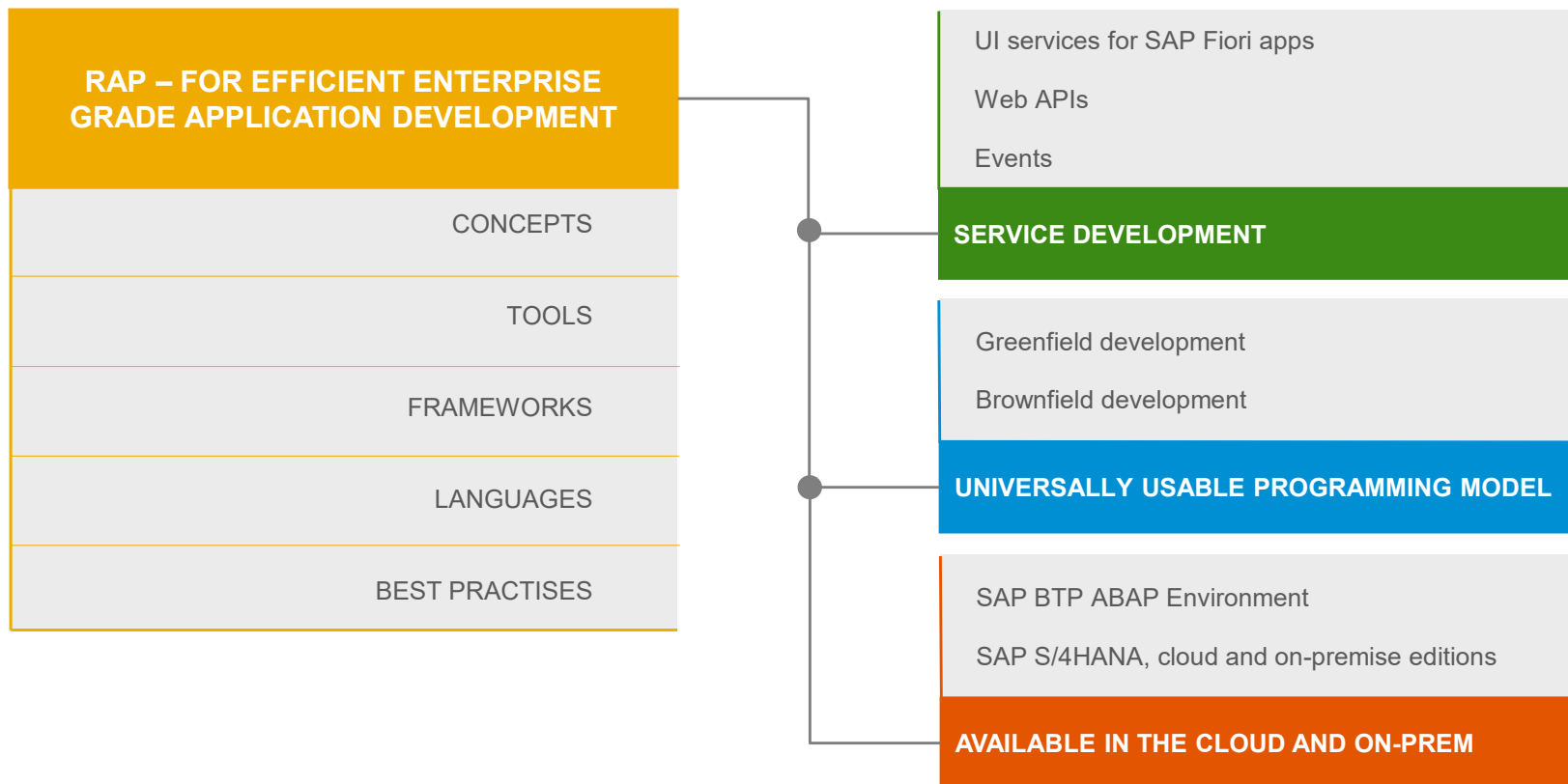[6] Business Application Studio

Availability of ABAP Cloud

ABAP CLOUD DEVELOPMENT ON SAP S/4HANA

ABAP CLOUD DEVELOPMENT ON SAP BTP

SAP S/4HANA (CLOUD)

public interfaces

public interfaces

remote API

public interfaces

SAP S/4HANA CLOUD ABAP ENVIRONMENT / ABAP PLATFORM

SAP BUSINESS TECHNOLOGY PLATFORM ABAP ENVIRONMENT
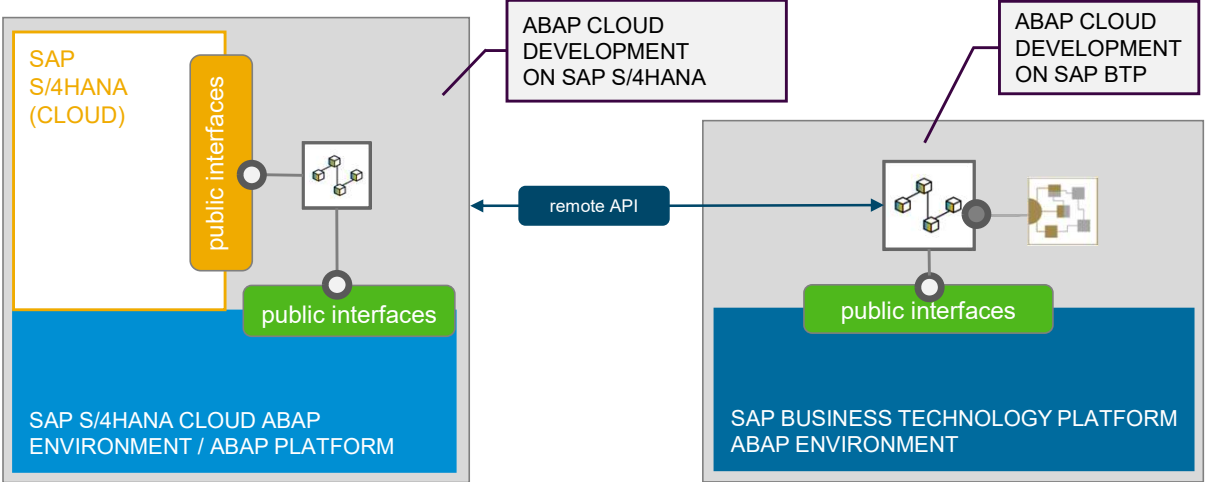
ABAP CLOUD IS AVAILABLE IN THE FOLLOWING PRODUCTS

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

ABAP RESTful Application Programming Model (RAP) at a glance

The centerpiece of ABAP Cloud for building transactional apps

RAP – FOR EFFICIENT ENTERPRISE GRADE APPLICATION DEVELOPMENT

- CONCEPTS
- TOOLS
- FRAMEWORKS
- LANGUAGES
- BEST PRACTISES

UI services for SAP Fiori apps

Web APIs

Events

SERVICE DEVELOPMENT

Greenfield development

Brownfield development

UNIVERSALLY USABLE PROGRAMMING MODEL

SAP BTP ABAP Environment

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

AVAILABLE IN THE CLOUD AND ON-PREM

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
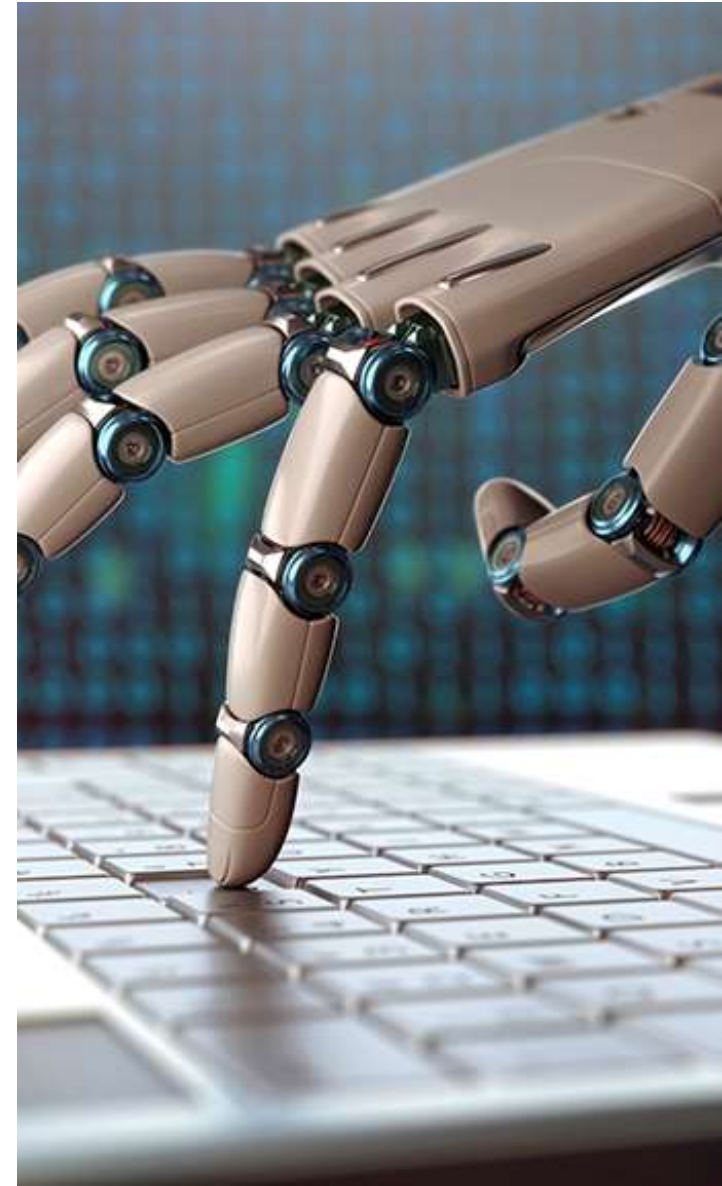
Efficient ABAP development in Eclipse©

**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

Public 11
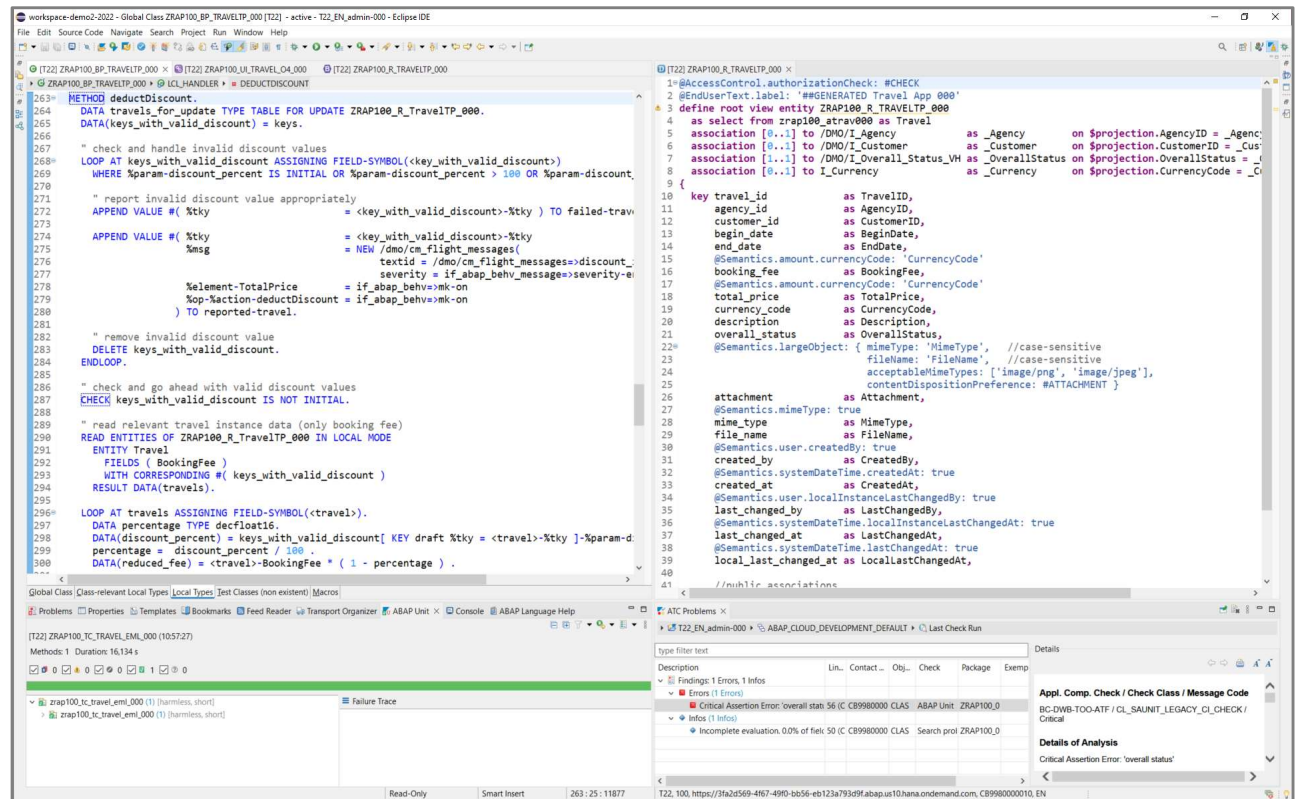
Next generation data modeling and access with ABAP CDS
Combine the best of both worlds

VIEW BUILDING
SQL views with restricted feature set for SAP HANA capabilities

LIFECYCLE MANAGEMENT
ABAP lifecycle management e.g. transports

ABAP type system

VIEW BUILDING
Specialized views (analytical views, attribute views, calculated views, …)

LIFECYCLE MANAGEMENT
Non ABAP lifecycle management e.g. transports

Non ABAP type system

ABAP AS

SAP HANA

⊕

ABAP CDS

VIEW BUILDING
Advanced data modelling leveraging DDIC semantics

Code pushdown with various built-in SQL functions and expressions

Code breakouts to utilize native SAP HANA features and capabilities via CDS Table Functions

LIFECYCLE MANAGEMENT
Proven and consistent **ABAP** lifecycle management e.g. transports

ABAP type system

Consumption in ABAP SQL and ABAP frameworks

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

Inline code documentation with ABAP Doc

ABAP Unit Testing with test doubles and test seams

More information:
ABAP Keyword Documentation

BIG PICTURE

RAP – The big picture

CONSUMPTION	**WEB APIs** Consume OData based services	**EVENTS** Consume business events	**SAP FIORI UIs** Consume OData based UI services

SERVICE BINDING – Bind to protocol version and scenario

SERVICE DEFINITION – Define scope to be exposed

BUSINESS SERVICE EXPOSURE

BUSINESS OBJECT PROJECTIONS AND INTERFACES

CDS: BO projection views

BDEF: Behavior projection

ABAP: Behavior implementation [1]

DATA MODELING & BEHAVIOR

CDS ENTITIES

CDS: Data modeling

BUSINESS OBJECTS

CDS: Data modeling

BDEF: Behavior definition

ABAP: Behavior implementation

EXTENSIBILITY

[1] Not applicable for RAP BO interfaces

17
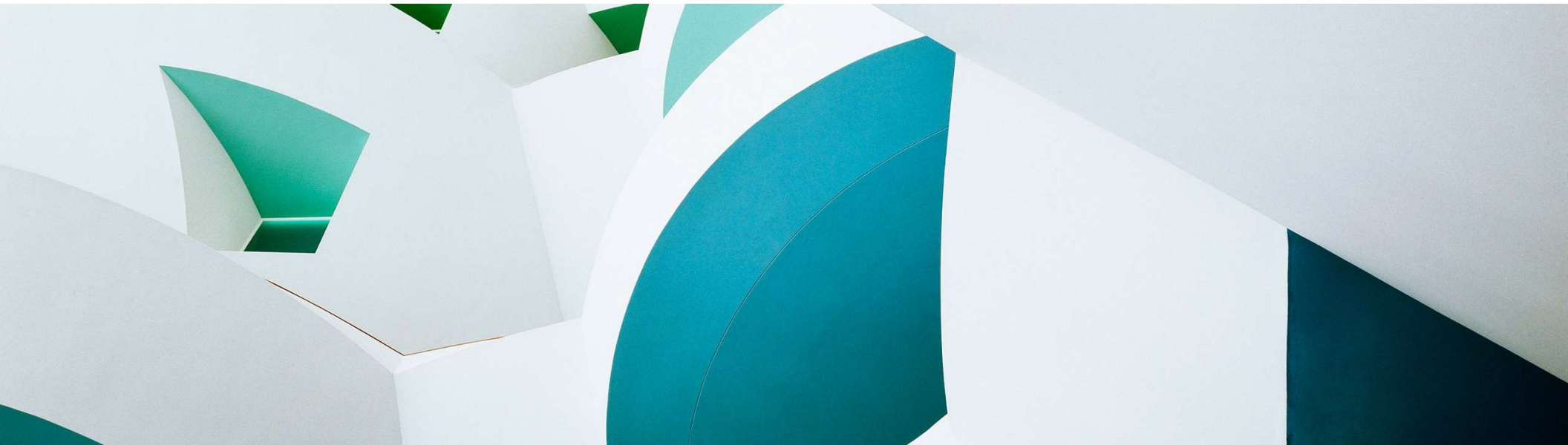
BUSINESS OBJECTS

What is a business object (BO) ?

Data Model

COMPOSITION
TREE
(root, parent and child nodes)

Behaviour

CRUD, Actions, Functions
Locks, eTag, Authorizations,
Feature Control, Draft

Runtime Implementation

INTERACTION PHASE

TX buffer
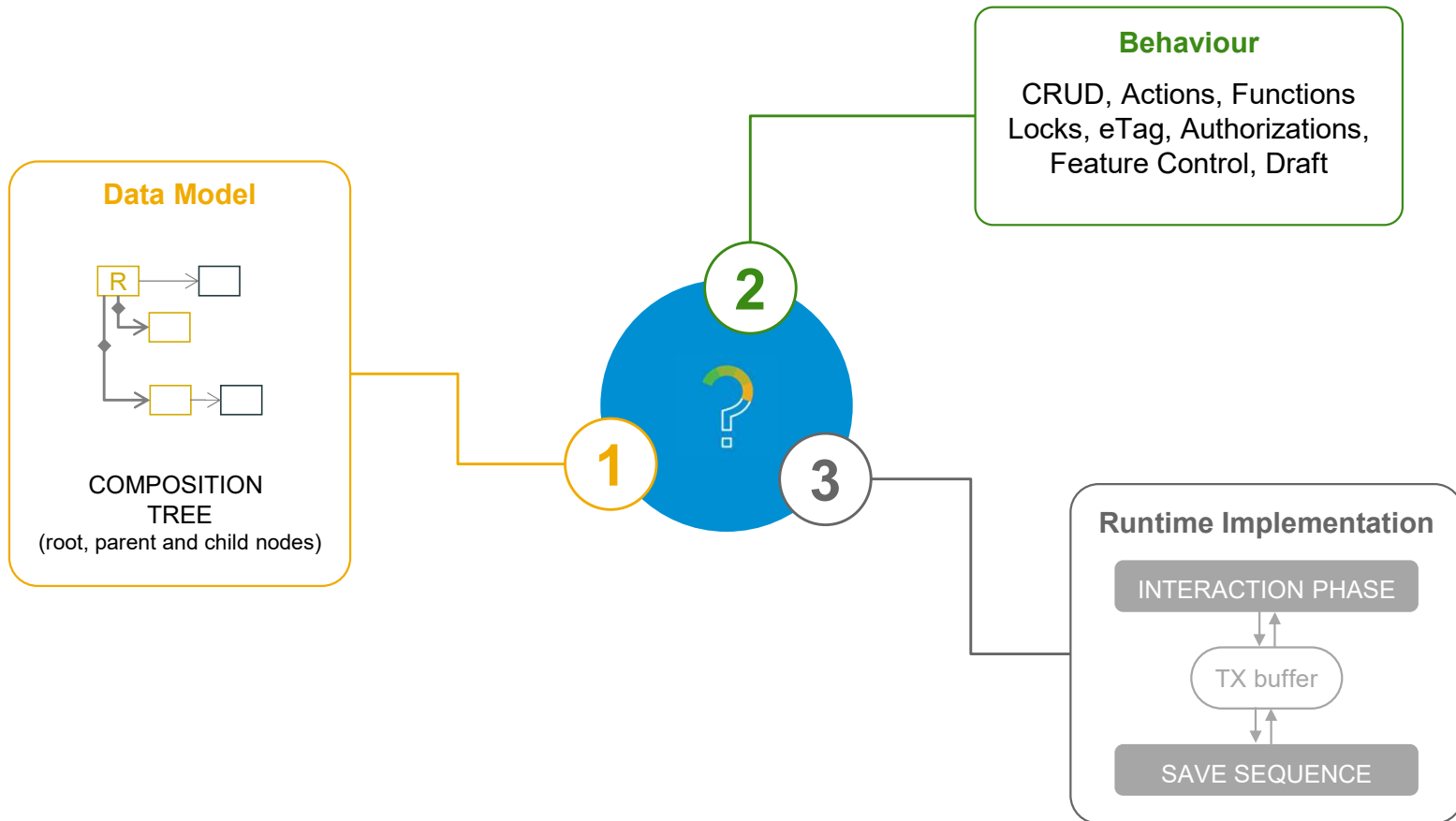
SAVE SEQUENCE

BO runtime implementation types

INTERACTION PHASE

SAVE SEQUENCE

MODIFY | READ | LOCK

finalize

check_before_save

adjust_numbers

save

Transactional buffer

SAP HANA

BUSINESS OBJECT (BO) RUNTIME
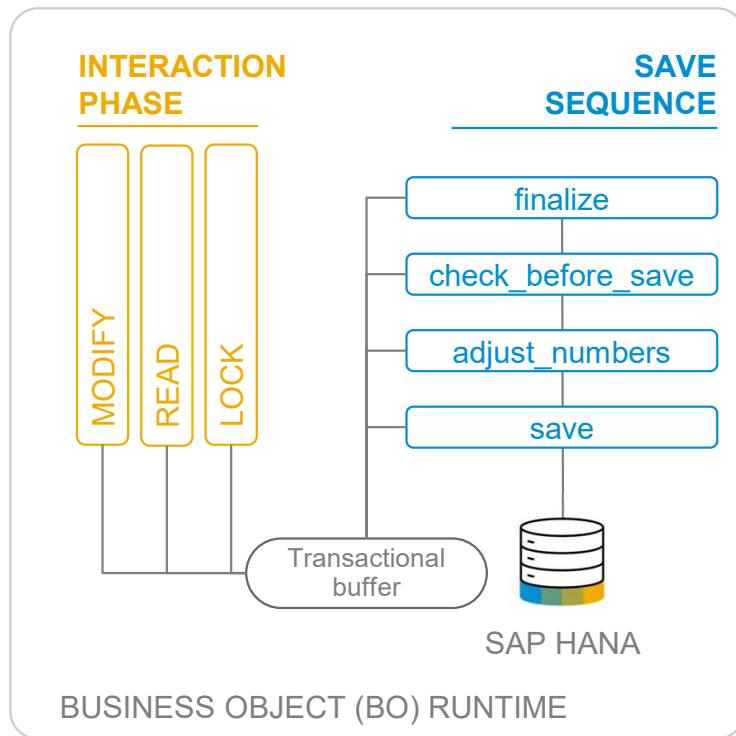
UNMANAGED

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

AUNIT
Scenario and integration test

AUNIT
Unit test

Authority object

CDS role

QUERY
DATA ACCESS
CONTROL

CDS BASED
DATA MODEL

ADD
BEHAVIOR

CDS BEHAVIOR
DEFINITION

IMPLEMENT
BEHAVIOR

ABAP CODE

AUTHORITY-CHECK

APPLICATION DATA
DATABASE TABLES

Lock object
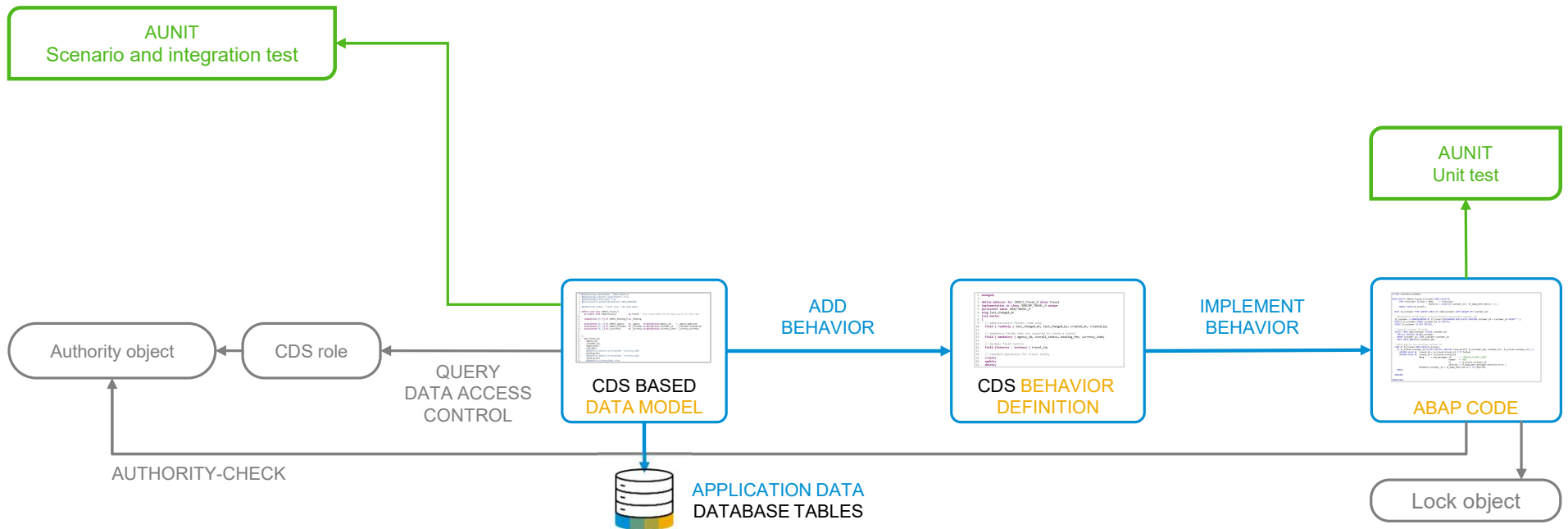
BUSINESS SERVICES

Business service

Service Binding

Protocol: OData V2, OData V4, …

Scenario: Web API or UI?

Web API Lifecycle

Release

Versioning

Deprecation

2

3

1

4

?

Service Definition: which entities?

BO Projection View: which elements?

Behavior Projection: which behavior?

R

Tool support

UI: SAP Fiori Elements preview

Web API: Swagger UI preview*

planned
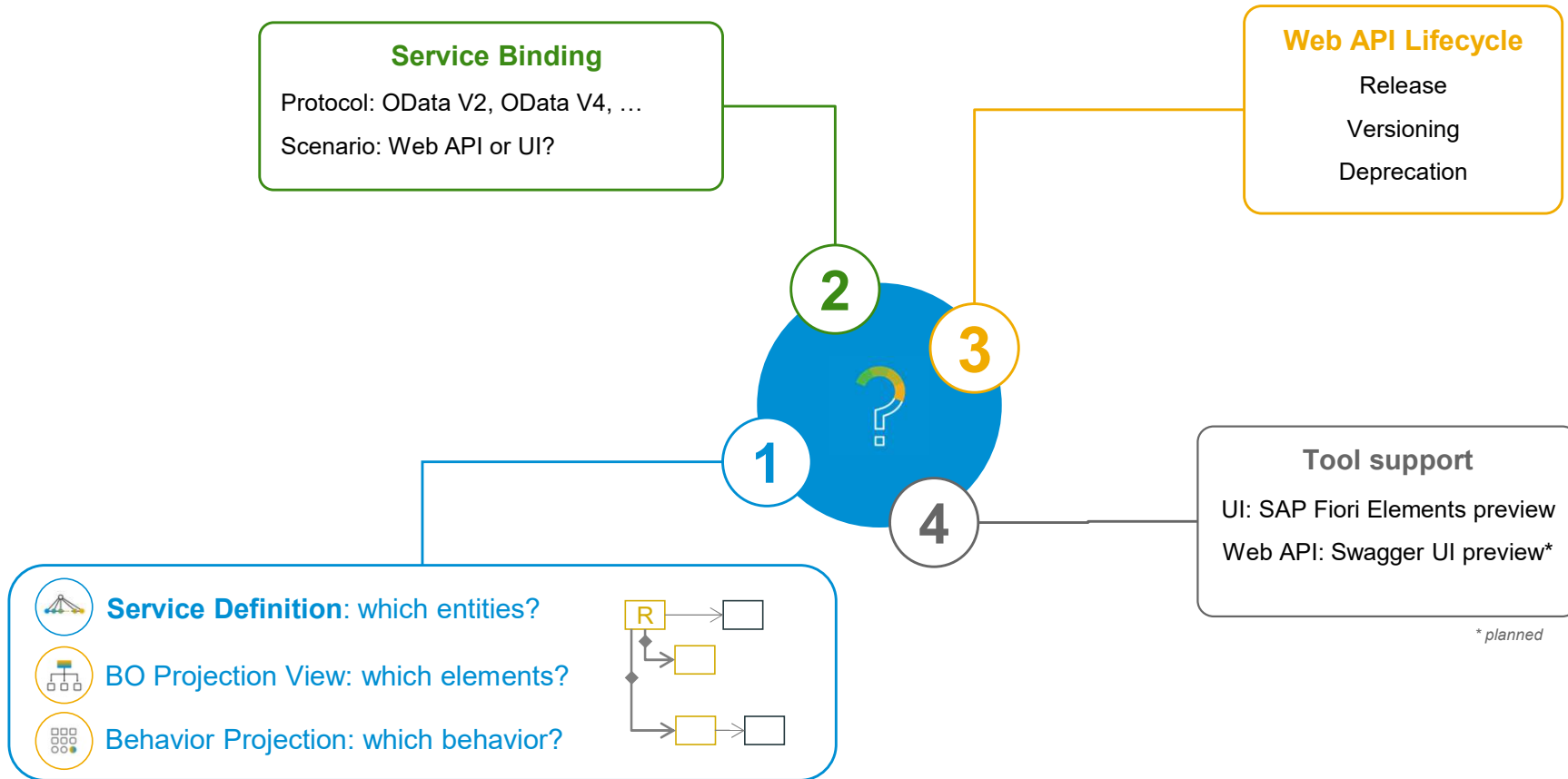
The development flow
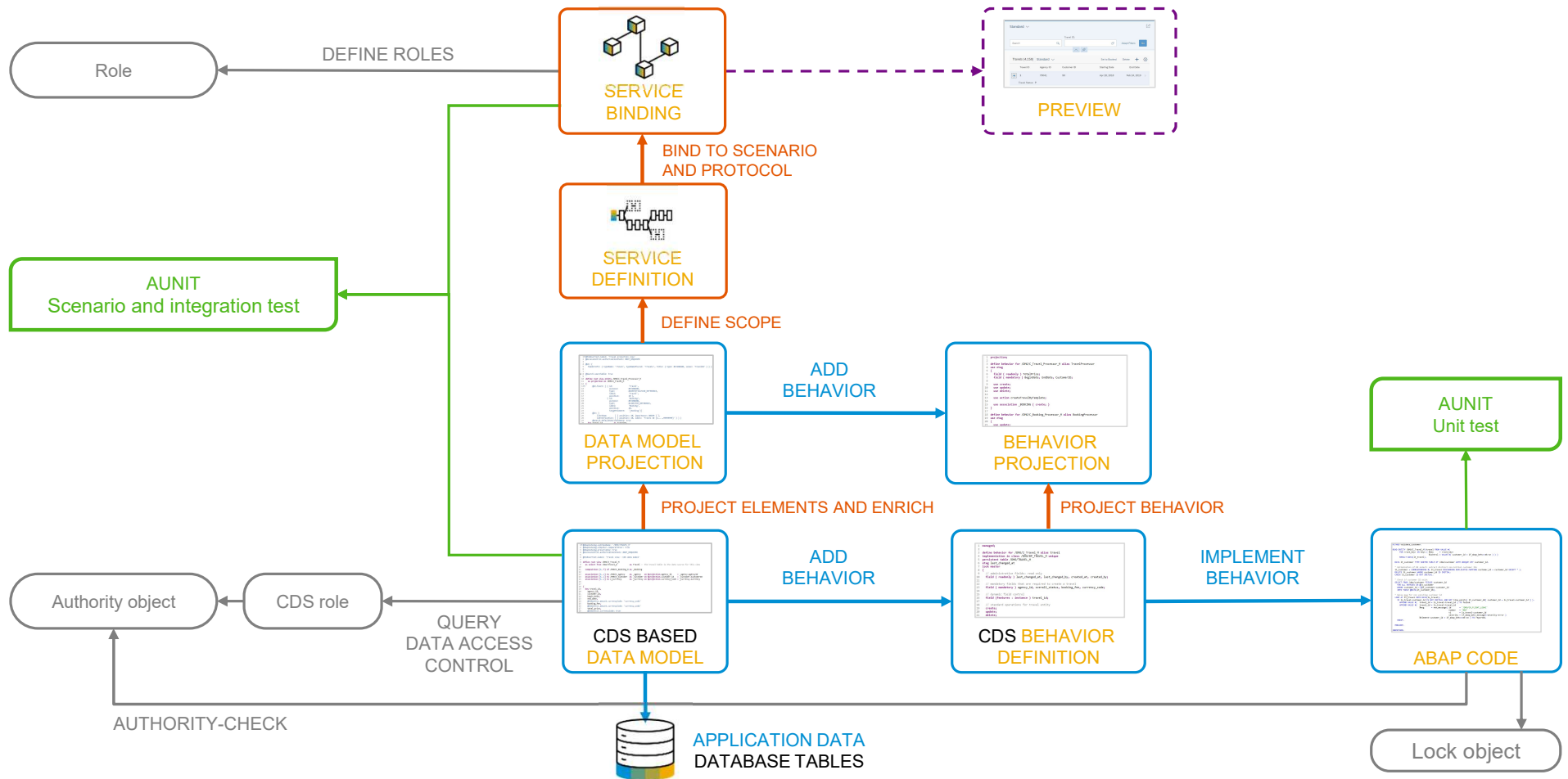
SUMMARY
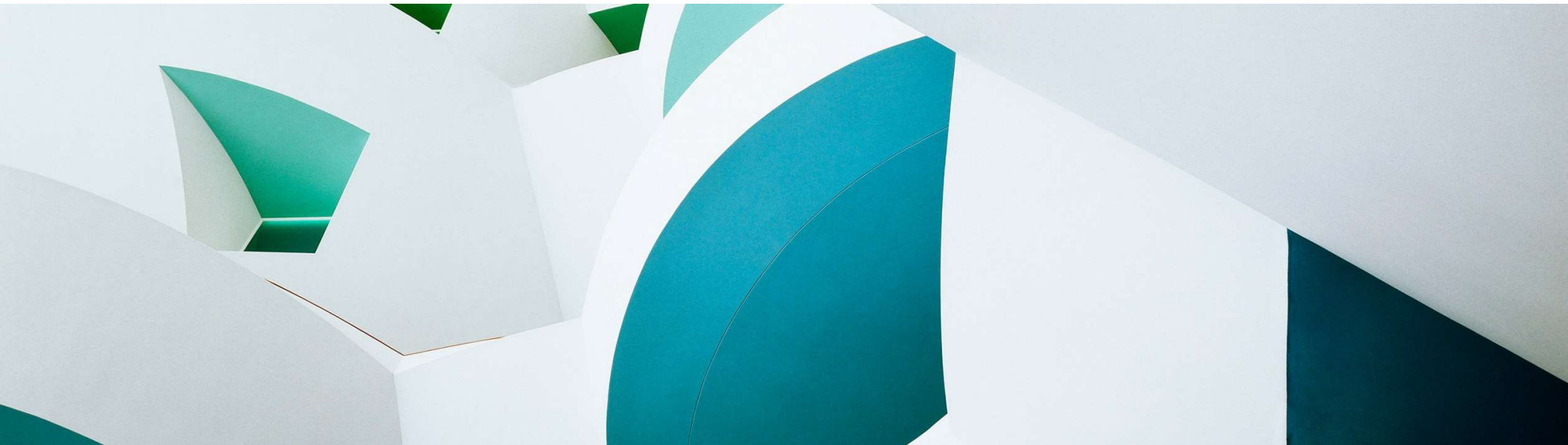
Key takeaways

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

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

RAP is available on **SAP BTP ABAP Environment**, **SAP S/4HANA Cloud**, and **SAP S/4HANA** as of edition 1909.

The **RAP feature scope** is enhanced **quarterly** in SAP BTP ABAP Environment, **twice a year** in SAP S/4HANA Cloud ABAP Environment, and **annually** in SAP S/4HANA.

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

What's Next: [ABAP Platform Roadmap Information](#) for all products

Guidance for the usage of RAP in SAP S/4HANA

SAP S/4HANA 1909

FIRST RAP DELIVERY WITH LIMITED FEATURE SET

Managed scenario for greenfield development not supported
No draft support for SAP Fiori development

GUIDANCE

Delivery with SAP S/4HANA 1909   ➥ Use the *ABAP Programming Model for SAP Fiori*

SAP S/4HANA 2020

BASIC RAP DELIVERY

Incl. **managed** scenario (*with major limitations regarding key layout and numbering*)
Draft support for managed or unmanaged BOs to build transactional SAP Fiori apps
OData V4 support for Web APIs and SAP Fiori UIs with FPS01

GUIDANCE

If limitations are crucial   ➥ Use the *ABAP Programming Model for SAP Fiori*
If limitations are not critical   ➥ Use RAP

SAP S/4HANA ≥ 2021

MASS ADOPTION READY RAP DELIVERY

Managed scenario now supports various key layouts
Late numbering for a managed BO (with or without draft)
Enhanced testability, documentability and supportability support
Extensibility options, native **business events** exposure, side effects and more features delivered with **Edition 2022**

GUIDANCE

➥ Exclusively use RAP

Sample implementations with the ABAP Flight Reference Scenario

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 on RAP

Further information

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

[Modernization with RAP](#) | SAP Blogs

[Building Apps with RAP](#) | openSAP Course

[Acquire Core ABAP Skills](#) | SAP Learning Journey

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](#) | [ABAP Platform Roadmap Information](#)

Public SAP Web sites

ABAP Development Community: 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

SAP training and certification opportunities

www.sap.com/education – e.g. trainings S4D437, S4D430, HA400, and S4D400

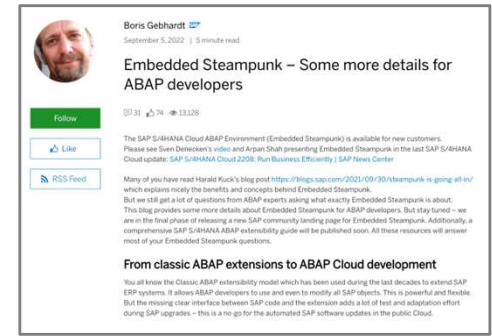learning.sap.com/learning-journey – e.g., search for ABAP

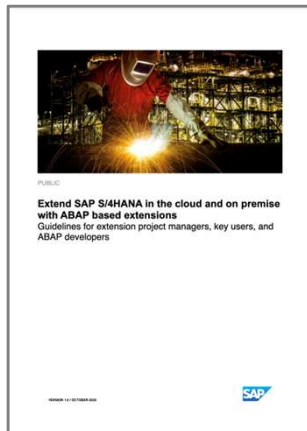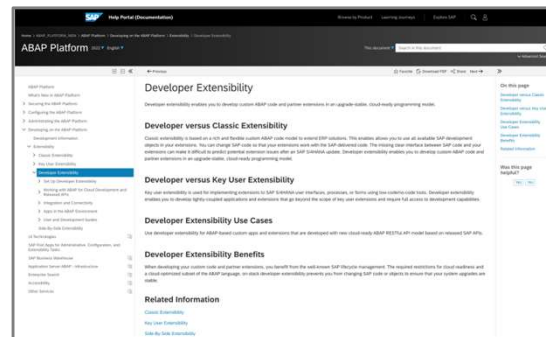# More information on ABAP Cloud
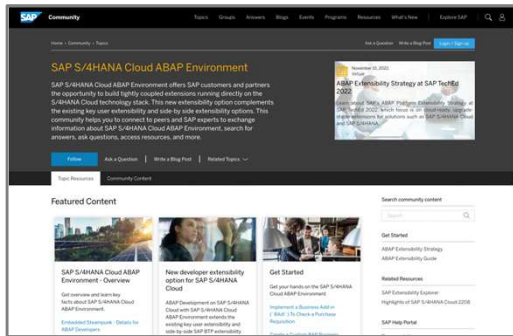
[SAP Community](#)
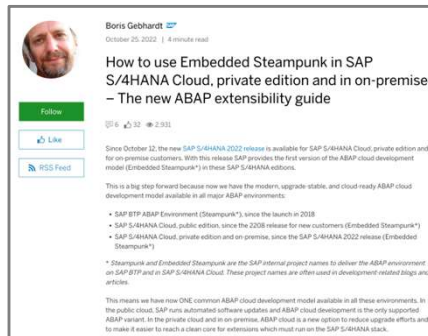
[How to use Embedded Steampunk in SAP S/4HANA Cloud, private edition and in on-premise – The new ABAP extensibility guide | SAP Blogs](#)
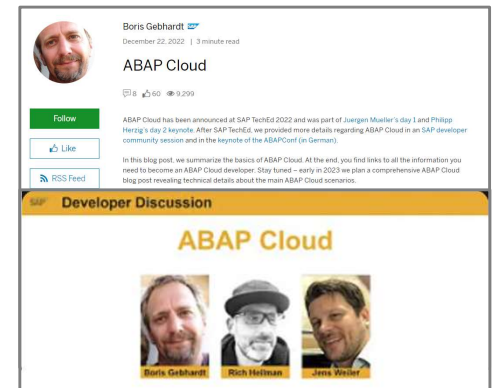

[Embedded Steampunk – Some more details for ABAP developers | SAP Blogs](#)

[The new ABAP extensibility guide](#)

[SAP documentation](#)

[ABAP Cloud | SAP Blogs](#)
[Developer Discussion: ABAP Cloud](#)

Thank you.

Contact information:

Rich Heilman
Developer Advocacy
SAP
rich.Heilman@sap.com

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