

AGENDA.

1

BMW, BMW Group IT, Big Data @ BMW.

2

Big Data Platform & Data Lake.

3

Use Case: Driving Patterns.

4

Use Case: On Demand Mobility.

THE BMW GROUP IN NUMBERS (2017).

129,932

employees worldwide

98.7 Billions

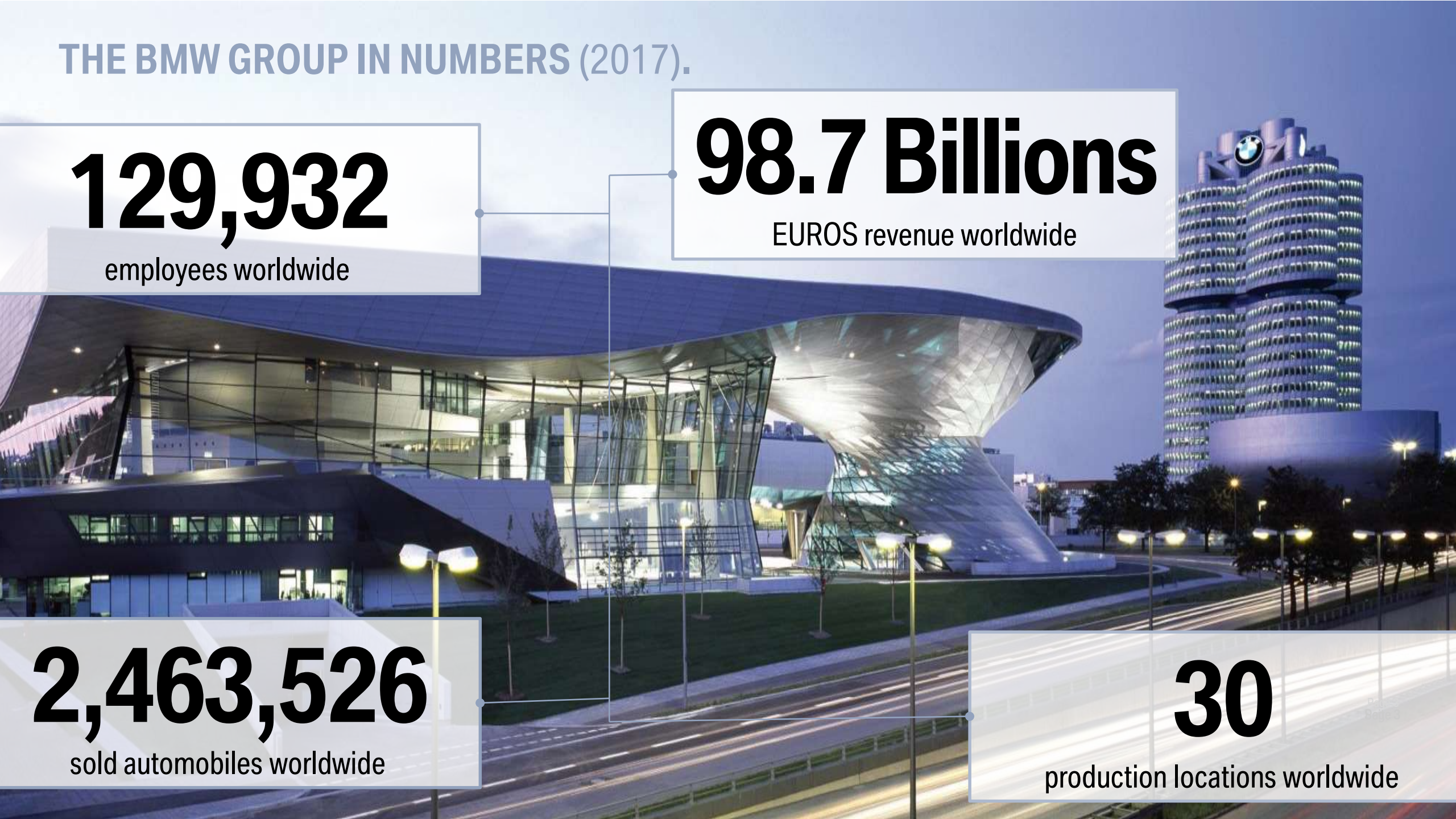
EUROS revenue worldwide

2,463,526

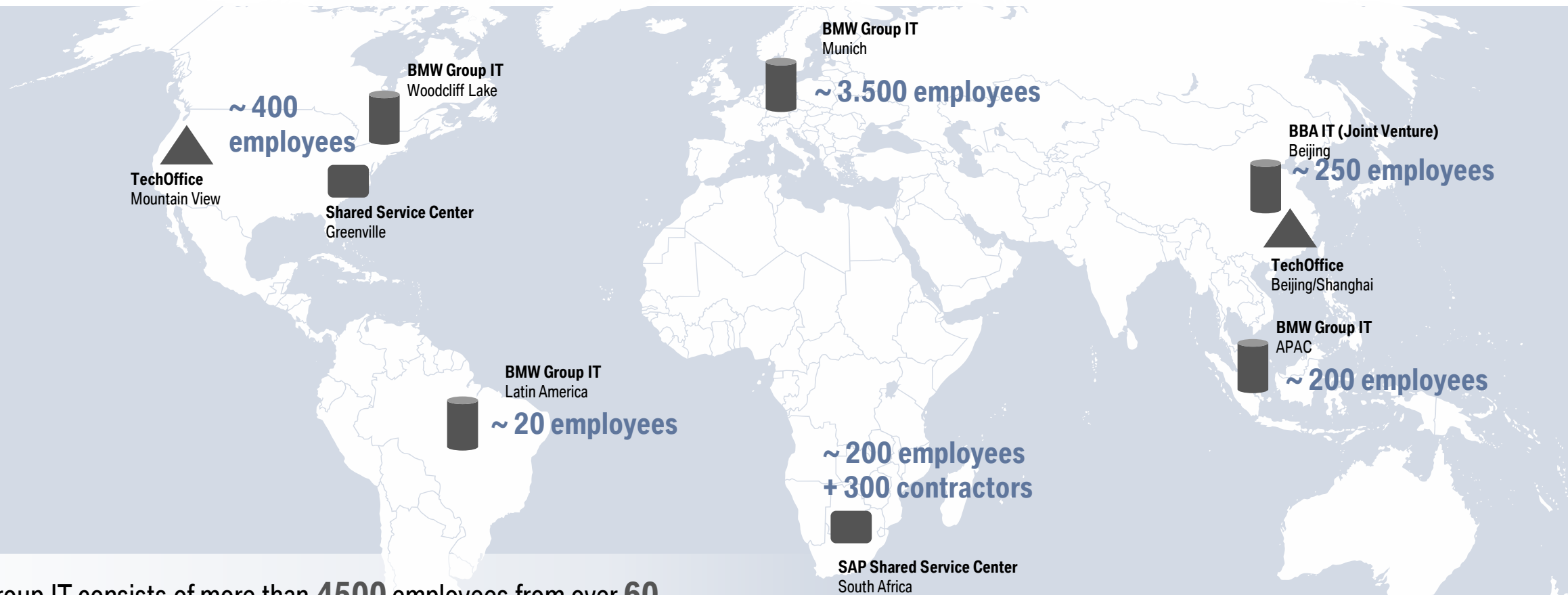
sold automobiles worldwide

30

production locations worldwide



A PRIMER ON THE BMW GROUP IT.



The BMW Group IT consists of more than **4500** employees from over **60** nationalities working in **29** countries all around the globe. We manage **450** software projects for all BMW business areas and speak **47** languages.

“BIG DATA, MACHINE LEARNING, ARTIFICIAL INTELLIGENCE” AT A GLANCE.

~100 Employees 20+ Divisions, for which use cases are currently being built

150+ conducted Use cases

Data Engineer
~20%

Data Scientist
~35%

Roles

Big Data Project Manager
~20%

Big Data Architect
~25%



Prospects, Use Cases, Projects







Data Lake



Plattform, Architecture, Tools



BUSINESS PROCESSES USING ADVANCED ANALYTICS AND MACHINE LEARNING

	Vehicle Development	Production	Aftersales	Digital Services
				
Use Case	TraceNet	Realtime Failure Detection in Assembly	Predictive Maintenance	Location-based Services
Data	Vehicle Trace Data	Images, Order Data	ECU / Vehicle Data	Geo/Location-Data, Fleet-Data

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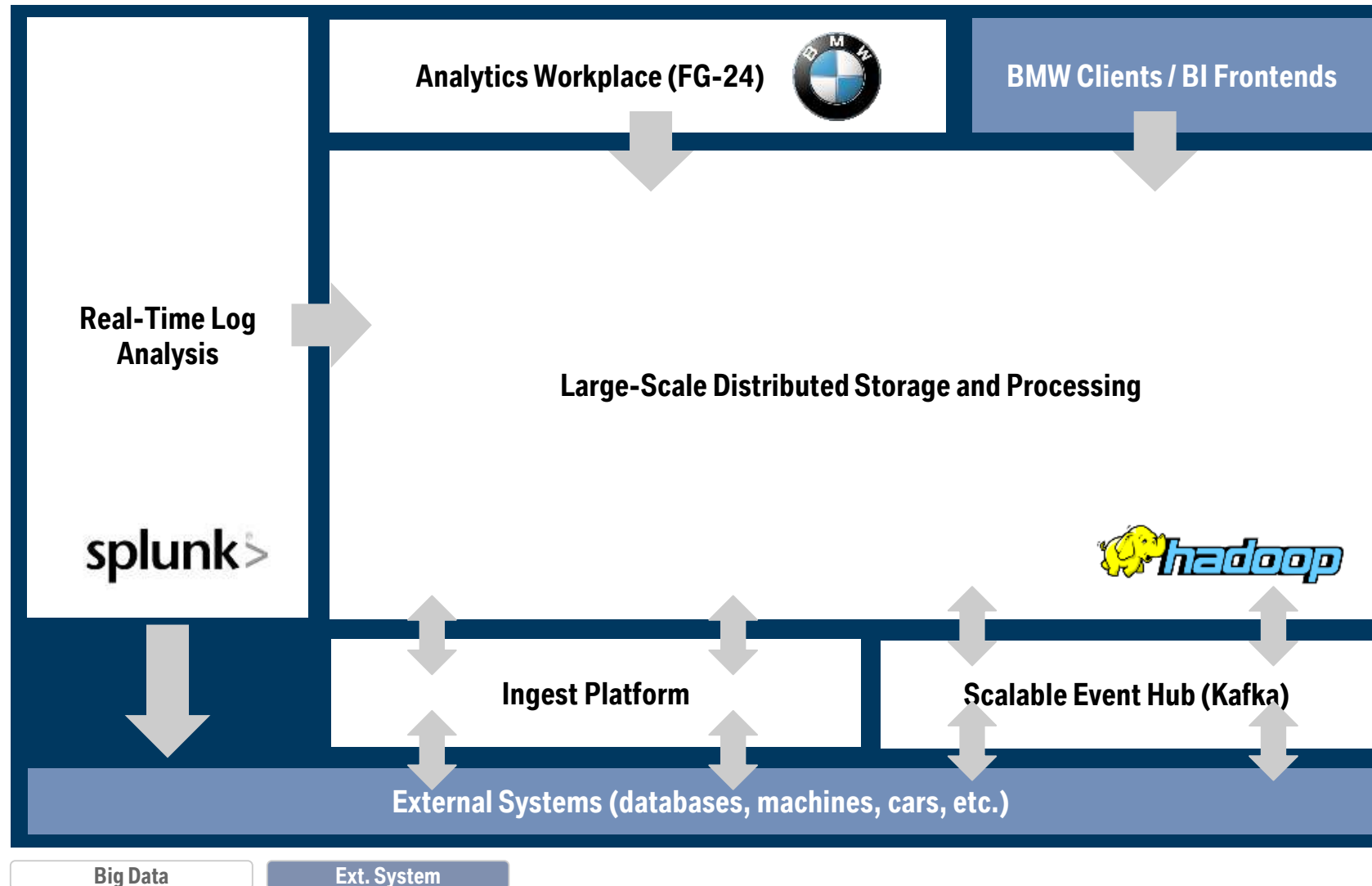
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Use Case: Driving Patterns.

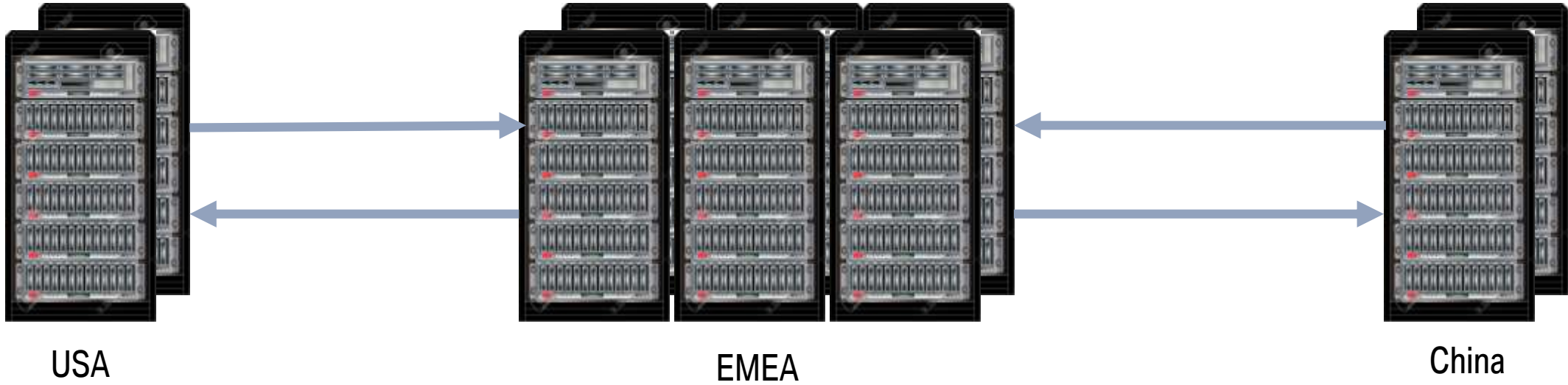
4

Use Case: On Demand Mobility.

BIG DATA PLATTFORM. HAUPTBESTANDTEILE.



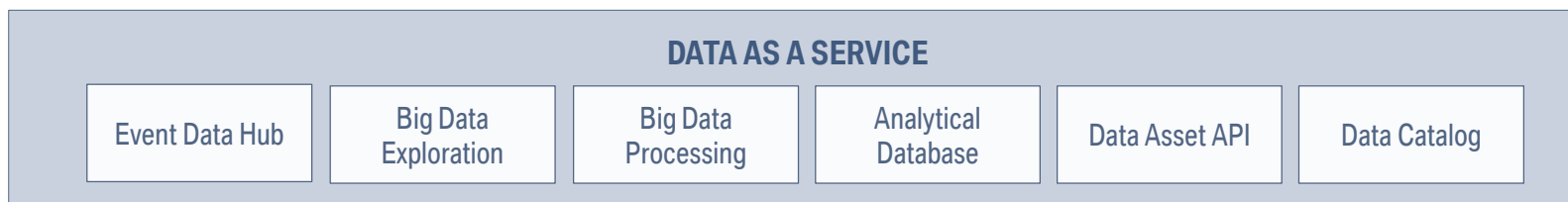
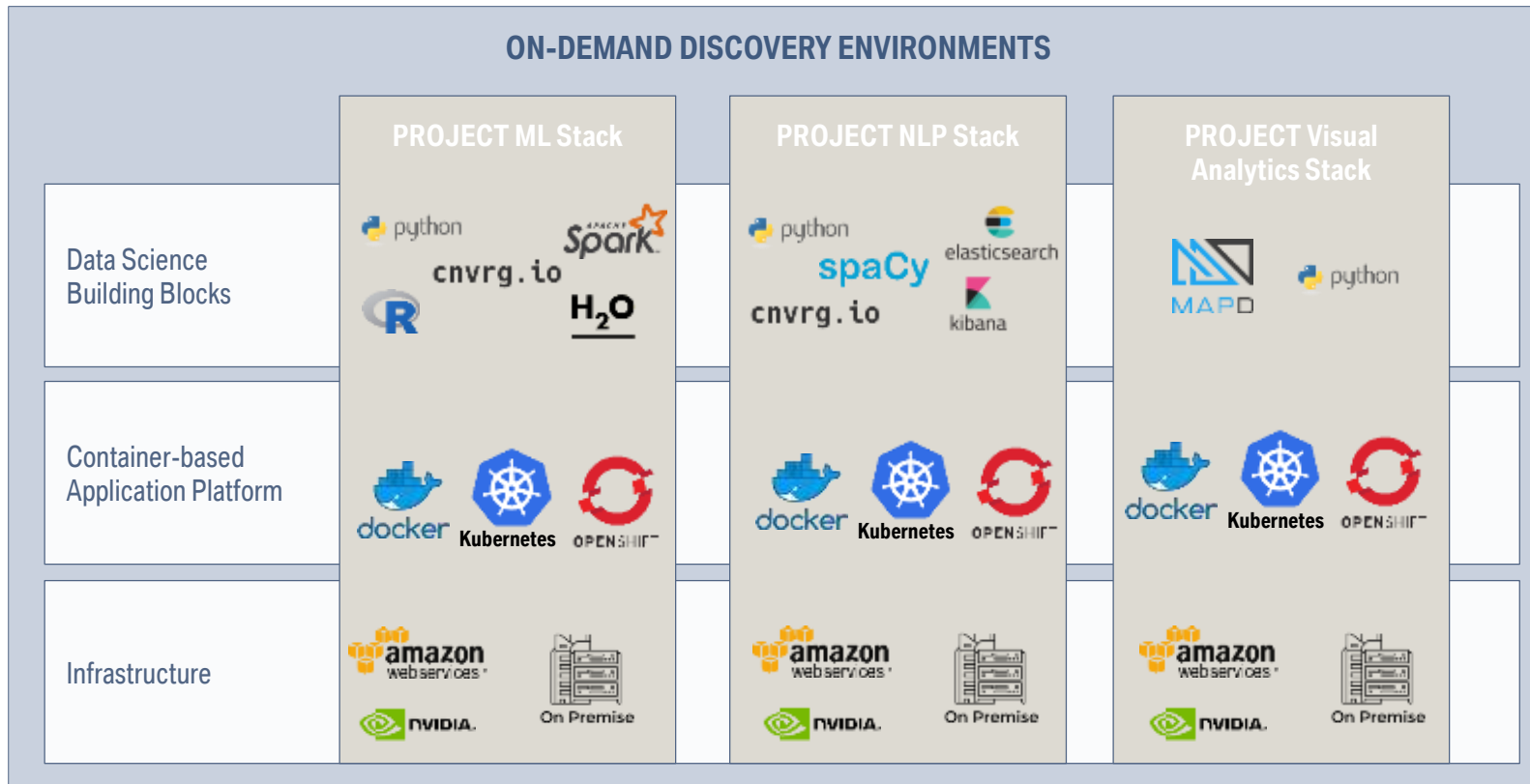
PLATFORM SIZING.



Location	Servers	CPU Cores	RAM	Disk Space
EMEA	256	10.240	49.152 GB	5,1 PB
USA	24	1.016	4.864 GB	1,1 PB
China	16	680	3.328 GB	0,7 PB

ON-DEMAND ENVIRONMENTS FOR DISCOVERIES

AUTOMATED PROVISION OF DATA SCIENCE TOOLS.



Conclusion:

- Automated provisioning and configuration of data science environments help data scientists to focus on their job.
- Isolated environments reduce risk of unwanted impacts among projects.
- Portability through containerization
- Integration with our Big Data Platform (e.g. Spark, Hive, Kafka) + GPU Support (DGX-1, Cluster GPUs)

DATA LAKE: BREAKING UP DATA SILOS ACROSS THE COMPANY.

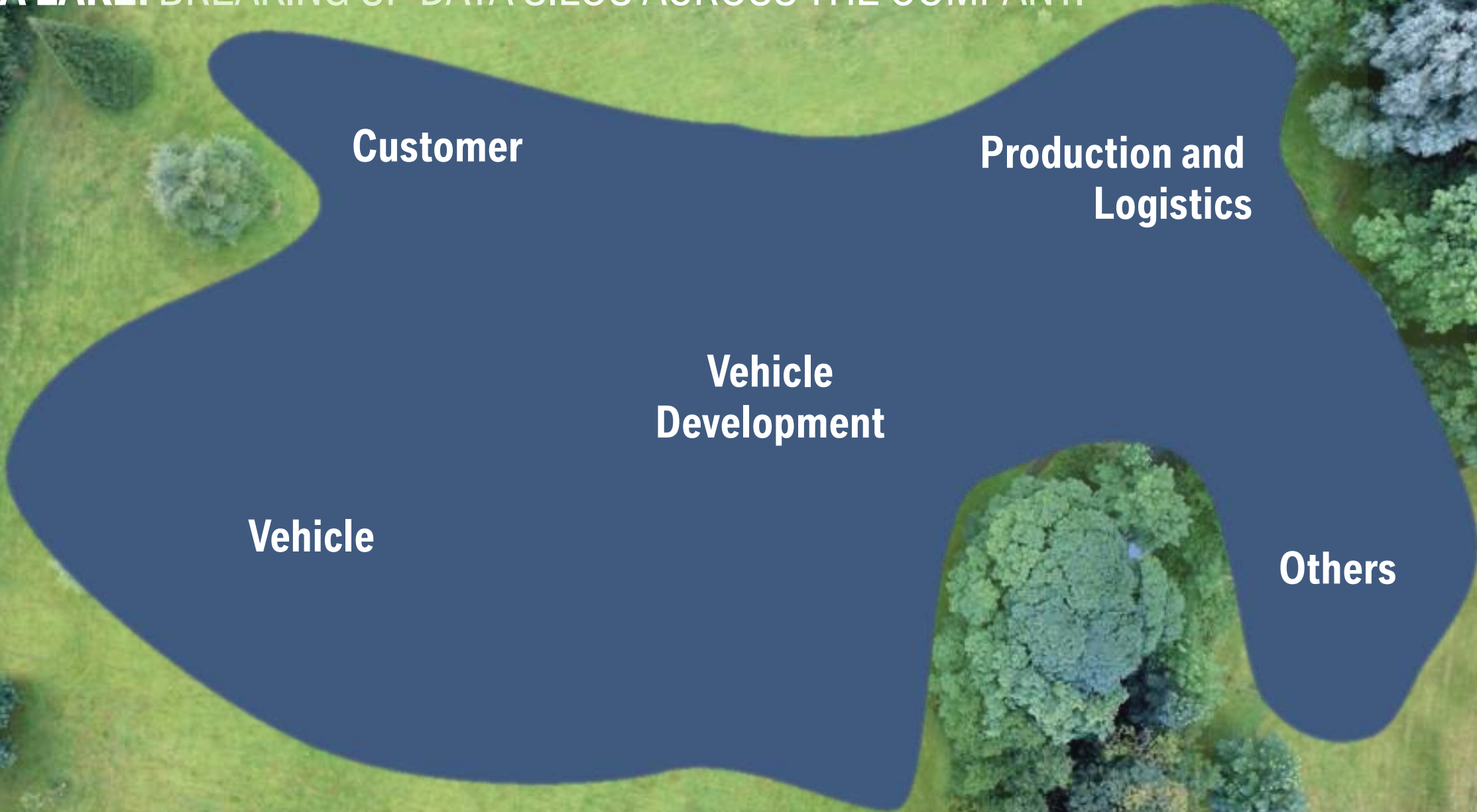
Customer

**Production and
Logistics**

**Vehicle
Development**

Vehicle

Others



FACTS AND FIGURES.

3 PB of Data

40 Areas
as Users

55 Data Assets live

300 TB of Data
Assets

3 Platforms on
3 Continents



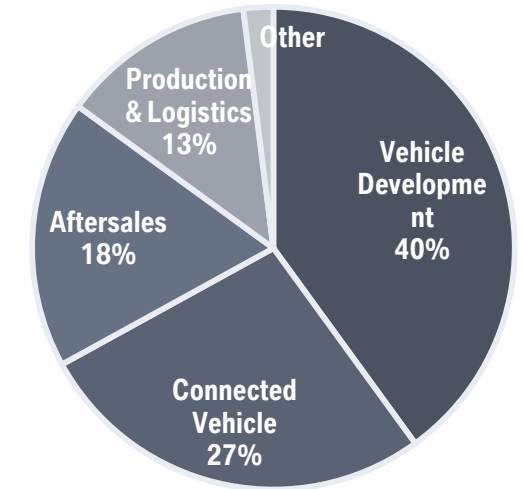
26+ Data Assets on
the Roadmap

32 Data Stewards

1 TB Data Assets
Growth per Day

1 Big Data Catalog

Data from all Business Areas



161 Data Scientists and Business
Analysts as Users

From **45** Departments

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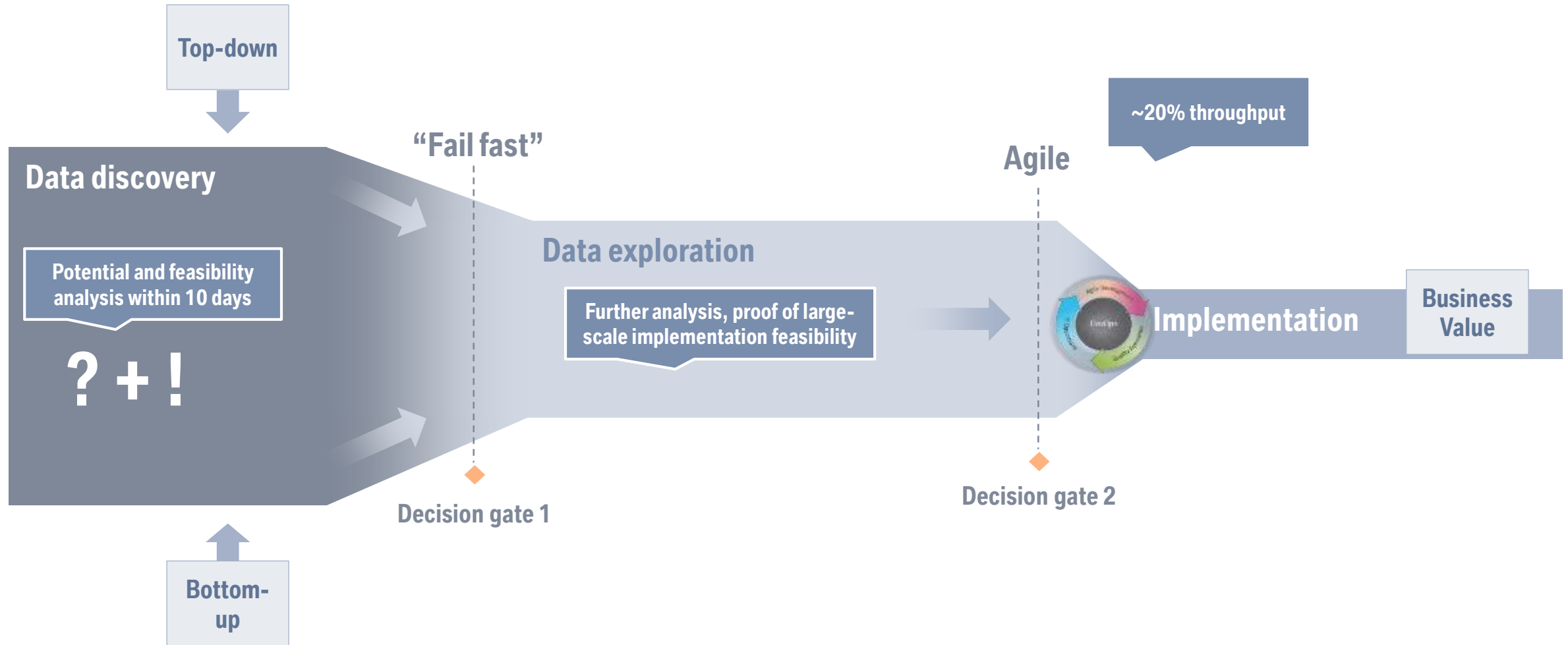
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Use Case: On Demand Mobility.

FROM IDEA TO IMPLEMENTATION. „AI DELIVERY MODEL“.

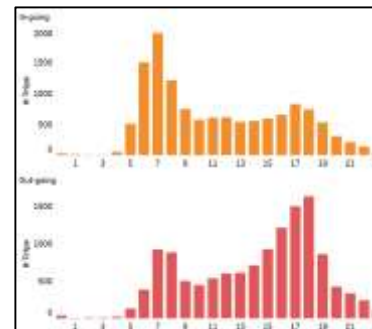


EXAMPLE: THE VALUE OF OUR BMW FLEET DATA.

COLLECT DATA



ANALYZE



ACT

- Derive requirements for HAD/FAD
- Evaluate design specifications
- Marketing hotspots in cities
- Launch area for parking app
- Robot Taxi Strategies
- Reduce Product Complexity (based on usage)
- ...

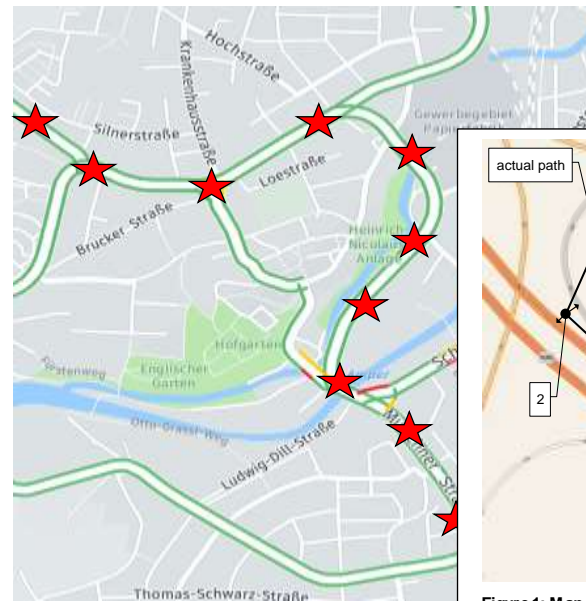
MAP MATCHING – MOTIVATION.

Map



- Complex data model
- 100 Mio. street segments (Europa)

Map-Matching



- Statistical Problem
- Depends on map and geo data

Figure 1: Map matching consists of matching measured locations (black dots) to the road network in order to infer the vehicle's actual path (light gray curve). Merely matching to the nearest road is prone to mistakes.

Scaling

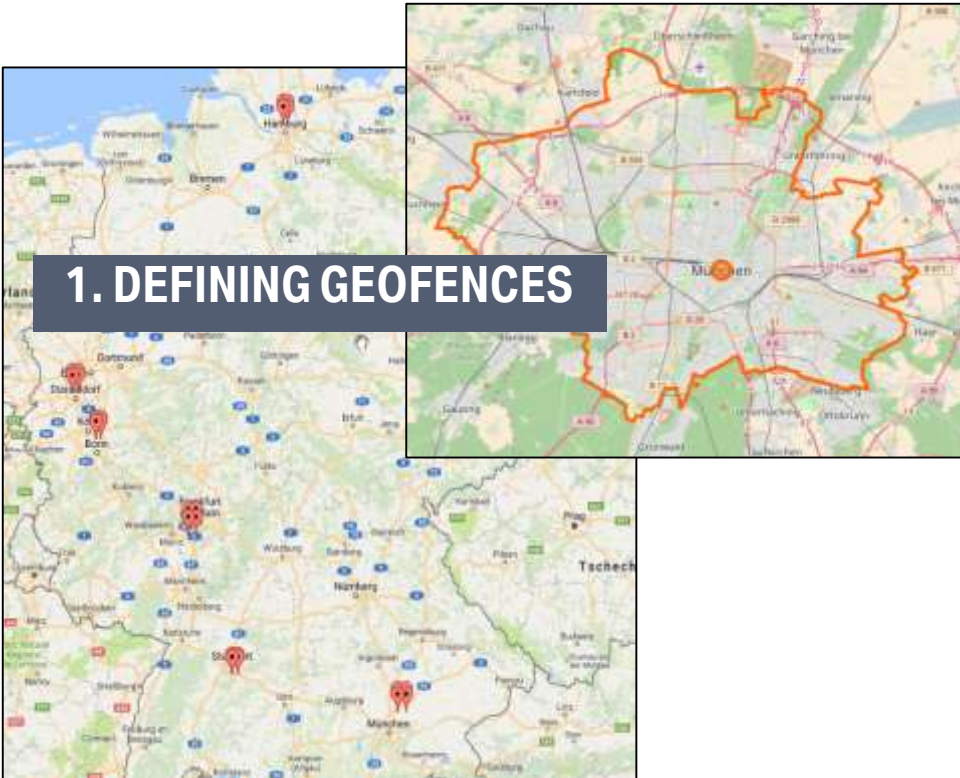


- Distributed computing
- Scales horizontally

LAUNCHING PARKING APP IN CITIES / AIRPORTS.

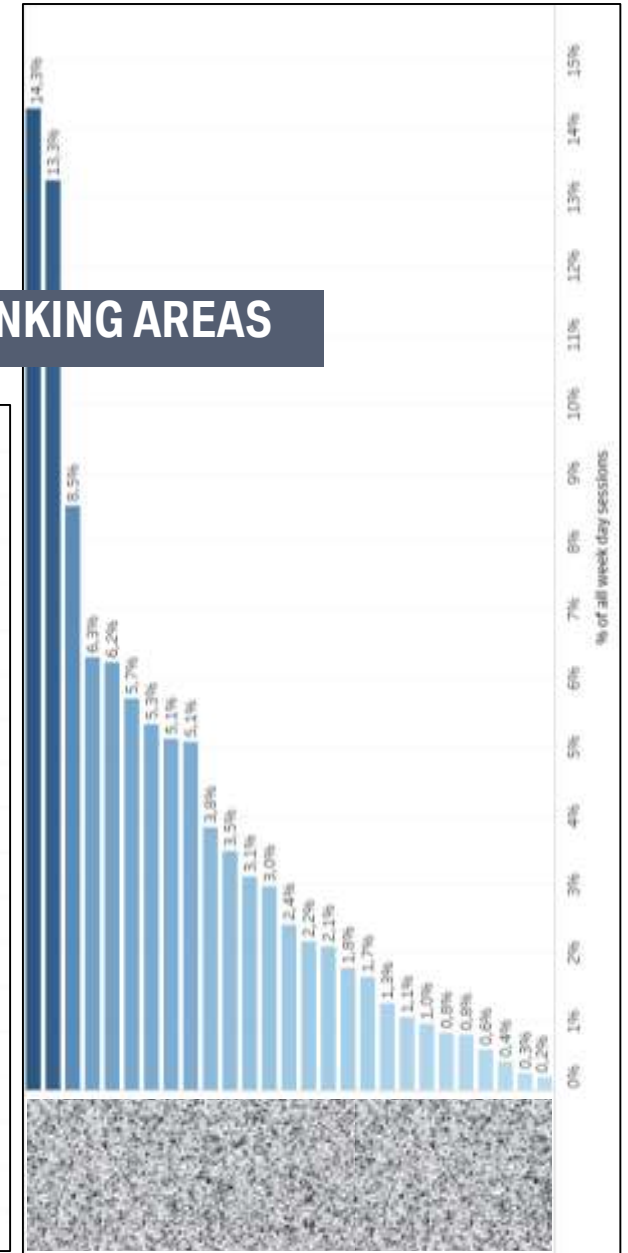
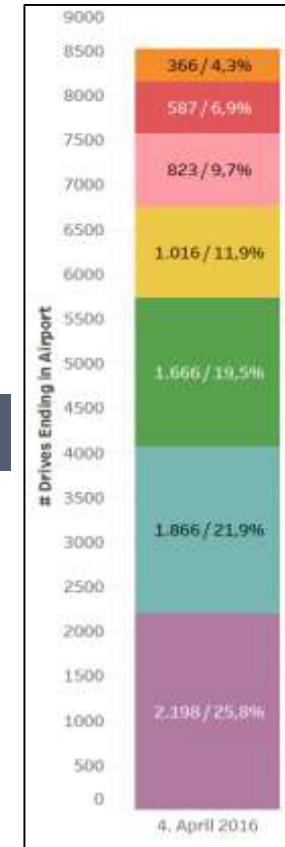
- Which cities / airports should be prioritized when launching a new parking app?
- How many BMW's enter certain cities / airports per day?

1. DEFINING GEOFENCES



2. COUNTING ACTIVITY

3. RANKING AREAS



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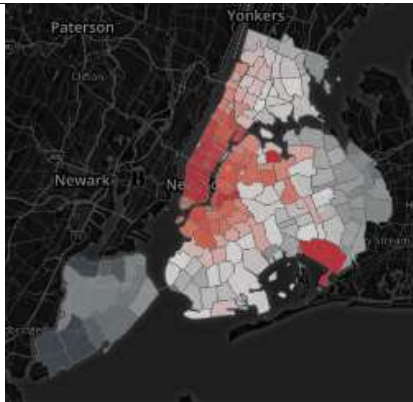
Use Case: On Demand Mobility.

On-demand mobility



THE ROLE OF DATA IN ON-DEMAND MOBILITY.

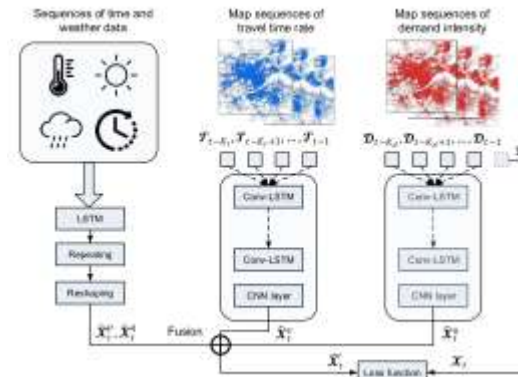
ODM SERVICES



Success factors
Price, QoS, ETA, ...

Data

DEMAND PREDICTION



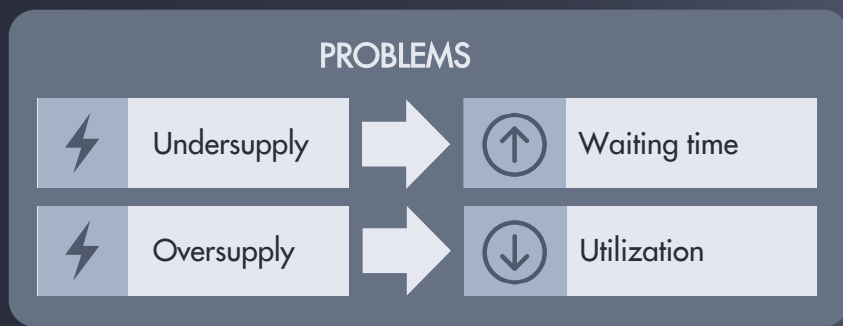
Where, when and how many ride requests do we have at any given moment in time?

Model

FLEET INTELLIGENCE



Which driver picks up the passenger and which route does the driver take?



Mid- and short-term demand prediction



1. Match supply with demand distributions.
2. Incentivize drivers moving from oversupply regions to overdemand regions.



Thank you.