IBM MQ – Choose where and how to deploy your secure, reliable and scalable enterprise messaging

Leif Davidsen

Senior Offering Manager – IBM Messaging. IBM Hursley Lab
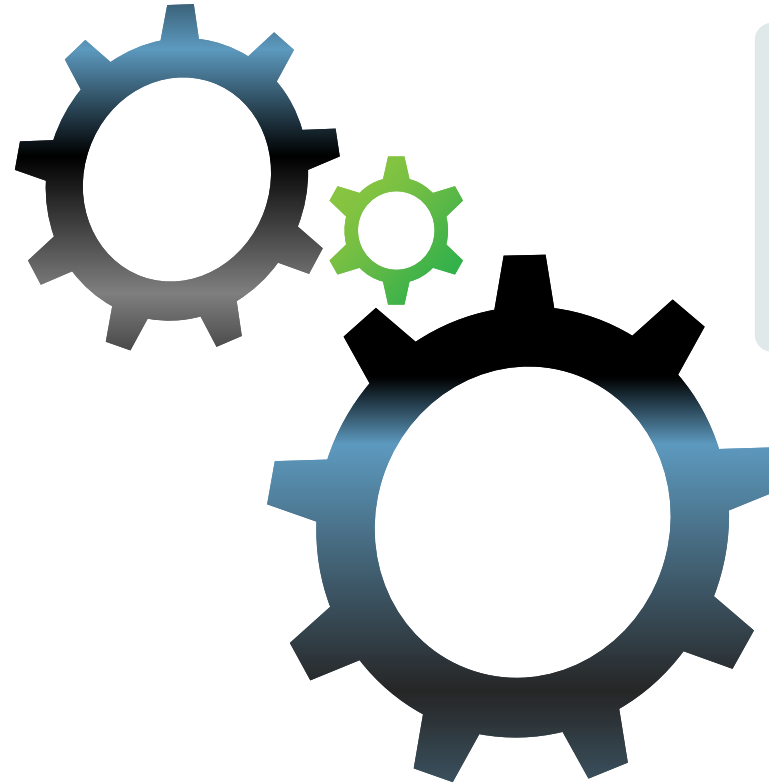
Leif_Davidsen@uk.ibm.com

Digital Transformation = Many Modes of IT

Digital teams

Digital Ecosystem

Speed & Agility

Speed and agility to drive innovation and growth
- Explore, adopt, adapt
- Rapid, Iterative prototypes

Reliability, security and scalability for Business Critical systems
- Always on, always available
- Security, control and governance

Core Enterprise

Enterprise IT teams

Integration & Scale

Hybrid Messaging

Digital IT

Enterprise IT

Cloud

Cloud

Message Hub
(Based on Apache Kakfa)

MQ Light API   Kafka API   REST API

docker
SOFTLAYER
Microsoft Azure
amazon web services™
PureApplication

IBM MQ

IBM MQ Appliance

Enterprise Messaging & Integration

MQ Light API   MQ Client   MQ Explorer
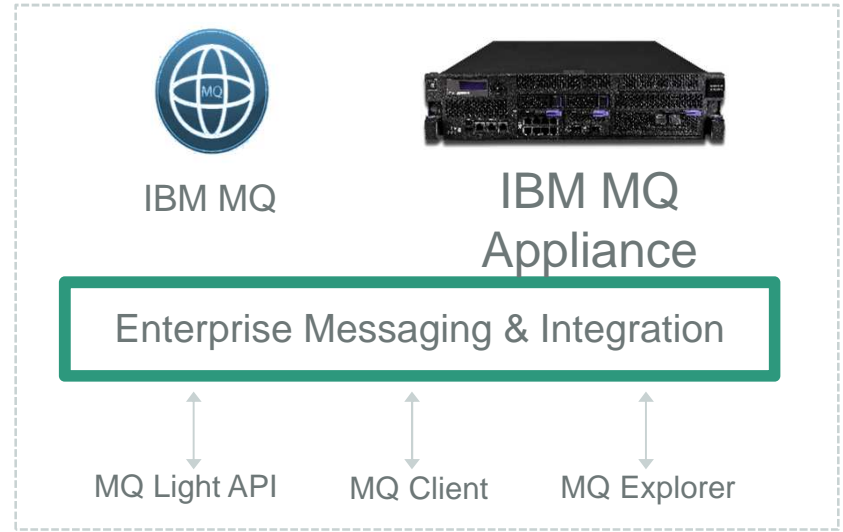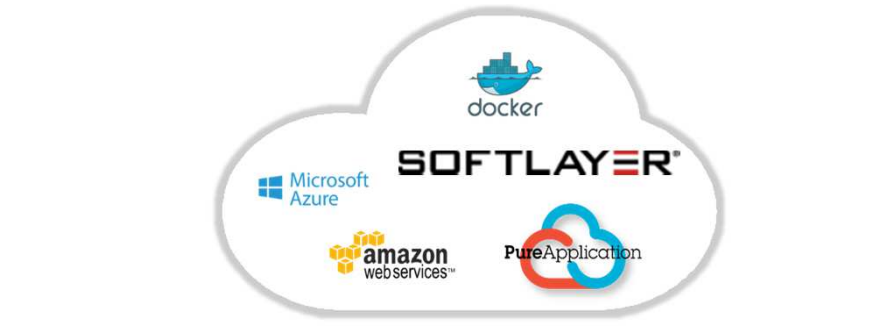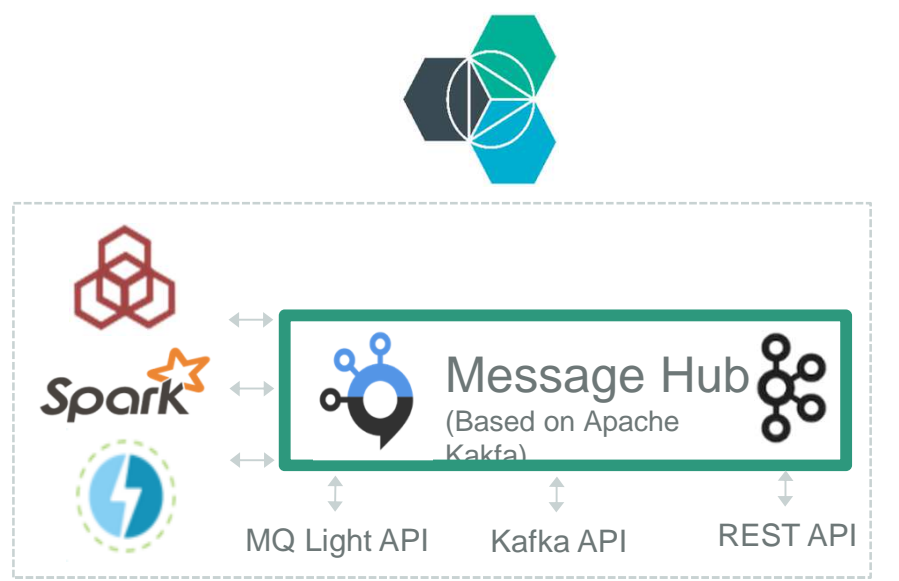
Bluemix Public ✔

Bluemix Dedicated ✔
(Announced, GA March)

Bluemix Local
(Coming soon)

IBM Message Connect

MQ Light API

On-Prem

On-Prem

Growth in IBM Messaging Deployment Choices

	2011	2012	2013	2014	2015	2016
Individual Software Deployment	MQ V7.1	MQ V7.5	MQ 7.5	MQ V8	MQ V8	MQ V8
Integrated Software Deployment		MQ V7.5 Advanced	MQ V7.5 Advanced	MQ V8 Advanced	MQ V8 Advanced MQ V8 Advanced pattern for Pure	MQ V8 Advanced MQ V8 Advanced pattern for Pure
Cloud/aaS deployment	MQ V7.0.1 HVE	MQ V7.5 HVE	MQ V7.5 HVE	MQ V7.5 HVE MQ Light Service on Bluemix	MQ & MQ Light on Docker MQ on Azure, AWS, SoftLayer Message Hub	MQ on Docker MQ on Azure, AWS, SoftLayer Message Hub
Developer focused deployment			MQ Advanced for Developers	MQ Light MQ Advanced for Developers	MQ Light MQ Advanced for Developers	MQ Light MQ Advanced for Developers
Appliance Deployment					MQ Appliance	MQ Appliance

About IBM MQ

- **Provides versatile messaging integration**, from mainframe to mobile, in a single robust messaging backbone.

- **Connects virtually any commercial IT system,** with support for more than 80 platforms.

- **Shields application developers from networking complexities, enabling them to develop and deploy new applications faster.**

- **Includes administrative features** that simplify messaging management and reduce time spent using complex tools.

- **Offers a range of Qualities of Service (QoS).**

Universal ← → **messaging**

IBM Messaging

Open   Flexible

Scalable   Robust

| Any Skills	Any End-Points	Right QoS	Any Deployments
Languages *COBOL, C/C++, RPC Java, JEE, JMS .NET, C#, VB, WCF AJAX, Perl, Python…*	**Vendor Platforms** *JEE, .NET, etc*	Transactional	Client-Server
	Operating Systems	Guaranteed	Backbone
	Exploitation & Support	Persistent	Point-to-Point
	Applications	At-Most-Once	Peer-to-Peer
Orientations *Services Batches Files Messages Resources…*	*SAP, Siebel, etc…*	Replay	Publish/Subscribe
	Devices *Mobile, Wireless, PoS, Sensor, Actuator, RFID…*	At-least-once	Grid
		Best-Effort	Bus
Mindsets *WSDL, XML, WS-* REST, MEST, KISS*	**Web services** *SOAP, WSDL, SOAP/JMS*	Fire-and-Forget	Multicast
	Web 2.0 *HTTP, AJAX, REST,…*	Request-Reply	Unicast
	Appliances	Fastest speed	Appliance
		Lowest Latency	Cloud

What makes IBM MQ Advanced different?

IBM MQ Advanced is a part that provides entitlement to **IBM MQ Server, Managed File Transfer Service, Advanced Message Security, and Telemetry**:

- Buy a **single part at a single price** (per PVU) for all the distributed server capabilities.

IBM MQ Advanced makes it easier for clients to buy and deploy all the IBM MQ distributed server capabilities they need within a single purchase.

- IBM MQ Advanced for Developers is also available specifically for development use only

IBM MQ Advanced

MQ

MFT Service

AMS

Telemetry
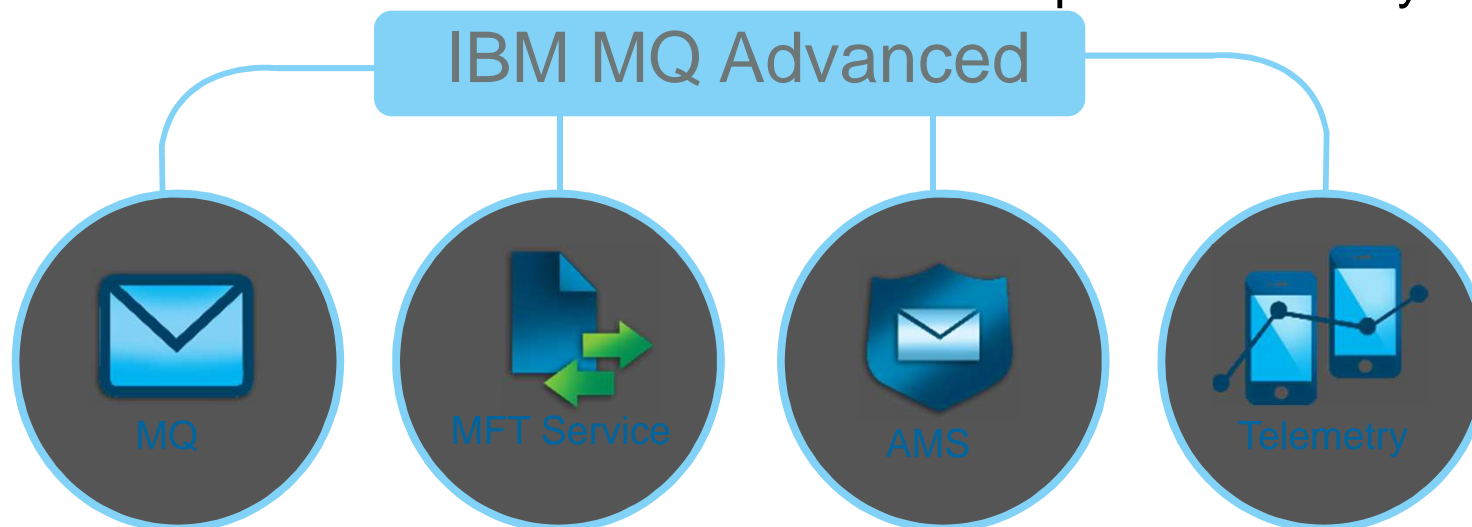
Where does Advanced Message Security fit in?

- IBM MQ has many built in security features:

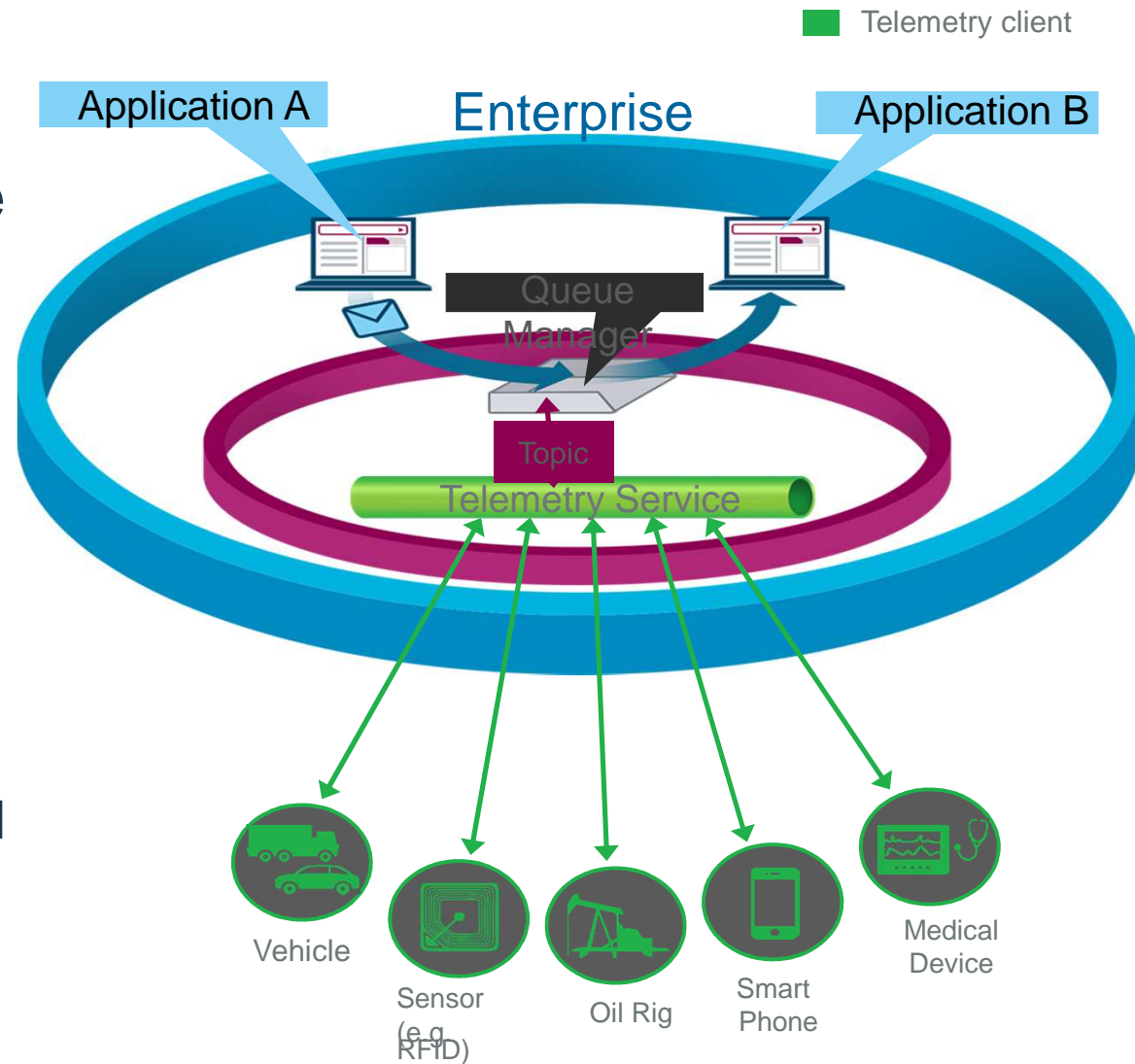- Use IBM MQ Advanced Message Security (AMS) to **guarantee the privacy of message contents**

- End-to-end data **encryption**

- Protects business and customer data from exposure if systems breached

- Demonstrates awareness of security risks and takes action to avoid impact

Application A

Application B

IBM MQ system

Channels

Queue Manager

Queue Manager
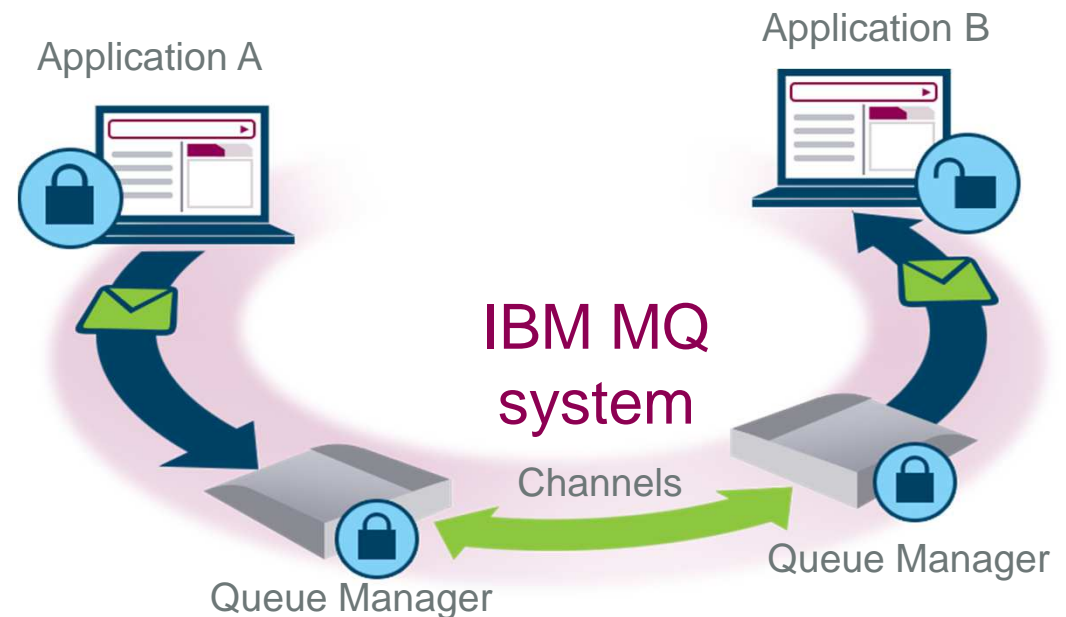
Where does Telemetry fit in?

- **Real-time access for enterprise applications to connect to a range of mobile devices, remote sensors, actuators etc.**

- **IBM MQ Telemetry includes the following key components:**

  - The **Telemetry service** that runs on the IBM MQ server

  - MQ **Telemetry clients** that are distributed to remote devices and applications

- **MQ Telemetry uses the open standard MQTT protocol.**

- **Ideal to connect devices within the enterprise**

Telemetry client

Application A

Enterprise

Application B

Queue Manager

Topic

Telemetry Service

Vehicle

Sensor (e.g. RFID)

Oil Rig

Smart Phone

Medical Device

8

Where does Managed File Transfer fit in?

- Bringing Managed File Transfer to IBM MQ – file data is moved as MQ messages. Available as 2 chargeable components: MFT Agent and MFT Service. Available separately, and MFT Service is included in MQ Advanced

- An MFT Agent performs the fundamental file transfer function of sending and receiving files from the local system.

- MFT Service installs a file transfer agent on a MQ server with additional capabilities

- MQ MFT supports file-to-file movement, but also file-to-message, and message-to-file

- An MQ Explorer integrated GUI or command-line is used to configure and administer MFT.

Application A   Application B

MFT Agent   MFT Agent

Channels

MQ network

Logging component
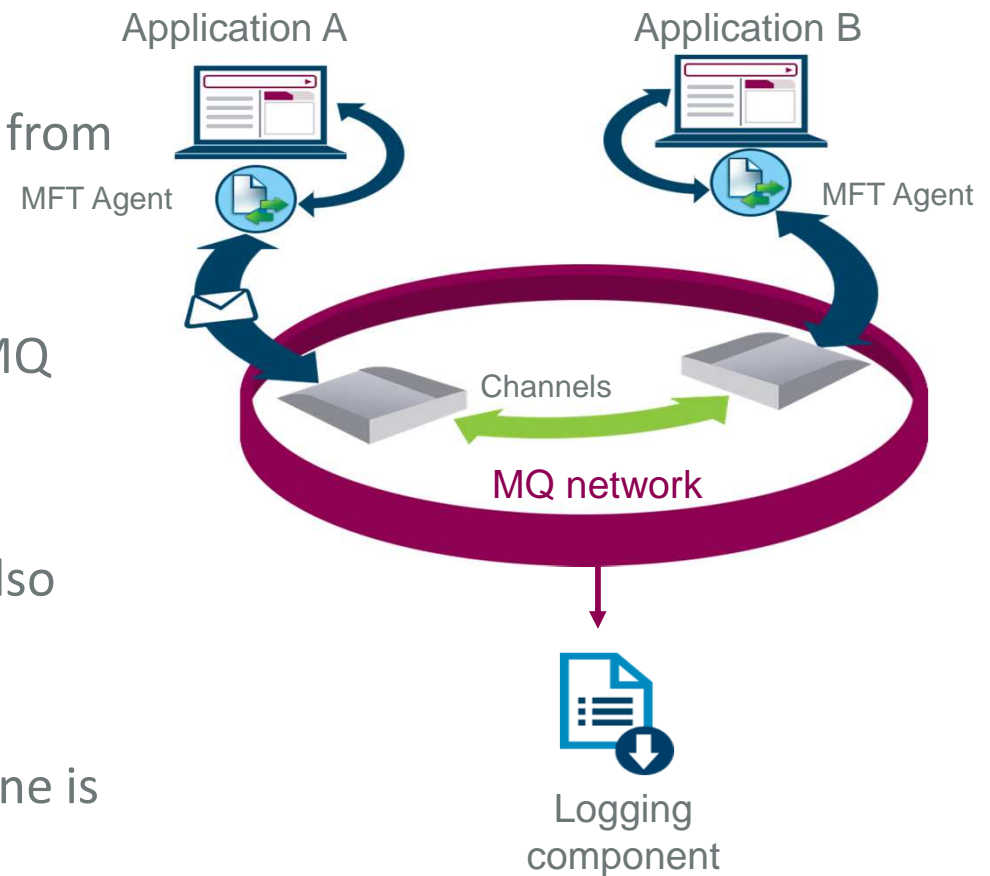
IBM MQ V8

IBM MQ V8 delivering best in class enterprise messaging

Platforms & Standards	Security	Scalability	System z exploitation
64-bit for all platforms	Userid authentication via OS & LDAP	Multiplexed client performance	64-bit buffer pools in MQ for z/OS means less paging, more performance
Multiple Cluster Transmit Queue on all platforms	User-based authorisation for Unix	Queue manager vertical scaling	Performance and capacity
Support for JMS 2.0	AMS for IBM i & z/OS	Publish/Subscribe improvements	Performance enhancements for IBM Information Replicator (QRep)
Improved support for .Net and WCF	DNS Hostnames in CHLAUTH records	Routed publish/subscribe	Exploit zEDC compression accelerator
SHA-2 for z, i & NSS	Multiple certificates per queue		SMF and shared queue enhancements

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- Availability:
  - May 2014 (eGA Distributed)
  - June 2014 (z/OS and pGA Distributed)

- FixPack 4 on Distributed platforms now available

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– Aligned MQ across its distributed platforms, and z/OS

– 64-bit server support for all queue manager platforms

– New MQ platform, Power Linux little-endian

Statement of Direction for MQ V8 on HP NonStop

IBM MQ V8 delivering best in class enterprise messaging

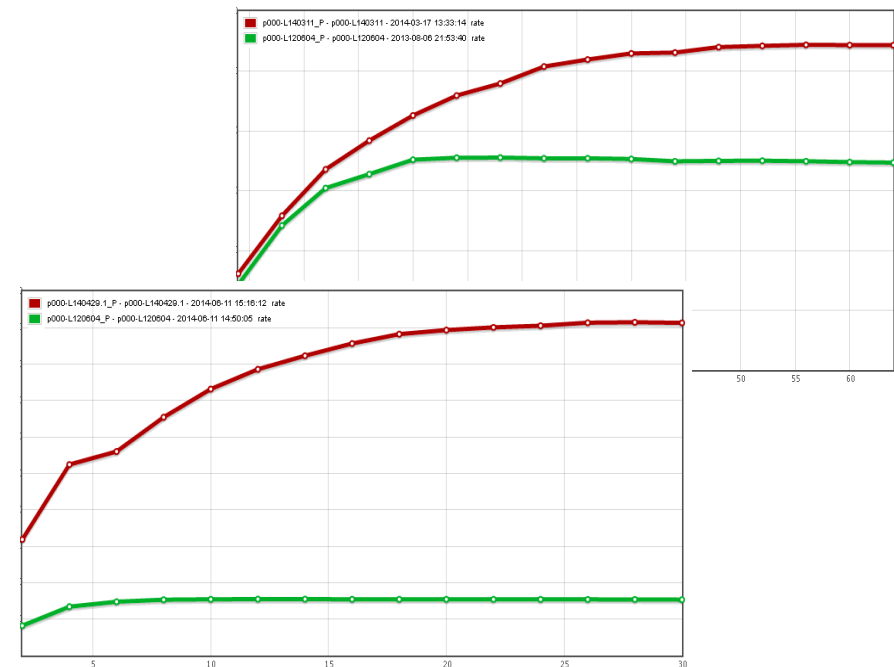| Platforms & Standards	Security	Scalability	System z exploitation
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- Long-awaited update from the JMS 1.1 standard

- New Messaging Features
  - Delivery Delay
  - Asynchronous Send
  - Subscriptions can be shared across a messaging provider

- API improvements

IBM MQ V8 delivering best in class enterprise messaging

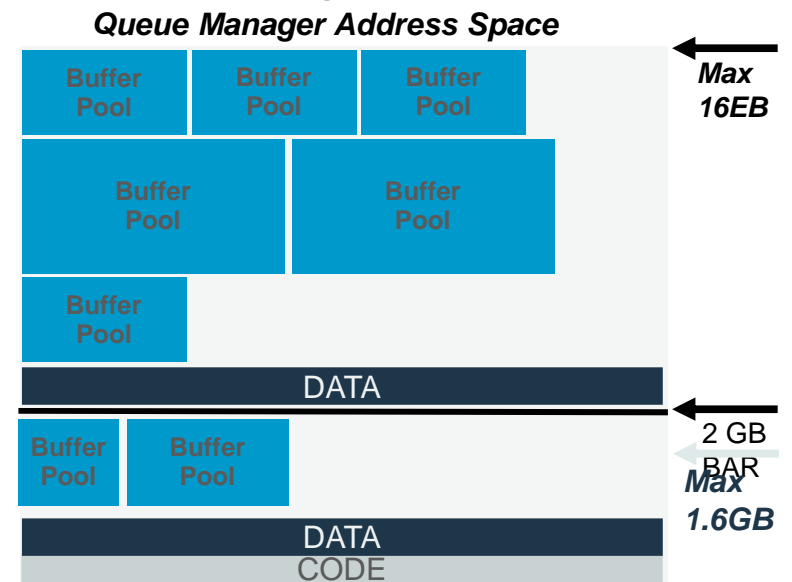| Platforms & Standards	Security	Scalability	System z exploitation
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- Is the application who they say they are?
- The ability to require a connecting application to provide a **userid** and **password**
- Authentication against **OS** or **LDAP** user repositories

IBM MQ V8 delivering best in class enterprise messaging

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- – Enhanced vertical scaling for distributed queue managers
  - Less targeted at internal benchmarks, favouring more *realistic* scenarios

IBM MQ V8 delivering best in class enterprise messaging

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- 64-bit address space available for buffer pools
  - Each buffer pool can be much larger
- Number of buffer pools can match page sets

Queue Manager Address Space

Buffer Pool · Buffer Pool · Buffer Pool · Buffer Pool · Buffer Pool · Buffer Pool · DATA · Buffer Pool · Buffer Pool · DATA · CODE

Max 16EB

2 GB BAR

Max 1.6GB

…and since MQ V8

Incremental features

MQ V8 is on its fourth fixpack

These have contained more than just fixes…

Distributed Fixpack 2

– **Built on the new LDAP features in MQ V8 to support authority records for LDAP users and groups**

  • No need to define OS users/groups for applications

  • Supported for Unix, Linux and IBM i

– **Activity trace data extended to include microsecond call durations**

Distributed Fixpack 3

– **Support for authentication via PAM on Unix platforms**

  • Configure authentication to go via PAM modules

  • Gives more flexibility in mechanisms for verification and account validation

– **Protection against SSL security vulnerabilities**

  • This was the time of Heartbleed, POODLE, BEAST, FREAK, Bar Mitzvah, LogJam, …

  • Before V8.0.0.3, **44** different CipherSpecs to choose from

  • With V8.0.0.3, subset of just **17** CipherSpecs

Includes z/OS

– **Extended start events**

  • Allows system monitoring applications to see when a multi-instance queue manager has failed over and where it is now running

Distributed Fixpack 4

- **Capped message expiry**
  - Administratively impose minimum expiries
  - Applies to queues and topics

Includes z/OS

- **Redistributable clients**
  - Simple tar/zip image for Windows and Linux
  - Permitted to embed clients with applications

- **Security change configuration events**
  - Coverage for all security changes
  - Includes new event formatting sample

- **Obfuscation of database passwords**
  - Queue manager configuration for connecting to resource managers

Enhanced Java SE support for MQ JMS on z/OS

– CICS Transaction Server

- MQ JMS applications in a CICS OSGi JVM server
- CICS TS V5.2+/V5.3
- IBM MQ V7.1+/V8+

– IMS

- MQ JMS applications in IMS IMS V13 (MPR, BMP, IFP, JMP, JBP regions)
- MQ V8+

> *Statement of Direction to provide MQ JMS in CICS Liberty*

Additional Active Logs on z/OS

– Maximum active log capacity increased 10x

– Improve resilience to issues affecting log archiving

– Now up to 310 x 4GB active logs.

– MQV8+

The IBM MQ Appliance

The IBM MQ Appliance

- The scalability, security and reliability of IBM MQ V8

- The convenience, fast time-to-value and low total cost of ownership of an appliance

- Built in high availability and disaster recovery capabilities

- Ideal for use as a messaging hub running queue managers accessed by clients, or to extend MQ connectivity to a remote location

- Familiar feel for existing MQ users – application interfaces, administration, networking/clustering, security….

MQ Appliance high availability and disaster recovery

– Fully built-in HA and DR capabilities

  • No external components required

  • Per queue manager active/passive topologies

– High availability

  • Short distance configurations

  • All recoverable data replicated immediately

  • Failures automatically detected and queue managers restarted

– Disaster recovery **(firmware update 4)**

  • Long distance configurations

  • Manual queue manager takeover

Synchronous replication
Automatic takeover

Asynchronous replication
manual takeover
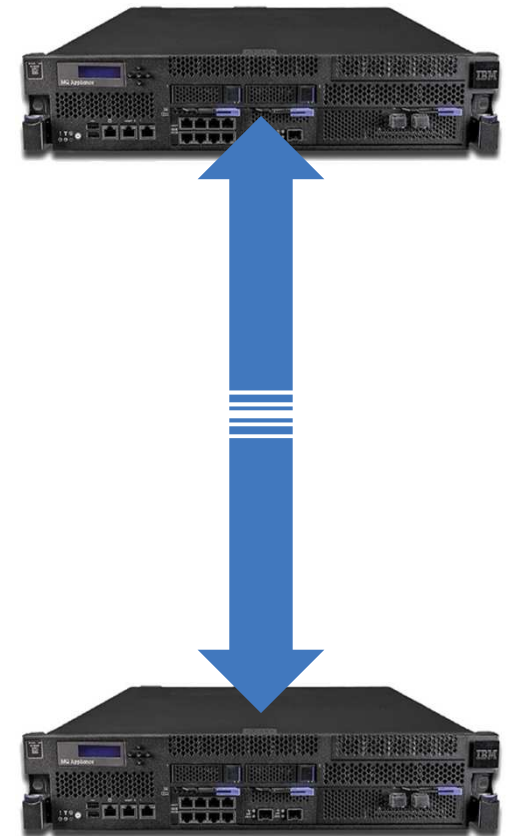
Statement of Direction to support combined HA and DR deployments

MQ Appliance console

- Browser-based UI for administering the appliance
  - Administration
    - Configuration of the appliance and the MQ resources
  - Monitoring
    - Exposes machine level metrics
    - And MQ operations
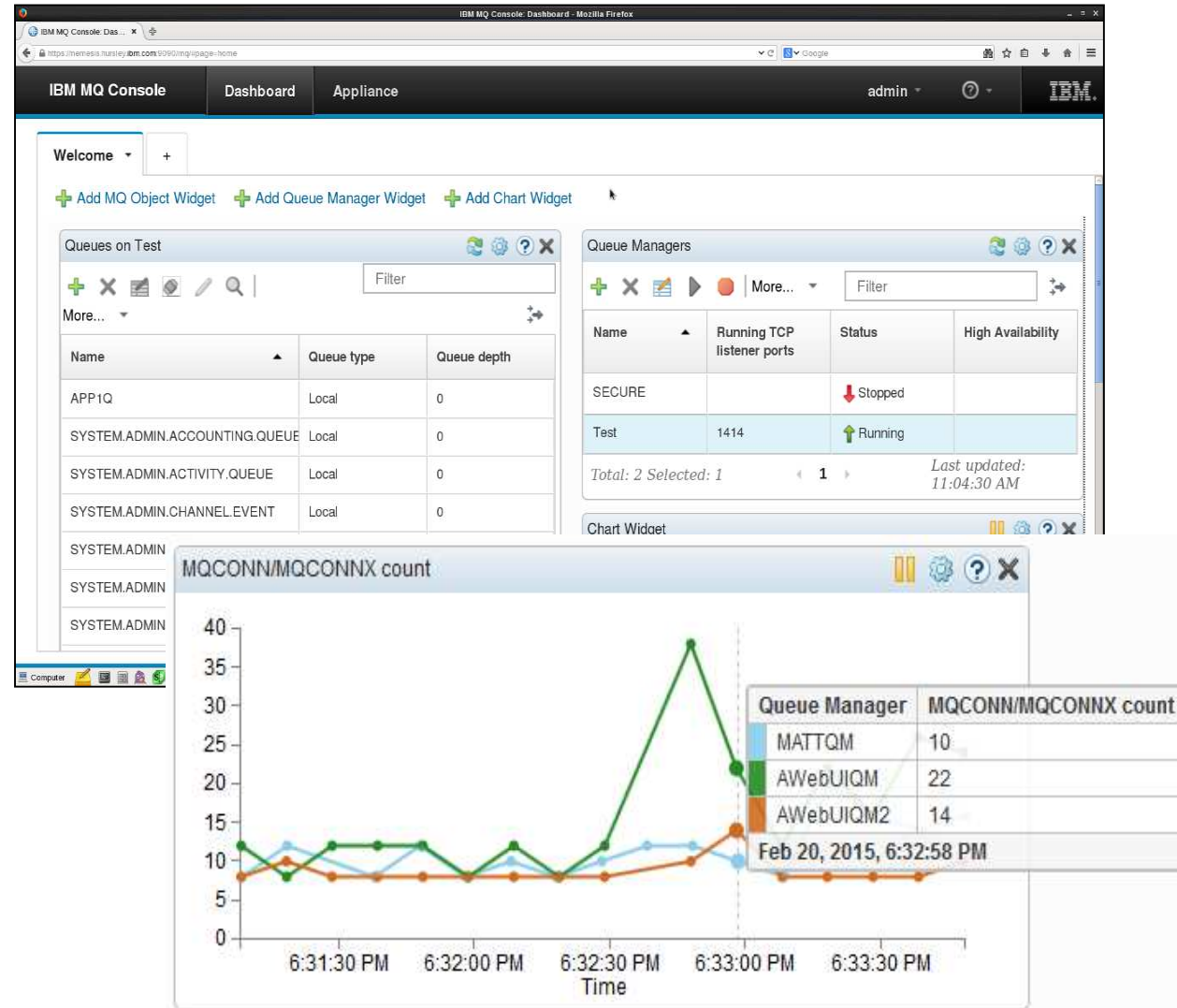
Statement of Direction to provide the console across multiple MQ platforms in the future

New MQ environments

IBM PureApplication
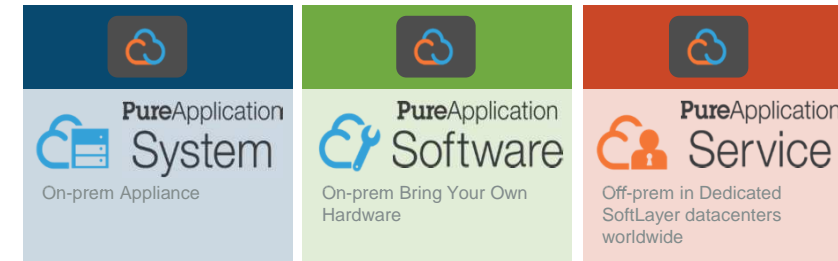
- PureApplication provides a fully integrated IaaS for automated provisioning of machines and software deployments

  - Available as a **hardware system**, **software** or a **Softlayer service**
  - Repeatable and reliable MQ deployments for consistency

- MQ vSys.Next Support in **IBM PureApplication V2.0** from **MQ V8.0.0.3** onwards

  - Concept similar to hypervisor but software components separated from O/S
  - Drag and drop MQ onto Core O/S image to compose VM configuration

- Management and maintenance of MQ via PureApp console
- Pattern support for **highly available** queue managers
- Power/AIX support added to Linux x86 support with **MQ 8.0.0.4**
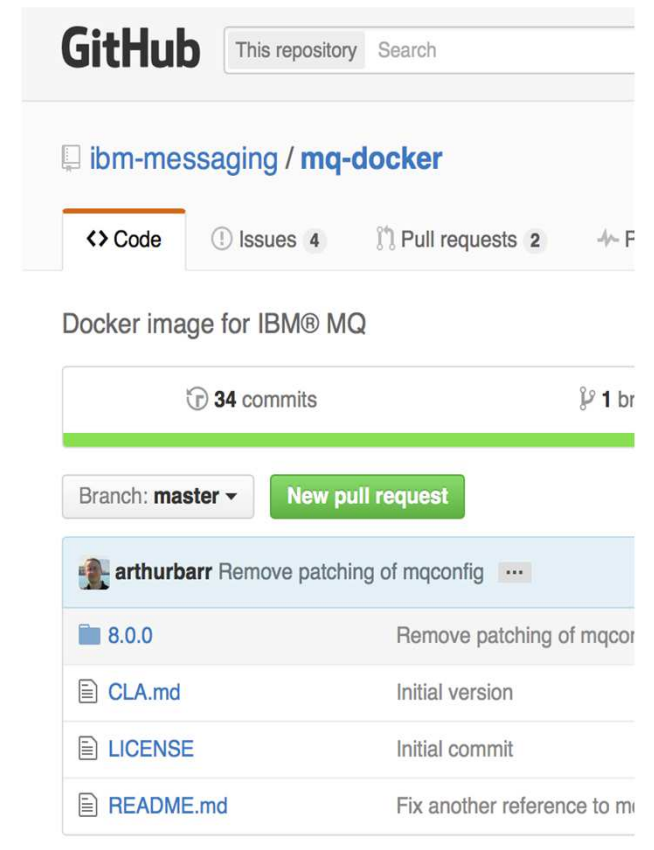
MQ in Docker

– **MQ 8.0.0.4** supported to run inside a Docker image.

  Details: https://ibm.biz/mqdocker

– Brings the benefits of Docker to MQ

  • Lightweight containers for running MQ

  • Predictable and standardized units for deploying MQ

  • Process, resource and dependency isolation

– IBM sample Docker files for customizing and building your own Docker images

  • Best practice guidance

  • Runs an MQ queue manager inside a container, isolated from the rest of your system
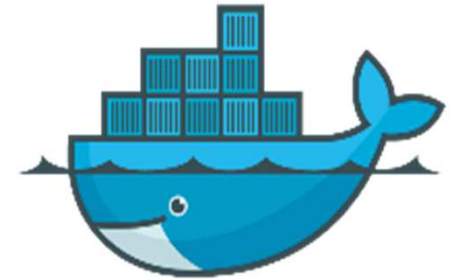
Supporting MQ deployed to the cloud

– Enterprise applications are expanding beyond the datacentre and asynchronous Enterprise Messaging is the easiest and most efficient way to bridge between the applications in globally distributed cloud datacentres.

- • MQ offerings available on popular public cloud platforms
    - – E.g. Azure, EC2, Softlayer
    - – Monthly or hourly license options for MQ are available
    - – Or BYOL
- • Or build your own VM or container and deploy

Using MQ as a service

- Not an environment, more a lifestyle choice!

- Addresses the increasing demands on agility and scale of messaging infrastructures

- As a service goes hand in hand with self service

- Many clients have built MQ as a service today
  - Orchestration and automation of MQ resources
    - E.g. IBM Urbancode Deploy, Chef, Puppet, etc.
  - Running on bare metal or in a cloud

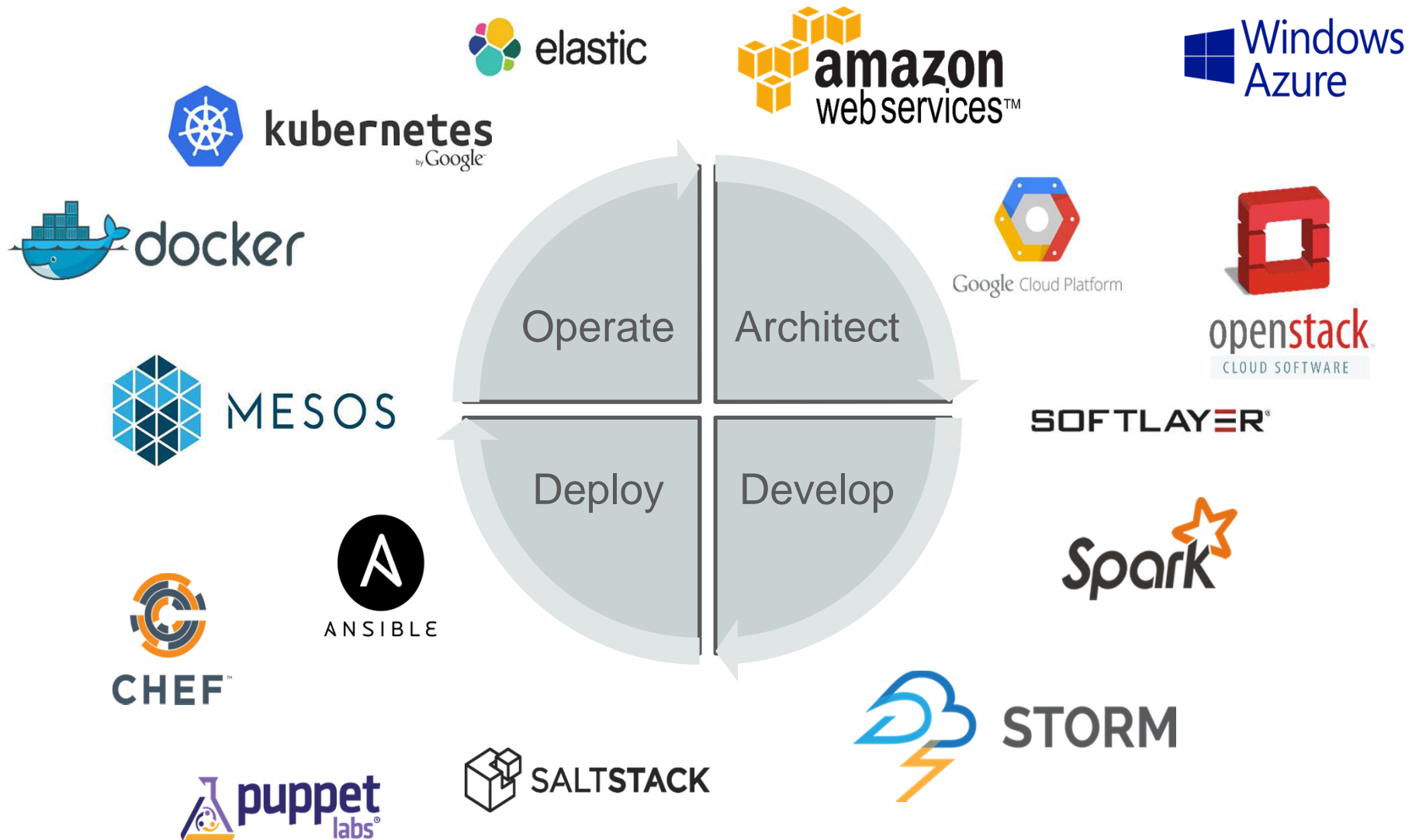- *Redpaper now available* http://ibm.biz/mqaas_red
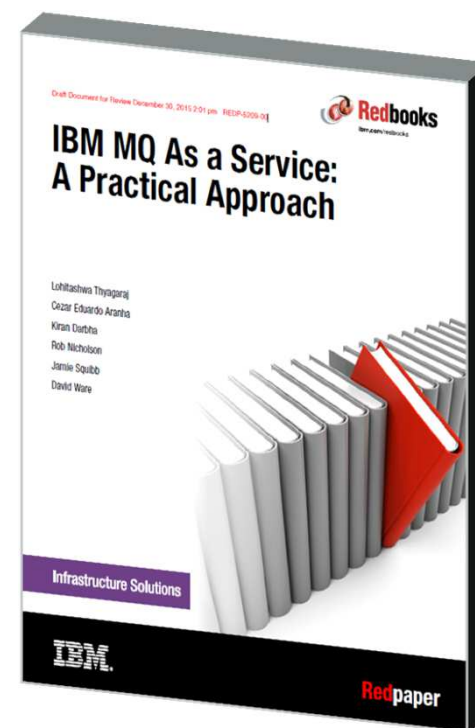
MQ ecosystem – what's new

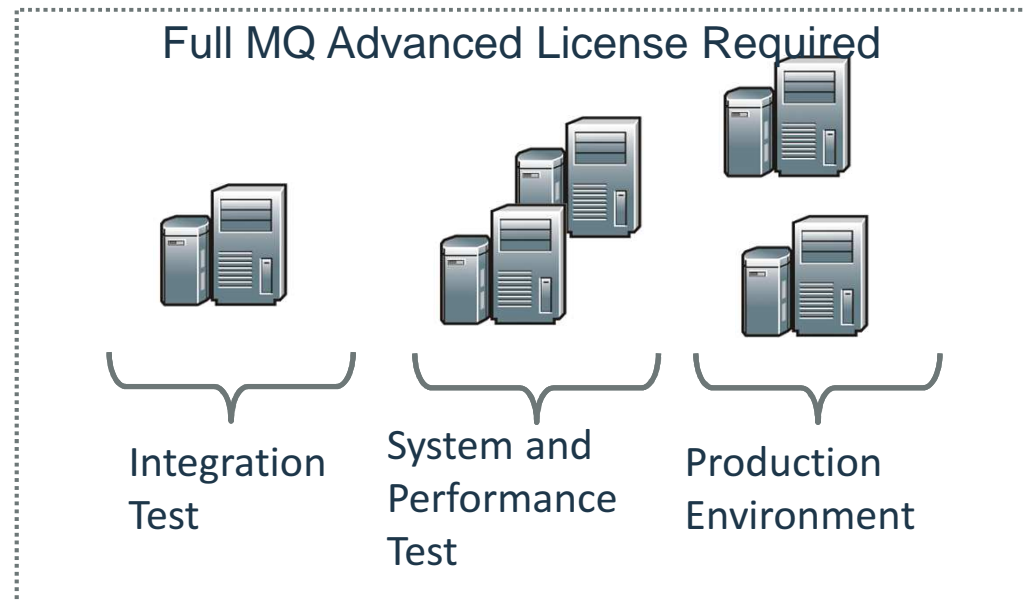Running MQ in Docker is now **supported** for production use
https://github.com/ibm-messaging/mq-docker

Sample cookbook for installing and configuring MQ using Chef
https://github.com/ibm-messaging/mq-chef

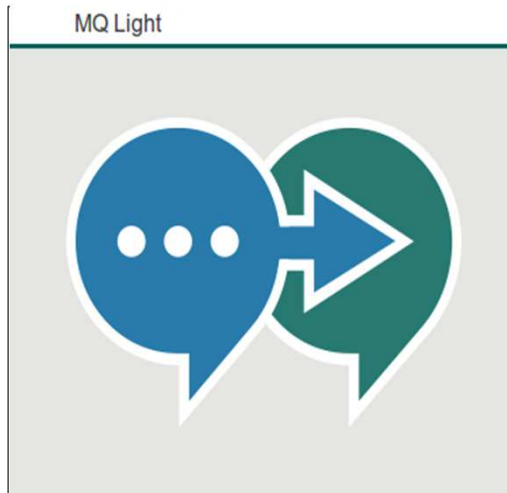# MQ ecosystem – what should we do next?

IBM MQ Advanced for Developers

– What's this for?

- A part in the IBM MQ offering that is intended for use by developers only
- Enables developers to install and use the entire IBM MQ Advanced stack on their personal development machines without needing to pay a PVU based license
  - Priced by Authorised User Single Install with IBM Support
  - Doesn't replace existing Test and Production usage
  - Also available without IBM Support – and free to download

MQ Advanced for Developers License

Development environment

© 2015 IBM Corporation

Full MQ Advanced License Required

Integration Test

System and Performance Test

Production Environment

Idle Standby License Required

High Availability
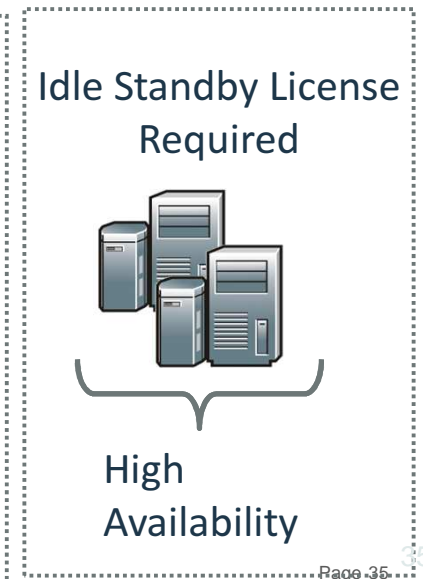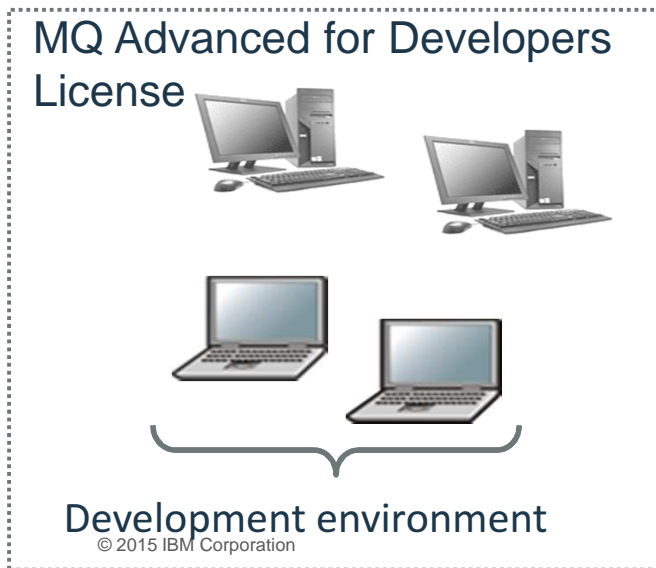
MQ Light

MQ Light : Software and Cloud

Messaging that application developers will love to use, helping them make responsive applications that scale easily

A very simple messaging API

Multiple ways to access MQ Light
- An **MQ Light software download for developers**
- A **managed Bluemix service**
  - **Message Hub** *(MQ Light support coming soon)*
- **Directly connected to MQ V8**

Connecting MQ Light applications to MQ

– MQ Light applications connect directly into MQ queue managers

– A new MQ channel type of "AMQP"
  • Supported from **MQ 8.0.0.4**
  • Similar in style to an MQTT channel
  • Supports the subset of the AMQP 1.0 Oasis specification required for MQ Light applications

– MQ Light applications interoperable with all other MQ applications
  • All share the same topic space
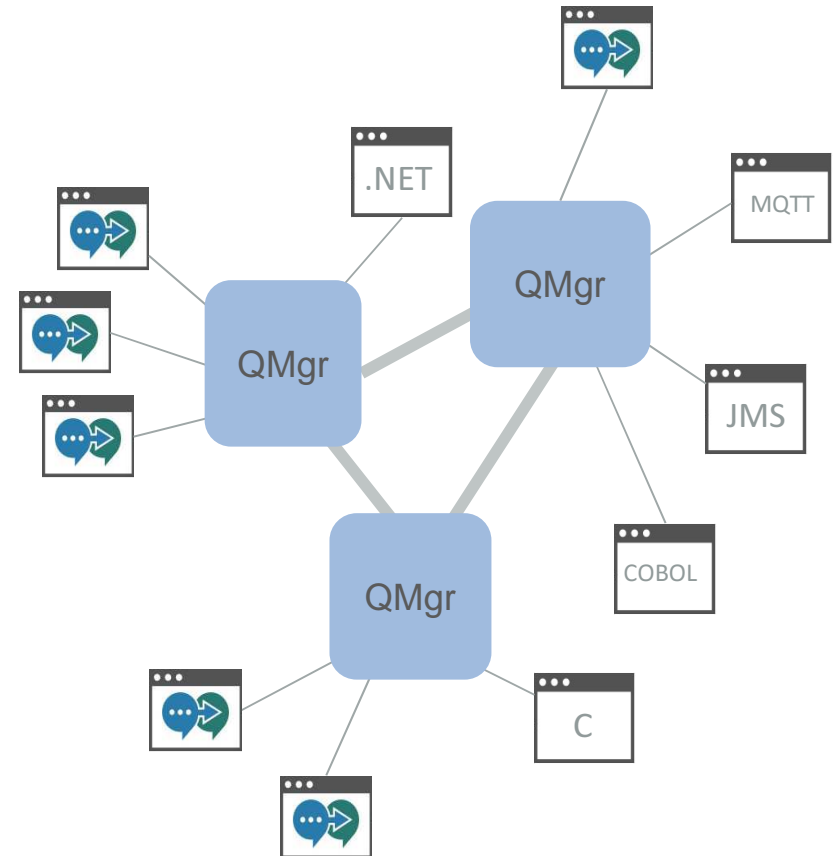
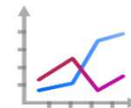# Message Hub

Both LoB & IT have Messaging Requirements:

- App composition
- Microservices
- Interaction with systems of record

- Emphasis on app responsiveness
- Quick (or no) install and easy to use
- Available in languages that support technology choices

- Assured delivery of data
- Transactional units of work
- Synchronizing systems of record

- Emphasis on reliability
- Planned maintenance windows
- Available in languages used by business critical systems

Hybrid Cloud Messaging
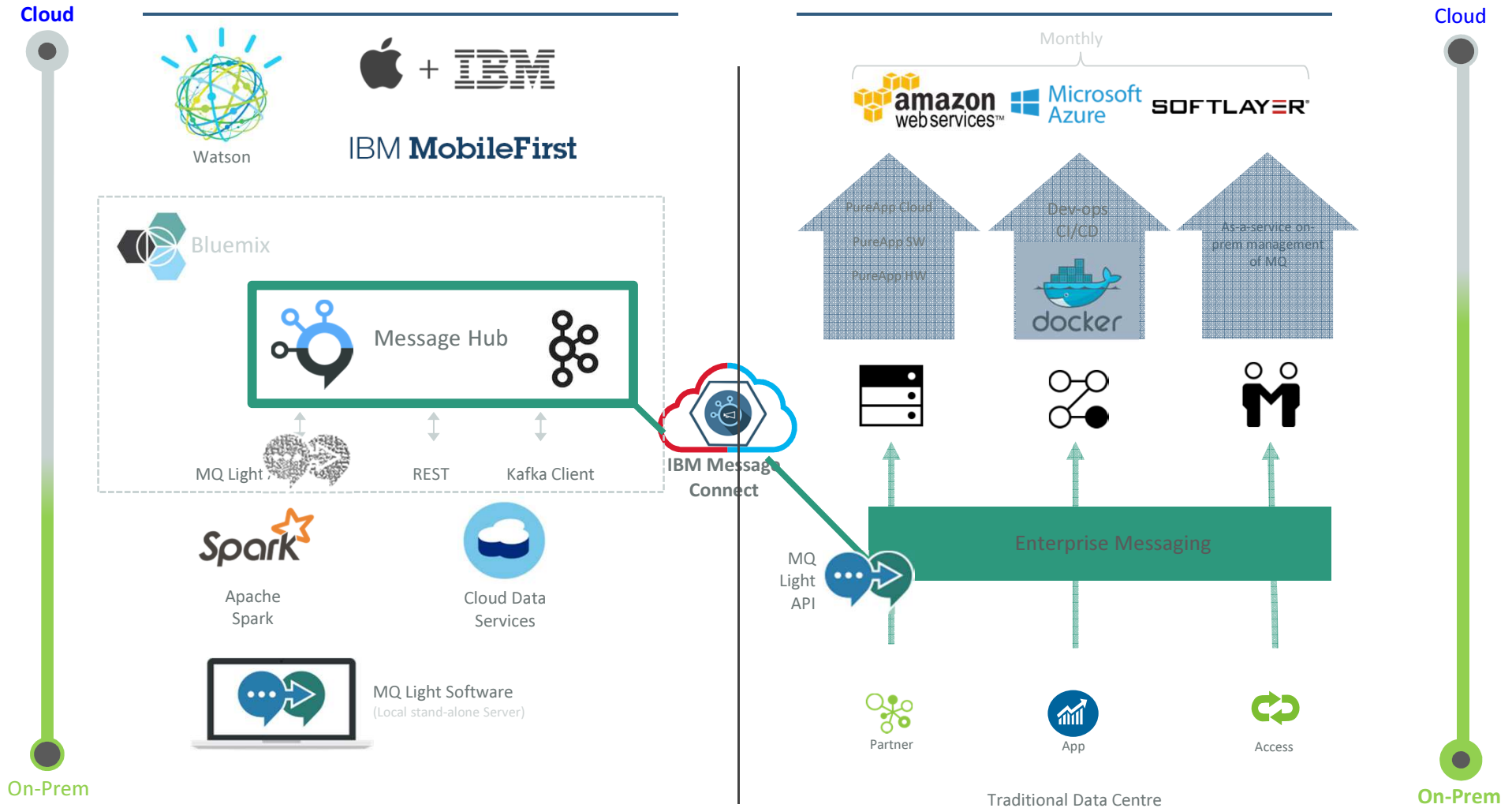
Digital IT

Cloud

Watson   + IBM

IBM MobileFirst

Bluemix

Message Hub

MQ Light   REST   Kafka Client

Spark
Apache
Spark

Cloud Data
Services

MQ Light Software
(Local stand-alone Server)

On-Prem

Enterprise IT

Cloud

Monthly

amazon web services™   Microsoft Azure   SOFTLAYER

PureApp Cloud
PureApp SW
PureApp HW

Dev-ops
CI/CD

docker

As-a-service on-prem management of MQ

IBM Message Connect

MQ Light API

Enterprise Messaging

Partner   App   Access

Traditional Data Centre

On-Prem

What does Message Hub enable?

Hub for asynchronously connecting services inside Bluemix or beyond

Applications connected to events happening in other Bluemix services, or from beyond the cloud
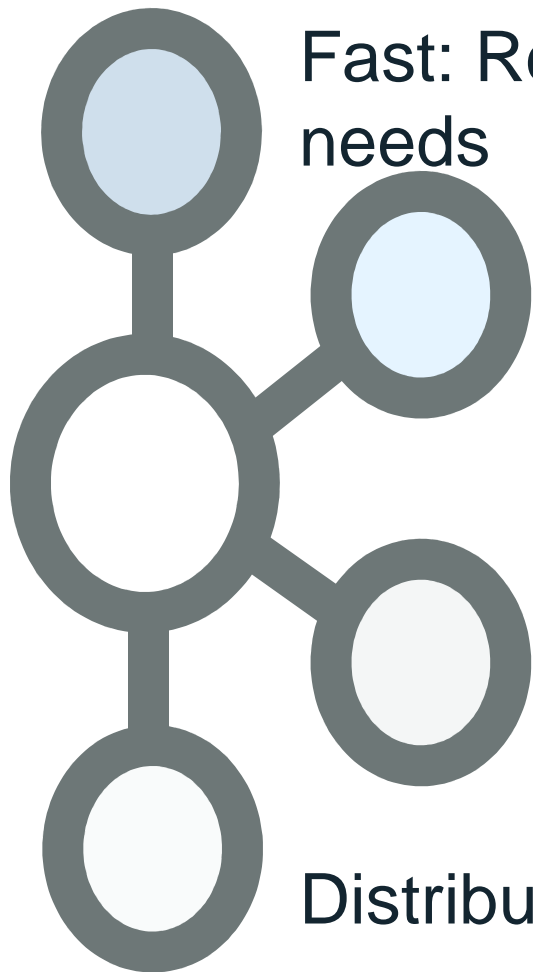
MQ

plus other
on-prem data sources

HTTP

Kafka

Microservices allow applications to evolve rapidly

Open protocols support polyglot runtimes, application controlled behavior and reactive scale

Insights from the data you already have
Data needs to be streamed from anywhere to one or many analytics engines

Why Apache Kafka?

Fast: Responds to your needs

Scalable: Scales according to demands

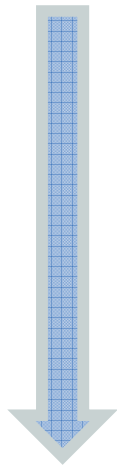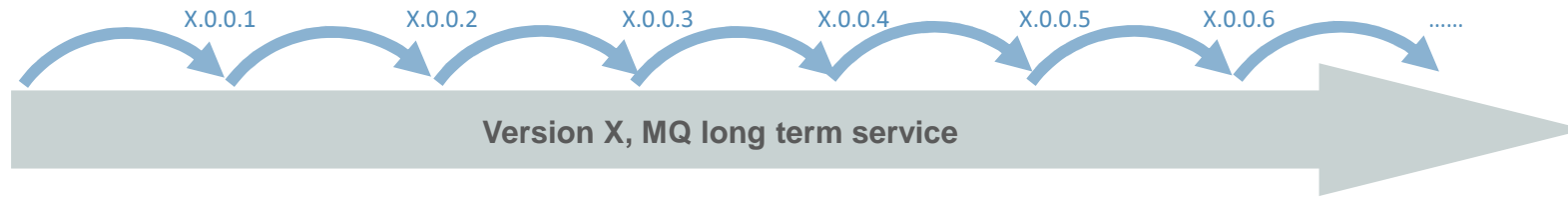**Durable:** Prevents data loss

Distributed: Fault-tolerant

Used by companies including:
- ✓ LinkedIn
- ✓ Yahoo
- ✓ Twitter
- ✓ Netflix
- ✓ Spotify
- ✓ Pinterest
- ✓ Paypal
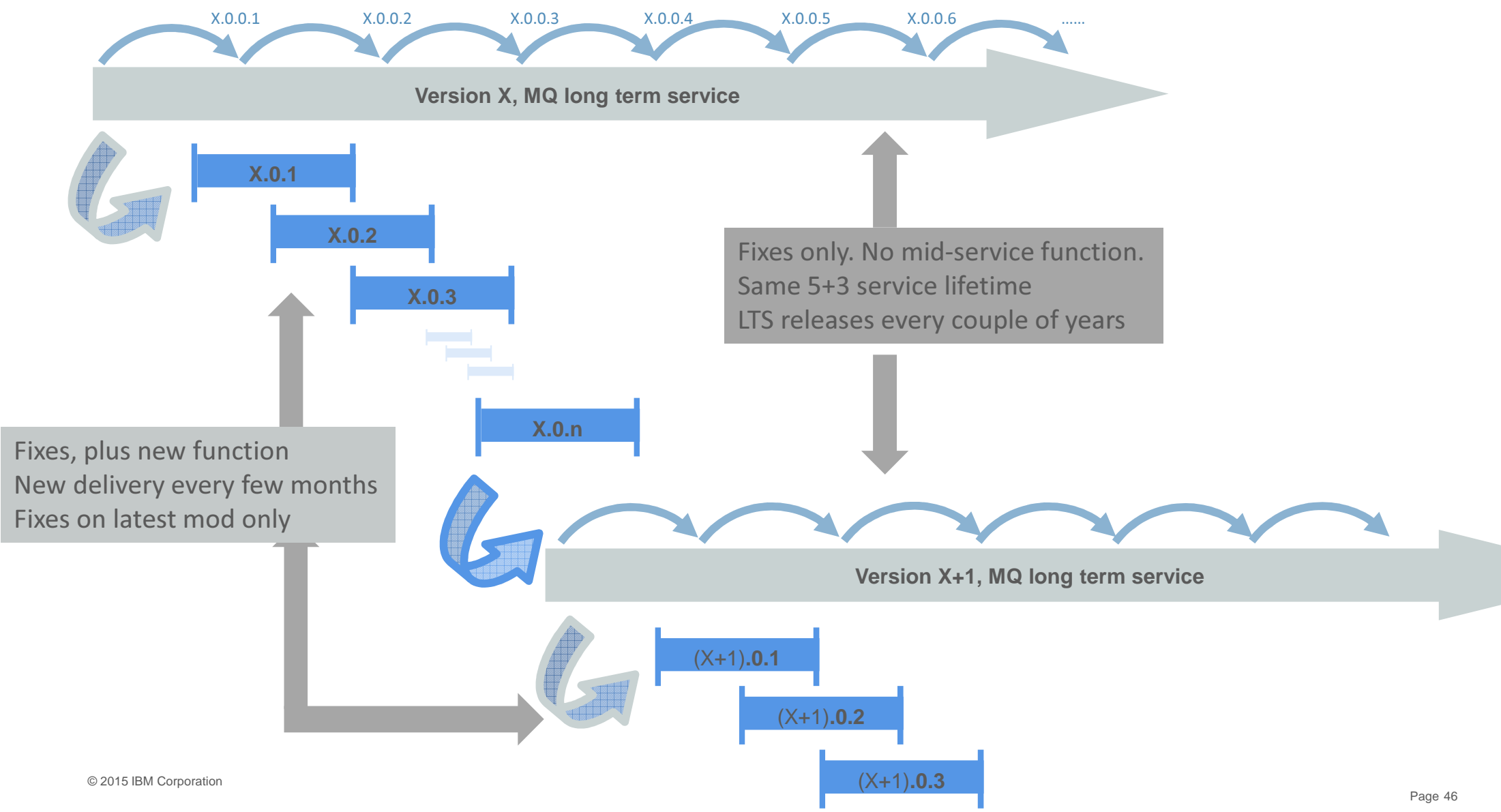- ✓ Tumblr

Going forward with MQ

Stable and Rapid Delivery

X.0.0.1   X.0.0.2   X.0.0.3   X.0.0.4   X.0.0.5   X.0.0.6   ......

Version X, MQ long term service

Version X+1, MQ long term service

Stable and Rapid Delivery

X.0.0.1   X.0.0.2   X.0.0.3   X.0.0.4   X.0.0.5   X.0.0.6   ......

Version X, MQ long term service

X.0.1

X.0.2

X.0.3

Fixes only. No mid-service function.
Same 5+3 service lifetime
LTS releases every couple of years

X.0.n

Fixes, plus new function
New delivery every few months
Fixes on latest mod only

Version X+1, MQ long term service

(X+1).**0.1**

(X+1).**0.2**

(X+1).**0.3**

IBM MQ early access programs

– Interested in hearing about the future direction of MQ?

– Want to influence the shape of features while they're still on the drawing board?

– Want access to early drivers?

– **Join any of the IBM MQ early programs**

  • IBM MQ v.Next early program

  • IBM MQ Appliance early program

  • IBM MQ on HP Non Stop Server early program

– Talk to your IBM contact, alternatively email *pete_murphy@uk.ibm.com* for further details

Backup

Digital IT in Action : Cognitive Coffee Scenario

Multi national craft coffee retailer creating next generation customer loyalty scheme in the cloud

QUESTION : How to integrate their new application with existing systems **WITHOUT** introducing additional and unpredictable load on these back end systems as demand ramps up?
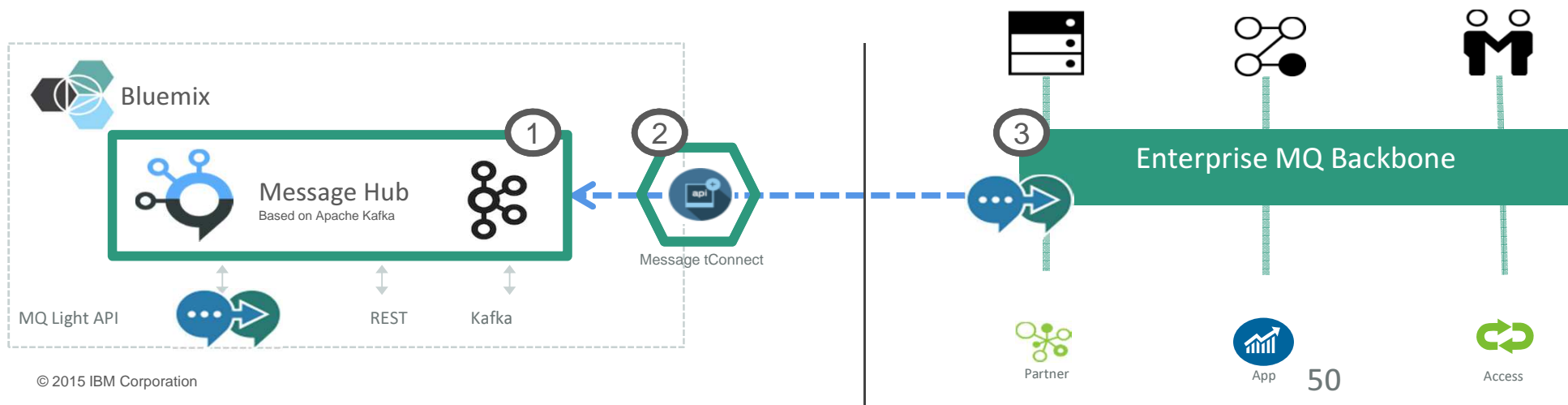
ANSWER : **Hybrid Messaging**

Hybrid Messaging

- Asynchronously connects Enterprise systems with cloud native applications
- Create more engaging applications by integrating existing customer knowledge embedded within your Enterprise systems
- Driving cloud applications with events ensures back-end systems are not overloaded

1. **Message Hub** : Managed messaging service on Bluemix (GA December 2015)
2. **Message Connect** : Bridging messaging systems using MQ Light API (released Feb 16)
3. **AMQP Channel in MQ** : Accepts AMQP protocol connections into MQ (Already GA in MQ 8.0.0.4)
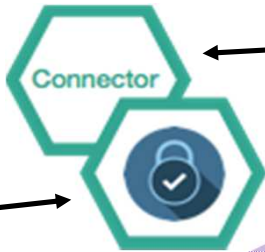
Bluemix

Message Hub
Based on Apache Kafka

MQ Light API   REST   Kafka

Message tConnect

Enterprise MQ Backbone

Partner   App   Access

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Messaging for Cloud Native Applications

(1)

Hub for asynchronously connecting services inside Bluemix or beyond

Applications should be connected to events happening in other Bluemix services, or from beyond the cloud

...

Connector

(2)

Microservices allow applications to evolve rapidly

Open protocols support polyglot runtimes, application controlled behaviour and reactive scale
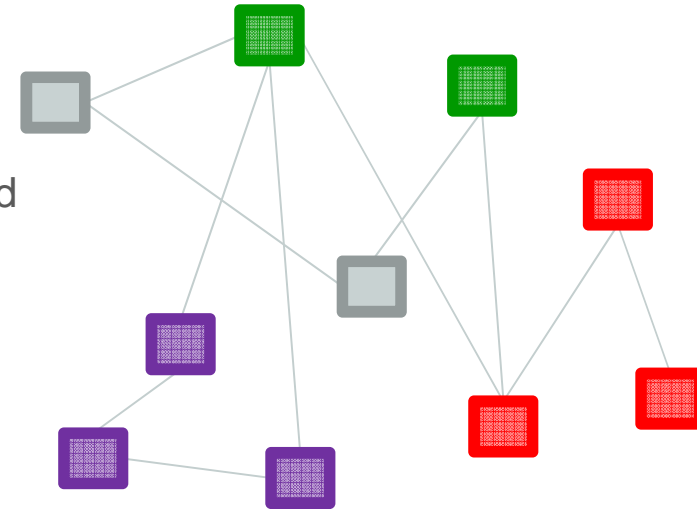
HTTP

Kafka

AMQP1.0

node js

MQ
plus other on-prem data sources

Streams

Spark

(3)

Insights from the data you already have

Data needs to be streamed from anywhere to one or many analytics engines

(4)

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Microservices : What, Why & When?

A service oriented application architecture well suited to complex cloud native (as a Service) applications.
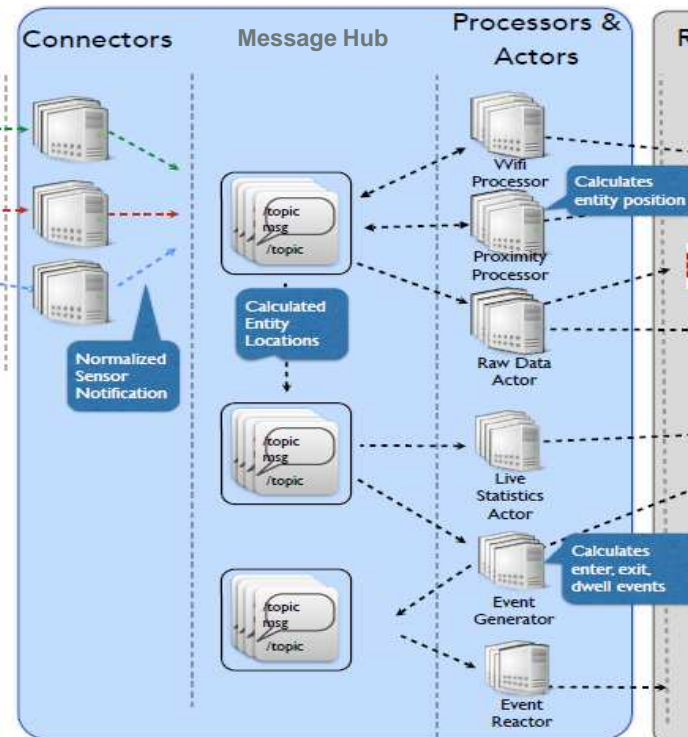
Where the service decomposition focus is for application :

- **Resilience** – designed to survive component failure
- **Agility** – designed to enable fast and frequent change
- **Scale** – designed to scale with unpredictable demands

It's the combination of **all 3 together** that matters

<u>Microservices is an application Architecture</u>

Case Study :
IBM **Presence Insights**

Advantage of Message Hub :

"…the team does not need to manage the service themselves (security compliance and operating system monitoring/management)"

*"**IBM's cloud messaging** as a managed service is a key element to our Presence Insights strategy. The capabilities that are provided in the Node.js client libraries provides a great foundation for our messaging system around publishing and subscribing to our location sensor events"*

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Message Hub Pricing Guide

Bluemix Free Trial

Platform wide 30 day trial with $200 credit

Message Hub Public PayGo

Partitions

$10 per month per Message Hub partition created Pro-rated by number of days in the month that the partition was provisioned for)

Messages

Messages sent / received

Tier (million msgs)	Price per Million
1 – 200	$0.10
201 – 700	$0.05
701 – 1,700	$0.03
1,701 +	$0.017

Message Hub
Dedicated

Message Hub Dedicated Base

$14K / month for 75 partitions

Message Hub Dedicated Increments

$ 4K / month, 25 additional partitions