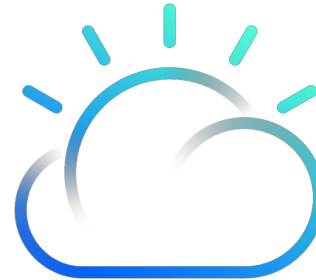


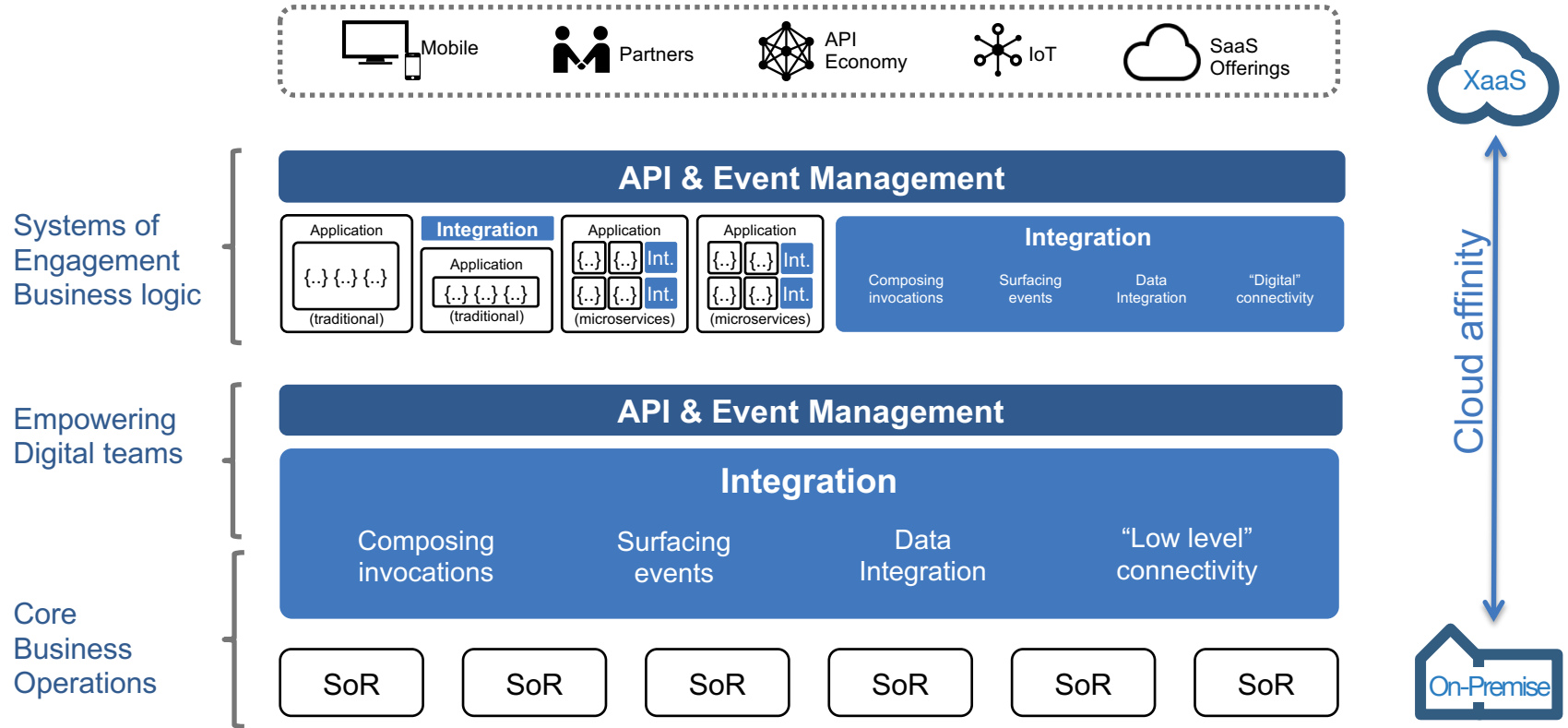
Hybrid Integration Architecture suitable for the Agile Enterprise

Ben Thompson
William Woodhead
IBM App Connect Enterprise, IBM UK Ltd.

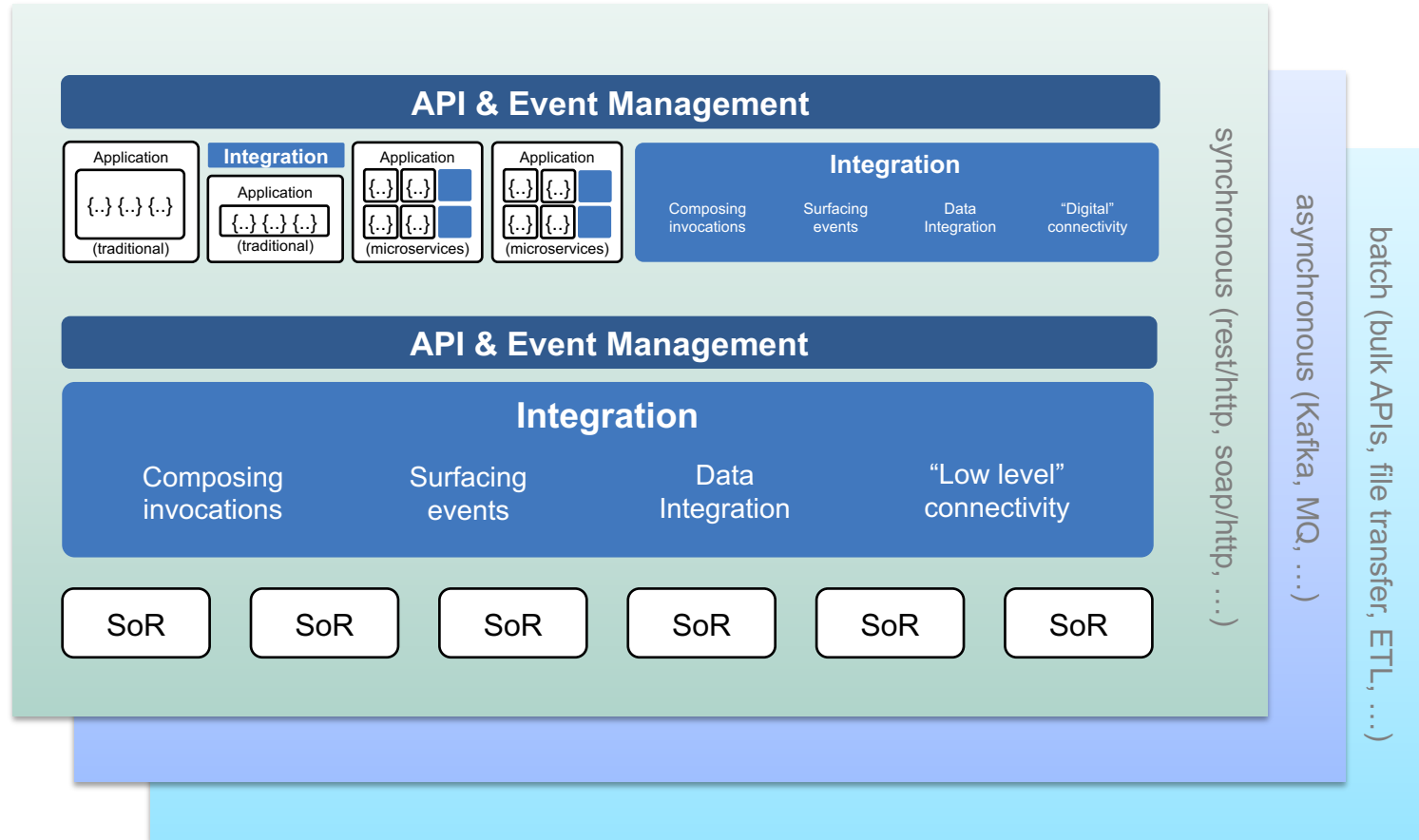
6th November 2018
Session JF



Hybrid Integration Reference Architecture for Digital Transformation



The integration architecture is reliant on *transport backplanes*



More than 70%
of companies
are already
leveraging cloud
to generate new
revenue streams
by:



Redefining
customer relationships

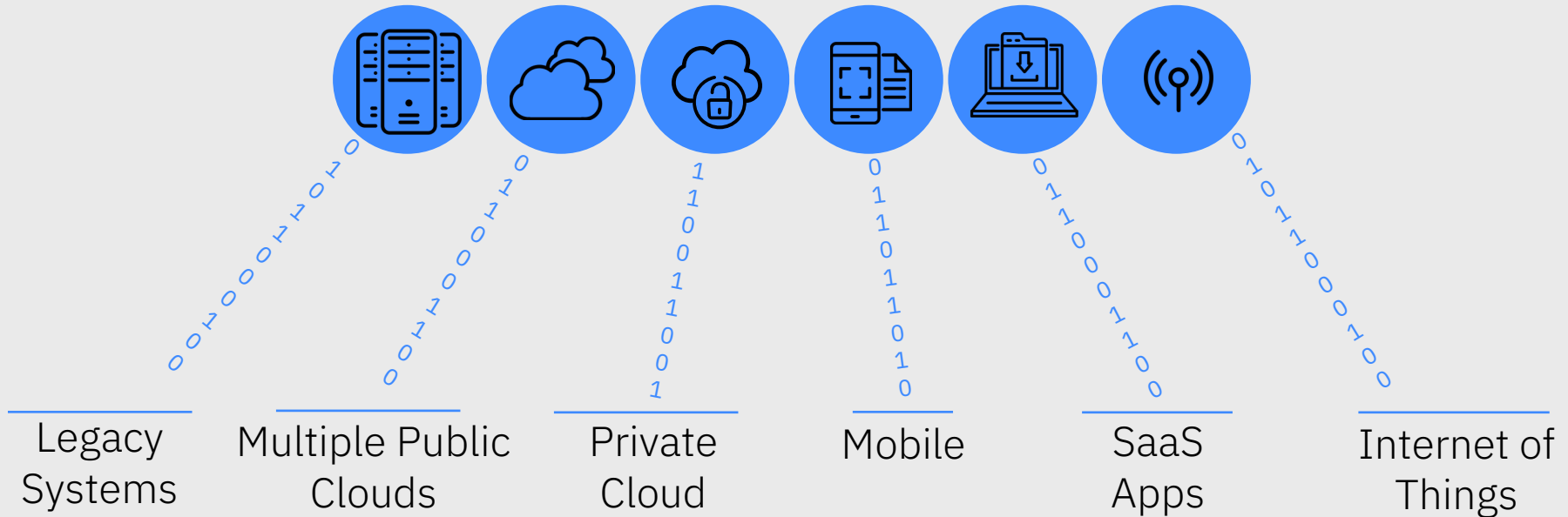


Developing cloud-enabled
products and services

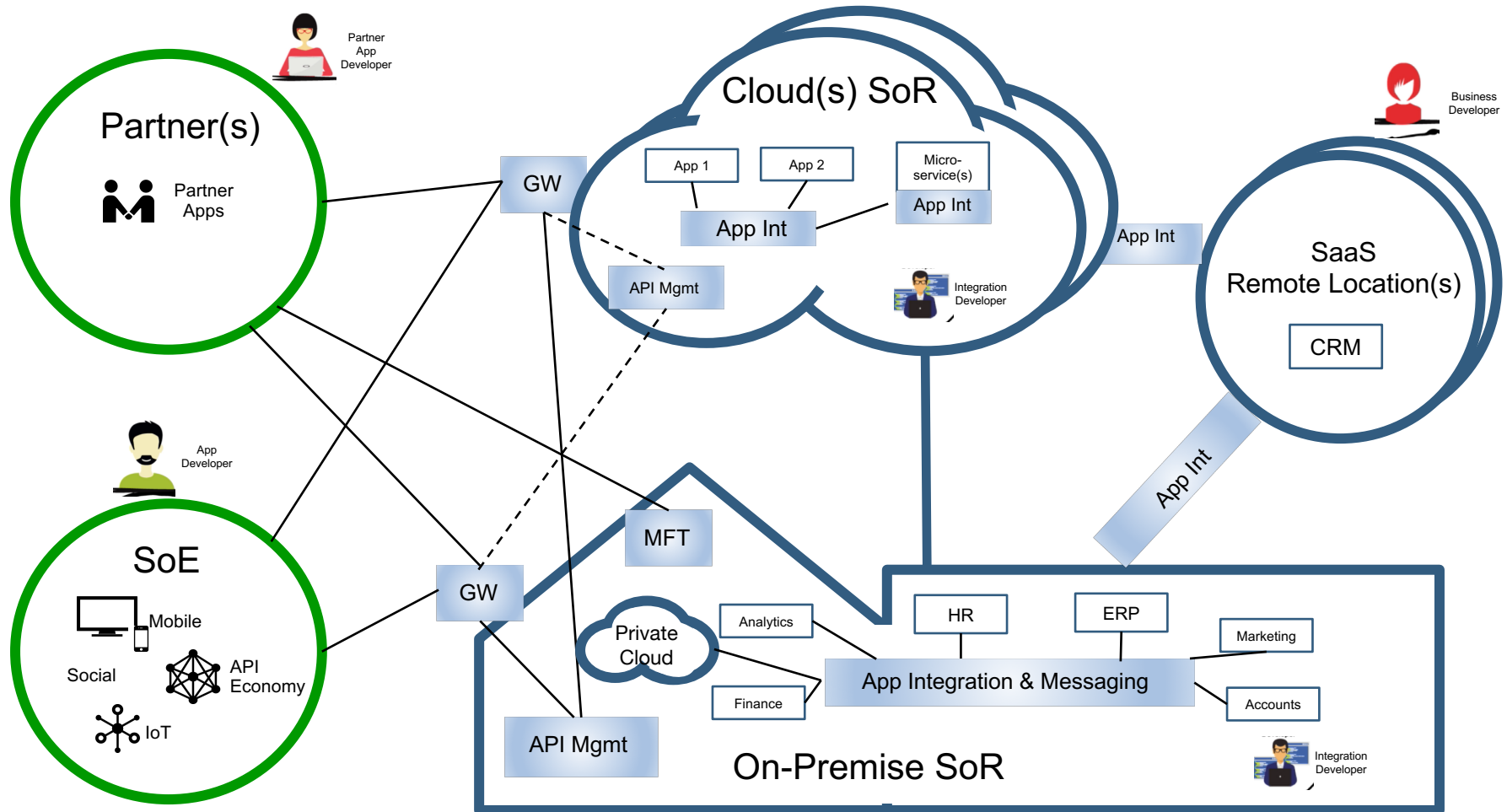


Expanding into new industries
and geographies

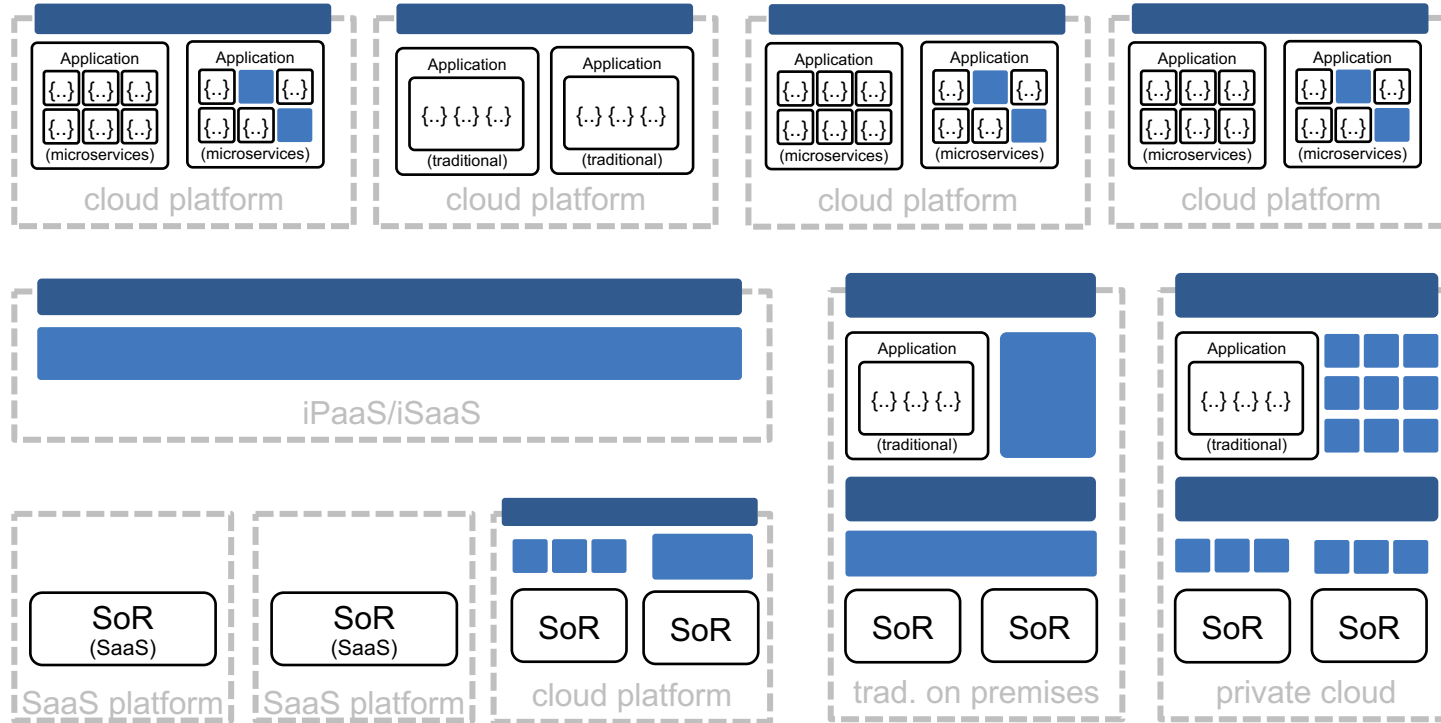
Digital Transformation and Cloud Adoption result in an ever increasing distribution of data



The Journey to Multi-cloud Integration



The multi-cloud challenge



Multi-cloud integration considerations

What are the multi-cloud challenges?

Scope of management

- self-managed pets
- platform managed cattle
- fully managed PaaS/SaaS

Ownership boundaries

- application boundaries
- between/within clouds
- different at each level
 - infrastructure
 - platform
 - software

Latency

- data location
- data replication close to consumer
- local data optimisation
- reducing layering, but retaining isolation and abstraction
- distance/bandwidth

Migration/modernization

- co-location and isolation of integration with its application
- lightweight topology choices
- granularity to enable movement
- lift/shift or refactor

Identity and access control

- choosing/bridging domains
- private, partner, public
- the implicit assumption of public

Portability

- cloud native principles
- orchestrated containerisation
- image based deploy
- write once deploy to any cloud
- Distributed deployment

SaaS integration

- cloud app connectivity
- business data aware connectors
- out of the box integration patterns

Decentralization

- federated management of runtimes and gateways
- simplifying cloud to ground hybrid solutions
- solutions spanning multiple clouds.

Data sovereignty/privacy

- Legislative information domains
- GDPR
- Encryption
- Archiving/deletion

Async. transport backbone

- messaging vs events
- event or log replication
- when/where to aggregat

Monitoring and operations

- viewing and diagnosing across boundaries
- Collation/aggregation of logs across and end to end solution

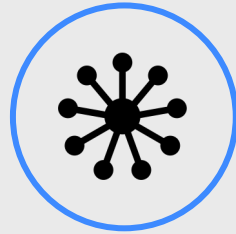
???

- ???

Common themes from discussions with our customers?



A single ESB may create bottlenecks in the organizations agility



Centralized control inhibits broader business innovation



SOA silos reduce general usefulness of application integration

Agile Integration Architecture

1

Fine-grained
integration
deployment

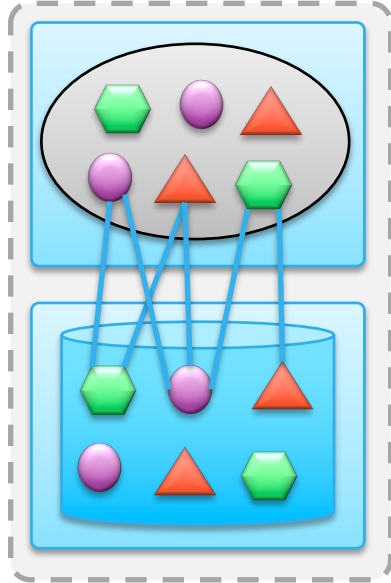
2

Decentralized
integration
ownership

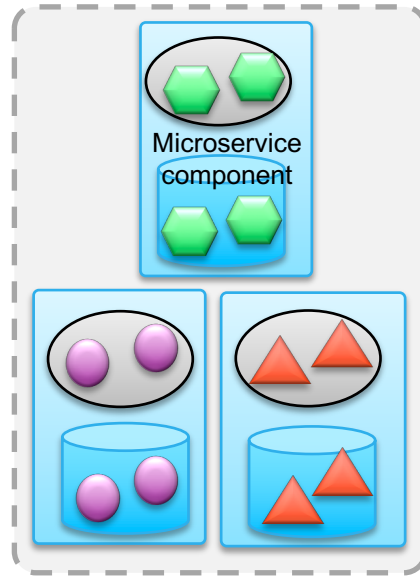
3

Cloud-native
integration
infrastructure

Monolithic Application



Microservices Application



Agility

Faster iteration cycles, bounded contexts, dedicated teams...

Scalability

Elastic scalability, workload orchestration, cloud infrastructure

Resilience

Minimized dependencies, discrete failover, fail fast, start fast

Considerations

Maturity

- Are you ready for a radical change in methods, skillsets, infrastructure, operations.
- Are you sufficiently automated (infrastructure, test, dev pipeline, deployment etc.)

Maintenance

- Will you be able to sustain the skillsets needed to maintain the microservices architecture in the future?

Latency & Serialization

- A request/response chained down a set of microservices must incur extra latency from network hops and serialization
- Serialization has advanced massively in recent years, but inevitably has some contribution to CPU usage

Data sharing

- Not all data can be split into neat independent functions. Some things are shared, and this needs careful design

Real-time dependencies and their combined availability

- Microservices calling other microservices synchronously need careful consideration
- Tends to creep, as one service builds on top of another
- Need to move to more complex message based techniques and/or introduce availability patterns such as circuit breaker

Manageability

- How do you manage and monitor a vast network of microservices
- How do you diagnose problems across a heavily distributed landscape

How does persistence work?

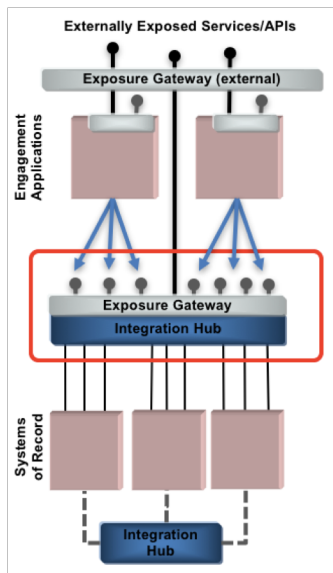
- Pessimistic versus Optimistic
- How to handle shared objects
- Relational / NoSQL
- ACID / BASE / CQRS / Event Sourcing?

Microservices in relation to integration

<http://ibm.biz/MicroservicesVsSoa>

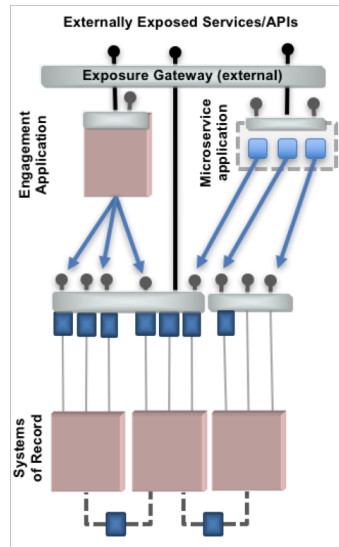
The fate of the ESB Pattern: Moving to agile integration

Centralized ESB



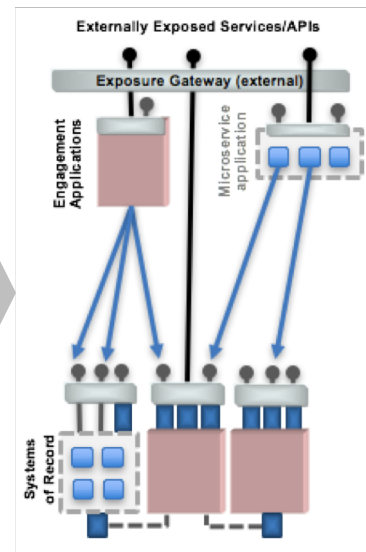
Containerization

Fine-grained integration deployment



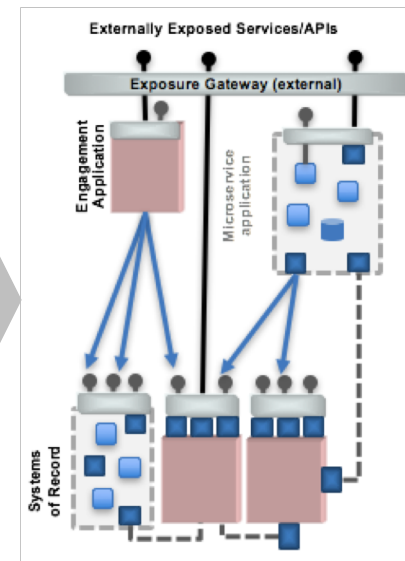
Application autonomy

Decentralized integration ownership



Polyglot runtimes

Cloud-native integration infrastructure



Part 1: The fate of the ESB

<http://ibm.biz/FateOfTheESBPaper>

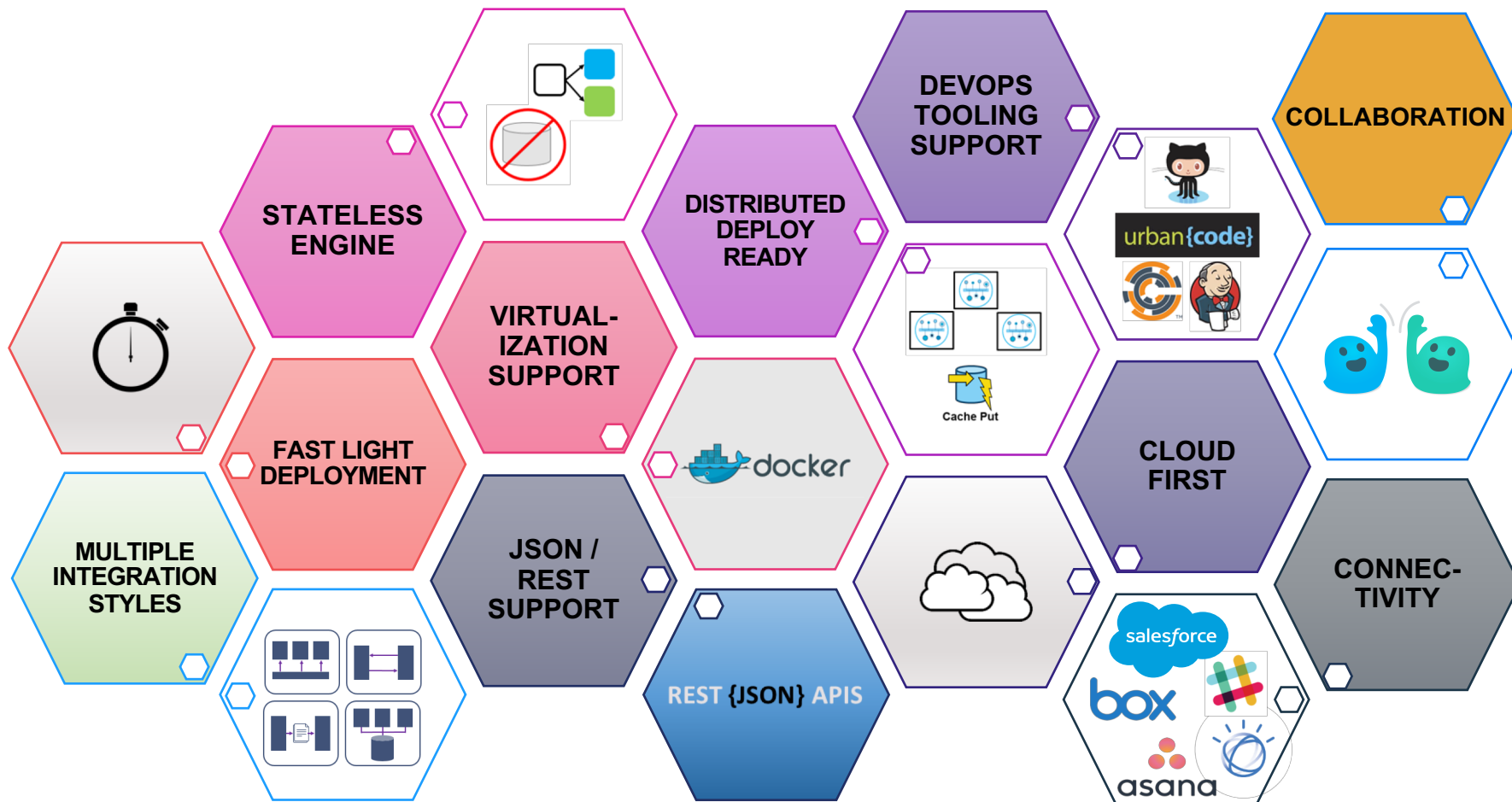
Part 2: Moving to lightweight, agile integration

<http://ibm.biz/AgileIntegArchPaper>

more material

<http://ibm.biz/AgileIntegArchLinks>

IBM App Connect Enterprise – An agile integration runtime



Agile Integration Architecture

1

Fine-grained
integration
deployment


2

Decentralized
integration
ownership

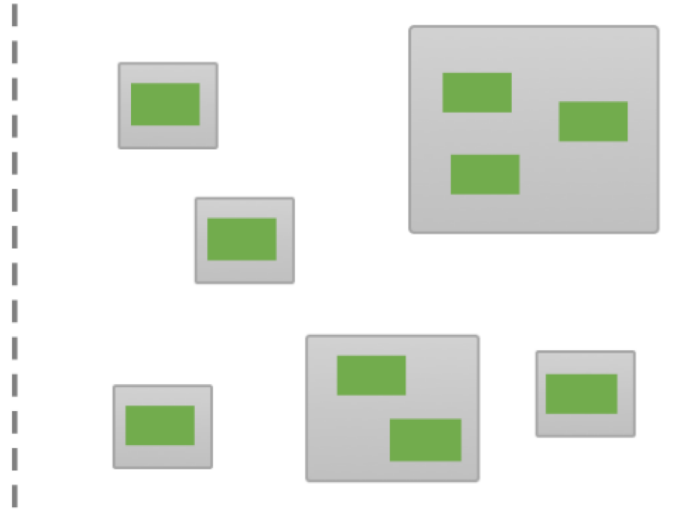
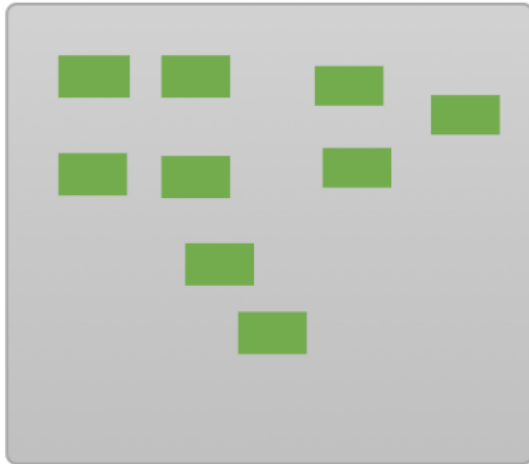
3

Cloud-native
integration
infrastructure

Deployment Granularity

 integration artefact

 integration runtime



- Agility
- Scalability
- Resiliency

Agile Integration Architecture

1

Fine-grained
integration
deployment

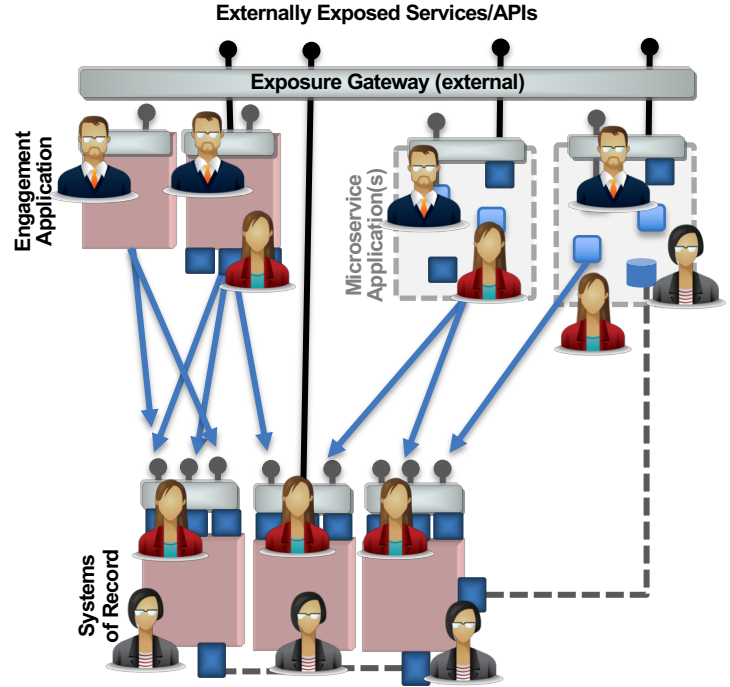
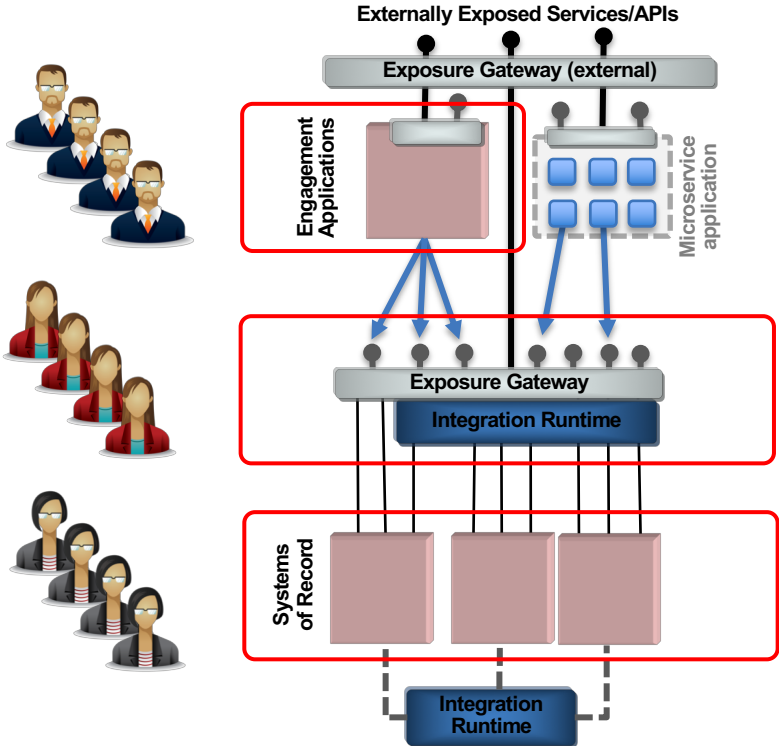
2

Decentralized
integration
ownership

3

Cloud-native
integration
infrastructure

The people aspect of decentralization



Agile Integration Architecture

1

Fine-grained
integration
deployment

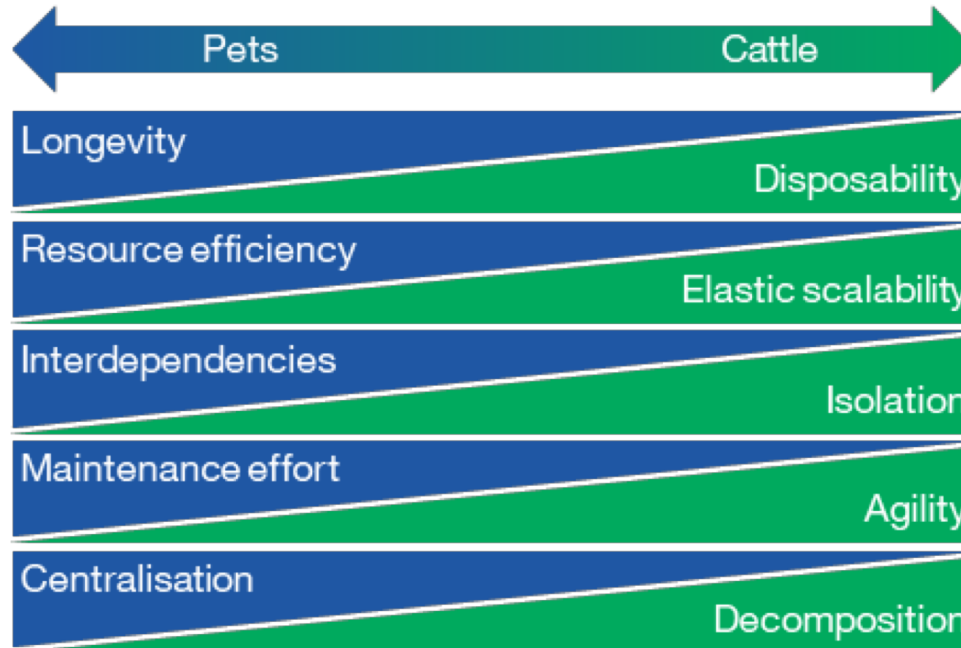
2

Decentralized
integration
ownership

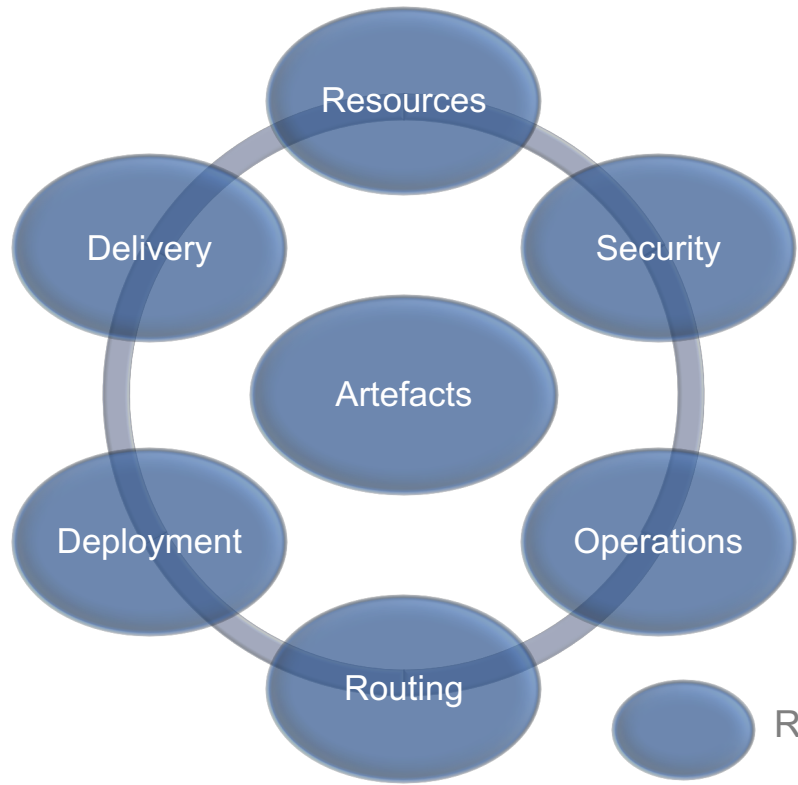
3

Cloud-native
integration
infrastructure

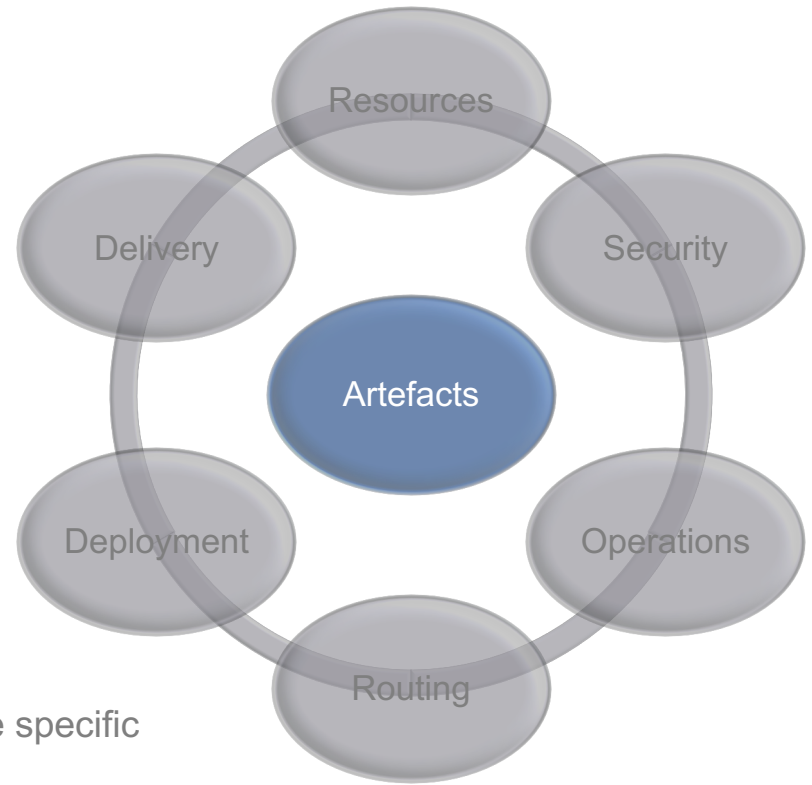
Cattle vs Pets



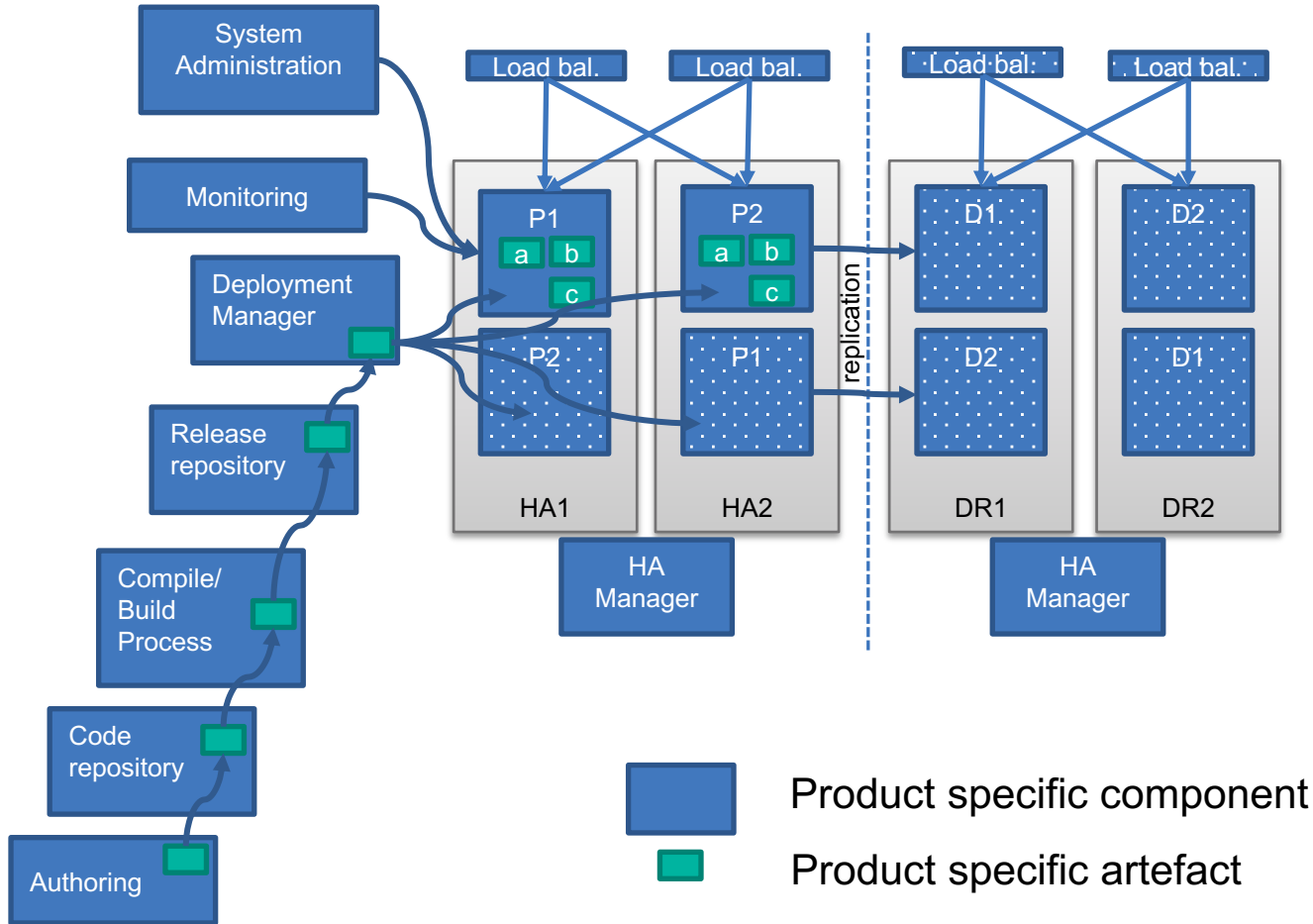
Traditional infrastructure (Pets)



Cloud native infrastructure (Cattle)



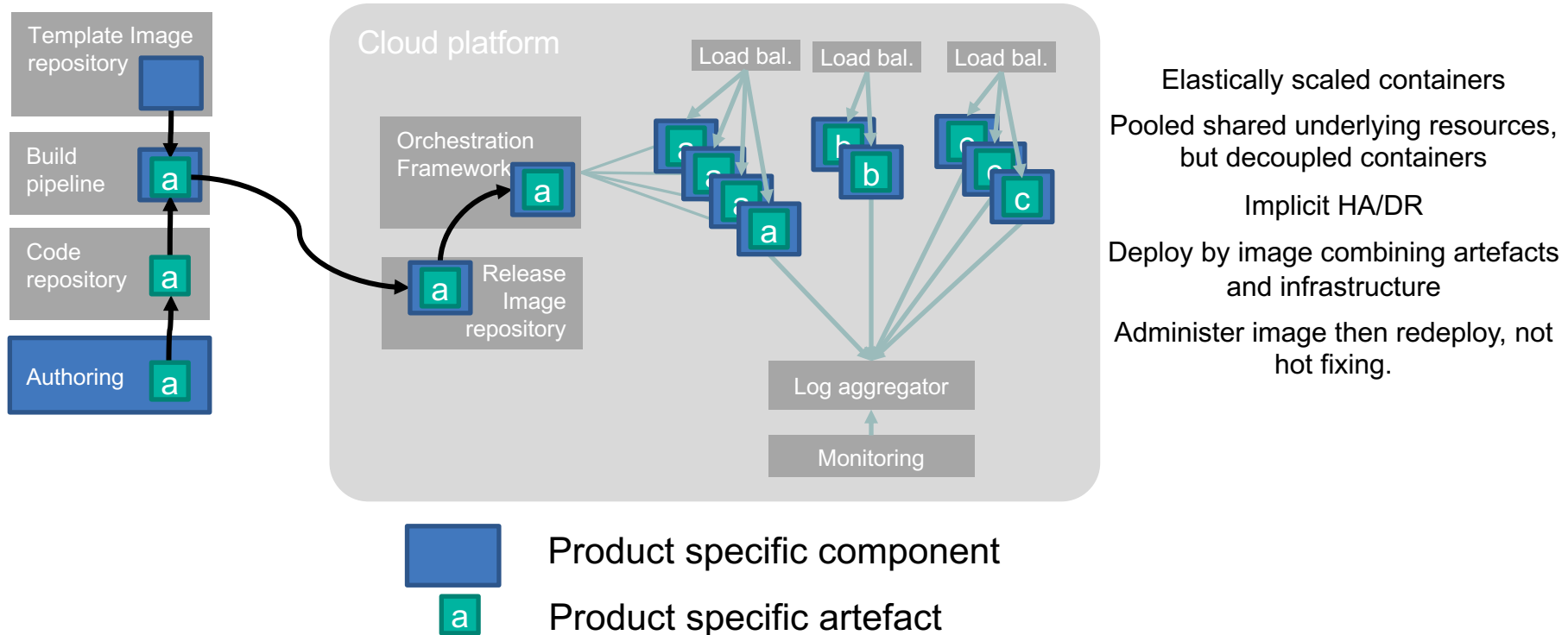
Challenges of traditional deployment topologies



Characteristics

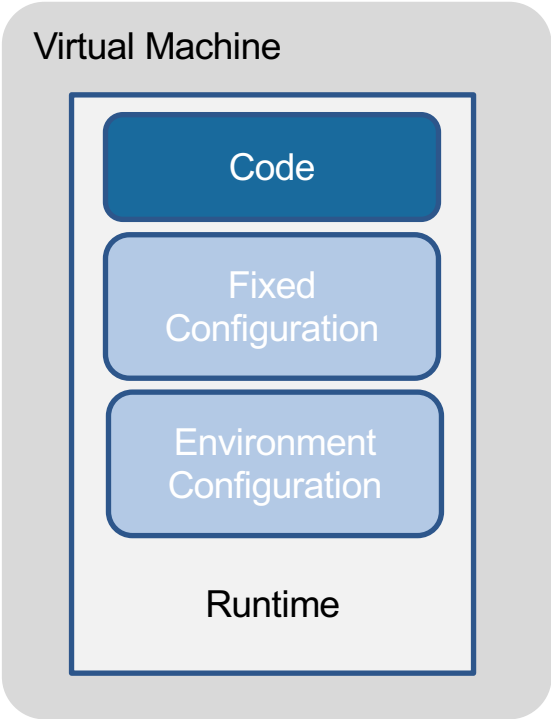
- HA pairs
- Scaling manual and vertical
- Defined nodes
- Explicit install and configure
- Explicit cold/warm HA & DR
- Peak CPU licensing
- Dedicated OS instances/HW
- Deploy to running shared servers
- Replication across DCs
- Administer live shared servers
- Code is only joined with the servers at deployment.

Simplicity and scaling benefits of cloud native platforms

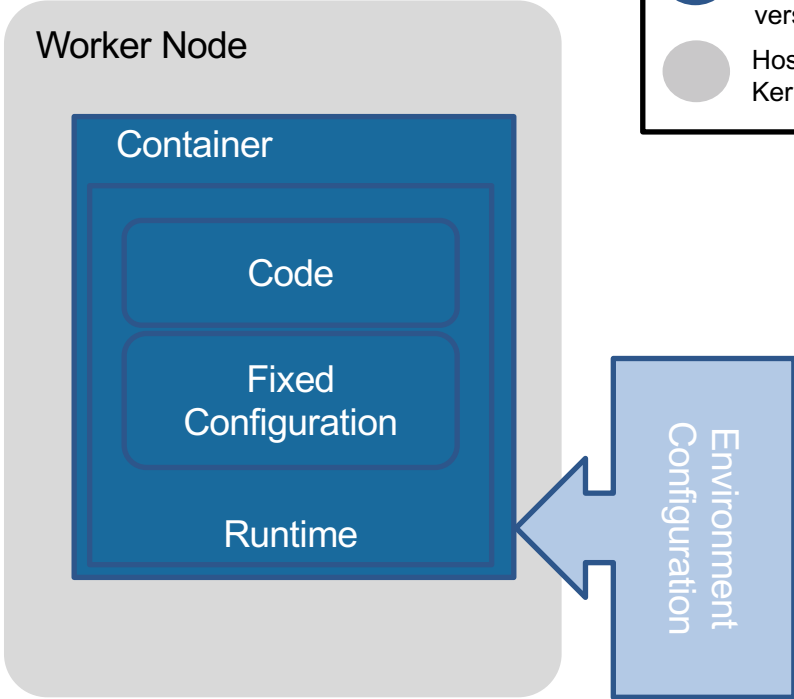


What Moves Per Release

- Created new for each new code version
- Remains same for each new code version
- Host – including Kernel



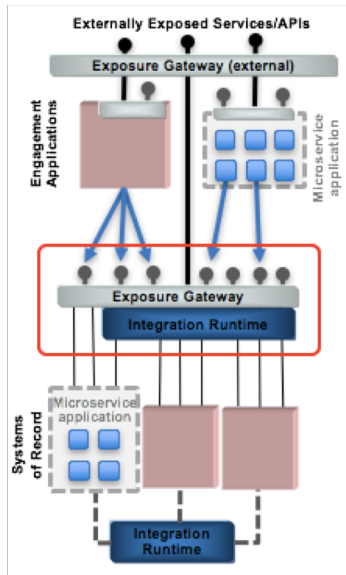
Pet



Cattle

3 core aspects of *agile integration architecture*

Centralized ESB

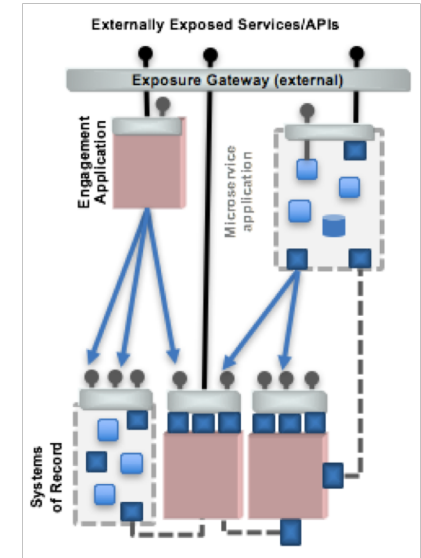


Fine-grained integration deployment
Breaking up integration into multiple, fully decoupled, independently deployable components
(Architecture & Design)

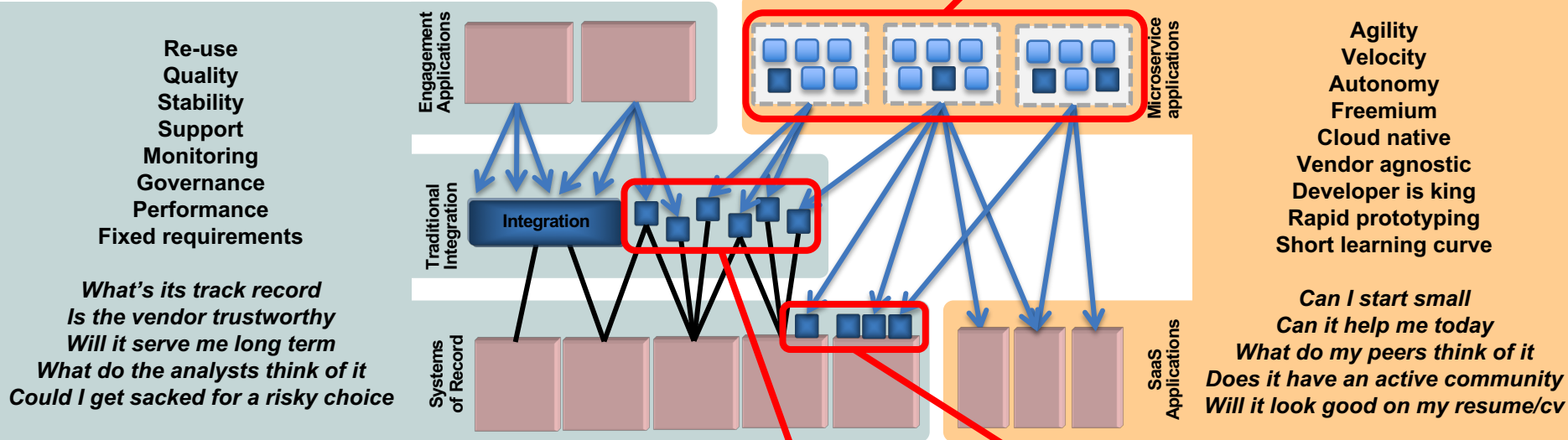
Decentralized integration ownership
Reducing centralized control, and providing autonomy to teams
(People & Process)

Cloud-native integration infrastructure
Standardized build, deployment, administration, orchestration, monitoring.
(Infrastructure & Technology)

Agile integration architecture



Varying priorities of agile integration architecture



- A. Fine-grained integration deployment
- B. Decentralized integration ownership
- C. Cloud-native integration infrastructure



App Connect Enterprise – there's more!



Extended Connectivity

- Expanded set of connectors across Cloud services, SaaS applications, Cloud platforms, and existing on-prem applications



Flexible integration styles

- Flexible support for the range of integration styles from APIs, Events, SOA and Batch through a simplified development experience



Collaboration across users

- Simple tooling for all styles of users that work together to expose, orchestrate, and curate data from enterprise systems

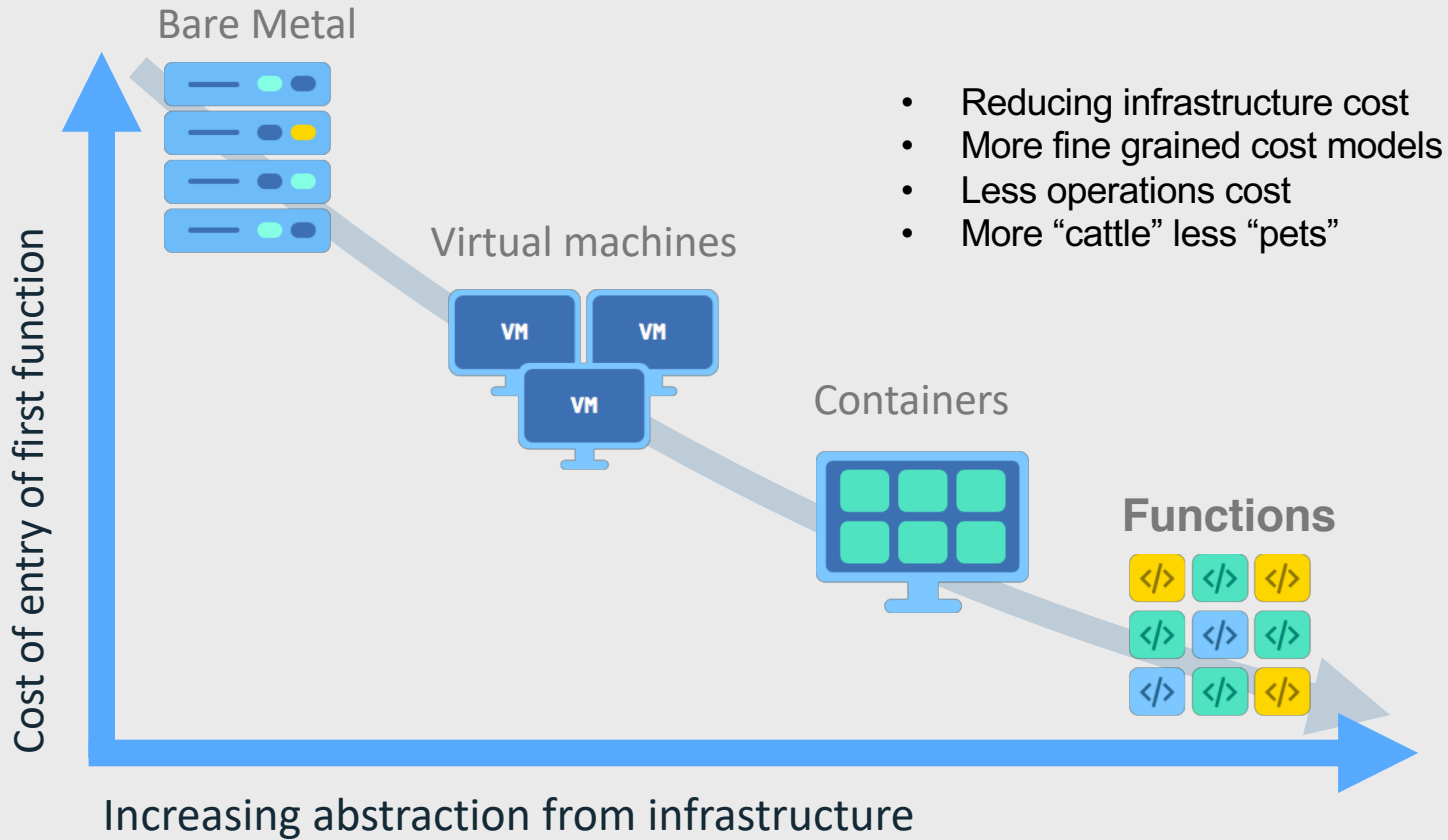


Containerized deployment and management

- Shrinks the engine size and makes the managing integration node optional so that an integration flows can participate in a microservices aligned cloud-native architecture



Focus of
agile integration architecture





User-appropriate tooling...



Automator

Event-driven &
data-prep
tooling

Anyone can do it, even without technical skills

- Zero code
- Cloud native
- Many pre- configured connectors

iSaaS (App Connect)



Integrator

Graphical flow
editors &
configuration

Technical person in a business environment

- Cloud native with on premises options
- Friendly modern style code
- Graphical options

iPaaS (App Connect)



Developer

API driven
coding
and
orchestration

Application developer

- Strong API capability and partnership with API Connect
- Intuitive interface for rapid, repeatable results

API Management



User-appropriate tooling...

in a single platform, eliminating the need for separate tools



Automator



Integrator



Developer

IBM App Connect Enterprise provides all the capabilities necessary to cater for the Automator and Integrator users. App Connect Enterprise users have a frictionless experience when engaging with Developers through first class integration with IBM API Connect.

Anyone can do it, even without technical skills

- Zero code
- Cloud native
- Many pre- configured connectors

Technical person in a business environment

- Cloud native with on premises options
- Friendly modern style code
- Graphical options

Skilled integration practitioners

- Graphical assist, but full code environment.
- Hybrid deployment
- Connect to anything

Application developer

- Strong API capability and partnership with API Connect
- Intuitive interface for rapid, repeatable results

IBM App Connect Enterprise

IBM API Connect

User-appropriate tooling...

to enhance productivity



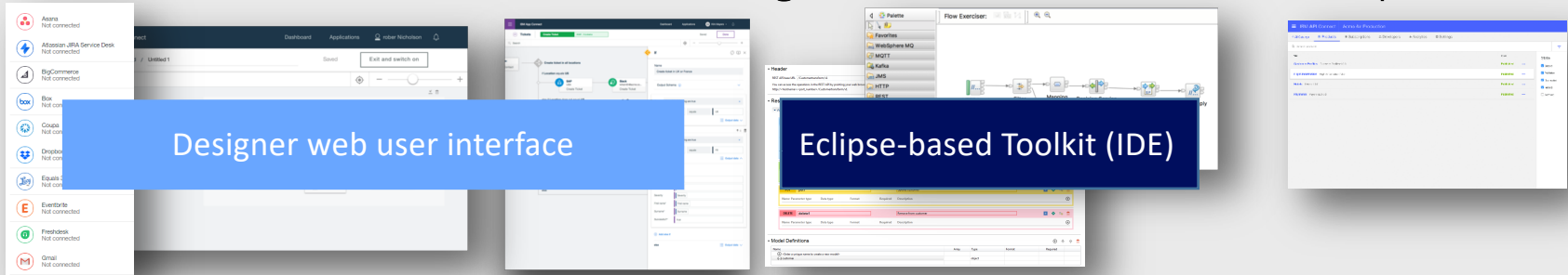
Automator



Integrator



Developer

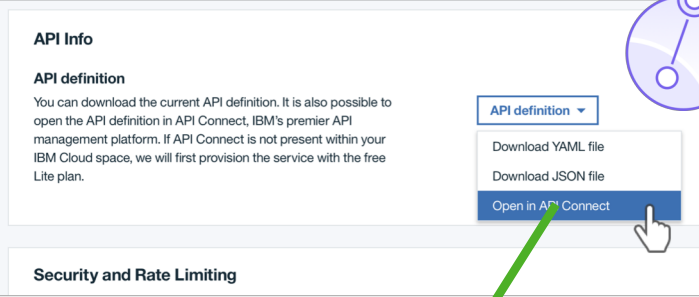


App Connect Enterprise enables a streamlined development experience:

- **Patterns and templates:** reuse your implementations and best practices reducing coding
- **Graphical Data Mapping** to reduce complexity in developing data transformation
- **Advanced Unit Testing** with data capture and replay for ease of troubleshooting
- **Choice of development languages** including Java and .Net Best solution for integrating with Windows applications and reusing .Net skills

Key Integration between App Connect and API Connect

Expose APIs in App Connect manage in API Connect



API Info

API definition

You can download the current API definition. It is also possible to open the API definition in API Connect, IBM's premier API management platform. If API Connect is not present within your IBM Cloud space, we will first provision the service with the free Lite plan.

API definition ▾

- Download YAML file
- Download JSON file
- Open in API Connect**

Security and Rate Limiting

Dashboard / leads Define Manage Saved Running

To get started, scroll down to 'Sharing Outside of Bluemix Organization' and click on 'Create API Key'. Copy the 'API KEY' and then click on the 'API PORTAL LINK' link. You can explore your API in the portal and invoke it by clicking on 'Try it'.

API name	Route
leads-rf67y	https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/15e11339605890c4a0d08c90e63d4aa98992868443285391a...

Rate Limit
None

Security
API key

Sharing
Not shared with Bluemix organization
0 Keys
Not shared with other users
0 Keys



Analytics and Logging Last updated: 9:31 AM

0 0

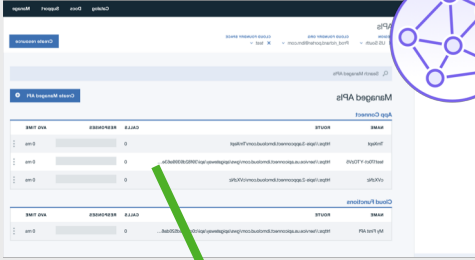
RESPONSES AVG RESPONSE TIME

9:31 7:32 7:42 7:53 8:04 8:15 8:26 8:31

API CALLS PER MINUTE

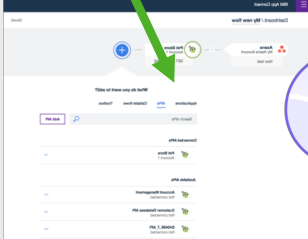
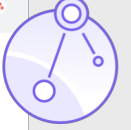



Consume API in App Connect from API Connect catalog



API Catalog

API ID	API Name	API Type	API Status	API Owner	API Description
api-0	bluemix	API	Running	bluemix	bluemix API
api-1	bluemix	API	Running	bluemix	bluemix API
api-2	bluemix	API	Running	bluemix	bluemix API



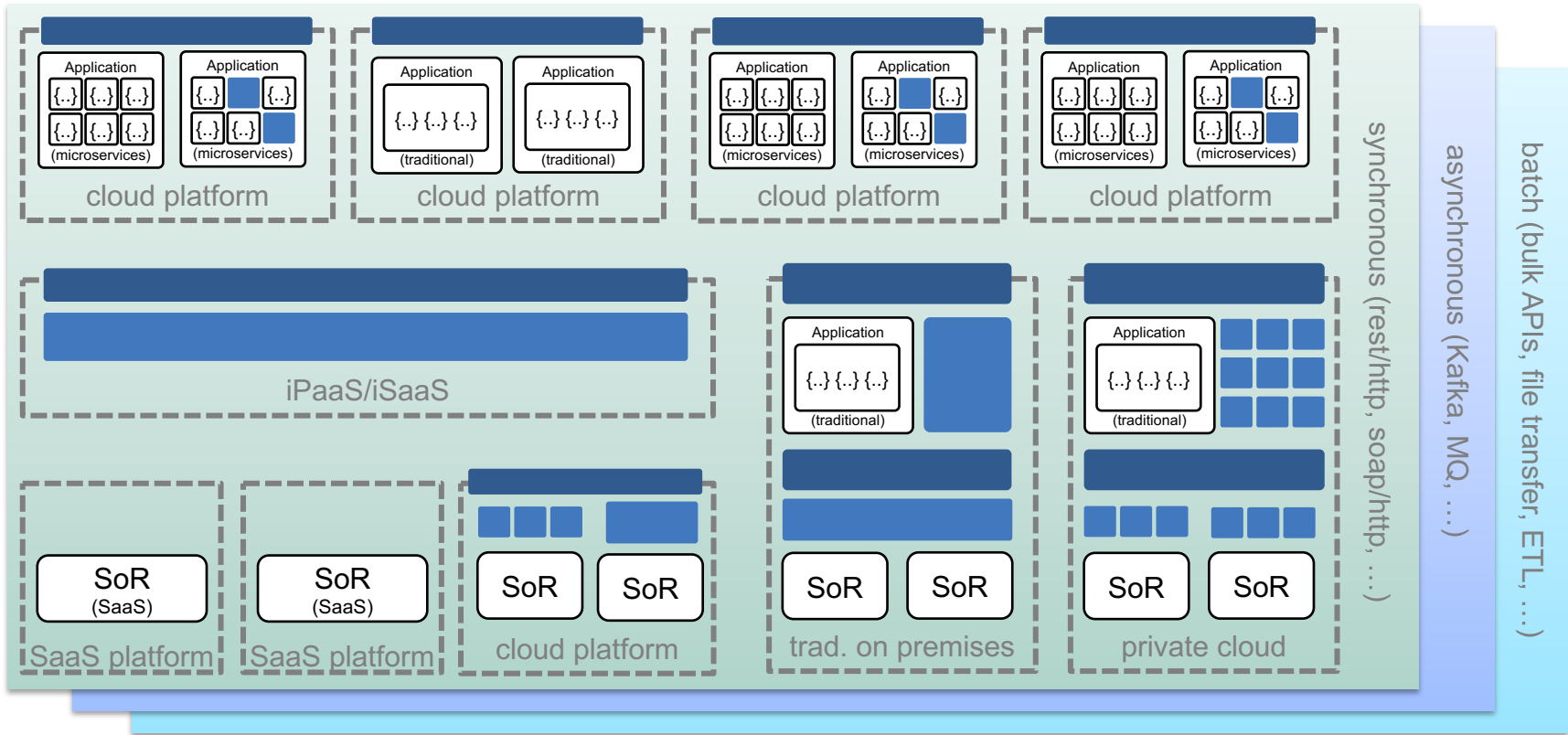
API Catalog

API Name	API Type	API Status	API Owner	API Description
bluemix	API	Running	bluemix	bluemix API
bluemix	API	Running	bluemix	bluemix API
bluemix	API	Running	bluemix	bluemix API

App Connect “Designer” – examples of key advances

- Rich, powerful yet simplistic of mapping based on open source
- Intelligent connectors – meta data aware, business object familiarity
- Open API & SOAP WSDL based connectivity
- Model driven API creation – embedded common practice
- Native access to API catalog and callable flows
- Multi pattern support – API, event, bulk
- Full integration with “enterprise” capabilities eg XML Parse and Write
- Nodes for cognitive actions

The multi-cloud challenge



IBM Cloud Integration – One Platform for All Integration Needs

IBM Cloud

Catalog Docs Log In Sign Up

IBM Cloud Integration

Simple. Fast. Secure.

A complete integration platform with unmatched end-to-end capabilities and enterprise grade security.

Try free



API lifecycle
Unlock business data and assets as APIs



Application integration
Connect cloud and on-prem applications and data



Enterprise messaging
Deliver relevant data at speed and scale



Data integration
Understand, cleanse, transform, and deliver quality data



Secure access
Control who uses your vital resources wherever they are



High speed transfer
Super fast and secure data transport across any cloud

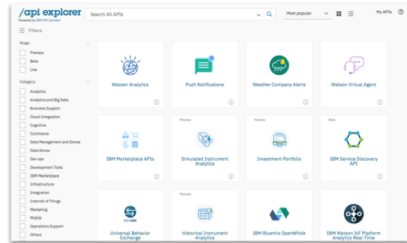
API lifecycle

Create, secure, manage, socialize, monetize and analyze your APIs

- Secure, control and accelerate delivery of your APIs with IBM DataPower Gateway.
- Engage developers via API socialization on your branded, self-service developer portal
- Gain insights and capture new revenue sources through built-in analytics and monetization capabilities

Try free

Learn more



We want your feedback!

- Please submit your feedback online at
 - <http://conferences.gse.org.uk/2018/feedback/JF>
- Paper feedback forms are also available from the Chair person
- This session is JF

