Car-Sharing in Practice

The TOSCA Take-Up Guide

Contribution to Sustainability

Organisation

Technology

Bologna Experience

Information Society

tosca

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Editorial

Intelligent Service for Sustainable Personal Mobility

Our cities suffer not only from motorised traffic in terms of noise and pollution, but also from the increasing consumption of resources and urban space.

The quality of the urban environment is directly concerned when space is "blocked by cars".

This is an - often underestimated but - very crucial problem: Social and ecological functions need public space, children need space for playing, pedestrians for walking, neighbours for meeting, trees for growing.

Car-sharing has the potential to win back street space by making car-use more rational. Fewer cars may serve an even higher level of mobility! "Cars-on-call" are a flexible and convenient alternative.

The TOSCA project shows how modern reliable, tried and tested car-sharing telematics can be used to reduce the need for a private car. Based on more than ten years experience of the City of Bremen, ATC, the public transport operator of Bologna, has started a car-sharing pilot operation. The cities of Barcelona, Bucharest and Strasbourg have developed business and implementation plans for car-sharing take-up.

The TOSCA project has yielded valuable experience concerning car-sharing take-up. In order to make this experience available to a broader public, the take-up guide summarises the main topics. Car-sharing is definitely an element in solving our urban transport problems. I hope you will benefit from this résumé!

Michael Glotz-Richter
Free Hanseatic City of Bremen
Department for Building and Environment

Transferring Car-Sharing Take-Up Knowledge

The City of Bologna has a long history of sustainable urban planning. Offering modern and user-friendly services to the citizens is a key concern of all local partners. Consequently, taking up a service that contributes both to private service that contributes both to private of high interest to a modern public transport operator such as ATC s.p.a-Bologna.

The European IST-take-up project TOSCA, opened up the possibility to benefit from the know how of the City of Bremen and of companies such as Cambio cambio and INVERS, experience built up in years of practical car-sharing and telematics technology work.

This knowledge transfer has enabled ATC to start-up car-sharing using resources extremely efficiently: No need to 'reinvent the wheel' or learn by 'trial and error'.

The present car-sharing Take-Up Guide summarises the knowledge assembled by the TOSCA project partners. It is a practical output of the European exchange and the support of the European Commission, General Directorate Information Society.

This documentation is aimed at people who would like to know more about car-sharing in practice (like prospective entrepreneurs, politicians, transport operators, future customers).

The guide gives an overview of what has to be taken into consideration when starting a car-sharing system. To us, TOSCA was very helpful - may you profit from it, too!

Mirco Armandi
ATC s.p.a- Bologna

The TOSCA Project - An Overview

Technological and Operational Support for Car-shAring

The TOSCA project is promoted and funded by the European Commission under Information Society Technology Programme. It is a strategic initiative that supports a number of European cities in the implementation of commercially sustainable IST-based car-sharing concepts, as an element of flexible and intermodal door-to-door mobility. TOSCA aims to facilitate further technological take-up developments, such as: Integrated smart cards for public transport, booking and information systems via Internet, call centre.

TOSCA was born from the necessity of setting up an alternative system to the traditional idea of mobility but it still aims at integrating the various transport modalities already existing.

The idea to transfer car-sharing is rooted in the experience of the city of Bremen. Thus, to guarantee the successful outcome of the transfer, the city of Bremen continuously offered the city of Bologna practical assistance and all necessary tools required for setting up a car-sharing system.

Within the TOSCA project, the City of Bologna (ATC), public transport operator, implemented a pilot application of IST-based car-sharing, called CarATC. ATC Bologna with the support of the Bologna Municipality implemented the car-sharing pilot application to guarantee high quality customer services and to increase environmental friendliness. All proven technologies and methodologies were taken-up successfully within the TOSCA project.

TOSCA Main Objectives

- **Transfer innovative technological tools of the car-sharing scheme in the City of Bremen to the public transport operator ATC-Bologna**

  TOSCA supported the transfer of car-sharing technological elements for setting up a car-sharing organisation and communication system in Bologna from the City of Bremen who is one of the leading cities in the management of an advanced IST-based car-sharing system.

  The hardware and software components of the Car-sharing organisation and communication system (COCOS) provided by INVERS (Germany) were used for the operation of a car-sharing system starting with 9 vehicles fleet placed at three locations in the central area of Bologna and involving a users group of about 100 customers.

  COCOS helped to provide a reliable, user-friendly and efficient car-sharing management by setting up an electronic booking and accounting system for transferring trip data from car-sharing vehicles to the booking centre (mainly for accounting and fleet management purposes). By means of contact less smart cards it is possible to control user's access to vehicles.

- **Develop and implement a pilot application of car-sharing in the city of Bologna, based on the implementation and business concept of the car-sharing system in Bremen**

  Within the TOSCA project ATC Bologna implemented a car-sharing pilot application to guarantee a high quality of customer services and environmental friendliness, the car-sharing scheme shall satisfy the following emerging standards for car-sharing operation:

  - Provide users with 24-hrs service accessibility, in order to offer a real alternative to the private car

  - Fee structure based on mileage, in order to prevent from driving more than really necessary ("pay as you drive" structure)

  - Use of low emission vehicles (compliant with at least EURO III norm)

- **Develop a car-sharing business and technical implementation plan for trhee European cities in France, Spain and CEEC (Central Eastern European Country)**

  The TOSCA project has enabled the cities Barcelona, Bucharest and Strasbourg to develop a car-sharing technical and business implementation plan. All three cities has with a high car-sharing market potential and are strongly committed to bring forward the idea of car-sharing.

- **Disseminate the project results and best practice examples of car-sharing**

  Dissemination activities help to increase awareness on the system benefits and potentials amongst transport policy decision-makers and users in Europe.

  TOSCA consortium was in charge of organising car-sharing workshops where results of the car-sharing demonstrations in Bremen and Bologna were presented and the transferability of these examples to other European cities discussed. Dissemination activities also include the edition of a project brochure and the setting up of a car-sharing best practice web page.

All this has successfully been realised. The present Car-Sharing Take-up Guide provides a good overview of the accumulated knowledge. Once the evaluation has fully been carried out a best practice study (ELTIS format) will summarise the TOSCA project information.

1. Car-Sharing: Intelligent Service for Sustainable Personal Mobility

No doubt: Modern society needs a high level of mobility. And our cities have passed the saturation point with cars. The challenge is: How to ensure (or even extend) personal mobility with fewer cars?

In modern transport policies new information and communications technologies are seen as an essential tool. Much more than technology alone, a change of mobility patterns seems to be necessary to achieve a more sustainable development.

The European Commission's White Paper "European Transport Policy 2010 - a time to decide" defines many elements, which are believed to be crucial for a new orientation in mobility patterns. Car-sharing is one of them.

Car-sharing is a service that gives access to a fleet of cars, with easy and unbureaucratic procedures, using the latest technology.

The TOSCA project shows how modern, tried and tested car-sharing telematics can be used to reduce the need for a private car.

The following chapter outlines how car-sharing contributes to sustainable personal mobility. Practical examples of the car-sharing experience in Bremen will be given.

1.1 Contribution to Political Strategies for Sustainability

Our cities suffer from car traffic in several ways: Not only from pollution, noise and the risk of accidents, but also because of the resources and space consumed by the increasing number of cars.

Whereas technical improvements have been made in the field of emissions, the problem of the consumption of public space has become increasingly virulent. Especially in existing inner city mixed and housing areas, very limited road space leads to strong competition between all users.

Achieving an accepted alternative to the ownership of a private car will be a big step forward, not only for the cities where street space could be regained, but also for mobility management in general.

Car-sharing can thus play an extremely important role in strategies of urban sustainability. It offers a more rational and responsible alternative to the private car - often being more flexible but less expensive.

1.1.1 Flexible Modes as Alternative to the Private Car Ownership

There is a common problem for taking measures of mobility management: As soon as a private car is available, the car usually becomes the basic means of transport. The environmentally friendly modes, public transport, walking and cycling, become just a stopgap.

Today, there is a high demand for flexible modes of transport. No doubt, the private car allows high flexibility in many cases, but is quite inefficient in terms of consumption of resources and space.

Modern services in the field of mobility may ensure an even higher level of flexibility - with less (external) costs - and with practical advantages for the user.
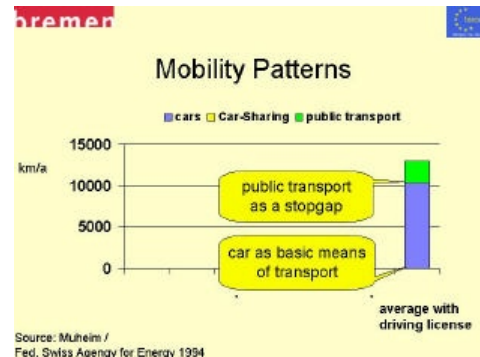
Mobility Gap

Classical public transport plays a key role in urban transport, but probably from the viewpoint of the customer it is not sufficient for all occasions. The same applies to walking and cycling: they have clear limits for most travellers. Thus, a 'mobility gap' does exist - and has to be filled!

This 'mobility gap' may be filled by various forms of car-based mobility - even without owning a private car.

- Taxi
- Car-rental
- Car-sharing
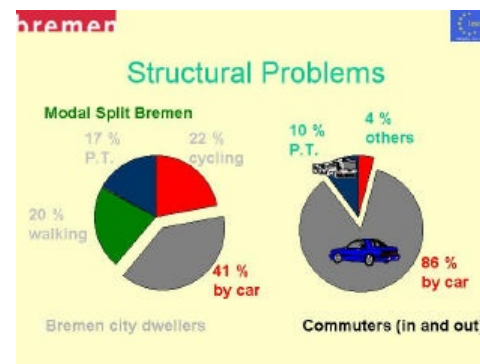
Walking, cycling and all modes of public transport remain the basic (sustainable) means of transport and the 'car-on-call' fills the gap, where the alternative modes are insufficient or not convenient enough.

Bremen Car-Sharing

Viewing the transport system in its entirety, the Bremen car-sharing scheme (cambio StadtAuto) provides a real addition to public transport. Car-sharing offers flexibility, as it is not bound to timetables and lines. So a combined system of public transport, car-sharing and probably taxi use may offer the flexibility of car ownership without the drawbacks of expense and inefficient use of space.
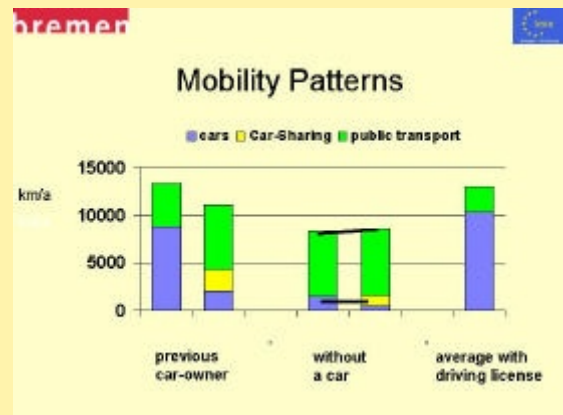
1.1.2 Integration into Urban Development

The integration of car-sharing into urban development is of key interest. It may increase the efficiency of urban infrastructure, supplement public transport and improve the quality of life in the city. Parking on the sidewalk, for example, is unfortunately widespread - any regained space is for the benefit of pedestrians - and children who regain playgrounds.

Car-sharing can benefit urban regeneration as well as more efficient (e.g. less space and energy consumption) new urban developments.

By reducing the need for parking space, car-sharing allows to save a lot of investment cost in new city developments with good access to public transport and cycling facilities.

Public Transport, Taxis and Car-Sharing are partners!

Reduced Parking Space in New Building Areas

In the recently realised Bremen Beginenhof (underground) parking facilities could be reduced. The local car-sharing location was the precondition to allow for limited private car ownership. The car-sharing station (above ground) serves as mobility insurance and the entire neighbourhood benefits from it.

1.2 Car-Sharing: A Modern Mobility Service

Organised car-sharing - or CityCarClub, as it is often called in the UK - completes the full range of environmentally friendly means of transport. It is in effect a 'mobility insurance' for all cases where public transportation, walking and cycling are not adequate: At night, for trips when public transport is not available or convenient, when bulky or heavy objects have to be transported, and so on. Car-sharing allows you to have a car available without tempting you to use it all the time.

Car-sharing is already in operation on a large scale in Austria, Germany, the Netherlands and Switzerland. Small-scale operations exist in other European countries, e.g. in Italy.

Today, about 100.000 people already use this modern service in Europe! With the support of the European Commission this figure is going to be extended.

What attracts Bremen Citizens to Car-Sharing

(% of participants)

Aspects of the service, which are important to new car-sharing members:

	% of participants
No need to worry about maintenance, insurance etc.	72%
Rental by the hour	69%
Convenience of locations and 24 hour services	50%
As an alternative to the privately owned car	33%

Promoting Car-Sharing

Of course, car-sharing has to be promoted - as it is still relatively unknown. When Bremen started the combined service 'car-sharing + public transport (season ticket)' much scepticism had to be overcome. It was not easy to convince decision makers in the administration, the public transport company and in politics.

In fact, the European ZEUS project played a key role in opening minds to this innovative idea. Not only was the grant the project received from the European Commission important to reduce financial risks, the fact that the activities were carried out within a European pilot project was also important to convince key decision makers in the public transport company. Since the initial period in 1998 the project has become more self-supporting, as the "Bremer Karte plus AutoCard" has won some awards - such as the 'king-customer award' of the German Transport Club VCD in April 1999 and the best-est (environmentally sustainable transport) practice award of the OECD in October 2000.

1.2.1 Car-Sharing - How Does it Work?

Car-sharing is a service that provides access to a car - whenever it is required[1]. Clients of car-sharing organisations are usually given a smart card and a PIN code for car access.

The booking of car-sharing cars is easy: A short and unbureaucratic phone call to the booking office or booking via Internet - both available 24 hours a day, making spontaneous use possible as well. Usually, different types of cars (probably including vans) are available.

Billing is effected according to the hours of car use and the mileage driven. Smaller cars are cheaper than larger ones.

Car-Sharing in Bremen

After ten years experience of car-sharing, the Bremen car-sharing operator (cambio StadtAuto Bremen) had about 2.500 clients at the end of 2001. The users have a fleet of approximately 100 vehicles at their disposal. More than 40 car-sharing stations are spread over the city - mainly in the densely built quarters around the city centre. The user can book the car either via the call-centre - with 24-hour service - or via Internet. Cars are available in all cities where cambio offers its services.

Information on cars and locations is accessible online (www.cambio.car.com). Bremen also offers online information on public transport connections to the local car-sharing parking lot: There is a direct link to the trip-planner of the Bremen public transport company (www.bsag.de) - it even offers a map showing how to walk from the nearest stop to the car-sharing location.

CarSharing locations in the PT trip planner

Car-Sharing Costumers

Car-Sharing is in particular interesting for those who do not depend on a car for their daily trips, e.g. to reach their workplace.

Users of public transport are quite often more rational in their modal choice. Therefore they are the principal target group for car-sharing. Publicity at stops and in vehicles, e.g. stickers outside and inside PT vehicles, posters at stops and printed brochures or other information material, can attract this target group and inform it about the car-sharing service.

Booking via internet

[1] For details on organisation and technology please refer to the respective chapters of this take-up guide. In addition, the TOSCA brochure gives a good overview of IT-based car-sharing.

1.2.2 Co-Operation of Public Transport and Car-Sharing

Innovative public transport companies may play an important role in the further development of car-sharing. With the following criteria they fulfil important requirements for becoming good car-sharing operators or partner organisations:

- Experience with vehicle fleets

- Technical maintenance system

- Customer service (e.g. for booking office)

- Public relations facilities

- Financial background

Public transport companies can support the marketing of car-sharing substantially as a broad target group can be reached at public transport stops and in the vehicles.

Fleet operators, even maintenance work and, if desired, the booking service can be provided (as for example by the Wuppertal PT operator).

A sound financial background is of course of great significance for overcoming the critical phase before reaching the break-even point.

Some examples of innovative public transport operators in Switzerland, Germany and Italy demonstrate how public transport operators may directly be involved in the car-sharing operation.

But until now, the majority of public transport companies have not yet discovered the value of such additional customer service - integrated in intermodal mobility services.

The use of innovative telematics is a prerequisite to offer high-quality service with:

- High level of security

- Easier access to the cars

- Automatic billing procedures

- Combined offer of car-sharing and public transport (e.g. season ticket and car-sharing in one card)

- New offers (e.g. WAP-booking or open-end-bookings etc.)

- Easy procedures e.g. for special offers that require a date of expiry, which can only be entered with modern electronics

Public Transport Season Ticket plus Car-Sharing AutoCard

Bremen has already introduced a combined offer of public transport and car-sharing in June 1998. This 'Bremer Karte plus AutoCard' links car-sharing to the public transport services of the local operator (BSAG) to offer a full mobility service.

The new intermodal service started on 1 June 1998 with a combined StadtAuto / BSAG offer as a monthly or annual pass for public transport. It also includes the electronic car-key of car-sharing for the "car-on-call".

Easy booking procedures give access to car-sharing vehicles 24 hours a day, 7 days a week. The basic fees are very low. The real costs of driving a car appear in the usage fees.

Based on this experience, there will be one combined smart card for the (chip-card based) electronic public transport ticket and the (contact less) functions for car-sharing in the future.

1.2.3 Key Benefits of Car-Sharing

More than ten years of car-sharing experience in Europe reveal the benefits car-sharing can bring about:

- Reduction of the total number of cars

- Reduction of the mileage driven per car

- Increase in public transport use and other modes of environmentally friendly transport

- Improvement of the environmental quality of cities

- Use of cars emitting less pollution

Mobility Patterns

Each Car-Share vehicle replaces 4 - 10 private cars !
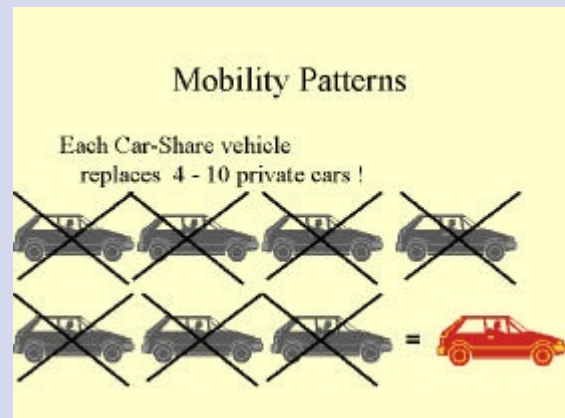
Results in Bremen

A survey carried out for the ZEUS project by the University of Bremen has shown that in Bremen car-sharing has replaced about 500-700 private cars. This is the equivalent of 2.500 m street space won back from the car. More than 2.200 participants (Jan. 2001) have reduced their car mileage by about 5.500.000 kilometres annually. In a life-cycle study this equals a CO2-reduction of about 1.250 tons per year.

Win-Win Situation

In Bremen, the survey not only proves the effectiveness of environmentally friendly mobility. It also shows that a win-win situation for the public transport operator and the car-sharing organisation is possible.

16 % of the clients of the "Bremer Karte plus AutoCard" are new clients for public transport season tickets. Additionally, a remarkable shift has taken place from monthly season tickets (used preferably for the bad weather season only) to annual season tickets (12 months validity)[2] - giving public transport a major role as basic means of transport.

Mileage Reduction
Experience of Car-Sharing in Bremen

5580000.0 Less Kilometres driven annually

by the actual 2200 Participants of the entire StadtAuto Bremen Car-Sharing System (05/00)

Emission Reduction
Experience of Car-Sharing in Bremen

Results for Bremen (p.a.) - estimated for 2200 Car-Sharer (10/00)
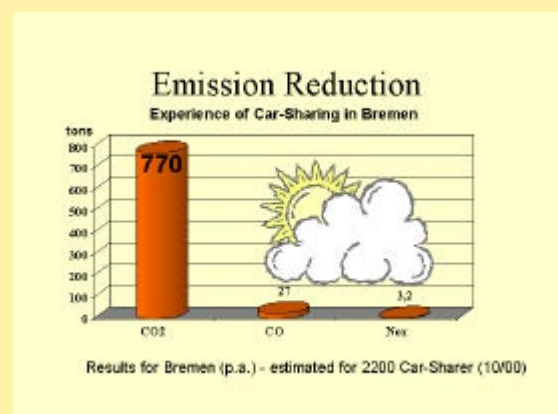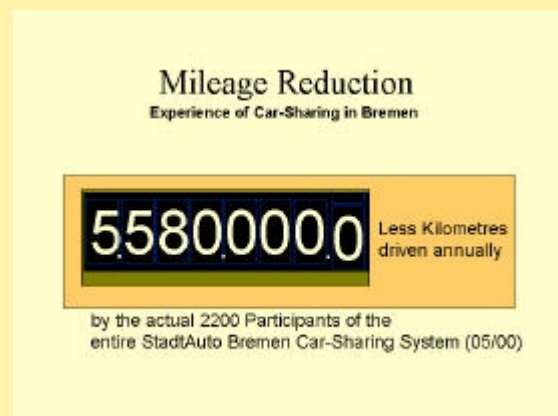
[2] Whereas before only 54% of the new clients had annual season tickets, this number has risen to 78%.

1.3 Final remarks

Car-sharing should become an integrated element of sustainable development - also as part of mobility management. Future options are obvious, e.g. the replacement of parking facilities and car ownership in new development areas (like housing with mobility services). Car-sharing works under market conditions - but should get a support to reach the critical mass.

The European Commission is actively supporting car-sharing in different projects. TOSCA is one of them, another is the moses project described below.

Car-sharing (and also taxi use) should be seen as natural partners for a co-operation with public transport.

But a lot of scepticism still needs to be overcome - a problem we still are facing even in cities with a well-developed and efficient transportation system.

It has to be emphasised that this policy is not anti-car. It is market-based and service-orientated - and it is a step towards more sustainability.

Mobility Services for Urban Sustainability

The contribution of car-sharing to the European 5 FP Key Action 'City of Tomorrow' is the key point of moses. The European research and demonstration project started in May 2001 and will run until November 2004.

Car-sharing as a modern mobility service will be developed to reduce dependence on the private car on a European scale - without restricting mobility. The existing (small-scale) system of car-sharing is to be improved significantly: better service, integrated innovative technologies, intermodal co-operation with other mobility services (e.g. public transport, taxi, cycling, delivery services etc.). An integration of these innovative services into strategies of urban revitalisation and new developments is aimed to take place to increase urban efficiency.

moses is practice-oriented and will examine the demonstrators under real-life conditions. A toolbox of technologies, services modules, awareness and framework instruments will be offered. moses involves municipalities and regional authorities, research institutions, mobility operators in Bremen (co-ordinator), Stockholm, London, Palermo, Turin, Genoa, the region of Wallonia and the International Association of Public Transport, UITP. moses aims to achieve sizeable impacts on the environment and on traffic.

Further information: www.moses-europe.org
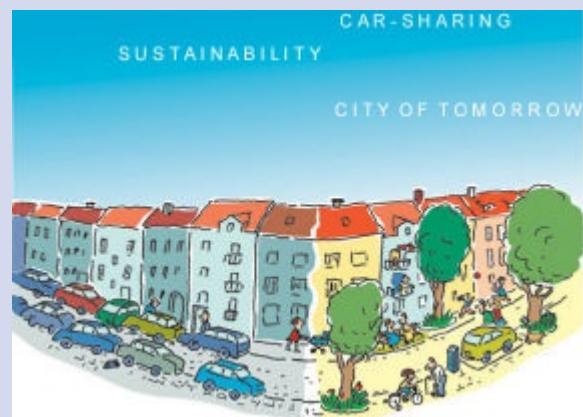
2. Starting Car-Sharing: Implementation - Organisation - Marketing

When car-sharing first started in Europe more than 13 years ago it was mainly in the form of co-operations and associations in Switzerland and Germany.

Ecologically oriented neighbours wished to give their private sharing of cars a new, more organised character. The motivation was to have access to a car whenever required, without the need to own one. Founding an association was a good way to achieve this and fulfil the wish for more privacy and clearly defined conditions of use. The association bought one or two cars and handed the reservation service over to the local taxi call centre.

Due to these slowly growing grassroots developments car-sharing had the image of "car use for freaks" in the minds of officials, politicians and decision makers for a long time.

Today, more than 80% percent of the 88.000 car-sharing customers in Switzerland and Germany are served by several bigger suppliers with more than 2.000 customers each.

The following chapter on the implementation and organisation of car-sharing is based on more than ten years of experience of one of the professionally working car-sharing companies: cambio, Germany.

2.1 Implementation

One of the reasons why car-sharing grew so slowly in the beginning was, that the offers simply followed the - almost non-existent - demand. A reason why today it is recommended to implement car-sharing the 'other way round': offers first!

Start big: The example of Saarbrücken

The car-sharing service in the city of Saarbrücken (200.000 inhabitants) started out with 12 cars at 4 locations right from the start, in May 2000. By this large-scale start, more than 300 customers were attracted in just one year.

In comparison: "StadtteilAuto" in Aachen (250.000 inhabitants) started with 2 cars in 1990 and reached 300 customers only after 3,5 years.

2.1.1 Requirements

Know-How

One basic recommendation when thinking about the implementation of a new car-sharing scheme is to purchase proven professional experience rather than 'reinventing the wheel'.

This know-how can be obtained in different ways:

- Gather information on the open market: Of course everything can be done entirely by one's own means, using the accessible information sources which are available on the open market. Mention should be made of this possibility in order to draw a complete picture, but the risk of loosing too much time and to launch an inferior product is much too high.

- Go for consulting services: Several professional car-sharing suppliers or associated consultants all over Europe currently offer consulting services for the implementation and organisation of a new car-sharing scheme.

- Join a franchise system: Some of the car-sharing suppliers have turned their mere car-sharing services into a franchise concept that can entirely be applied by interested entrepreneurs.

- Use modular paid services: A convenient compromise between business set-up exclusively by one's own means and taking over of an entire franchise concept is the purchase of single services. Technology or system service providers offer the following, for example: car access technology, call centre services, web hosting, invoicing.

- Get a car-sharing partner for a joint venture: Existing car-sharing companies are sometimes interested in expanding their system by becoming a shareholder in the new company. This solution provides know-how and additional capital at the same time.

Know-How on Local Situation

Beside the essential knowledge of car-sharing, general information about the city is needed:

- Political climate: It is an open secret that some political parties are fonder of sustainability projects than others. The current orientations should be analysed and their impact on the launching should be taken into account - not only in terms of financial support.

- Demographic data: Car-sharing is quite a difficult thing to implement in cities with low population density. At least the starting quarters should be of high population density. A good knowledge of the city's demography is therefore recommended.

- Traffic and urban planning: Information on traffic and urban planning for the forthcoming years is of high interest, in order to avoid 'unpleasant surprises'.

- Legal aspects: Before setting up a scheme the legal framework should be analysed thoroughly. Examples for supporting or hindering legislation are: The traffic code, insurance conditions and taxes.

Capital

As with any other commercial undertaking, enough capital is one basic requirement for the implementation of car-sharing. The ideal situation is to be able to finance the entire project with one's own capital. Consequently, the recommended start-up with a "real offer", including several locations and numerous cars, will include the need of fund raising in most cases.

To attract additional loan capital, a thoroughly worked out business plan is an important precondition. If there is a chance to get financial support from a public institution, of course this is a welcome way of getting additional capital. In most cases however, the business plan will be applied rather to convince prospective future shareholders.

Political Support

Car-sharing managers should keep in touch with local politicians and the municipal administration. This is especially recommended in regions where car-sharing is not known yet. Although the impacts of car-sharing do fulfil the political objectives of urban and transport development strategies, much effort should be put into the transfer of experience. Even the most general support of the municipality in terms of public relations is very valuable as it contributes to a better reputation. This can strengthen the faith of prospective customers in this brand-new product.

Beside this general support, a very practical item can make a big difference for the car-sharing operation: support to open up car-sharing parking lots at convenient locations in the city. As municipalities often dispose of appropriate sites within the urban quarters, this may help to solve one of the biggest problems a car-sharing manager has to cope with: the lack of parking space.

2.1.2 Preparation

Product

Before starting out, the future car-sharing management needs to consider which services will be offered. Besides the "classical" car-sharing service - book, start and end at the same location - there are other options. As they are not yet applied broadly, here just a brief overview:

- ### Open End
  One of the biggest drawbacks of car-sharing is the fact that the customer has to fix the time of returning the car. Private users, but especially business customers feel very much restrained by this obligation. "Open End" refers to the possibility to reserve a car without the need to define the return time. The car is then blocked for the following time span (or for a certain time period defined in the company's conditions of use). This, of course, requires quite some logistical effort. Telematics technology may solve the problem of transferring the data of a returned car to the reservation call centre. The actual reason why Open End is still not applied much is the fear that the car's occupancy and allocation ratio will be reduced.

- ### Instant Access
  Use a car without reserving it. This customer-friendly variant might be considered in combination with an Open End service. Obviously, these services can only be realised at large car-sharing locations with a high allocation ratio. Especially the incorporation of Open End into a running car-sharing system that offers both services - with/without reservation - causes quite a few logistical problems (e.g. the risk of reservation through the call centre of a car which is still registered in the reservation program as "available", whilst an Instant Access customer drives away with it at the same time).

- ### One-Way
  Starting with a car in one city and returning it in another city (as possible with car rentals) or to another location in the same city.

- ### CashCar
  This somehow 'reverse car-sharing' concept has been developed in Berlin by "choice": The car-sharing company purchases a car and concludes a leasing contract with one(!) CashCar customer. Consequently this person has the car to himself. However, at any desired moment, he can introduce it into the car-sharing fleet and it can then be used by all car-sharing customers. In return, the CashCar customer receives a financial compensation for this period of time[3].

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[3] The original idea was to link the level of compensation to the occupancy of the car-sharing fleet. Handing over a car in peak periods, like weekends, would thus be more lucrative than e.g. on Monday nights. However, this system has never been implemented.

Tariff Structure

Once the service has been defined, the tariff structure needs to be decided.
The three main types of tariffs offered today are:

	Cost	Characteristics
Start tariff	● Very low entrance fee ● Very low fixed cost	● People who wish to try car-sharing ● Costumers who drive very little
Bonus tariff	● Deposit ● Entrance fee ● Monthly fee ● Favourable driving prices	● "Classical tariff" ● Suitable for the majority of customers
Comfort tariff	● Deposit ● Entrance fee ● Annual 'comfort fee' ● Monthly fee ● Even more favourable driving prices	● Costumers who drive more frequently ● Costumers who drive longer distances

The usage fees are usually divided into time and mileage rates. In order to pay respect to the ecological impact of car-sharing, mileage rates should never be for free - each kilometre has to be billed.

On the basis of the product and tariff definitions, the legal conditions for use can be specified. The conditions need to be adapted according to specific local and/or national conditions and worked out in co-operation with a skilled lawyer.

The last steps of product definition are decisions on the name and corporate identity. The product itself and the way it is presented to the market are at the basis of the company's identity.

Locations

Cars and locations are the visiting cards of car-sharing. The locations need to be clean, safe and good to oversee, especially at night. There should be neither vandalism nor 'wild parking'.

In order to ensure sufficient occupancy of the cars, the car-sharing locations ought to be in residential quarters with high population density, combined with business units.

One of the most important drawbacks for the development of car-sharing in Europe is the lack of appropriate parking space.

Nonetheless, after more than ten years of intensive lobbying and presswork, only weak successes can be registered. Only the example of the Netherlands and the UK can be judged to be a real solution. In these countries a legal framework has been set up to allow for the installation of special car-sharing parking zones within the ordinary kerb side parking areas.

In Italy, only public services are entitled to use public parking space, which is another good reason for the implementation of a car-sharing scheme directly with the local public transport company.

Fleet

Before thinking about the composition of the fleet, the suitable car access technology needs to be chosen[4]. There are two main suppliers on the European market: Drive-It (Sweden) and INVERS (Germany). The composition of the fleet is thus not only depending on customers' preferences. It needs to be checked, whether the existing car access technology suppliers do already apply their technique to the respective type of car. If the company does not have its own technical personnel to install the necessary technology, the search for an especially skilled garage to install this technology also has to be considered.

Once the technology has been ascertained, price negotiations can be started, which may have an impact on the car type decision. Respecting the postulate of making a 'real offer', the locations should provide at least two cars of the same type.

If the car-sharing company does not have its own infrastructure for car maintenance, an appropriate garage and a car wash need to be chosen. The intervals of maintenance and care have to be defined.

Concerning car insurance a price comparison is the main parameter. Besides, the legal framework needs to be taken into account. In the UK for example there were quite a few problems when car-sharing started, as most insurances in Britain relate to a person and not to the car.

Usually, fuel cost is included in the mileage prices. Thus it is good service for the customer if each car is equipped with a fuel card, permitting the purchase of gasoline without the need of having to advance and reimburse the money. The parameters for the fuel card decision are of course the cost for this service, but also the regional differences in spread. The cost for frequent reimbursements (because the customer could not find a filling station of the respective company) can be much higher than slight differences within the card cost.

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[4] The chapter on technology for IT based car-sharing offers more details.

Software

Beside standard office software, such as programs for internal communication, mail and bookkeeping, some special applications for car-sharing purposes need to be installed[5]:

- ### Administration and billing software
  The administration tool has to be compatible with the reservation software and the applied accounting software. It should include an automatic ride registration (import and calculation of on-board computer data).

- ### Reservation software
  The main requirements for the booking software need to be compatible with the chosen car access system and offer reservation via Internet.
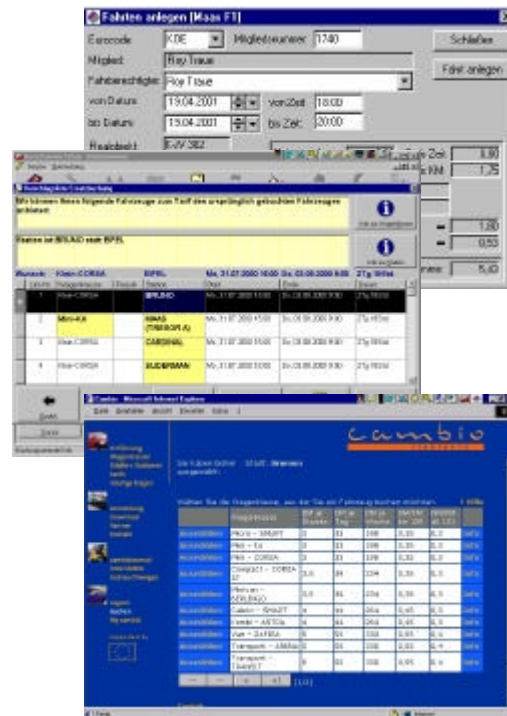
Office

The requirements for the car-sharing office are dependent on whether a traditional car-sharing or a mere sales office is intended. The office should at any rate be centrally located and installed in quarters with sufficient telecommunications supply (e.g. DSL).

For contract signing with new customers, respectively providing them with their smart cards or other access means, traditions among the existing car-sharing companies are varying. Some offer or even require attendance at an information evening in the local office.

Such an information event not only offers condensed information and practical on-site explanations, but also the possibility for the prospective customer to show his driving license and passport as well as to get the smart card right away. Other companies do not offer information evenings, but receive their customers one by one during their regular business hours. Others even do not get in personal contact with the users at all, as all contract communication is done by mail.

[5] For more details, please refer to the chapter on technology for IT based car-sharing.

Partners

For a fruitful development of the car-sharing operation, suitable partners should be selected right from the start. These partners can be:

- Public transport suppliers

- Taxi companies

- Car rentals

Staff

The absolute minimum personnel needed for a car-sharing company is:

- Branch manager

- Fleet manager (to organise at least the maintenance, but maybe also the purchase and sale of cars)

- Secretary

Setting up the Company

To meet the formal requirements to set up the new car-sharing company, several business connections need to be established.

A lawyer and a tax consultant have to be contacted to define the company's articles of partnership. A notary has to execute the formal registration into the register of companies. A bank has to be chosen for accounting and financing purposes.

Finally, membership in the respective trade association and the local chamber of commerce has to be applied for. It is also recommendable to join the international car-sharing endowment European Car Sharing (ecs).

2.2 Organisation

The following recommendations on organisational issues are based on the assumption that one company is offering the entire service and in just one city[6].

2.2.1 General management and Finances

The business director continuously has to make decisions on locations, fleet and staff. Moreover he or she has to develop strategies concerning the product (see chapter 2), finances and technology. Prospective co-operations need to be analysed as well as the market and competition situation on the whole. Strategic steps like the application of ready-made services or merging have to be taken on time.

If the management aims to have as much control of the company as possible, the company itself should carry out the following tasks:

- Accounting (including tax declaration)
- Budgeting
- Controlling (on the basis of a regular business assessment)
- Balance preparation

Moreover, there should be enough know-how to organise the financing of car purchase and of technical development.

In most cases the additional support of a tax adviser is recommendable for salary accounting and the financial statement (balance).

2.2.2 Service

Front Office and Administration

The traditional car-sharing front office has to deal with direct customer contact. This includes phone calls and office visits for information and consulting as well as administrative customer care.

Of course the administrative tasks of a car-sharing back-office depend on the company's services. The complete list, however, includes billing, dunning and organising the interface to the reservation call centre (for example the preparation, registration and interchange of customer and vehicle data).

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[6] As stated before, almost all services can be purchased on the open car-sharing market.

Moreover, the administration has to keep in close contact with the company's marketing department, especially by providing it with information on customer needs and feedback in order to integrate them into the marketing material (e.g. customer news, customer manual) and into the product itself.

Reservation

At least in the beginning, car reservation should be carried out by an external call centre to provide a 24 hour 7 days a week service. The implementation of one's own reservation call centre would be much too expensive: about 500 hundred cars have to be administrated in order to reach satisfactory occupancy of the call centre staff.

Formerly, local taxi or security call centres mainly carried out the reservation services. Today, car-sharing costumers' expectations concerning the information provided by a call centre are supposed to have strongly increased. More and more companies are therefore using the services of especially skilled car-sharing call centres. They not only offer reservation services but also information, e.g. on public transport connections.

Besides, online reservation through the company's website it getting more and more important.

Website

The importance of one's own information or interactive website is very high, especially for online reservation and information. The company's homepage should include:

- Product and service information

- Possibility of registration

- Online reservation of the cars

Fleet Management

The tasks of the fleet management staff comprise:

- Purchase and registration of the cars

- Input of relevant data into the administration software; data maintenance

- Organisation of the interface connecting the company with the call centre and the applied reservation software

- Maintenance and care of the cars

- Damage management

- 24 hours 7 days a week emergency service (e.g. for troubleshooting, accidents and breakdowns)

- Purchase and distribution of car equipment

- Sale of the cars

Technical Personnel

The technical personnel has to deal with the computing network administration and the development of special software components (the importance of the latter is quite reduced if modular paid services or entire franchise solutions are applied).

The main part of the technical work, however, is not carried out in the offices on the business premises, but right at the fleet. Here, most of all the installation and troubleshooting of the applied access technology has to be managed. If no ready-made services are applied, the development of the car access technology has to be worked on as well - in co-operation with the respective car access technology supplier.

2.3 Marketing

Since car-sharing is not too well known to the broad public even in urban centres, effective marketing is needed to stimulate the demand. For the success of car-sharing a good marketing is of key importance.

2.3.1 Strategy

A good marketing strategy does not start with the concept of the information leaflet. First of all, some very basic pillars of the company's philosophy need to be defined: the aims, the styles and principles of the company. Of course, for these no general suggestions can be given here.

After having established this philosophy, the search for the appropriate name of the company and its product may start, followed by legal registration and trademark protection. Moreover, web domain registration should be carried out on time.

A market analysis, stating the target market and the prospective need, is another important step to be taken.

2.3.2 Tasks and Tools

Fundraising

The initial marketing task will not focus on the car-sharing customer but on prospective supporters or shareholders.

For the attraction of shareholders and public subsidies it is indispensable to produce a convincing business plan and to present it in a business plan leaflet, stating not only economic data for the next three or four years but also information on the market framework and the product itself.

Public Relations

Press and the media are very fond of car-sharing. More than ten years after its start, car-sharing still seems to be a topic worth being reported upon. And in fact car-sharing companies do lots of PR-work as the costs are quite low and the effect of reports in local newspapers, on radio or TV stations is very high.

For the inauguration of the car-sharing scheme it is recommendable to raise the public's awareness by launching articles some months earlier. A subscription offer might for example be a topic the press regards worthwhile reporting on (e.g. a 'reduced subscription rate within the first weeks or month' or "subscribe now - and pay no entrance fee later").

An opening press conference should take place the same day as the launch of the car-sharing operation or a few days before. Local and national press and media should be invited as well as local VIPs. This requires the fixing of a press index (press, radio, TV) and a VIP index. A press invitation should then be forwarded. At the press conference the journalists should receive a press release together with a press file containing additional PR and information material.

Once the business is running, many occasions can be used for new press releases: the opening of a new location, the extension of the service to a new city; the first 100, 500 or 1.000 customers; new service offers or products or new co-operations.

Advertising

Classical advertising is quite expensive and for car-sharing at least it has not proven to be a very successful PR means. Therefore, it is often limited to small advertisements in relevant journals.

Posters and stickers on busses or trams are far more effective and less expensive within marketing co-operations. If the co-operation with the local public transport company is very productive, even a whole bus or tram can be used as advertising medium.Advertising in cinemas is even more expensive and the direct effects are rather poor.

Leaflets

Information leaflets are one basic PR medium applied by car-sharing companies. The leaflet should contain detailed information on:

- How the car-sharing system works

- Available cars

- Locations

- Tariffs

The distribution should be organised in a permanent way at defined spots (e.g. shops, pubs, universities, business complexes). The involvement of a professional distributor (e.g. bicycle courier) is recommended.

Besides, an event-driven distribution should take place whenever this makes sense, e.g. distribution in a specific quarter of town at the occasion of the inauguration of a new location there.

Of course, the leaflets also serve as information material on demand (by phone-call, web, fax or regular mail).

Cars and Locations

The car-sharing locations themselves are very important PR tools. It is strongly recommended to install eye-catching signs or even information boards and leaflets.

In addition, the cars may also carry banners or the company's logo. However, most car-sharing customers do not like to act as a promoter for car-sharing when driving. For this reason most bigger car-sharing suppliers limit their advertisement on the cars to very decent mentioning of the product name on the car.

Customer Information

Lots of marketing work is done through direct contact with prospective customers. The local office or point of sale should therefore offer customer-friendly business hours. To provide good information services when people are calling should be regarded as an important marketing task. Offering information evenings can also be a good method to convince prospective customers.

Marketing materials for this direct customer contact are: information leaflets, customer manuals (stating all necessary information on cars, locations, reservation, usage, tariffs, business conditions etc.), ordering forms, company headed paper and visiting cards.

Field service

The classical field service is indispensable to attract companies and administrations as customers. It should be prepared by establishing a database, followed by initial telephone calls in order to fix an at-the-face-date.

In addition to the marketing materials outlined above, a special leaflet for business use is recommended.

Customer Relationships

The bigger a car-sharing company, the more important the car-sharing service itself becomes for PR. Materials to support this are: Customer journal, customer manual, smart cards, driving reports and other office material. Of course, also the company's website is of great importance.

Customer surveys from cambio have revealed that first-hand information from satisfied car-sharing customers was the main reason for new comers to join car-sharing.

Improving the service is not only an investment in customer relationships, but also the most important way to attract new car-sharing users.

3. Technology for IT-Based Car-Sharing

During the last decade enormous progress has been made in the development of IT tools for car-sharing. These tools have proven to be easy to handle, efficient and reliable. Today, online booking, electronically controlled car access, automatic data recording and processing are considered preconditions for successful and professional car-sharing applications.

The following chapter offers an insight into car-sharing technology, the requirements for its operation, the options and the related workflows. This overview helps to prepare for the first step into IT-based car-sharing, but can of course not replace the necessary specific consulting and workshops.

This documentation refers to the mostly used car-sharing system in the world, "COCOS" (Car-sharing Organisation and COmmunication System). COCOS is a car-sharing system built of different components that can be adapted to the special needs of applicants. All its components are available on the market. COCOS was developed by INVERS GmbH, Siegen, Germany[7].

COCOS offers:
- Modern contact less smart card technology
- Modern communication tchnology
- Fully verified onboard computer and immobiliser technology
- Optimised back-office software

All COCOS system variants provide electronic data processing from booking to billing.
Manual trip reports are not required anymore. Permanent and close co-operation between COCOS providers and customers guarantees constant improvement of the system and permanent realisation of new mobility ideas. COCOS is currently in use in over 40 car-sharing projects with about 90.000 customers worldwide.

Fig 1. COCOS System Components

[7] INVERS GmbH offers support concerning initial decisions: Workshops inform interested groups about possibilities and drawbacks of this growing market.

3.1 Car access and trip recording technology

The key features of car-sharing are convenient and secure access to the cars and reliable recording of all usage data. The main IT tools to ensure these are: Smart cards, Key Manager and Standalone System.

Smart cards

Contact less smart cards have been established as identification media for car-sharing applications over the last few years. A smart card (see Fig. 4) contains an integrated chip, which can be read electronically. COCOS uses smart cards recommended by ECS (European Car-sharing).

Standalone System

It seems intriguing to install a highly sophisticated access technology into each car. Just unlock the car with your smart card. An onboard computer checks your reservation via mobile data communication and releases the immobiliser of the car. All usage data is recorded automatically and sent to the billing system at the end of the trip. This vision became a reality with the "COCOS Standalone-System"*. Many car-sharing providers employ this system in their cars.

Fig. 2 Smart card unlocks door

Key Manager System

Most car-sharing providers also use another type of access system at certain locations, the "COCOS Key Manager System"*. Here, the keys of the cars are kept in an electronic safe box, a so-called "key manager". Instead of unlocking the car directly with the smart card, the door of the key manager is unlocked with the smart card. The key manager is linked via a data communication link to the reservation centre to check the reservation before unlocking the door. Only the key of the car for which a reservation has been made is released by the key manager. The car is unlocked with the normal key.

Fig. 3 Smart card opens key manager

* Developed by INVERS GmbH, Siegen, Germany.

Inside the car, there is a small onboard computer, which just tracks the usage data. After returning the key into the key manager, the trip data is automatically transferred from the onboard computer to the key manager. From there it is sent to the billing system.

Both systems, Standalone and Key Manager System, are operated with the same back office system. The rental procedure for the customers is quite similar in both cases and both provide electronic data processing from booking to billing. Manual trip reports are not required anymore.

Usage of both systems by one and the same provider may be done for economical and organisational reasons. For a better understanding both systems will be explained in detail hereafter. Decision rules for the selection of the appropriate system will also be given.

3.1.1 Smart cards

COCOS uses modern contact less smart cards for the identification of its customers. The system is protected by an additional secret PIN to avoid misuse in case of loss or theft. Key Manager and Standalone System are operated with the same smart card and PIN.

Fig. 4 Contact less Customer Smart Card

The following has to be decided at the beginning of a car-sharing operation:

- Print layout of the cards (type of printing, design, sponsoring etc.)

- Co-operation with other card applications (e.g. public transport season cards; additional magnetic stripe or additional chips required?)

- Customer number structure (administration of user groups etc.)

- Workflow for card issuing process

These issues need to be discussed in a technical workshop at the beginning of the car-sharing operation.

3.1.2 Key Manager System

The Key Manager System is most suitable for locations with several cars and different types of vehicles. Typical applications are car-sharing locations at railway stations, blocks of flats and company carpools. Key Manager Systems allow changing the fleet with little effort due to the easy installation of the onboard computer. Thus, they are often used to provide "special cars", like convertibles or vans.

Fig 5. Key manager in operation

Technical Information

The key manager is installed on the site of the car park. It contains and controls the keys of all the cars parked at this location. One key manager can keep up to 16 keys.

To get the ignition key of a reserved car, the customer just has to present the smart card and the secret PIN to the key manager. If a reservation is available, the key manager opens up door and releases the ignition key of the reserved car.

Data exchange between key managers and administration centre is performed via GSM or analogue telephone line respectively, depending on the infrastructure available at the location.

For additional security and high convenience each car is equipped with a simple, low-cost onboard computer with electronic immobiliser. Only if a key has been released correctly from the key manager it can be used to start the engine!

The onboard computer records all trip data and automatically transmits this data to the key manager at the end of the trip.

Reservation and Billing System of Carsharing Provider

CUCM and Reservation System

Modem

Trip Data

Reservation Data

Telephone- or GSM-Network

Contactless Smartcard with User Data

Keymanager

Immobilizer

Speed-Sensor

Onboardcomputer

Key-Reader

Data Exchange

Data-Key

Ignition Key

Car and Onboardcomputer Equipment

Fig. 6 Key Manager System Overview

The key manager sends all data to the billing office. Based on this data, the car-sharing accounting software calculates a detailed invoice for each trip.

For the operation of a Key Manager System you need:

- A key manager to be mounted near to the parking lot

- Infrastructure for the key manager (best case: power line and telephone line)

- Smart card and PIN for each customer

- Back office reservation and billing system which is able to communicate with the key managers (e.g. COCOS2000-Package)

- Onboard Computer "BCKM" (BoardComputer Key Manager) to be installed into each car-sharing car

Key Characteristics

The major benefits of the Key Manager System are:

- **Low costs of key manager onboard computer**

  The onboard computer costs only a quarter of the price of the standalone onboard computer. With more than 2 cars at one location the key manager solution is cheaper per car than the standalone solution.

Onboard Computer "BCKM"

- **Easy and fast installation of onboard computers into every type of car**

  The onboard computer can be installed into every modern car without any additional equipment. The installation is done within 0.5 - 1.5 hours by standard car electricians.

- **No special knowledge required for installation into "non-standard cars"**

  The installation into "non-standard cars" can be done by the car workshop staff with some hours of special adaptation effort. There is no risk of encountering unsolvable problems.

- **Full operation also at locations without GSM-coverage (e.g. underground parking)**

  The key manager can also be installed in areas without mobile communication network. In this case, the key manager can be connected to a telephone line to make data communication possible.

- **Access to locked parking**

  Sometimes appropriate parking lots are only accessible with additional keys or cards (e.g. parking in a locked backyard). In this case the key manager can be installed outside and the required keys/cards can be stored together with the car keys inside the key manager.

- **Advanced operation schemes**

  New kinds of operation schemes like reservation of a certain class of car ("class reservation") or usage of some cars without reservation ("spontaneous open end use") are already implemented into the key manager.

But there are also some inconveniences that need to be taken into consideration:

- **High organisational effort for opening a new location**

  The installation of a key manager requires many preparatory tasks (like building permissions, enough parking lots nearby, power line, telephone line)

- **Only cost-efficient, if more than two cars are placed at the same location**

  Or if it is sure that there will be more cars at this location in the near future.

- **Less "High-tech-Feeling" than the Standalone System**

  The use of new technology tools like the Standalone System may create more 'publicity' (e.g. 'open the car-sharing vehicle simply with the smart card') than the use of the Key Manager System - an IT-solution with a mechanical component.

Check-List

The following questions help to decide whether a specific location is suitable for a key manager installation.

☐ **Is there a high demand for different cars and types of vehicles at this location?**

A key manager only makes sense if you put at least 2 cars at this location. If you are not sure, you should start out with standalone cars (if the necessary infrastructure is available).

☐ **Is there a place for installation of the key manager?**

Usually the key manager is hung up on a wall near the parking lot. You need the building owner's permit to install the key manager. Freestanding key managers are also available but more expensive. Generally the key manager front should not be on the side exposed to the weather.

☐ **Is the installation following regulations of local "city architecture"?**

Especially in historical city centres the installation of a key manager might be forbidden.

☐ **Can the key manager be installed close to the parking lot?**

The distance between key manager and parking lot should not exceed 100 metres. There should be enough parking spaces to allow for extension of the location in case of high demand.

☐ **Is the car-sharing location in a safe area?**

Even though the key manager is illuminated, it should be placed in a well-lighted and safe area. Especially women are not willing to use a car-sharing location in an unsafe area.

☐ **Is a connection to a power line available?**

Most key managers are connected to a power line (115V or 230V). In special cases, the key manager can be powered by a battery. In this case, the battery has to be replaced and recharged at least every 4 weeks.

☐ **Which kind of data communication system can be used?**

If it is easy to connect the key manager to a telephone line, this solution should be preferred. Otherwise the location must provide sufficient GSM signal quality (check with your mobile phone). In this case the key manager will be delivered with GSM Communication (which is more expensive).

3.1.3 The Standalone System

The COCOS Standalone System provides direct keyless car entry with the smart card. Therefore, the Standalone System does not require any technical infrastructure at the car-sharing location. Thus it allows for the flexible and economical setting-up of small car-sharing locations with only a few cars per site. Typical applications are widely distributed de-centralised car-sharing locations and company carpools branched at various locations.

In some special projects, the Standalone System is equipped with a GPS receiver to track and send GPS position data of each car.

Due to the more complex installation of the onboard computer into the car, the Standalone System is mostly used in those car models only, which are the "standard cars" of the provider organisation. "Special cars" like vans are usually parked at key manager locations.

Technical Information

The customer just has to present the smart card to the windshield card reader. The doors are unlocked only for the customer who has made a reservation for this special car. The immobiliser inside the car is released only if the customer enters the correct PIN on the keyboard of the onboard electronically controlled "key holder" in the glove compartment.

The exchange of reservation data between the reservation centre and onboard computer is performed by cost-efficient GSM Data Communication.

During the trip the onboard computer automatically records distance and time.

Carsharing Provider

CUCM and Reservation System

GSM Modem

GSM-SIM (inserted into Modem)

trip data

reservation data

SMS Service Center (GSM Network Provider)

GSM Network

Contactless Smartcard with User Data

inVERS INNOVATIVE VERKEHRSTELEMATIKSYSTEME

Cardreader

GSM-Antenna

GSM-SIM (inserted into BCSA)

Keyholder

Onboard Computer (BCSA)

Data-Key

Immobilizer

Central locking System

Ignition Key

Engine

Car and Onboard Computer Equipment

Integrated into the onboard computer is a radio (for music and traffic information). If necessary, the customer can phone the service centre directly by pressing the Hotline Button.

At the end of the trip the onboard computer transmits the recorded trip data via GSM Short Message Service to the billing office. Based on these data, the car-sharing accounting software calculates a detailed invoice for each trip.

Fig. 8 Onboard Computer Standalone System "BCSA"

Additional options of the COCOS Standalone System are mobile voice and data information services and GPS localisation.

The onboard computers power consumption is very low. They have a standby time of several weeks even in cold winters.

Key Characteristics

The major benefits of the Standalone System are:

- **Flexible set-up of new locations**

  There is no need for special infrastructure at the location. With flexible set-up the Standalone System can be used to try out the acceptance of new car-sharing locations.

- **Free speech telephone during the trip**

  The customer can talk directly to the service staff via the integrated Hotline free speech unit. Private calls (incoming and outgoing) can also be allowed for.

- **Fuel card tracking**

  The fuel card can be placed in a card slot in the onboard computer. Every removal and return of the fuel card is automatically recorded.

- **Installation in the standard radio slot**

  As there is a radio already integrated into the onboard computer, it can be installed into the standard radio slot. The car can be bought without radio.

- **GPS-tracking option**

  If required, the standalone onboard computer can be equipped with a GPS-Receiver to track the position of the car.

- **Deactivation in case of lost vehicle**

  If a car is lost, it can be deactivated via remote control.

- **High-tech feeling**

  The Standalone System is very appealing to the press and decision makers.

But there are also some inconveniencies, which have to be taken into consideration:

- **Higher investment cost per car**

  A Standalone Onboard Computer (BCSA, onBoard Computer Stand Alone) costs about 4 times the price of a Key Manager Onboard Computer (BCKM, onBoard Computer Key Manager).

- **High costs for installation**

  An installation, which fulfils the requirements of European car insurance companies, takes 2.5 to 6 hours, depending on the type of car and the training of the car workshop staff.

- **Cost-efficient installation only in "standard cars"**

  The installation of the Standalone System should be limited to a few car models. Otherwise the installation and training of the car workshop staff becomes too time-consuming. Especially the first installation into a car model so far unknown to the staff may take more than 8 hours in the car workshop and might cause additional research and development cost. Therefore "special cars" like vans should be placed at key manager locations.

Check-List

The following questions help to decide whether a specific location or car is suitable for a Standalone System.

☐ **Is the parking area covered by sufficient GSM signal quality?**

The Standalone System can only operate in locations with good GSM coverage (e.g. not in some underground parking). If in doubt, ask your GSM Provider if coverage of this area is planned within the next months.

☐ **Are the parking lots accessible day and night without any additional key system?**

Locations in locked backyards or garages are not suitable, if there is no way to reach the car without an additional key system. If the car can be reached by the customer (e.g. backyards with a barrier), the key for the barrier can be placed inside the car. There are also smart card door locker systems offered by INVERS. With these systems the customer can unlock the backyard door with his car-sharing smart card. But this system has to be adapted individually to the local situation.

☐ **Does the desired type of car belong to the list of "standard cars" or will it be added to the list in the future?**

The installation of the Standalone System should be limited to a few car models. Otherwise the installation and training of the car workshop staff becomes too time-consuming. "Special cars" should be placed at key manager locations.

☐ **Will this car stay in the fleet for at least 12 months?**

An installation of the Standalone System is not cost-efficient if the car stays in the fleet for 6 months only.

3.1.4 Comparison of Key Manager and Standalone-System

This chapter gives a summarised comparison between Key Manager and Standalone System.

Functional and Organisational Comparison

The following table presents an overview of the most relevant features and requirements of both systems.

	Key Manager System	Standalone System
Installation at the Location	Key manager	Nothing
Infrastructure at the location	Wall, Power line, Telephone line (depending on the local situation)	Nothing
Installation effort per location	1 - 6 hours[8]	0
Installation into the car	Onboard computer "BCKM"	Onboard computer "BCSA"
Special requirements for cars	None	Central door locking system
Limitations due to car models	None	Profitable only for some "standard cars"
Installation effort per car[9]	0.5 - 1.5 hours	2.5 - 6.0 hours
Required workshop staff qualification	Standard qualification; 3-5 hours basic training	High qualification; 12 hours basic training; 4 hours additional training per car model
Required technical administrator qualification	6 hours basic training	12 hours basic training
Operable at locations without GSM Signal	Yes, if telephone line is available	No
Operation in locked backyards possible?	Yes, if the key manager can be placed outside	No; only possible with additional door opener technology
Integrated Radio	Not yet available	Yes
Fuel Card Tracking	Not yet available	Yes

[8] Depending on the local situation and infrastructure to be provided (telephone line, power line).
[9] If installation is done by trained car workshop staff. The first installation into an unknown car type can take much longer.

GPS-Tracking	Not yet available	Yes
Hotline Telephone	Yes (only key managers with GSM communication)	Yes
Reservation by class possible?	Yes	No

Comparison of Cost

The following table presents a rough comparison of cost between a location with Key Manager System and a location with Standalone System. This calculation includes depreciation of the hardware (onboard computers and key manager), installation and deinstallation of onboard computers, communication cost and support fees. It does not contain the cost for the back office system and car depreciation. Neither does it include the installation costs for the key manager. The calculation is based on the typical average cost and usage data of German car-sharing providers.

The table gives the calculated monthly cost required to operate the hardware (total cost broken down per car in Euro).

Number of cars per location	Key Manager System Car holding period within the fleet [months]			Standalone System Car holding period within the fleet [months]		
⇓	12	18	24	12	18	24
1	111 €	107 €	105 €	82 €	71 €	66 €
2	66 €	62 €	60 €	82 €	71 €	66 €
4	43 €	39 €	37 €	82 €	71 €	66 €
8	31 €	28 €	26 €	82 €	71 €	66 €
16	26 €	22 €	20 €	82 €	71 €	66 €

Example:

At a key manager location with 4 cars, the total transferred monthly cost per car is 43 €, if the car is kept in the fleet for 12 months. If the car is kept for 24 months, the monthly cost is reduced to 37 € (due to the saved cost for installation and de-installation).

Cost for the Standalone System is independent of the number of cars at a location. If a standalone car is kept for 12 months, the total transferred monthly cost is 82 €. If it is kept for 24 months, the monthly cost is reduced to 66 €.

3.2 Back Office Software Technology

Apart from the hardware components a car-sharing provider needs suitable back office software for master data administration, reservation and billing. This software has to be linked with the onboard computers and key managers to provide electronic data processing from booking to billing.

There are two ways to provide this back office service. A car-sharing provider can either build up his own back office system or use parts of the back office as service of external service providers. The best solution has to be developed from case to case. Generally, small private start-up car-sharing companies should start with an external service provider or build up a trans-regional co-operation with other local car-sharing providers. Companies with an already existing IT-department can use this base to build up their own car-sharing back office.

The following chapters give a short summary of both solutions.

3.2.1 Operate your own Back Office Software

This is the classical way to operate back office software for car-sharing. The car-sharing provider buys a suitable software package, builds up his own computer network and 24h-call-center and does all the data administration with his own specialised staff. Some providers have even developed parts of the software themselves.

This solution has the following benefits:
- No dependency on external computer networks

- Full access to all data

- No storage of data in external computers

- No cost for external services

- Individual adaptation to your own business model

- Knowledge of the regional situation

The inconveniences are:
- High investment cost in software, hardware and training at the beginning

- Qualified IT-staff permanently required

- Highly qualified staff for master data administration required

- Own qualified call centre staff (or external call centre) required

- Own responsibility for data security and backup

- Permanent cost for support and software updates

- Risk of failures due to unqualified staff

The only complete software package on the market is COCOS'2000 by INVERS, which has especially been designed for car-sharing applications.

3.2.2 Use an Application Service Provider

Due to the rapid growth and decreasing prices of high speed data networks (Internet) it is possible today to outsource parts of the data processing to external service providers. For example, the complex master data administration can be done by specialised staff at the back office service provider. The standard tasks of customer care can be done locally by the car-sharing provider on his own. During daytime the car-sharing provider might offer his own reservation centre with staff with regional background knowledge. During the night, the reservation can be done by the staff of the back office service provider.

There are various options to share operational tasks between the car-sharing provider and the back office service provider. The optimal solution has to be developed individually from case to case.

In general, the following advantages are achieved by Application Service Provider, ASP:

● Less investment in your own hardware, software and IT-staff

● Cost proportional to car usage and organisation size

● Centralised data security and backup systems

● Less qualification of local administration staff required

● No own 24h call-centre required

● Less risk of failures due to wrong software handling

But there are also disadvantages:

● Dependency on external computer networks

● Less flexibility in business model

● Dependency on the quality of the service provider

Car-sharing back office ASP is provided by some large car-sharing organisations and by INVERS.

3.3 Technical Staff and Workflows

The operation of an IT-based car-sharing scheme is a complex technical challenge. Therefore some preparation workshops and technical trainings are required. System providers like INVERS offer support to business start-ups. Nevertheless every provider organisation needs its own qualified technical staff, which is able to operate and maintain the systems.

The tasks and requirements increase with every system component, which is operated by the provider organisation itself. Therefore it makes sense to start a small organisation with support of an external service provider.

The following tasks should be centralized

Operation of Back Office Software:

- Arrange the ordering of hardware components
- Co-ordinate installation date with local car workshop
- Check if the onboard computer installation was done correctly by the car workshop
- Initialise the onboard computers with the correct data
- Enter the data of the new car into the administration databases
- Test all functions of the onboard computer system

Error Handling:

- Analysis of error situations
- Handling of exceptional situations
- Feedback of errors to the car workshop and to INVERS
- Organisation of repairs

The following technical tasks must be performed by the local provider

Set-up of a new location:

- Decide whether Key Manager or Standalone System is used at this location
- Arrange the ordering of cars and hardware system components
- Find an appropriate location for the key manager (see checklist)
- Organise installation of key manager with local staff
- Final functional test of cars

Local Customer Care:

- Explain technical system to the customers
- Check invoicing complaints

Error Handling:

- Analyse error situations
- Handling of exceptional situations

In widely spread trans-regional organisations the knowledge for the set-up of new locations and cars can be concentrated in the headquarters of the organisation. Nevertheless there must be local staff which is able to handle exceptional situations and which is able to distinguish between a car failure (e.g. empty battery), customer failure (e.g. wrong PIN) and a system failure (e.g. defective installation or hardware). The centralized provider has to build up and co-ordinate this network of competent staff.

For better customer relations it might be better for the local provider to operate his own reservation call centre during office hours. The technology for this kind of operation is available.

For better business control the local car-sharing provider needs statistical data from the central database. The extraction of data can be done by the central back office service provider. If needed, raw data can also be exported to the local provider for his own statistics.

4. Car-Sharing Take-Up Experience

CarATC is the car-sharing initiative realised in Bologna by transferring the car-sharing system of the city of Bremen, Germany, to the city of Bologna, Italy, having adapted and tailored it accordingly.

4.1 Bologna Approach

Start-up of the car-sharing initiative in Bologna has not always been easy since car-sharing is a mobility solution Italians are not yet used to.

Different steps had to be taken in order to organise the system. Various internal ATC departments had to contribute their experiences to guarantee the best unfolding of this experiment.

ATC, the local public transport operator, is certainly a local reference company for a series of initiatives aimed at improving mobility management as it offers a wide range of innovative and alternative services. ATC is in charge of research, planning of and commercialising of innovative technological solutions for public transport (e.g. on-demand-service[10]), parking management in the area of Bologna and it is responsible for the depots for vehicles towed away by the police. The car-sharing idea originated and has been developed within this general context.

In order to set up a car-sharing service in Bologna it was essential to have the application framework analysed and evaluated beforehand. Above all, the feasibility study was important to verify that all necessary pre-conditions for setting up a car-sharing scheme were duly met (esp. identification of suitable car-sharing locations, analysis of target groups, definition of adequate tariff structure, vehicle selection, confirmation of system components, planning of call centre and administration centre, marketing campaign).

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[10] E.g. "ProntoBus" which is a new service that works only on users ' request serving low-density areas. The booking is made through a call centre operator who enters all data necessary to the reservation, which are then automatically sent to the server which compacts all information received and forwards a passenger boarding list to the driver via GSM by means of an sms.

4.1.1 Organisation and Internal Co-operation

Activities undertaken have involved different aspects from management and practical organisation to a strategic study on how to promote the car-sharing service.

During the preparation phase, direct support was provided by the ATC parking manage-ment system, the technological depart-ment and the marketing offices. These ATC three departments assembled their expertise and know-how to accompany the implementation:

- **Parking Management Office:**
  Co-operation was particularly useful because of its wide experience and knowledge in the territorial and fees management of the city of Bologna

- **Technological Department:**
  played a fundamental role concerning testing and training activities

- **Marketing offices:**
  Primarily important in the development of the strategic marketing solutions for creating ever increasing awareness among people of this new means of transport.

4.1.2 Institutional framework and External Cooperation

Strong and intense political sponsorship of the Mobility City Council plus an agreement with the Bologna taxi operator proved to be successful starting points for the service.

To provide customers with increasingly efficient services and to integrate already existing public transport modes, ATC established a co-operation with the local taxi operator. The agreement was a necessary tool for different reasons:

- Avoid conflict with private interests

- Benefit from the experience of the taxi operator (COTABO)

The taxi operator, in fact, not only supports ATC in the booking tasks (call centre), but also concerning the 24-hour fleet assistance with the most basic activities:

- Car maintenance

- Towing service

- Refuelling

- Vehicle cleaning

From the very start of car-sharing in Bologna, communication of data between the two local partners showed that a successful co-operation had in fact been achieved.

Obviously the first months were meant to be a training phase. Arising difficulties were ascribed to the fact that the service was innovative in several aspects:

- Type of mobility

- Type of service

- Use of new technologies

Caratc – Car sharing Bologna Locations signposts

Road signs

4.2 Bologna Car-Sharing Pilot System - CarATC

The idea of car-sharing in Bologna not only derives from the necessity to offer citizens a new and alternative mode of transport but it is also seen as an intelligent solution to limit private car use. It is also intended as an incentive to decongest the city centre from the high level of pollution and noise.

4.2.1 Information Campaign

An information campaign was launched with posters and leaflets promoting the pilot application in buses and at the most strategic Bologna Municipality info-points. Radio and television broadcasts as well as newspaper articles also promoted the new service. Direct contacts were obtained through a telephone "CarATC hotline" in order to enquire in more depth into the serious interest, willingness and availability of people to join the car-sharing club during the lifetime of the TOSCA project.

4.2.2 Locations

Four car-sharing parking locations in the historical city centre were set up for the pilot application:

P.za Roosevelt :

- Situated in the very "heart" of the historical city centre

- Very crowded area

- Business area

P.za VII Novembre 1944:

- Close to the main railway station

- Situated on the main access road from the North

- Area of high population density P.za di Porta Saragozza

P.za di Porta Saragozza

- Close to engineering faculty

- Few parking spaces available (esp. difficult for private vehicles)

- Highly populated area

Via Zanolini:

- Located in the university area

- Close to the S.Vitale railway station and "Sant' Orsola" hospital
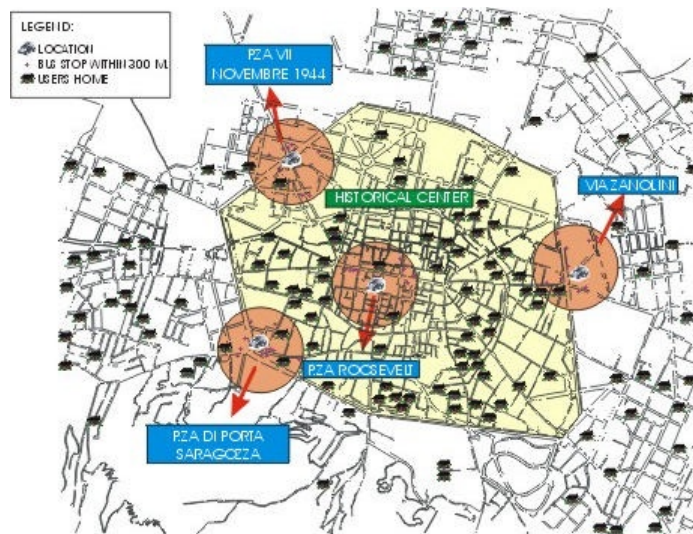
4.2.3 Vehicles

The vehicle chosen for the pilot application was the SMART (759 cc, 30KW) with automatic gear. The SMART was chosen amongst others for its ecological engine (eco diesel) and the reduced dimensions of the car itself. Nine vehicles were offered to ATC by the SMART car dealer in Bologna free of charge for the whole experimentation period. The vehicles carry the CarAtc logo, the acronym of the location and the car number. At each parking location, two Smart cars are parked. One vehicle is left at the disposal of the ATC operator staff for car-sharing intervention tasks.

ATC decided to start with this vehicle but in future car-sharing operation a diversity in vehicle types and a higher number of locations is planned.


4.2.4 Technology

In the Bologna pilot application, the hardware and software elements of the car-sharing organisation and communication system COCOS, provided by INVERS (Germany), are used. The smart card based access system to the car-sharing vehicles has proved to be very efficient in Bremen and many other cities.

COCOS helps to provide reliable, user-friendly and efficient car-sharing management. It allows of an electronic booking and accounting system by transferring trip data from the vehicles to the booking centre. Contact less smart cards are used to control users' access to vehicles.

Within the TOSCA pilot application, the following COCOS system elements are used:

- COCOS 2000 is a software for administration, booking and accounting. The ATC billing system is also characterised by an OCR system[11].

- The communication system between cars and operative centre includes:

  - GSM-based onboard computers for highly flexible car-sharing locations (for Standalone System)

  - Contact less smart cards for customer identification and keyless entry

  - CocoWeb web server software for reservation via Internet

COCOS System overall view
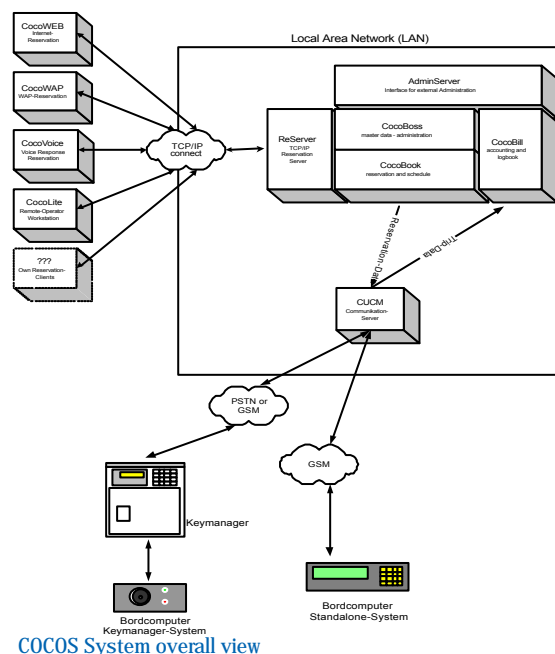
[11] OCR, Optical Character Recognition: This system is used to transform logbook information into a data file.

For car access the Standalone System was chosen. It does not require any technical ground infrastructure at the location and allows of flexible, economical set-up of car-sharing locations with only a few cars per site.

Final tuning and overall system verification made the successful start of the Bologna car-sharing real life operation possible.

CarATC Technology

The COCOS Standalone System gives direct keyless access to the car with the COCOS contact less smart card. Customers just need to hold their smart card in front of the windshield card reader. The red light turns to yellow: The onboard computer checks if there is a current reservation for this smart card and, if so, turns the light to green and unlocks the doors immediately.

The exchange of reservation data between the COCOS reservation centre and the onboard computer is performed by a cost-efficient GSM Short Message Service.

As additional security feature, an immobiliser is released only if the customer enters the correct PIN on the keyboard of the onboard computer.

If the number is entered correctly, the immobiliser of the car is released and the car can be started with the ignition key.

The ignition key is kept in a "key holder" in the glove compartment. During the trip, the car is locked and unlocked with the key and not with the smart card. At the end of the trip, the car will be returned to the location. The ignition key has to be put into the 'key holder'. Only after letting the key inside the car can be locked with the smart-card.

4.2.5 Tariff Structure

The tariff structure currently used in Bologna is a simplified one, which is only based on vehicle usage. During the whole pilot application customers do not pay any deposit or admission fees. Registration is in fact free of charge.

The cost of the car-sharing service is calculated according to mileage and time of use: Each km driven costs 1,29 Euro, each hour of usage costs 0,26 Euro.

The tariff is valid day and night on working days as well as Sundays, i.e. 24 hours a day, every day.

4.2.6 Users

A focused informative campaign aimed at selecting potential car-sharing users (testers) has been conducted. Three categories of potential users were identified as a good representation of the whole population of Bologna:

- ### Students
  Bologna, one of the most ancient European University locations, is hosting a large number of students

- ### Residents
  Many residents, especially those living in the historical city centre, have to struggle finding parking lots everyday[12]

- ### Small Business Sector
  Many business offices and enterprises (e.g. lawyers, commercial offices, banks, post offices) are located in the city centre.

Different steps to select user groups have been taken, and different methods used. The very first approach was to address a personal letter to all associations of occupational groups (e.g. free-lancers, such as doctors, architects, engineers), to the University's halls of residence and to hotel keepers. This preliminary contact was aimed at verifying that car-sharing customer requirements were really met by future users.

Parallel to the information campaign a focused survey was held investigating users' actual mobility needs (e.g. days worth considering and reasons expressed for opting for car-sharing - work, study, shopping, leisure time).

Once the contract has been signed, the users need to agree to give a bank permission to CarATC. This serves as guarantee for correct payment to CarATC.

By the end of November 2001, more than five months after the start of the pilot application, 96 customers have registered to use the car-sharing service.

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[12] About 10.500 parking lots are reserved for 'special categories', such as the Police, disabled people and for goods discharge. "CarATC" users will have the advantage of free parking and less mobility restrictions in comparison to private cars.

CarATC registration provides:

- Customer Number: Necessary for booking and billing.

- Smart Card: For car access (starts and ends registration of CarATC use).

- PIN Number: Needs to be entered any time when getting into the car in order to record the trip.

4.2.7 CarATC in Use

Car-sharing vehicles can be booked through the COTABO call centre or directly via Internet, at the CarATC web site (www.caratc.it), at any time of the day for a at least one hour of use.

During booking, users have to provide the operators with their personal details: Name, client number, car needed and estimation of trip time.

If the required car has already been booked, another vehicle or location is proposed for the time band chosen. Via mobile radio commu-nication, the booking data are sent directly to the onboard computer.

To access the vehicles, smart card and PIN code are necessary. During the trip, the car is locked and unlocked with the key and not with the smart card.

All vehicles are equipped with a logbook, containing specific forms to be filled out by each car-sharing customer before starting the trip in order to record mileage, time and possible irregularities of the vehicle.

Example of CarATC Conditions of Use

Cancellation

Cancellation of reservation is possible at no extra charge if effected 12 hours in advance. For cancellations less than 12 hours in advance, users will be subject to 30% charges relative to the cost foreseen for the cancelled trip.

Reservation Extension

If it is not possible to return the car within the planned time span, it is necessary to call the CarATC call centre immediately in order to extend the reservation: If the car has not yet been booked by other users, a new term of re-entry will be confirmed. Otherwise the extension - only possible in case of emergencies - will be followed by a penalty charge of 12,91 Euro for each hour of delay. This amount is meant to refund those having disadvantages because of the delay.

Adult Use Only

As this is just a pilot application with monotype vehicles only, it is up to now not allowed to transport children under the age of 12. Nor is it allowed to transport animals.

Car Condition Check

Before starting the trip it is necessary to check out its internal and external condition: Possible visible damages which have not been signalled in the log book by other users must be communicated to the reservation service or signalled in the log book before starting the trip.

Refuelling

Each CarATC vehicle is equipped with a fuel card, with which the cars can be refuelled at specific gas station chains in Italy. No automatic refuelling is possible. (A list is provided together with the card). When paying with the card it will be necessary to enter the PIN code, the fuel cost will be automatically invoiced to ATC.

By the end of the trip, the car will have to be returned in the same condition encountered when starting (e.g. tank filled up).

Invoicing

Trip billing is done on a monthly basis. The invoice will indicate 'kilometre' and 'time of use' cost separately. Each trip is documented, which might be of great use for business users. The total amount will be billed directly to the user's bank account.

Accidents

In case of vehicle breakdown or road accidents it is necessary to inform the call centre immediately. In the latter case users are asked to fill in the fault recognition form as usual and to collect personal details of possible witnesses.

Cleaning and maintenance

The company provides cleaning and maintenance to the vehicles periodically - carried out by COTABO. Still, the user is asked to leave the vehicle in good condition.

4.3 Take-Up Experience

The car-sharing pilot application in the city of Bologna can undoubtedly be considered as promising. Bologna car-sharing take-up can really represent a launching pad for replication and further developments within other geographical and social contexts as well.

4.3.1 Lessons Learned

Looking back on the TOSCA car-sharing pilot application, it is now possible to make an assessment of the benefits and drawbacks.

The major benefits of the TOSCA car-sharing take-up are:

- ### Strong Political Support

  The fact that car-sharing was supported by a European project helped considerably to convince politicians and local partners to support this new service not only at the local but also at the national level.

  Strong political support from decision makers is essential to interest people in modern means of mobility. The role decision makers play is fundamental in preparing citizens for changes, in making them aware of the fact that the city needs to find new and better solutions to the problems of pollution, noise and traffic. Their task is to show that benefits of innovative solutions are not limited to well-functioning transport due to modern technologies and tools, but that they may also solve more urgent and dangerous problems related to the environment.

- ### Successful Local Co-operation

  The Bologna pilot application succeeded in building up a good local co-operation with the local taxi operator. This avoided a conflict between two mobility systems. Without co-operation, companies fear that a market segment will be taken away from them (even though in reality car-sharing is mainly competing with private traffic).

  It is also obvious that car-sharing is a good supplement to the classic service of a public transport operator. Mobility is a field of service, where co-operation between the various actors is a prerequisite for achieving a modal shift towards environmentally friendly modes of transport.

- ### Knowledge Transfer

  ATC has clearly gained a lot from knowledge transfer within the TOSCA project, mainly in terms of organisation (e.g. how to start, what are priorities, marketing strategy) as well as concerning the technical implementation. The existing car-sharing experience in Europe is a good basis for the spread-out of the philosophy and also for further developments in terms of technology, services and integration into strategies of sustainability.

● Successful Transfer of Proven IT -Tools

The transfer and implementation of proven car-sharing technology has successfully been realised by the TOSCA project.

For sure, one of the elements of success for car-sharing is represented by the use of tried and tested technologies. They are able to provide reliability: A non-reliable technology would only create feelings of mistrust of the new system. Technical problems could be solved without delay with the help of the TOSCA partners.

The standalone system with no fixed ground structure might represent a service flexibility, which allows of further adaptability according to the real user needs and the social context.

From the point of view of ATC and with the perspective of a future replication of the service - both in local and national contexts - ATC has learned the following lessons form TOSCA. These issues should be considered carefully in order to avoid drawbacks:

● Awareness Raising

Considering the fact that car-sharing in Bologna, and in Southern and Eastern European countries in general, is a quite unknown mode of mobility, it is necessary to create stronger awareness among citizens who should gain trust in car-sharing as a complementary and innovative mobility solution. It is important to create a positive awareness of the personal and public benefits derived from car-sharing use through focused sensitisation campaigns.

● Information Campaign

The information campaign should, in fact, have been more focused and broader at the same time. Looking back today, it does not seem favourable anymore to limit the marketing campaign to the 'bus world' only (e.g. leaflets, posters in busses and at stops). Of course, public transport users need to be addressed since they are less focused on use of private vehicles. In fact, the majority of users are already used to public transport means and thus are more likely to start using the new service. But also people who do not use public transport services should be attracted to car-sharing. The more people are involved, the higher the possibility of success.

A broader information campaign may attract more costumers than CarATC has succeeded in gained at the moment (96 registered users by the end of November 2001). It is important to create a higher ratio of the number of users to the number of cars to increase the average use of the car-sharing vehicles.

The recommendation 'start big' is thus truly valid (see also chapter 'Implementation').

● Different Types of Vehicles

Another relevant aspect for the future development and success of the service is the possibility to offer more diversity in vehicles types. According to the specific purposes, different vehicles may match these varying requirements.

● Car-Sharing Locations

Bologna has a mixed city centre, where also many residents live. Car-sharing parking lots need to be located not only in the city centre, which is certainly the most affected area as concerns traffic and congestion, but also in the more peripheral housing and mixed areas. It is assumed that this would create a higher and more positive demand from those citizens who live in those areas. This way the demand might have more chances of being exploited.

● Raise Commitment by Requesting Admission Fee

Allowing registration as pilot car-sharing user without any (annual or monthly) charges, does in the end not seem recommendable. It turned out that many CarATC users only registered because no admission fee was required, not because they were really motivated and interested in using the service. A low basic fee could sort out those people and cover the costs of regular information services etc. - without creating a threshold for becoming a client.

4.3.2 Future Plans

In the future, the city of Bologna is planning to implement car-sharing as a regular service. This will be achieved - hopefully - within the next two years.

The number of parking lots for car-sharing will be increased from 4 to about 10 locations. Parking lots will presumably be distributed not only in the city centre areas, but also in the periphery. This should allow a higher number of potential users living far from the centre to take advantage of the service in an easier and more comfortable way. The need to catch a bus or any other means of transport to approach the nearest car-sharing location will be limited.

Implementation will also deal with organising a service that can offer its customers a wide and diversified range of vehicle types that can then satisfy users' daily needs and requirements.

It is planned to attract more than 500 car-sharing users within the next 18-24 months. Hopefully, more and more people will benefit from car-sharing in the future. Beside the mobility and ecological benefits, each single user can profit from considerable economic benefits: Buying and maintaining a vehicle is a risk, paying a fee for a car-sharing service only when it is really needed, is a good deal instead, especially for short trips.

The positive results of the TOSCA car-sharing transfer and experiences of the pilot application will be useful and certainly a reference point for the national car-sharing basis. In the near future ATC will certainly assist the development of car-sharing on a national level.

The Italian Ministry of the Environment has allocated a substantial amount of money to the implementation of car-sharing in other Italian scenarios. This co-funding and the 'Iniziativa Car-Sharing', ICS, is a promising opportunity to work on the future implementation of car-sharing services on a larger scale.

4.3.3 Bremen, Bologna and the TOSCA Follower Cities

Within the project the TOSCA 'follower' cities - Barcelona, Bucharest and Strasbourg - analysed the potential of a car-sharing and have all developed car-sharing 'Technical and Business Implementation Plans'. All three cities has with a high car-sharing market potential and are strongly committed to bring forward the idea of car-sharing. Strasbourg has already started car-sharing, Bucharest is aiming to do so as well as Barcelona.

Car-Sharing Barcelona

The City Council together with the Metropolitan Transport Company of Barcelona (TMB) and the Association for the Promotion of Public Transport (PTP) are striving jointly towards a car-sharing take-up.

In order to set up car-sharing Catalunya, there is a need for the collaboration of all social agents: social entities, public administrations and public transport companies.

The success of car-sharing is based on the fact that in this way mobility is considered with respect to the optimal cost/service. For this reason the concept of combined mobility has been introduced, which is set against the traditional vision of a single form of transport. From this new point of view, all transport systems are put on the table before a journey begins: By car-sharing car, public transport, bicycle or on foot.

Car-sharing causes a radical change in the mobility of customers who had a car before entering the system and might have gotten rid of it when they started car-sharing. These people analyse the cost/ service ratio of each trip; the result is that the number of kilometres travelling by public transport is multiplied by four, which shows that the competent authorities (the ATM here) must set up annual public transport season tickets with discount for members of and particulars to car-sharing.

Here some examples how everyone can gain:

- Customers can save up to 500,000 Pts a year in the mobility expenses per family

- Companies can save car parking spaces and their workers are able to prepare their professional activities on their way to work

- Public transport has new costumers that use their facilities intensively

Many of the conclusions of the demand studies that have been made around Europe may be extrapolated to Catalonia. It is estimated that up to 20% of the population might potentially be interested in car-sharing.

These data lead Barcelona to believe that if the initial obstacles inherent to the starting up of any project are overcome, car-sharing is a viable project in Catalonia.

Barcelona background

- Signature of the agreement between Barcelona City Council and the PTP to obtain a first vision and opinions of the car-sharing (beginning 2000).

- Presentation in Sep. 2000 of the comments on the research work carried out in the media to the institutions and public opinion.

- At the end of the year 2000 the PTP organised a trip to Germany, re-presentatives form the public administra-tions, public transport companies and other social agents got informed about car-sharing in practice.

- A second agreement will be signed soon between Barcelona City Council, TMB and PTP, to support the study that is being carried out within the TOSCA Project.

Association for the Promotion of Public Transport offers information at: www.laptp.org
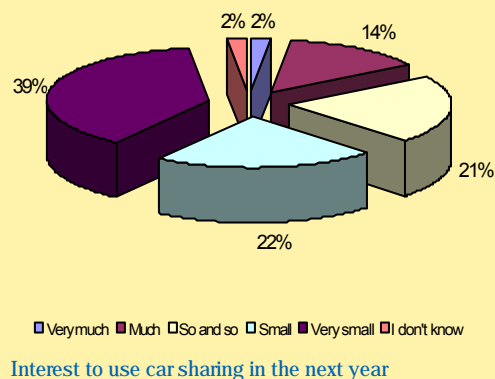
Bucharest Car-Sharing

In Bucharest, different studies and projects have been elaborated within a transport modernization initiative to improve the infra-structure and adapt the facilities to the in-creasing transport demand in the city. Within the TOSCA project study was carried out to find individual solutions for the specific conditions in a major East-European city and transforming economy.

Making car-sharing available to the inhabitants in those areas with a high population density contributes to stimulate a certain social, economic and cultural dynamic. It helps to overcome the limitations that the available urban space poses to an ever increasing mobility rate. The municipality deliberately fo-cuses on car-sharing system as a means to promote environmental friendly transport vehicles that could influence congestion as well as social behaviour. The safety and attractiveness of the system are assured by the development of intelligent communication and data processing systems.
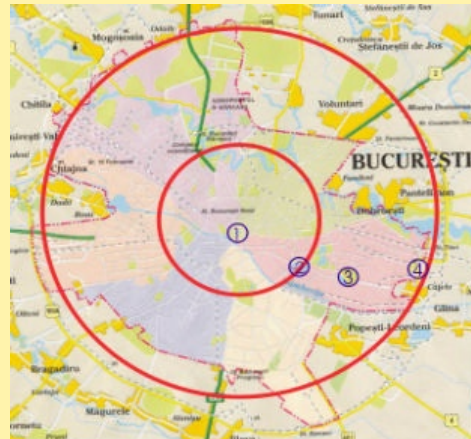
The implementation of car-sharing in Bucharest aims to achieve a number of goals related to the modernisation of the transport system:

- Efficient land use management

- Integration of all transport modes

- Provide answers to the mobility demand

- Improve quality of life

- Create awareness for sustainable mobility

□ Very much ■ Much □ So and so □ Small ■ Very small □ I don't know

Interest to use car sharing in the next year

The study carried out analyses the mobility patterns within the city of Bucharest and its metropolitan area, taking into account demographic, economic, urban and environmental development data.

Based on this analytical framework the study-and demonstration sites in Bucharest have been defined. In order to provide a better understanding of the feasibility of car-sharing the selection criteria were a high demographic density and a high average education level.

It appeared that the number of potential car-sharing users is sufficiently high for the launching of a pilot project. Nevertheless, additional financial support needs to be assured to prevent drawbacks during the start-up of the service.

The economic results of the analysis were so positive so that in coincidence with the initial assumptions the feasibility of the car-sharing system designed for Bucharest has been proved. It is planned that car-sharing costumers will have at their disposal an entire car fleet comprising models with different technical characteristics, from compact cars to sports cars or vans. The subsidies for theorganisation is considered to decrease due to the fact that members pay as they drive. Regarding the environmental impacts it has been calculated that C02 emissions could be reduced by more than 40t if 60 cars (Daewoo "Tico") will be in operation during an entire year.

Car-Sharing in Strasbourg

For 10 years, Strasbourg has implemented transportation means re-balancing policies, achieving a number of results. Now car-sharing appears as an innovative and pragmatic solution for helping transportation means cohabit. Car-sharing clashes with the car as an individualist symbol, and is an assertion of solidarity, of space and resource sharing.

Based on a market survey and on an experiment that shows that car-sharing meets the need and is likely to grow, a new car-sharing system is under consideration. It is based on the rapid setting up of a network of stations and a system based on new technologies.

There are three identified target user groups:

- The inhabitants of central areas and highly populated areas
- The younger inhabitants (25-35 years)
- Public transportation users

A survey has been conducted concerning the location of the car-sharing stations. Two types of stations will be set up :

- Inter-modal stations, in the vicinity of public transportation systems (train, tram etc.)
- Local stations in various areas with high car-sharing potentials. About ten stations will be set up by the end of 2002.
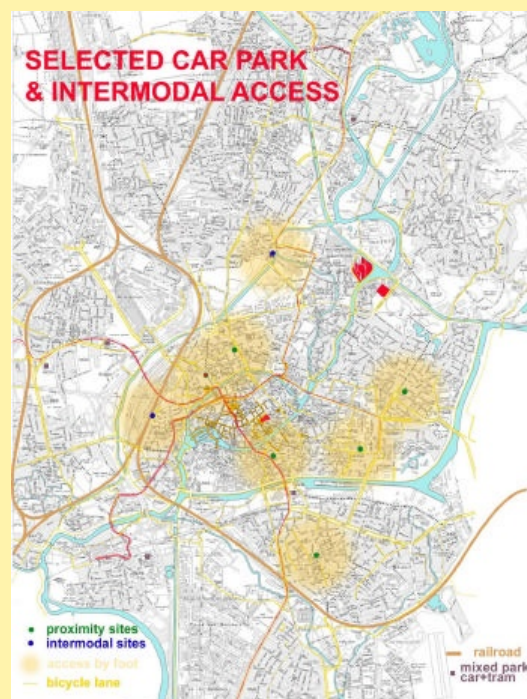
In addition to the concept of city network and meshing, the concept is emerging of a French network, both to offer a networked service and to share the costs associated with setting up a car fleet management system based on new technologies.

Strasbourg, based on the co-operation between public and private partners, plans to establish a network of 50 vehicles in the territory of its city within 3 years.

Obviously, the expected result is a reduction in the number of parked cars, but also a reduction in polluting emissions, based on a shift of transportation structures towards public transportation and other alternative transportation means.

The main expected outcome from car-sharing: To raise the users' environmental awareness and showing that it is possible to move about in an intelligent, environment friendly way in the city of Strasbourg.

More information available in the 'TOSCA - Strasbourg Implementation and Business Plan' and at: www.autotrement.com
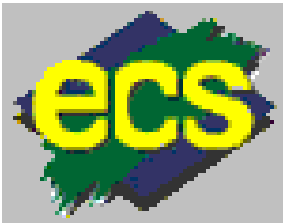

SELECTED CAR PARK & INTERMODAL ACCESS

- proximity sites
- intermodal sites
- access by foot
- bicycle lane
- railroad
- mixed park car+tram

TOSCA related Car-Sharing Internet Links

www.atc.bo.it/tosca/

www.cambiocar.com

www.carsharing.org

European CarSharing

www.carsharing.de

Bundesverband CarSharing e.V. Germany

www.invers.com

www.moses-europe.org

Mobility Services for
Urban Sustainability

www.autotrement.com

Strasbourg car-sharing

www.mobility.ch

Switzerland Mobility CarSharing