2 Mobility and Market Processes

2.1 Dynamic market development

The first version of the kontiki Recommendations for Action, issued in October 2000, initially described

- the requirements of the customers on the mobility process
- the requirements of the operators on the business processes

and linked both sets of requirements through the business process.

This approach was in accordance with a process-oriented system concept, which was determined by the demand side – the customers' decision-making process – and reflected a relatively static representation of the customer-operator relationship.

The customer-operator relationship will now be updated, taking into consideration the dynamics of market development. These dynamics result from developments on both the supply and demand sides.

The dynamics of market development will generate new business profiles with new services and a new quality of relationship to the customer. If the implemented electronic ticketing processes are to continue to sustainably facilitate the new system structures of future mobility management, they must keep pace with these developments.

2.1.1 Development on the demand side

Customers continue to currently organize a large portion of their mobility chain themselves.

Mobility chain is defined here as the individual linking of means of transportation using information and services, for targeted overcoming of spatial distances (system of value-adding elements of mobility).

Although this may sound highly theoretical, it demonstrates that the mobility chain comprises more than the simple transport from a station A to a stop B.

At the same time, it must be recognized that mobility is merely a means to an end for the customer, and only seldom the goal itself. An associated event is the actual reason for mobility, an event that may be related to work or recreation. Mobility is thus a supporting service.

In the future, customers expect to be relieved of organizing this chain, through the supply of a complete "problem solution package." In other words, demand is increasing for an integrated palette of services, information, and

transactions ("all-in-one" mobility services), which preferably include the actual event (the purpose of the trip).

This means that the customer's wishes will determine the product in the future. Only those products that best fulfill those wishes will be successful. This statement is independent of sector, i.e. it applies for all of public transportation.

In other words, the task more involves offering customers an individual solution from a well-rounded palette, than selling them a certain predefined transportation product, which they must then laboriously integrate into their mobility chains – along with other such products procured through other channels.

A public transportation provider that completely facilitates the customer's mobility process, i.e. offers all necessary services from a single source and guides the customer in this process, creates an additional value for the customer. This additional value could represent exactly the criterion according to which the customer decides for the package from this public transportation provider, and not another's solutions.

Consequence:
In the latter arrangement, the service provider offers customers a palette of individual services (toolbox) from which, in their concrete decision-making situation, they assemble those individual services they need into a package for realizing their mobility chains. Thus the actual sales product first results through the customer's act of selection. Chapter 2 addresses this toolbox in detail, while Chapter 4 describes the dynamics of the decision-making process.

2.1.2 Development on the supply side

Historically, transportation companies perceived themselves purely as carriage providers. The task was to carry a person or goods from A to B.

In such a transportation world, the customer was characteristically designated as an "instance of carriage." The product palette was characterized by the physical transport service, with the directly related services of ticket sales, timetable service (including punctuality), and provision of routes and vehicles (including security and cleanliness).

The current situation in transportation companies certainly supplements the operator's physical carriage service with "intraservices," auxiliary services that a public transportation company offers its customers, either free of charge or upon use of a certain form of payment.

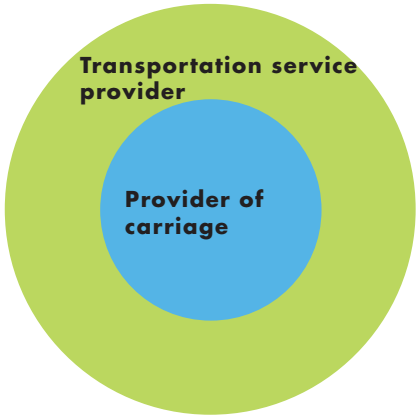
The simple provider of carriage became a transportation service provider (see Figs. 2.1.2.1 and 2.1.2.2).

However, intermodality is still associated with the combination of transportation agents exclusively within the public sector.

Intermodality is defined as the system side-consistent interaction of several transportation agents, in which the usage procedure for the passenger is coordinated within and between the individual transportation systems.

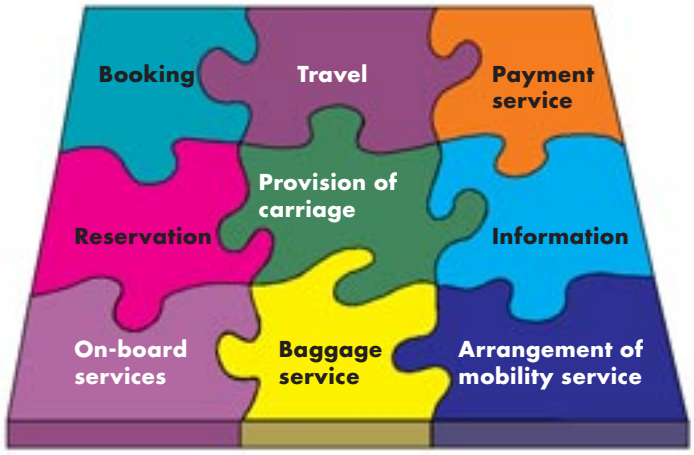
Transportation service provider

FIG. 2.1.2.1



Transportation service = Provision of carriage + intraservices

FIG. 2.1.2.2



Economic developments will dramatically change the situation of public transportation seen in this manner.

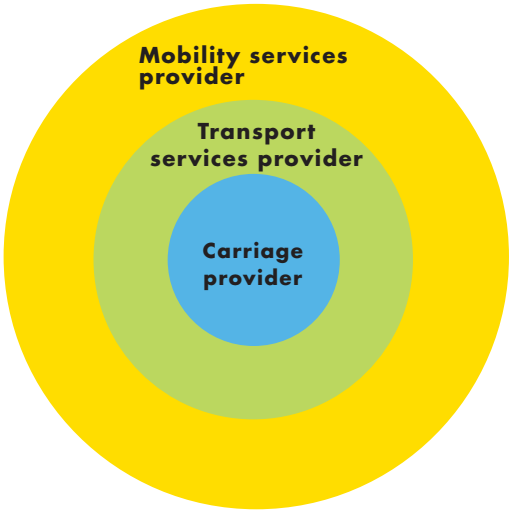
The following indicators are cited as examples:

- Regionalization (competition) is forcing public transportation to externally orient itself toward the customers in an active and attractive manner. A reorganization of sales & marketing is only logical.
- Regionalization (end of unlimited financing through operational deficits) is forcing public transportation to internally optimize its business management structures, in order to compensate cost disadvantages relative to private suppliers.
- Regionalization (obligation to collect competitive bids) is enabling market penetration even by foreign third-parties in the traditional public transportation domain, with the result that current transportation companies are being marginalized. Examples: Connex/Vivendi or Arriva.
- Advances in telematics (digitalization) are forcing the establishment of creative marketing with aggressive product strategies
- The development in numbers of passengers (population decline, less travel by young apprentices and occupational trainees), but also the increase in workers' flexibility, is additionally increasing the pressure to take action.

In order to defend their own core business, public transportation companies must quickly develop from mere providers of carriage or transport to mobility service providers, able to either completely meet the customer's entire needs along the mobility chain, or at least sustainably facilitate them.

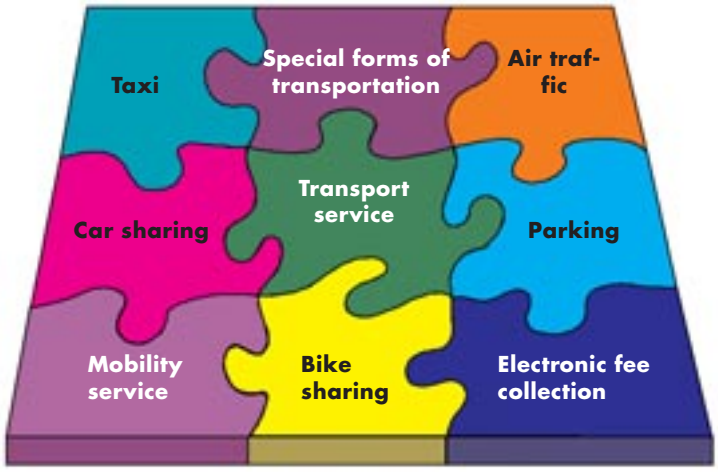
Mobility services provider

FIG. 2.1.2.3



Mobility service = transport service + interservices

FIG. 2.1.2.4



The boundaries of modern public transportation are becoming more flexible; the term "intermodality" thus comprises a completely new dimension and is abandoning the public sector.

Transportation companies will be offered the opportunity of reorienting their current palette of products and thus facilitate the customer's entire mobility chain. The original transport services will be supplemented by "interservices." These are services that a non-public transportation supplier independently provides to public transportation as value-added services.

The requirements for electronic access systems become accordingly more complex, with corresponding consequences for the interoperability of the access medium (see Chapter 3.8).

As a vision – or a competitive necessity – it is certainly possible to imagine a development that would allow contemporary transportation companies to operate in other markets, beyond their core provision of mobility services, as providers of "multiservices" – either independently or in cooperation with third parties. Because the actual boundaries of the core business of public transportation would be transcended, it is possible to speak of "transservices."

In their endeavors to serve the customer in an integrated manner, why shouldn't public transportation providers themselves be active in the fields of trade, procurement and insurance, or themselves organize sporting and cultural events? With the focus always on the customer, there are no longer any limits to marketing departments' creativity.

The development of new technologies represents ideal conditions for companies to optimally link individual service areas.

This development is still in its initial stages in contemporary public transportation.

But cooperations with a wide range of partners lend themselves to jointly exploring these new paths. Public transportation will not only leave behind its original characteristic market, but also gain the opportunity to generate new markets, together with its partners.

It is evident that the new providers, encroaching on the market through regionalization, are ready to face this challenge. The decisive factor for success is a strong presence at the interface to the customer. This is how new providers with integrated mobility services and strong brands will position themselves in the market.

The following will appear as providers:
- airlines
- automobile manufacturers
- mobile telephone network operators
- mobility agencies
- automobile rental agencies
- private telematics providers
- tourism companies

Consequence

Through the market pressure on the supply side, today's transport service providers – transportation companies or integrated transportation networks – are already faced with a situation that necessitates appropriate action with respect to comprehensive mobility service, or even multiservices. And this is exactly where the opportunity lies. New forms of organization and new business profiles will be formed that have little to do with those in today's public transportation.

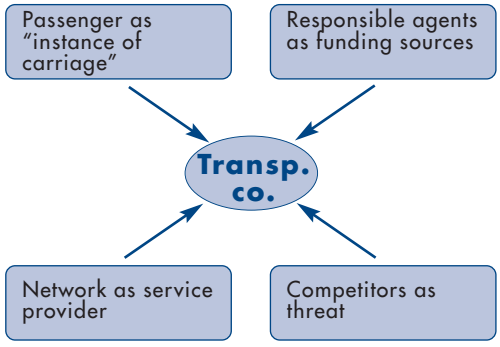
Public transportation companies will metamorphose from the current internally-oriented transportation operators to externally-focused mobility service providers.

The following diagram clearly illustrates this phenomenon.

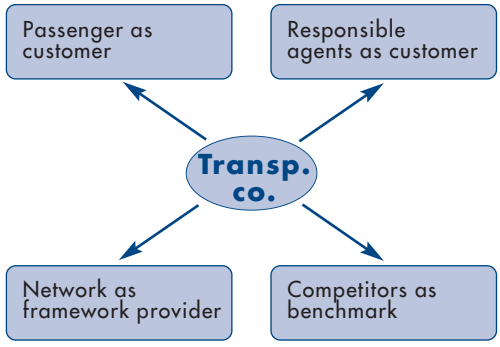
Internal/external orientation

FIG. 2.1.2.5

Internally oriented transportation company
- production-oriented
- cost-oriented
- task-oriented
- deficit-oriented



Externally oriented mobility provider
- market-oriented
- results-oriented
- customer-oriented
- performance-oriented



Source: Metropolitan

A transportation company that continues to be oriented only internally, with the focus on the production function, must reckon with being driven from the market. In contrast, the externally oriented mobility provider ensures its ability to survive through cost and income transparency, product flexibility, cooperation, emphasis on the marketing function, etc.

The contents of electronic ticketing will also have to expand in the course of this development. Whereas today, the electronic medium is merely a carrier for identification (e.g. post-paid code) or an electronic ticket (single or season ticket), in the future it will be understood as the medium of an integrated system for accessing the world of mobility and/or for facilitating the entire mobility process of the customer.

This approach transcends the purely technological aspects of electronic ticketing. Electronic ticketing will become much more important in marketing than is the case today. eTicketing will be combined with an entirely new palette of products and services, which, however, must be co-developed to the same extent. The medium would then be much more of a marketing instrument than merely a payment one.

2.2 Future services and service processes

As the "core fields" of public transportation alone can no longer satisfy demand, the customer's requirements will increasingly pose a challenge for public transportation's entire range of products. The trend is toward combinations of, and supplements to, products and services, made available to the public as a freely customizable package.

Starting from traditional public transportation services in
- long-distance traffic
- regional traffic
- local transit

with their trains and motor vehicles, as well as transport with airplanes, passenger ships, and ferries, additional types of transportation must be included in the transportation chain, as nearly ideal and absolutely necessary additions:

- non-scheduled services as a type of public transportation, satisfying individual transportation needs, in contrast to routed traffic. In addition to rental cars and excursion trips, this domain is characterized by taxi transportation.
- Special forms of public transportation, such as shared hailed taxis or dial-a-bus systems, but also the domain of transportation types not regulated as commercial or for-fee. This spectrum makes it clear what a broad range of needs defines the demand for mobility.
- Systems that correspond to private transportation, but can be used without one's own vehicle, according to special criteria of availability (e.g. car sharing, bike sharing).

Services auxiliary to the actual transport process are suited to customers' demands and are added to a single overall provided package. The range of products should not be limited to purely transportation needs, but should also include information from the trip periphery.

The majority of mobility for all travel purposes is nonetheless characterized by private transportation (high affinity for automobiles). Currently, there is hardly any demand on the part of transportation users for typical intermodal or multimodal services. By lowering barriers to access to public transportation – which includes the reorientation of services and service processes – new potentials for business can nonetheless be generated.

The decisive prerequisite is functional information logistics. The information itself can be considered as a package tool. Its character is descriptive, for instance giving information about the current traffic situation in public transportation or private (motorized) traffic. Better quality will be achieved, however, by acquiring these pieces of individual information and combining them in their frequency so that they also represent alternatives. Up-to-date availability fundamentally determines the standard of quality and potential synergies.

In this way, information logistics form the basis for bundling services, which can then be requested, reserved, booked, or purchased by the customer.

All customer surveys in the marketing field indicate that more and more groups of customer are emerging that desire a full-service package and will accept this from whomever offers them the most favorable conditions. The customer would like to receive a complete package, and have to worry as little as possible about the individual steps within a trip chain or a within a tangle of different services.

Additionally, offers of products such as interservices should be made on the basis of fixed legal jurisdictions, addressing issues of liability and guarantees. Standardized services, freely configurable in quality and quantity, should be considered the optimum.

Not only the availability of interservices in all sales media, but also such areas as marketing and customer management will play increasingly important roles.

Companies must undergo a process of change in the orientation of their marketing. In comparing internally and externally oriented companies, significant differences can be observed in the definition of objectives.

A company's external orientation creates ideal conditions for fulfilling the described nature of a mobility service or multiservice provider and being able to present demand-oriented package solutions.

In this context, particularly issues of the quality of contact with the customer and customer retention are becoming increasingly important. Customer data already on hand (e.g. from season ticket subscribers) and data from frequent users must be collected and stored in a "marketing database." If this customer data were combined with the data from using eTickets, "database marketing" would make it possible to address the customer in a much more targeted, orderly, and qualified manner.

"Database marketing" designates the central storage of information about customers or potential customers, the analysis of this data, and its target group-specific use, in order to more efficiently tap the potentials of existing customers.

Through an optimal arrangement of the frequency and quality of customer contact generated in this manner, long-term customer retention can be established. This in turn enables public transportation companies to significantly decrease the costs of new customer acquisition.

This means the customer must be viewed in a completely different light. Customers are entitled to receive individual and custom-tailored service offers.

To achieve this, however, it is absolutely necessary to know the customers and, specifically, their mobility behavior, and to store this knowledge in such a database. After all, individual customer service necessitates de-anonymization of consumer buying behavior. It must become transparent for a mobility services provider what service packages are requested and how often.

Serving the customer via a call center function will become self-evident; a carefully planned loyalty program will become an important component of sales and marketing. An attractive customer loyalty program can contribute to sustainable, long-term binding of customers to "their" mobility services provider. An eTicket is not always necessary for this purpose; customer retention, customer service, and incentives can be provided regardless. But an eTicket does aid in establishing the corresponding marketing and technology platform.

Demand requirements and customer desires are not removed from economic considerations in designing products. That which in the end proves itself as good package design may significantly vary from region to region. For the service provider, this means that it must search for solutions itself, and not always resort to standard packages. This confirms that service tools from which customers can configure their own packages make good sense.

The new service domains of the all-in-one provider (service toolbox):

In principle, it would be possible to define in detail the processes and content of each of the following services; however, this would be beyond the scope of this document.

The following list nonetheless gives a good overview, and the listed topics are largely self-explanatory:

Information from the trip periphery

- Hotel and restaurant information
- Information on recreation and cultural events
- Information about alternative trip routes
- Dynamic route information
- Timetable information via SMS and WAP
- On-board television for passengers

Event management

- Hotel reservation
- Tickets for cultural events
- Tickets for sporting and recreational events
- Event organization and execution

Transport services

- Flight reservation/tickets
- Bike sharing
- Taxi
- Rental car service
- Highway toll
- Dynamic, intermodal routing
- On-board service
- Car sharing
- Taxibus
- P+R (info + operation)
- Pick-up service
- Baggage transport
- Trip advisement

Trip management
- Complete planning and execution
- Travel expense reports
- Organization of arrival and departure
- Mobility guarantee
- Connecting with the actual purpose of the trip

Regional services
- Office management at traffic hubs (mobile office)
- Organization of excursions
- mCommerce
- Customer care (CRM functionalities)

Insurance companies
Procurement agencies
Commercial businesses
- Price comparison agency
- Sales of travel-related items
- Trade of all kinds

Associated service functions

- Informing
- Booking
- Bundling services into products
- Establishing customer contact
- Clearing of the products
- Providing decision-making aids through evaluation
- Advising
- Supervision
- Reservation
- Payment
- Billing
- Guarantee

Target group-specific definition of packages, e.g.
- senior-friendly
- handicapped accessible
- schoolchildren- and apprentice-friendly
- "night owl"-friendly
- business-friendly
- recreation-oriented
- tourist-friendly
- cultural event-oriented
- for specific occasions, e.g. a complementary ticket from automobile repair shops while one's car is being serviced
- search for appropriate combination for lower price segment

The goal in the end is to create a market currently unknown in public transportation, but that will be considered a matter of course in a few years. This will prevent public transportation from losing touch with modern development. Public transportation should not miss out on the opportunity to present itself as a competent partner in individual mobility and to offer the customer demand-oriented service packages along the mobility chain. Public transportation must actively shape this process, taking into consideration the new technologies that sustainably facilitate it.

2.3 Influence of new technological developments on the public transportation market

New technologies in the field of communication and information technology are changing the behaviors of market participants. This especially applies to the new technologies that facilitate procuring and clearing services in public transportation. The focus in the following sections is thus on these technologies, and not on those for carrying out the services (e.g. improved means of transportation).

The technological development will be described in detail in the chapter that follows. Only the implications of this development will be listed here briefly.

Through the technological development, organizational processes not possible today can be realized:

- New customer media such as mobile telephone/PDA/internet/tags/intelligent shells offer extended functions, or integrate functions already available today
- New chips feature greater storage capacities at faster processing speeds. Functionalities of an application that are not feasible at the moment will become possible.
- The use of other transmission techniques such as Bluetooth and mobile telephone networks offers high data rates and security.
- This means the achievement of faster transaction times, improved data availability, platform and network independence, and multiple application capability.
- With the passenger tracking technology, the goal of simple "board and ride" travel would be achieved.
- Customers can be reached in an entirely new manner over the internet; an economically modellable dialogue with the customer becomes possible.
- The development of a stand-alone ticketing application, controlled by public transportation, as a nation-wide standard creates a uniform platform for establishing interoperable use of public transportation.

The technological development is also generating new patterns of behavior:

a) The mobility services provider

- Products not feasible until now will become conceivable
- Significantly more flexible fare structuring can be achieved through the possibility of electronic fare determination (see also Chapter 6)
- New cooperations and organizational forms will emerge (see Chapter 2.5)
- Processes can be automated, e.g. product structuring
- Processes can be individualized for the customer
- Uniform access procedures for the entire mobility process can be created
- Guiding the customer by facilitating processes throughout the entire travel chain
- Active database marketing will be possible and sustainably change marketing activities (see above)

b) The customer

- Mobility desires can be activated in real-time with spontaneous use of public transportation
- Mobility will become more plannable
- Transparency in fare calculation brings transparency to the customer's decision-making process
- Access to up-to-date information increases the comparability of public transportation and improves its use
- Increased use of secondary services through simpler access

2.4 The dynamic market process

In the future, the customer's needs for mobility will no longer be fulfilled by standard pre-fabricated products alone, as is the case today. Rather, standard products will have to be supplemented by a palette of individual mobility-related services offered to the customer (see Service Toolbox Chapter 2.2).

Whatever is sold to the customer in the end as a sales product will be created dynamically from the customer's specific needs, assembled by the customer as a package from the service toolbox (including standard products).

This does not mean that today's standard products will disappear. Transportation companies will simply no longer predefine these products, in the hope that this will be greeted by the customer. But the process should run in exactly the opposite direction. The essential thing is to make those services available that the customer can combine into an individual package, to optimally and multimodally fulfill his/her concrete decision-making situation

It is obvious that completely modified sales logistics must be a consequence.

The eight steps of the customer's mobility process as described in the Recommendations for Action 2000,

1 Identify need
2 Establish own value scale
3 Obtain offers and evaluate them
4 Decision
5 Acquire access to mobility service
6 Payment/clearing
7 Realize transportation & services, including intermodal combination
8 Assess overall mobility service

remain fundamentally the same. However, Steps 3 and 4 do not take place as deterministically as described in the Recommendations for Action 2000. The dynamics of the market process are just starting to act here, and the transportation companies' facilitation of customers' decision-making processes is already of critical importance, if they want to win over new customers or avoid losing their regular customers.

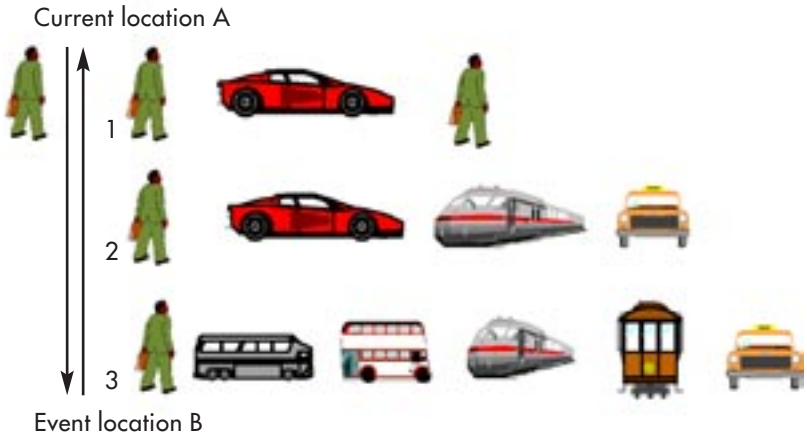
2.4.1 Illustration of alternative mobility chains

Only in the rarest cases can a single product meet the demand for mobility in a concrete situation. Even for those customers 100% loyal to public transportation, there are still alternatives. These result not only from using different

means of transportation, but are also determined by the actual event behind the need for mobility and the services associated with the need for mobility and the event.

Alternative mobility chains

FIG. 2.4.1



The mobile passenger would like to go from A to B. From the services offered – whether through the internet, a paper timetable, a mobile telephone, etc., incl. from his/her own individual situation – the passenger assembles the following alternative mobility chains:

Chain 1: By foot to garage, use of private motorized transportation, by foot from parking lot to final destination

Chain 2: By foot to garage, use of private motorized transportation to long-distance transportation, use of long-distance transportation, taxi to final destination

Chain 3: By foot to public transportation station, use of public transportation (including transfer) to long-distance transportation, use of long-distance transportation, use of public transportation to destination station, taxi to final destination

After all, behind every mobility chain, there is a concrete supply (product) through which customers can meet their needs. The (end) product thus results dynamically from the customer's selection process. Of course, not all services will be offered as single products. Standard packages make it easier for the customer to choose. Complete packages would be the optimum. Before deciding for a certain alternative, the customer must hence know what possibilities are actually available. They often opt for their own automobiles simply because information about suitable alternatives or the disadvantages of private motorized transportation (traffic jams, time) is not available in real-time.

On the other hand, however, the announcement of an event can generate demand for mobility in that customers use public transportation because they spontaneously take advantage of a complete product offered in the context of this event.

Providing customers with this information at any time, at their location, is the real challenge in information logistics for mobility providers. It is after all essential to not only represent alternatives, but also to place a value on them in terms of time and money, in order to give the customer a criterion for making a decision. Individually tailoring services to the customer means not placing a value on the supplied product until the customer has selected the services, and then transmitting this information to the customer in real-time, whether stationary or mobile.

The alternatives must also include products from competitors (e.g. private motorized transportation), so that a corresponding comparison can be made. The assessment of private motorized transportation thus necessitates for instance knowledge of dynamic information on traffic jams or street conditions.

The newest technologies optimally facilitate this, but it will nonetheless be a long path towards its realization. Especially the availability of data must be ensured and the licensing of data regulated.

2.4.2 The evaluation, decision-making, and selection process

How does the concrete decision for one of the available mobility chains take place?

The criterion for the customer's decision is his/her individual evaluation of the available alternatives along an individual value scale (see Step 2, Requirements for Mobility). In this respect the provider's quantitative valuation in time and money is alone not decisive for accepting or declining a product. Qualitative criteria such as punctuality, cleanliness, security, convenience, interoperability, anonymity, transparency, simplicity, and availability play an equally important role.

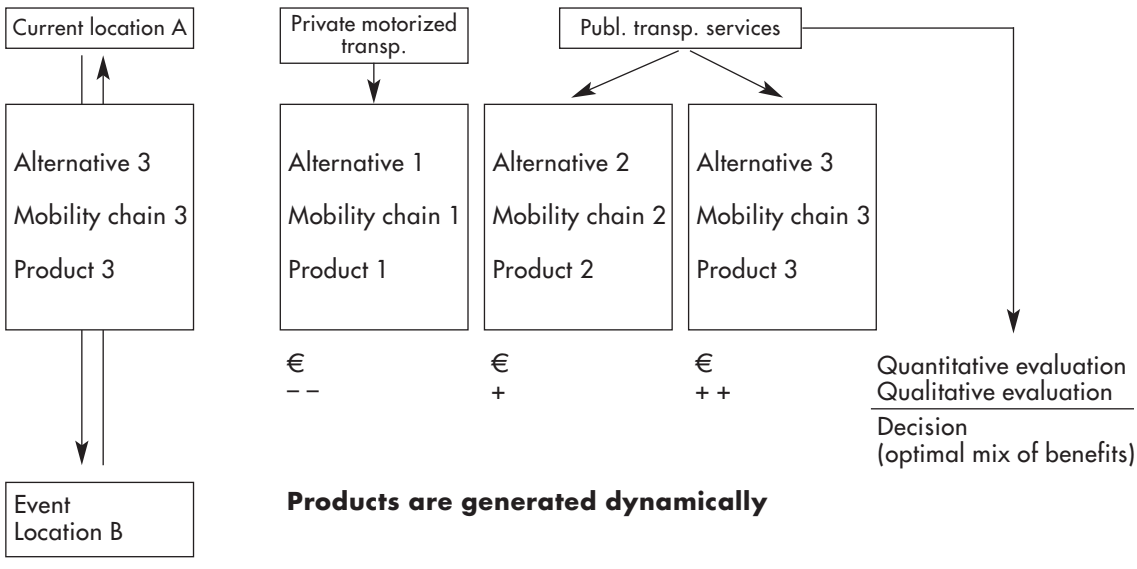
The valuation of these quality characteristics varies from customer to customer (and, moreover, is influenced by individual experiences). A service accompanying the fulfillment of the demand for mobility, such as door-to-door baggage transportation or facilitation of the actual event, naturally changes the customer's evaluation (see package solution).

The knowledge of the customer's individual preferences would in other words be very important information for a provider to be able to influence his/her decision for or against its product. The marketing database mentioned in Chapter 2.2 will collect and process exactly this information, thus enabling the provider to optimally facilitate the customer's selection process.

The customer selects the mobility chain that offers him/her the optimal mixture of benefits in time, money, and individual quality.

Selection process

FIG. 2.4.2



2.4.3 Consequences

If the selection process is to proceed in the future as depicted above and if the customer is to be accordingly assisted, this poses entirely new challenges for configuring sales and service processes. Information logistics now become the critical factor in mastering this dynamic process.

From Sections 2.4.1 and 2.4.2, it is clear that only through timely and complete provision of the necessary information can the customer make a decision for or against an offered mobility package (= product). This naturally includes the representation of intermodal alternatives. This is exactly what increases the complexity of the system significantly, since the data for this must always be up-to-date and available in the background system. Additionally, the provision of information must not be limited to only stationary terminals (e.g. private PC, special sales terminals); it must be just as available mobile.

The cooperation of all transportation agents and the combinatorial usage of all means of transportation, along with the provision of relevant information and corresponding services, will be factors for the success of public transportation of the future.

How to design such a system will not be addressed in this document. Together with the remarks from Chapter 2.2, the following scenario can be described:

Scenario: **Business traveler**
A business traveler leaves the house in the morning, travels by bus/rail, car or taxi to the airport and flies to Berlin. Up to this point, he has not required any new technology, since as a frequent flyer he knows exactly what transportation agents to use at that time of day to arrive at the airport as quickly as possible (taking into consideration traffic jams, parking places, train route). He is picked up by his business partner and keeps his appointments with the customer.

However, the meeting lasts much longer than planned, and our traveler misses his flight back home. He has rebooked the flight for tomorrow morning, but will require a hotel. He uses his PDA to search the internet for a suitable hotel, directly books a room, and receives an immediate confirmation by email.

Now he just needs to arrive there. He accesses the LBS (location based services) components of his PDA and is localized at his current location. Through intermodal routing, he receives exact directions to the hotel, including price and transfer information.

Assistance in planning for instance a cultural, culinary, or sporting event can be imagined in a similar manner. He can be assisted in exactly the same way in determining the route to the airport the next day.

Everything described here has already been in use, individually, for one to two years now. The technology exists and is fully developed.

Instead of a PDA, it would of course be possible to use
- a suitable mobile telephone
- web services from an internet terminal in a hotel
- info terminals at bus and train stops

and much more.

However, in the described overall context and in this process combination, such a solution isn't used anywhere. Transportation companies should feel called upon to realize such a scenario in the future.

Responsible agents and companies in today's transportation market will no longer be able to meet the future market demands without fundamental changes in their own organization.

The described changes in the mobility market will lead to new roles in the future. Each transportation company will have to decide for itself how it will position itself in the market in the future. Companies' own capabilities must be reflected in these roles and subjected to profitability analysis.

2.5 New business profiles

It has been determined in the previous chapters that the future operations of the mobility service provider in the market will no longer take place under traditional organizational forms. Rather, new business profiles will emerge that meet the requirements.

The basis for the derivation of future business profiles is the separation of the physical roles established in today's transportation networks and companies into their logical components, to the extent relevant for electronic ticketing.

The resulting role model proposed for intermodal ticketing has prevailed in a variety of domains, such as in the interoperability of public transportation systems, and is now being developed as a prestandard (ENV) at the European level (CEN). The VDV core application has likewise adopted this model and significantly influenced it at the same time. The presented model has proven successful in related sectors, for instance in highway toll collection and the telecommunications industry.

2.5.1 Logical role model for intermodal ticketing

It is important to emphasize here the assumption of a logical model from which the architecture of ticketing systems is drawn. It should not be confused with the "real" world.

Card issuer

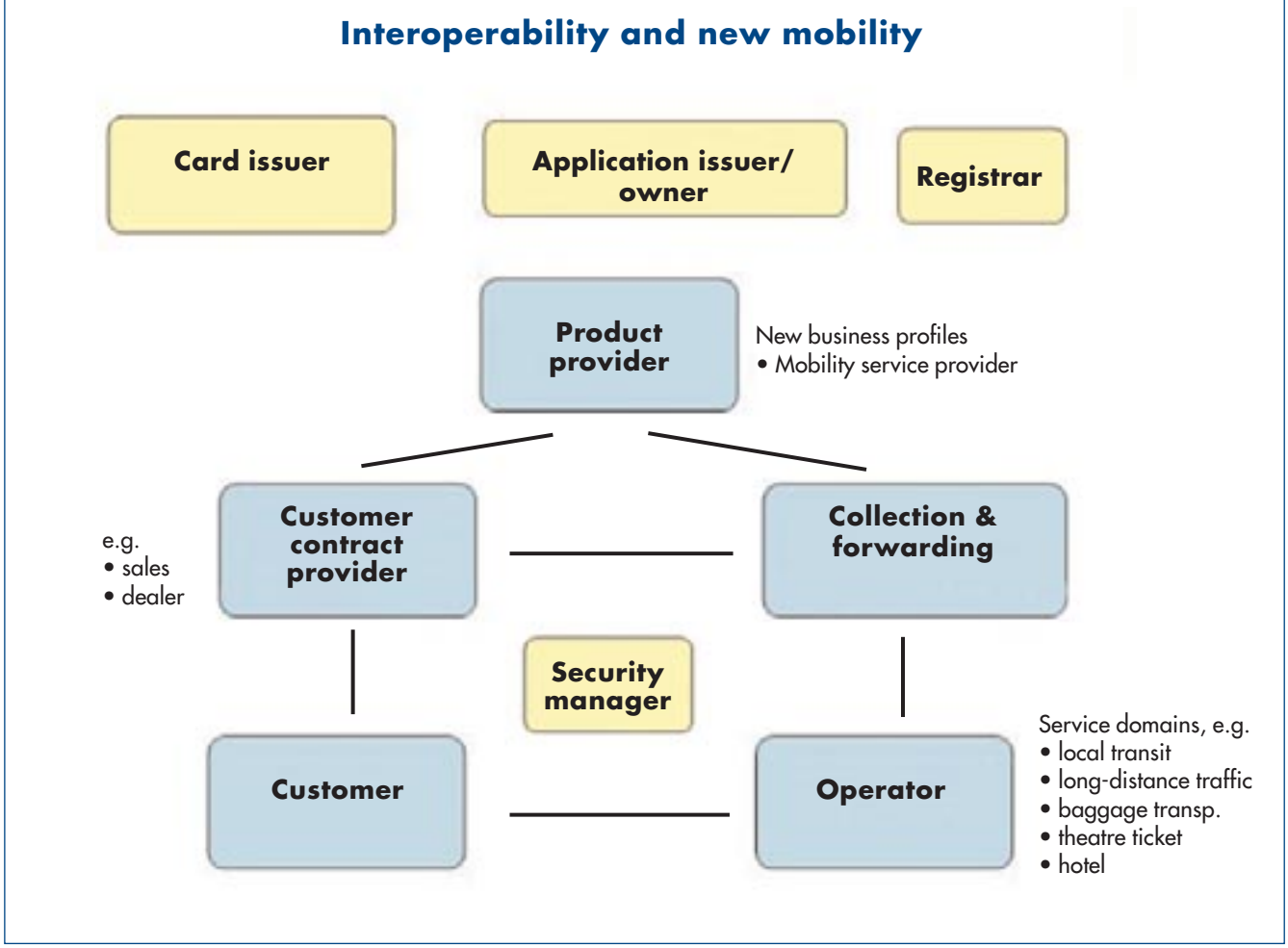
Creates the master card data, with the possibility of managing one or more applications. Responsible for managing the card security key (transport key). It is possible to have several different card issuers that accept a public transportation application on their cards.

Application issuer/application owner

It issues the public transportation application with the key management defined for it. It is responsible for certifying the application according to prescribed certification procedures. It is responsible for managing the key for the applications issued under its authority and assumes the risks of their operation.

Role model, public transportation

FIG. 2.5.1



The public transportation application issuer can commission the customer contract provider to implement the public transportation application on the customer media, including the corresponding initialization.

Customer

The customer acquires the public transportation application from an application issuer. It can be loaded on an already existing storage medium (chip card) or one specially issued for this purpose.

The customer can load fare products into this application and sign customer contracts with customer contract providers for this purpose. Customer contracts can define the manner in which the customer participates in the electronic fare management system (e.g. by specifying the form of paying for services, use of stored travel rights).

Customer contract provider

The authority that signs customer contracts with the customer regarding transportation fare agreements or payment procedures, or in whose name such contracts are signed. Customer contract providers can be, for instance, a fare network, a transportation network company, or a transportation company external to the network. All application data valid for this customer contract is collected by the customer contract partner. In the case of the post-paid payment method, the customer contract provider is also the invoicing party.

Data network (collection and forwarding agent)
Data network (comparable with the internet) that ensures that data can be transported simply from one place to another. Each participant has its own dial-up hub, and so only needs a telephone line and telephone number in order to relay its data or receive data authorized for it.

The data is forwarded through the data network to the corresponding recipient. It may make economical sense for certain network hubs to also feature a "collection function," i.e. to collect all data addressed to a certain recipient over the course of a day and then forward it in a relatively large packet.

Public transportation operator (service provider)
Public transportation operators are companies that offer and provide public transportation services in exchange for using a product or for flat-fee service authorizations. They are license holders for operating a public transportation service and in this sense are commercial service providers in the eFM system.

This is distinct from the renderer of services as the physical service provider, which is commissioned as a subcontractor by the public transportation operator to render a transportation service, e.g. at a fixed price for the public transportation operator. Payment takes place here in a bilateral relationship.

Product owner
This is the provider of public transportation products or the authorized agent that specifies fares for transportation services in a regional area or along a route in which the operators operate (e.g. integrated into a transportation network). It thus specifies prices for a certain transportation service, both the price the customer must pay and that which the public transportation operator receives for its service.

Customer service
In an interoperable system, customer service represents a stand-alone function. As long as the customer remains within one public transportation system, it is usually clear who to contact in the case of problems or complaints.

The situation is more complex in an interoperable system. In this case, public transportation operators also accept products from customer contract providers from other networks. This means it can become difficult for the customer to determine the responsible contact person. For this reason, the "customer service" function will be introduced in the core application; it serves as a central service point for the customer.

Retailer
Retailing involves the infrastructure of the customer contract provider. This can mean automatic ticket machines, staffed points of sale, but also authorized sales outlets such as newspaper kiosks.

Inspection
Inspection is not a stand-alone function in Fig. 2.5.1. It is in the operator's interest to only transport those passengers with valid electronic tickets, which is why passengers' tickets are inspected.

In contrast to traditional inspection, in which simply the existence of a ticket and its validity are checked, in an eTicket system, it is also possible to check whether the special ticket or the chip card has been locked. The data for this inspection can be obtained from security management.

Stored travel rights (STR) provider

Within the framework of the core application, a special stored travel rights, valid throughout public transportation, will be specified. This will enable the acquisition of complete tickets from automatic ticket machines before travel, as well as direct, contactless fare payment in CiCo and BiBo systems.

The role of the provider of stored travel rights is closely related to the stored travel rights themselves. These in turn depend on the manner in which the stored travel rights are organized in light of the regulations of the Fourth Financial Market Promotion Act in Germany (two-sided or three-sided). The operator must on the one hand ensure that the system always keeps up with the state of the art; on the other hand, it also assumes the risk inherent in operating the stored travel rights.

There are further participants, but they are not relevant for considerations in this document (e.g. regulatory authorities, purchasers).

2.5.2 Combinations of roles

The logical roles outlined above represent the decisive functions present in an electronic fare management system. In the real, physical world, these roles are not so isolated in the market, but rather are found in different combinations. These potential combinations will now be illustrated in this section.

Combinations of roles

FIG. 2.5.2

Function/ type of company	Product provider	Operator	Clearer	Customer contract provider
Company 1		X		
Company 2	X		(X)	X
Company 3	X	X		X
Company 4				X
Company 5	X			

Company 1: limited to its role as a typical transporter

Company 2: creates and markets products (complete range): today this might be an integrated transportation network, in the future a potential mobility provider

Company 3: typical contemporary transportation company

Company 4: e.g. travel agent or online shop

Company 5: creates products and offers them on the market: potential mobility providers, see list of providers, Section 2.1)

The trend is towards customer-friendly, virtual networking of organization units, in order to generate flexibly operating company units.

2.5.3 Role models in transportation companies and integrated transportation networks (as of 2003)

The transportation networks and companies represented in kontiki were surveyed about their current and future roles. Although the results are not yet complete, it is clear that especially the integrated transportation networks, which already have experience with electronic fare management systems, are already reconsidering the current and future allocation of these roles.

Role models in transportation companies and transportation networks

FIG. 2.5.3

Role	VRS Current	RMV current	RMV future	DVB	HHA
Card issuer	No	No	No		undecided
Application issuer	No	No	Yes		undecided
Registrar	No	No	No		
Product provider	Yes	Yes	Yes	No	No
Customer contract provider	No	No	Yes	Yes	Yes
Clearing	No	No			Yes
Operator	No	No	No	Yes	Yes
Security manager	undecided	No			

It is becoming particularly clear that transportation companies and integrated networks are thoroughly willing to assume the operative roles. In contrast, they do not plan to issue cards or carry out registration or security management. Apparently, a higher-level central authority must be set up, with central responsibility for these tasks on behalf of all companies in a transportation network or all networks in Germany.

Such a central authority also makes sense in terms of efficiency, neutrality/independence, standardization, and establishing a basis of trust.

2.6 Future architecture of the access system

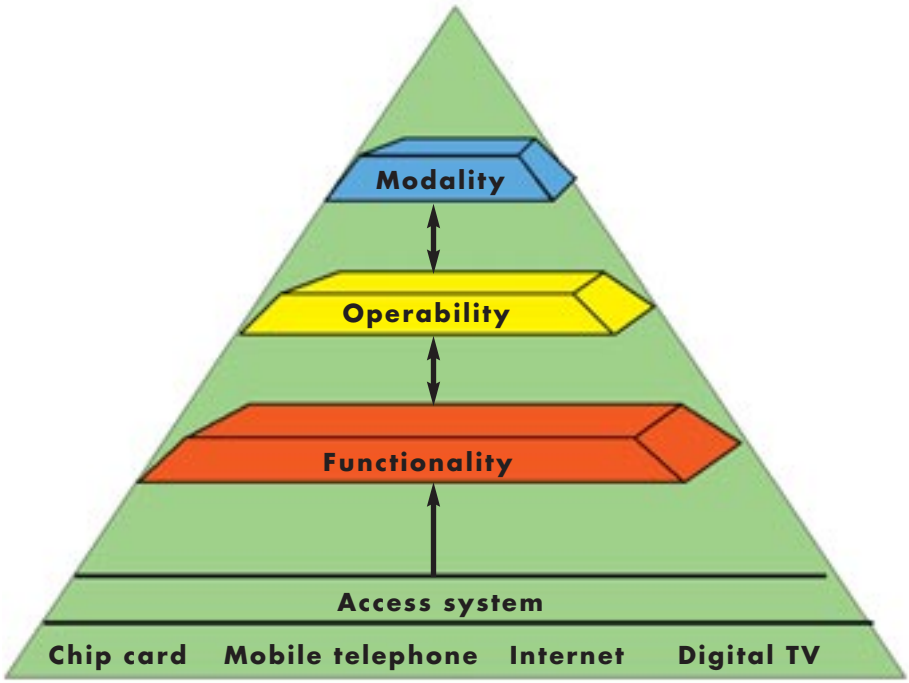
kontiki is committed in its goals to taking into account the described development and viewing electronic ticketing as an integrated system for access to the world of mobility, or as an aid in the mobility process.

2.6.1 Modality of the access system

Limiting the use of the access system to certain transportation agents will be done away with; the perspective of as extensive intermodality as possible along the entire mobility chain is necessary.

Architecture of the access system

FIG. 2.6



2.6.2 Operability of the access system

The access system must be able to operate all acceptance methods along the mobility chain; interoperability must be maximized. Additional remarks on interoperability can be found in Chapter 3.9.

Interoperability is ensured by using one application or through the standardized interaction of several applications in different electronic ticketing technology environments, with their corresponding technical characteristics (technical interoperability).

- devices for generating complete tickets/authorizations
- devices for requesting information from the background system or the chip's memory
- devices for printing tickets/authorizations from the background system or the chip's memory
- devices for loading public transportation travel rights
- devices for activating and personalizing the application
- mobile devices for inspecting tickets/authorization
- mobile devices for canceling tickets/authorization
- devices for creating/completing tickets in public transportation (CiCo, WiWo, BiBo terminals)

The described technological characteristics can also be combined in one device (e.g. ticket issuing, information request, ticket printing), which is why singularity of technology cannot be assumed:

- in the wide range of means of transportation from all the transportation agents
- in local, regional, and long-distance public transportation, in commercial passenger traffic
- in different companies in passenger transportation, or transportation networks (spanning different fare systems), in the future internationally as well
- taking into consideration all possible payment forms and methods

In order to achieve interoperability between the different ticketing systems, contracts are to be signed between the corresponding network operators or mobility providers (contractual interoperability) regarding

- specification of mutual acceptance of parameters relevant to the fare or the contract
- specification of the interfaces between the background systems for joint data exchange
- regulation of financial and legal agreements
- regulation of technical-organizational execution, such as

o interpretation of jointly used data elements
o handling of hotlist and white list procedures
o handling of customer complaints
o execution of clearing
o key management
o rules governing process security

2.6.3 Functionality of the access media

The interoperable application must support all acceptance techniques, fare systems, and payment forms and methods along the mobility chain, independent of transportation agent (see Chapter 3.9).

This cannot mean that the numerous fare systems in Germany will be reproduced in the application; this would be completely beyond the scope of the medium and the performance at the terminal interface. The application will rather reproduce only the customer-relevant fare parameters ("user fare parameters") common in all fare systems, thus building a basis for calculating the relevant fare.

In cooperation with fare experts from transportation networks and companies, these parameters were elaborated in a generic fare model for the public transportation core application. The parameters include:
zone, stations, eFM fares available (package price), section of route, relation, regional area, direction, passenger type, weekday, time code, comfort, quality, marketing, extent of use, and frequency of use.

In addition, internationally coordinated parameter lists from UIC exist for long-distance transportation, which, like those from the core application, will become part of the European Norm EN1545 (data elements in smart card-based transportation applications).

Furthermore, this concept of interoperability presupposes a number of additional components from the sales, usage, and service phases, which an access medium at an interface to the mobility system must be able to operate. This will not be further described here, as it would necessitate too much detail about the systematics of system description.

2.7 Summary

- Through the market pressure on the supply side, transportation companies or transportation networks today are already being placed in a situation that challenges them to take appropriate action towards comprehensive mobility services or even multiservices.
- Demand will increase for integrated services, information, and transactions ("all-in-one" mobility services) that include the actual event (the purpose of the trip) as much as possible.
- Moreover, new technologies will generate new behavior patterns in customers and providers.
- In order to defend their own core business, public transportation companies will have to develop very quickly from carriage or transport service providers to mobility providers, able to either completely meet the entire needs of customers along their mobility chains, or at least sustainably facilitate them.
- The customer's desires will determine the product in the future, and will lead to products being created dynamically through the customer's selection process.
- In this arrangement, the service provider will simply offer the customer a palette of individual services (toolbox), from which the customer, faced with a concrete decision-making situation, can compile services into a package for realizing his/her mobility chain.
- Information logistics will now become a decisive factor in mastering this dynamic process.
- This will no longer take place with traditional organizational forms. Instead, new business profiles will emerge that better meet the above requirements. The trend is toward customer-friendly virtual networking of organizational units, in order to generate flexibly operating business units.
- The customer medium will increasingly become a marketing instrument instead of merely a payment instrument; it will contribute to the de-anonymization of the sales process.
- The establishment of a marketing database and a marketing program based on it are the organizational means of rendering the customer's mobility behavior more transparent and pursuing effective customer retention.
- In the course of this development, the contents of the electronic ticket will expand. Whereas today the electronic medium is merely a carrier of identification (e.g. post-paid code) or an electronic ticket (single or season ticket), in the future it will be understood as the medium of an integrated system for access to the world of mobility and/or as an aid to the customer's entire mobility process.
- The interoperable application of the customer medium must support all acceptance techniques, fare systems, and payment forms and methods along the entire mobility chain, in the fare management systems of all those involved, independent of transportation agent (see Chapter 3.9).
- The cooperation of all transportation agents and the combinatorial use of all means of transportation, together with the provision of relevant information and corresponding services, will be factors for the success of public transportation of the future.