



# SAP Business Technology Platform

## L2 – SAP Event Mesh

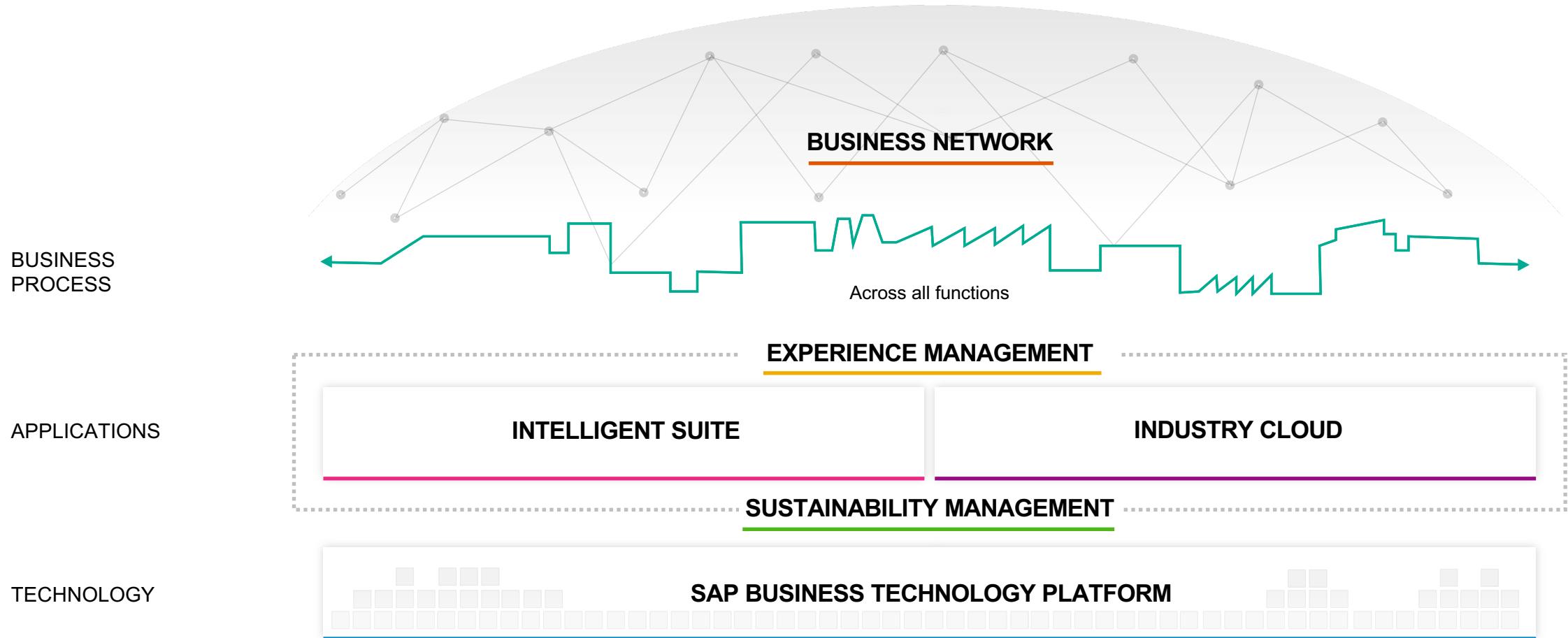
SAP  
February 2021

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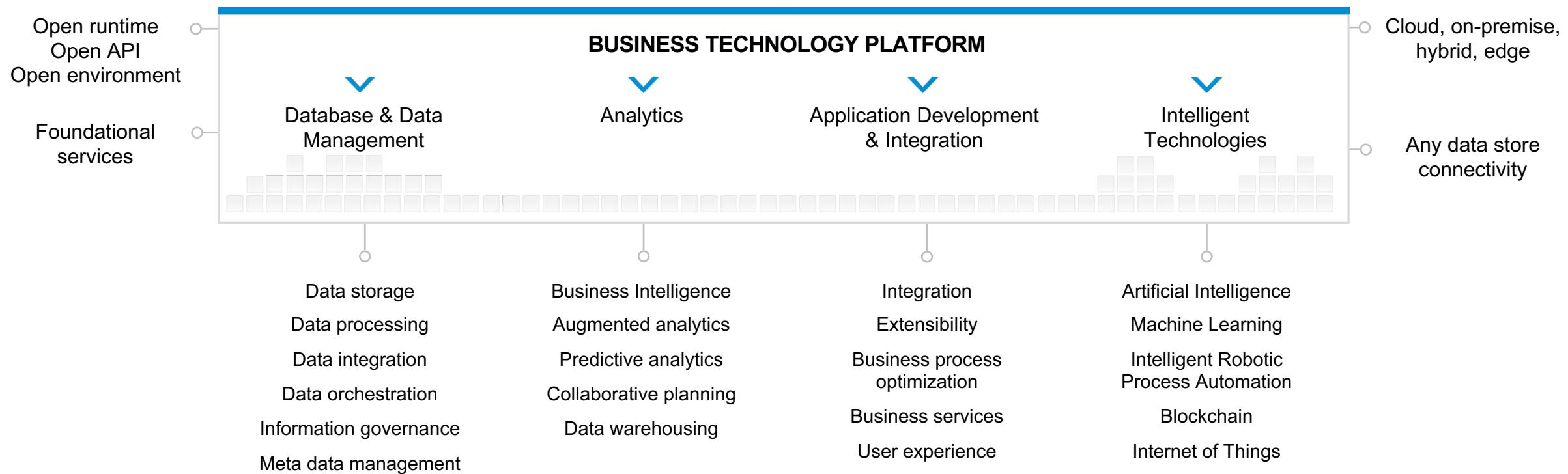
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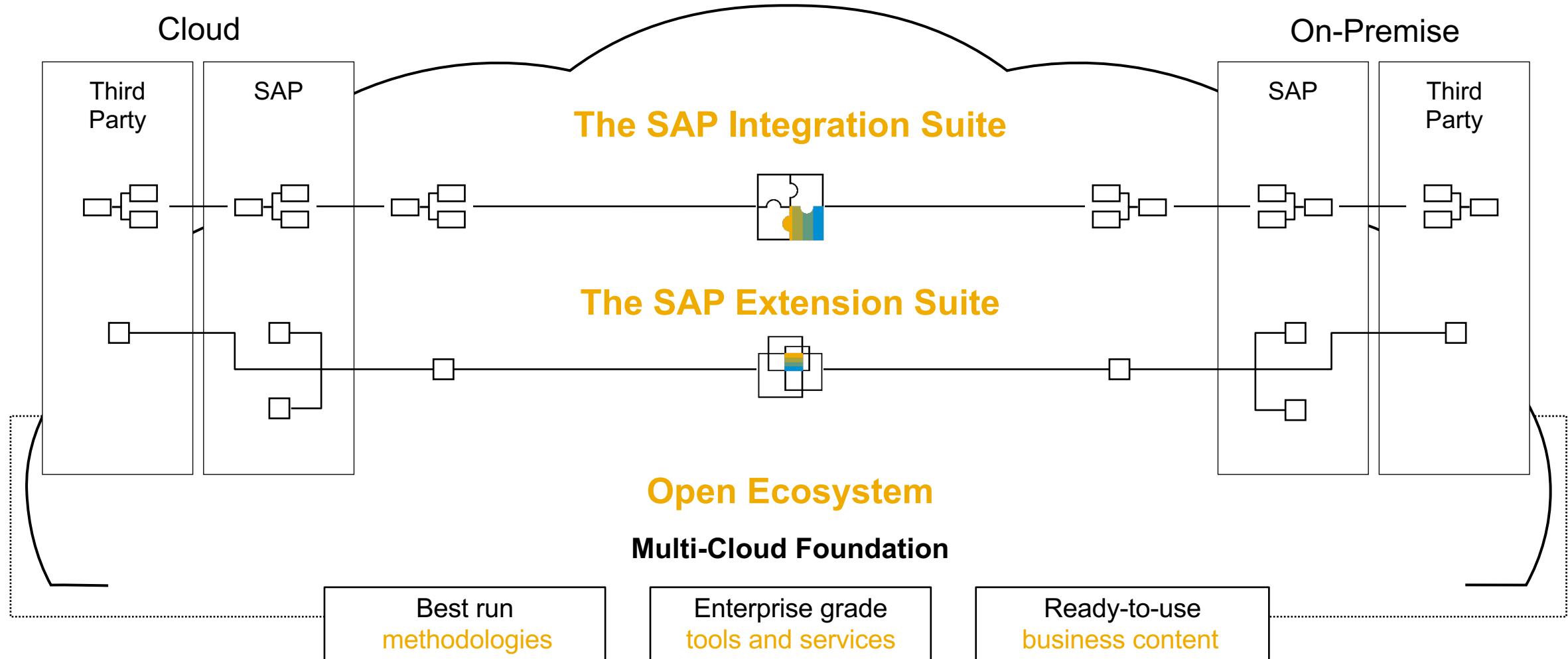
# Intelligent Enterprise



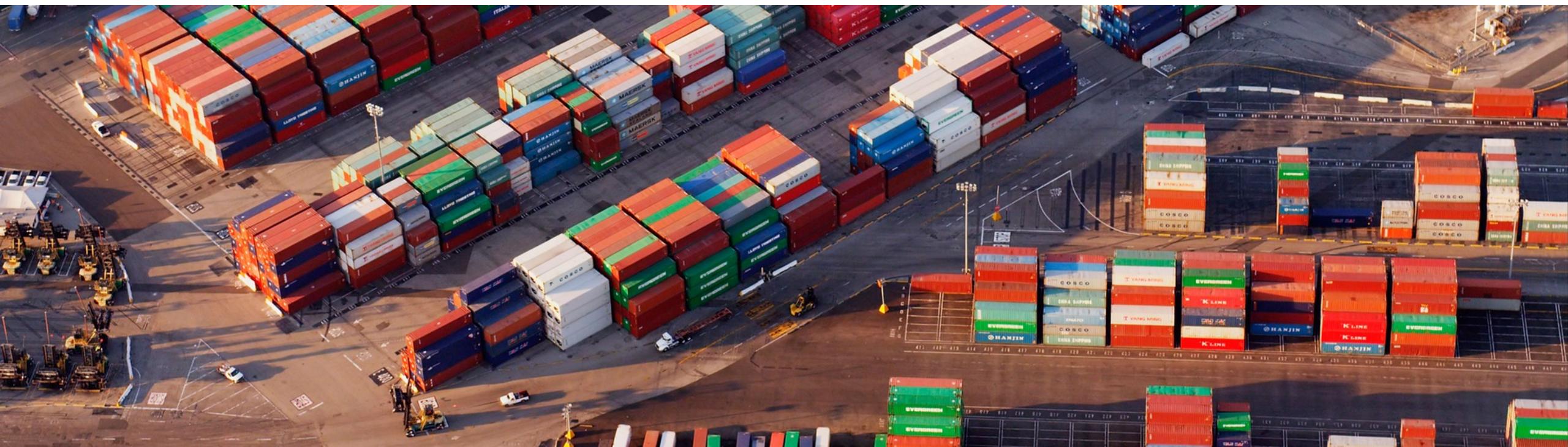
# SAP Business Technology Platform is the platform for the Intelligent Enterprise



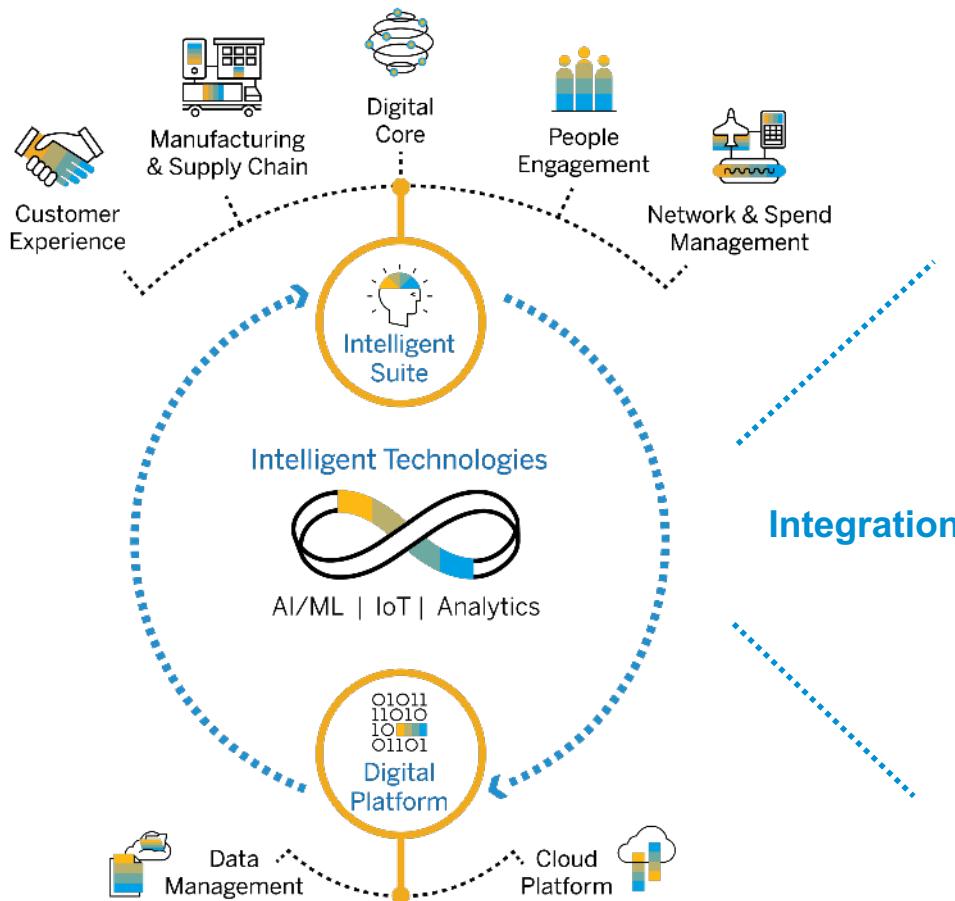
# SAP Business Technology Platform – Drive agility during rapid change

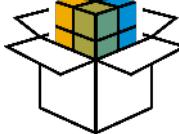
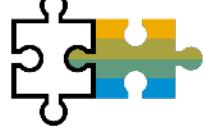


# SAP's integration strategy for the Intelligent Enterprise



# SAP's integration strategy for the Intelligent Enterprise



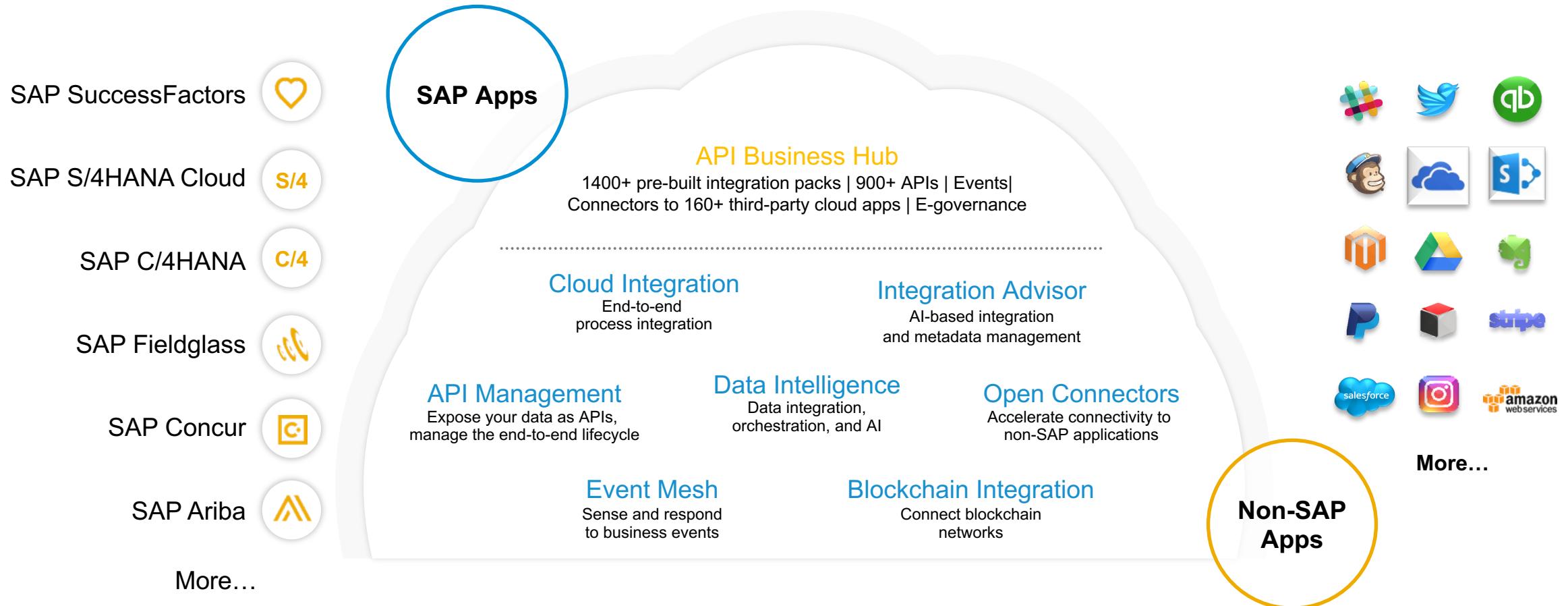
- 1**  
Out-of-the-box integration  

- 2**  
Open integration  

- 3**  
Holistic integration  

- 4**  
AI-driven integration  


***“Digital Platform - to facilitate the collection, connection, and orchestration of data as well as the integration and extension of processes in our integrated applications”.***

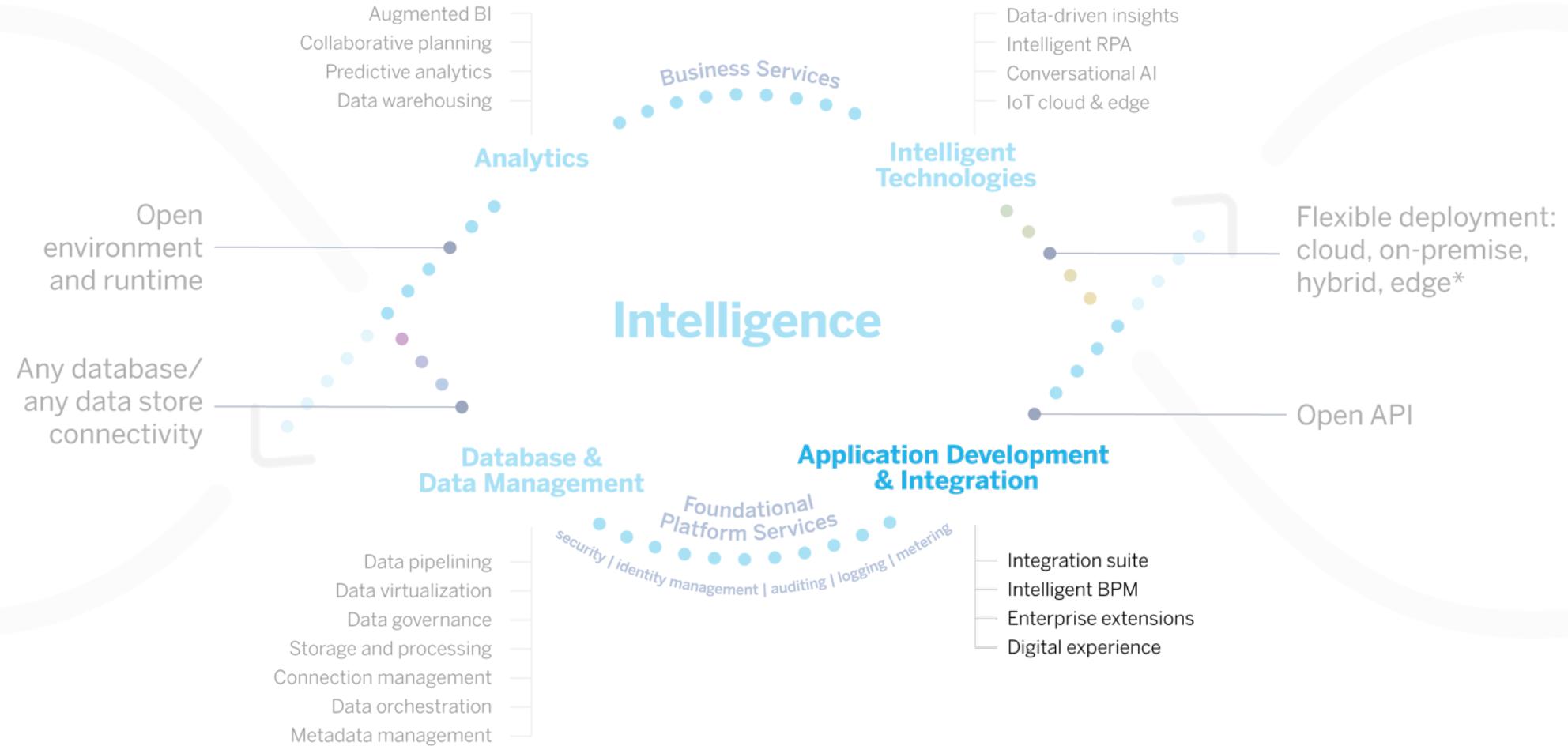
# SAP Integration Suite

## Connect. Accelerate. Empower.



# SAP Cloud Integration Suite connects the Intelligent Enterprise

A key technology within SAP's Business Technology Platform

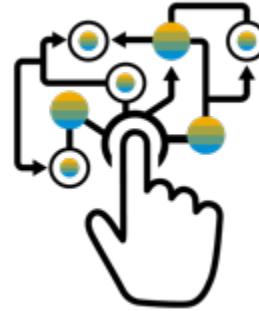


# Vision: Intelligent Enterprise is an integrated enterprise.



## Real-time digital interactions

- **Integrate anything** (people, things, processes and data) , anywhere (on-premise/cloud, edge)
- **Share real-time data** with supply chain, business network and customers with APIs



## Simplified connected experiences

- **Orchestrate** people, processes, events, and things with digital workflows and automate decision making with dynamic business rules.
- **Enable omni-channel experiences** with APIs
- **Integrate** SAP and non-SAP apps in cloud and hybrid landscapes



## Process excellence through integration and intelligence

- Real-time and connected **end-to-end processes** (Hire to Retire, Lead/Consume to Cash, Procure to Pay)
- **Sense and respond** to business events proactively

# SAP Integration Suite

A modular iPaaS to connect the Intelligent Enterprise



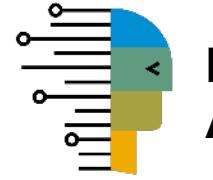
## Cloud Integration

Seamlessly integrate anything, anywhere (A2A/B2B) in real time.



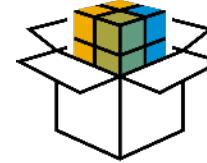
## API Management

Expose your data and processes as APIs. Manage E2E life cycle.



## Integration Advisor

Accelerate implementation and maintenance of B2B scenarios using machine learning.



## API Business Hub

Jump start integration projects with APIs, packaged integration content and adapters.



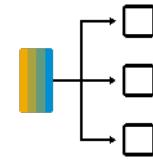
## Data Intelligence

Deliver data-driven innovation, unifying enterprise AI and intelligent information management.



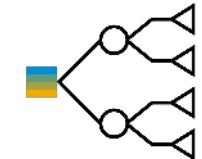
## Open Connectors

Accelerate connectivity to 3<sup>rd</sup> party applications.



## Connectivity

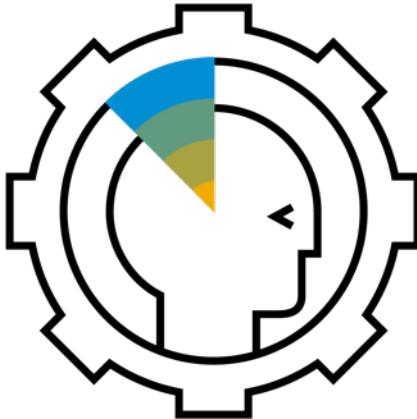
Securely access remote services that run on-premise.



## Event Mesh

Support event-driven integrations to build responsive extension apps without disturbing digital core in serverless environment

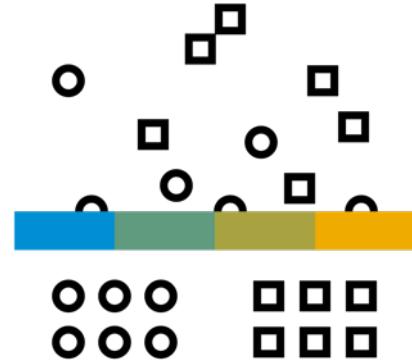
# Event-driven innovations - a perfect match for the Intelligent Enterprise



## Intelligent Enterprise

- Situation awareness
- Real-time decisions
- Intelligent automation
- Dynamic ecosystems

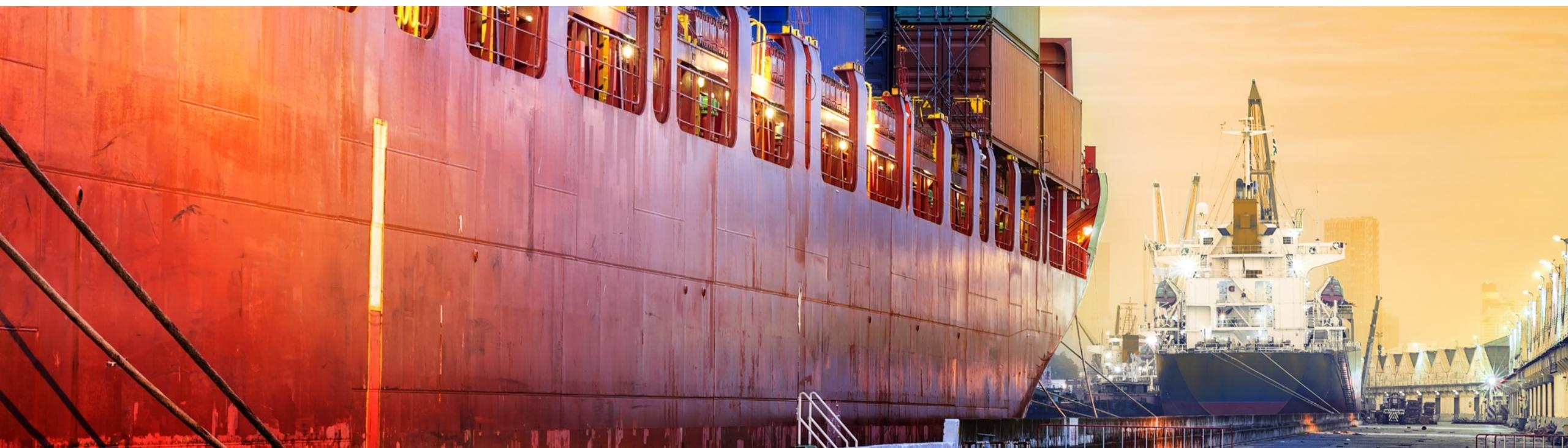
**Always sensing  
Always ready  
Always changing**



## Event-driven innovations

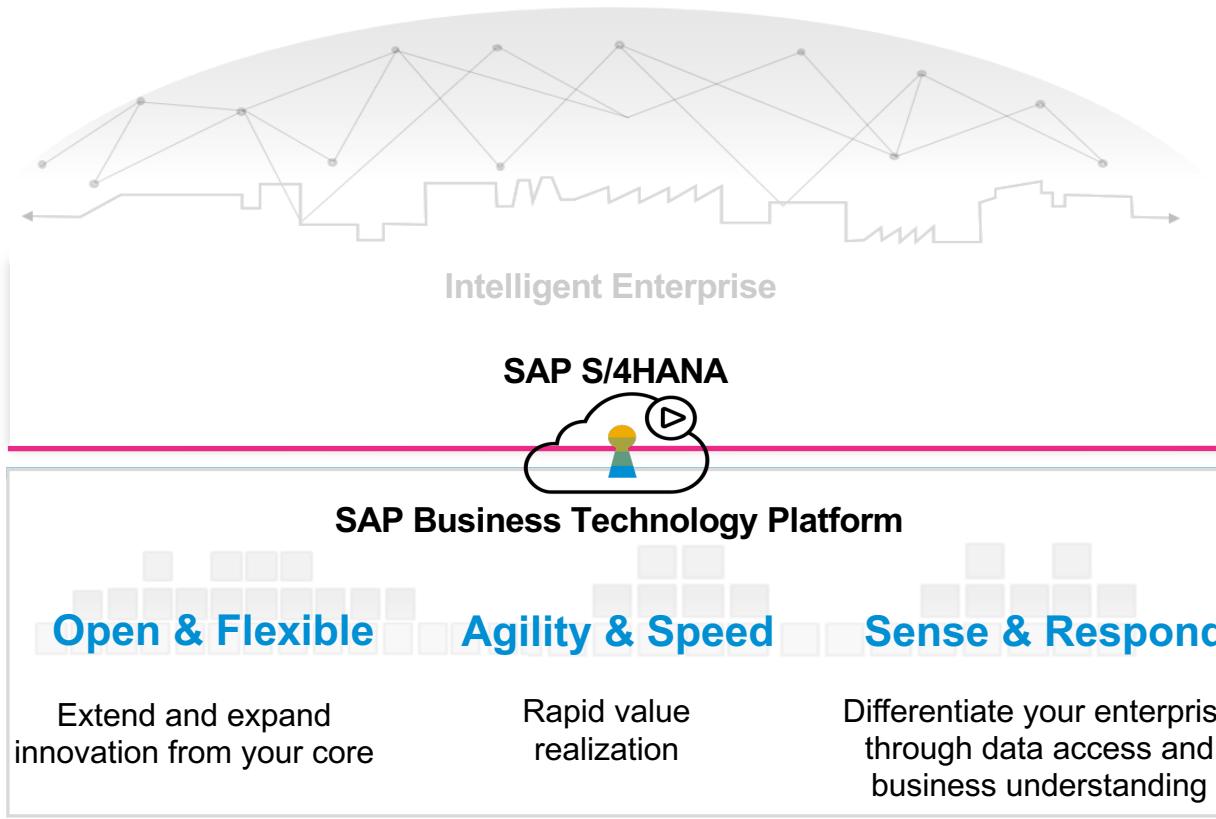
- Instant responses
- Unlimited extensibility and scale

# SAP's extension strategy for the Intelligent Enterprise



# Innovate beyond your standard solutions like SAP S/4HANA

## with SAP Business Technology Platform



### Data to Value

A foundation for data driven intelligence. Combine your enterprise's data to feed analytics and drive actionable insights



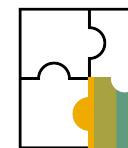
### Integrate across your value chain

1,800+ prebuilt integration packs  
Extensive cloud-to-cloud and cloud-to-ground integrations



### Expand value with cloud extensions

Guided contextual experiences  
Pre-built industry content and process workflows  
Orchestrate and automate across your ecosystem

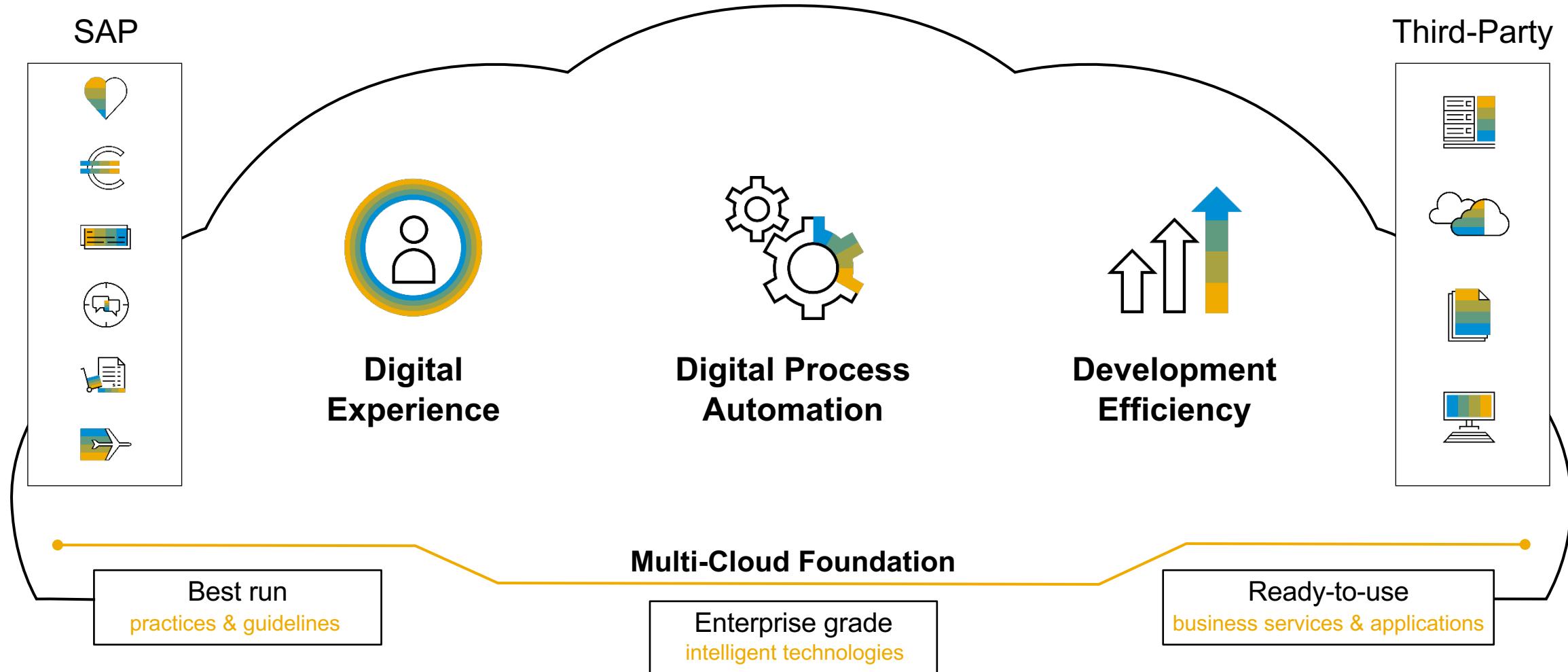


### Differentiate with SAP's ecosystem

Access to 15,000 partners across 25 industries  
Deliver digital content and business workflows  
Implement best practices

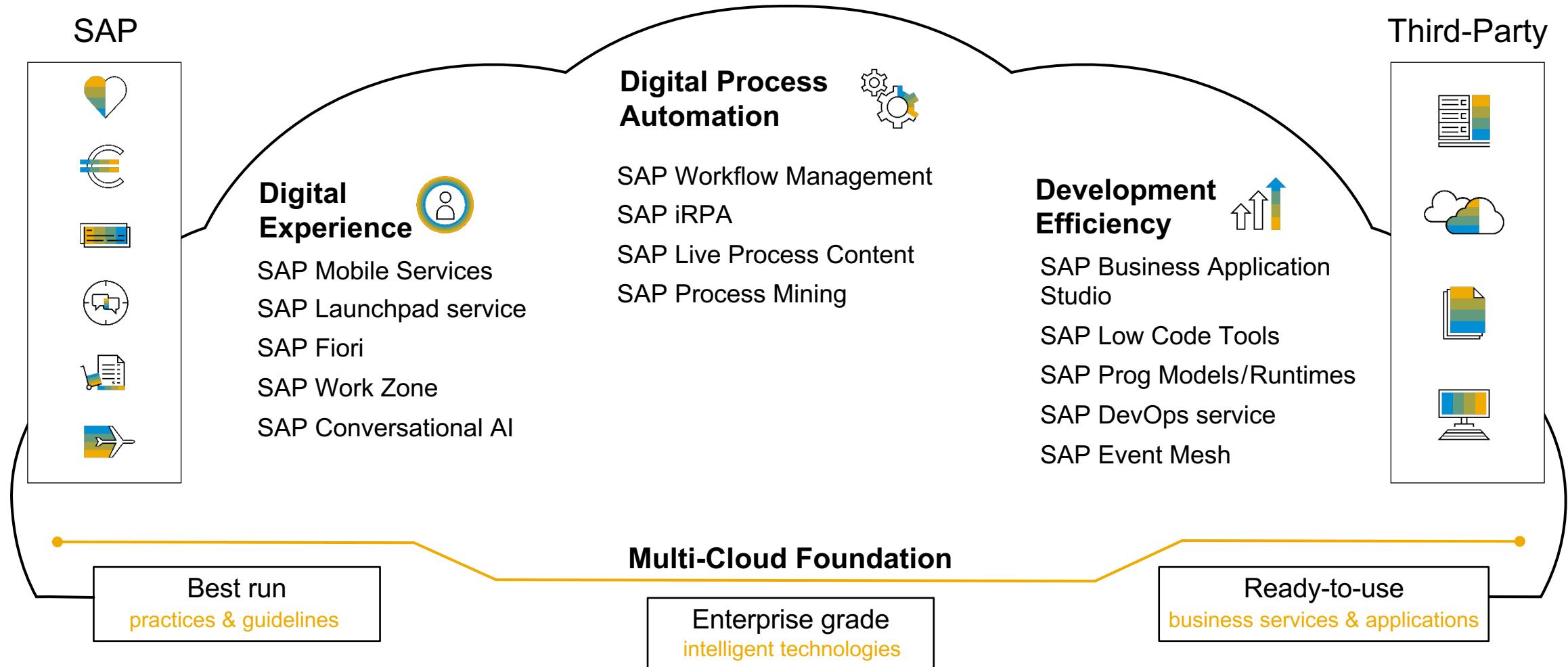
# SAP Extension Suite

Simplify development of your application extensions



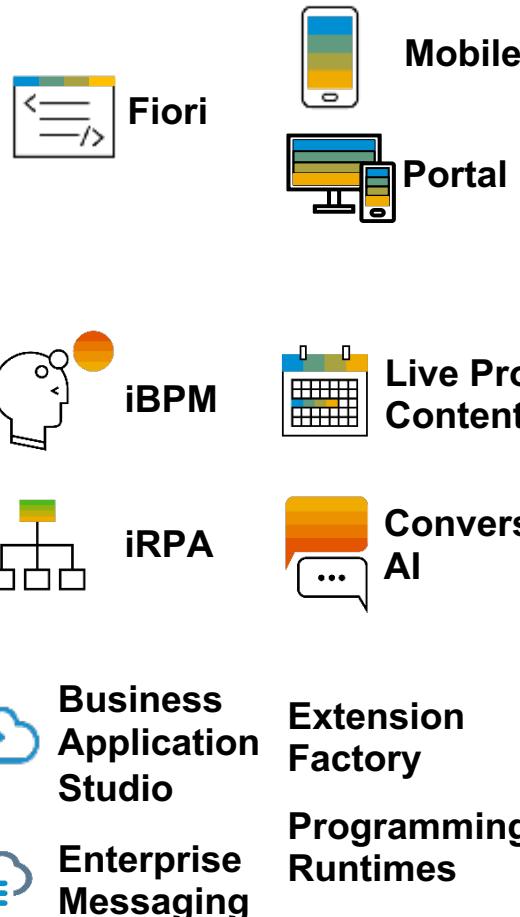
# SAP Extension Suite

Simplify development of your application extensions

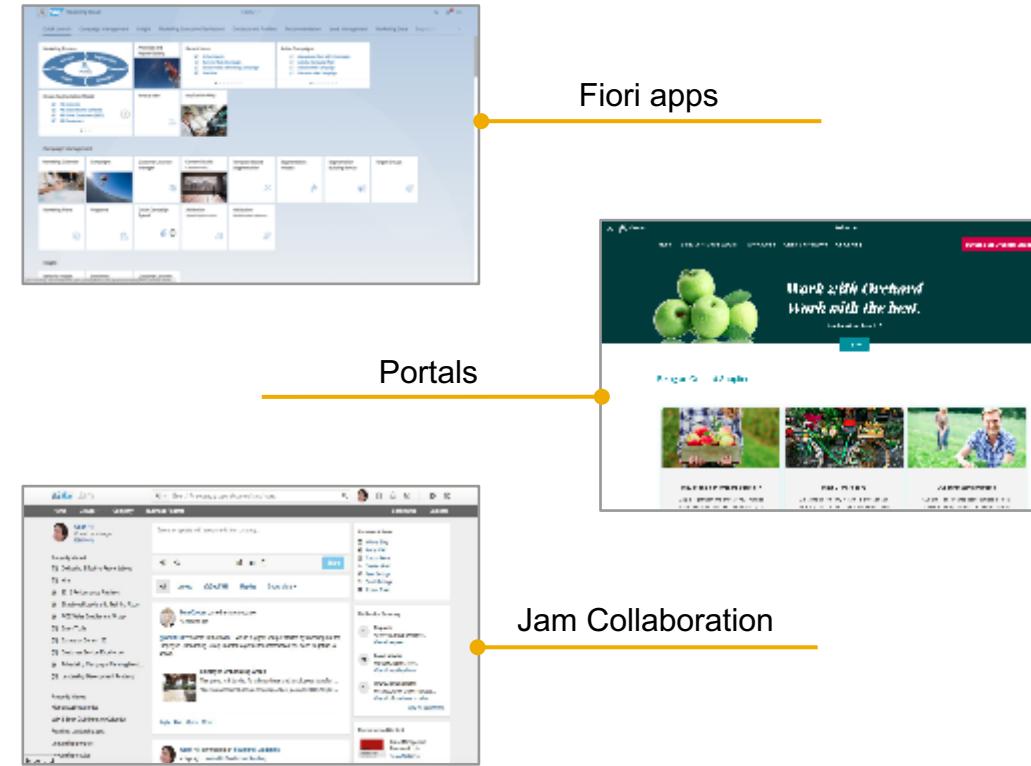


# Challenge : Extending an SAP Landscape Prior to Today

## Multiple Technologies



## Multiple Experiences



## Multiple Challenges

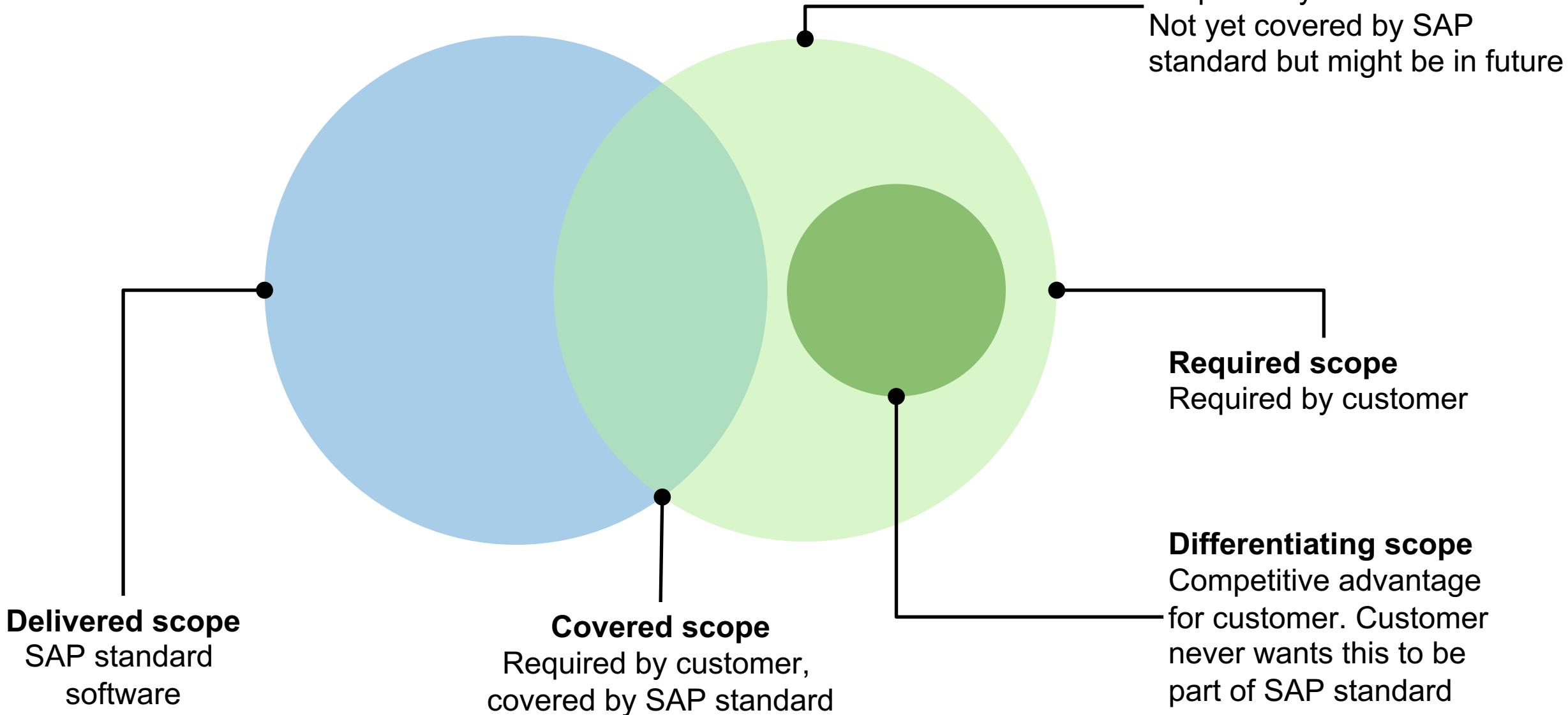
Lacks a unified **prescriptive** approach

Customers use technologies for **point solutions**

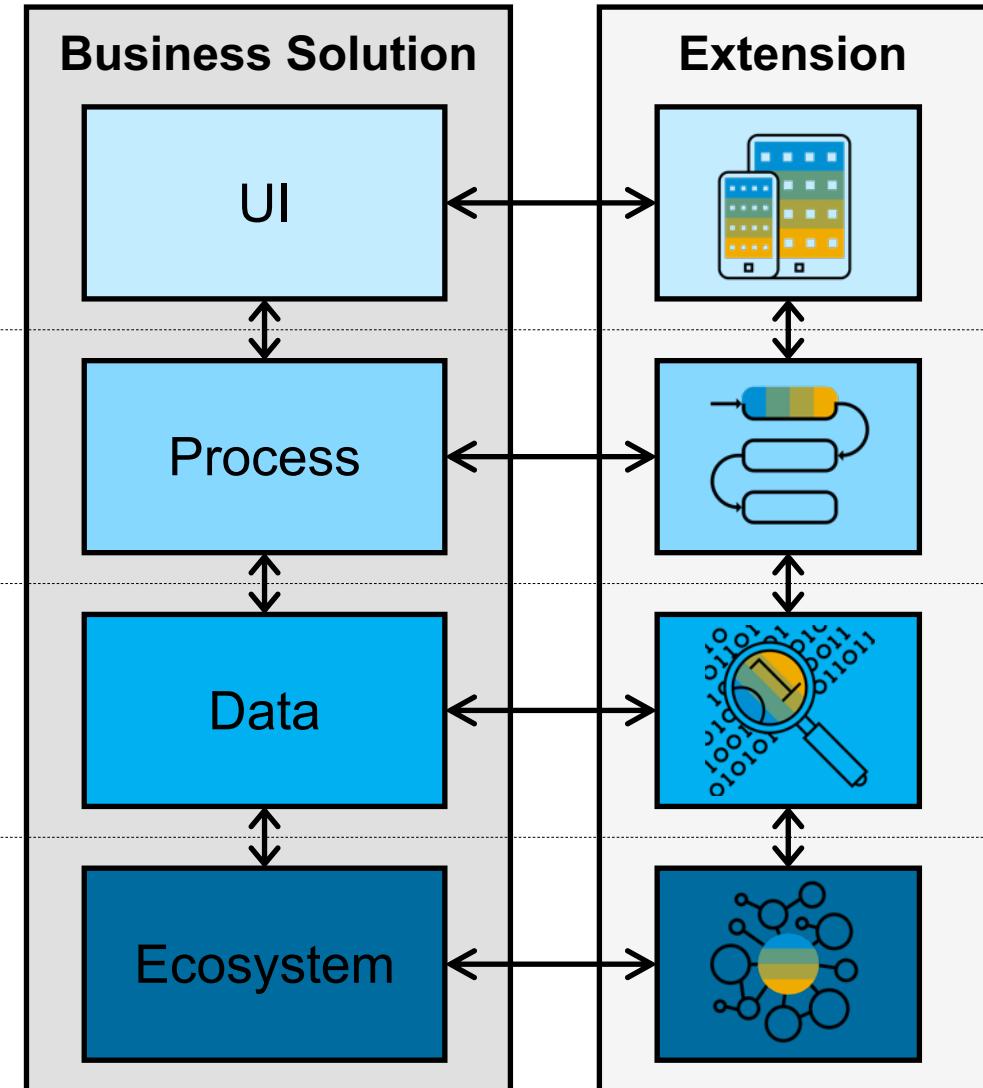
Selling supports customer use & doesn't emphasize a **platform**

# Introduction to SAP Cloud Platform Extension Suite

## Extending the Scope



# Extension scenarios



**Extend user experience** of existing processes and provide controlled access for additional user groups.

**Extend business process** with additional steps for business process optimization or innovation.

**Extend data insight** by consolidating and combining data in one central place.

**Extend ecosystem** by creating and operating a SaaS application and selling it to multiple customers

# What is an event?

- **An event is a significant change in state** (of an object in an enterprise system)
- **Event notifications** can be sent from the system in which the event occurred to inform other systems, microservices, and applications of the change.



- **cloudevents** is a specification for describing event data in a common way
- SAP, Google, Microsoft ... support cloudevents



## Enterprise Messaging:

```
{"type":"BO.SalesOrder.Created","specversion":"1.0","source":"urn:sap:topicNS:sap/abap/test","id":"XqnXqrPdW4DhAACmIUGQ==","time":"2020-05-04T13:17:44Z","datacontenttype":"application/json","data":{"KEY":[{"SALESORDER":"0000017716"}]}}
```

Topic: sap/abap/test/BO/SalesOrder/Created · 5/4/2020, 3:17:44 PM



## Enterprise Messaging:

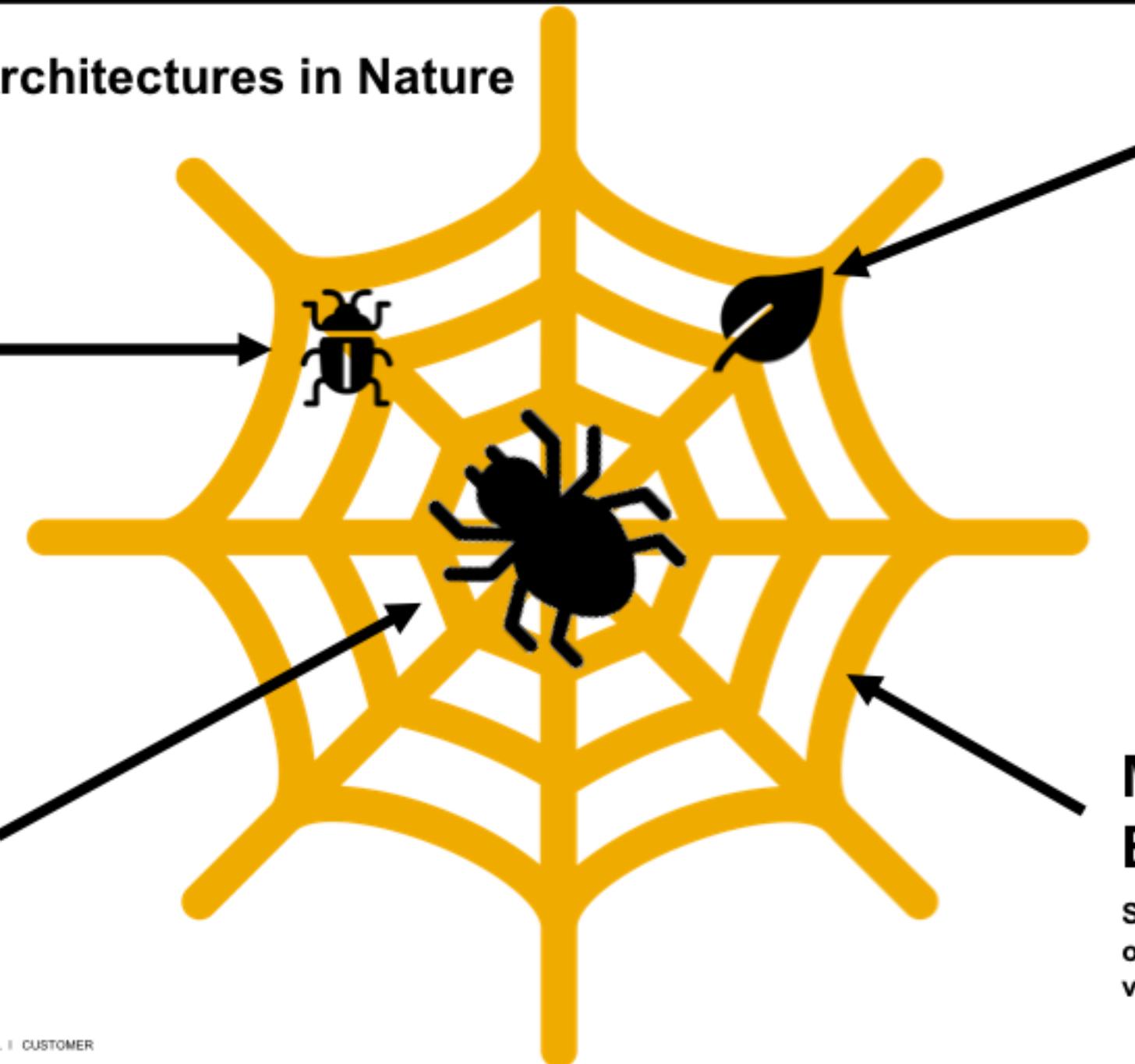
```
{"type":"BO.BusinessPartner.Changed","specversion":"1.0","source":"urn:sap:topicNS:sap/abap/test","id":"Xq7VjTlKCLhAACmIUGA==","time":"2020-05-04T13:11:47Z","datacontenttype":"application/json","data":{"KEY":[{"BUSINESSPARTNER":"0001000409"}]}}
```

Topic: sap/abap/test/BO/BusinessPartner/Changed · 5/4/2020, 3:17:05 PM

# Event-Driven Architectures in Nature

**Event**

A significant change  
of status in a spider's  
web



**Event**

A significant change  
of status in a spider's  
web

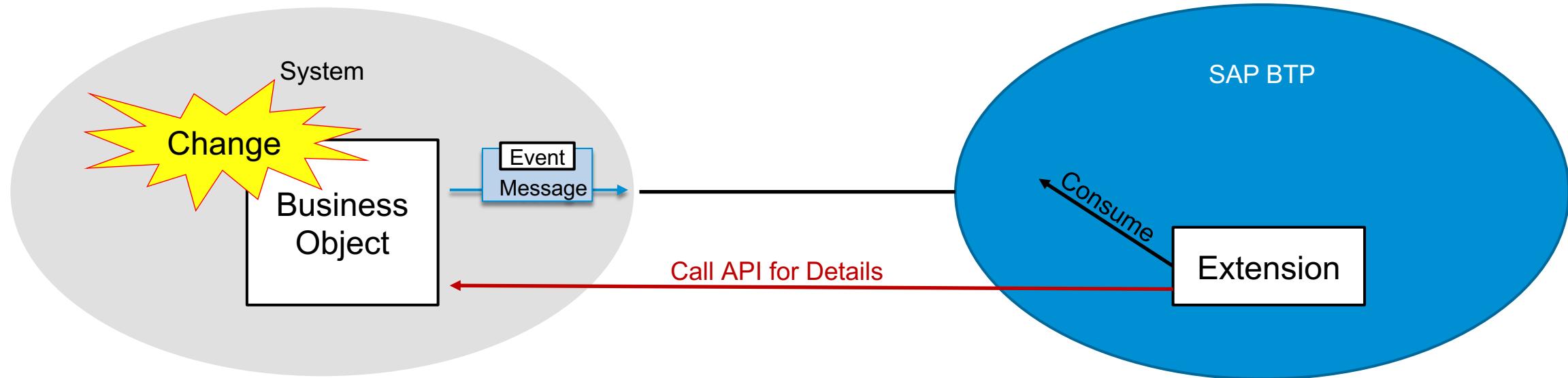
**Event  
Consumer**

Listening for and  
reacting to events

**Messaging  
Broker**

Spider's web passes  
on events via  
vibrations

# Event-driven Extensions



Highly **decoupled**, single-purpose event processing components that asynchronously receive and process events

**Senders** of events are **not aware** of event **receivers**

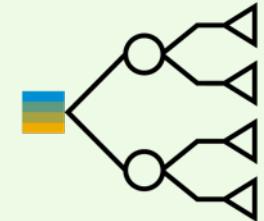
# Benefits of event-driven architectures

## Event-Driven Architectures

- **Distributed asynchronous architecture pattern** used to produce highly scalable applications.
- Made up of **highly decoupled, single-purpose event processing components** that asynchronously receive and process events.
- A key element of event notification is that the source system doesn't really care much about the response.

## Benefits

- Decouples communication
- Removes idle downtimes
- Enables responsive applications that react to events in other systems/applications
- Permits events to trigger functions (as a service) in response to execute defined business logic
- Facilitates pay-per-use consumption costs by removing “always on”



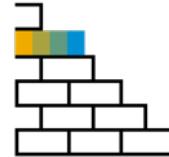
# Extensions Step by Step



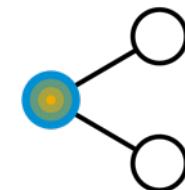
Provides an integrated toolkit for extending and enhancing standard SAP solutions efficiently and economically



**Connect**  
on-premise and  
cloud systems to  
SAP Cloud  
Platform to  
extend standard  
SAP solutions.



**Create endpoint**  
extension  
applications based  
on your existing  
skillset.

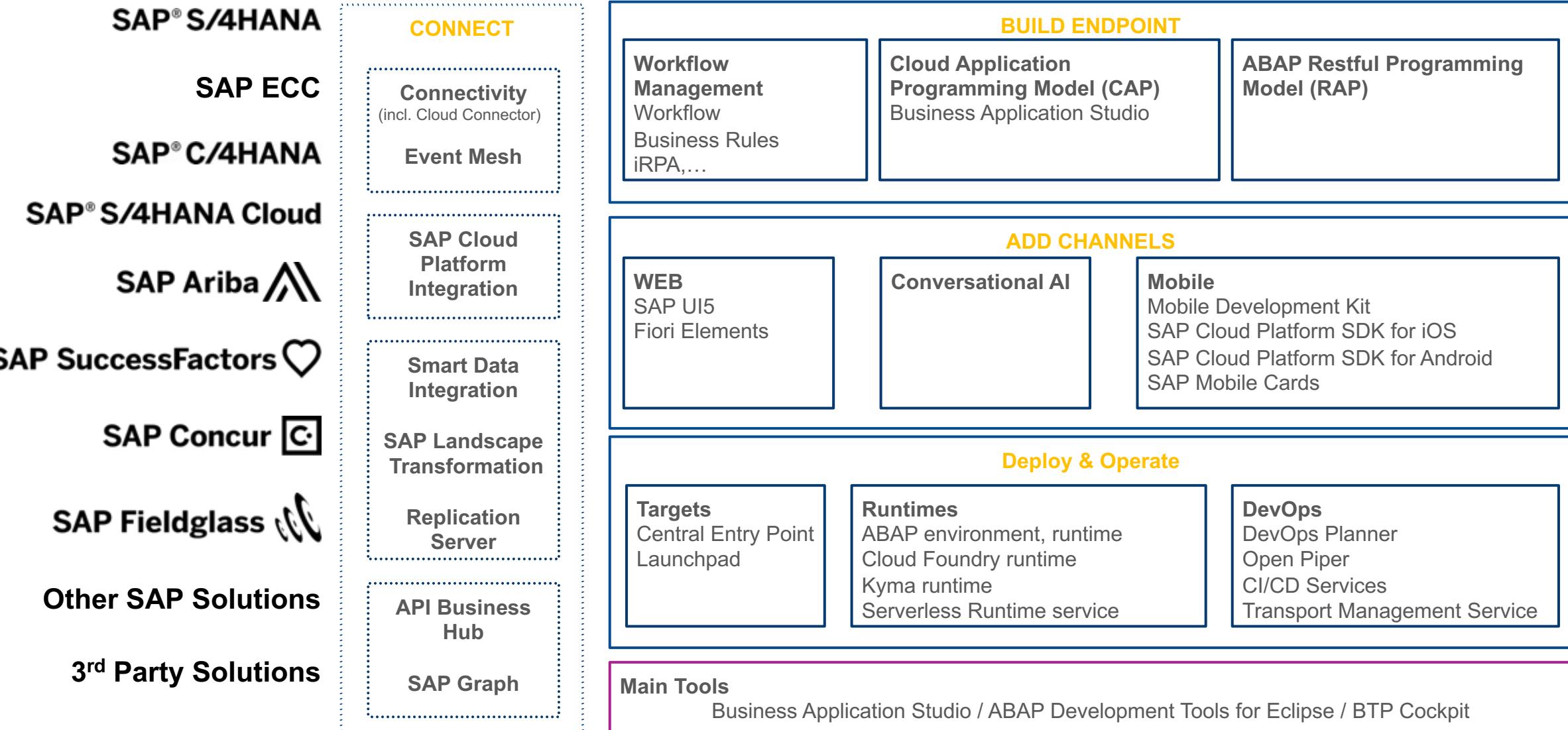


**Add channels**  
Web, mobile,  
conversational,  
others.



**Deploy & operate**  
in your  
organization.

# SAP Extension Suite



# SAP Enterprise Messaging





# SAP Event Mesh

SAP Event Mesh is a fully-managed cloud service that allows extensions and applications to communicate through asynchronous events and seamlessly extend your digital core.

## Key capabilities

- Broker business events from SAP and non-SAP sources
- Connect applications and services seamlessly
- Communicate reliably at large scale

## Benefits

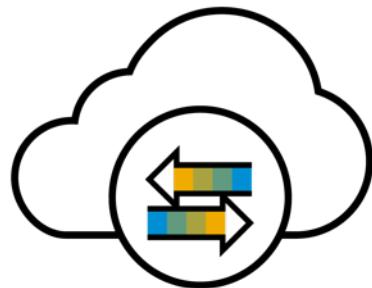
- Simple implementation
- High throughput, low latency
- High availability clusters and elastic scalability
- Multiple message protocols (e.g. AMQP, MQTT, REST), APIs (Java JMS, Node.js) and exchange patterns (e.g. pub/sub, point-to-point, request/reply)





# SAP Event Mesh

Fully-managed cloud service for enabling applications to **communicate asynchronously** through messages and events.

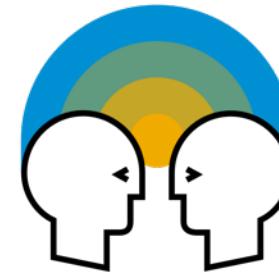


## Event enablement

- Transports events (type of message) from event source to the Cloud for seamless integration of hybrid landscapes.
- Build responsive applications and extensions that can react to events without disrupting core business systems.

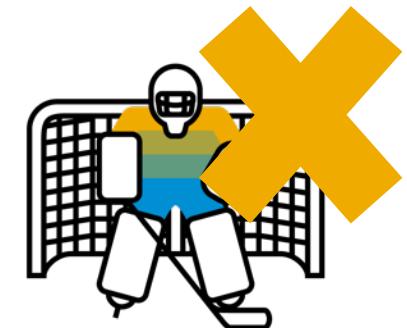
## Seamless connectivity

- Connect your applications and microservices seamlessly using standard protocols (MQTT, AMQP 1.0, REST)
- APIs (Java JMS, Node.js)
- Exchange patterns (e.g. pub/sub, point-to-point, request/reply)



## Reliable communication

- Messaging middleware decouples communication between senders and receivers for greater scalability.
- Choose from different Quality of Service levels to ensure messages are delivered reliably.



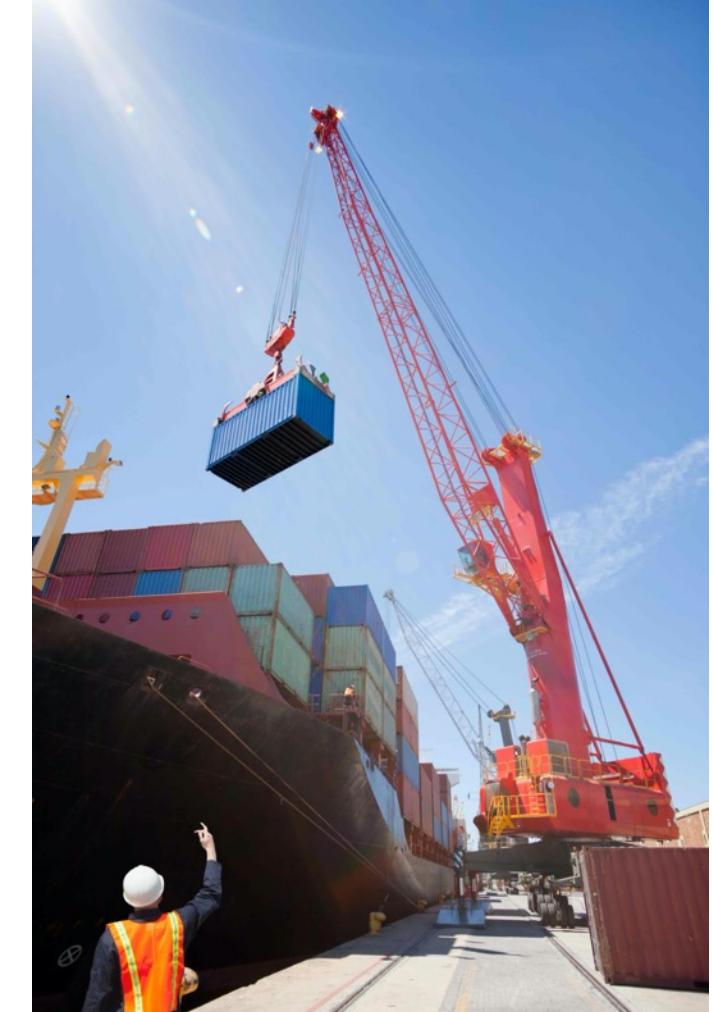
## Non-blocking communication

- Asynchronous message patterns provide elasticity meaning unexpected peaks in data traffic can be handled efficiently.



# Use SAP Event Mesh to

- **Decouple communication** between applications, services, and systems using asynchronous messaging patterns.
- **Support event-driven architectures** and microservices
- **Publish business events** from SAP and non-SAP sources across hybrid landscapes from the digital core to extension applications.
- **Build event-driven extensions** and subscribe to business events from core SAP systems like SAP S/4HANA, or third-party sources to enable cloud-native extensions to respond to the latest business developments.
- **Seamless connectivity** through decoupled communication between applications, services, and systems as part of the SAP Cloud Platform Integration and Extension Suites to implement extension and integration scenarios.



# Key capabilities



## Events broker

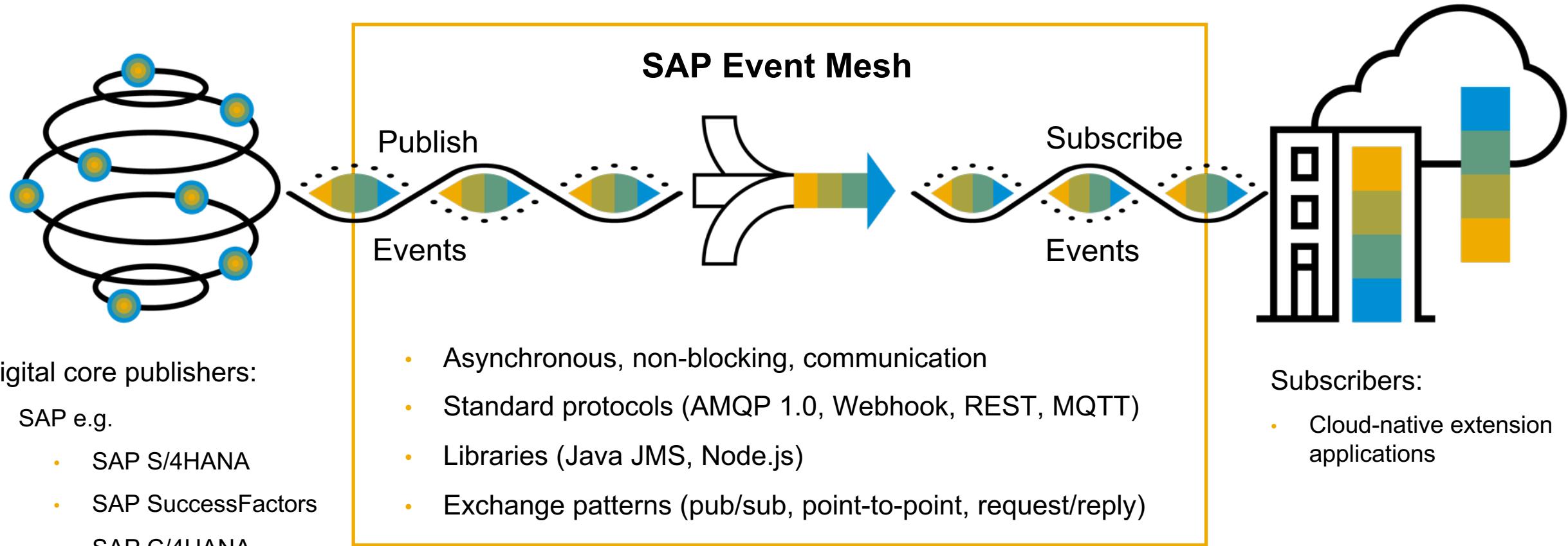
- Events enablement for SAP and non-SAP sources including
  - SAP S/4HANA Cloud / On Prem
  - SAP ECC
  - SAP SuccessFactors
- Events registration to enable consumption of events
- Events discovery and catalog



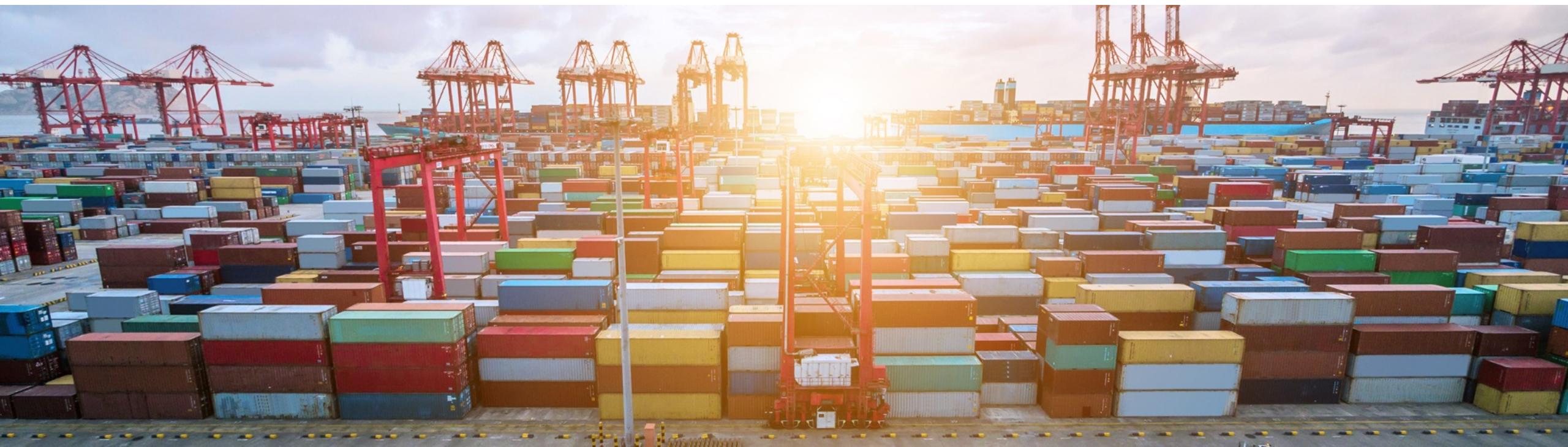
## Message broker

- Asynchronous communication
- Standard messaging protocols
- Secure and reliable
- Point-to-point, queue-based messaging
- High throughput, low latency
- Java and NodeJS messaging clients

# SAP Event Mesh - decoupled communication between digital core and cloud



# SAP Events Mesh: Event Enablement and Event Sources

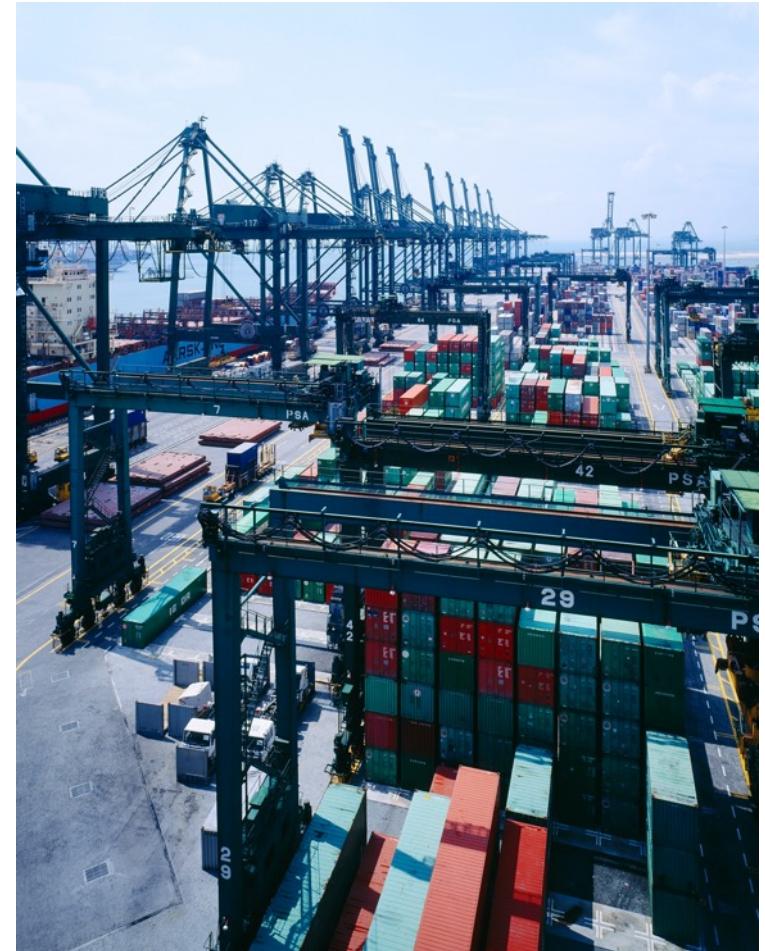


# Importance of events in extensions and integration scenarios

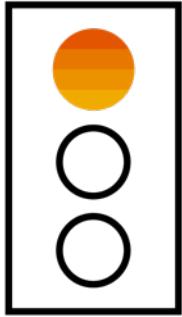
Both **integration and extension** scenarios need APIs to access data or call a function, but this is only part of the solution.

The missing piece of the solution is **events** and this is why SAP Enterprise Messaging provides important event enablement capabilities.

**Why?** The apps of API consumers need to be responsive, event-driven, and react to changes in real-time.



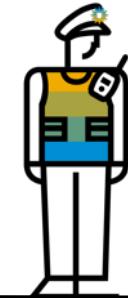
# APIs vs. Events



**Application programming interfaces** are a **contract** between client and server.

**Synchronous and blocking.**

Need to be called **actively**.



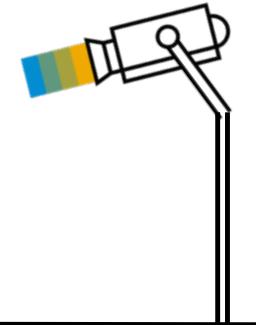
**APIs enable us to read and write data, call functions, and start processes.**



**Event notifications** inform interested parties on significant changes.

**Asynchronous and non-blocking.**

**Register once** - no additional action needed.



**Events allow us to react to changes, by informing that something has changed.**

# Selected Event Sources

SAP S/4HANA Cloud +  
On Premise

S/4

Billing Document Request	Created, cancelled
Business Partner	Created, changed
Business Situation	Created, changed, completed
Contract Accounting Billing Document	Created
Contract Accounting Invoicing Document	Created
Credit Memo Request	Created
Customer Returns Delivery	Created, changed, deleted
Debit Memo Request	Created, changed, deleted
Inbound Delivery	Created, changed, deleted
Kanban Control Cycle	Created, changed, deleted, Container created, changed, deleted
Legal Document	Created, accepted, Version created
Legal Transaction	Created, cancelled, expired, terminated

SAP SuccessFactors

HF

Recruiting	Onboarding and Offboarding	Hiring	Job Changes	Talent Management
Update of Job Requisition	Onboarding Step Complete	Employee Hire	First Time Manager	Add Development Objective
Update of Job Application	Offboarding Step Complete	Employee Rehire	Change in Manager	Spot Award
Approval of Offer Detail			Job Transfer	New Successor

SuccessFactors Intelligent Service events can be enabled following this blog [How to use SAP Enterprise Messaging as an event bus for SuccessFactors](#)



cloudevents

A specification for describing event data in a common way

SAP ECC NetWeaver 7.31+ Event Enablement Add-On

ECC

A screenshot of the SAP ECC NetWeaver 7.31+ Event Enablement Add-On interface. It shows a 'Create Person' dialog box with fields for Name, Address, and Standard Address. The 'Name' section includes fields for Title, First name, and Last name. The 'Address' section includes fields for Street, City, State, Zip, and Country. The 'Standard Address' section includes fields for Street/Number, Postal Code/City, and Region.

Highly scalable to bring events and data to the cloud:

- notification and data events
- delta loads / change pointers
- outbound and inbound

# ECC - SAP NetWeaver® Event Enablement Add-on 1.0: Overview

**Event Enablement Add-on 1.0 for SAP Enterprise Messaging** is the new and powerful add-on from SAP for SAP NetWeaver® systems

Add-on to SAP NetWeaver ABAP systems that operates within the established SAP infrastructure

Allows to enhance or create custom content (extractors, formatters) and connectors

Uses highly scalable techniques to bring customer data and events into the cloud:

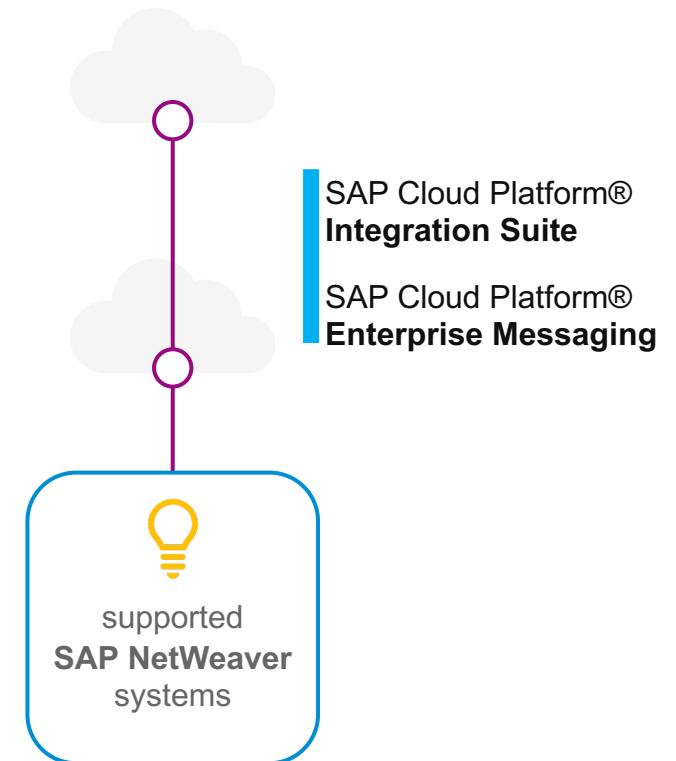
- event based triggers
- delta loads / change pointers
- parallel data processing (in multiple SAP work processes)
- data splitting

BAPI calls for data selection possible

Supports outbound AND inbound process and data flows

Supports interface clustering for efficient provisioning to multiple cloud applications

Available with SAP Cloud Platform Enterprise Messaging, no additional license required.



# Selected SAP SuccessFactors Intelligent Service Events

Intelligent Services begin as events that are published in one area of the SAP SuccessFactors HCM Suite.

Any SuccessFactors product can trigger and publish an event.

Recruiting	Onboarding and Offboarding	Hiring	Job Changes	Talent Management	Continuous Performance	Leave of Absence	Separation	Learning
Update of Job Requisition	Onboarding Step Complete	Employee Hire	First Time Manager	Add Development Objective	Management Activity	Time Off	Employee Termination	Completion of Learning
Update of Job Application	Offboarding Step Complete	Employee Rehire	Change in Manager	Spot Award	Management Achievement	Long term disability	Expiration of Work Order	
Approval of Offer Detail			Job Transfer	New Successor		Short term disability		

<https://help.sap.com/viewer/b8da92fb08c347cbab0c8fff82af0a3f/1908/en-US>

# Events discovery & catalog

- Discovery of events exposed by SAP S/4HANA Cloud system via provided OData service
- Intuitive UI to explore and organize available events

The screenshot shows the SAP S/4HANA Cloud Events Administration interface. The top navigation bar includes 'Enterprise Messaging - Events Administration' and various icons. On the left, a sidebar has 'Overview' (selected), 'Manage Event Channel Groups', and 'Explore Events'. The main area is titled 'Explore Events' with a subtitle 'Event Channel Group: CC2'. It shows a list of event topics under 'Event Topic Name: CC2' and a 'Service Instance: Show'. A 'Collapse All' button is at the top right of the list. The list items are:

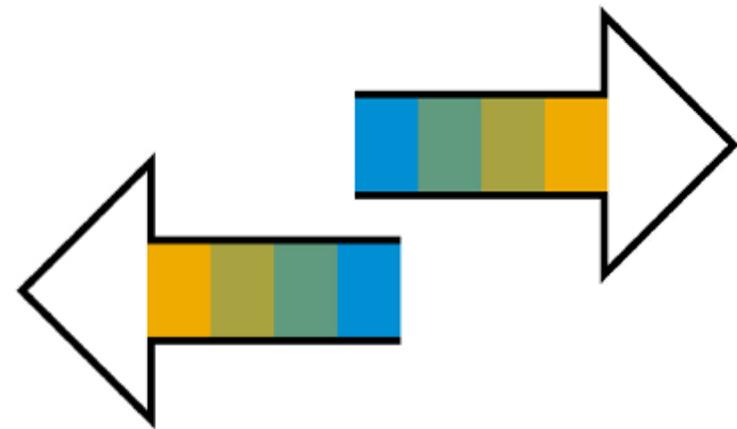
- CC2
- CC2/BO
  - CC2/BO/BillingDocumentRequest
  - CC2/BO/BusinessPartner
    - CC2/BO/BusinessPartner/Changed
    - CC2/BO/BusinessPartner/Created
  - CC2/BO/BusinessSituation
  - CC2/BO/ContrAcctgBillingDocument
  - CC2/BO/ContrAcctgInvoicingDocument
  - CC2/BO/LegalDocument
  - CC2/BO/Product
  - CC2/BO/RequestForQuotation
  - CC2/BO/SalesOrder
  - CC2/BO/SupplierQuotation

## SAP Event Mesh **core messaging capabilities**



# Asynchronous communication

Asynchronous communication means the sending application does not need to wait for a response from the receiving application.



Messages sent by the sending application are placed in a queue before being sent to the relevant receiving application. This approach ensures greater scalability compared with synchronous communication because sending applications can “fire and forget.”

# Standard messaging protocols

SAP Event Mesh supports standard messaging protocols:

- **AMQP v0.9.1**

- **AMQP v1.0.0**

The Advanced Message Queuing Protocol (AMQP) is an open standard application layer protocol. The defining features of AMQP are message orientation, queuing, routing (including point-to-point and publish-and-subscribe), reliability and security.

- **MQTT v3.1.1**

The Message Queuing Telemetry Transport (MQTT) is an ISO standard (ISO/IEC PRF 20922) publish-subscribe-based messaging protocol

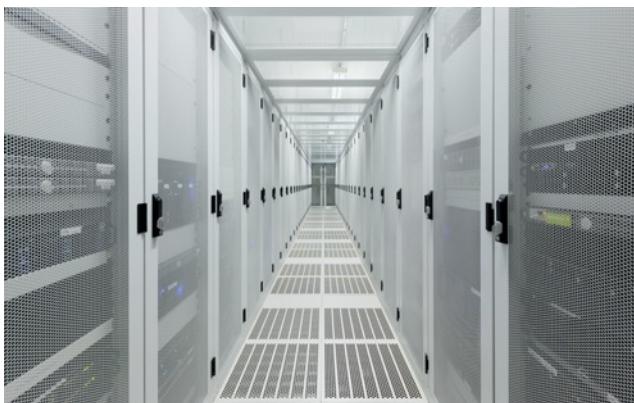
- **HTTP 1.1 REST**

Expose messaging capabilities using REST APIs

Messages can be published to and consumed from queues and topics.

# Secure messaging

SAP Event Mesh provides secure and reliable messaging capabilities as a service. SAP manages and delivers your data across its secure data centers around the globe.



# Reliable messaging

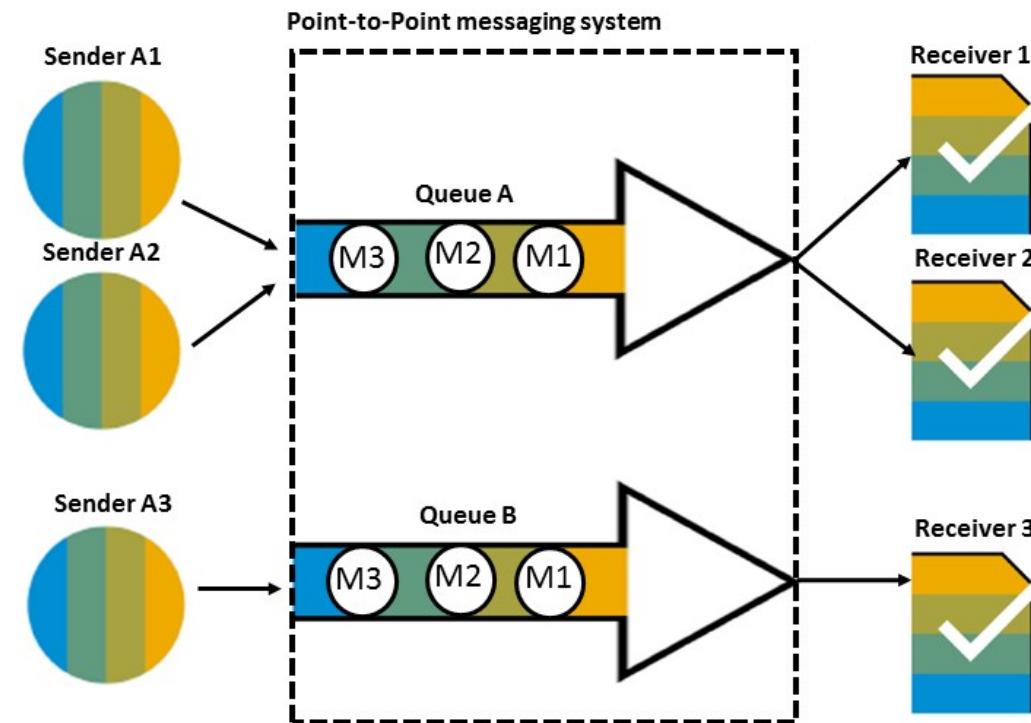
SAP Event Mesh supports the following types of reliable messaging for the MQTT messaging protocol. The MQTT protocol handles retransmission and ensures that a message is delivered regardless of network reliability.

## MQTT

- **QoS 0 = at most once**  
Messages are not acknowledged by the receiver or stored and redelivered by the sender. This is often referred to as “fire and forget” to transmit non-critical data.
- **QoS 1 = at least once**  
Messages are delivered at least once to the receiver. Consequently, a receiver might receive the same message multiple times.

# Point-to-Point (P2P) queue-based messaging

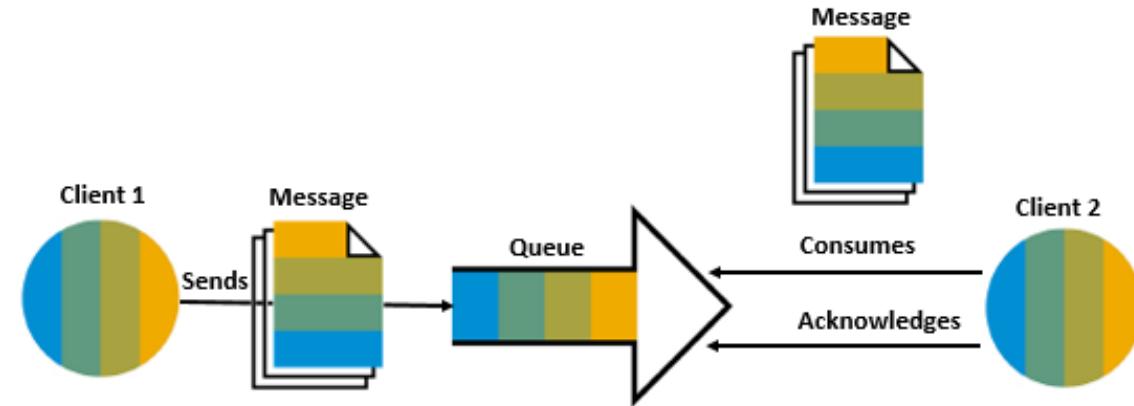
Sending applications send messages to a specific queue where they are processed first-in, first-out (FIFO).



SAP Event Mesh delivers each message exclusively to one receiver. A receiver can browse (eg. to count) the number of messages in a queue, but cannot receive them out of sequence or change them.

# High throughput, low latency

SAP Event Mesh provides scalability by enabling components to communicate indirectly with one another via an intermediary messaging host, which supports queue-based communication.



SAP Event Mesh places messages in a queue and ensures these are sent fast and securely to receivers. Consequently, sending applications do not need to know who the receivers are and they do not need to wait for a response.

## SAP Event Mesh **messaging clients**





- Java libraries available on Maven Central
- Example projects available on GitHub
  - Basic MessageSender & MessageReceiver projects
  - Plain Java projects and Spring Web projects to run on-prem or on SAP Cloud Platform
  - Initial connection to binding

```
// use Spring CloudFoundry tools to get...
final Cloud cloud = new CloudFactory().getCloud();

// ... the MessagingService of the `Messaging Client Java API` via the ServiceConnector
MessagingService messagingService = cloud.getSingletonServiceConnector(MessagingService.class, null);

// bind to binding with name 'input' and build the MessagingEndpoint
MessagingEndpoint messagingEndpoint = messagingService.bind("input").build();
```

- Receive from endpoint

```
// open stream via `receive` and define flow for each received message in `Consumer` function
inQueue.receive("client:xbem::samples::sapcp", (stream) -> { // (1)
    stream.peek((m) -> LOG.info("Message received..."))           // (2)
        .map(Message::getContent).map(MessageEvent::new)            // (3)
        .foreach(messageEvents::add);                                // (4)
```



Four different flavors of NodeJS clients to choose from, according to the scenario available on [npm](#):

- **xb-msg** / Stream-based Messaging:  
The package provides a protocol and binding-agnostic approach - wrapping protocol-specific client implementations from separate packages.
- **xb-msg-amqp-v091**  
Provides a messaging client implementation for AMQP v0.9.1
- **xb-msg-amqp-v100**  
Provides a messaging client & server implementation for AMQP 1.0
- **xb-msg-mqtt-v311**  
Provides a client implementation for MQTT 3.1.1
- Usage examples are part of the package + additional samples and snippets available on GitHub

## Key takeaways

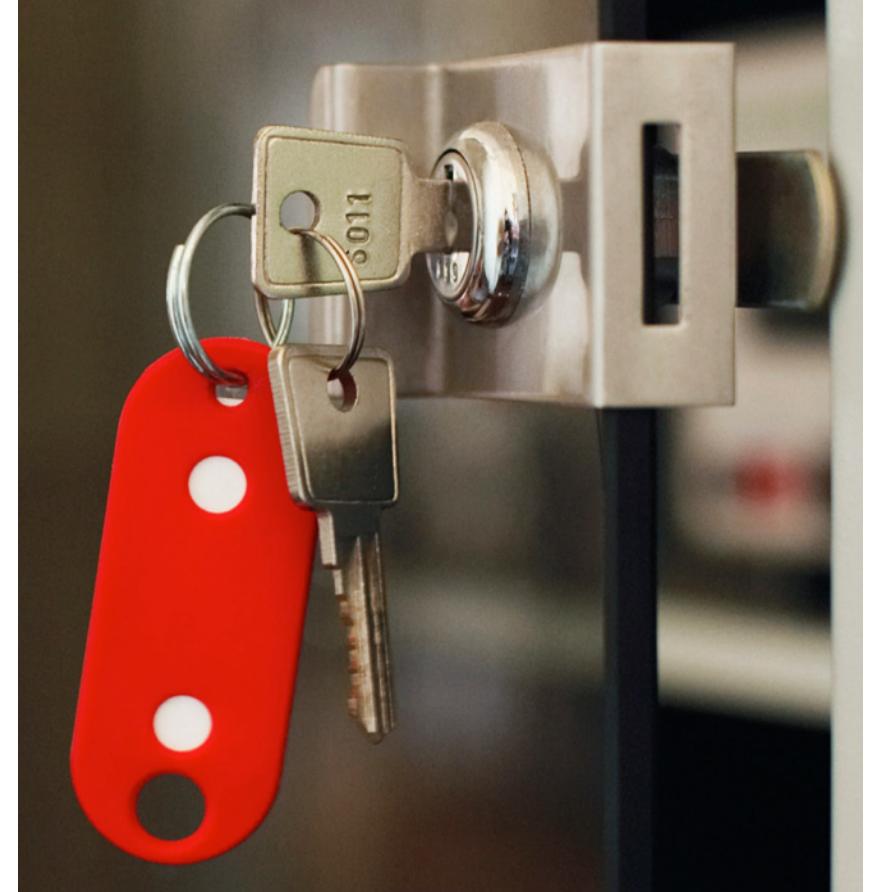


# SAP Event Mesh

## Key takeaways

### SAP Event Mesh

- is SAP's **event broker** and supports event-driven extensions and integrations
- is an integral part of SAP's event-driven ecosystem
- is SAP's **Messaging as a Service** and highly scalable
- comes stand-alone and as part of Extension Suite and Integration Suite
- 



# Thank you.

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