

CLOUD NATIVE CONNECTED CARS.

Dr. Alexander Lenk, 28.09.2017

BMW GROUP – OVERVIEW 2016.

126.013

employees worldwide



2.367.603

sold vehicles worldwide
in 2016

ENSURING OUR POSITION AS TECHNOLOGY LEADER.

Technology and innovation leader

Future focus: Powertrain technologies



**Efficient
Dynamics
NEXT**



Hydrogen



Connectivity

Future focus: Digitalisation



**Artificial
Intelligence**



**Autonomous
driving**



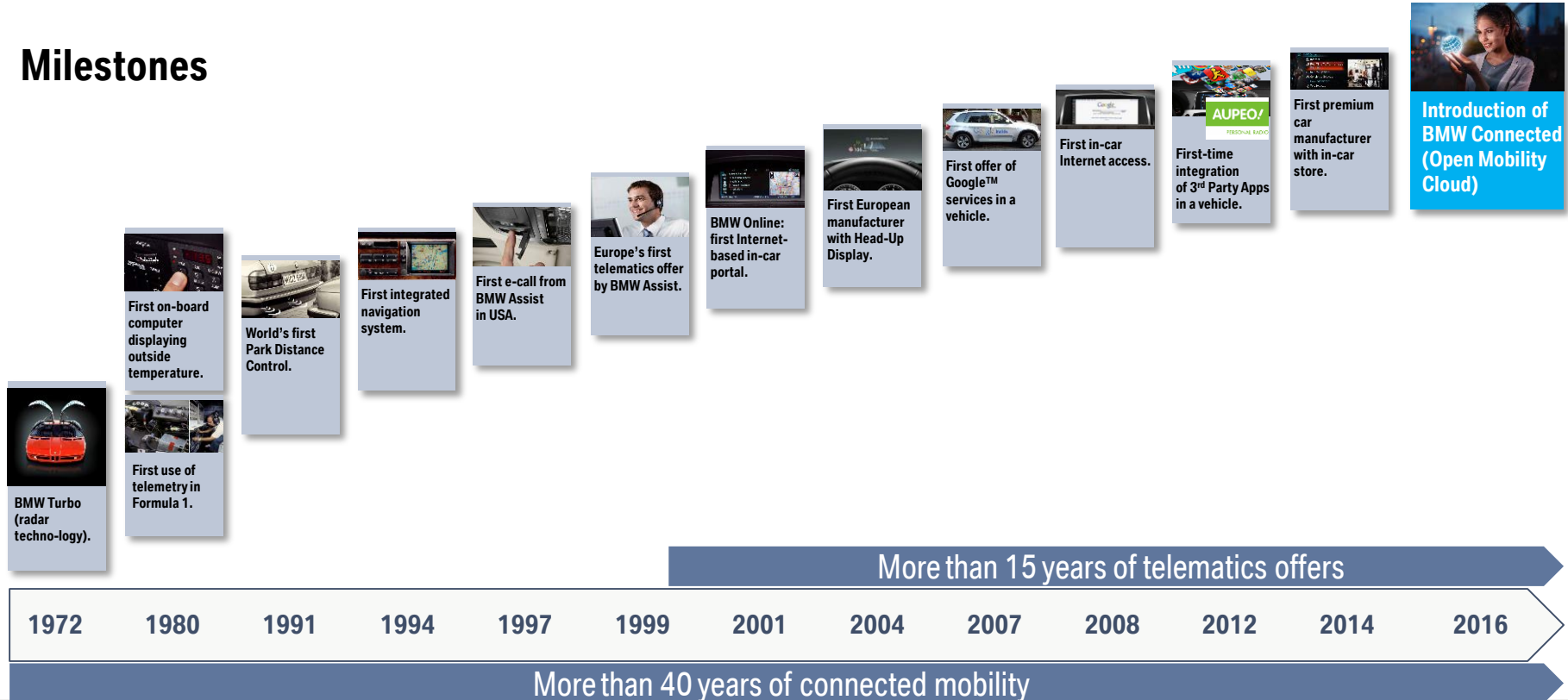
THE IMPLEMENTATION OF THE STRATEGY NUMBER ONE > NEXT LEADS TO A TRANSFORMATION PROCESS TOWARDS A TECH COMPANY.



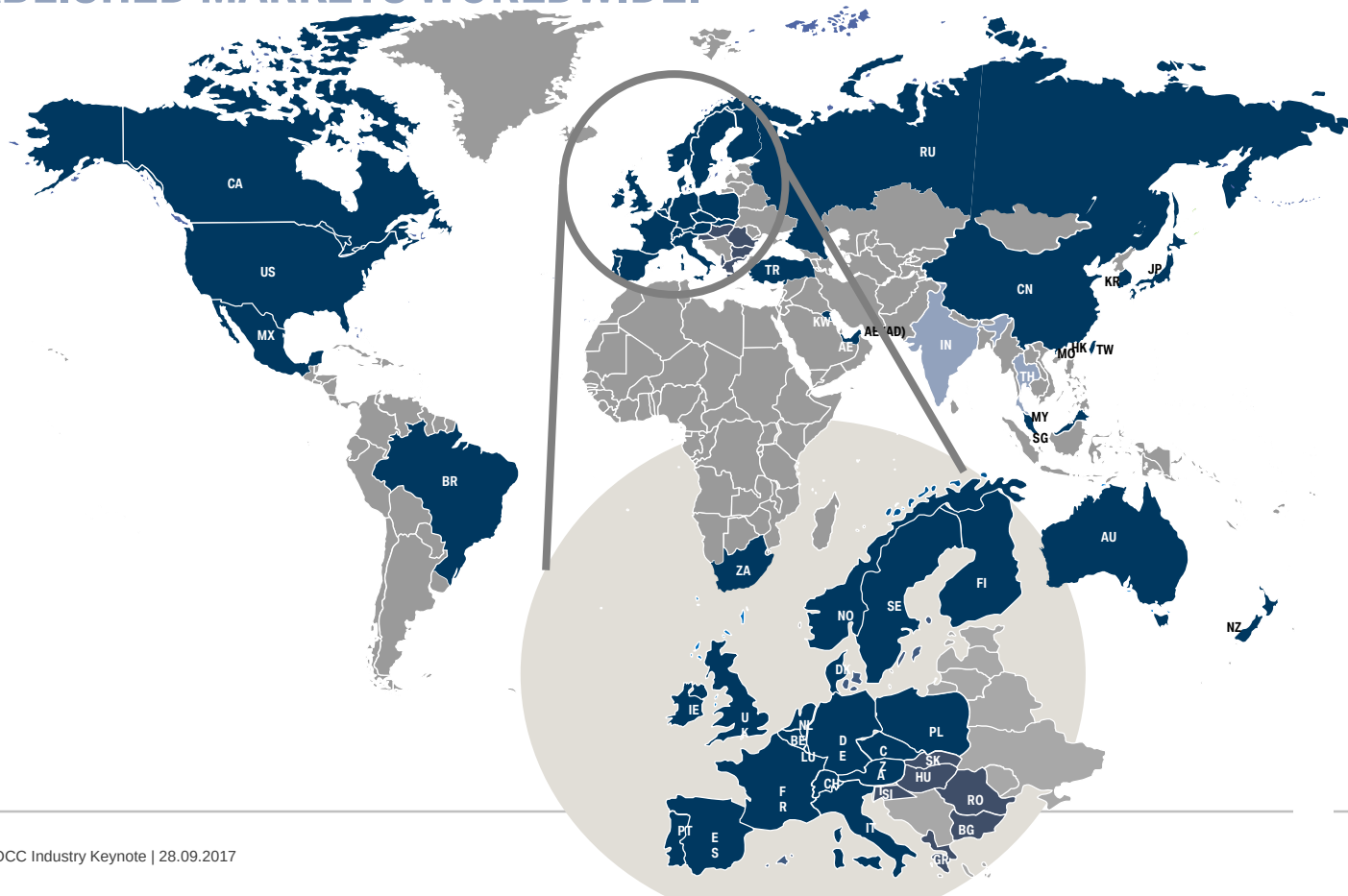
Digital customer experience, connected and automated driving and digitalized business processes lead to a transformation of the BMW Group towards software and services (Tech).

BMW CONNECTED DRIVE HISTORY. MORE THAN 40 YEARS OF EXPERIENCE.

Milestones



BMW CONNECTED DRIVE. 44 ESTABLISHED MARKETS WORLDWIDE.



BMW CONNECTED DRIVE. CONSISTING OF “SOFTWARE” AND “HARDWARE”.

BMW ConnectedDrive

BMW CONNECTED DRIVE DIGITAL SERVICES

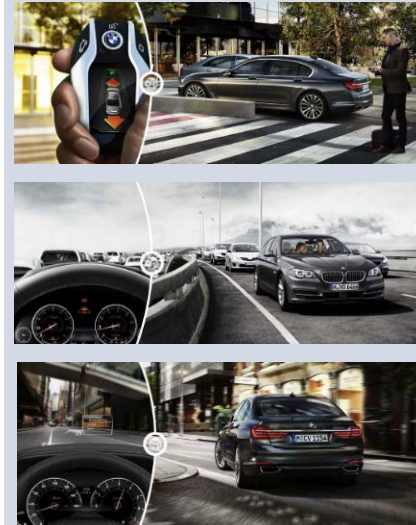
“SOFTWARE”



Update and upgrade capable “software”

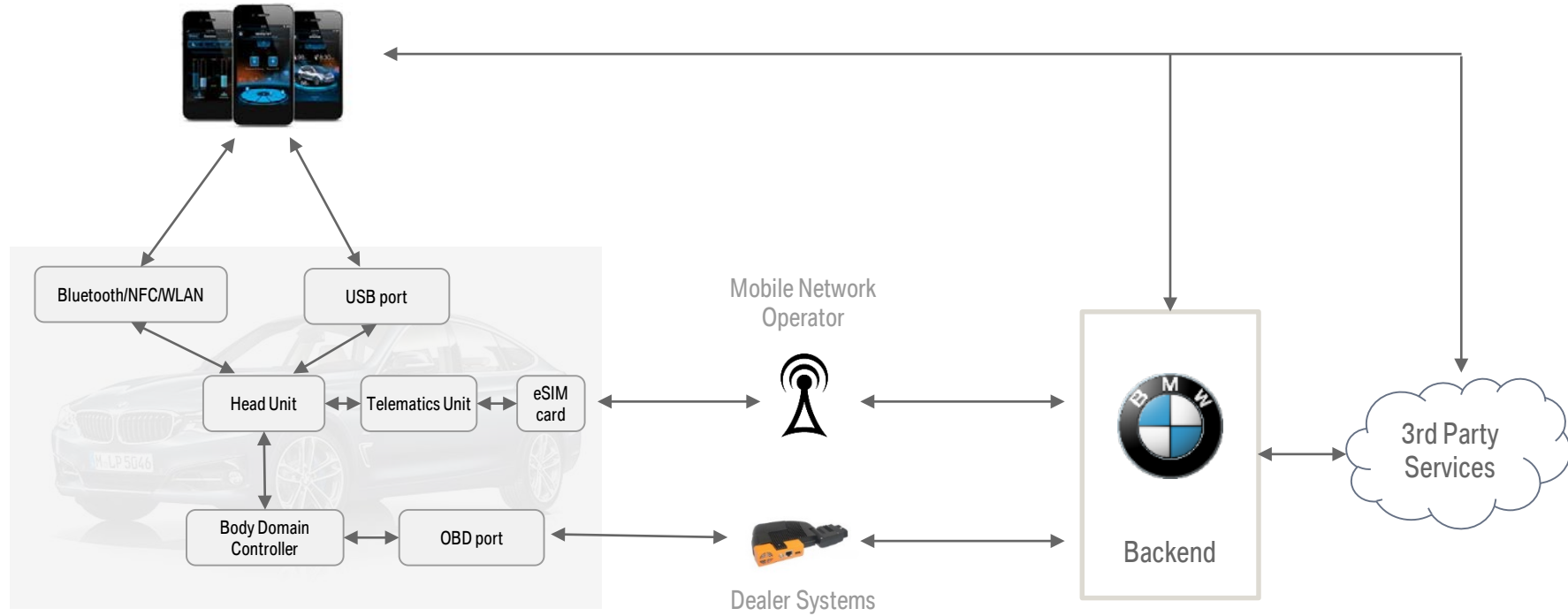
BMW CONNECTED DRIVE DRIVER ASSISTANCE

“HARDWARE”



Prefitted “hardware” and sensor technology

OVERVIEW OF THE ARCHITECTURE.



SELECTED USE CASES.



Electric Cars



Service Calls



Real-Time Traffic



Driving Assistance



Autonomous Driving

 **DriveNow**

 **ParkNow**
You found your place.

 **ChargeNow**

FACTS AND NUMBERS.

15

Years

4 Mio.

Lines of Code (Backend)

8 Mio.

ConnectedDrive Cars

30 %

Yearly Growth

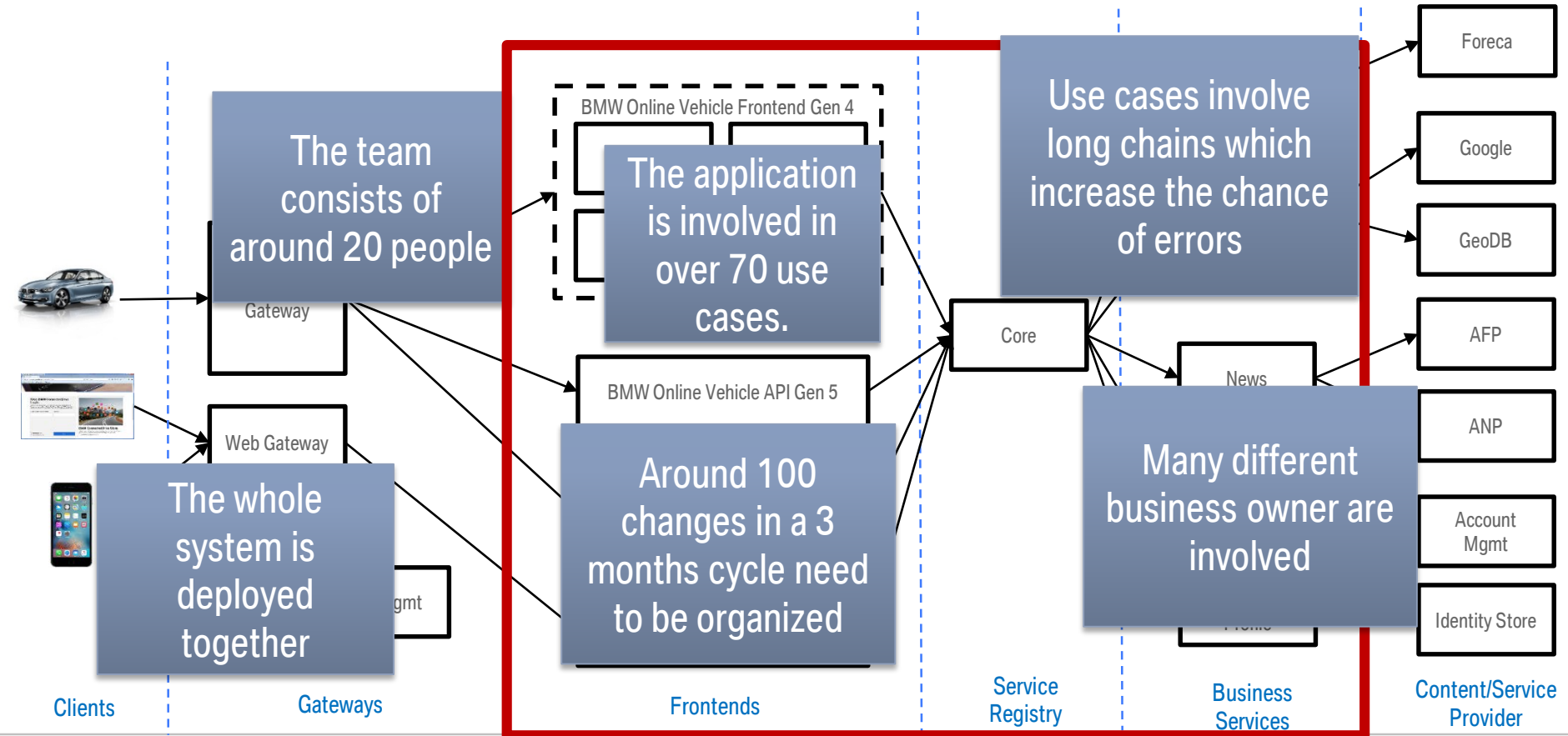
300

Microservices (Planned)

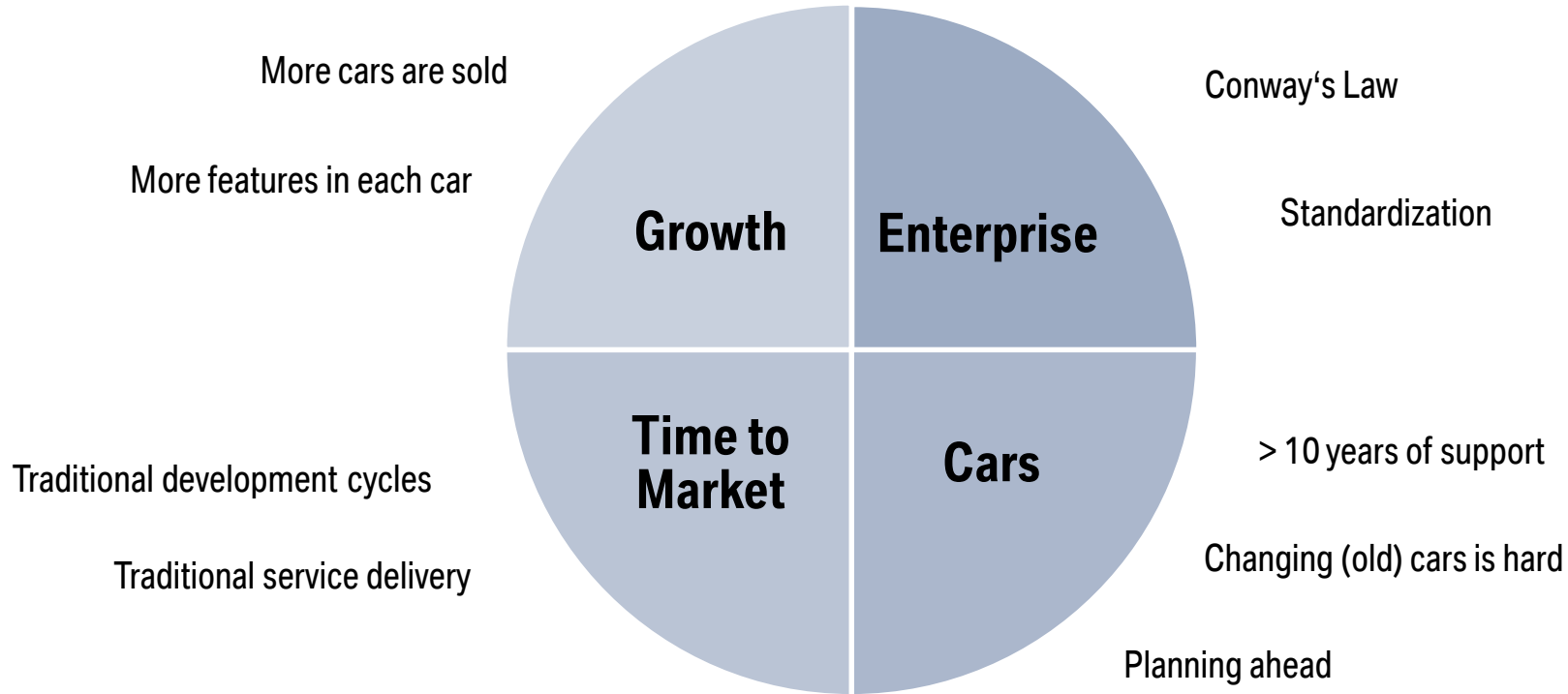
1100

Jenkins Jobs

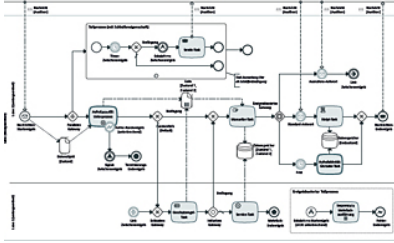
EXAMPLE OF THE BMW ONLINE MONOLITH.



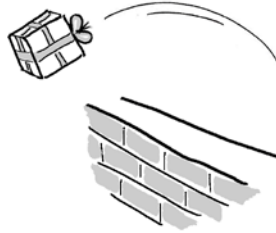
CHALLENGES AND SOLUTIONS FOR CONNECTED CARS.



CLOUD NATIVE. SERVICE DELIVERY IN THE PAST.



Manual Processes



„Silos“



Long Processes



We need to gain more agility back

Picture Source: <https://www.johner-institut.de/blog/wp-content/uploads/2015/01/BPMN-zum-Beschreiben-von-Prozessen-Workflows.png>, <https://slides.com/brampatelski/javaone/embed>

WHICH ELEMENTS REGARDING ARCHITECTURE AND TECHNOLOGY ARE MOST RELEVANT WHILE MOVING INTO AN AGILE WORLD?

Requirements

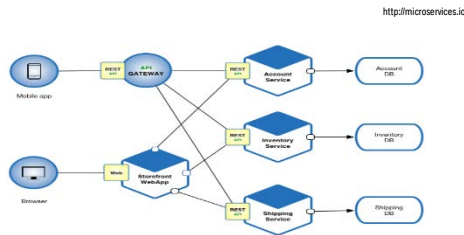


Requirements:

- Short Time to Market
 - Short cycle times
 - Continuous Delivery
 - Maintainability
 - Stable operations
- Integration and adaption of modern technologies
 - Durability and fast reaction times
 - Long term cost efficiencies
- Rapid integration of market available services (e.g. IoT, AI)
 - Integration of Cloud based services (e.g. Robotics predictive maintenance)

Innovation:

Micro Service Architecture



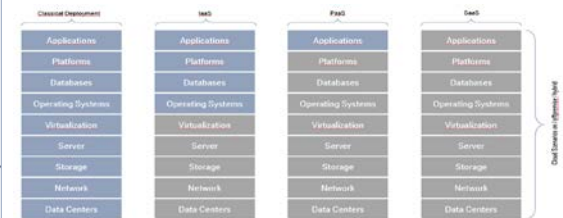
Fast, flexible and independent realization of requirements with a micro service architecture.

Continuous Integration



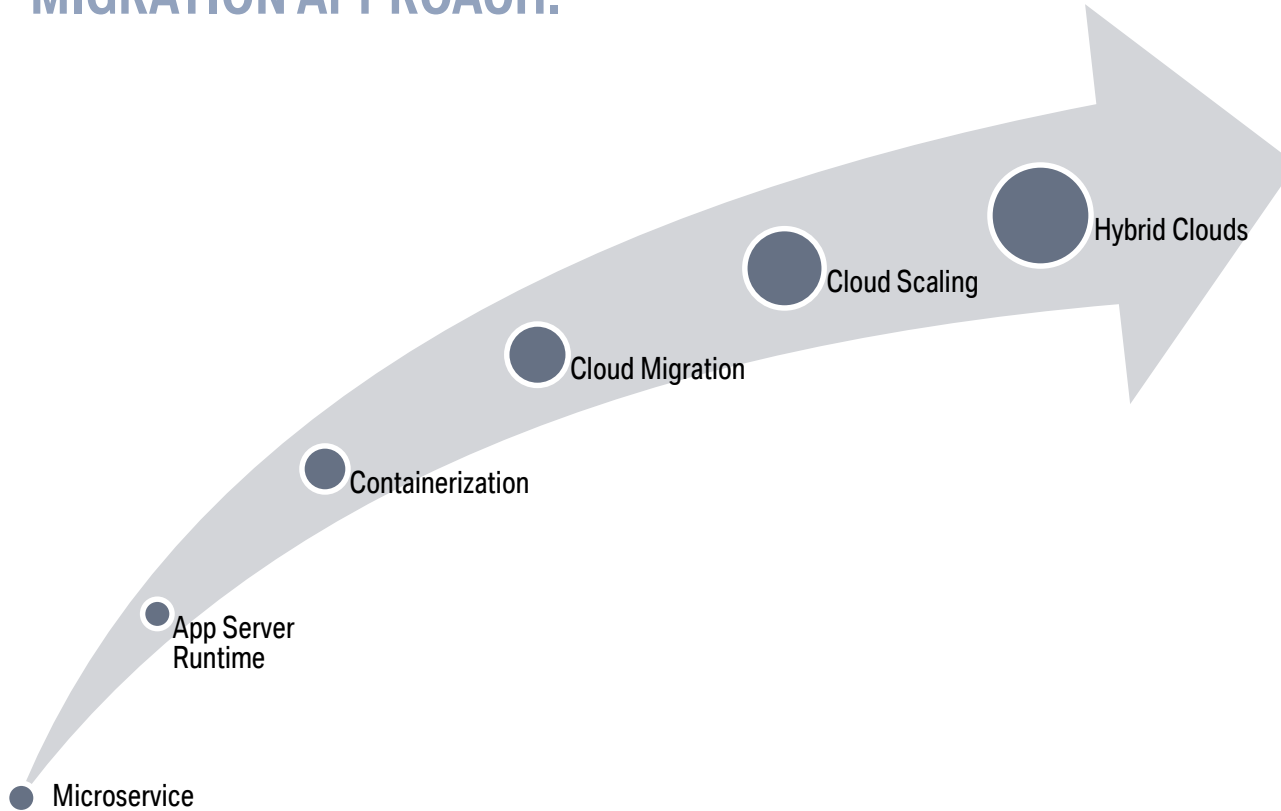
Early detection of integration issues and a constant availability of a "current" build with continuous integration.

Cloud

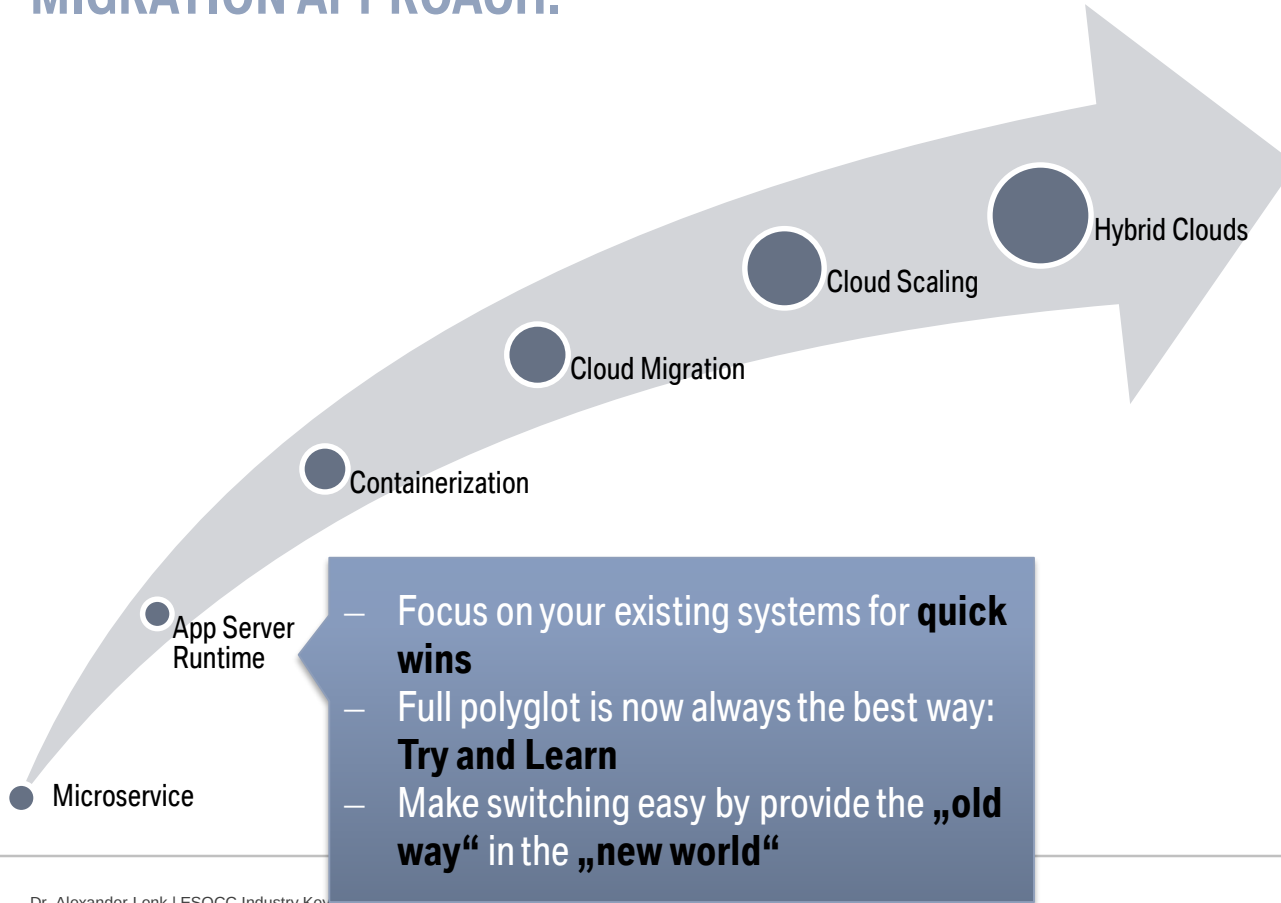


Easy access to innovations and global deployment with cloud based services.

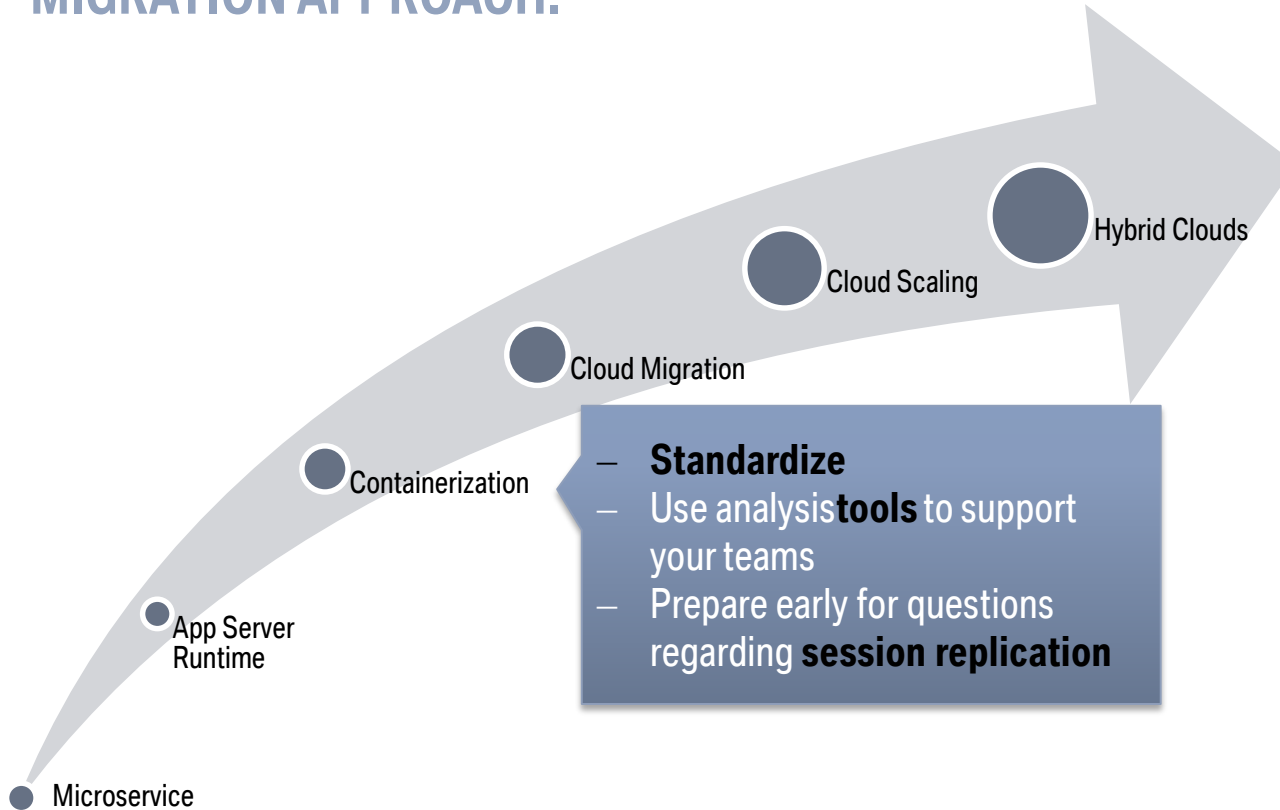
CLOUD NATIVE. MIGRATION APPROACH.



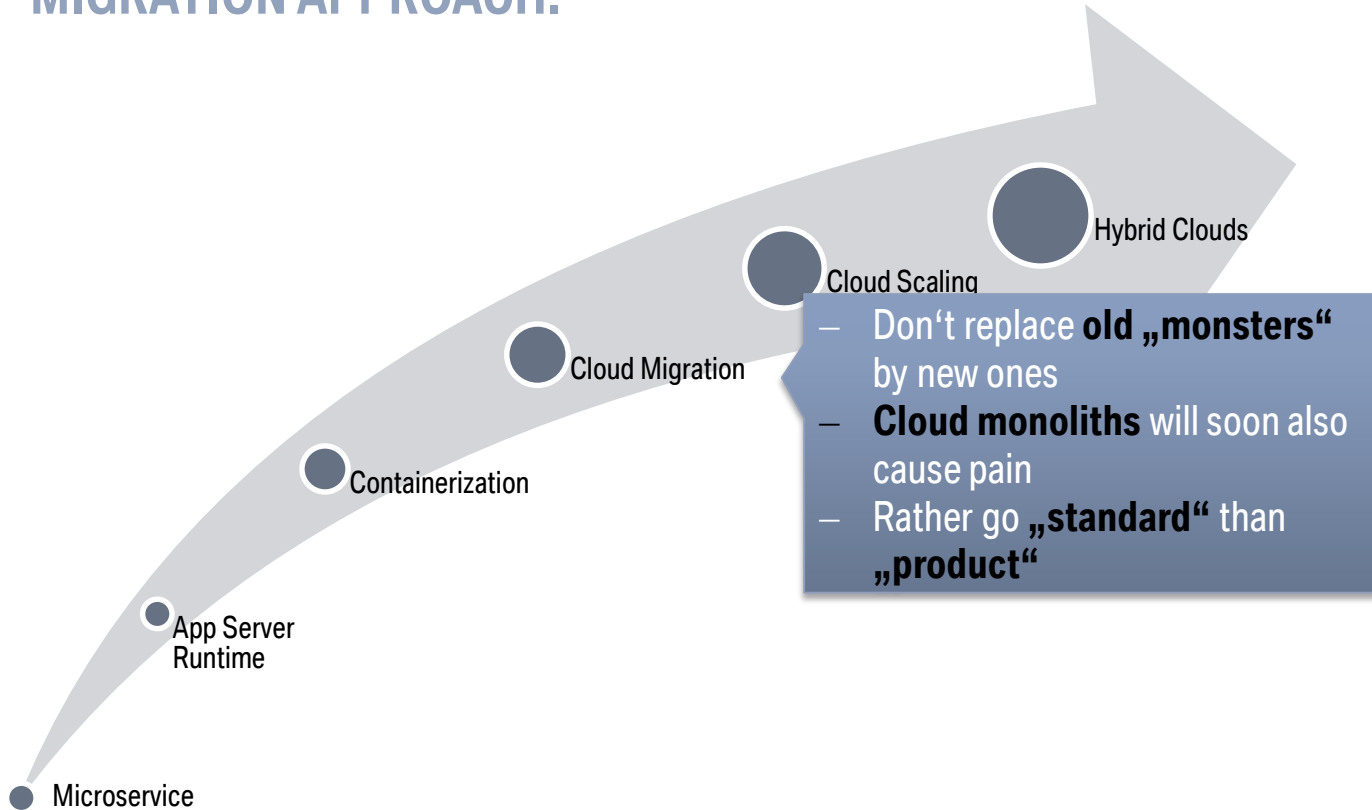
CLOUD NATIVE. MIGRATION APPROACH.



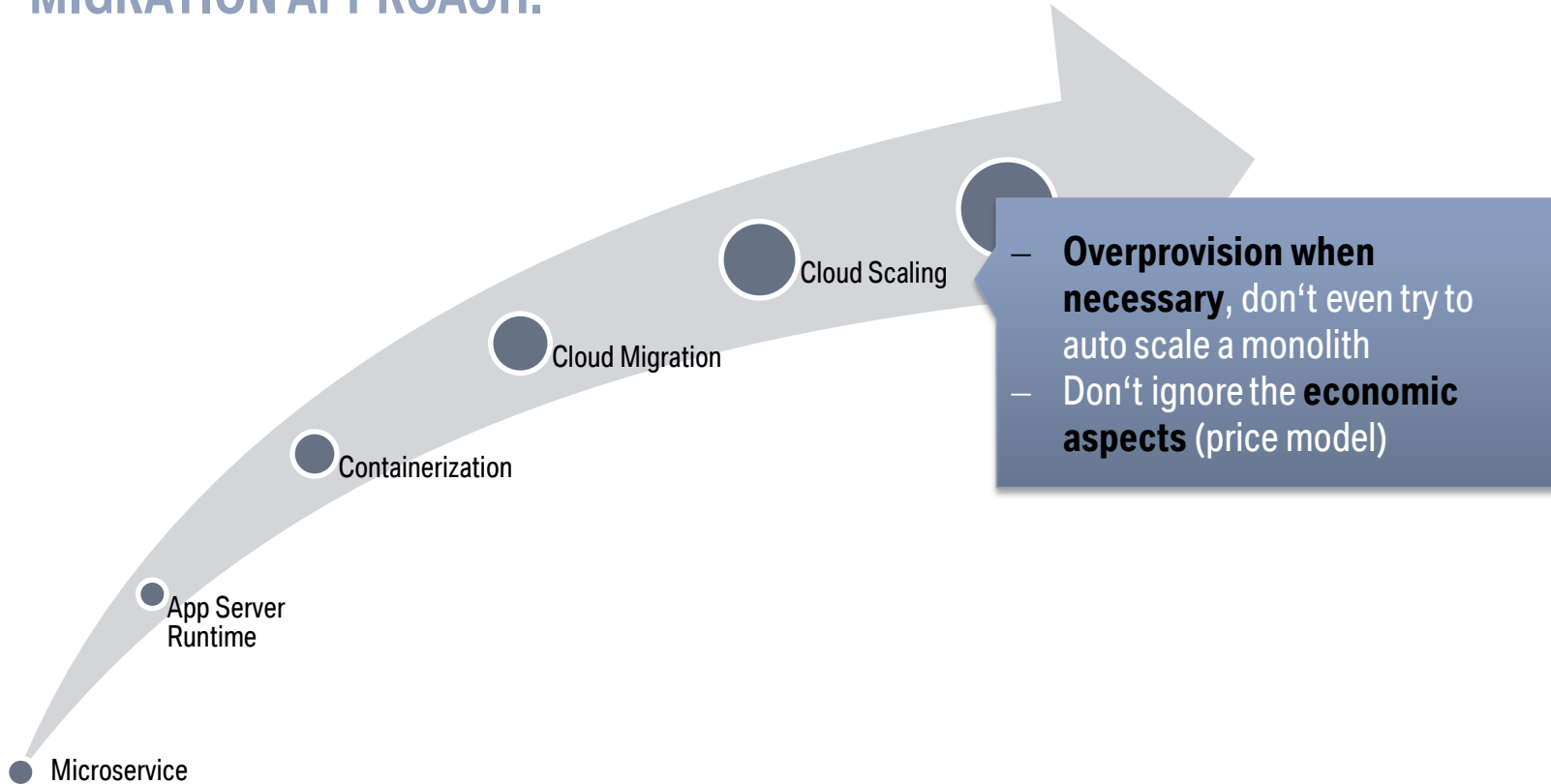
CLOUD NATIVE. MIGRATION APPROACH.



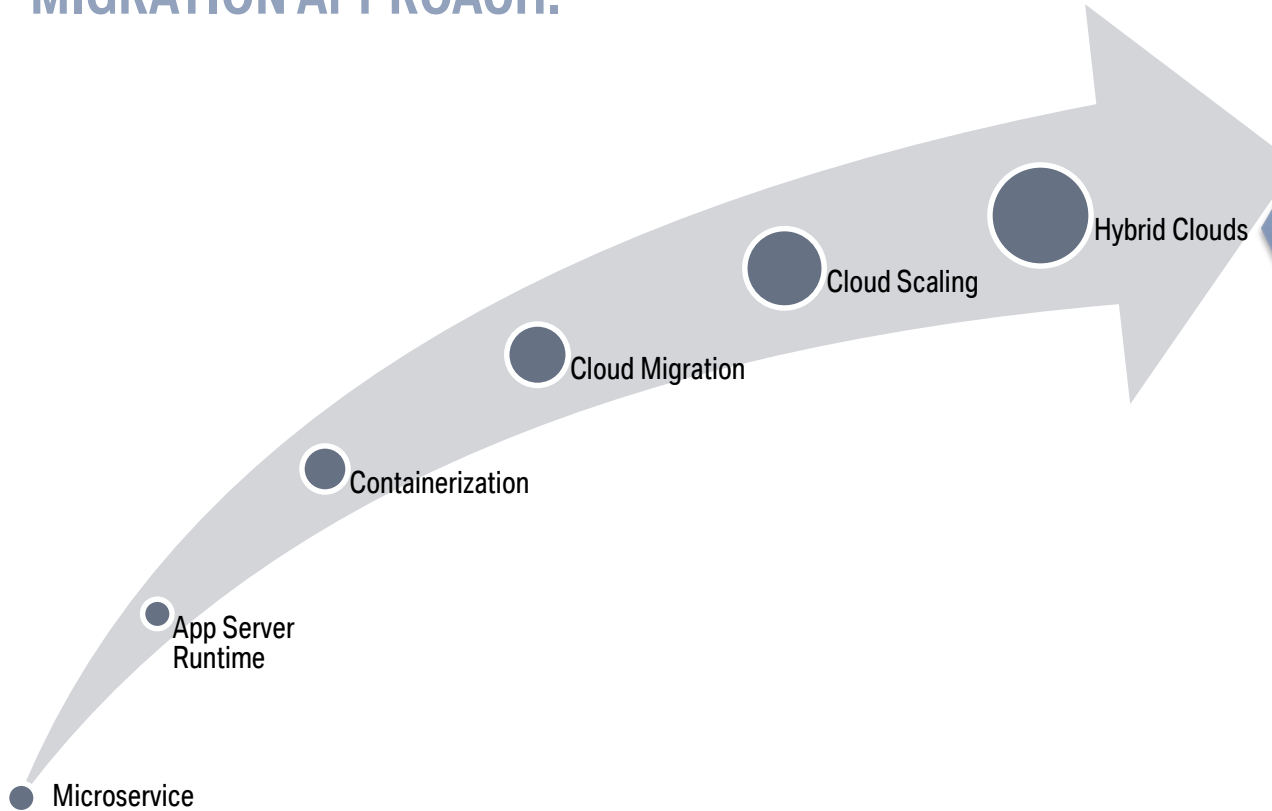
CLOUD NATIVE. MIGRATION APPROACH.



CLOUD NATIVE. MIGRATION APPROACH.



CLOUD NATIVE. MIGRATION APPROACH.

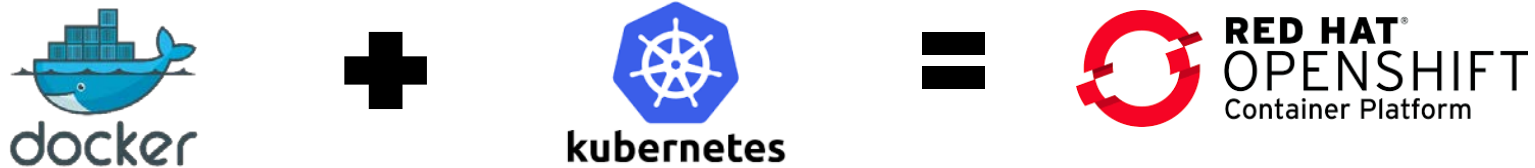


- Hybrid means **outsourcing**
- Same code / containers inside and outside
- There's always a better offer, **be ready to switch**, and then stay
- **Compliance, Privacy, Security**

CLOUD NATIVE. CLOUD BASED SERVICE DELIVERY.



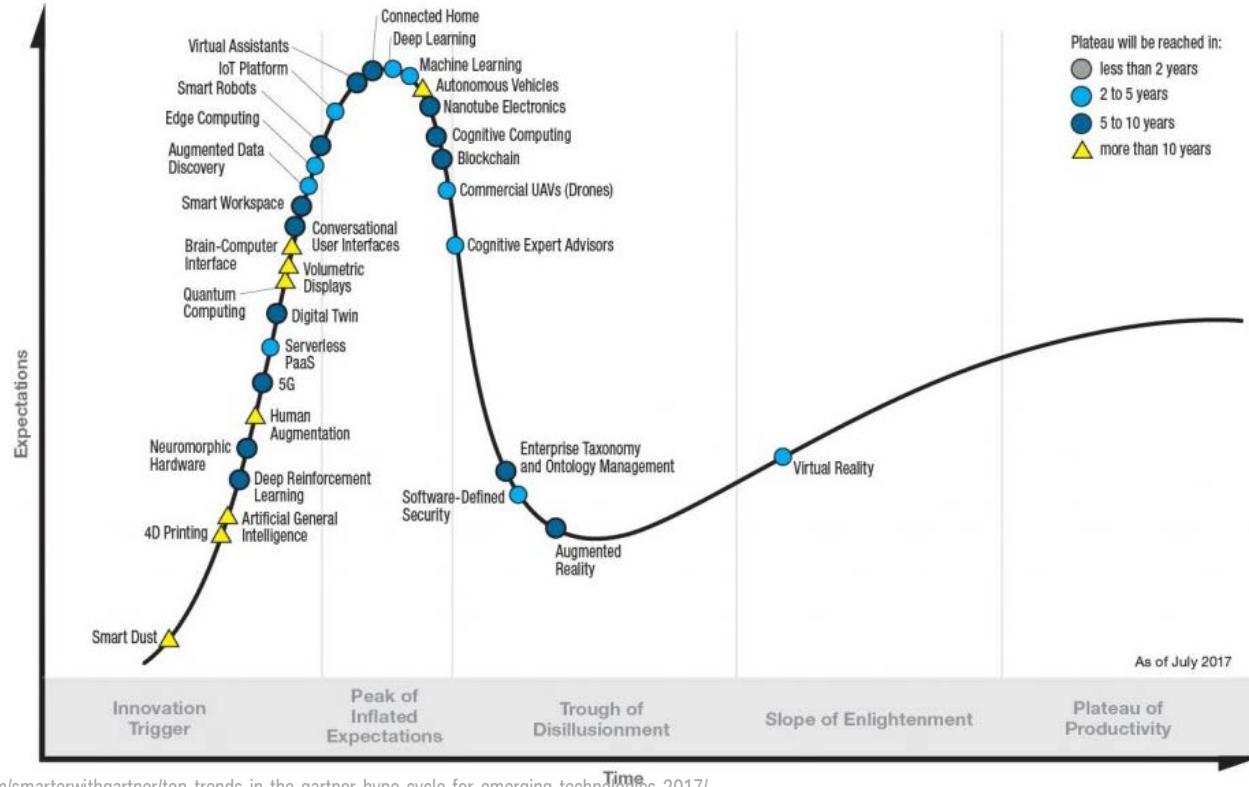
Technology Stack



Cloud Native Platform

HOT RESEARCH TOPICS.

GARTNER HYPE CYCLE FOR EMERGING TECHNOLOGIES, 2017



Source: <http://www.gartner.com/smarterwithgartner/top-trends-in-the-gartner-hype-cycle-for-emerging-technologies-2017/>

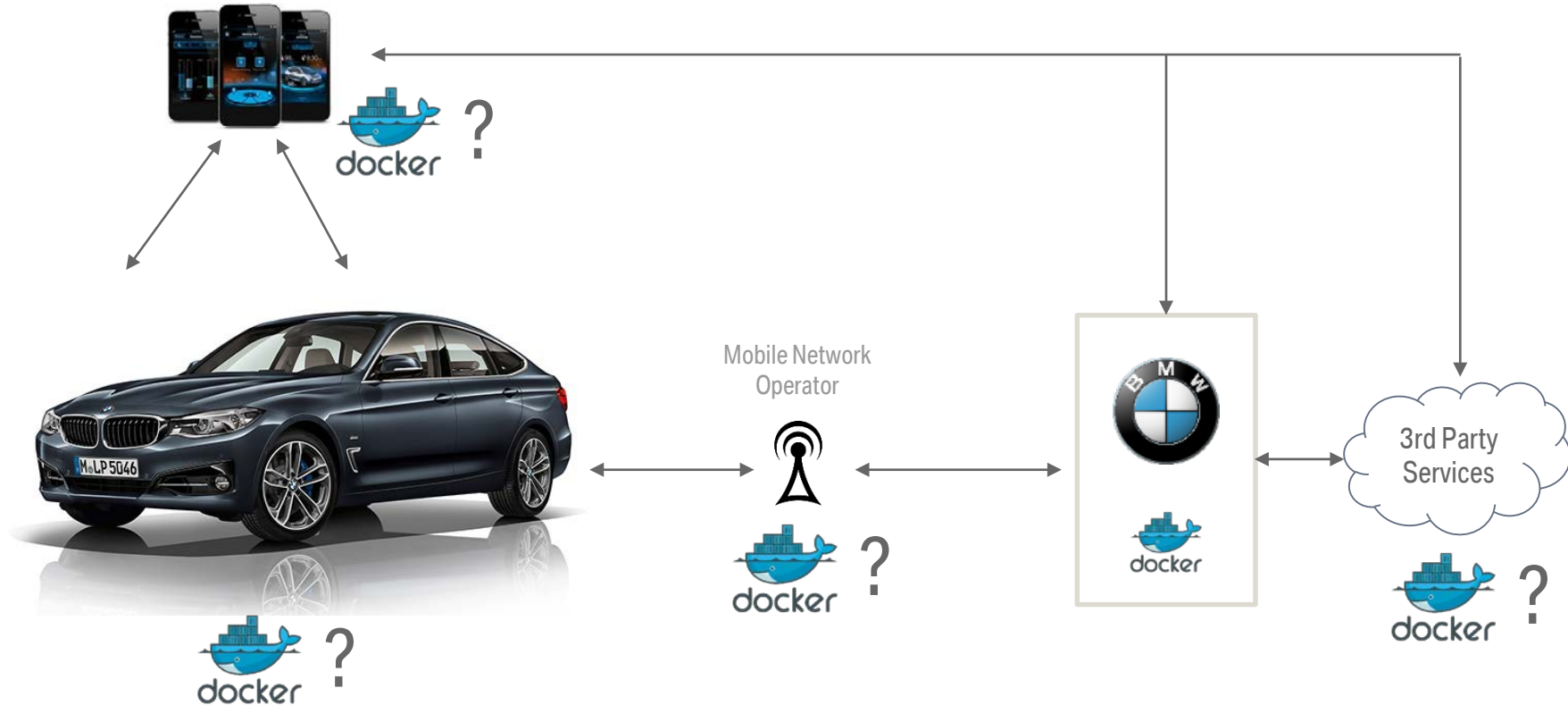
HOT RESEARCH TOPICS. SERVERLESS PAAS.



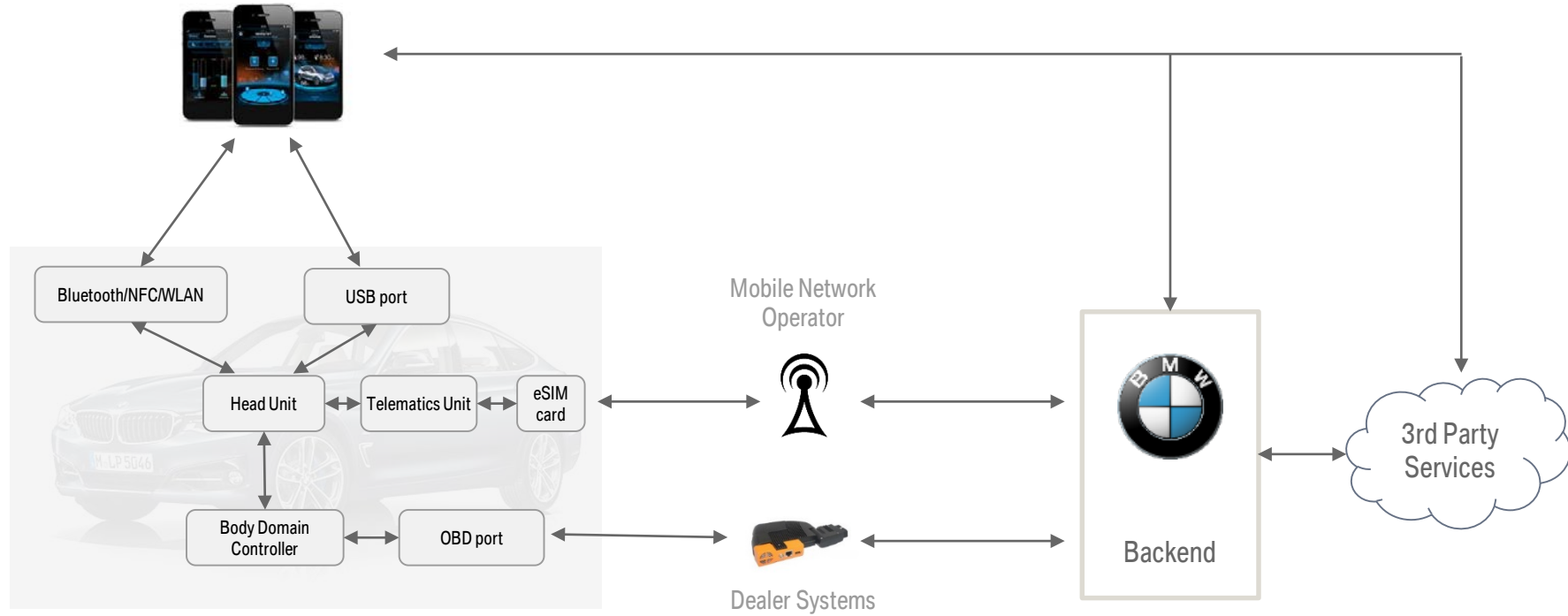
HOT RESEARCH TOPICS. DIGITAL TWIN.



HOT RESEARCH TOPICS. EDGE COMPUTING.



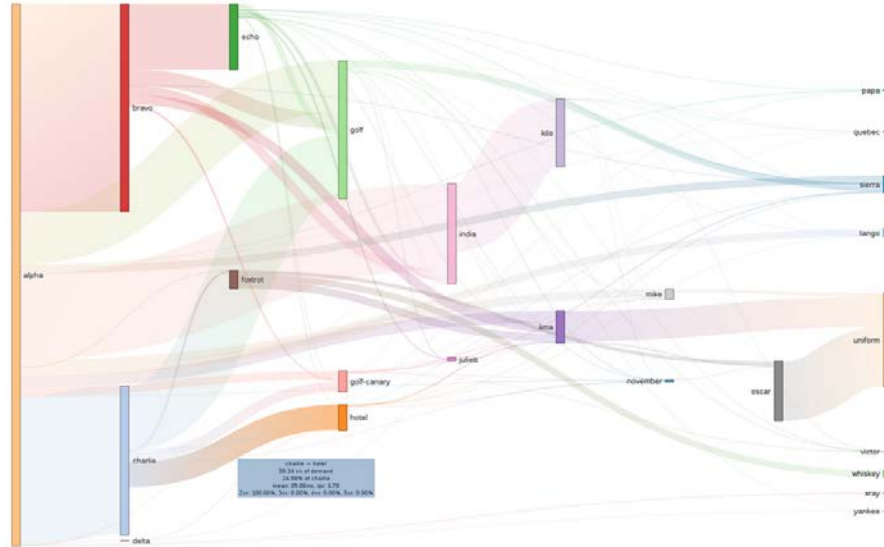
HOT RESEARCH TOPICS. IOT PLATFORM.



HOT RESEARCH TOPICS. ENTERPRISE CLOUD PRICING AND INCENTIVATION.



HOT RESEARCH TOPICS. SERVICE DISCOVERY BASED ON DEEP LEARNING.



Source: <https://medium.com/netflix-techblog/a-microscope-on-microservices-923b906103f4>

Let's work on the future together!

