TUM Living Lab Connected Mobility

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„Something interesting is happening“

Tom Goodwin

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The world‘s most valuable retailer…
… has no inventory

UBER

The world‘s largest taxi company…
… owns no fleet

The world‘s most popular media owner…
… creates no content

The world‘s largest accommodation provider…
… owns no real estate

Source: http://techcrunch.com/2015/03/03/in-the-age-of-disintermediation-the-battle-is-all-for-the-customer-interface/

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Project: TUM Living Lab Connected Mobility
The team behind the academic project!

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Teilprojekt	*Titel*	*Antragsteller*	*Stellen*	*PM*
TP 1.1	Plattform und Ökosystem Governance	Prof. Matthes / Dr. Wittges	2	72
TP 2.1	Partner On- und Offboarding	Prof. Matthes	1	36
TP 2.2	Crowdsourcing und Crowdinnovation	Prof. Matthes	1	36
TP 2.3	Service-Mashups und Entwicklerunterstützung	Prof. Broy / Dr. Prehofer	1	36
TP 2.4	Geschäftsmodelle Plattformanbieter	Prof. Krcmar	1	36
TP 3.1	Accountablity	Prof. Pretschner	2	72
TP 3.2	Integriertes Monitoring (Infrastruktur, Dienste, Geschäft)	Prof. Matthes	1	36
TP 3.3	Visuellller Service-Management Leitstand	Prof. Matthes	1	36
TP 3.4	Sensing on Demand	Prof. Ott	1	36
TP 3.5	Proximity Services	Prof. Ott	1	36
TP 3.6	Technische Plattform-Architektur	Prof. Broy / Dr. Prehofer	1	36
TP 4.1	Modelle und Werkzeuge für Indoor-Karten	Prof. Broy	1	36
TP 4.2	Umweltsensitives Verkehrsmanagement	Prof. Busch	1	36
TP 4.3	Verkehrsmanagement bei Großereignissen	Prof. Busch	1	36
TP 4.4	Kollaborative und soziale Mobillitätsdienste	Dr. Wörndl	1	36
TP 5.1	Integrationsplattform für temporale geographische Daten	Prof. Kemper	1	36
TP 5.2	Geospatial Big Data Exploration	Prof. Kemper	1	36
	Summe Wiss. MA / Postdoc Stellen		*19*	

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Overview

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1. **The digital transformation of transportation and mobility**

2. **Challenges for the automotive industry**
   - The innovator's dilemma
   - Lagging "digital" capabilities (lessons learned by the media industry)
   - Competition by strong customer-focused digital players
   - Fragmented markets

3. **Vision: A marketplace and ecosystem of mobility services**

4. **The TU München Living Lab Connected Mobility (TUM LLCM)**
   - Guiding principles
   - Research areas and research projects

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Cars are becoming a victim of their own success

Mexico City

Source: Reid Gilman, https://www.flickr.com/photos/reidgilman/3413877426/

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Cars are becoming a victim of their own success

Sao Paulo, Brazil

Source: Zé Carlos Barretta, https://www.flickr.com/photos/zebarretta_stock/11015897873/

Cars are becoming a victim of their own success

Kuala Lumpur, Malaysia

Source: https://www.flickr.com/photos/lynac/321100379

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Bill Ford

A new perspective on vehicles

“If we do nothing, the sheer number of people and cars in urban areas will mean global gridlock.

Now is the time for all of us to be looking at vehicles the same way we look at smart phones, laptops and tablets: as pieces of a much bigger, richer network.”

Source: http://www.ford.co.uk/experience-ford/AboutFord/News/CompanyNews/2012/Bill-Ford-Outlines-Blueprint

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Innovative concepts and products are emerging

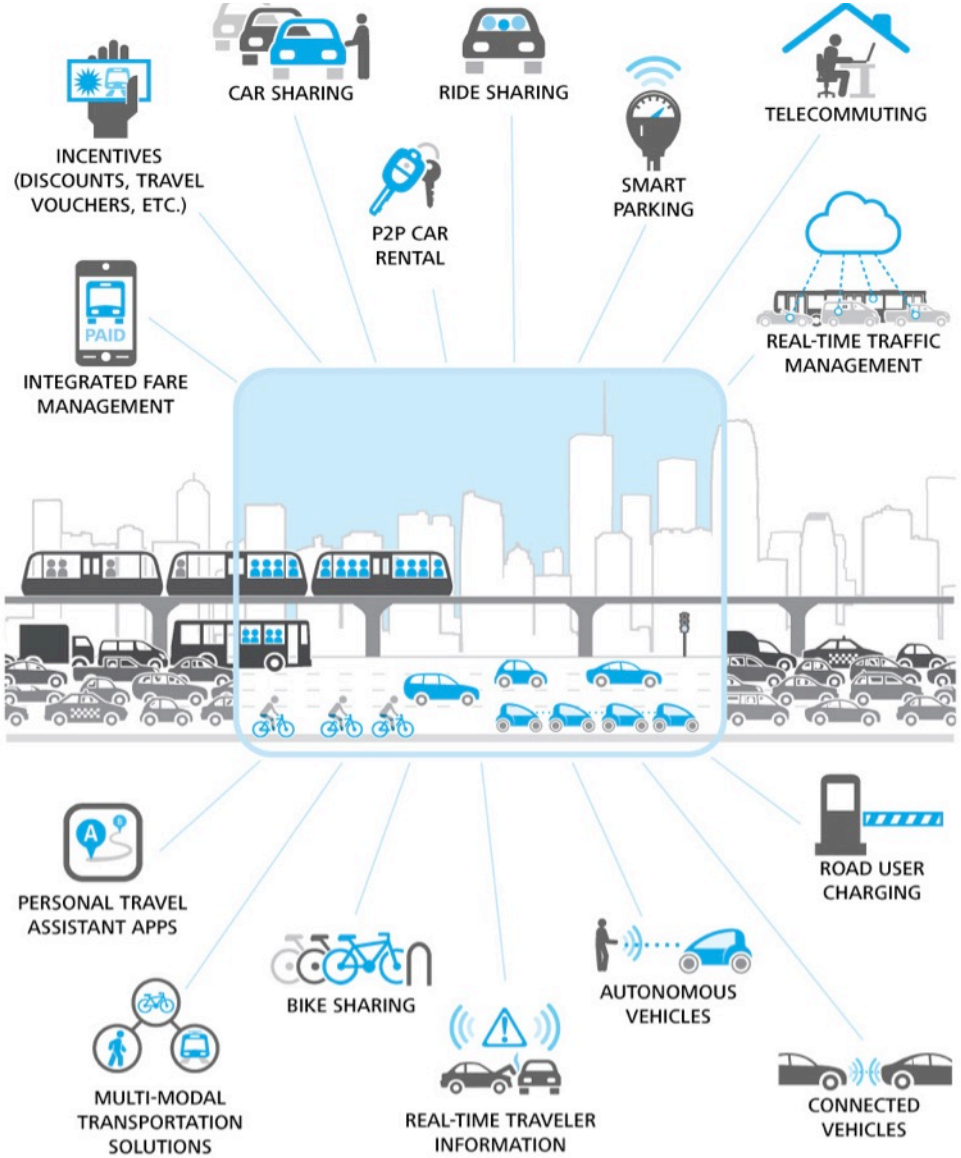
… and platforms

- Apple CarPlay
- Android Auto (Open Automotive Alliance)
- Nokia MirrorLink
- …

Source: Apple, Android

Next-generation urban transport systems

Integration of transportation modes, services and technologies



Source: Deloitte, „Digital-Age Transportation – The Future of Urban Mobility“

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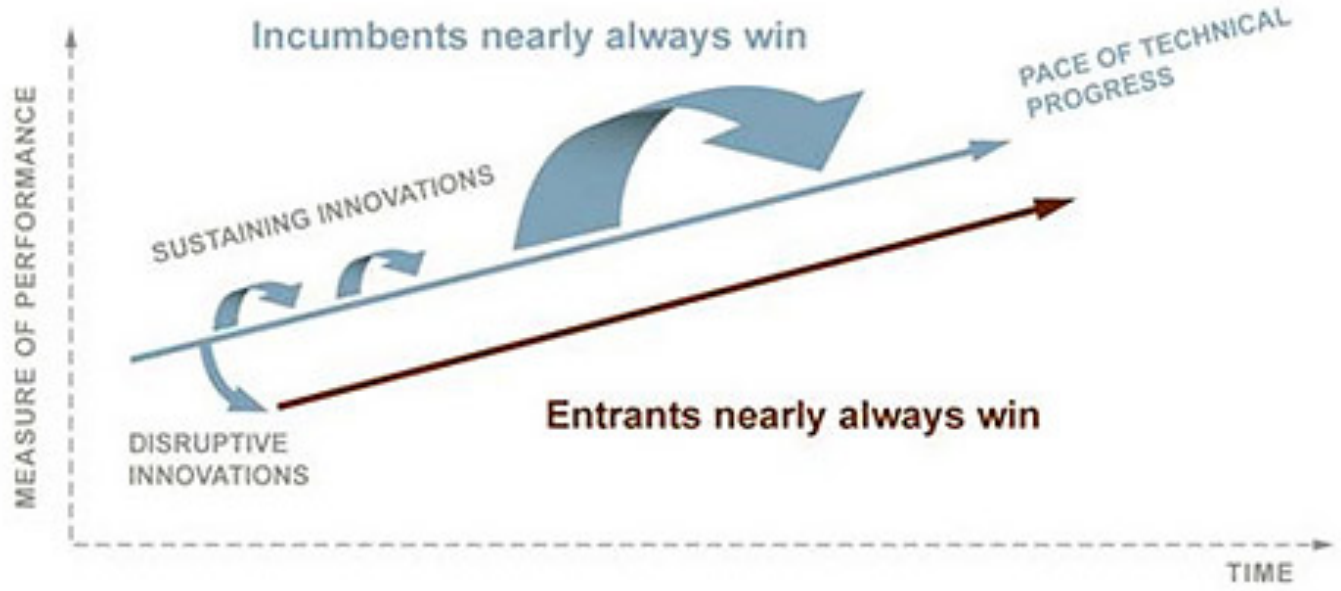
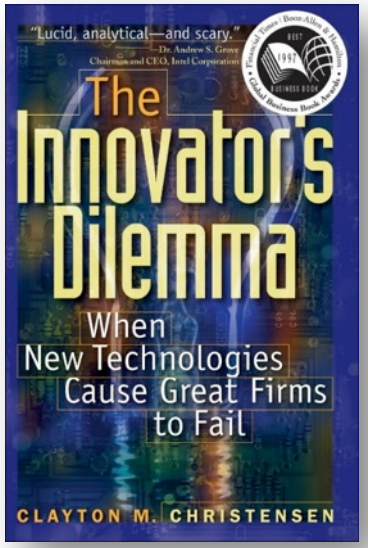
The innovator‘s dilemma

When new technologies cause great firms to fail

„… the logical, competent decisions of management that are critical to the success of their companies are also the reasons why they lose their positions of leadership.“





Clayton M. Christensen,
Harvard Business School

Incumbents beat newcomers at sustaining innovations, but lose with disruptive innovations.

Source: The Innovator‘s Dilemma, http://www.claytonchristensen.com/key-concepts/

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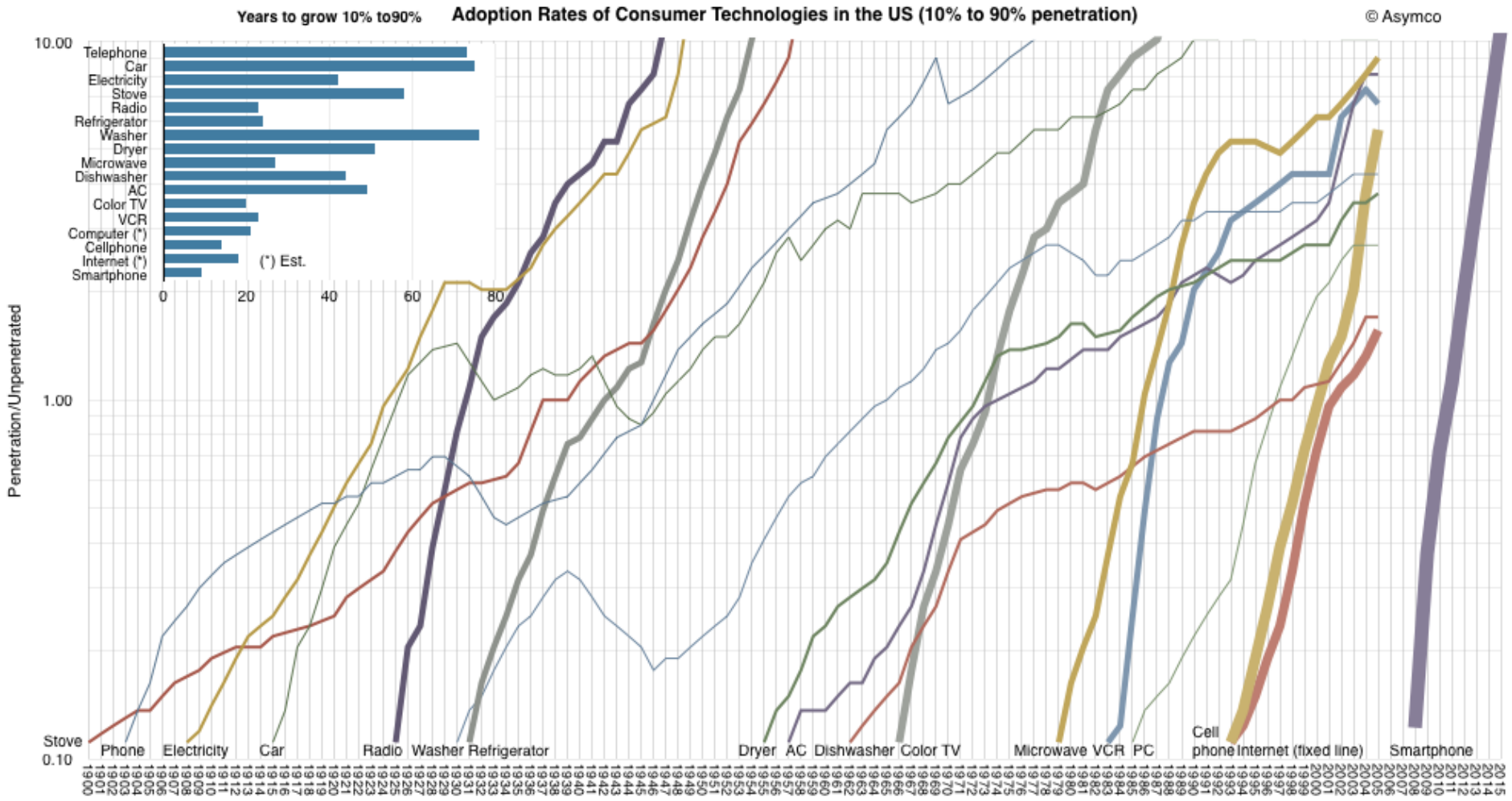
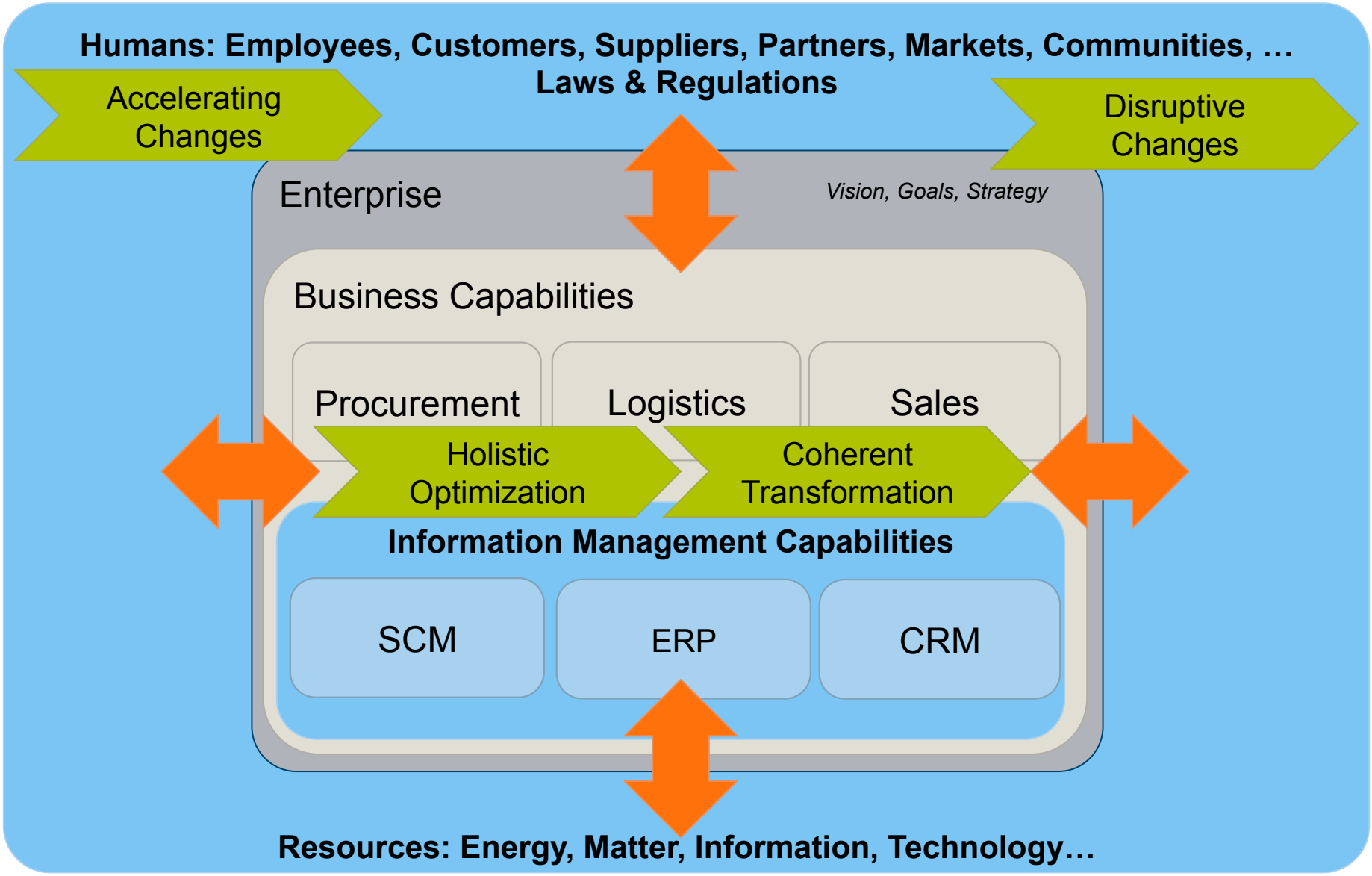
Accelerating adoption rates for new technologies



Tablet, Sensors, …

Enterprises have to adapt their business capabilities to an increasingly turbulent environment.



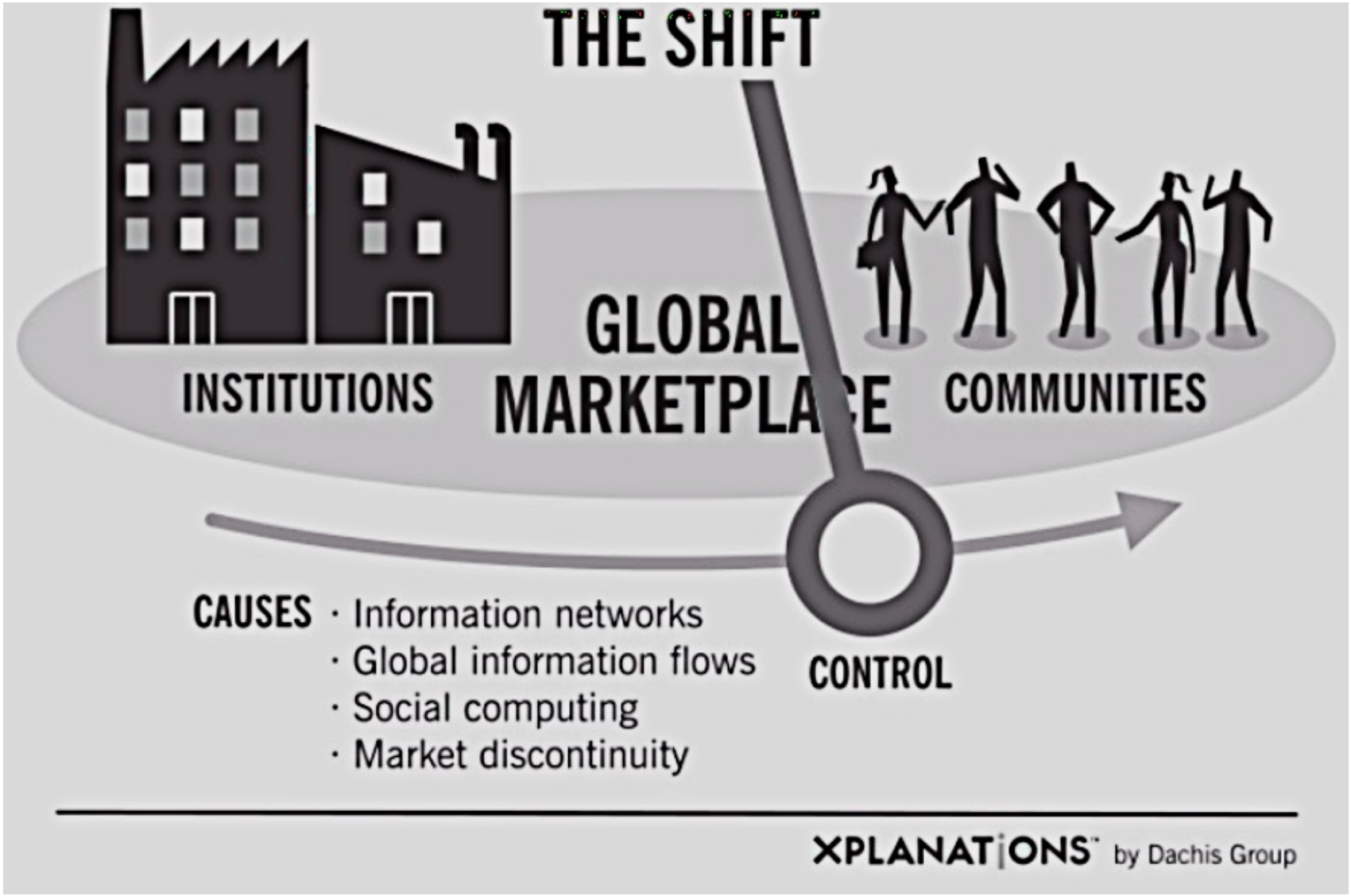
Competition by strong customer-focused digital players

- Uber

- Apple Maps
- Apple Siri
- Apple Passbook
- Apple Wallet
- Apple Watch

- Google Maps
- Google Android
- Google Analytics
- Google Now

The global markets are changing



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Marketplaces, platforms enabling ecosystems

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Marketplaces

- Amazon Marketplace
- Ebay
- Alibaba
- Uber
- Apple Store
- Google Play
- Microsoft Store
- Telekom Business Marketplace

Platforms

- Windows, Linux, Android, iOS
- Wordpress, Typo3, Drupal, Sharepoint
- SAP R/3, Salesforce
- PaaS: Amazon, Microsoft Azure, Google App Engine, ...

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Example: Moovel (Daimler)

Acquisitions and partnerships

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Towards mobility platforms

Upcoming research project in Munich (TUM, BMW, SIEMENS)

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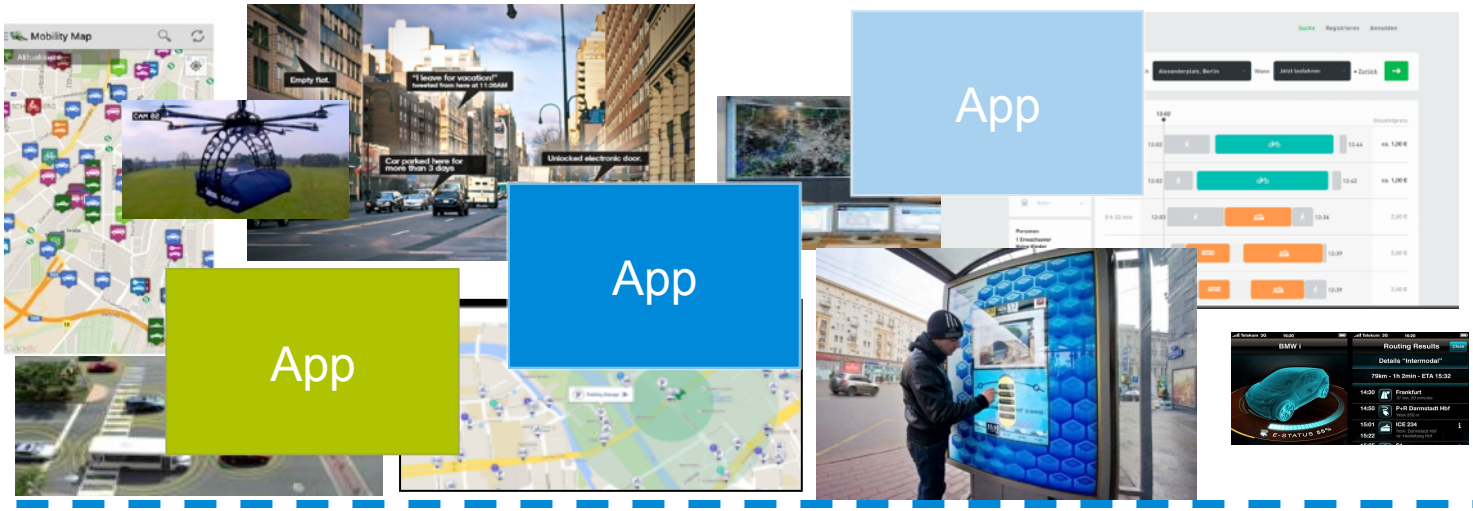
School Kids, Taxi Drivers, Business Travelers, Disabled People, Elderly People, …
Mobility and Information Demands, Contexts (planning, meeting traveling, accounting)



Test Region Munich

Connected Mobility Lab & Platform

Industry Partners

Traffic Flow Detection | Floating Car Data | Traffic News | Public Transport | Long-Distance Transport | Sensors | Car Sharing | Bike Sharing | Bike Sharing | Parking | …

Project organization

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AP 1: Governance

AP 4: Use Cases

AP 5: Geospatial-Temporal Analytics

AP 3: Platform Architecture and Core Services

AP 2: Platform Requirements, Business Models, Value Networks

AP 6: Pilot Service Delivery

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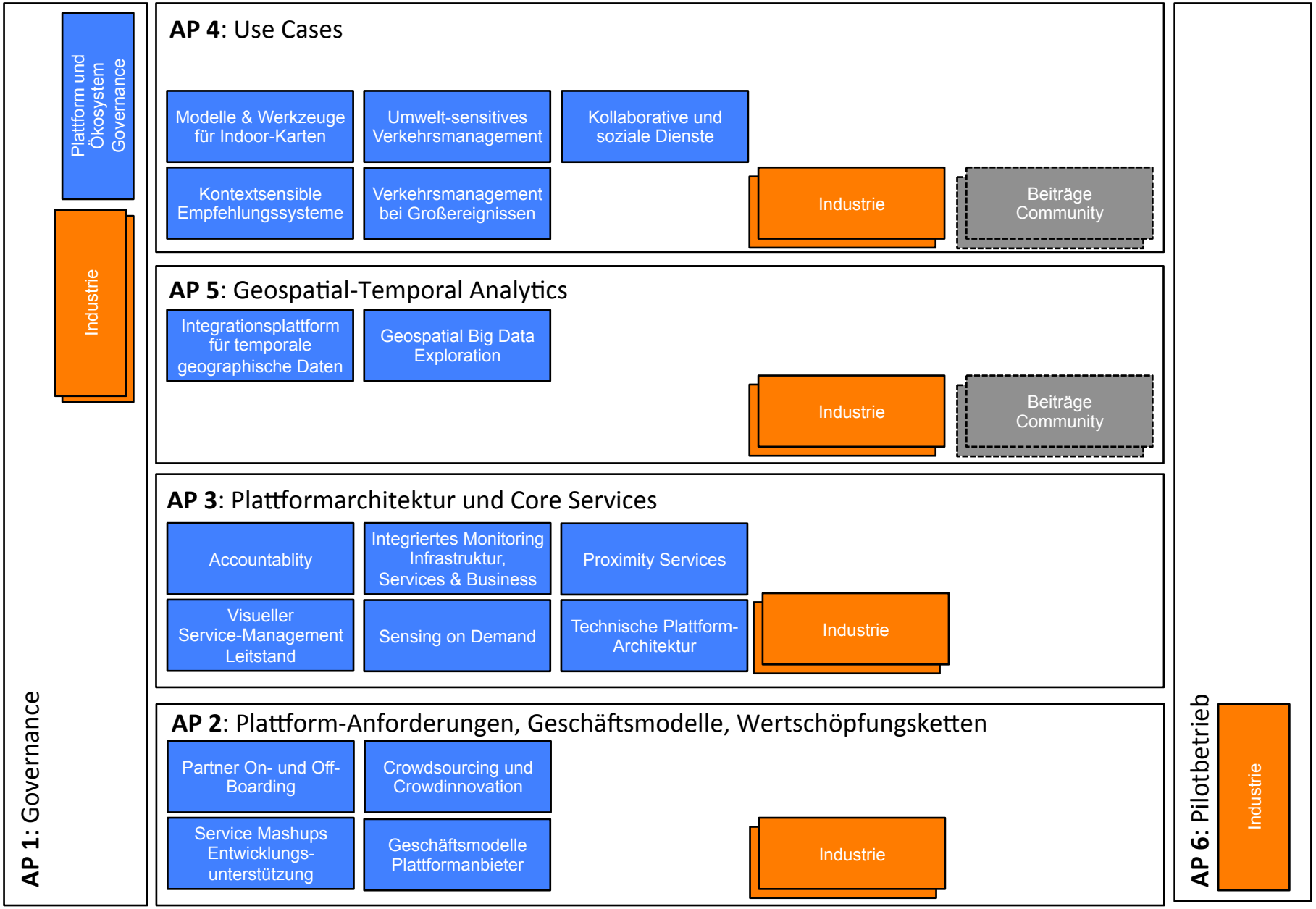
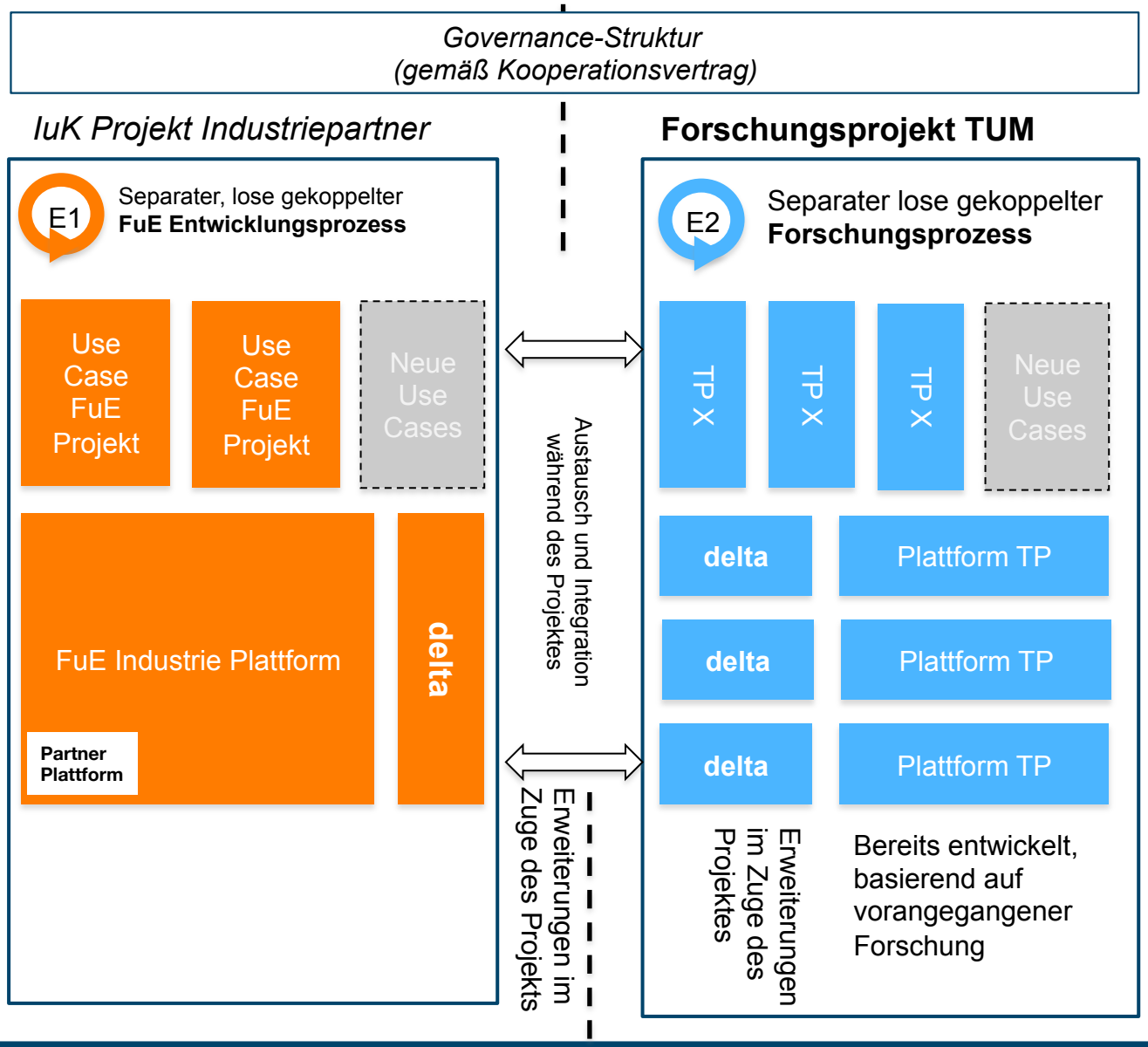

Plattform und Ökosystem Governance
Industrie
AP 1: Governance
AP 4: Use Cases
Modelle & Werkzeuge für Indoor-Karten
Umwelt-sensitives Verkehrsmanagement
Kollaborative und soziale Dienste
Kontextsensible Empfehlungssysteme
Verkehrsmanagement bei Großereignissen
Industrie
Beiträge Community
AP 5: Geospatial-Temporal Analytics
Integrationsplattform für temporale geographische Daten
Geospatial Big Data Exploration
Industrie
Beiträge Community
AP 3: Plattformarchitektur und Core Services
Accountablity
Integriertes Monitoring Infrastruktur, Services & Business
Proximity Services
Visueller Service-Management Leitstand
Sensing on Demand
Technische Plattform-Architektur
Industrie
AP 2: Plattform-Anforderungen, Geschäftsmodelle, Wertschöpfungsketten
Partner On- und Off-Boarding
Crowdsourcing und Crowdinnovation
Service Mashups Entwicklungs-unterstützung
Geschäftsmodelle Plattformanbieter
Industrie
AP 6: Pilotbetrieb
Industrie
AP X
TP XY
Forschungs-Teilprojekt XY im Arbeitspaket X
AP X
Industrie
Leistung vorhanden oder erbracht durch paralleles IuK Industrieprojekt
AP X
Community
Beiträge der Plattformnutzer bzw. Community (kleine und mittelständische Unternehmen)

Two independent project consortia with aligned research questions and prototypes



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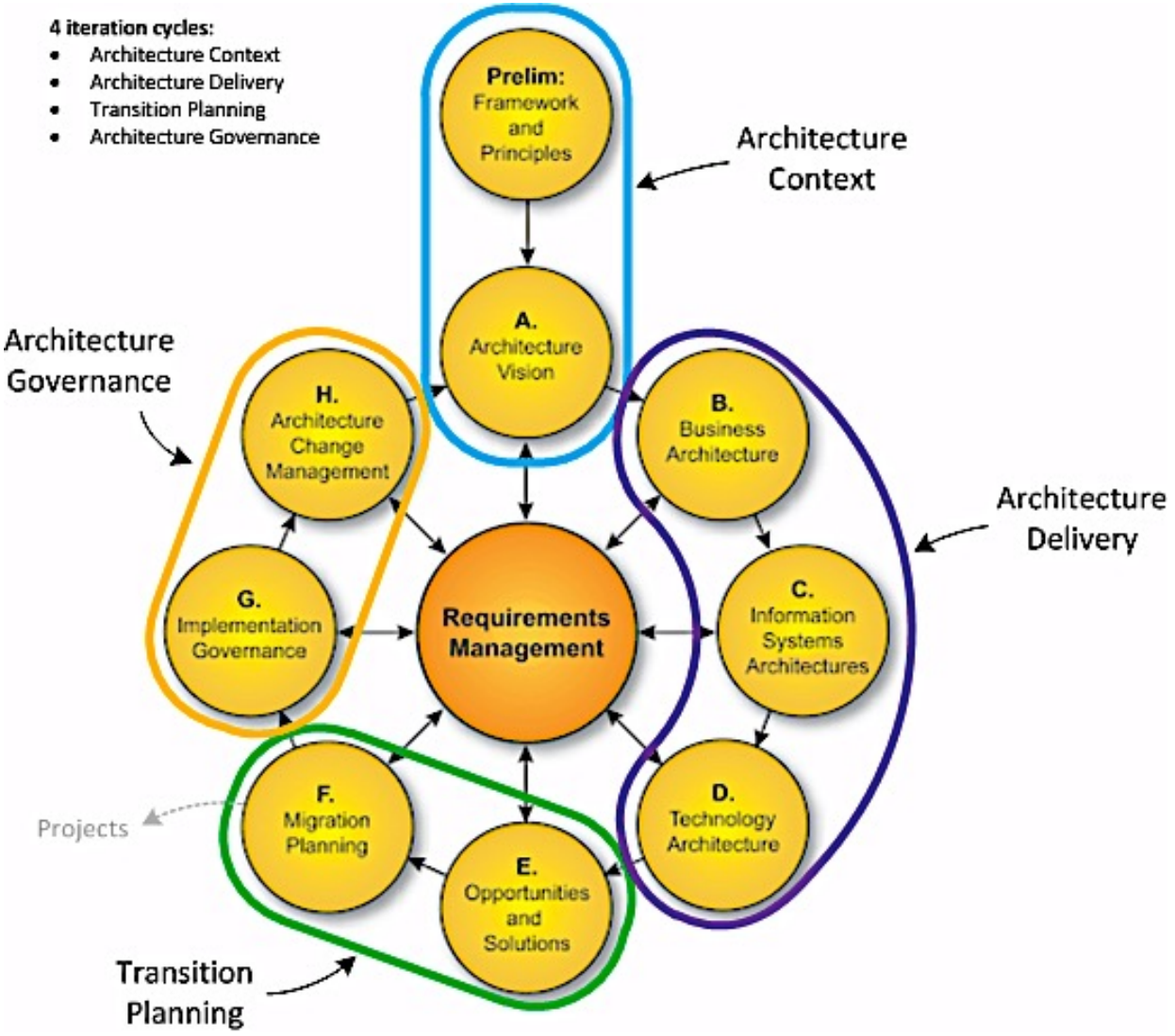
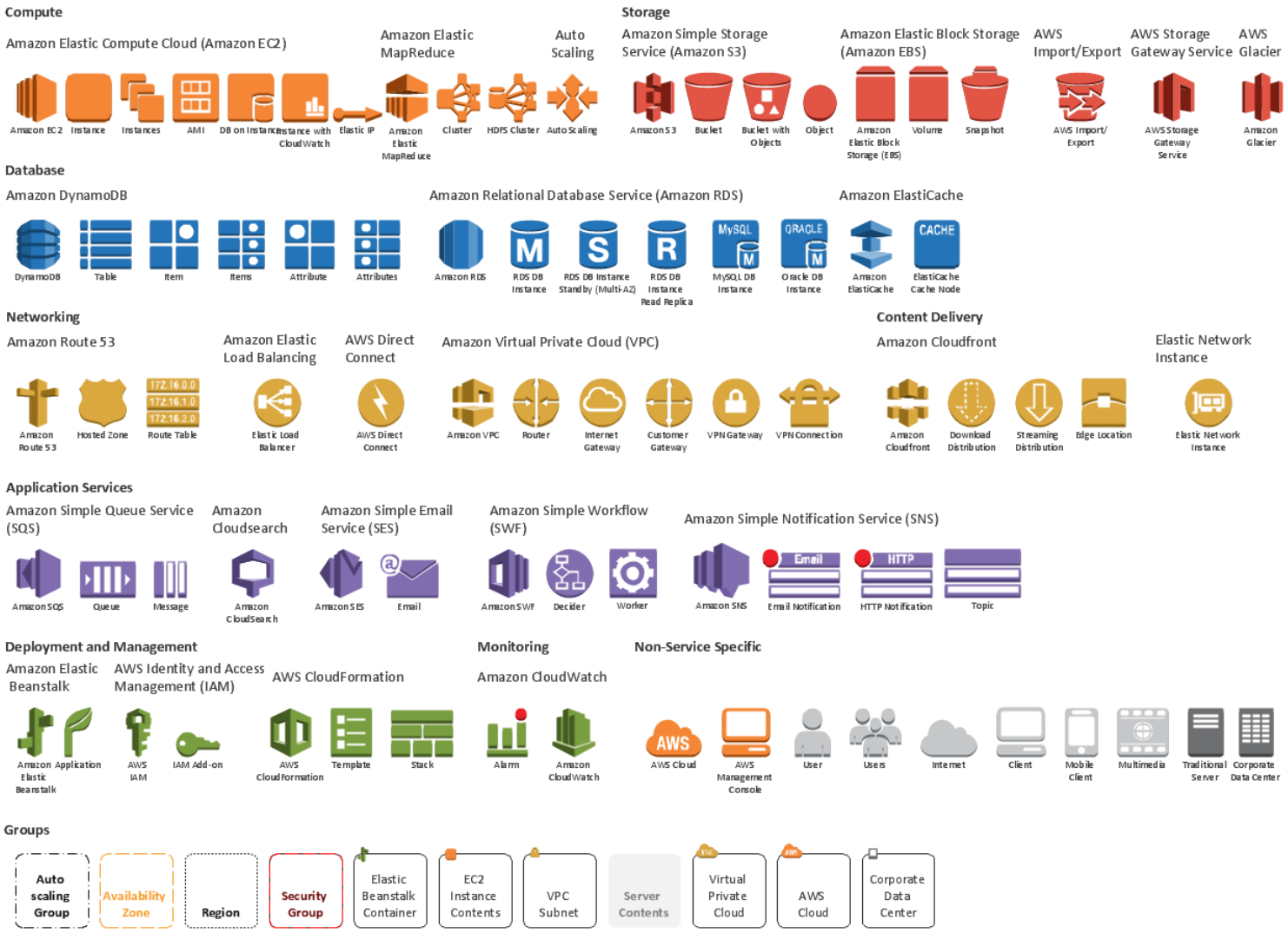
TOGAF Architecture Development Method



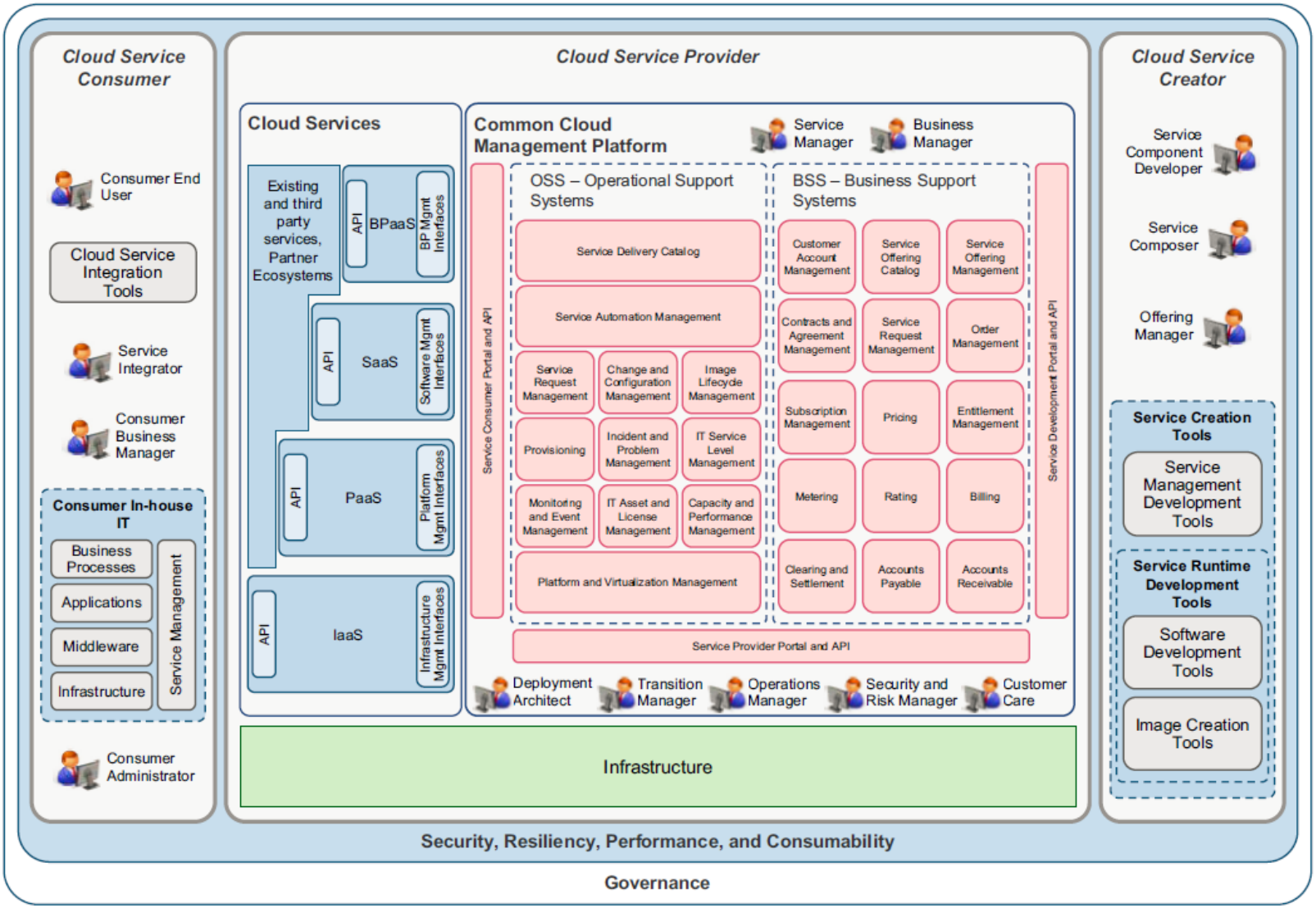
http://bmsace.blogspot.be/2011/04/togaf-notes-part-3.html (29.5.2015)

PaaS Example: AWS Services



http://www.conceptdraw.com/How-To-Guide/picture/Design%20Elements%20-%20AWS%20-%20Amazon%20Web%20Services%20architecture%20solution-2.png (29.5.2015)

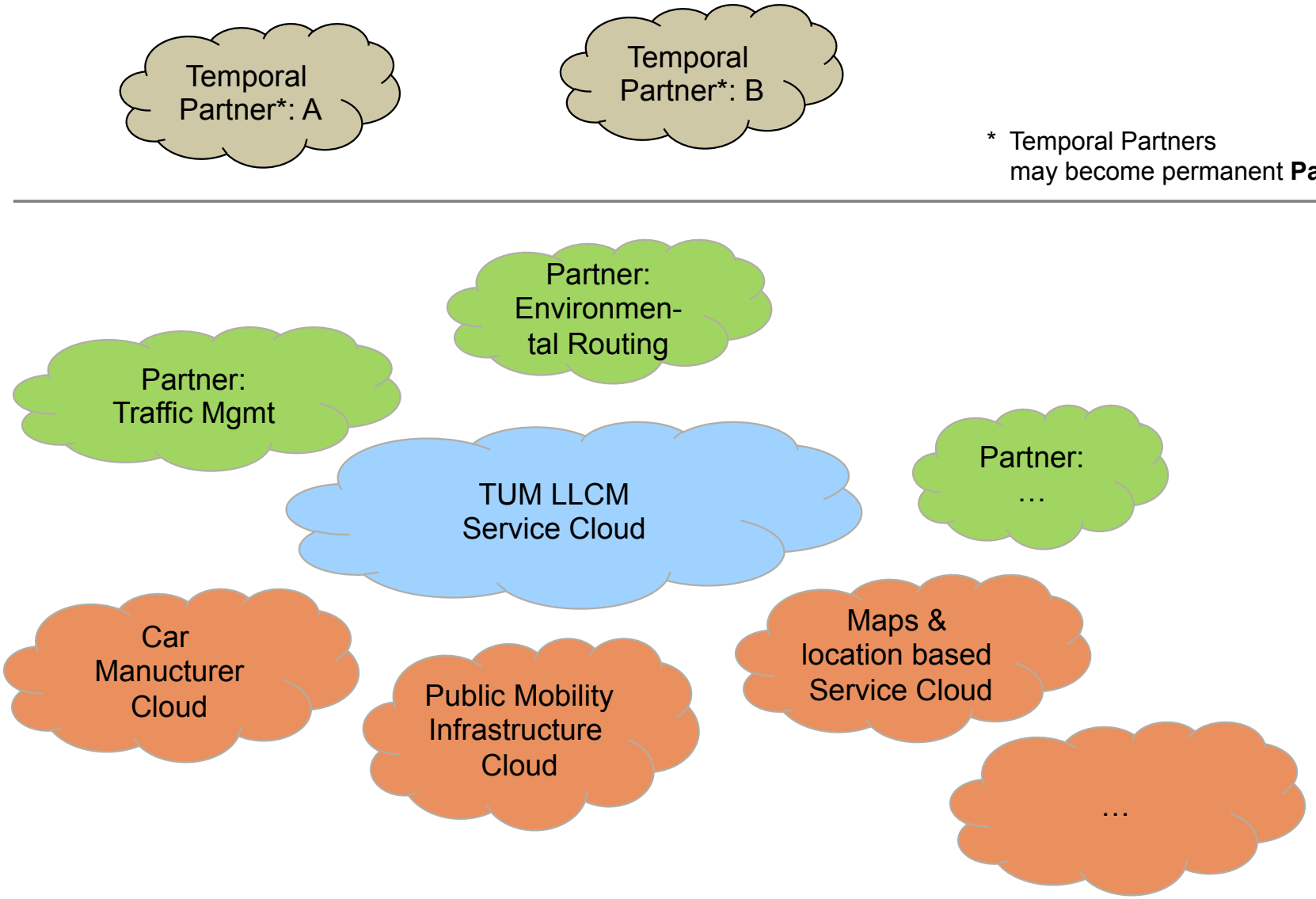
IBM Cloud Computing Reference Architecture



http://www.ibm.com/developerworks/webservices/library/ws-soa-ref-arch/index.html (26.5.2015)
http://alanstreet.net/what-are-ibm-ccra-and-ccmp/ (26.5.2015)

TUM LLCM

Core Cloud Services & Temporal External Partner



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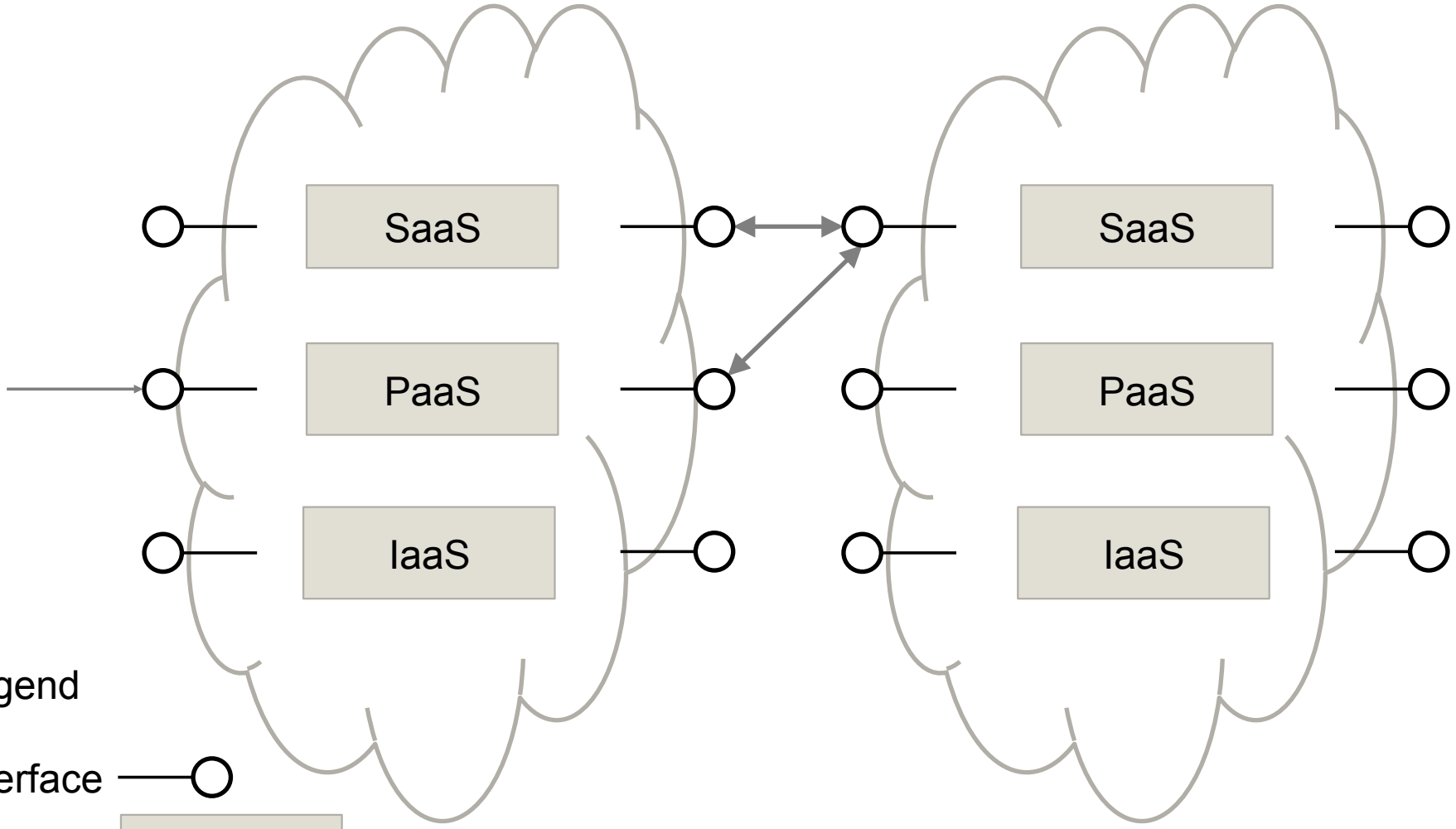
Connecting Clouds

Different Cloud implementations may be connected on different levels



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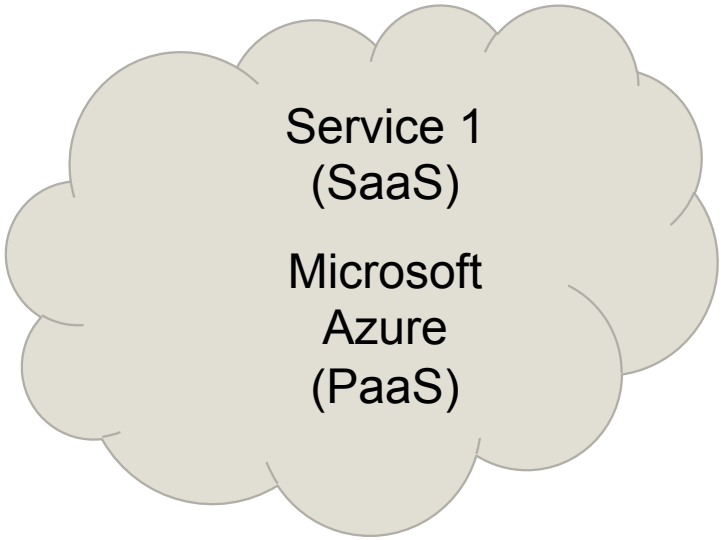
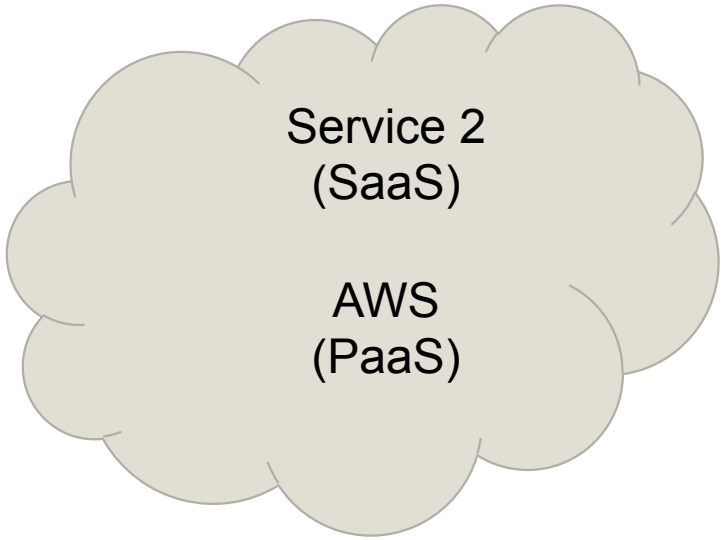
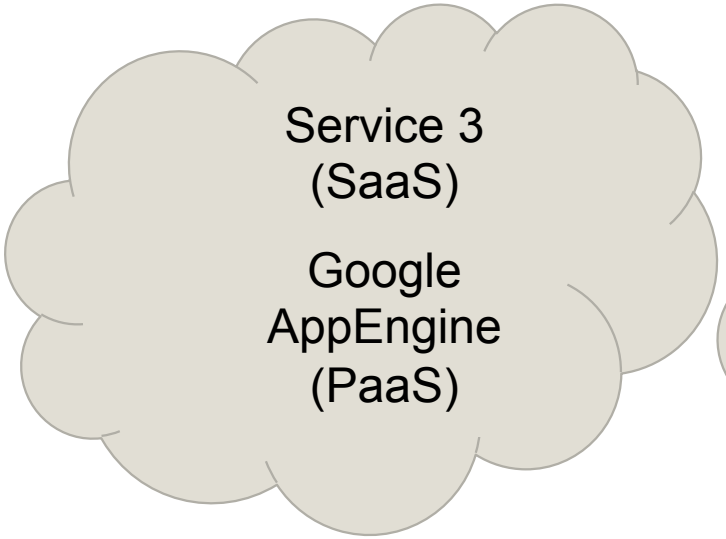
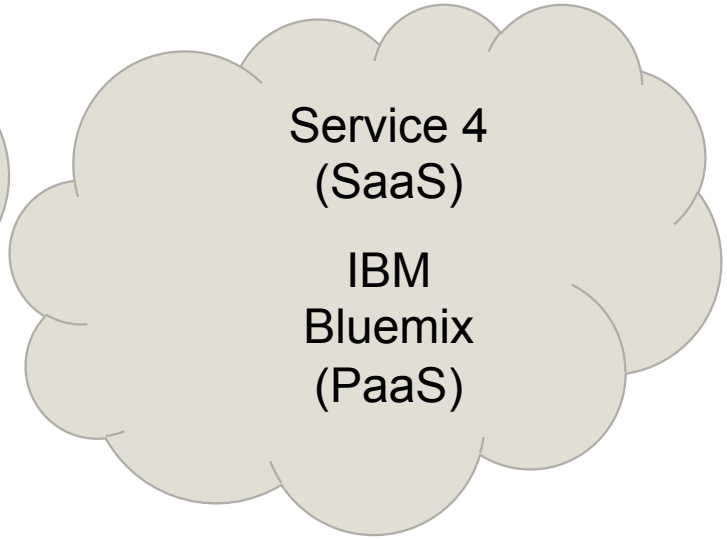
TUM LLCM Vision: Service providers are free…

to choose their appropriate PaaS/IaaS Provider & Stack









and even more…

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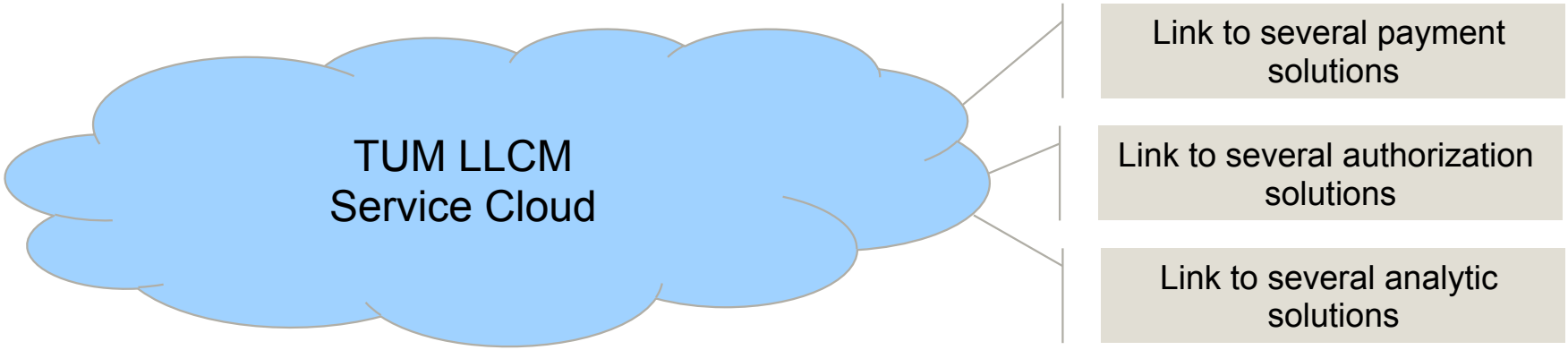
TUM LLCM Vision: Integration becomes easier

By using central LLCM Services instead of one service



Authentication Service(s)

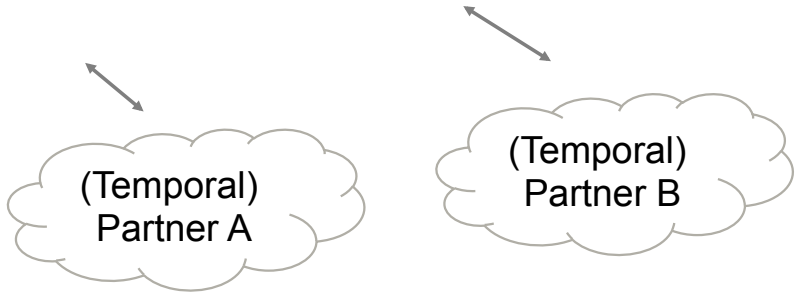
Payment Service(s)

Analytic Service(s)

t.b.d.

…

TUM LLCM defines standards for central services like:



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Applied research for the development and delivery of innovative digital mobility solutions

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Kern-Applikationen

Vernetzte Information

Intermodales Reisen

Optimale Verkehrssteuerung

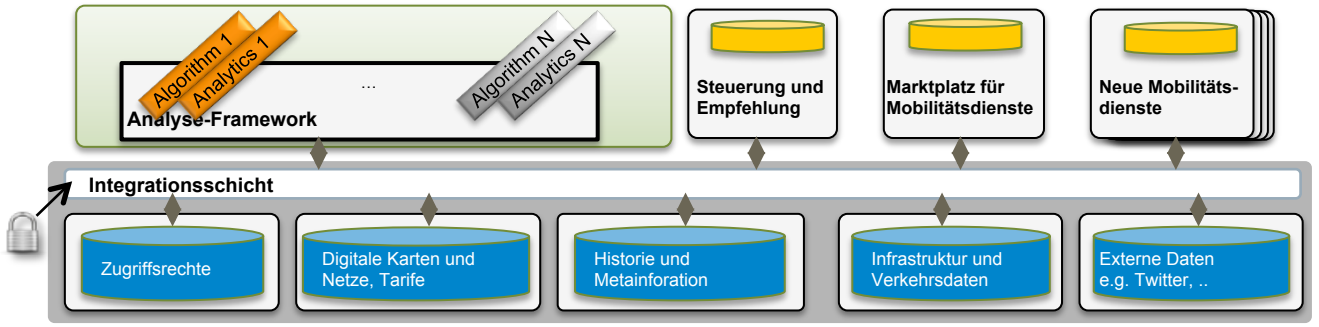
Optimale Ressourcennutzung

Effizienz und Sicherheit

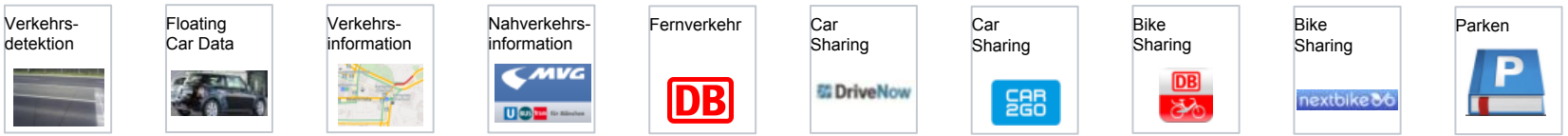
Plattformen & Daten-Analyse

Connected Mobility Lab

- Time synchron
- Geo-referenced
- Security / Privacy by Design



Daten Quellen



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A human-centered design thinking approach

The main questions to be answered

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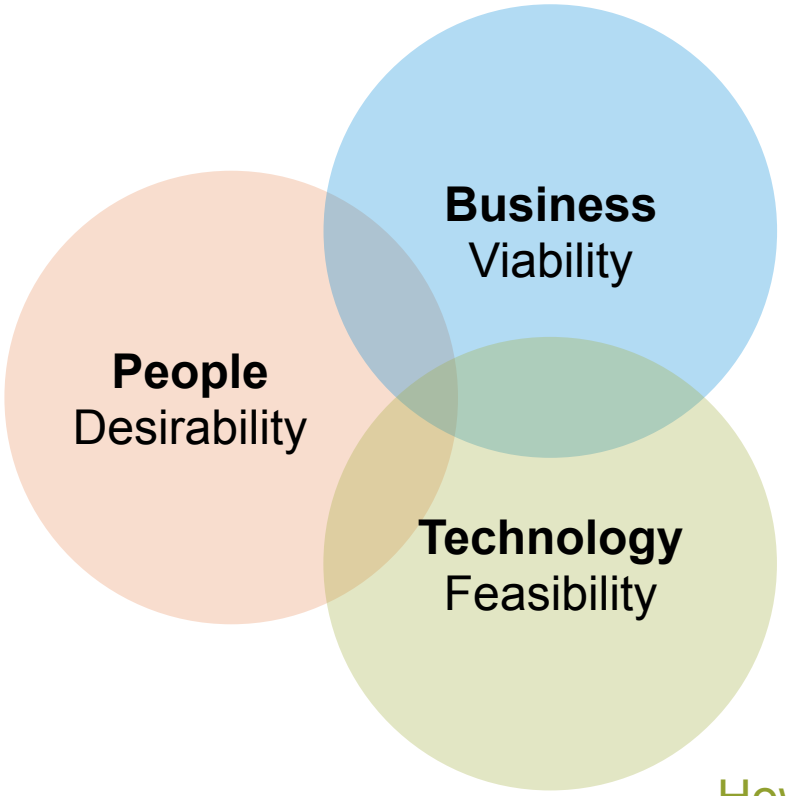
How do we provide our solution in a sustainable manner?

Which problem of whom do we solve?



How can we solve it?

We are looking for solutions which are desired, feasible and viable!

© Florian Matthes

Thank you for your attention. Questions?

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Prof.Dr.rer.nat.

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