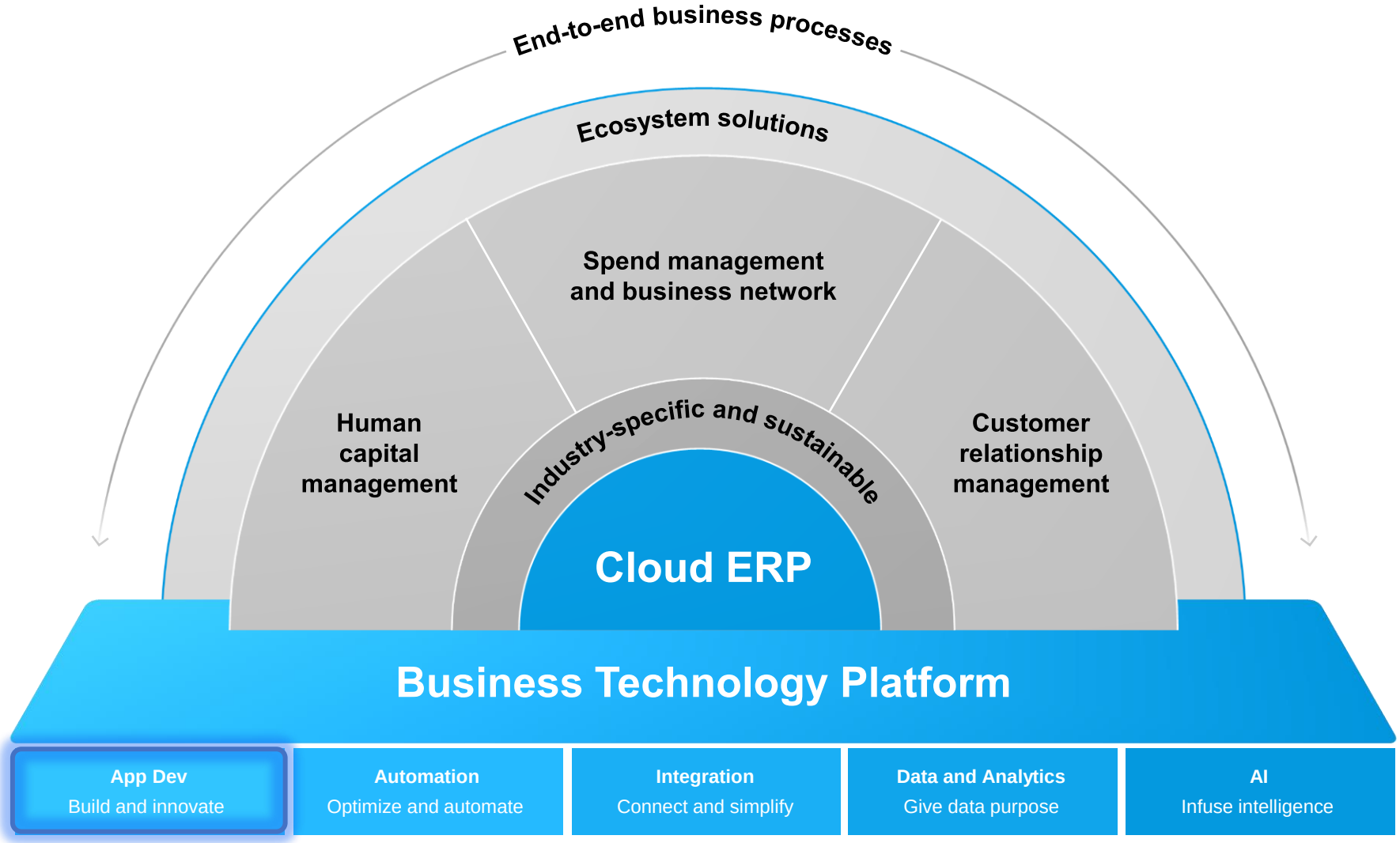
The Universe of BTP in a Nutshell
Pro Code based Development with SAP BTP

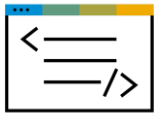
Tim Back, Chief Development Architect, Application Development, Automation and Integration, SAP BTP
02.05.2023

Business Technology Platform Overview

The SAP Business Technology Platform makes our integrated modular suite fit for the uniqueness of any organization„



SAP BTP products can support your journey



SAP BUILD

SAP Build Apps

SAP Build Process Automation

SAP Build Work Zone

PRO-DEVELOPER TOOLS

SAP Business Application Studio

SAPUI5 / Fiori elements

SAP Cloud Application Programming Model
Java, JS

ABAP RESTful Application Programming Model
ABAP

SAP-Optimized Frameworks & Services

SAP INTEGRATION SUITE

API & Event Integration
(Cloud & Hybrid)

API Management

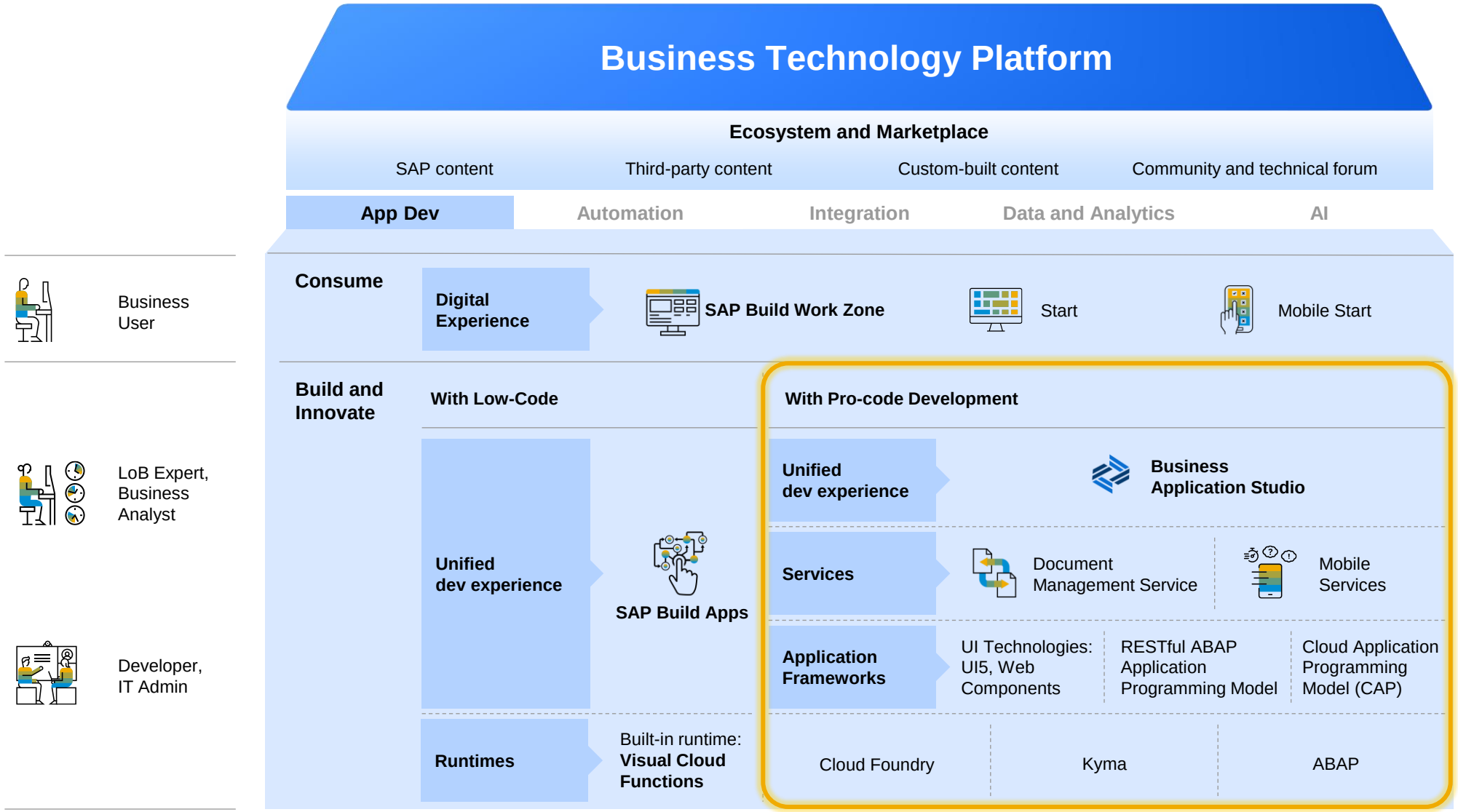
Integration Advisor

Trading Partner Management

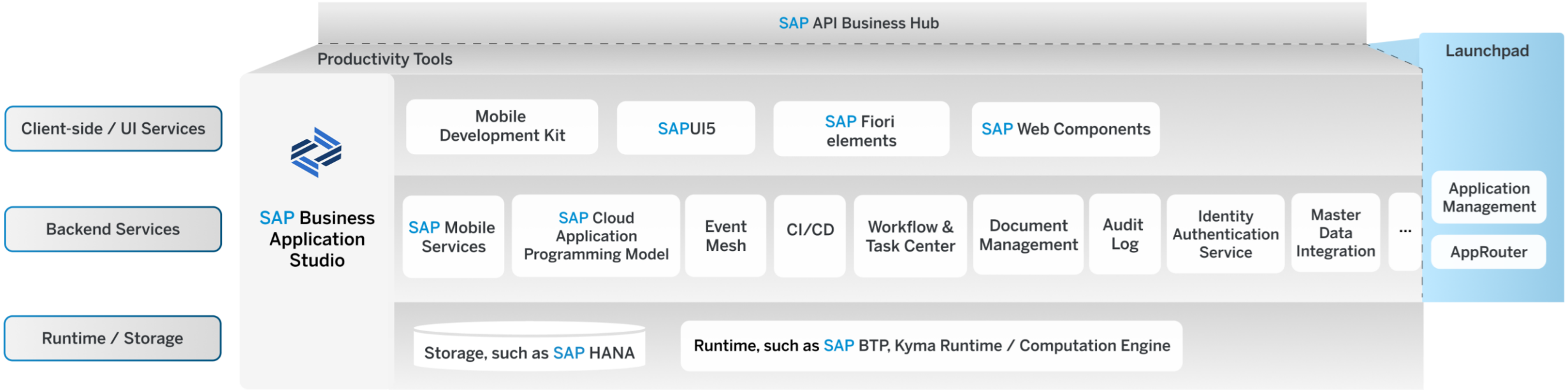
Pre-built content: API Business Hub

SAP Business Technology Platform

SAP BTP for Application Development

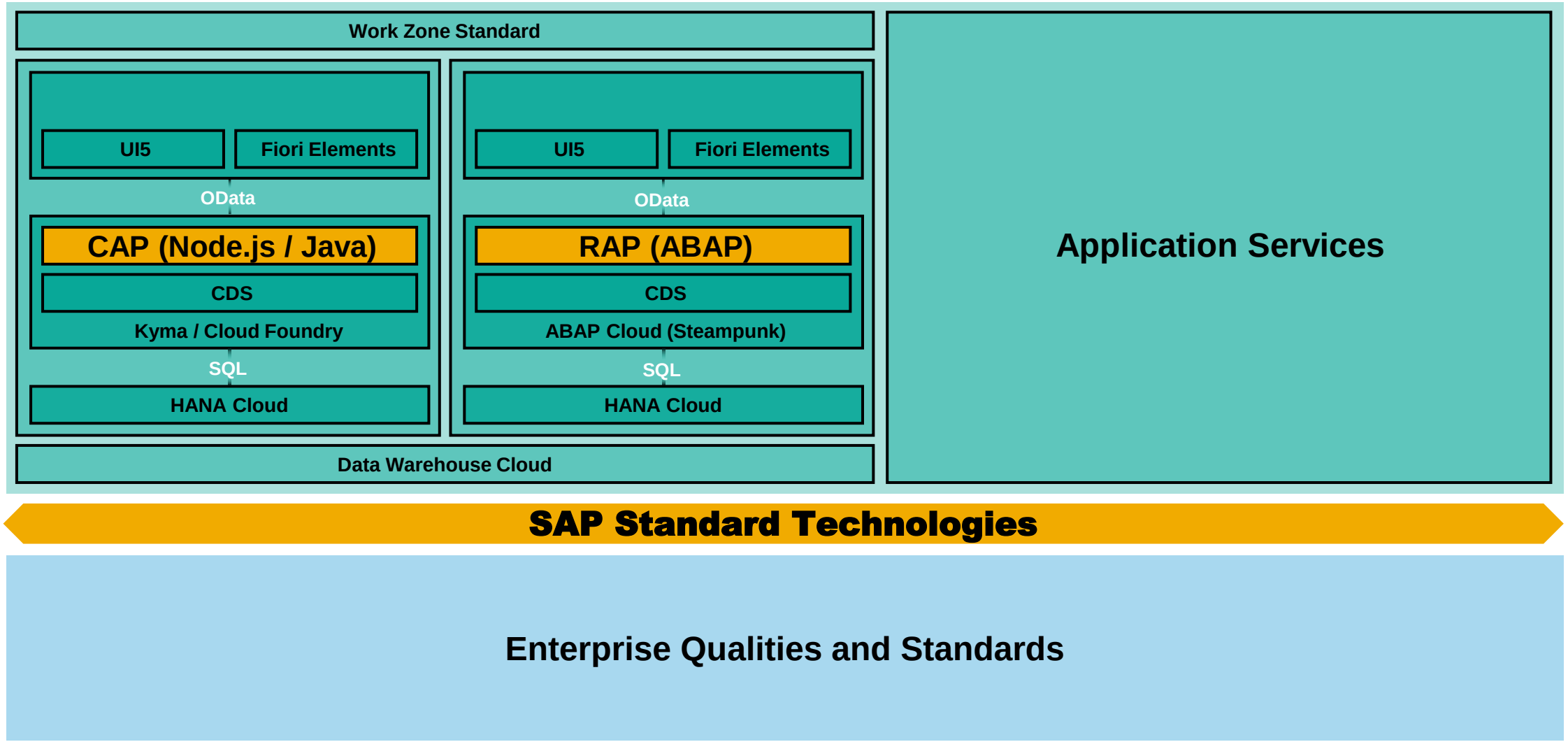


Integrated Tools and Frameworks for full-stack App Development on BTP



- **SAP Business Application Studio** is the preferred development environment to maximize productivity on BTP for applications and extensions
- **SAP Cloud Application Programming Model** provides domain-driven modelling powered by CDS
- **SAP Mobile Services** can also be used for native development in XCode and Android Studio with SAP BTP SDKs for iOS and Android

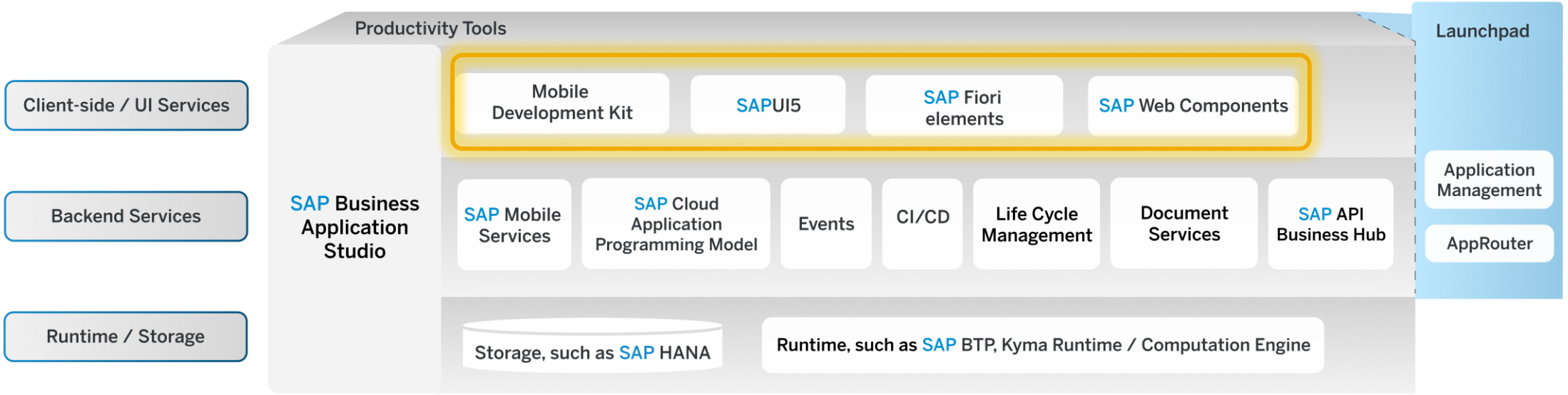
Building Blocks of BTP Applications



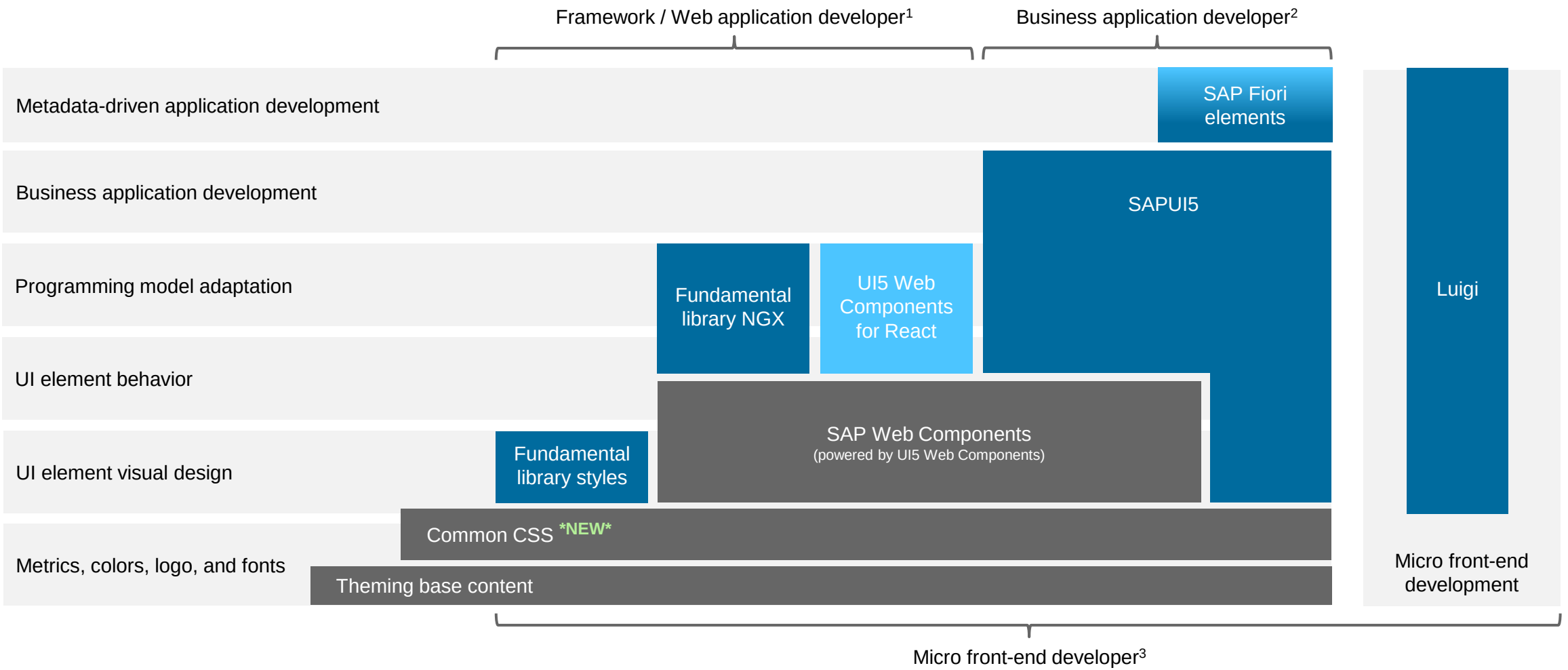
Client Side / UI Services

Client Side / UI Services

Quickly build enterprise-ready applications based on opinionated technologies from SAP



A tailored pro-code approach for everybody!



- UI technology option from SAP
- Reuse UI technologies
- Inner source UI technology options from SAP

1. Works with HTML/CSS, using component tool kits, free framework choice, special requirements, limited lifetime of apps
2. Works with UI components, using app framework, built-in connectivity, preconfigured UI flexibility, fulfill enterprise qualities
3. Works with multiple UI components, built in different technologies and put together in a micro front-end with Luigi

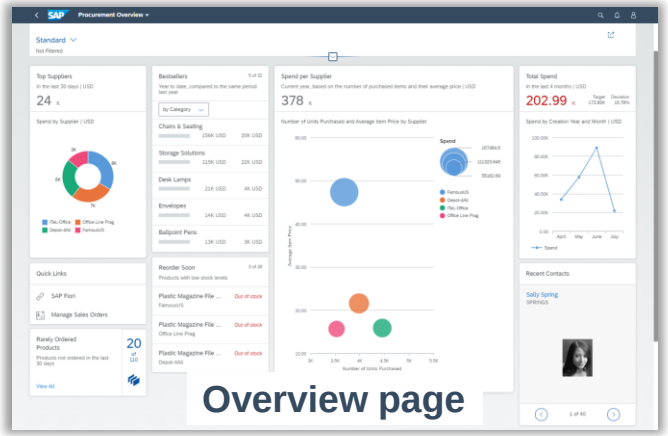
Client Side / UI Services

SAP Fiori elements

SAP Fiori elements ensures consistent layout, navigation

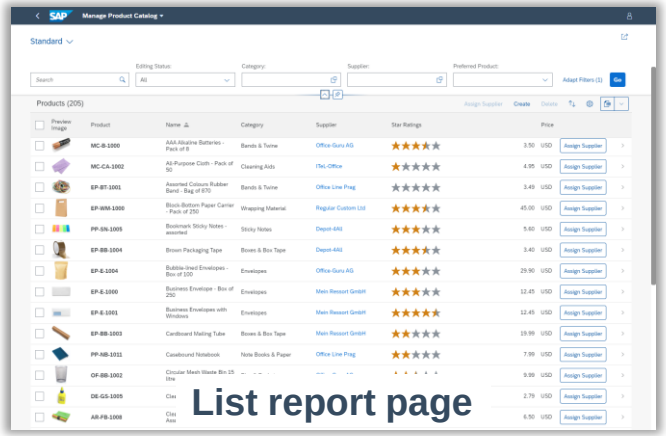
Most use cases in the enterprise space involve providing an **overview**, **lists** of business objects and management of these business **objects**.

Provide **overview** on business relevant data



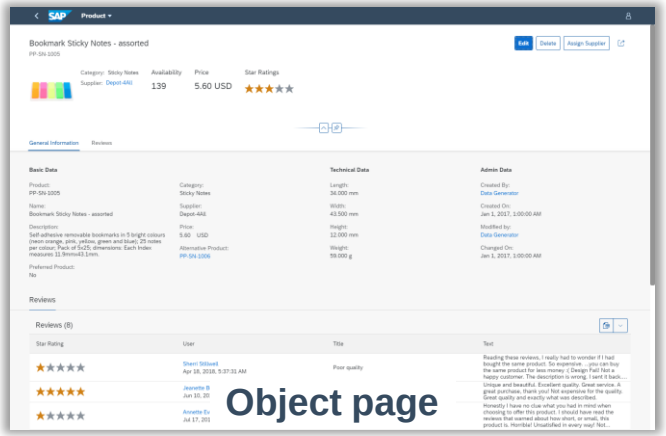
Overview page

Work on a **list** of business objects

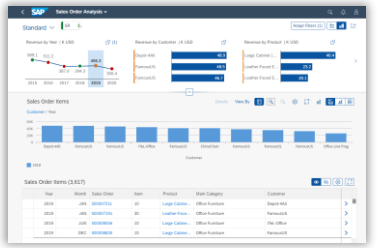


List report page

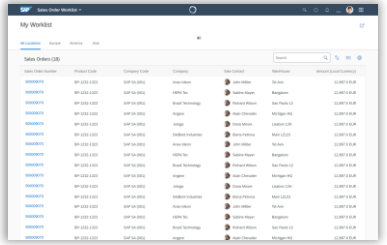
Manage individual business **objects**



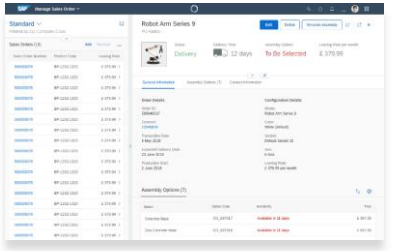
Object page



Analytical list page



Worklist page

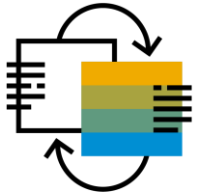


Flexible Column Layout

SAP Fiori elements boosts SAPUI5 development efficiency

Developer Productivity

- Focus on **business logic** and back-end services
- Write **less UI code**
- **Reduce** development and maintenance **costs**



UX Consistency

- Comply with the **latest SAP Fiori design** specification
- Deliver a **centrally managed** user experience
- Include **uniform** fonts, colors, layout, navigation, actions, search, filtering, and more

Enterprise Readiness

- Deliver **high quality** SAPUI5 applications to end-users
- Ensure **stable**, **optimized** UI code out of the box
- Include **standard enterprise features** (accessibility, mobile, translation support, …)

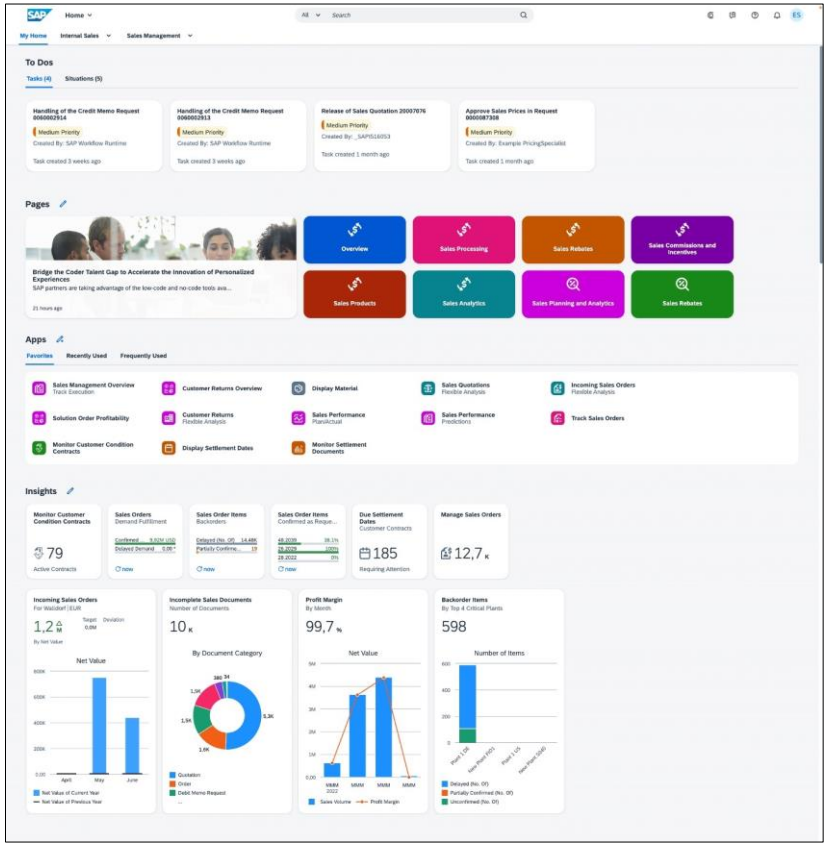
Client Side / UI Services

SAPUI5 and SAP Web Components

Building modern Web applications with SAPUI5 and Web components

SAPUI5 is an HTML5 framework for creating cross-platform, enterprise-grade applications

- **Consistent UX**: SAPUI5 enables the SAP Fiori design system evolution across SAP solutions (and beyond).
- **Anywhere use**: SAPUI5 allows a single, responsive app implementation for all browsers, platforms, and devices.
- **Hundreds of enterprise UI elements** to build professional UIs: UI5 Web Components extend UI5 to all Web technology stacks.
- **Powerful extension options**: You can adapt SAP standard apps and customize UIs without coding.
- **Flexible tools for any developer**: SAPUI5 comes with tools to efficiently build, test, and deploy apps, including SAP Business Application Studio, which is our recommended IDE.
- **Innovations**: SAPUI5 brings a separation of apps and framework to centrally innovate while staying upgrade compatible.
- **Open source**: SAPUI5 qualities are available as OpenUI5.

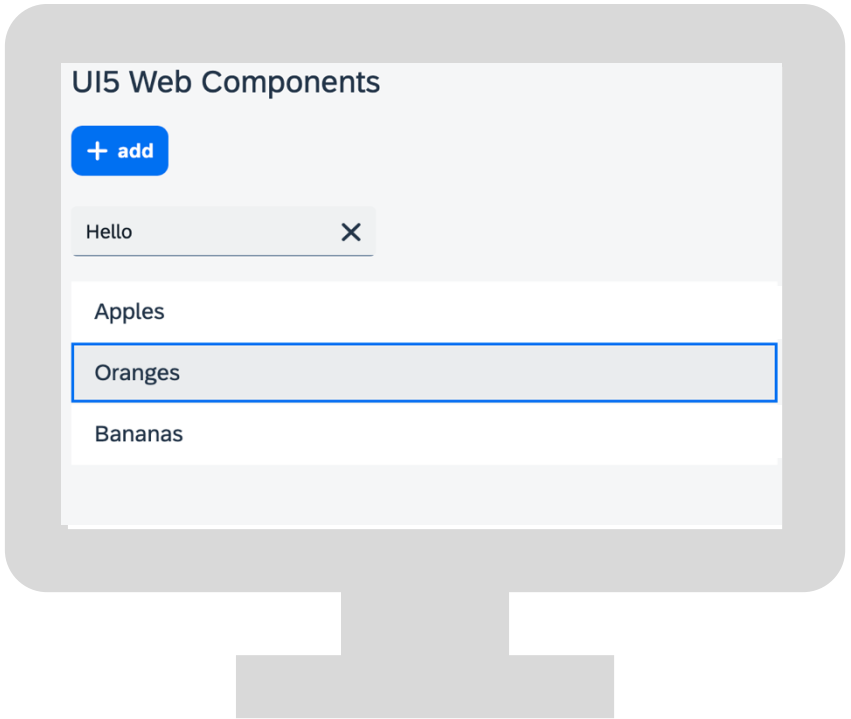


Video: What is SAPUI5?

UI5 Web Components **in a nutshell**

```
28  <body class="sapUiBody">
29      <h2>UI5 Web Components</h2>
30
31      <button>add</button><br>
32      <input placeholder="Hello"></input>
33      <ul>
34          <li>Apples</li>
35          <li>Oranges</li>
36          <li>Bananas</li>
37      </ul>
38  </body>
```


```
28  <body class="sapUiBody">
29      <h2>UI5 Web Components</h2>
30
31      <ui5-button>add</ui5-button><br>
32      <ui5-input placeholder="Hello"></ui5-input>
33      <ui5-list>
34          <ui5-li>Apples</ui5-li>
35          <ui5-li>Oranges</ui5-li>
36          <ui5-li>Bananas</ui5-li>
37      </ui5-list>
38  </body>
```



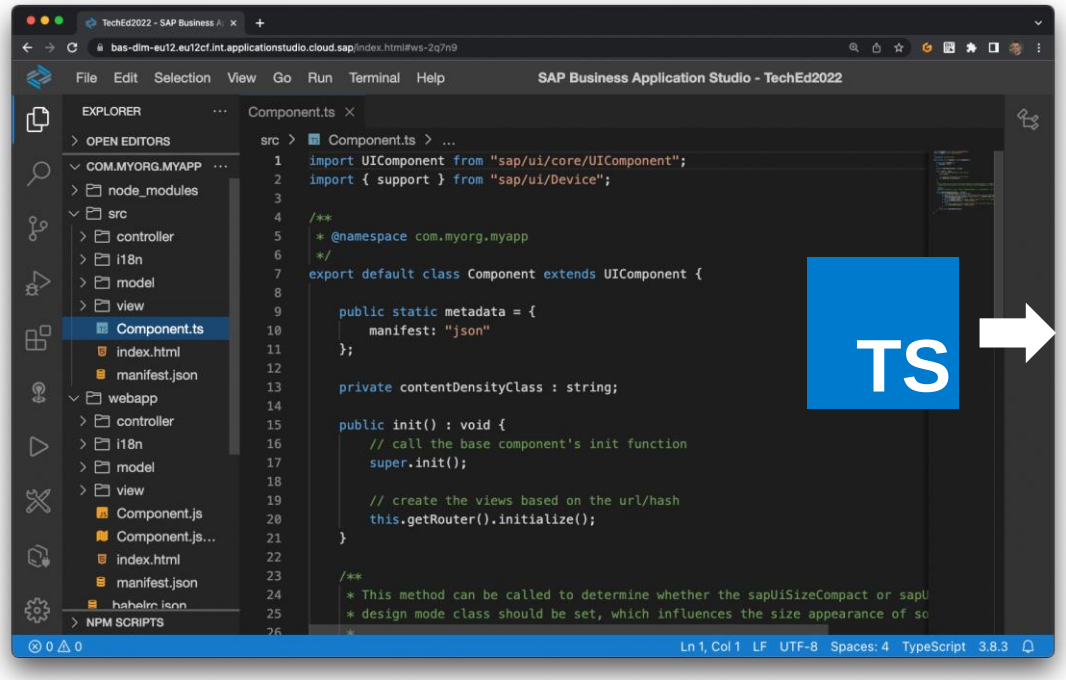
TypeScript for SAPUI5: Professional application development

Modern ES language features for SAPUI5

Support in **SAP Business Application Studio** and **Visual Studio Code**

Transpiled into SAPUI5 runtime code

TypeScript as a fully optional layer on top

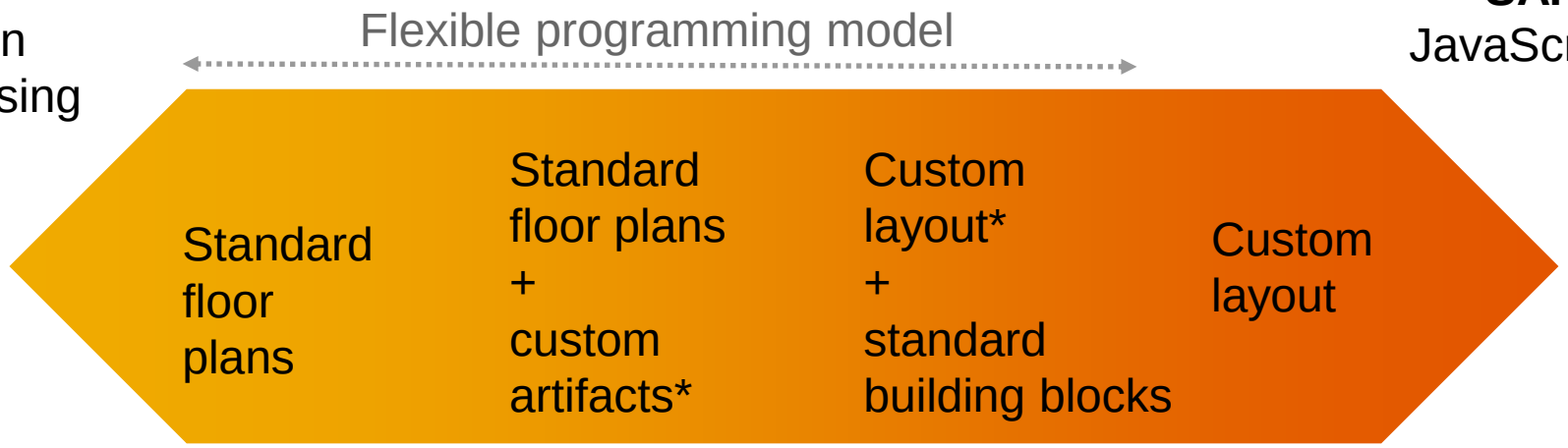


Flexible programming model blends SAP Fiori elements and SAPUI5 freestyle

Developers have a continuum of options instead of an either/or decision

SAP Fiori elements
Metadata-driven development using annotations

SAPUI5 freestyle
JavaScript framework and UI library



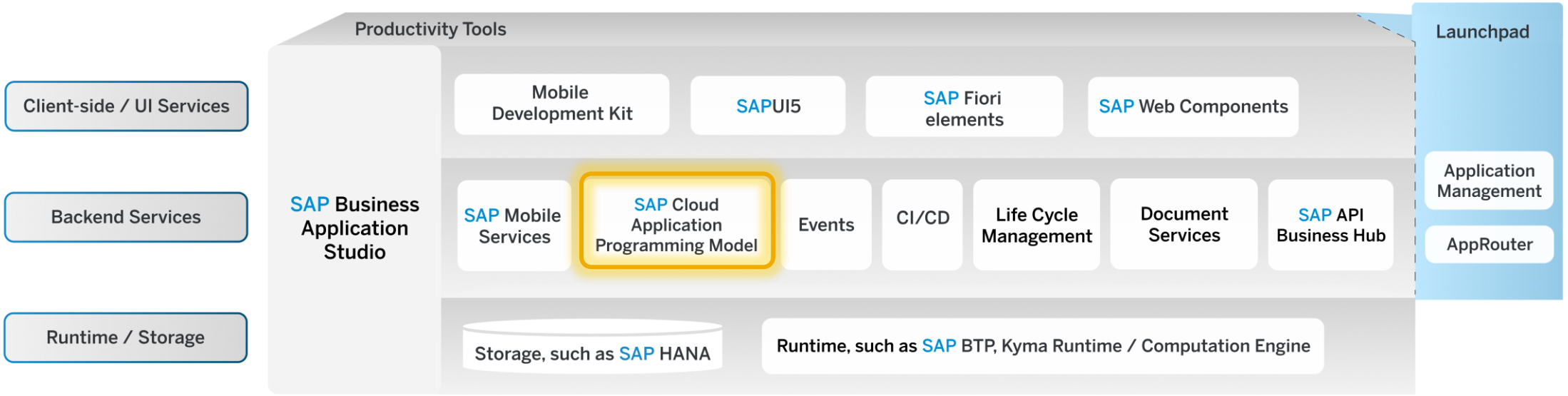
*Leveraging standard building blocks and/or SAPUI5 controls and custom code

The Backend

Cloud Application Programming Model (CAP)

Productivity tools for a comprehensive pro-code offering on SAP BTP

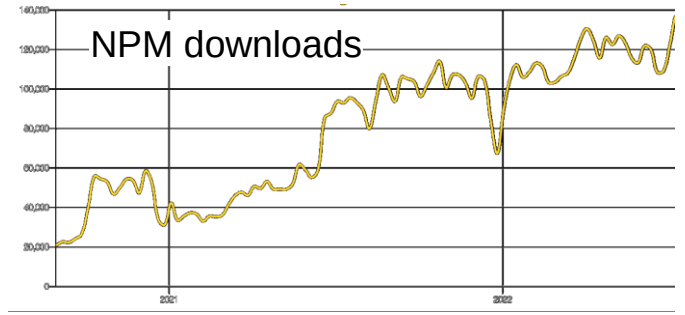
Quickly build enterprise-ready applications based on opinionated technologies from SAP



SAP Cloud Application Programming Model is the most adopted framework in SAP (non-ABAP hemisphere).

- **100+** internal stakeholders
- **100+** customers and partners
- **500+** blogs featuring SAP Cloud Application Programming Model

→ All growing steadily…



CAP Cloud Application Programming Model

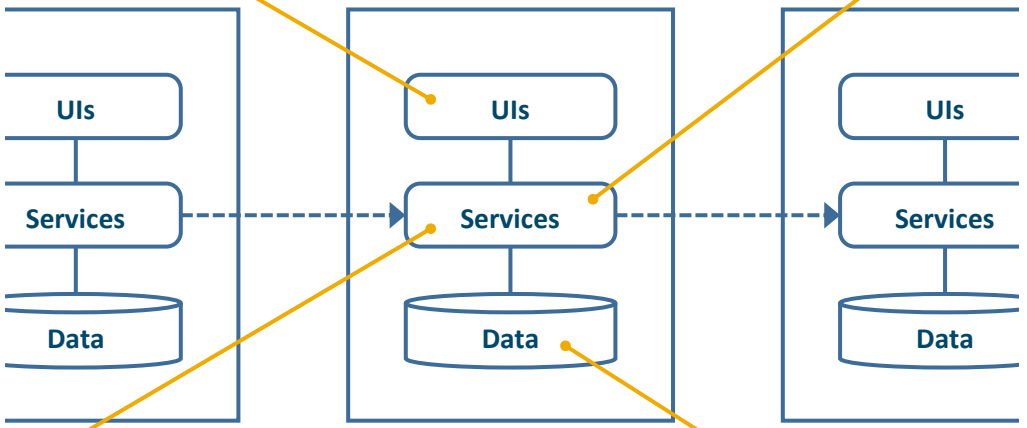
Features Overview

Serving Fiori UIs

- **OData** v4+v2
- **Draft** support
- **$batch** support
- **…**

Providing Services

- Service Definitions in CDS
- Generic Providers
- Event Handlers
- **Synchronous** and **Asynchronous**



Consuming Services

- Import from API Hub, S/4, SFSF, …
- Mashup with local services
- Uniform, Protocol-agnostic APIs
- **Synchronous** and **Asynchronous**

Platform and Database Support

- **Deplyoment** to **BTP Cloud Foundry** and **Kyma**
- **Schema evolution**
- **HANA** (prod) **and sqlite** (dev)
- (PostgreSQL upcomming)

CAP Modeling through CDS: Define “what”, not “how”

Data Model Editor | schema.cds

```
namespace user001;

using { API_BUSINESS_PARTNER } from '../srv/external/API_BUSINESS_PARTNER.cds';

using
{
    Country,
    Currency,
    Language,
    User,
    cuid,
    extensible,
    managed,
    temporal
}
from '@sap/cds/common';

entity Capex
{
    key ID : UUID
        @Core.Computed;
    description : String(100);
    totalcost : Integer;
    category : Association to one Category;
    BusinessPartner : Association to one API_BUSINESS_PARTNER.A_BusinessPartner;
}

entity Category
{
    key ID : Integer;
    name : String(100);
}
```

- **Data Model Definition** creating or importing entities

service.cds

```
using { API_BUSINESS_PARTNER } from './external/API_BUSINESS_PARTNER.cds';

using { user001 as my } from '../db/schema';

using user001 from '../db/schema';

@path : 'service/user001'
service user001Service
{
    @odata.draft.enabled
    entity Capex as
        projection on my.Capex
        {
            *
        };

    entity Category as
        projection on my.Category
        {
            *
        };

    entity BusinessPartner as
        projection on API_BUSINESS_PARTNER.A_BusinessPartner
        {
            BusinessPartner,
            FirstName,
            LastName
        };
}

annotate user001Service with @requires :
[
    'authenticated-user'
];
```

- **Service Definition** creating projections on the data model

CAP basics

- **Describe the “what” and not the “how” via CDS**
- **Initialize CAP Projects via *cds init***
  - Provides only the bare bone things that you need. No unnecessary files
- **“Grow as you go”: *cds add***
  - Add additional parts only when you actually need them
    - HANA support
    - Deployment (mta, helm)
    - sample / mock data
- **Fast development cycles with *cds watch***
  - Automatic spin up of SQLite locally, automatic switch to HANA after deployment
  - Includes UIs from UI5 and Fiori elements
  - Mock data for remote service calls
  - Dummy authorizations
  - Optionally with hybrid mode (e.g. CAP app local, DB HANA)

Accelerated development

- Jump-start: x hrs **1 min**
- Turnaround: x min **1 sec**
- First app: x days **25 min**
- *Grow-as-you-go* with mocked cloud environment **Minimized costs**

Focus on domain

- *What, not how* → through CDS
- Capturing **intent** in close collaboration of **developers** and **domain experts**
- Rapid prototyping for reqs analysis (from months → **days**)

Proven support for **best practices**

- Served **preconfigured** by generic runtimes, eliminating recurring tasks
- Clear guidance along **golden paths**
- **Minimized code** (100s → **0–10** lines of code)

Cloud scale by design

- **Services** and **event**-centric paradigm
- Memory **~100 mb**
- Response times **~10 ms**
- Requests **~5.000**

Intrinsic **extensibility**

- **Customizations** by SaaS tenants
- **Verticalization** by partners
- **Feature-toggled** extensions by SaaS providers

Safeguarded investments

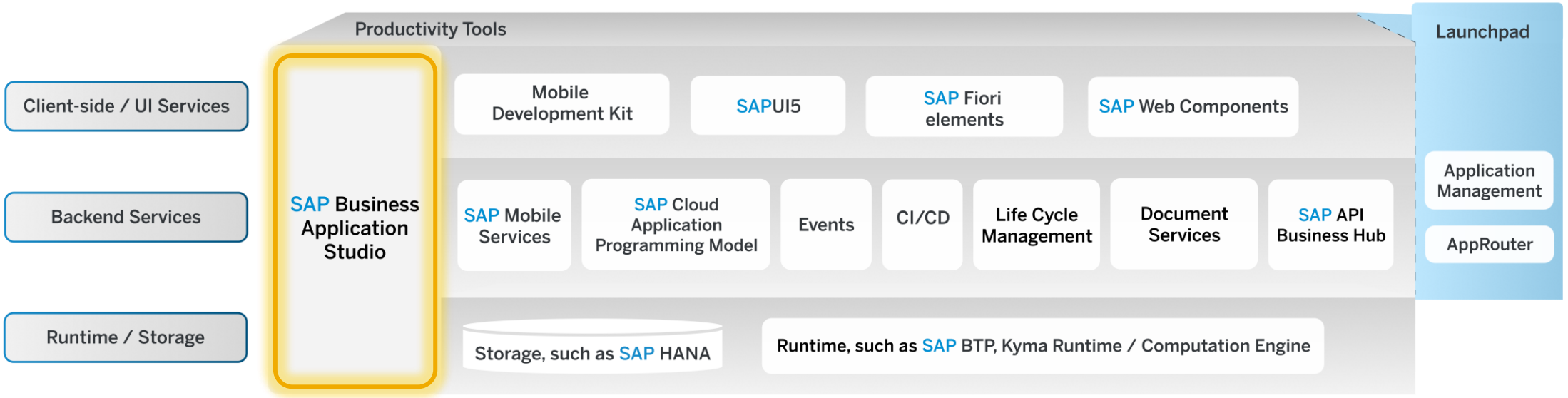
- **Minimized lock-ins** to platform, protocols, and databases
- **Higher-level APIs**, shielding users from utterly technical disciplines

SAP Business Application Studio

The high-productivity approach for professional developers

Productivity tools for a comprehensive pro-code offering on SAP BTP

Quickly build enterprise-ready applications based on opinionated technologies from SAP



- **SAP Business Application Studio**, the preferred IDE to develop applications and extensions on SAP BTP
- Core technologies from SAP in one development environment with all necessary design-time and runtime services
- Fully flexible developer experience – from application composition through graphical productivity tools to command line; code-exit possible at any time
- Optimal integration to SAP data for consumption and deployment (cloud and on premise)
- Provision of content, support for best practices, and delivery of tools for guiding developers
- Complement to ABAP and SAP BTP, Kyma runtime for UI and mobile development

SAP Business Application Studio: The high-productivity approach for professional developers

Scale your development and build smarter enterprise apps

- **Visual development environment**, tailored for efficient development of business applications for the Intelligent Enterprise
- Intuitive path **from visual tools to professional development tools**

- **Modern and intuitive** Web user interface
- **Simplified, faster setup** of the development environment
- **Tight integration** with SAP services, technologies, and systems

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- **Accelerated time to market** with high-productivity development tools
- Based on **industry best-of-breed IDE and tools,** providing full, tool-independent, developer flexibility

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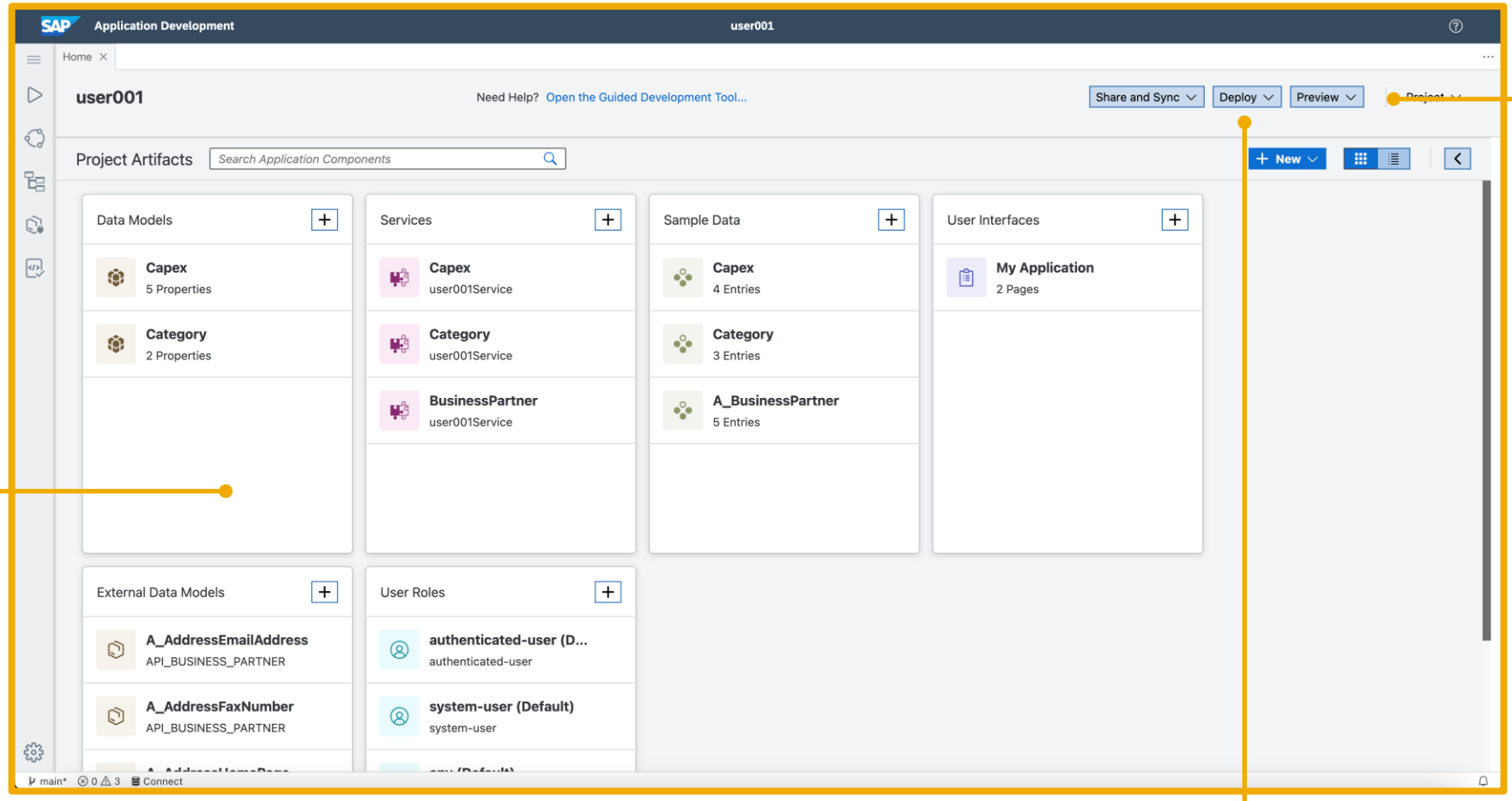
- **Highly adopted SAP BTP service**, across all channels, with thousands of paying customers
- Serves as the official tool of choice for **thousands of internal SAP developers**

Simplify Application Development for Professional Developers

Enhanced development environment and user experience

- **Visual overview of all assets of a project** combining
- CAP data models and services
- Fiori elements applications
- Mobile Development (MDK) Applications
- External Services like S/4 HANA APIs

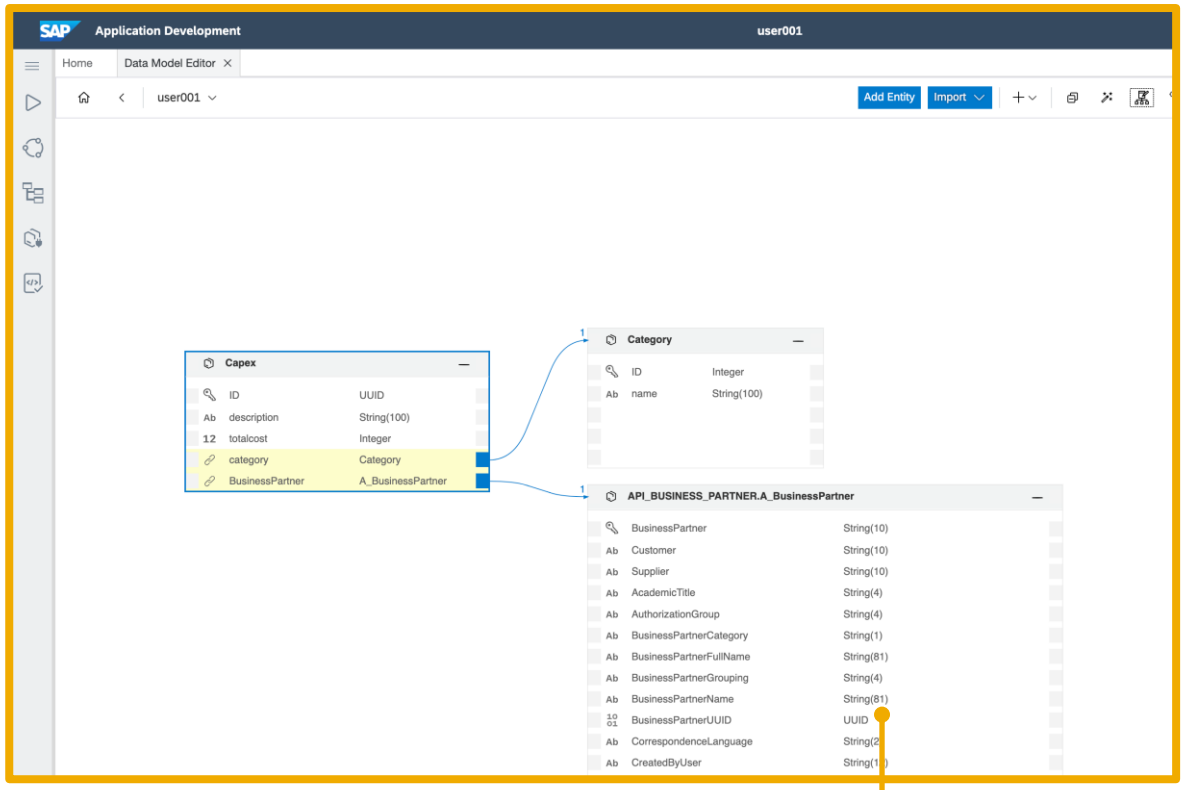


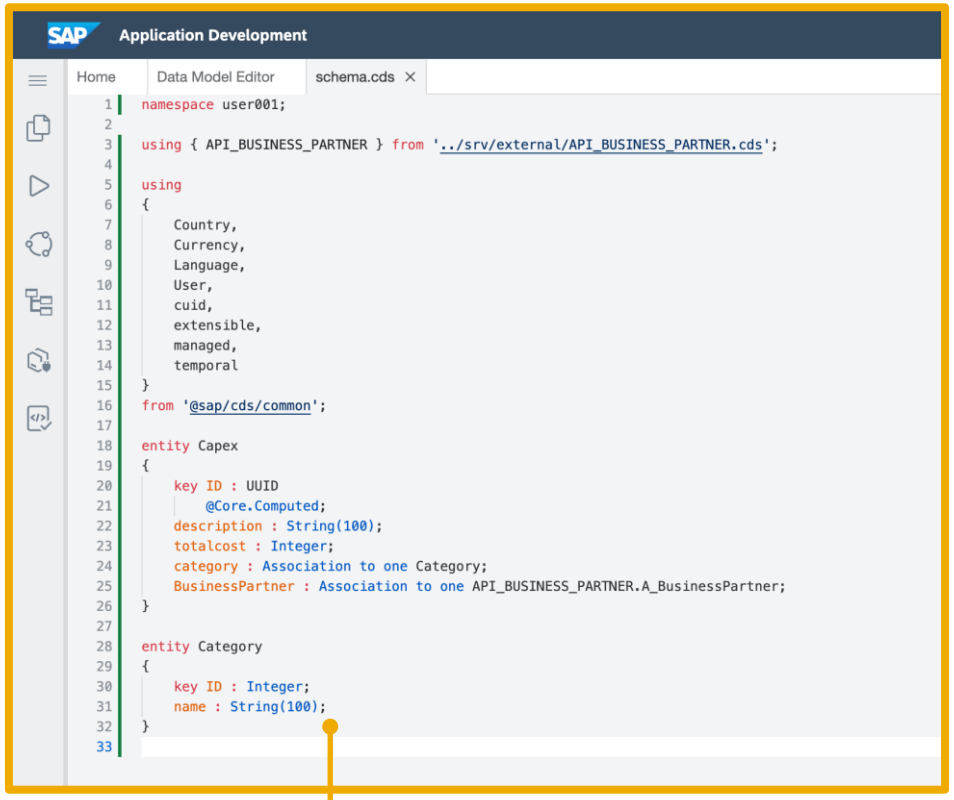
- **Preview** for fast development turnaround times

- **One Click Deployment** to the BTP by generating all the necessary configurations

Simplify Application Development for Professional Developers

Visual Data Modeling: Switch from visual tools to textual editors





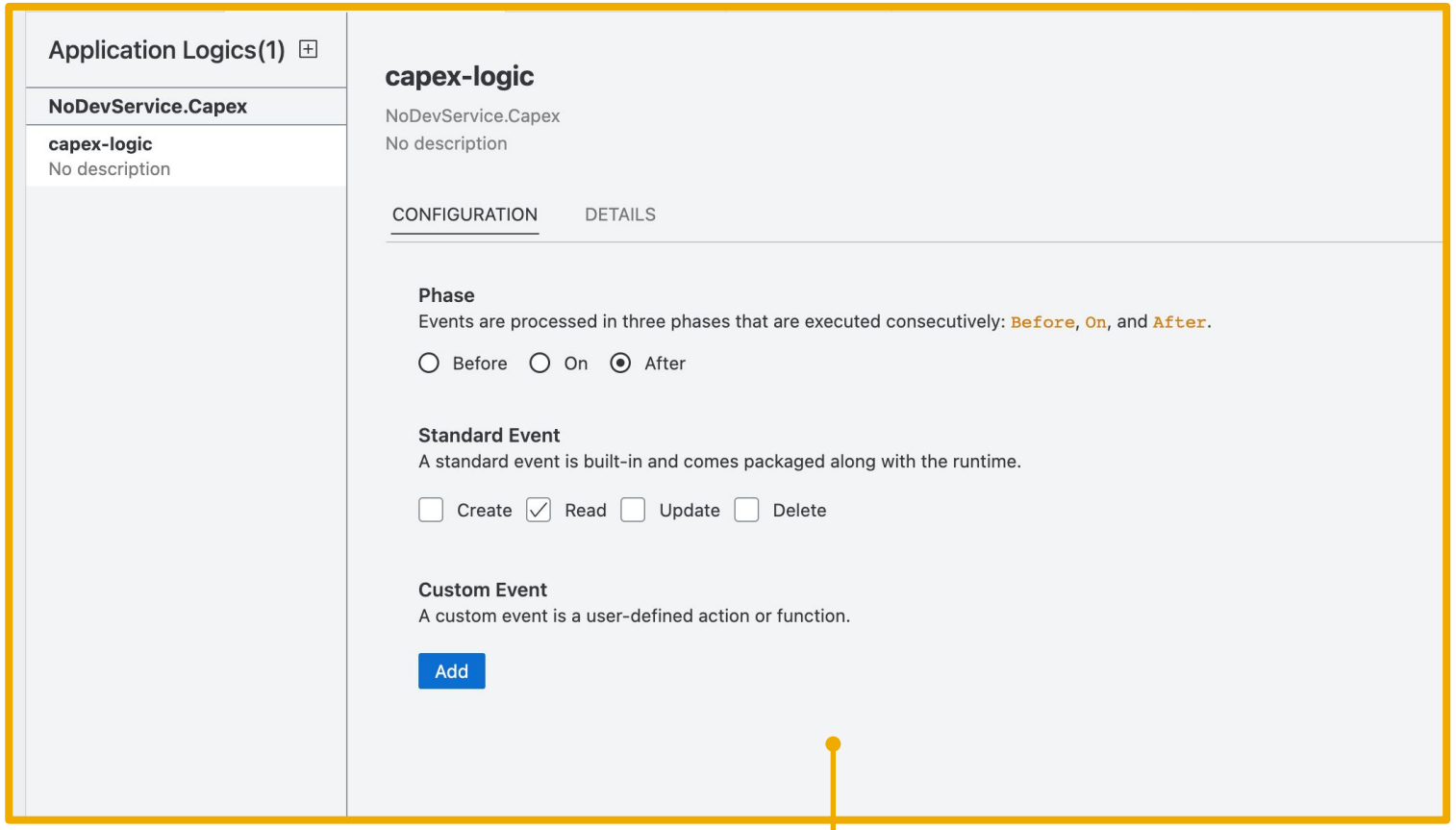
- **Visual editors** provide high productivity but create standard code with 0 additional meta data

- **Switch** possible for all editors: CDS/CAP, Fior elements, MDK + Deployment Config

- **Textual code editors** to allow developers to continue with normal coding for the last mile of the app

Simplify Application Development for Professional Developers

Application Business Logic: CAP Handlers



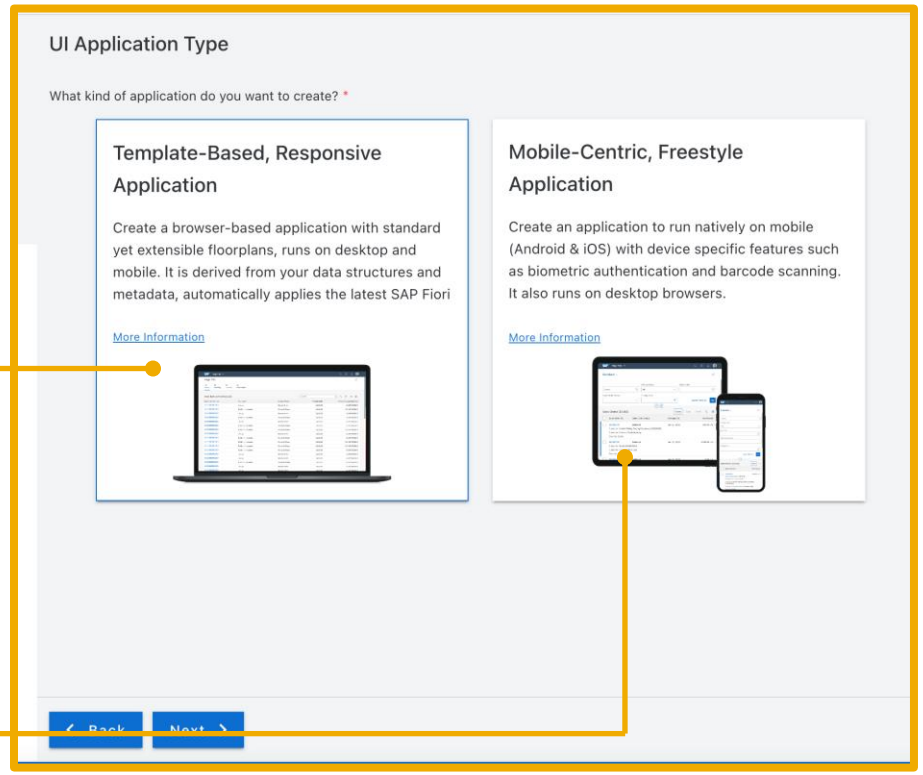
- **Application Business Logic** stub generators for CAP

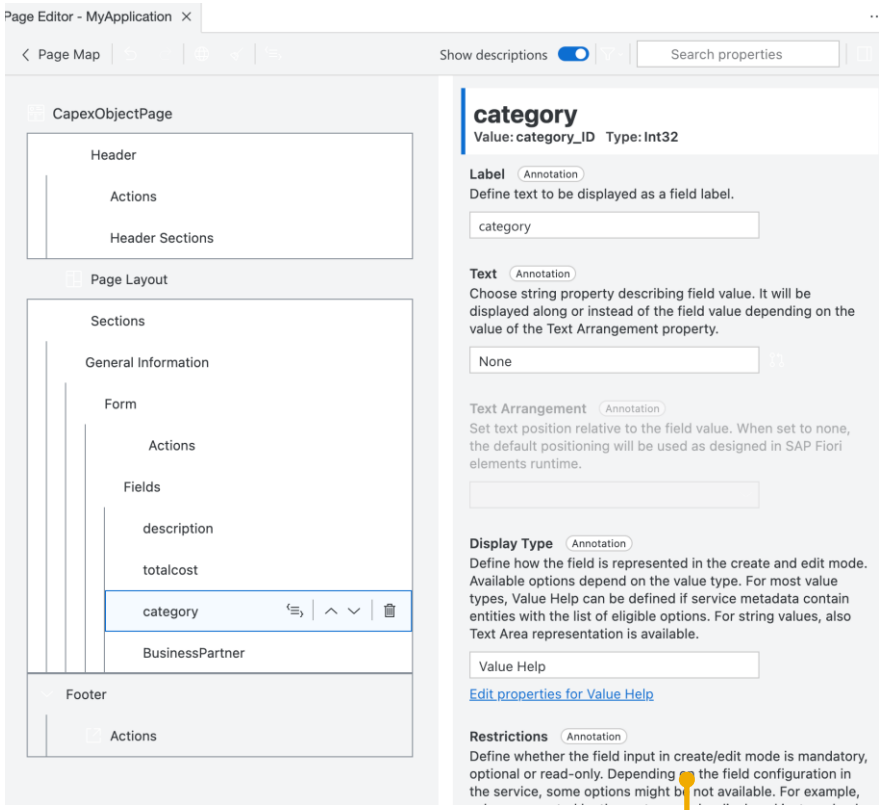
Simplify Application Development for Professional Developers

Choice of UI Application types in Productivity Perspective: Fiori elements and Mobile Development Kit

- **Fiori elements apps** responsive, works on all devices but optimized for Desktop

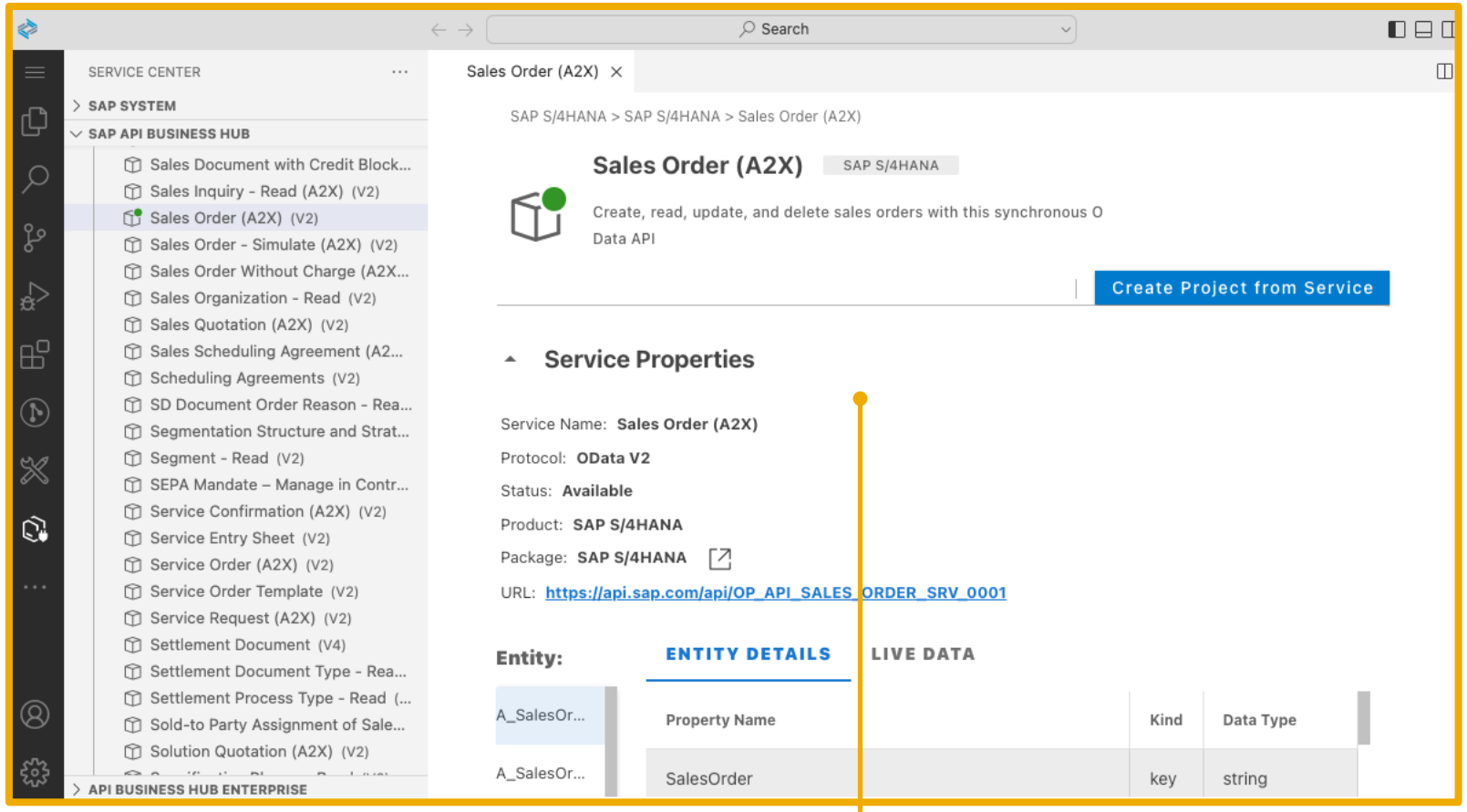
- **MDK apps** responsive, works on all devices but optimized for Mobile





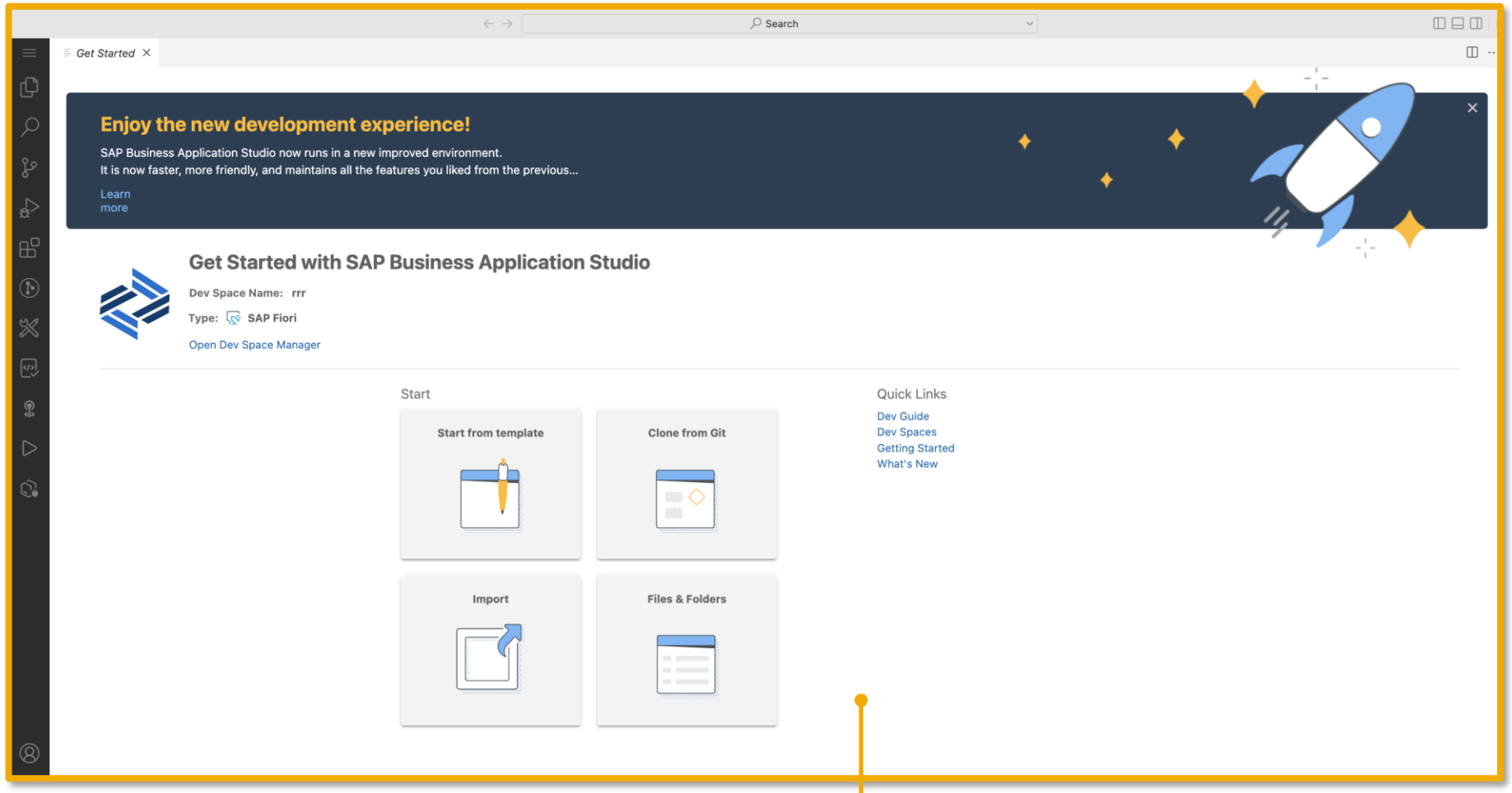
- **Page Map for Fiori elements apps** no manual writing of annotations, lots of configs e.g. for creating value helps

Service Center – Discovery and Connectivity to External Services



- **Service center** provides the developer a single entry point for discovery and consumption of SAP APIs, originating from any SAP data sources (Destinations to S/4 HANA, Ariba, C4C, API Hub, SAP API Hub enterprise)

BAS Platform



- Get VS Code's latest and greatest and better performance
- BAS extensibility – 100% VSCode compatibility, community extensions working out of the box
- **Business Application Studio comes as a "turn key" solution** with all the necessary extensions installed at the developers' fingertips

- **SAP Business Application Studio** includes **Visual Studio code** compatibility powered by Microsoft Code OSS Client

Embedded Analytics

Business Application Studio, HANA Cloud, CAP, Fiori elements

Embedded Analytics in Fiori elements with OData

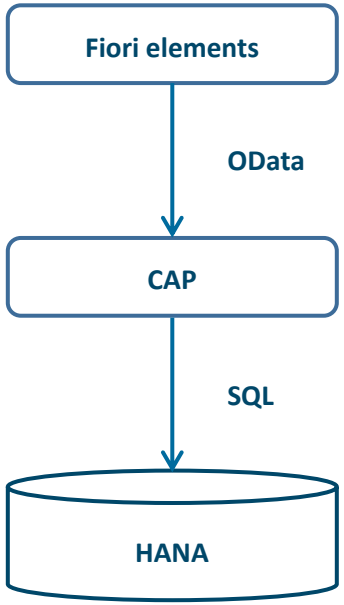
CAP and Fiori emenents support analytical content based on OData Service analytical capabilities

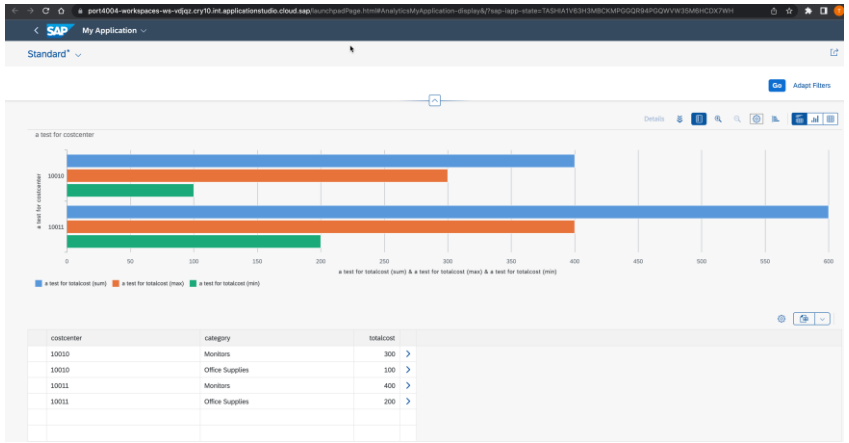
- Based on just annotations for
  – Data model (dimensions and measures)
  – UI configuration
- Free of charge for any customer

Used to be a completely new floorplan (Analytical List Page, ALP), now just an additional feature in any List Report Object Page floorplan, so available to a large amount of applications

Only supports ”basic analytics” that OData supports

- No multi-dimensional analytics, like Pivot tables





Analytical Charts in Your List Application

In order to add basic embedded analytics in your list application, you can

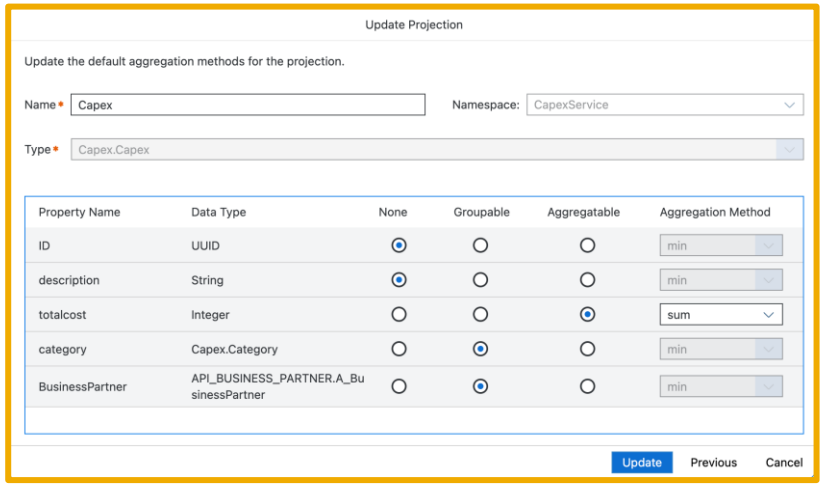
- write CDS annotations like this to model dimensions and measures

```
service CapexService
{
    annotate Capex
    {
        totalcost
            @Aggregation.default : #sum;
    }

    annotate Capex with @Aggregation.ApplySupported :
    {
        $Type : 'Aggregation.ApplySupportedType',
        GroupableProperties :
        [
            category_ID,
            BusinessPartner_BusinessPartner
        ],
        AggregatableProperties :
        [
            {
                Property : totalcost
            }
        ]
    };

    @Aggregation.CustomAggregate#totalcost : 'Edm.Int32'
```

- And like this to configure the chart underneath the list

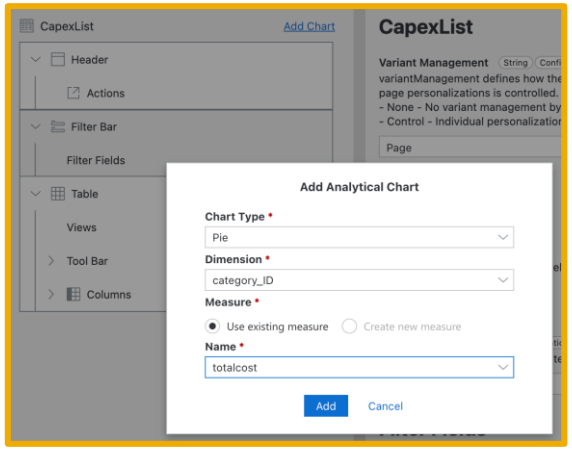
```
annotate service.Capex with @(
    UI.Chart #alpChart : {
        $Type : 'UI.ChartDefinitionType',
        ChartType : #Pie,
        Dimensions : [
            category_ID,
        ],
        Measures : [
            totalcost,
        ],
    }
);
```

… but also work in an editor that

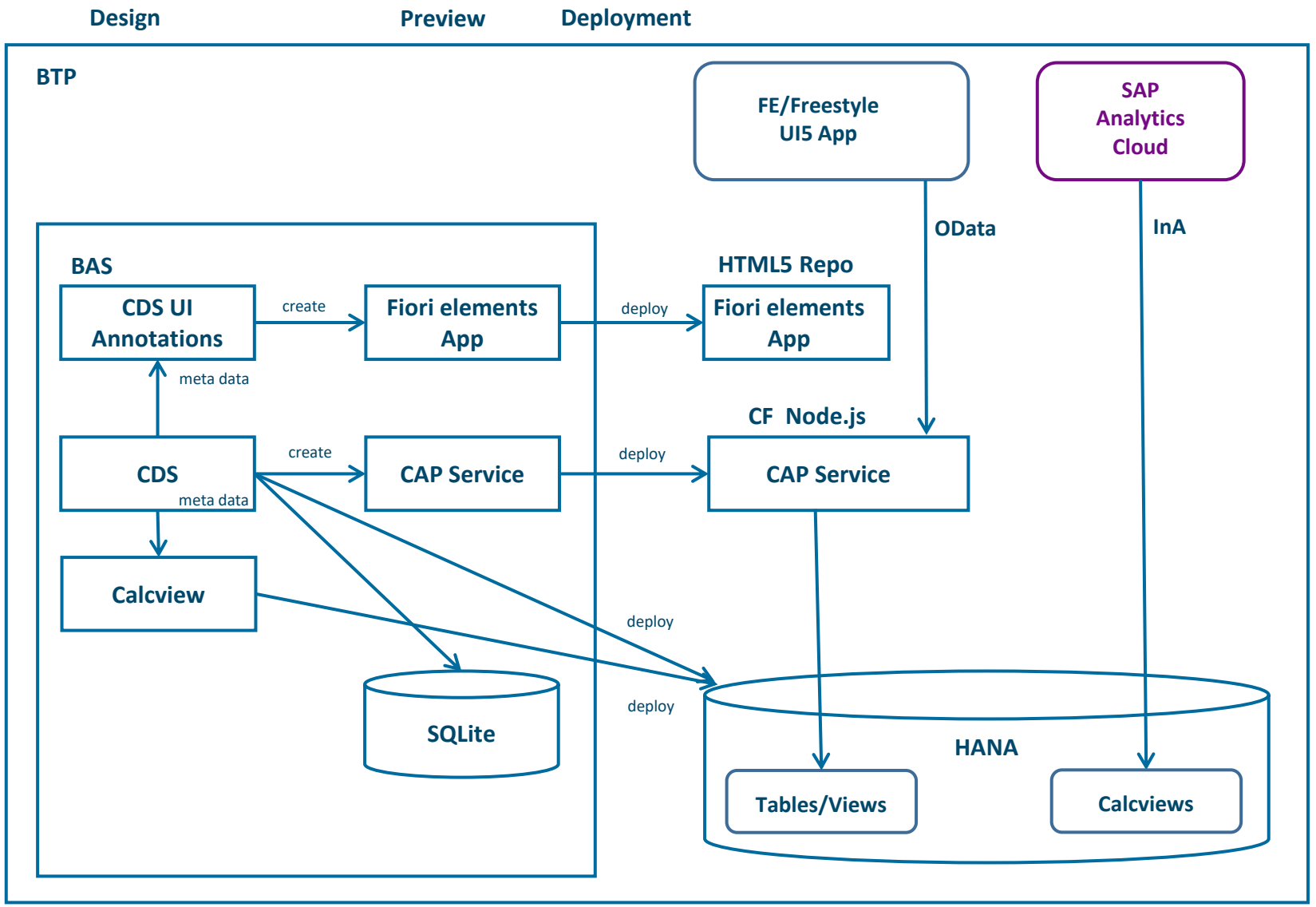


- Lets you define dimensions and measures next to your data model properties

- Lets you add a chart and its configuration



New: Design of the Calcview from CDS Entities Without Prior Deployment



DevOps with BTP

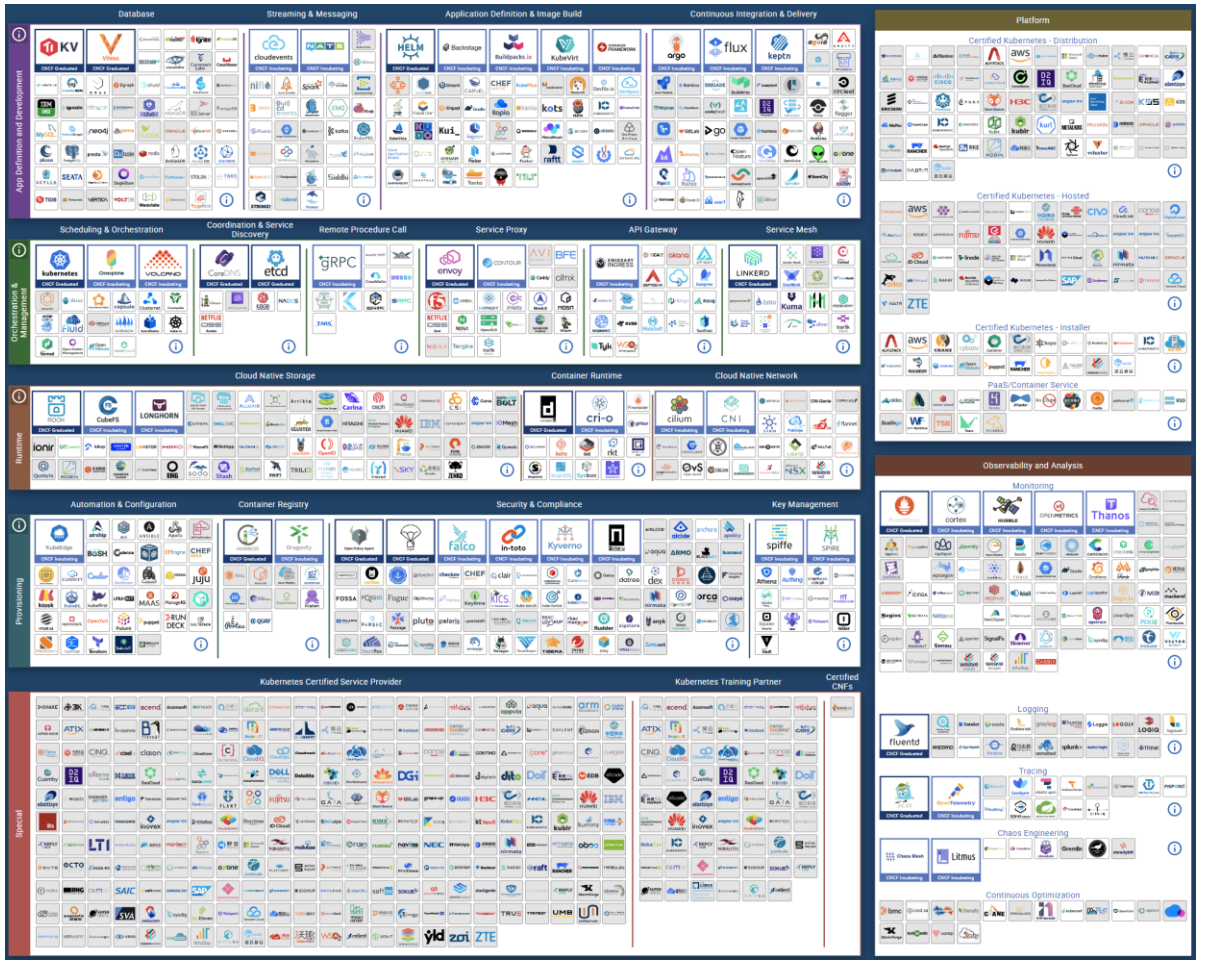
Implied complexity for finding the right DevOps approach

Finding the right approach and toolset can be a long, complex and challenging task

- Manifold toolchain options and variants
- Where to find a good starting point – taking you where you are today?
- How to reduce cognitive load of your teams and avoid overburdening them right from the start?

Especially if approached as part of bigger cloud transformation, concentrate on quick wins first

- Confirm and verify the value an agile DevOps approach can bring – in your environment, for your boundary conditions
- Start opinionated for SAP use cases
- If required, adapt and evolve by time



[CNCF Cloud Native Interactive Landscape]

DevOps with SAP BTP – easy start + highly integrated

SAP BTP makes it easy for you to benefit from DevOps principles for your apps running on SAP BTP, as part of your cloud transformation

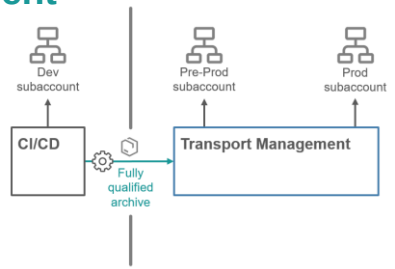
- Provides opinionated approach focused especially for SAP-centric scenarios and use cases
- Respects existing ops processes – integrate into change management and operations, as needed
- If you should bring DevOps expertise and existing infrastructure, we support you to bring in SAP-specific aspects
- Examples:

'Pipeline-as-a-Service' + golden paths – running CI/CD pipeline for SAP-specific use cases in minutes, with direct support from SAP

Continuous Integration and Delivery

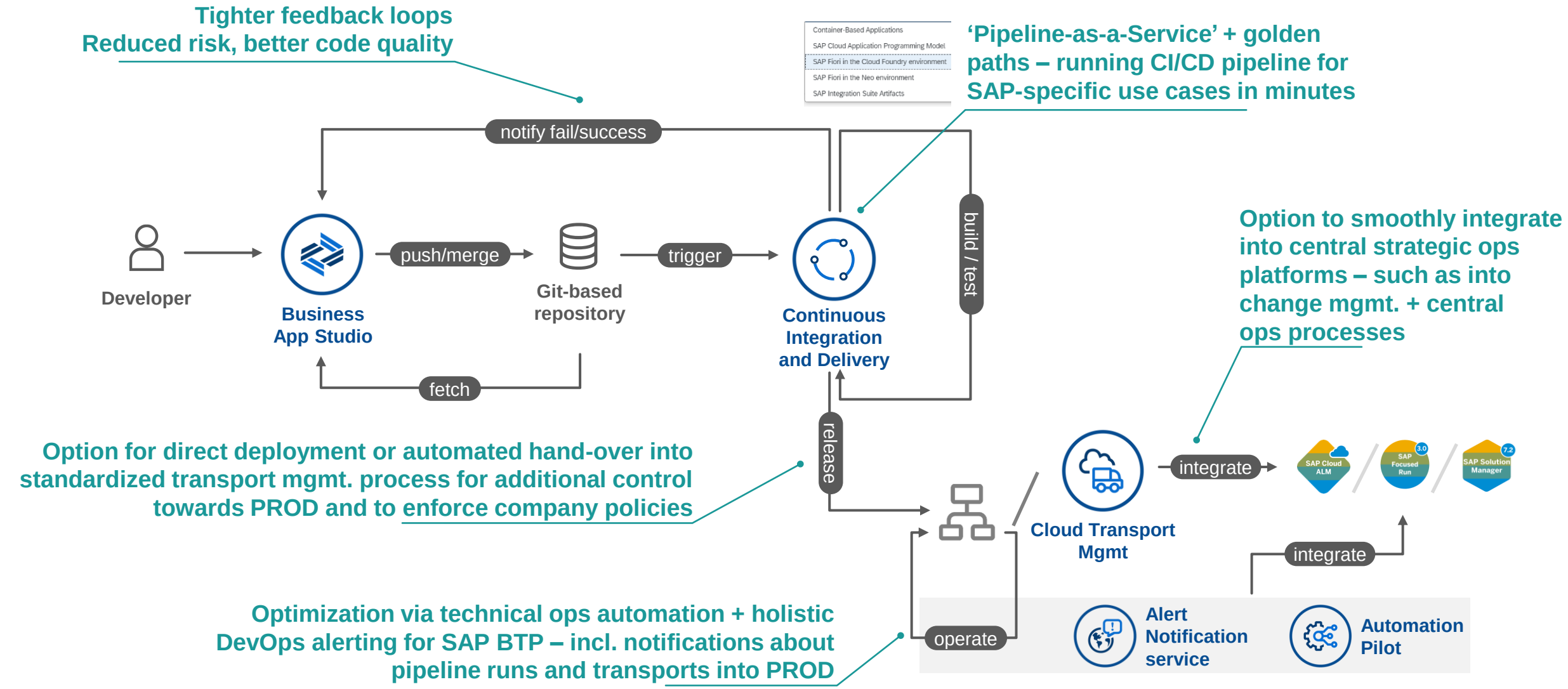
Respects existing ops processes – integrate into change management and operations, as needed; such as running on SAP Solution Manager or SAP Cloud ALM

Highly integrated standard setup for agile development on SAP BTP – covering the complete lifecycle from development to operations; example: automated hand-over of qualified changes into transport management

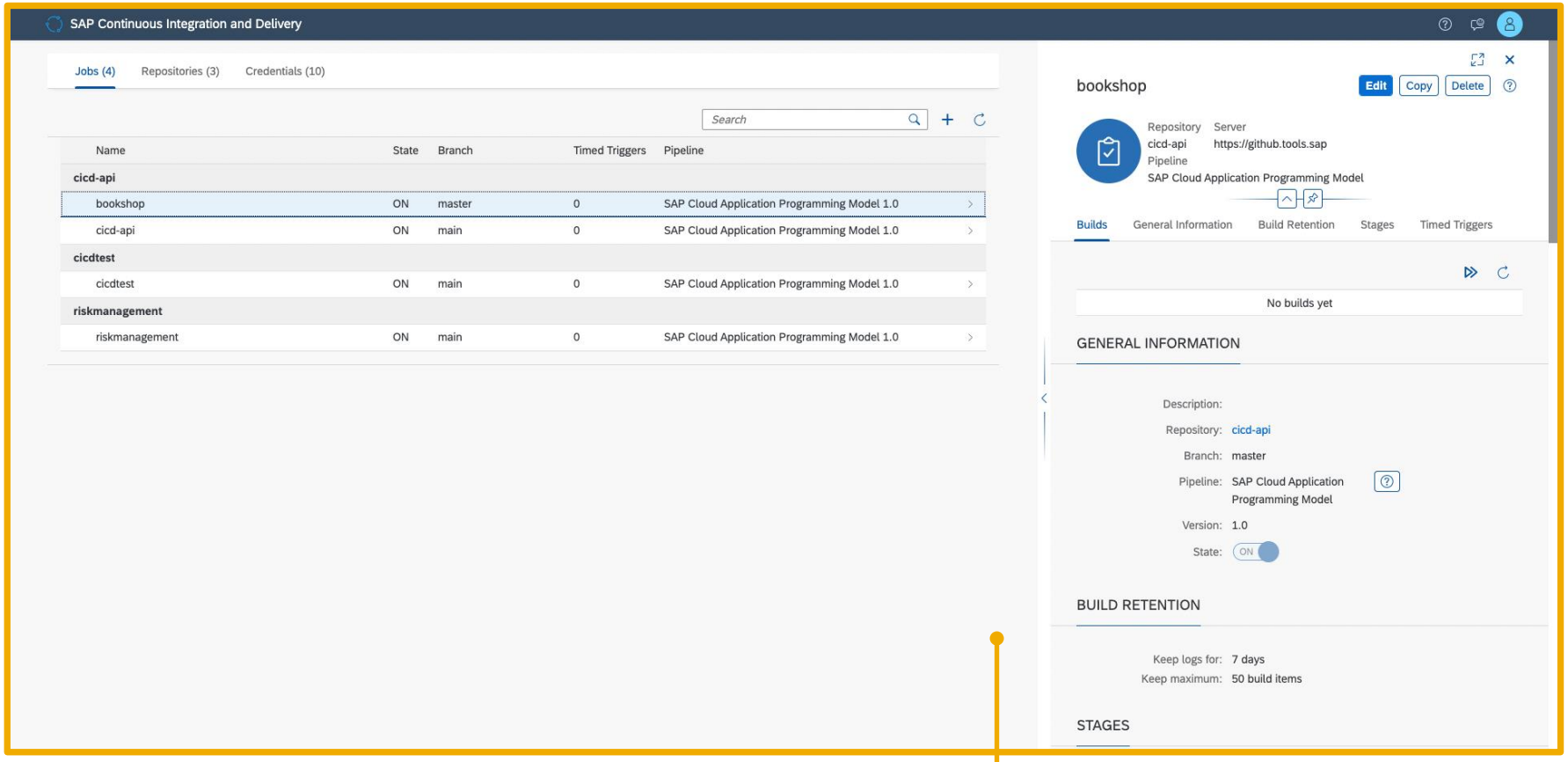


How to enable DevOps with SAP BTP?

Benefit from highly integrated standard setup especially for SAP-centric dev use cases



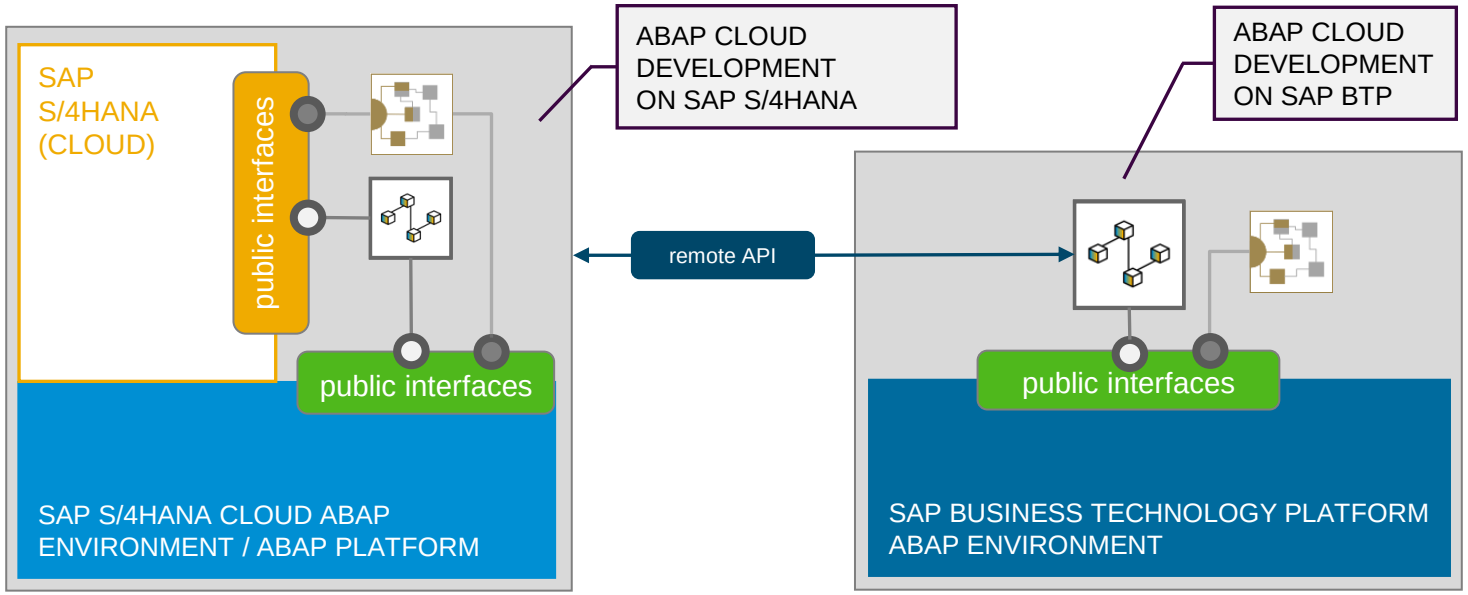
Out of the box CI/CD Integration in BAS' Productivity Tools



- **Out of the box integration with SAP Continuous Integration and Delivery** for CAP based apps to assist with pipeline configuration and quick access to pipelines

SAP S/4HANA CLOUD ABAP ENVIRONMENT (Embedded Steampunk) + UI Applications on BTP

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

Use Cases

New user interfaces or mobile apps on top of S/4

- To build modern Fiori user interfaces public remote APIs are needed
- While S/4 has a lot of remote public APIs, most of them are optimized for UI consumption (Example: The Business Partner API has 43 entities).
- To build optimized remote UI APIs, either just leveraging the rich existing S/4 functionality or extending it with additional customer entities and logic, the ABAP RESTful Programming Model (RAP) on Embedded Steampunk is well suited. To develop these API, developers would use the ABAP Development Tools (ADT).
- To build user interfaces developers use BTP tools and technology like the Business Application Studio (BAS) or Build Apps and deploy the final apps to BTP, Steampunk or Mobile

Embedded Steampunk and SAP BTP tools

SAP S/4HANA Extensibility Strategy

- **Keeping the core clean is a key priority for customers**
- Extending business entities is complex, if done outside the core
- Increasing need to deliver custom apps and processes fast

▶ Leverage Embedded Steampunk for **business entity and logic extensions**

▶ Leverage BTP Tools for **customized experiences /web/mobile)**, as well as **automation and cross-application processes**

Combine the power of

SAP S/4HANA Public Cloud
"Embedded Steampunk for ABAP"

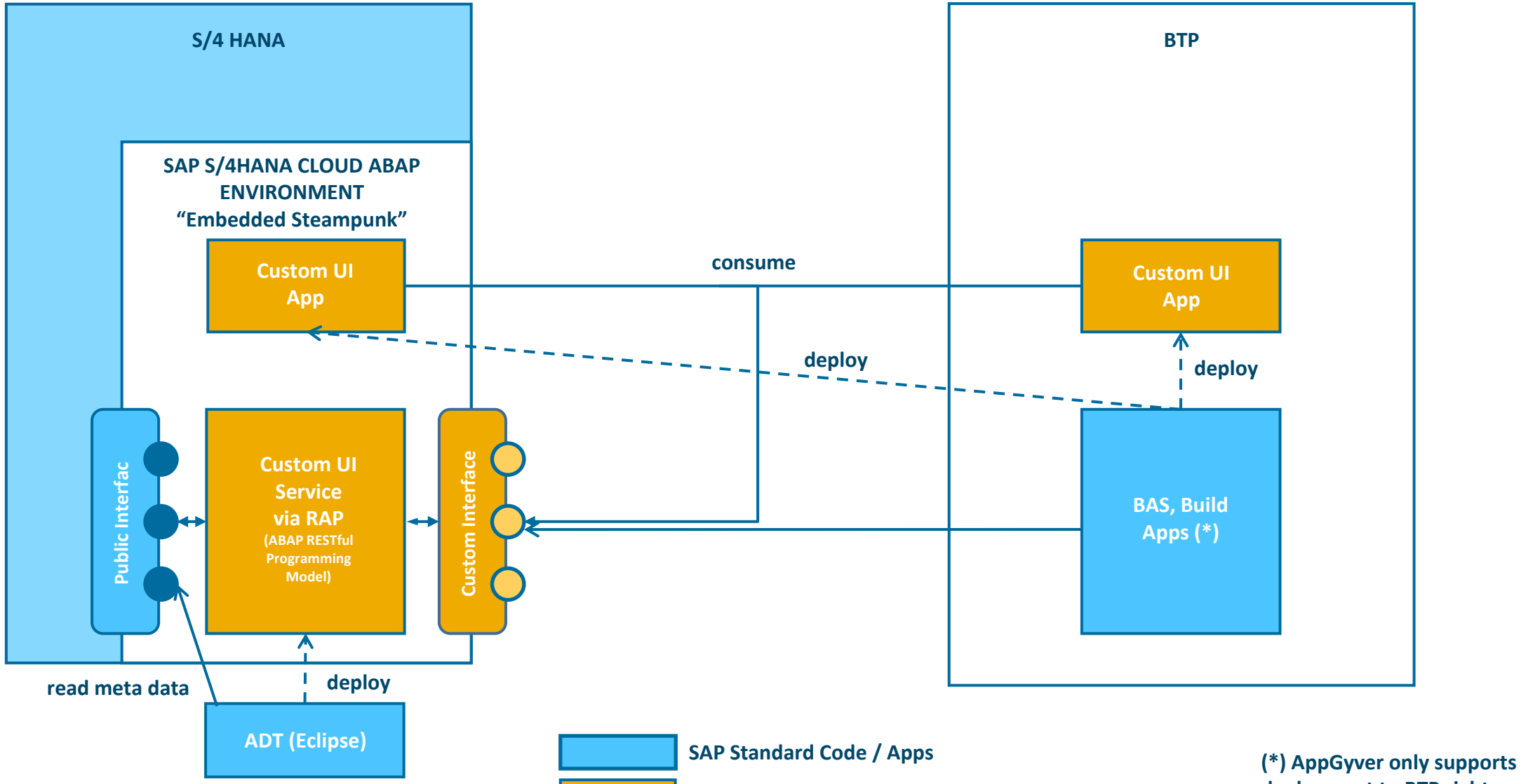
+

SAP BTP Tools
"SAP Build & SAP Business Application Studio" + BTP Services

SAP Business Technology Platform

Model / Business Entity Extensions	Business Logic extensions	New Integration and UI Services	Customized Experiences - Web and Mobile	Cross Application Processes & Automation

New UI app (customized experiences) on existing S/4 business entities



New process on SAP S/4HANA / LoB business entities using SAP Build Process Automation (SBPA)