The Smart Mobility Ecosystem

5

Barbara Flügge

Abstract

The Smart Mobility Ecosystem is the entry point into the overall mobility complex from a strategic level down to an individual task level, for all participating and future actors, whether these are a car-sharing user, a project manager that heads the conceptual depiction of mobility management, or an operator of a public transport management unit. By intention, the presentation of the Smart Mobility Ecosystem is design-oriented and structured by personae, roles, and responsibilities. The initial results of a study that was conducted in 20 cities are leveraged. The Smart Mobility quadrants – the Mobility Consumers, the Physical Mobility Front Office, the Digital Mobility Front Office, and the Mobility Back Office – conclude the chapter.

Contents

B. Flügge (✉)
SAP (Switzerland) Ltd., St. Gallen, Switzerland
e-mail: b.fluegge@sap.com

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Fostering the right to a Mobility-as-a-Service offering, hence a *Mobility-as-a-Service* (*MaaS*) construct, thoughts and considerations arise. Taking a look into the next centuries we ask ourselves if there are further, far-reaching means to work from home. We ask if drones do indeed substitute for the delivery person to reach us wherever we are. To what extent are mega trends such as urbanization, on the one hand, and aging, on the other hand, demand other mobility services than those to date? How do modern urbanizations look like or will they turn into zones and fragments based on personae's needs and life styles?

Furthermore, we ask if MaaS should turn into a personalized on-demand service, similar to the personalized pair of sneakers that gets produced with our individual style and color coding, so that mobility offerings can adapt to our needs and preferences instantly.

To make this happen all personae need to get connected in a more fashionable, yet ubiquitous, manner. This includes vehicles, infrastructure, and assets as well as travelers. Personalized and dynamic pricing models offer a pervasive stream of offerings with respect to means of transport, timing, and further services. Tailored information, commercial, and entertainment packages enrich the offerings and lead to new business segments. The biggest challenges we see are in the design and deployment of governance frameworks and in the interplay among public, private, and non-profit making actors and institutions.

5.1 The Role Play

Barbara Flügge

To identify the role play for the *Smart Mobility Ecosystem* we now gather all the design elements about personae, roles, and responsibilities which we introduced in Sect. 3.4. The richness and variety of Smart Mobility *personae* has been gathered through the above mentioned global study of 20 cities. Fifty personae have been identified so far. The large number, however, demonstrates not only the connectedness of mobility. Taking a greater look into the benefits of Smart Mobility for roles and responsibilities of the personae, the variety of personae emphasizes the importance of public, government, private, and institutional interests. The perceived benefit of Smart Mobility with respect to the denoted personae and their occurrence in one or more of the 20 cities is now introduced in Tables 5.1and 5.2. With these first analytical results the reader might deduce which of the following personae relate to which city and geography. The assessed cities are Bangalore, Barcelona, Beijing, Berlin, Guangzhaou, Hong Kong, London, Madrid, Melbourne, New York, Seoul, Shanghai, Singapore, Stockholm, Sydney, Taipei, Tokyo, Warsaw, Washington DC, and Vienna. The cities are numbered in alphabetical order, meaning Bangalore is designated "1", Beijing "2", and so forth.

In Table 5.1 those personae that encounter a benefit throughout Smart Mobility offerings for the listed city are marked with an "x"; "X" relates to the perceived, not necessarily realized, benefit of Smart Mobility in the listed city. Table 5.2 continues the assessment for cities labeled "11" to "20". The assessment took place by analyzing the mobility offerings of any of the 20 cities and the identification of the addressable personae.

Table 5.1 Personae in the context of mobility in cities 1–10

Identified persona	1	2	3	4	5	6	7	8	9	10
Academic researcher		x	x	X	x	X				
Automotive company				X						
Building inspection officer	x								x	
Bus driver		x	x	X			x	x		
Bus operator										
Business traveler		x	x		x	x				
Citizen	x	x	x	X	x	x			x	
City planner	x			X	x	x	x	x	x	x
Civil servant	x	x	x	X	x	x	x			x
Corporate company	x				x	x	x		x	x
Data scientist					x	x				x
Disabled person							x			
Driving school										
Educational service provider	x			x		x				
Event manager		x	x		x		x			
Firefighter				x						
Freight authority										x
Freight manager		x	x				x			
Government (local, national)										
Healthcare provider				x	x	x				
Local authority	x						x	x	x	x
Logistics service provider										
Major				x		x	x			
Parking authority									x	
Pedestrian					x			x		
Policeman	x			x		x	x	x	x	x
Private driver		x	x	x						
Professional employee		x	x			x				
Public transport authority				x	x		x			
Road infrastructure authority										

Table 5.1 (continued)

Identified persona	1	2	3	4	5	6	7	8	9	10
Scholar		x	x		x	x				
School authority		x	x							
Social welfare office	x			x	x					
Student	x	x	x			x				
Taxi driver	x	x	x						x	
Toll authority										
Toll collection units (private, government)										
Tourist		x	x		x	x				
Tourist office (private)	x				x					
Tourist office (public)										
Traffic authority		x	x					x	x	x
Traffic police							x	x	x	x
Traffic scientist						x				x
Traffic signal controlling unit								x		x
Transport manager (private)	x			x	x		x	x	x	x
Transport authority	x	x	x				x	x	x	x
Travel agency					x					
University staff member						x				
Waste disposal company				x						
Water authority		x	x	x						

Table 5.2 Personae in the context of mobility in cities 11–20

Identified persona	11	12	13	14	15	16	17	18	19	20
Academic researcher							x		x	
Automotive company	x	x					x	x		
Building inspection officer										
Bus driver		x								
Bus operator					x	x	x	x		

Table 5.2 (continued)

Identified persona	11	12	13	14	15	16	17	18	19	20
Business traveler										
Citizen				x		x				x
City planner	x		x	x	x				x	x
Civil servant			x			x		x	x	
Corporate company	x			x	x		x		x	x
Data scientist							x			
Disabled person										
Driving school										x
Educational service provider	x									x
Event manager										
Firefighter										
Freight authority	x	x								
Freight manager								x	x	
Government (local, national)	x		x		x	x	x	x	x	
Healthcare provider										
Local authority	x	x	x	x		x	x	x	x	
Logistics service provider									x	
Major					x					
Parking authority	x	x	x	x		x				x
Pedestrian										
Policeman	x	x		x						
Private driver										
Professional employee			x		x					x
Public transport authority						x				
Road infrastructure authority				x						
Scholar										
School authority										x
Social welfare office							x	x		
Student										
Taxi driver										
Toll authority			x							

Table 5.2 (continued)

Identified persona	11	12	13	14	15	16	17	18	19	20
Toll collection units (private, government)					x					
Tourist										
Tourist office (private)					x	x				
Tourist office (public)				x	x					
Traffic authority	X	x	x		x	x	x	x	x	
Traffic police	X	x	x	x						
Traffic scientist	X		x	x			x	x	x	
Traffic signal controlling unit	X	x								
Transport manager (private)	X	x		x	x	x	x	x	x	x
Transport authority	X	x		x	x		x	x	x	x
Travel agency					x					
University staff member										
Waste disposal company										
Water authority										x

Mobility Consumers The above introduced personae are now clustered along their motives for consuming mobility (see Fig. 5.1):

- Commuting to work location or other destination
- Business triggered travel
- Private travel need for shopping, vacation, or visiting
- Travel in transit in conjunction with connecting trips via a central station or an airport to reach the cruise ship for example
- Distribution and supply of goods and/or services
- Event and/or purpose motivated travel
- Incident or inception driven counter measures caused, for example, by evacuation scenarios or natural catastrophes.

Employees and service consumers of mobility service providers themselves are private users of their own and third party mobility offerings. The illustration in Fig. 5.2

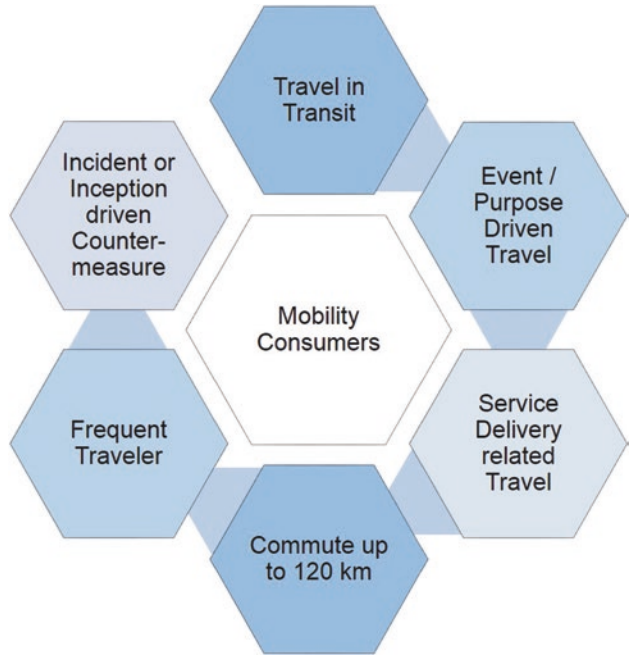

Fig. 5.1 Motives for mobility consumers to travel

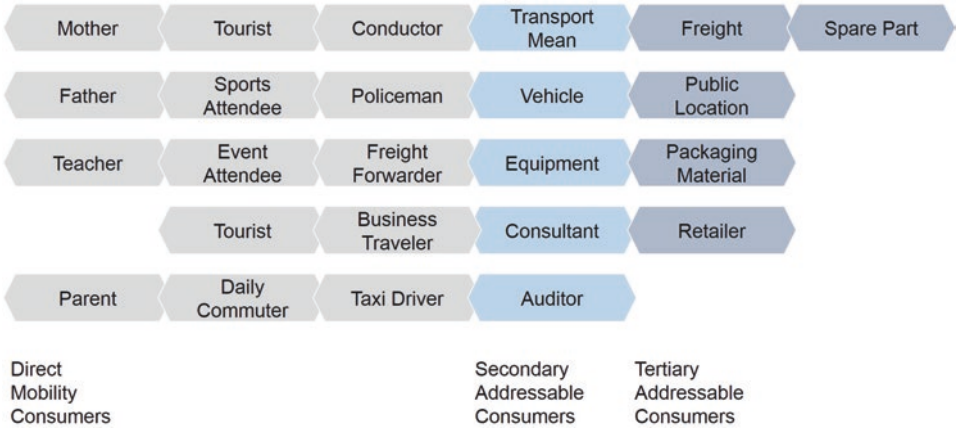

Fig. 5.2 Outline of addressable personae throughout one or multiple Smart Mobility service offerings

demonstrates the multi-sided viewpoints in the case of three usage profiles: a family, a teacher, and a parent.

The three examples reveal that driven by the first motive to consume mobility, further requirements and mobility consumption opportunities result. Here service providers have the opportunity to cross-sell their offerings to second and third tier consumer groups. Once

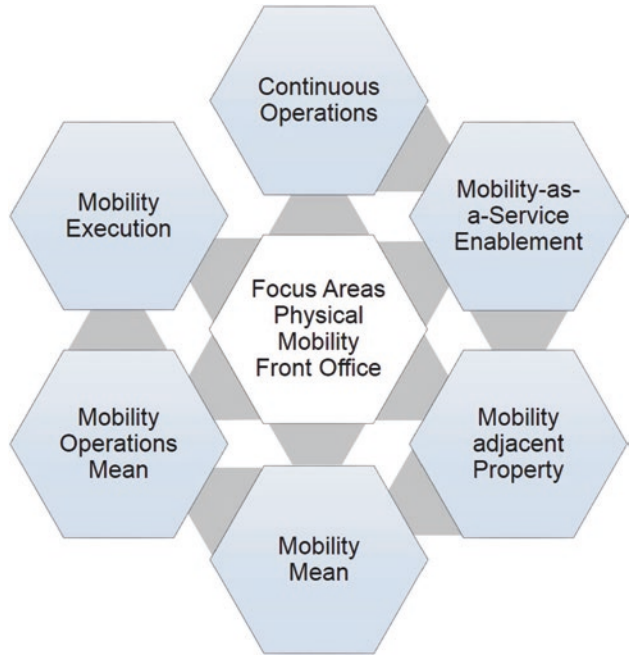

Fig. 5.3 Core activities of the Physical Mobility Front Office

this mechanism is built into the underlying *business model*, further usage potential and revenue drivers are made addressable. Those might then result in a new business model variant or an adaption of the original one.

A functioning *Physical Mobility Front Office* is often the first contact point for consumers. Here those personae reside that we encounter along our travels and ensure the trip's progression and completion. The task list of the Physical Mobility Front Office is structured along the following core activities, as outlined in Fig. 5.3:

- Continuous Operations
- *MaaS*
- Maintenance of mobility-related transit areas and mobility-related property management
- Operating content and information portals as the mobility broker
- Operating and maintaining means of mobility that are in private and government hands, provisioned by private communities or individuals
- Operating infrastructure assets
- Executing and deploying mobility offerings.

Compared to the *Physical Mobility Front Office*, the *Mobility Back Office* is the home base to those personae that are in charge of physical, infrastructure, and space related, structural, political, and digital tasks. In Fig. 5.4 the most relevant and apparent user groups are listed. Projecting into the future, we will encounter even further back office related

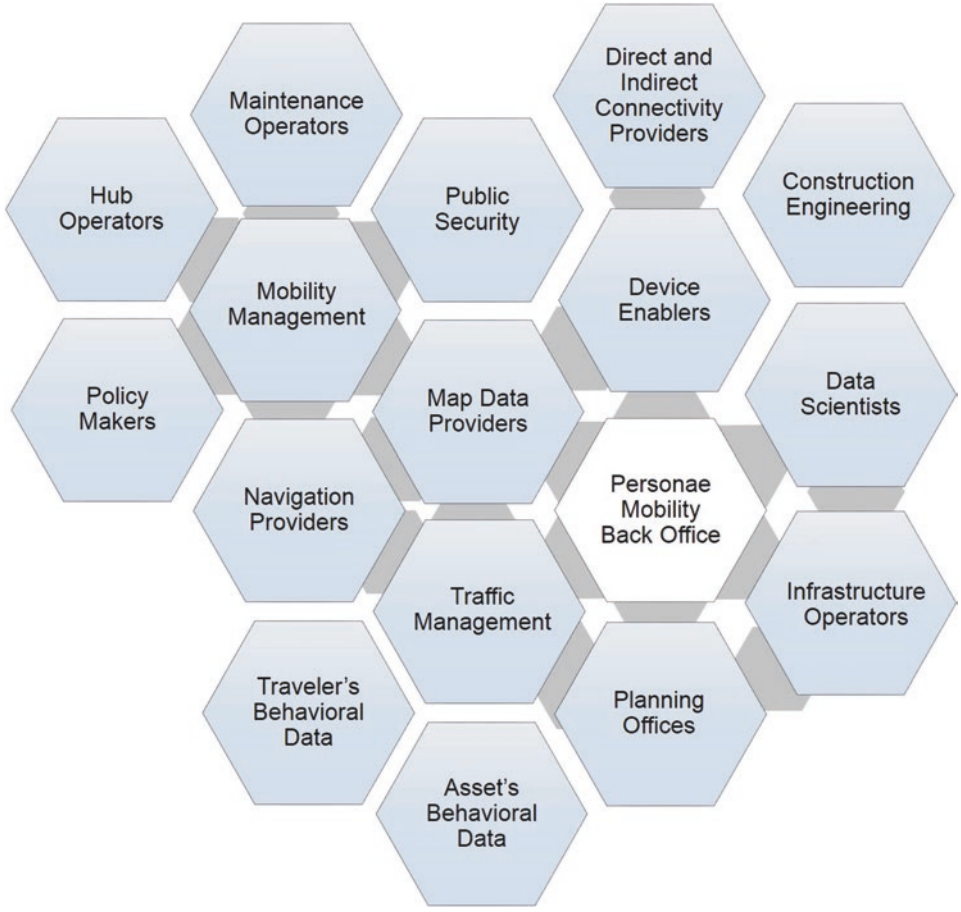

Fig. 5.4 Personae in the Mobility Back Office

groups that to date do not yet exist or emerge throughout other non-mobility matters into a mobility relevant business.

An environment that is characterized by default of services and technology, like the Smart Mobility one, needs further analysis of the ecosystem's stakeholders (app providers, service providers, content distribution systems, hardware providers, system integrators, and connectivity providers). The last refers, for example, to the telecommunications industry and private connectivity "operators" that emerge through 5G technology [85]. The examples from the travel industry in Sect. 2.5 illustrate the opportunities. Those above listed stakeholders we allocate to the *Digital Mobility Front Office* (see Fig. 5.5).

Smart Mobility defined as an ecosystem encompassing the service portfolio reaches completeness once the offerings and prerequisites are targeted in a systematic manner.

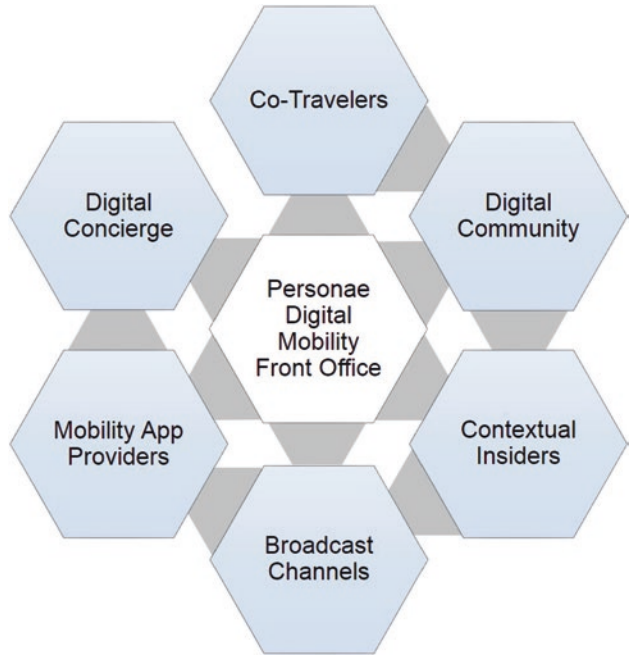

Fig. 5.5 Personae in the Digital Mobility Front Office

Otherwise the portfolio is being looked at solely, for example, from the increasing number of digitalized mobility offerings that flood the market or the portfolio is being rated by the preparedness of the markets to provision connectivity, to have the budget to own smartphones, or to establish a sensor-based monitoring of the transportation network.

A complete outline of Smart Mobility offerings should at the minimum embrace the following groups:

- The *Physical Mobility Front Office* with reference to the cluster of mobility service providers that ensure a safe and punctual departure and arrival, whether individuals or cargo transportation orders
- The *Mobility Back Office* with reference to those infrastructure units and providers that ensure mobility offerings are being executed, namely providers of hardware, software, and connectivity as well as devices belong to that group
- The *Digital Mobility Front Office* that is in charge of enabling and fostering digital consumption and service expansion.

The dependencies of the three groups on each other resonate with the increasing digitization in the market: without the Digital Mobility Front Office the portfolio of service offerings is incomplete and limits future business opportunities. Even more, the business with unknown business partners remains untapped. Another downturn would then slow down the accessibility of additional consumer groups, as outlined in Fig. 5.2.

Now, all previously introduced other personae fold into the three-tier grouping as outlined in Fig. 5.6.

Mobility Operations Characteristics	Smart Mobility Enablers						
Physical Mobility front office	Driver	Those that share mobility property	Those that share mobility property	Train	Rail Tracks	Storage	Signaling
	Conductor	Those that share mobility property	Those that share mobility property	Street	e-Bike	Drive-in	Traffic Light System
	Police	Maintenance Engineer	Car	Subway station	Plane	Loading Zone	Switch
	Inspector	Construction Engineer	Bus	Watergate	Runway		
Digital Mobility front office	Digital Concierge	Mobility App Providers	Broadcast Channels	Contextual Insiders	Digital Community / Communities	Co-Traveler	Contextual Expert
Mobility back office	Mobility Manager	Operations Planner	Traffic management unit Public	Rail Operator	Maintenance Service Unit Public	Digital Map Provider	Traveler's Behavior Analyst
	Public Security Office	Policy Making Unit	Traffic management unit Private	Hub Operator (Airport, Port, …)	Maintenance Service Unit Private	Connectivity Providers	Travelers' Behavior Analyst
	Traffic Data Provider	Construction Data Source Provider	Incident Advisor	Hub Navigator	Door-to-Door Navigator	Device Enabler	Data Scientist

Fig. 5.6 Smart Mobility Personae

5.2 Smart Mobility Role Model

5.2.1 Impact of Smart Mobility on Existing Sectors

Barbara Flügge and Heinrich Pfriemer

Automotive manufacturers will no longer sell their cars piece by piece, instead they will offer mobility packages. They will have to turn themselves into mobility provides. Their future business model will orient itself to a constant cash flow, away from margin per car produced.

The mobility of the future or the future of mobility will force governmental or semi-governmental transport providers to re-focus as well. In such organizations political influence is paired with huge investment budgets and Key Performance Indicators (KPIs) to function under the premise of the industrial age, the latter measured by scale, mass, and standards. Taking the majority of today's mobility innovation projects into account, it becomes evident that they mainly focus on product improvements or product service improvements. Examples are new wagons, railway routes, and better use of tracks.

Currently digitization is mainly regarded and executed in cost saving measures, like the implementation of ticket machines with little or no user experience and with a clear neglect of the principle of sophisticated service offerings for the elderly, for example. Prices on homepages are not coordinated with local pricing methods and result in puzzled clients. Real mobility requirements of the population are less regarded than political prestigious projects.

If public transport providers want to come close to the promise of digital change and the future request for mobility, this requires the implementation of a holistic digital strategy

driven by institutional and organizational leaders and an establishment of new strategic roles such as the Chief Digital Officer or Mobility Manager.

5.2.2 Transformation into the Digital Era

Barbara Flügge

Mobility more than any other area will evolve into a service oriented system of synergies and effects. Not only do roles and responsibilities change, but grounded in the *IoS Role Model,* services now offer new and disruptive white spaces for formerly strategic, functional, and task oriented positions. We hereby introduce the *Smart Mobility Role Model* as an opportunity to identify new positions and opportunities.

Service Provider Mobility *service providers* relate to public and private organizations that supply transport and/or transport networks. Furthermore, mobility providers supply ticketing, travel offers, seats, and cargo and freight targeted space on buses and trains. Once a mobility service opportunity is launched as a public tender, listed providers design and supply the service on behalf of the government institution.

Service Hosting Virtual services such as ticketing, the sale of travel and freight transport, packaging materials and their bookings, for example, are being offered by *service hosting* providers in conjunction with web or app access, at the counter or in the means of transport itself. Physical offerings such as rail tracks, streets, or bridges are usually offered by public institutions in cases where they are not privatized. The maintenance and hence physical hosting of these assets is conducted by public or private organizations. Although the trend in some regions veers towards privatization, in other regions we observe a trend back to government ownership of assets.

Service Gateway The service provider and the hosting unit rely on in-house or third party organizations such as IT companies and system integrators, the so-called *Service Gateway*. The challenge will be – and not only in the field of mobility – to calibrate, connect, and embed organically grown data impulses from supply and consumption channels with standardized formats. The resulting business for *Data-as-a-Services* then contributes not only to the interoperability of data provisioning but expands the business model of the service gateway.

Service Broker Mobility related *service brokers* are manifold: being a transport or local public transport company, a hospitality service provider such as a hotel, restaurant, tourism office, travel agency, or shopping mall, a VIP service provider, or a car-sharing or leasing company. Digital brokerage takes place via those brokers or third party service providers such as global distribution systems providers Travelport [35] and Amadeus [36]. Brokerage, in addition, takes place through travel content providers. Those providers

that monetize their business through search engines and comparative portals turn more and more into influencers. These influence the price design and pricing schemas, or the perceived price compared to the real price that has been commented or evaluated in rating systems and via recommender engines. *Service brokers* focus on pricing, on the one hand, and on defining deployment concepts to establish Smart Mobility in the markets, on the other hand, for example through local and international franchising concepts.

Service Aggregator Service bundles such as train-to-fly or train-to-rental are examples of aggregated services once the offering is launched in one package and priced as such. *Service aggregators,* for example the Swiss Railway SBB, offers through its GA Travelcard [86]. The card is purchased on an annual basis and to date permits the use of any means of transport, including trains and buses, and gives reduced entrance fees to museums and further promotions. Innovators such as the initiators of the MaaS alliance offer profile, hence personae, dependent bundles. Those vary by the number of hours used in public transport, whether bus or train, and the estimated amount of mileage consumed by a rental car. The pricing then follows a utility driven business model.

Service Channel Maker Consumption channels for mobility turn more colorful than ever before: whether an app, the multi-functional terminal at home, or the smart bus stop. *Channel makers* are often the real innovation drivers who design and create on behalf of established institutions or who invent new "docking stations" to win new customers and bonding mechanisms in their very own start-up. The key objective is to increase the probability of consumption: the higher the reach and usage numbers the higher the conversion ratio, hence the real booking or consumption of an offering.

What is the role of today's players in the field of mobility? Focusing on a segmentation of public and private mobility offerings or by a separation of customer and business partner narrows down the way of looking at this question. Especially in times of rising infrastructure burden and more apparent competition among regions and cities an isolated view is outdated.

The real target of companies and governments should be to strategically position themselves in the market based on the influence they want to pursue. Thus companies as well as governments need to be clear about their strategic objectives. A service oriented acting is then feasible through the use of the Internet of Service (IoS) concept, digital means and tools. The IoS approach does not only enable mobility related services to get traded digitally, but any other services. Techniques and methods are necessary to assess and ease complexity and thus make IoS deployable.

Service Consumer As outlined before mobility consumers are manifold. They reach from individuals to organizations, interest groups and families, institutions and occasional travelers. We speak here as primary consumers. Secondary and tertiary *service consumers* are those that get dragged into the offering by the primary consumer and his interest; see Fig. 5.2.

In the following example we demonstrate the IoS role play. Moreover, occupying distinct roles and switching from one role to another are already daily business for some of the

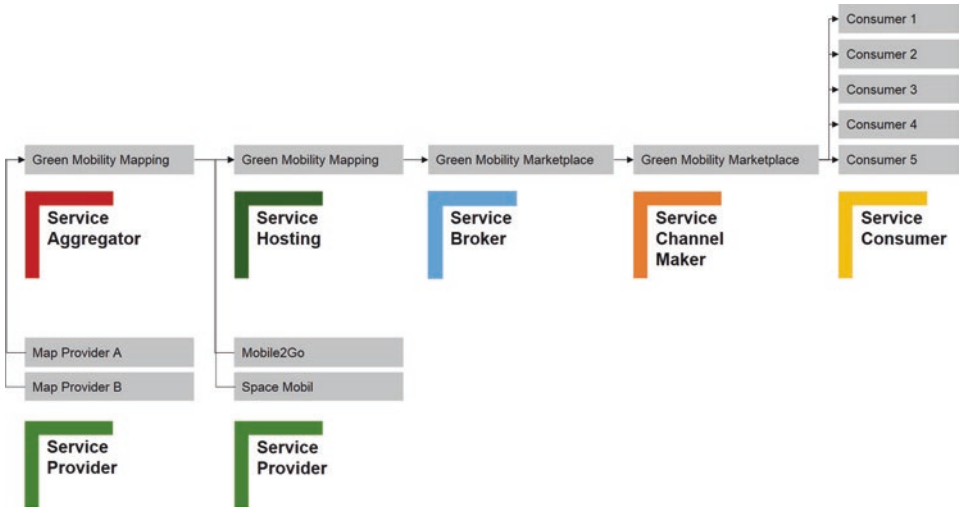

Fig. 5.7 The IoS Role model in use – an example

service providers. The ability to turn the focus into one or multiple roles and make the strategic move are two of the critical success factors to turn an offering into a realistic offering.

Example: The Real Eco Mobility Changing a role and turning on new services impacts suppliers as well as business partners. How organizations are being connected is now introduced in the example of "real eco mobility". We define three organizations that are part of a field trial: Mobile2Go, Spacemobil, and Green Mobility Mapping. All of them offer mobility services. Mobile2Go acts as MaaS provider, Spacemobil offers loading and storage capacity in static and moving rooms, and Green Mobility Mapping offers interactive maps for spaces and ecological profiles. Next to the services they offer, all three organizations consume services, too. Mobile2Go is now seeing a chance to transfer into a marketplace operator driven by its business activities with Spacemobil and Green Mobility Mapping. See Fig. 5.7 for an outline.

In case further business partners seek to enter the network of Spacemobil, Green Mobility Mapping, and Mobile2Go the graphical outline then helps to identify in which positions the existing players encountered competition and which newly added dependencies among the organizations changed the portfolio of Mobile2Go as marketplace operator.

5.3 Service Enablement and Service Enrichment

Barbara Flügge

The connector among the outlined service roles is the service itself. Once service design is made the depiction of to-be-traded products and services takes place in a handy manner and in a consumable and tradable format via digital consumption channels. This step we

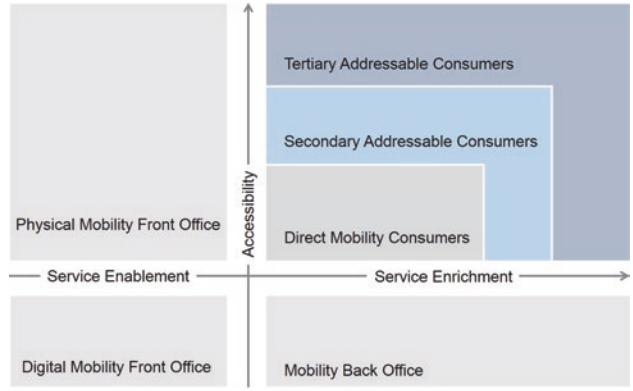

Fig. 5.8 Service enablement and enrichment in the mobility provisioning process

refer to as *service enablement*. In a second step, *service enrichment*, the service depiction gets enriched with further characteristics including bundling variances with other services and/or products. These service relevant steps follow the consumers' requirements and get executed in their respective task areas in conjunction with the *Physical Mobility Front Office*, the *Digital Mobility Front Office,* and the *Mobility Back Offices* (Fig. 5.8).

As part of the global study of 20 cities, a second analysis of service provisioning concerning mobility design, preservation, and measurement was conducted. This took place independently of the cities. The following 52 services in Table 5.3 might sound very familiar to experts from traffic management and operations units. The listing that is far from complete does however illustrate the variety and variances of distinct activities in the mobility field.

Service Dialogue Process Services such as the ones listed above are typically categorized according to essential and sufficient characteristics. A deep and multi-layered analysis is required to be able to capture all relevant aspects. In the course of the diagnosis big data and further intelligent building blocks facilitate the process. As the diagnosis takes place in a dialogue among service consumers, enablers, field and desktop personnel according to the *IoS Role model,* we refer to the analysis as the *Service Dialogue Process*.

One element of the Service Dialogue Process is benchmarking. Mobility consumers, for example, judge the offered service by usage, comfort, and savings potentials: see Fig. 5.9. Independent of its form and geographical allocation, any ecosystem seeks benefit and savings potential through intelligent offers. The most relevant ones are summarized in the *savings polydiagram* in Fig. 5.9.

Getting back to the service examples shown in Table 5.3 those got sorted in a third step in the *IoS Role Model*. The objective of the third analysis is to identify clusters of tasks that link one role with another and thus fosters interaction among the role owners. The analysis results in *linkage clusters*. The applicability of the linkage clusters we then checked for all of the 20 cities and beyond. It turned out that the linkage clusters are applicable to

Table 5.3 Service portfolio (extract) concerning mobility provisioning in an ecosystem

Accident prevention analytics and measures
Accommodate traffic mode to usage pattern
Accommodate traffic mode to demands
Adapt bus and station schedules to peak hours
Adapt bus schedules to climatic conditions
Adaptation of parking spots to user needs, intelligent parking spots, parking spot overview service for users for the whole city
Analysis of insurance driven measures for accident prevention and mobility safety
Analysis of intermodal infrastructure with respect to walkability needs
Analysis of traffic network with respect to ticketing and pricing schema for cargo and individual passengers
Analysis of transit related transport offerings and demand driven extension
Assess fuel efficiency for bus related procurement decisions and more intelligent and efficient routes
Assess pollution level in specific districts and ban some vehicle types for limited amounts of time in order to improve air quality
Bike lanes outside the city in recreational areas
City planning concerning bus lanes
City planning concerning pricing for public transport with regard to customer satisfaction, investment decisions, demand/supply analysis
City planning concerning space management to adapt infrastructure to demands
City planning concerning space management to adapt infrastructure to special interest demands
City planning concerning traffic lights steering
City planning for goods and service delivery
City planning to accommodate business' demands
City planning to accommodate daily living demands
City planning to accommodate sidewalks to citizens' demands
City planning to assess extension of street systems
City planning to expand intelligent routes including intermodal transport solutions with special focus on reducing stress levels of pedestrians
Conduct of insurance offerings for dangerous routes and crossings
Conduct of premium and risk analysis
Cost/benefit analysis for service provider
Customer interaction with respect to fare management
Customer interaction with respect to maintenance, expansion, and renewal of transport infrastructure
Customer interaction with respect to serving special needs and interests such as less-able passengers

Table 5.3 (continued)

Customer satisfaction analysis concerning complaints
Customer satisfaction concerning on-demand and predictive booking capabilities
Customer satisfaction concerning sustainability measures and recommended use of means of transport
Customer satisfaction concerning traffic provisioning
Customer satisfaction with respect to increasing service quality – measured in accordance with sustainability objectives
Customer satisfaction with respect to pricing and ticketing procedures
Decision support for infrastructure measures through visualization and simulation techniques
Demand analysis for intelligent intermodal transport systems with one central app and payment method
Demand analysis with respect to investment decisions for production, education, retail, and hospitality service providers
End user applications which integrate all information about all available modes of transport including public bike sharing stations, car-sharing, etc.
Flexible public transport stops and re-assessment of infrastructure every year
Improve navigation for cyclists
Improve security for cyclists
Inform customers about the amount of gender separated seats in the respective vehicle they plan to take
Intelligent fare management in conjunction with persona driven analysis of pricing and usage behavior in the targeted ecosystem
Maintenance related demand/cost/benefit analysis for provider
One payment card for all modes of transport (cars, buses, bikes, etc.) for individuals and cargo
Parking spot planning and allocation according to demands in a district
Road taxing for highly frequented and emission critical roads
Sustainability analysis
Sustainability management and deployment in collaboration with asset and infrastructure provider
Sustainability measures
Traffic analysis per 1000 inhabitants
Traffic flow analysis with respect to as is, and adaptability to demand driven requirements
Traffic management for residential areas

Fig. 5.9 Benefit and revenue drivers in ecosystems – the savings polydiagram

any other ecosystem, whether a city or any other type. Figure 5.10 introduces the linkage clusters.

Through the concept of linkage clustering one essential step is made to facilitate service deployment in entire ecosystems and markets. A service provider could identify its linkage cluster. Service design gets deployed in a task and role oriented manner. Moreover service design evolves into a valuable and critical element of business modeling. This transformation process itself denotes the transformation of mobility offerings from the old world towards Smart Mobility in the digital era. We identified the critical nine transformation elements as illustrated in Fig. 5.11. We introduce a detailed depiction of organizational transformation maturity throughout Chap. 19.

Digital Moments Another element in the service dialogue among consumers, providers, and intermediaries is the element "*moment*". Terms such as the *digital moment* or *moment of truth* describe the instantly, hence immediately, perceived "okay" of a consumer that lets the service provider know that the consumer chose the right offering and it met his expectations. This ultimate acceptance is the best confirmation a provider could get. The positive outcome of the service delivery will most likely turn into positive referrals and recommendations.

However, in case a service provision turns into a mismatch or a low-quality delivery experience, negatively perceived services fall back directly onto the service provider. They cause denial and frustration. The mismatch could not only harm the service provider

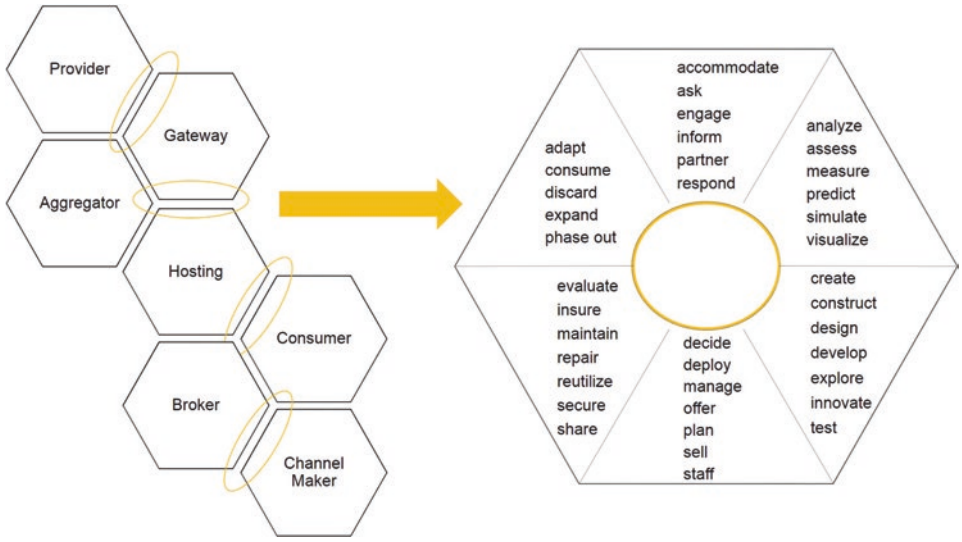

Fig. 5.10 Typology of linkage clusters in accordance with the IoS Role Model

Transforming from	To
Anlagen intense service offerings	Asset independent service offerings
Partly accomplished mobility integration	End-2-End Mobility
Ownership	Subscription
Product-embedded technology	Technology as connector
Isolated profit model	Integrated profit model
Professional associations and social legislation	legal vacuum in smart phone applications
Non-standardized data models	Connected data
Transport company	Technology company
Sustainability measured by consumer	Sustainability monitoring of the ecosystem

Fig. 5.11 Transforming from mobility to Smart Mobility

giving him a hard job to be chosen again, but harm the platform that issued the service. Subsequently, service broker and channel maker get dragged into a negative spiral.

We physically encounter these moments by simple eye contact, checking a graphic in a display, or encountering a spelling error on the digital bulletin board of a public transport operator. Another moment of truth comes into play when figuring out pricing information,

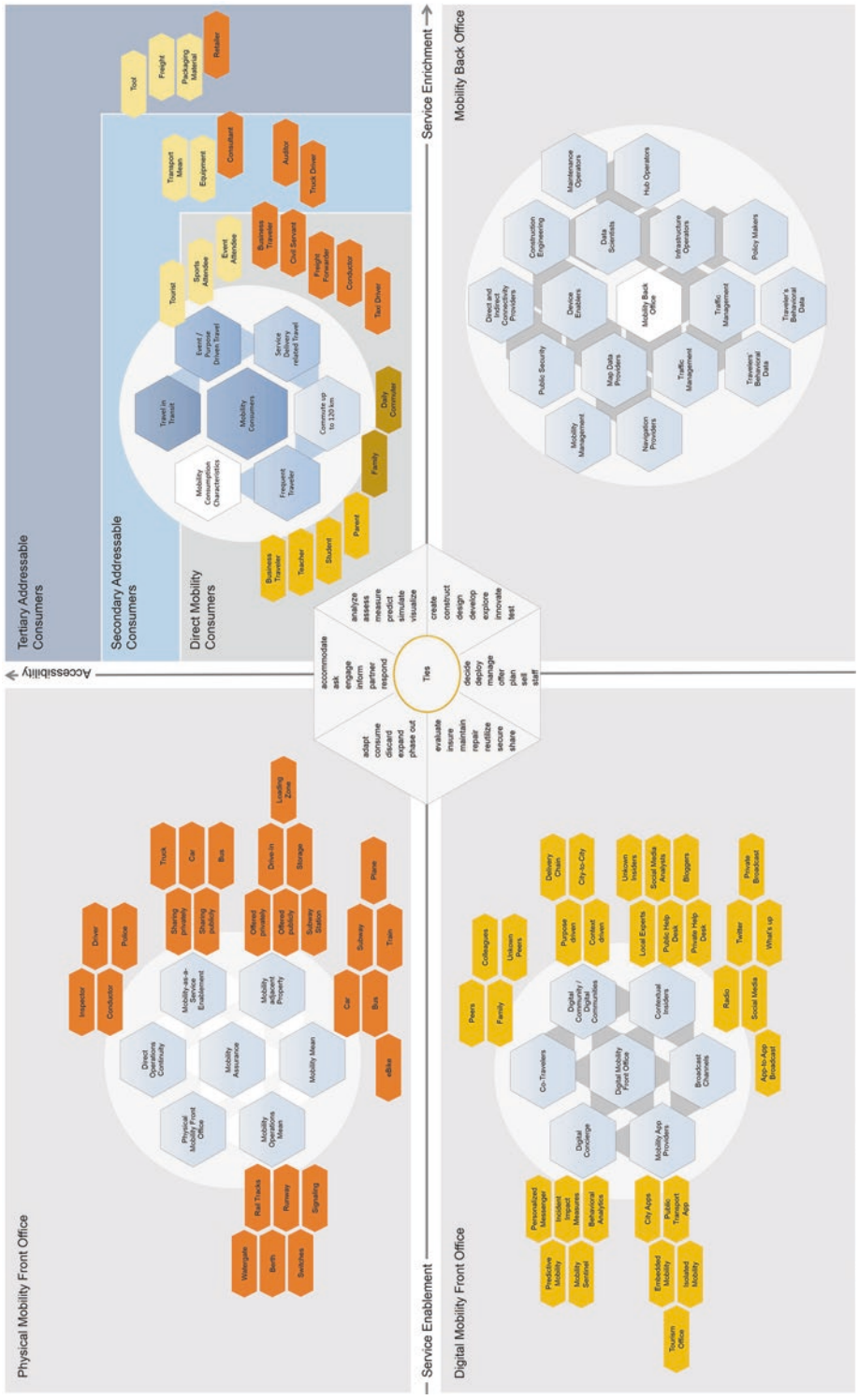

Fig. 5.12 The Smart Mobility Ecosystem

positively gaining instant clarity about the offering or negatively registering hidden elements or misleading information, for example in the case of discounts or rates. Next to customer retention, another application field is dynamically offered pricing and service bundles driven by capturing the "right digital moment".

Mathematical models and emotional media, recognizing facial and gesture-related expressions for example, will be of further use in capturing situational and emotional influencers when using apps or making several click attempts in a portal.

5.4 The Smart Mobility Ecosystem

Barbara Flügge

By combining now the complex of roles, services, and linkages, the *Smart Mobility Ecosystem* is born. Figure 5.12 denotes all elements in an overall view. With regard to the infographic, please refer to the book's website at springer.com.