

Digital capabilities and IT architectures for mobile-enabled business models

11.06.2024 / Goethe University / Carsten Hentrich, PhD





Technology-enabled

Digital marketing & sales

Generating data

Extending traditional offerings through digital services





Transaction-oriented

Internet of things

Automated transactions

Usage-based service models





Customer Experience

Customer-centricity

Personalized offerings

Digital customer profiles





Solution-oriented

Supporting personal goals

E2E-solutions

Integration of partners



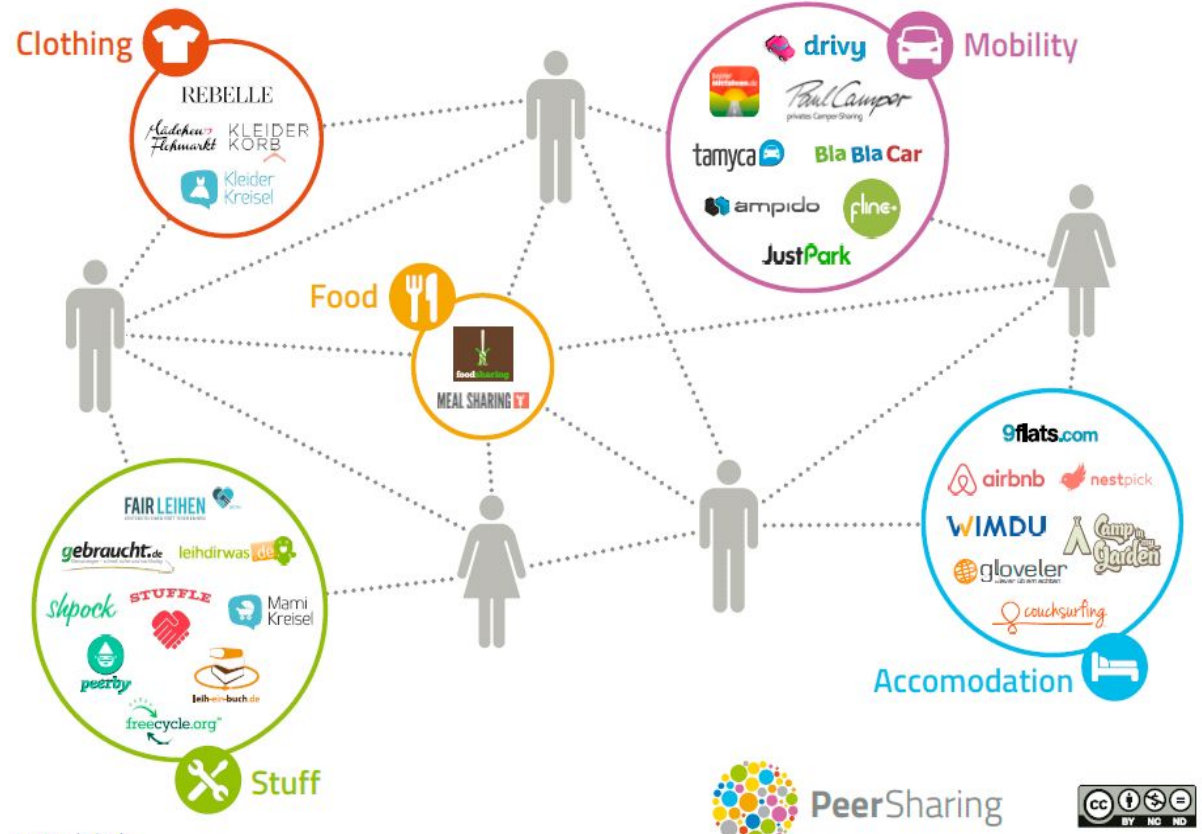


Open Digital

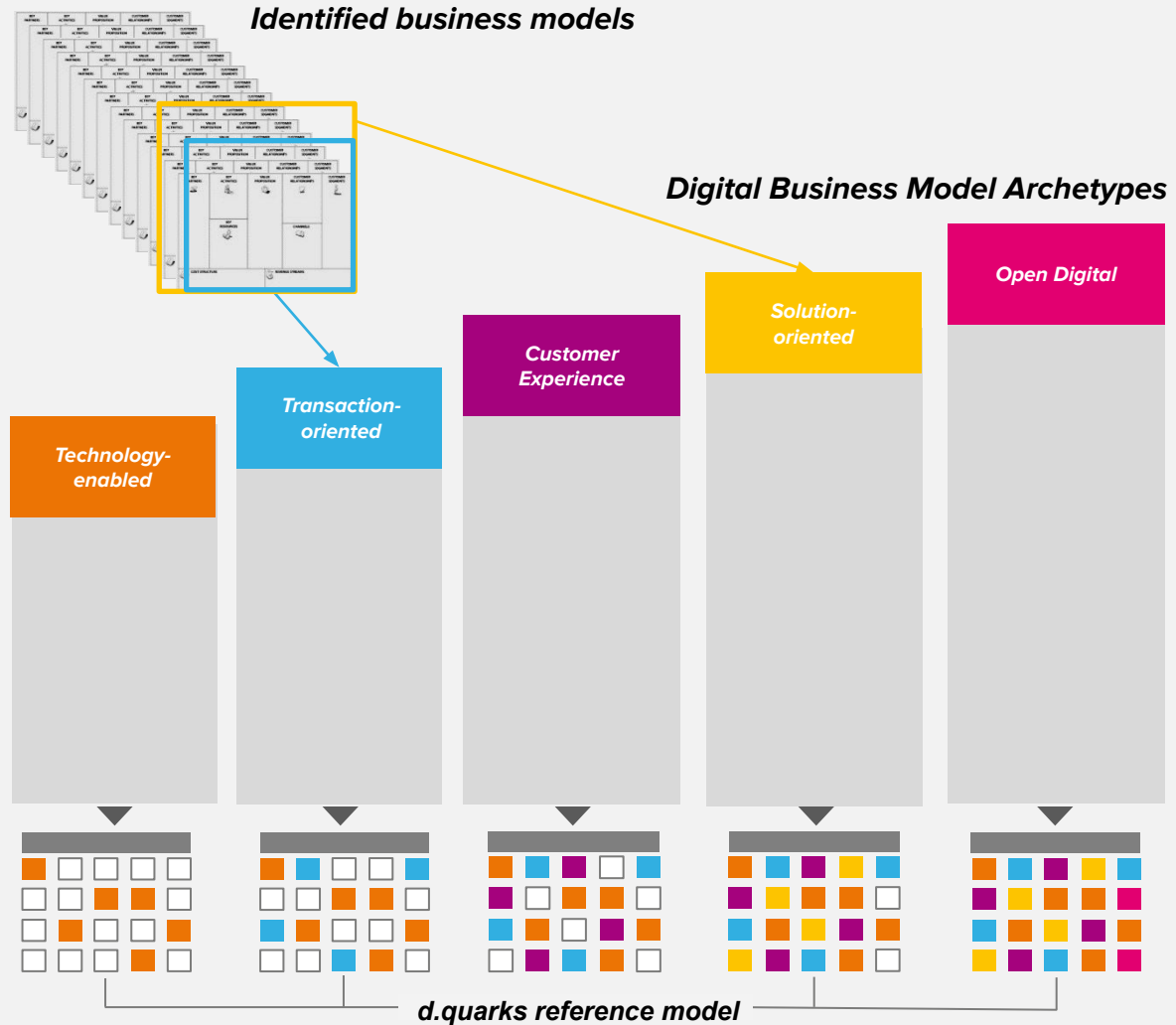
Ecosystem

Network for value creation

Co-Creation



Assigning business models to the corresponding archetypes speeds up and facilitates the derivation of required skills „d.quarks” (capabilities)



What is a capability?

Capability:

Requires a combination of **organization, people & skills, processes** and **technology**



Capability “brew coffee”

People & Skills



Barista / Staff

Organization



Coffee Shop / Franchise model

Technology



Coffee Machine

Process (“brew coffee”)

Fill in water



Fill in coffee



Put a mug under the
dispenser

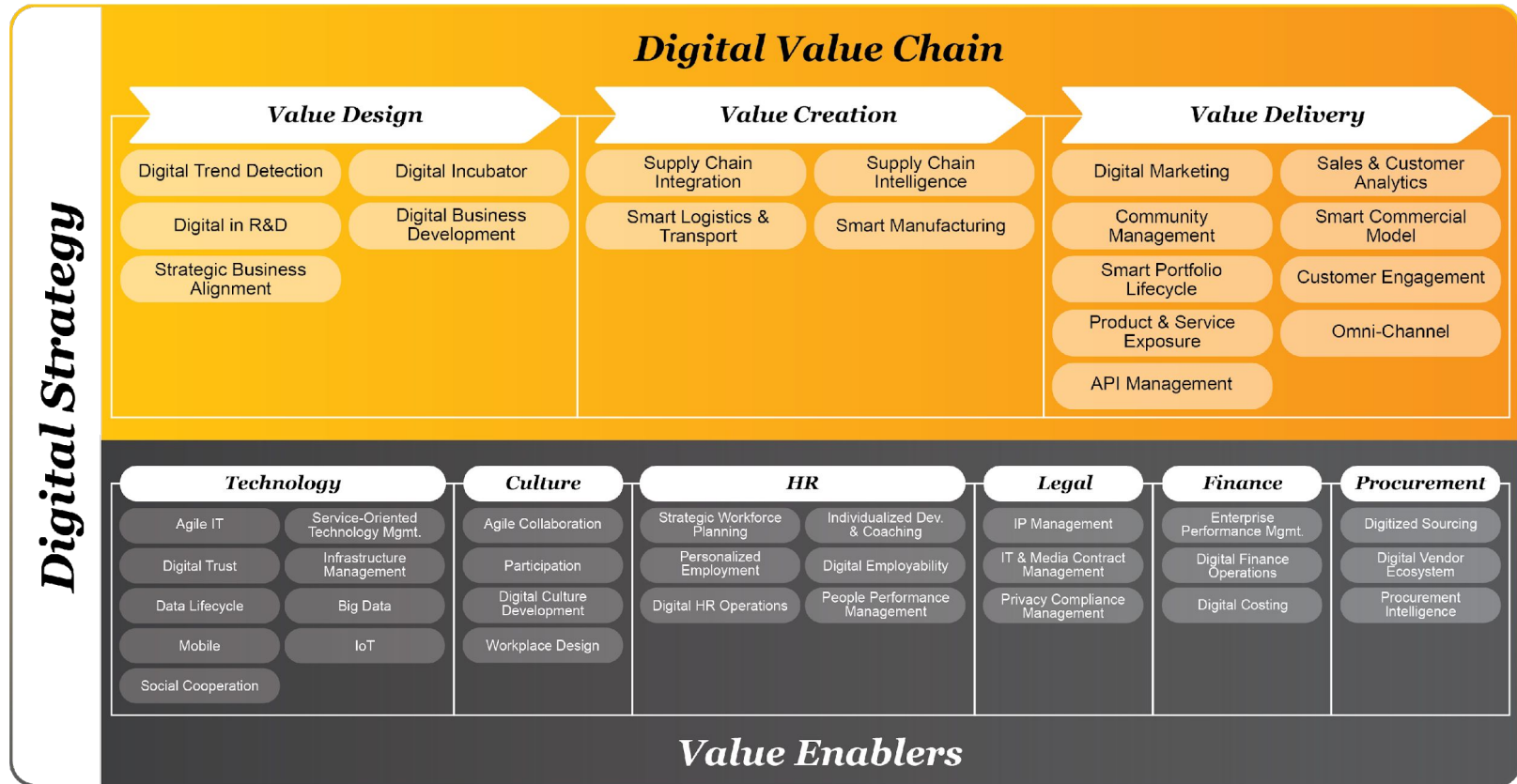


Select coffee type
and strength



Activate brewing

d.quarks represent the capabilities that companies need in order to design, enable, and deliver digital value creation

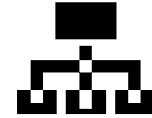


d.quarks

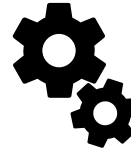
– digital capabilities are the building blocks of digital transformation



People & Skills



Organization

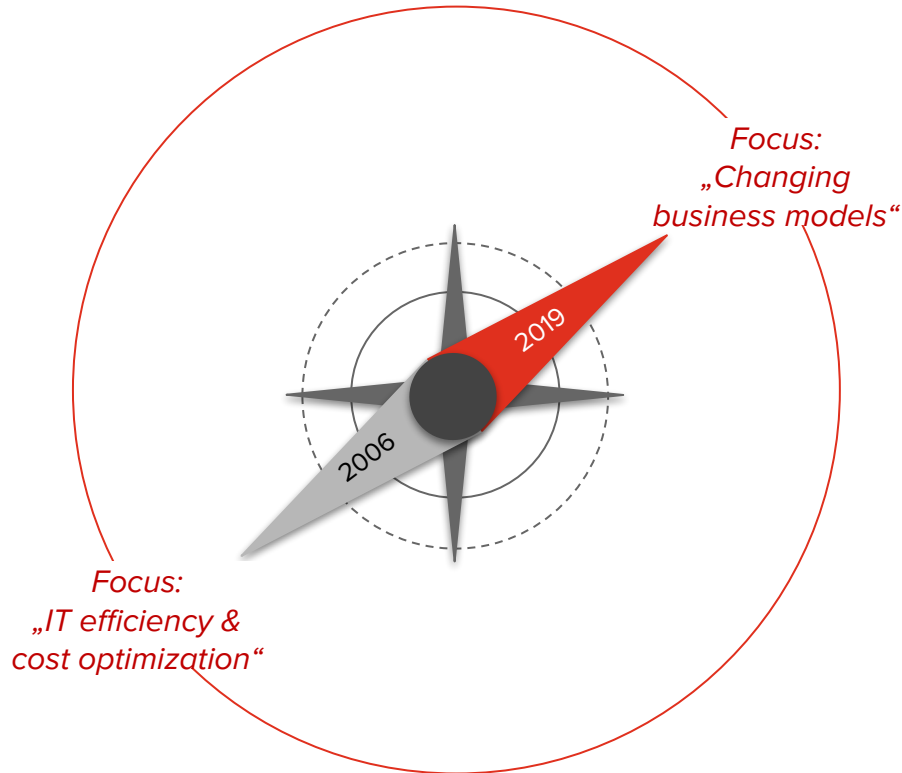


Processes



Technology

Today, IT is going to be the enabler for technology-enabled business models



Business advantages



Help create business outcome



Reduce time-to-market



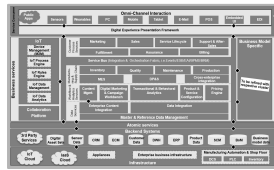
Provide business services,
not just IT

Agile Architectures are one way to enable the agility of a company

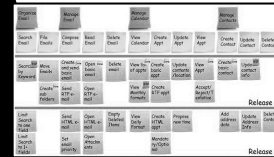
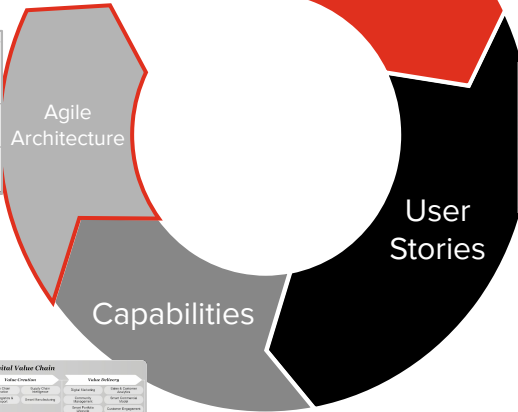


Business Model –
Business Model Canvas

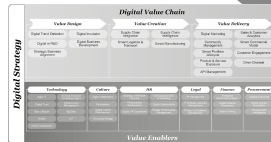
Business Model



Agile Architecture –
Functional Building Blocks



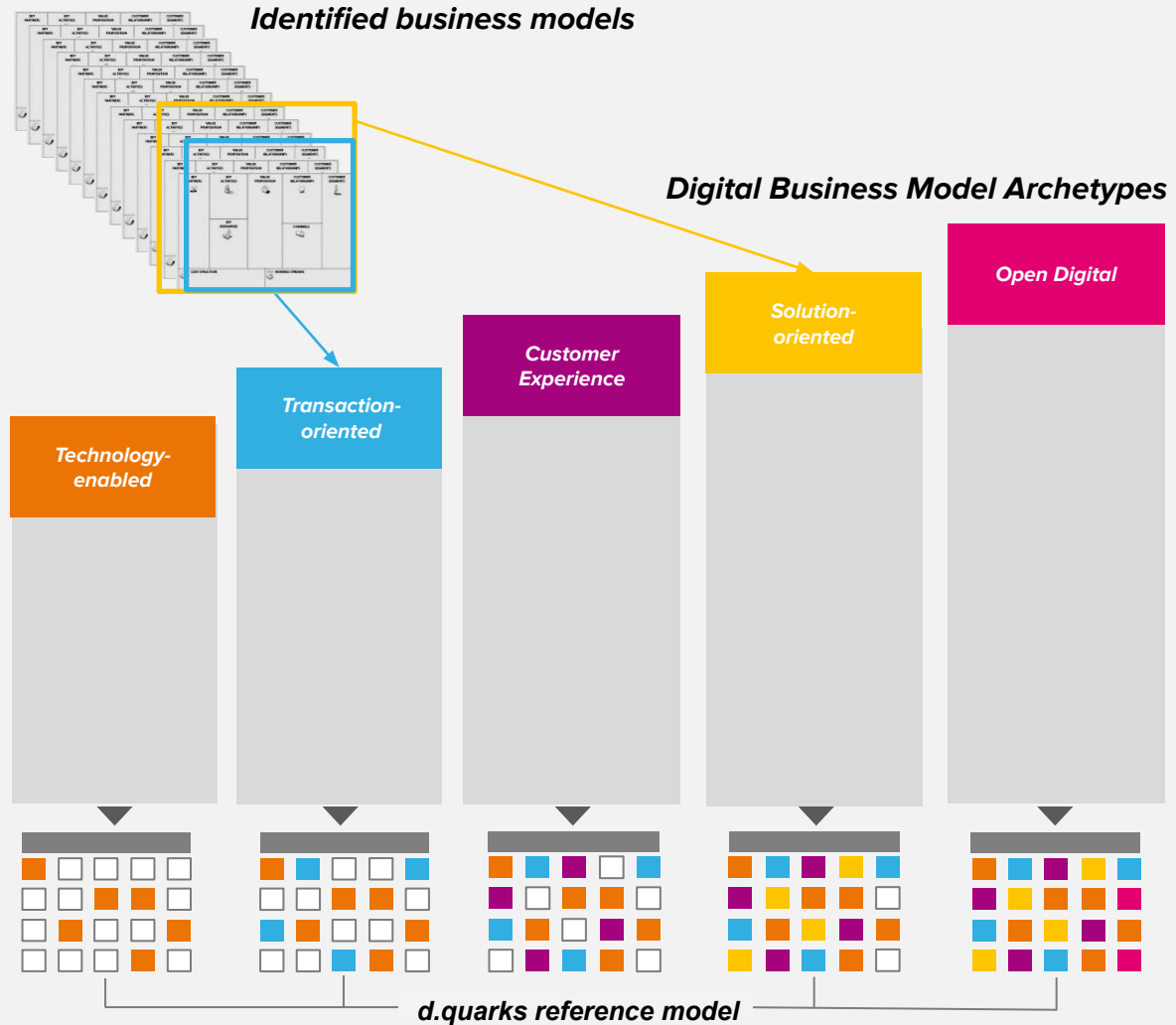
Agile Project – User Stories



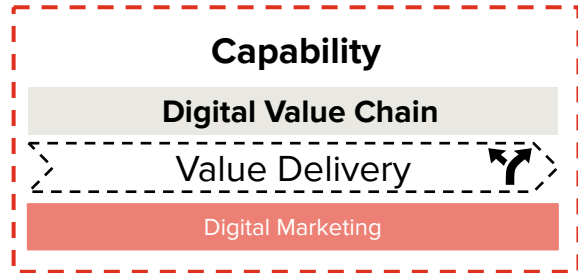
Digital Transformation –
Digital Capabilities (d.quarks)

“ Agile Architecture – a hands-on, non-academic approach to enable fast time-to-market, agile projects, and digital transformation in general

Assigning business models to the corresponding archetypes speeds up and facilitates the derivation of required skills „d.quarks” (capabilities)



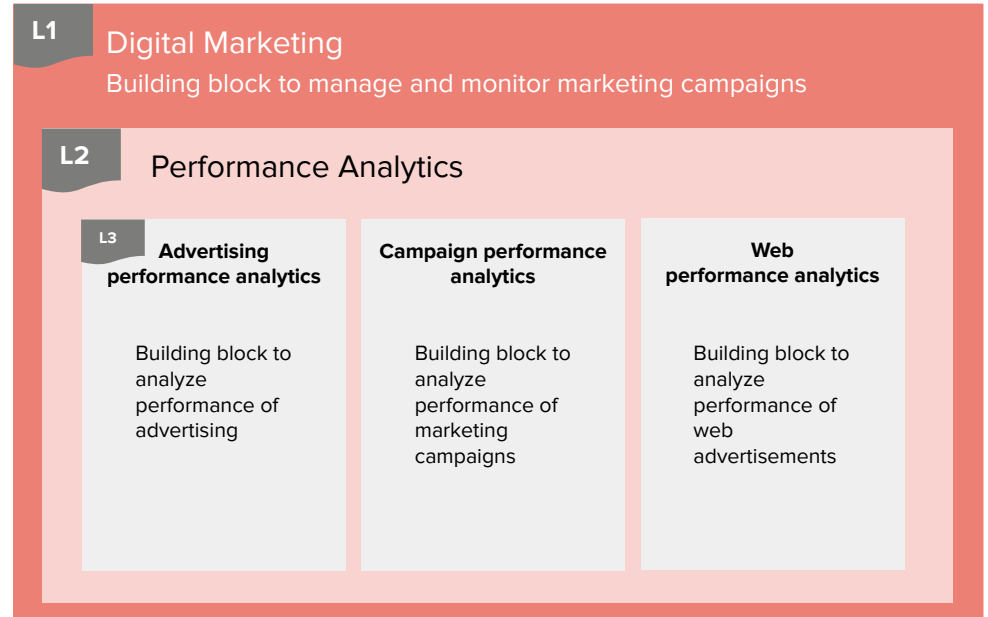
To translate your capabilities into an architecture you need to describe functional building blocks



Building Block



Functional Building Block description with 3 level

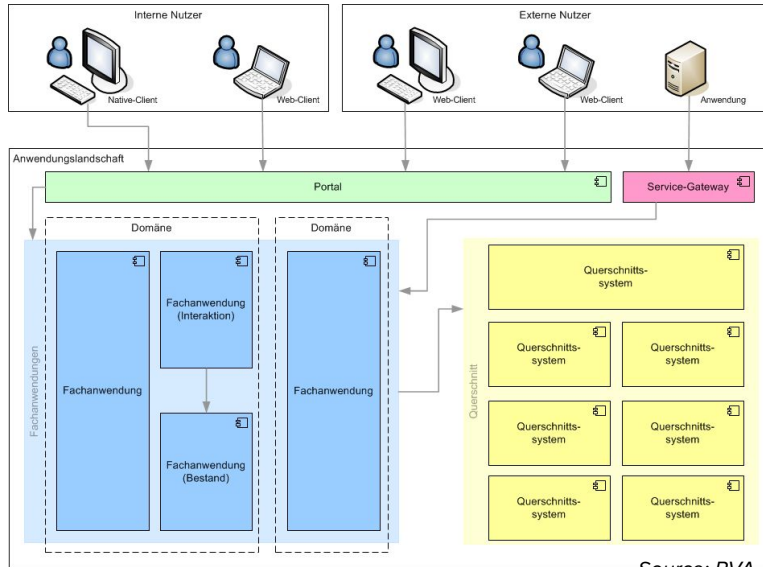


Building blocks are reusable and not technology specific

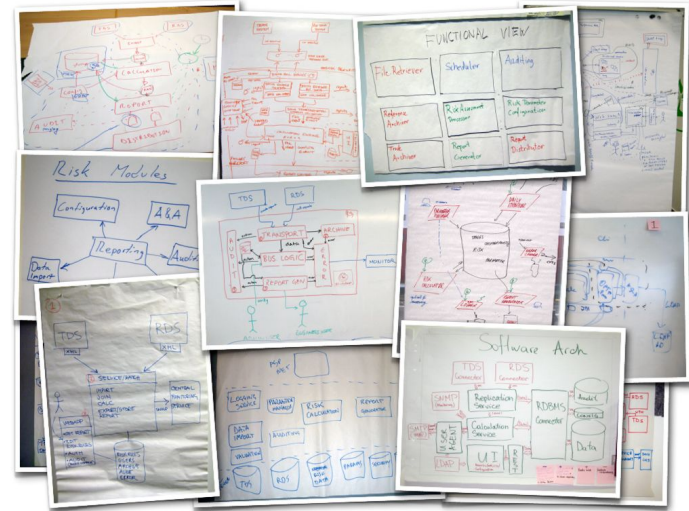
What is an Architecture?

A well-defined practice for conducting analysis, design, planning, and implementation, using a comprehensive approach at all times generating different views.

Functional View



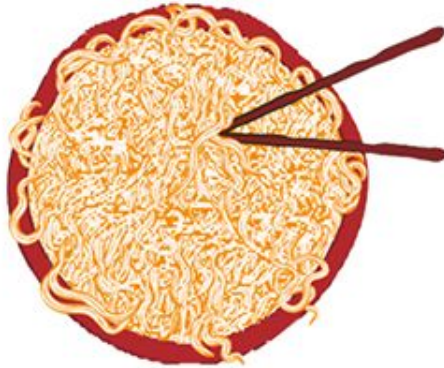
Chaotic View



Microservices architecture is a variant of the service-oriented architecture with fine grained services for improved modularity

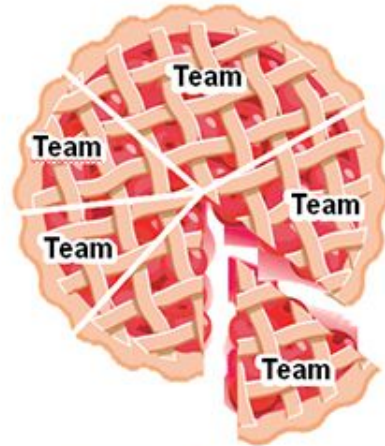
1990s and earlier

Pre-SOA (monolithic)
Tight coupling



2000s

Traditional SOA
Looser coupling



2010s

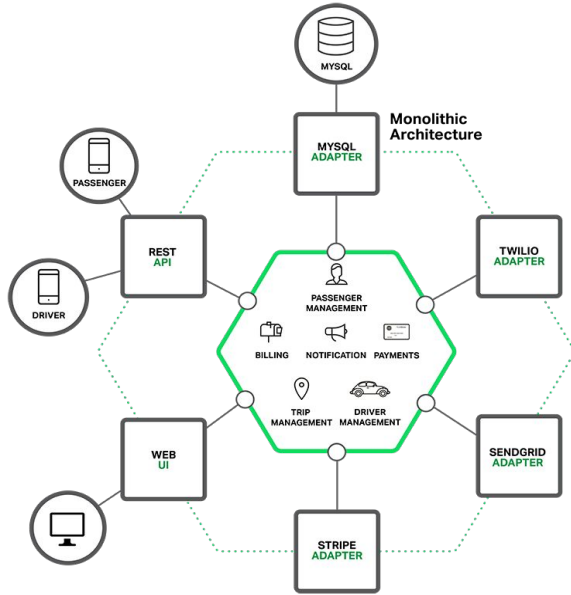
Microservices
Decoupled



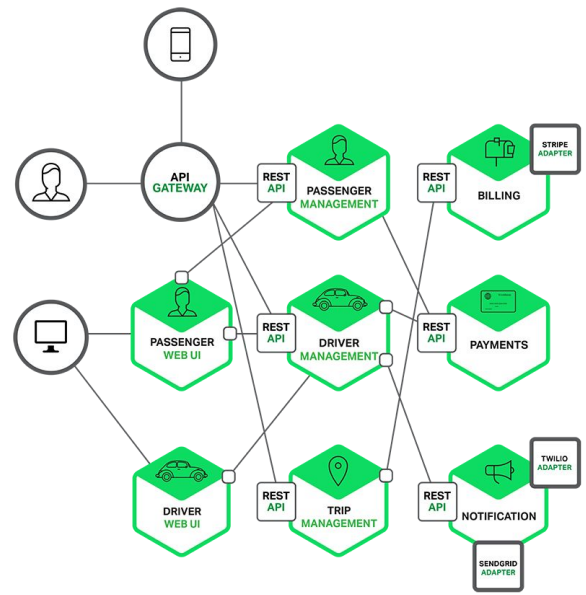
A Microservices Architecture enables a modular and more flexible architecture for developing an E2E-service

Implementation of a taxi-hailing service

Monolithic Architecture

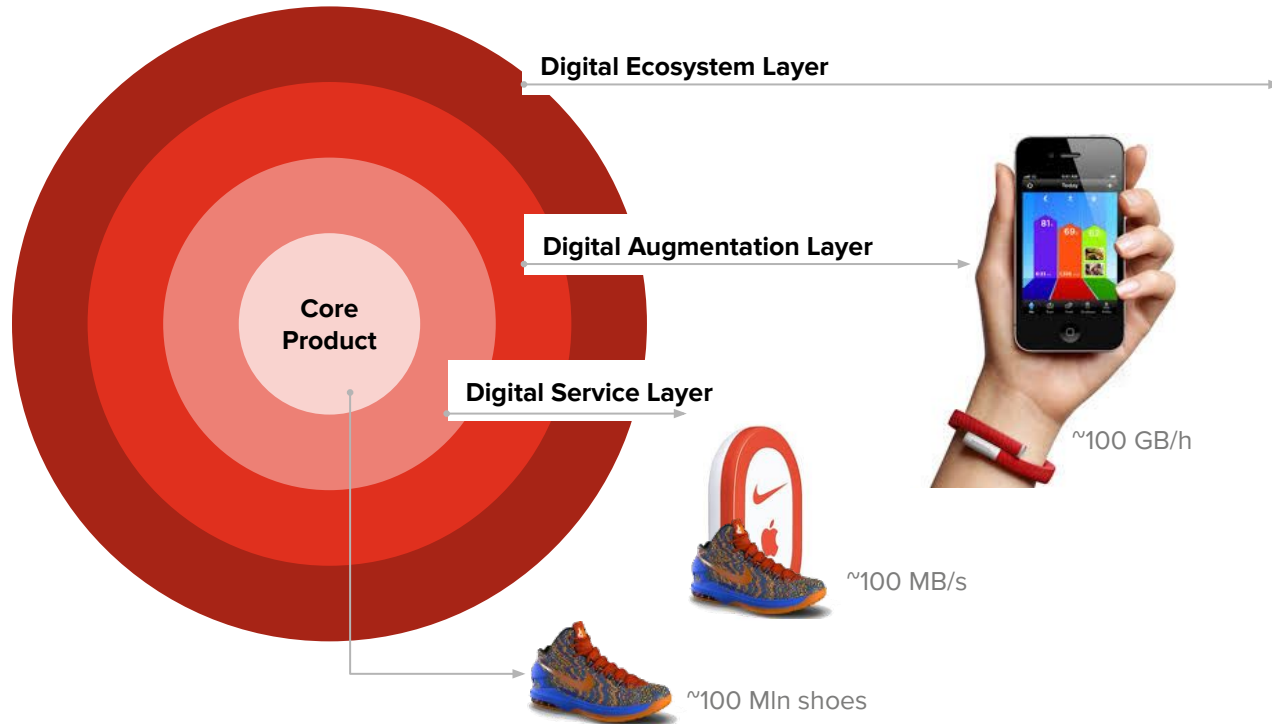


Microservices Architecture



Source: <https://www.nginx.com/blog/introduction-to-microservices/>

Smart Products and Smart Services generate an enormous amount of data



~1 PB/year

For Comparison LHC data
70 PB/year

What questions do you need to answer when designing a data landscape?

WHAT

WHAT is the data:
type, classification,
format, structure, ...?

Type of data

Structure

Classification

Quality

Format

Volume

WHERE

WHERE is the data
coming from:
availability, source,
access, ...?



WHO

WHO accesses,
owns, governs,
ensures quality... of
the data?



HOW

HOW is it used:
reporting, planning,
forecasting,
automation...?



Reporting



Automation



Forecasting



Planning

So how does that translate to an architecture?

WHAT

**Storage
Layer**

Relational DB

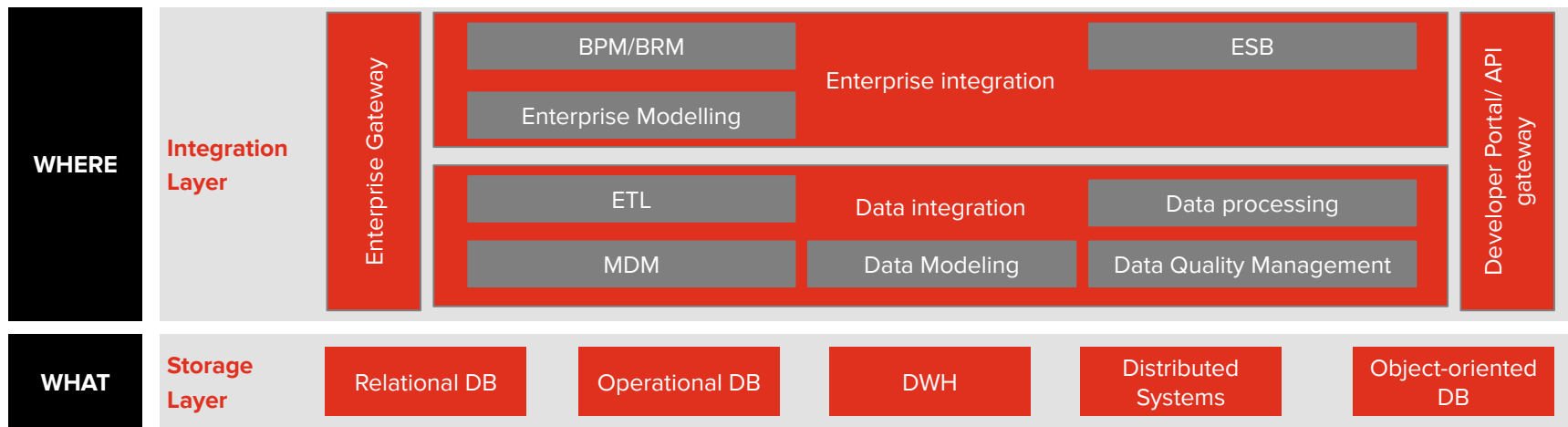
Operational DB

DWH

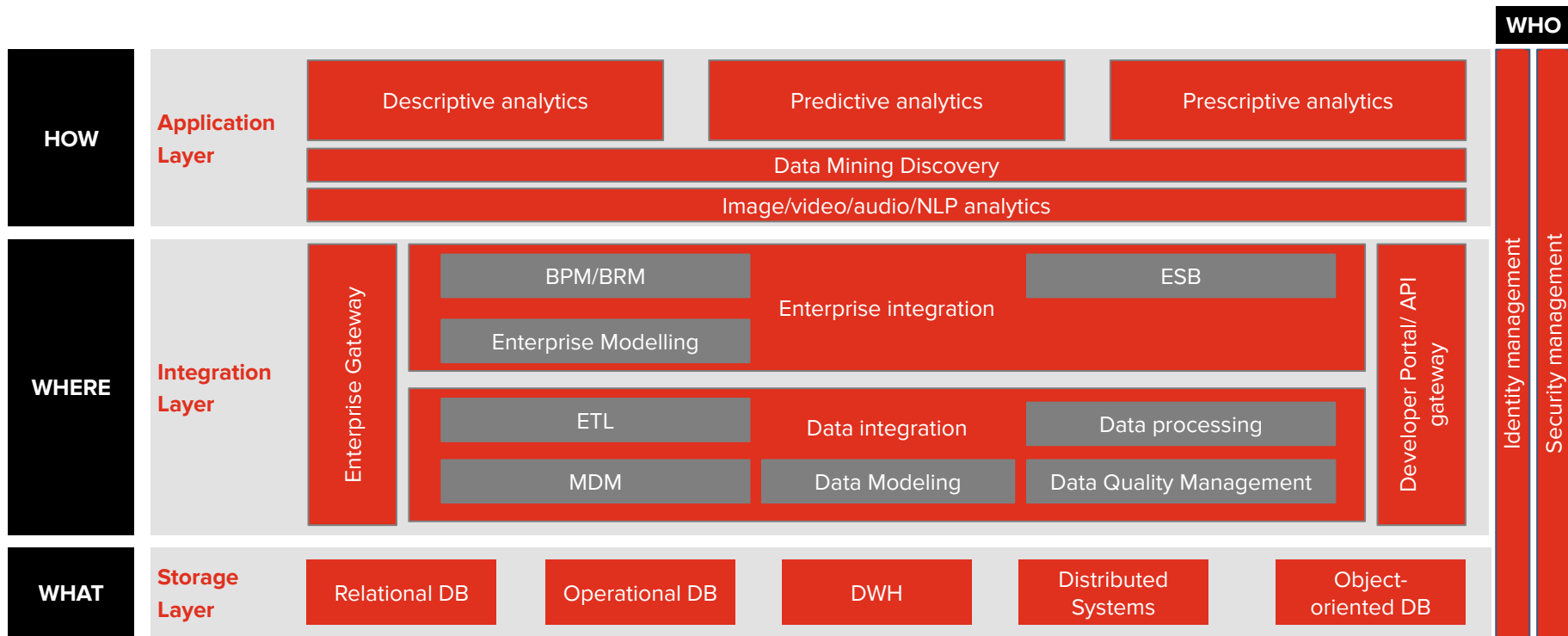
Distributed
Systems

Object-oriented
DB

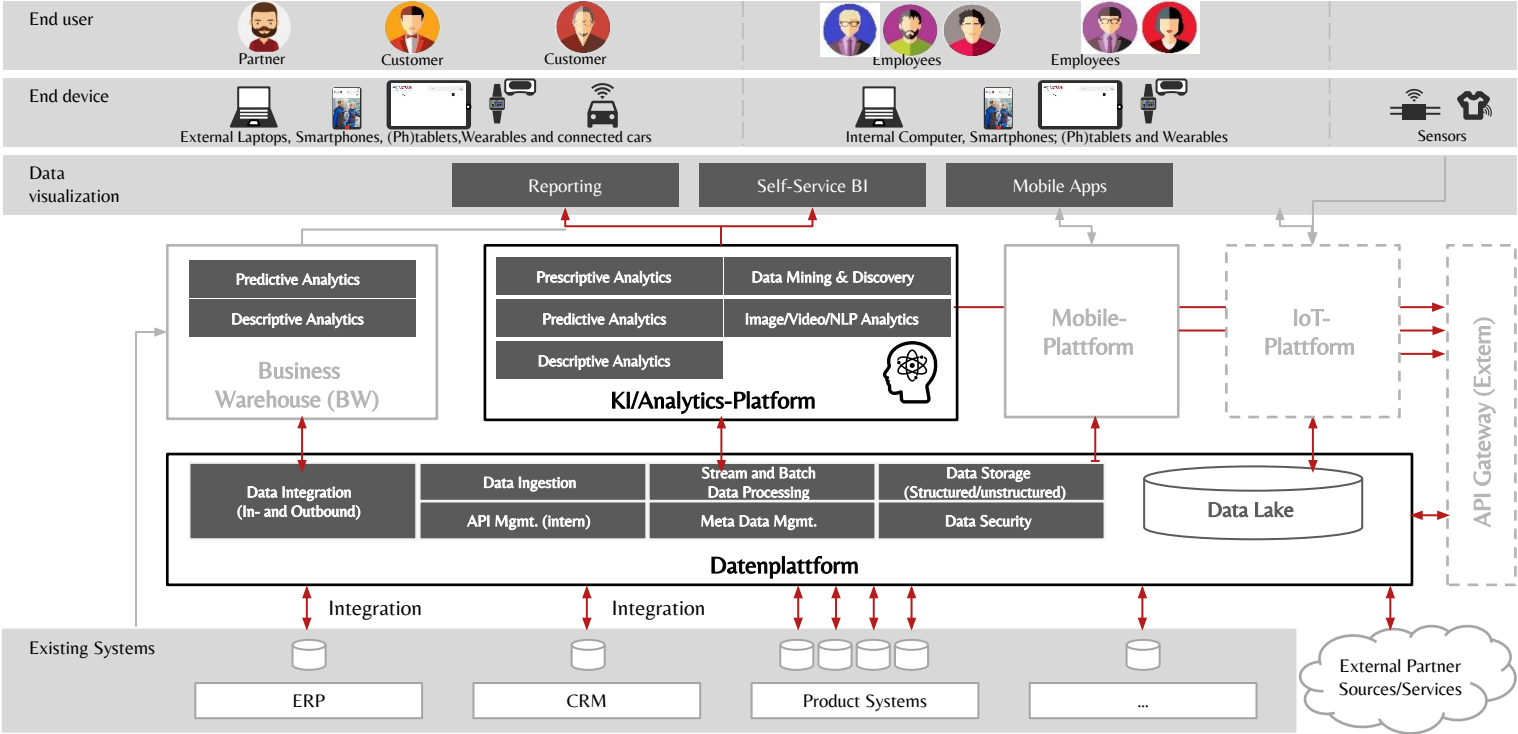
So how does that translate to an architecture?



So how does that translate to an architecture?



Data Architecture - Client Example



What problem are you solving? What value will you create?

Usefulness = Value



Is achieved by good UX development

Usability = Ease of Use



Is achieved by good UI design



The following three dimensions of a mobile frontend need to be considered

Users

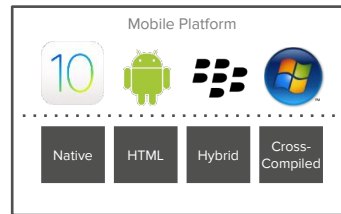


- Different data access needs
- Different functionalities required
- Different usage environments



Depending on the users different demands need to be fulfilled

Software



- Availability of developers
- Availability of SDKs and other development tools
- App Store ecosystem



Depending on the mobile platform different requirements arise

Hardware



- Different display size
- Different performance and functionality
- Responsive Design



Depending on the selected devices different requirements need to be fulfilled

Choosing between a native, web, or hybrid app

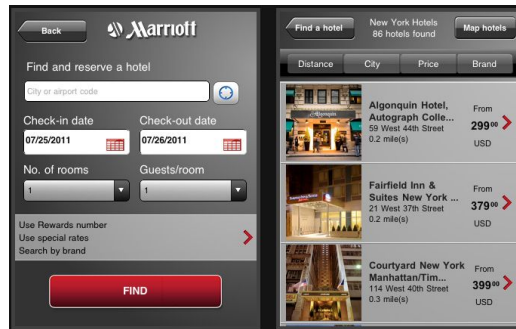
Native App

A **native app** is written in the **programming language specific for a platform**, the most popular being Objective-C or Swift for Apple devices and Java for Android devices.



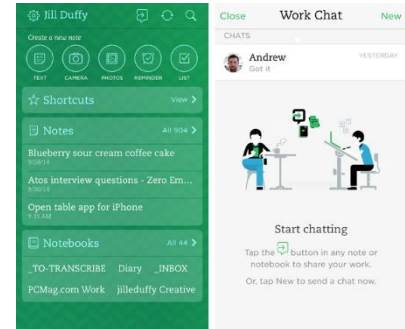
Web App

A **web app** is an app **written in web code** that is similar to a website but more interactive so it feels like an app on mobile devices.

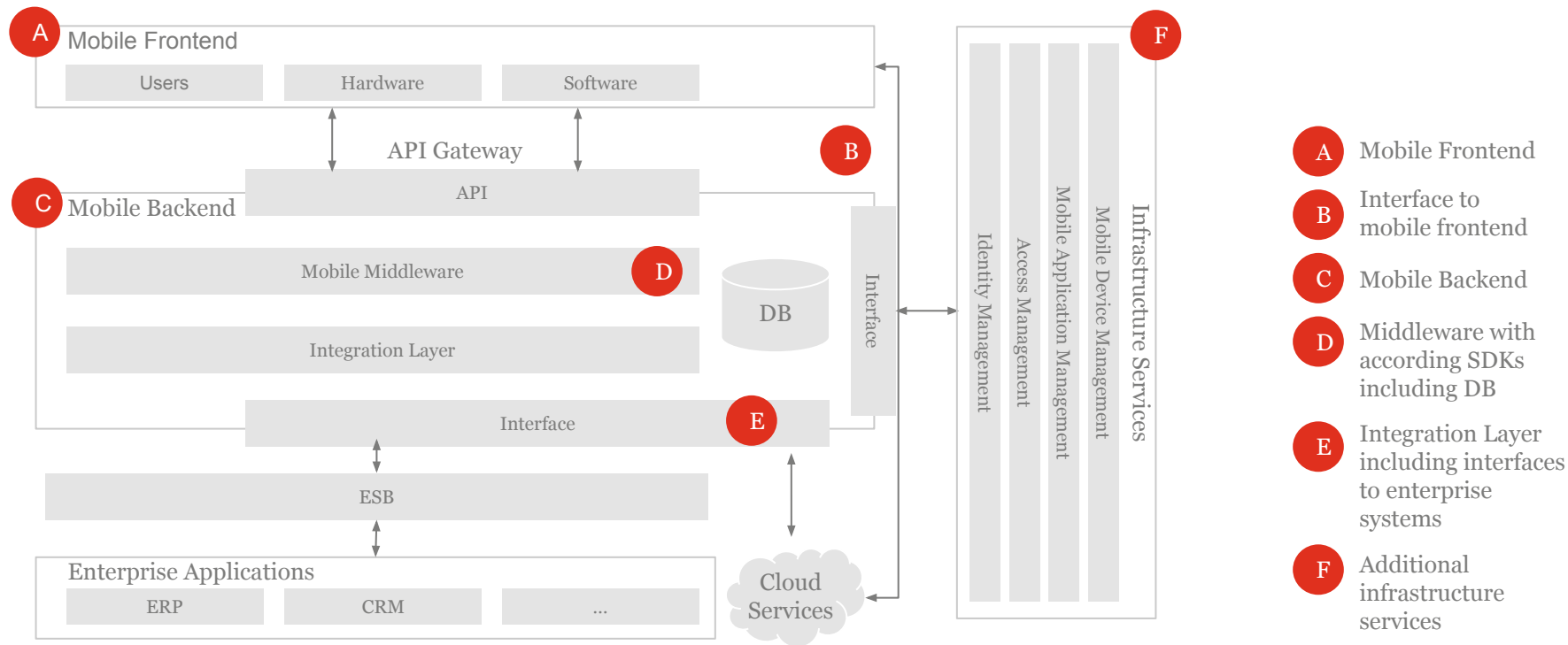


Hybrid App

A **hybrid app** is a **web app that translates to native code**. A hybrid app uses a browser view and hooks to allow the web app to access features on mobile devices like Push Notifications, Contacts, or Offline Data Storage.

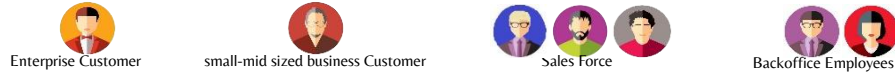


A generic mobile backend integration architecture



Case example of a proposed mobile architecture

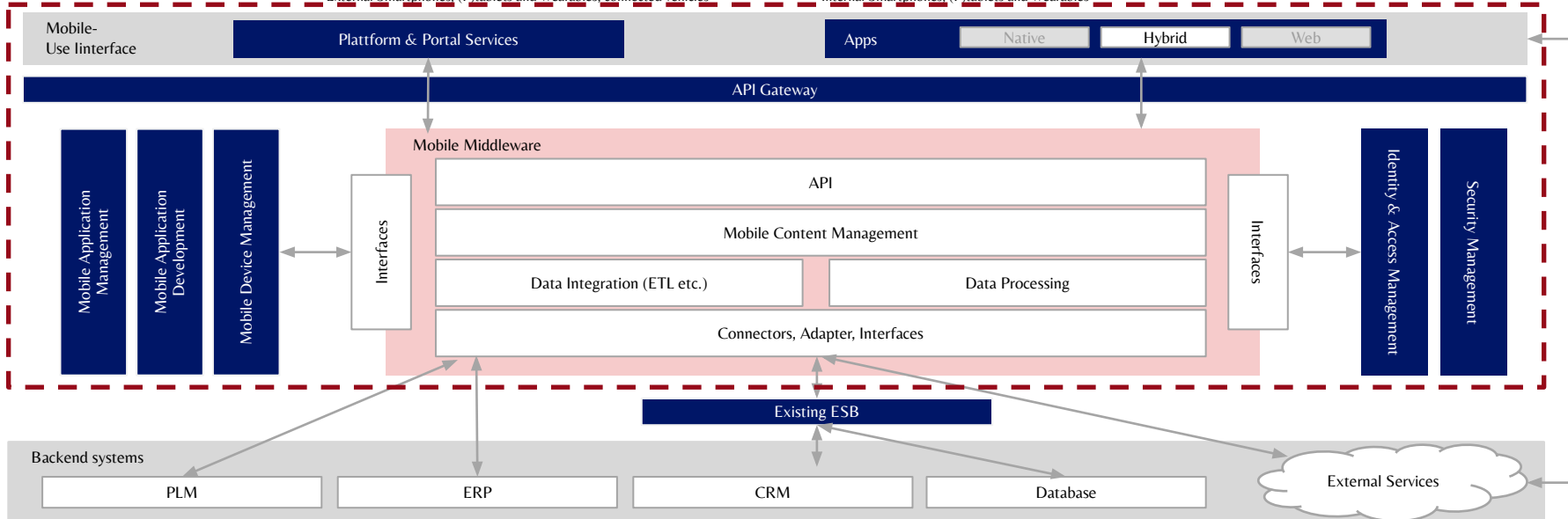
End-Customer



Mobile-Devices



Mobile Platform



Multi-tenancy

Data Centre



Data Centre #1

DC #2

Multi-tenancy

Server

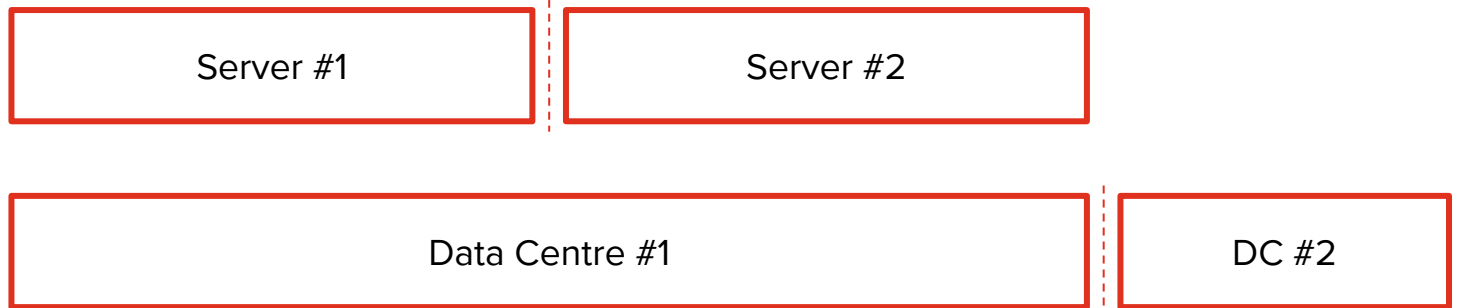
Server #1

Server #2

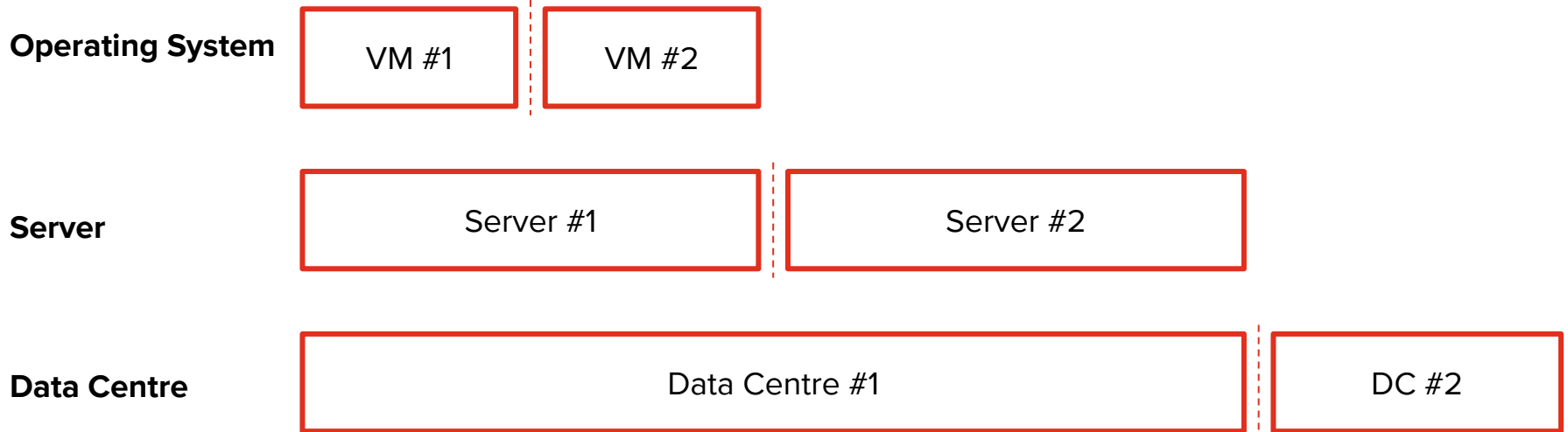
Data Centre

Data Centre #1

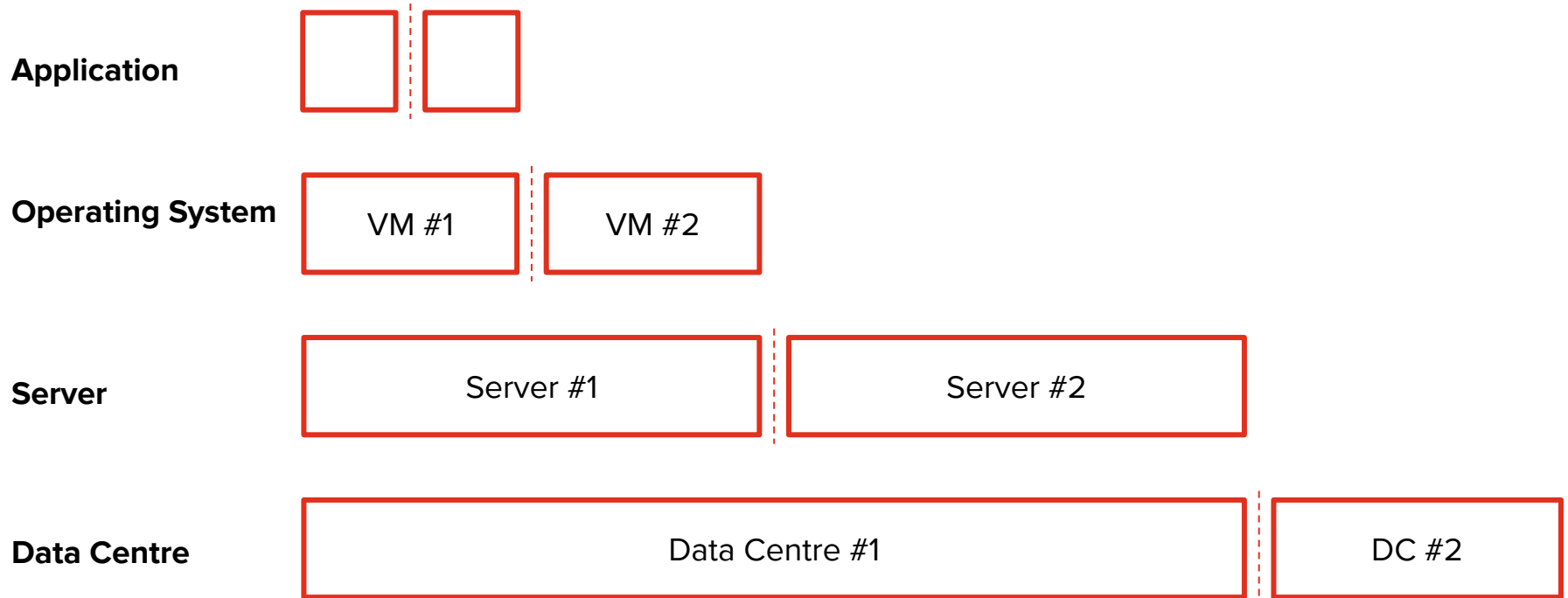
DC #2



Multi-tenancy



Multi-tenancy




Cloud Service Model

The level of abstraction increases from On-Premise to SaaS

On-Premise	IaaS	CaaS	PaaS	SaaS
Configuration	Configuration	Configuration	Configuration	Configuration
Application	Application	Application	Application	Application
Runtime	Runtime	Runtime	Runtime	Runtime
Operating System	Operating System	Operating System	Operating System	Operating System
Hypervisor	Hypervisor	Hypervisor	Hypervisor	Hypervisor
Servers	Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking	Networking

 Managed by Cloud Service Provider

 Self-managed

Cloud Deployment Models – public or private?



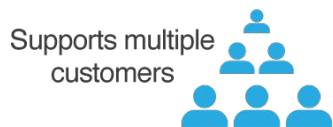
VS



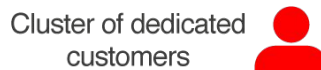
Publicly Shared
Virtualised Resources



Privately Shared
Virtualised Resources



Supports multiple
customers



Cluster of dedicated
customers



Supports connectivity
over the internet



Connectivity over
internet, fibre and private network



Suited for less
confidential information



Suited for secured
confidential information
& core systems



AO...

QUESTION
EVERYTHING
WHY?

"
TEARER
TLW