TEN YEARS OF THE ZURICH MOBILITY STRATEGY
- LESSONS LEARNED AND OUTLOOK

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ABSTRACT

This paper takes a close look at the Mobility Strategy of the city of Zurich, Switzerland, and reflects on ten years of experience in applying that strategy. After a short introduction with relevant facts about Zurich's situation with regard to mobility, it briefly explains the structure and contents of the Mobility Strategy along with its eight principles and 19 sub-strategies. The achievements attained after ten years of implementation are quite considerable: city-wide low-speed zones in residential areas, a demand-oriented public transportation system, stabilized motorized transport as well as good progress in establishing a mobility culture among the city's population and commuters. This experience shows that implementing a Mobility Strategy is generally not done in large steps but rather with modest yet continuous efforts towards established goals. The 19 sub-strategies of the Mobility Strategy are not prioritized, yet priorities among them must be set on a project level by applying specific processes. In a brief outlook, the future challenges of Zurich's Mobility Strategy are outlined, among them the contribution of the transportation sector towards reaching the city's goal of a "2000 watt society", the increasing conflicts between functionality and quality of time spent within public spaces along with actions to resolve the divergent requirements of speeding up public transportation and slowing down traffic to improve co-existence on public grounds.

1. INTRODUCTION AND BACKGROUND

1.1.   Developing the Mobility Strategy

Zurich's transportation policy in the past has pursued a rather sector-based approach by focusing on each mode separately and neglecting interactions, namely urban aspects or the quality of public spaces.

In 2001, the City Government of Zurich enacted a Mobility Strategy [1] that aims towards a holistic consideration of the various means of transportation, even beyond the city limits. Only a reasonable combination of all means of transportation with their strengths and their optimal range of application will be able to satisfy future mobility demands in a way that is environmentally friendly and compatible with the goals of a liveable and prosperous city. The overall goal is to provide optimized conditions for sustainable urban development in all relevant sectors. Sustainability is hereby viewed as a process that considers the impacts of mobility on a comprehensive scale for all three dimensions (social, environmental and economical). All stakeholders are to be involved in the discussion and decision-making process [2].

1.2. Zurich mobility: facts and figures

Zurich is the largest city and the economic center of Switzerland with 385,000 inhabitants and 330,000 workplaces within the city limits, and it contributes 20% to the country's GDP. Furthermore, the greater Zurich metropolitan area has 3.2 million inhabitants. A mobility monitoring system [3] provides an overall database and updates a variety of indicators on a 2–year cycle. The following facts reflect just a limited selection of the information available but nevertheless give a brief picture of the mobility situation in Zurich.

Every day, more than 1 million people travel across the city limits, more than 400,000 using public transportation and about 700,000 by car.
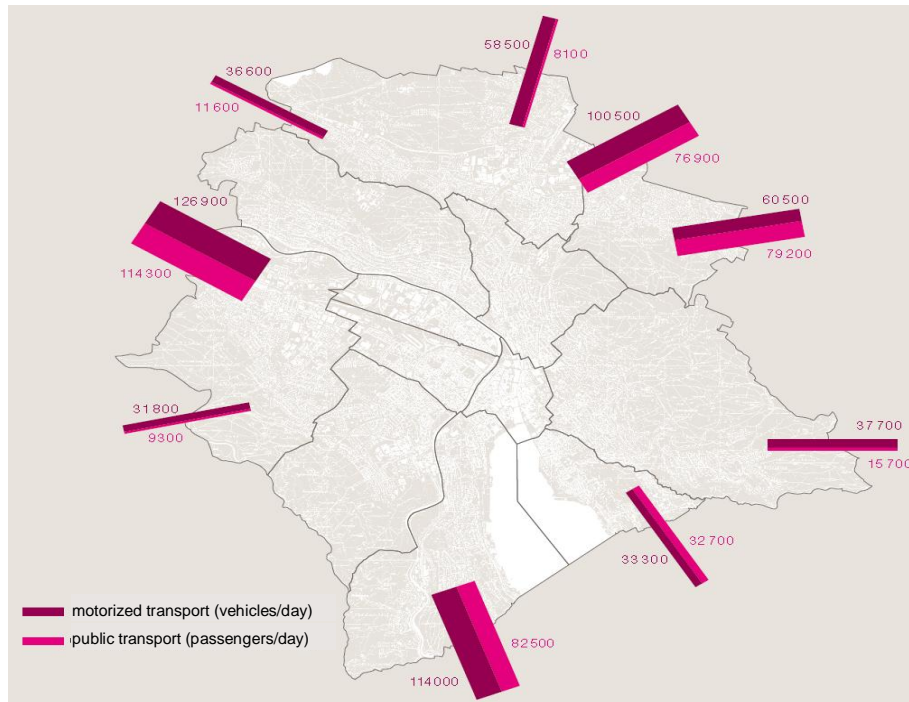

Figure 1 - Trips per day in main corridors across the city border:
motorized (dark brown) and public transport (red) [3]

The overall modal share of trips into the city and within the city by its population shows that about 65% to 70% of all trips are taken by foot or bicycle or result from the use of public transportation.
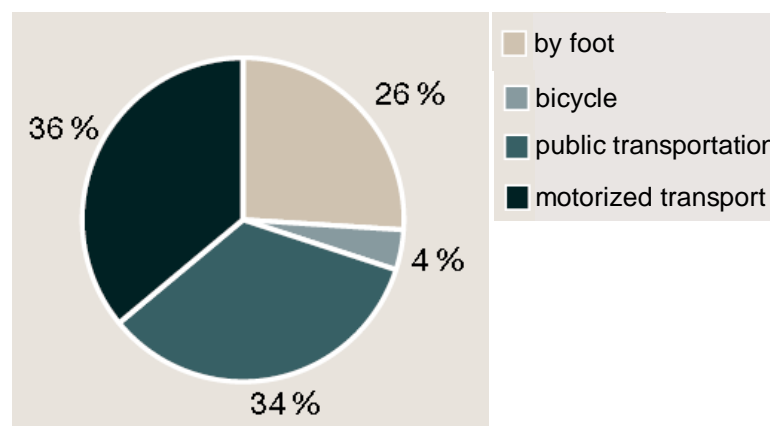

Figure 2 - Share of means of transportation with respect to the number of trips
within the city limits [3]

Despite a comparatively high per capita income, car ownership by the city's population in terms of households is quite moderate, and about 30% of all households do not own a car.
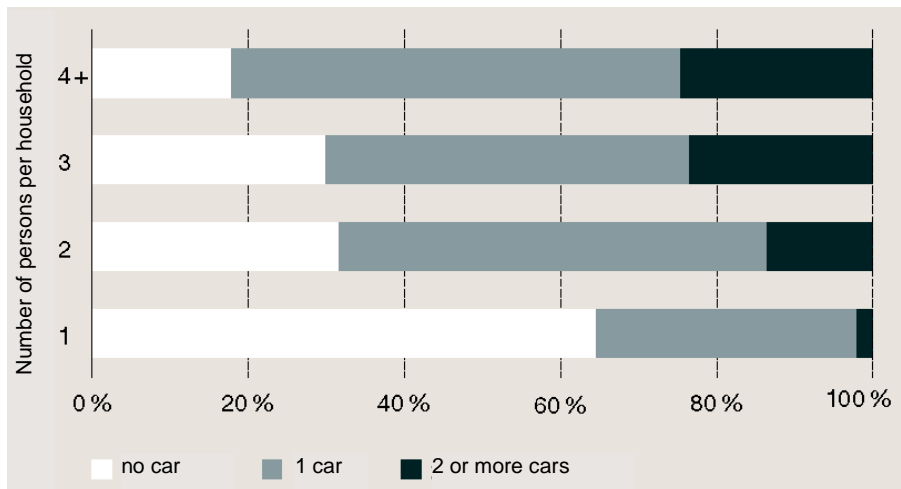
Figure 3 - Number of cars with respect to number of persons per household [3]

In relation to the population, only one out of every three inhabitants owns a car and 40% own a (registered) bicycle.

The use of public transportation is a key factor towards meeting the demand for mobility. The development of the number passenger trips on the regional rail network across the city limits has increased continuously over the last 20 years.
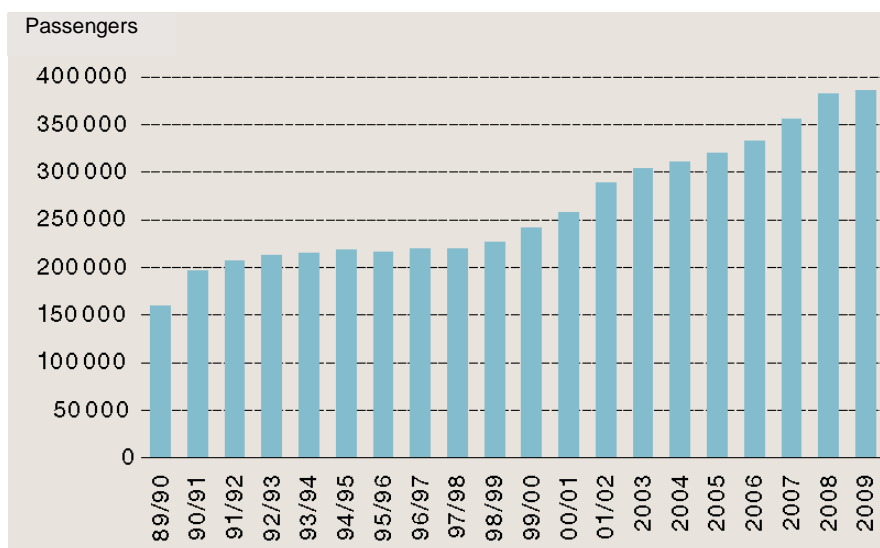
Figure 4 - Average number of passengers per day crossing the city limits by rail [3]

The use of cars in the city has remained static over the last few years despite an increasing number of inhabitants and of workplaces in the same period. Continuous traffic counts on main arteries show a constant number of vehicles.
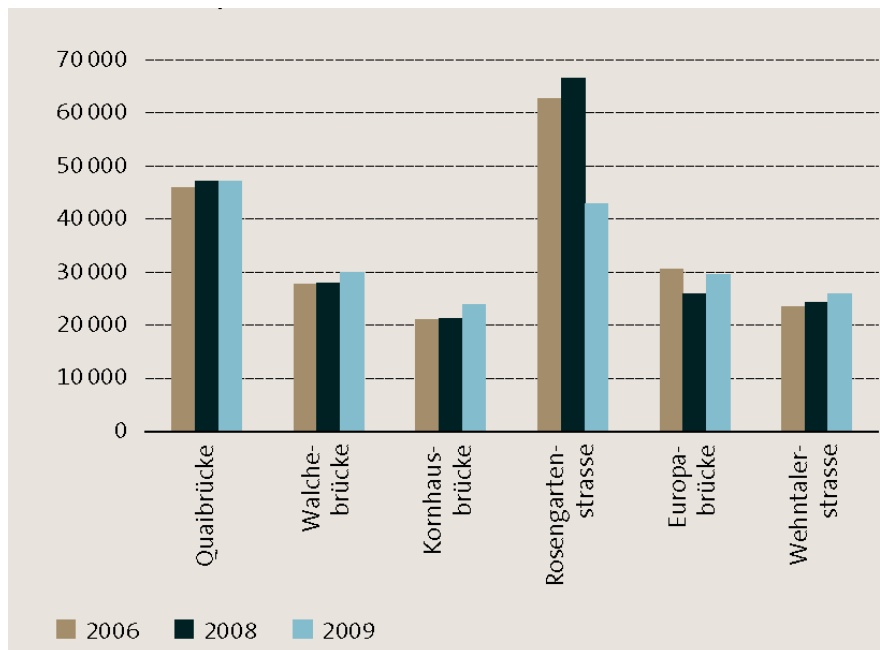
Figure 5 - Vehicles per day on main arteries and bridges [3]

1.3. Objectives and contents of this paper

Based on ten years of experience, this paper reflects on the Zurich Mobility Strategy and its structure, identifies the key factors for success in implementing the Strategy, draws conclusions on the lessons learned, and sketches out the remaining and newly expected challenges for the Mobility Strategy in the future.

2. THE ZURICH MOBILITY STRATEGY – A BRIEF PORTRAIT

2.1. Goals and main areas for taking action

The overall goals of the Zurich Mobility Strategy at the policy level are to provide optimized mobility conditions and thereby promote the city's prosperity in terms of quality of life, economic development, cultural variety, sporting events and tourism. According to the Zurich City Council, all actions are to be aligned within the framework of sustainability, and the impacts of mobility should be considered holistically for the respective three dimensions (society, economy, environment). The goals are described and specified by the following main areas for taking action:
- Optimizing and cross-linking of existing conditions
- Focused completion of infrastructure projects
- Broadening horizons for city-friendly mobility
- Promoting and developing innovations
- Achieving cost transparency and adapting flexible financing

2.2. Principles

These goals were transformed into a transportation policy consisting of a cross-linked grid of eight principles and arranged around a new Mobility Culture in the center.
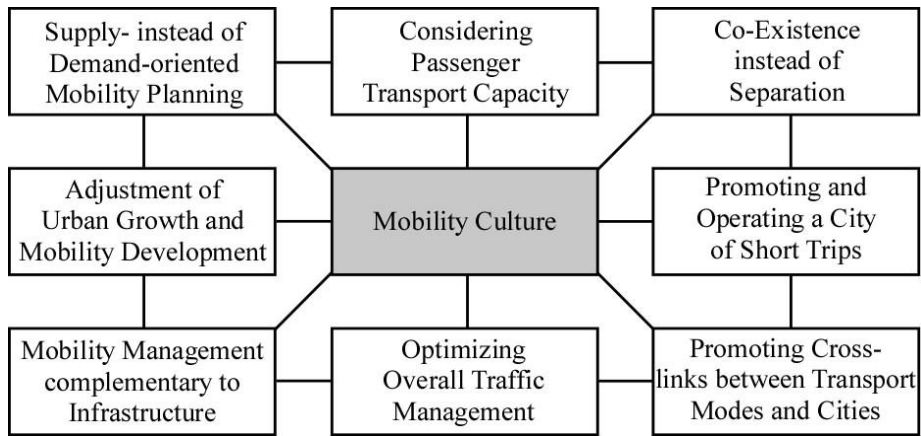
Figure 6 - Eight principles for building a Mobility Culture [2]

For each of these principles there exists a detailed description that facilitates its application and ensures proper interpretation for all parties involved in its implementation.

2.3. Sub-strategies

The goals and principles are implemented through concrete measures in 19 specifically formulated sub-strategies [2]. They reflect the technical and political position of the City with regards to important topics, and they provide a body of arguments that can react to new and actual challenges in transportation policy. Thus the sub-strategies are a rather flexible toolkit that can easily be adjusted compared to a fixed and normative framework. At the same time, this flexibility also has a certain disadvantage in that it does not give clear guidelines for setting priorities among the sub-strategies. The goals, principles and sub-strategies can be visualized as a "house of mobility" (see Figure 7).
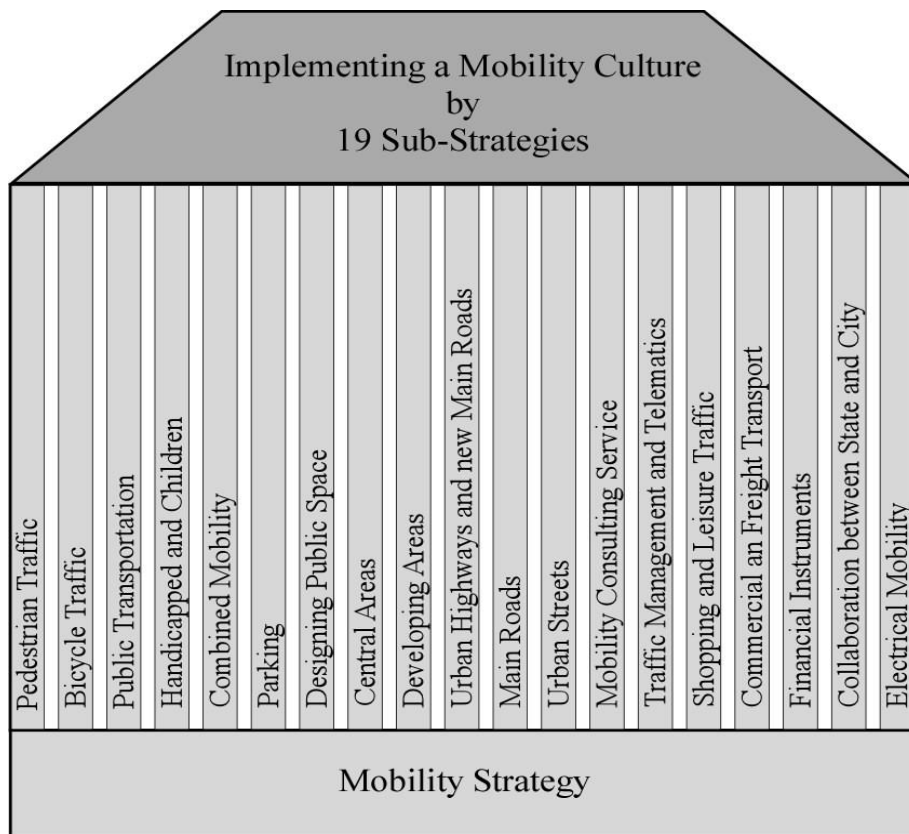

Figure 7 - The "house of mobility" [2]

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2.4. Implementing and controlling the Mobility Strategy

Key factors in the success of the Zurich Mobility Strategy can be identified through its dissemination into daily work and its periodic monitoring with specific tools:
- Status reports of sub-strategies every two years
- Strategic controlling of the Mobility Strategy for key projects every four years
- Continuously performing strategy conformity assessments (SCAs) for major infrastructure projects, identifying deviations and streamlining from the Mobility Strategy. Results of the assessments are evaluated by a well-balanced working group.

3. ACHIEVEMENTS IN THE LAST TEN YEARS

3.1. Overall achievements

Mercer's worldwide Quality of Living Survey [4] has ranked Zurich in the top position for the years from 2000 to 2008 and second (behind Vienna) in the years 2009/2010. One of the categories upon which the total index is based is "public services and transport" in which the main factors for sustainable mobility are considered.

The modal share of local traffic over the last years has continuously shifted from motorized individual transport to public transportation and slow traffic (bicycles and pedestrians). The consequent implementation of promoting public transportation has led to simplified tariff and ticket structures for the public transportation system ("One ticket for all different means of public transportation"). Together with prominent extensions of the public transport infrastructure, passenger frequencies on the public transportation system as well as pedestrian and bicycle trips have increased substantially in the last ten years. In the same period, trips with motorized individual vehicles have stayed at practically the same level.

Figure 8 - Promoting public transportation ("One ticket for everything.") [5]

Air quality in Zurich has improved significantly over the last decade, and substantial improvements in noise protection for residential areas along major thoroughfares and rail lines have been achieved. Even so, noise emissions are still a major nuisance for Zurich's population and will remain high on the agenda for future actions.

3.2. Promoting sustainable mobility behavior

Building and cultivating public awareness of the goals and principles of the Mobility Strategy is done through a vast variety of instruments. They range from innovative products and advertising/commercials to active event management and mobility consulting for companies and schools. Two examples are given in the figures below.
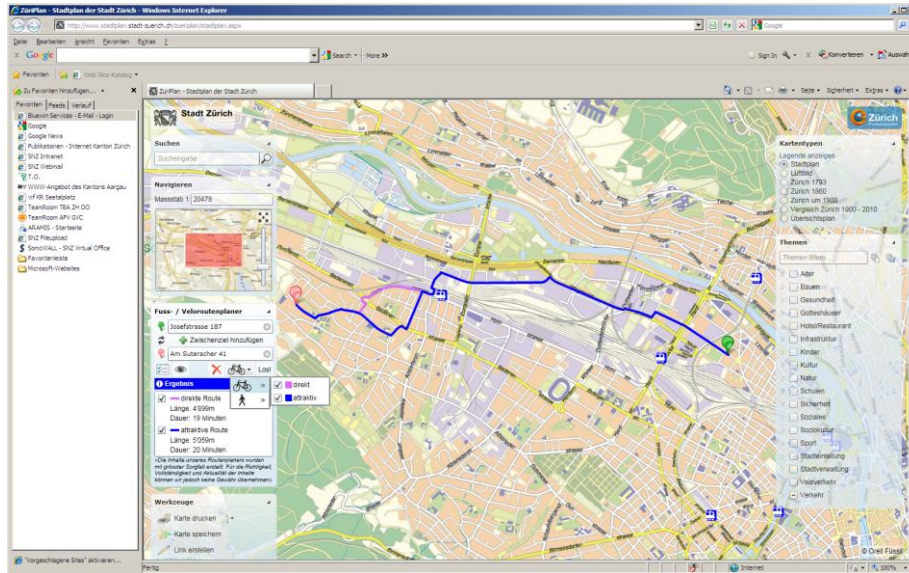

Figure 9 - Interactive route planner for walking and riding bicycles [6]
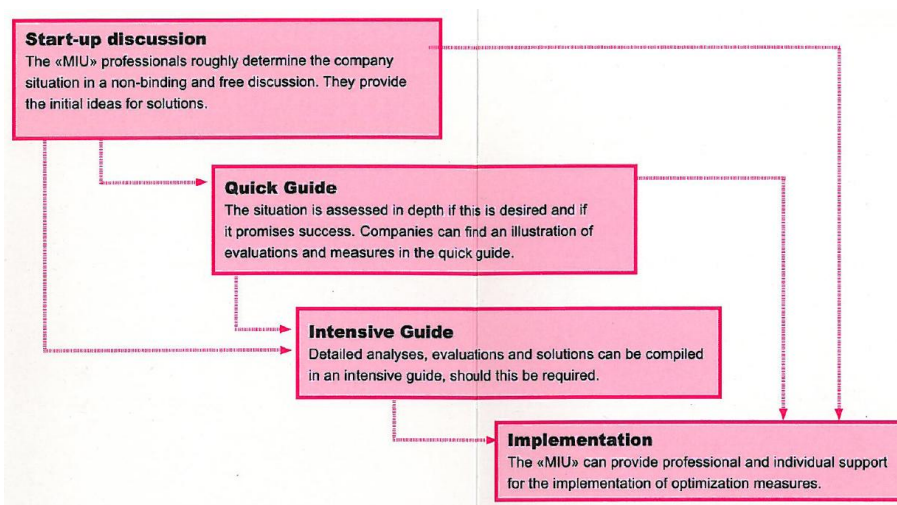
Figure 10 - Mobility consulting process for companies ("MIU") [7]

3.3. Parking – from an historic compromise to parking management

Every trip with a car starts and ends in a parking space. In the late 1990s, the City Parliament made an historic compromise: the number of public parking places in the city center was frozen at the actual level, and for every public parking place built in an underground public parking garage, a parking space within a reasonable distance on the streets had to be removed. The compromise has been enforced to this date.

Furthermore, a number of other instruments and parking regulations were created and applied in the last several years, and they address the management of private parking spaces. For a number of mobility-intensive facilities (e.g. shopping centers, universities, sports stadiums), trip-counting models were developed together with investors and put into effect on a contractual basis. Here a given facility is allowed to generate a defined number of car trips during a certain period, normally one year. The number of car trips is counted continuously, and restricting measures or sanctions are applied when the number of these trips exceeds the agreed upon base level.

Besides a routing system for all public parking garages to reduce unnecessary search traffic, variable parking fees are applied to manage car traffic, and they take into consideration the status of congestion of the surrounding road system. Nowadays and within the city limits, free parking on public property has practically disappeared except in "blue zones" that are reserved primarily for residents.
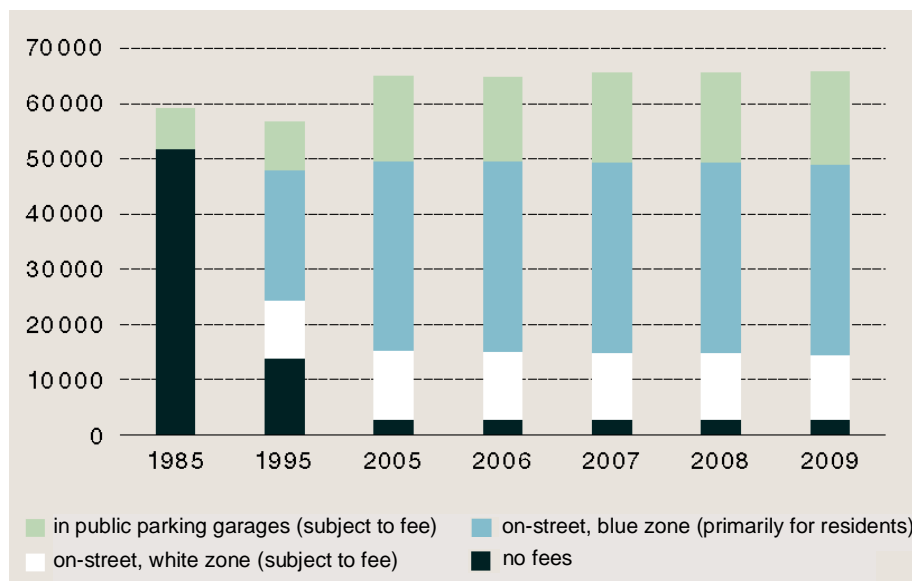

Figure 11 - Number and types of public parking spaces in the city [3]

3.4. Low-speed zones in residential areas

A city-wide program for low-speed zones in residential areas (30 or 20 km/h) was launched in the early 1990s and is now almost entirely complete. Detailed concepts for concentrating car traffic on main roads and specific traffic routing were necessary to achieve public acceptance. Increased safety (especially for very young children attending kindergarten as well as grade-school students), lower noise emissions and much more attractive public spaces were all achieved, thus making an important contribution towards sustaining Zurich as a liveable city for the future.

3.5. Demand-oriented public transportation planning

In contrast to the supply-oriented planning of motorized individual transport, the planning of the public transportation system follows a demand-oriented approach. This means that not only is the capacity of the public transportation system continuously adapted to the growing demand for mobility, but also that there is pro-active planning at the appropriate moment.

In this regard, a new tramway line in Zurich's former industrial West Side will begin operation in December 2011 [8], and it is viewed as a success story for the interactive planning of transportation and land use. The line's design started more than ten years ago at the moment when decisions were made to convert this former industrial zone into a modern business and residential district. The early anticipation of a changing situation opened great opportunities to direct the future mobility in this area towards public transportation and thus foster the continuous modal shift toward environmental friendly means of transportation.

3.6. Improved collaboration among responsible parties

Creating and establishing a Mobility Culture in the consciousness of the various parties involved has proved to be a challenging task indeed, one that will need constant efforts in the future, as well.

The Department of Infrastructure and Transport is responsible for the implementation of the Mobility Strategy; however, this task can only be achieved successfully when other departments with tasks in the public sector are involved in the decision-making processes in appropriate ways. In concrete terms, the Mobility Strategy must be detailed for any specific project dealing with public spaces, be it the design of a new pedestrian zone, the replacement of tramway tracks or road resurfacing.

Therefore, a general awareness of the Mobility Strategy on the part of project managers in the city administration is necessary, and common rules and instruments should be applied. The fact that the Mobility Strategy is backed by the City Council facilitated this task substantially and led to continuous and further training seminars for city employees.

4. LESSONS LEARNED, THOSE REMAINING AND NEW CHALLENGES

Despite improvements in mobility during the last ten years achieved on the basis of the Mobility Strategy, a number of lessons were learned – and we have found room for further actions along with newly discovered challenges. One general finding can be mentioned at the very start: the implementation of a Mobility Strategy is hard work, and it consists of numerous but rather modest steps towards the established goals. It is difficult to achieve large steps or find easy implementations.

4.1. Maintaining efforts for establishing a Mobility Culture

Keeping the public consciousness alive in terms of mobility behavior and preserving a Mobility Culture is by far not just a one-time action but rather a continuous task that must be maintained in the future. The resources required for this task, in terms of finances and staff, cannot be reduced without jeopardizing the achievements gained in previous years.

The respective challenge will consist of keeping up political awareness along with the conviction that we cannot be satisfied with the fruit harvested during the last few years but must also "plant new trees" for the benefit of mobile future generations. The demand for mobility will increase in the future as it has always increased in the past. Early and persistent education in addressing aspects of mobility among different age groups, and finding methods to teach ways for sustainable mobility behavior – especially in light of climate change and limited fossil resources – remain major challenges.

4.2. Mobility Strategy at the project level

As mentioned in Section 2.3, the great flexibility of a toolkit of 19 non-prioritized sub-strategies brings the disadvantage that priorities must be set at a more specific project level. Setting priorities among sub-strategies and finding compromises at the project level have proven to be a very time consuming and exhausting process, and it is often a battle for just a few centimeters. Questions such as "Is a separate bicycle lane really necessary or should the available space rather be used to make the sidewalk wider?" or "Can't one of the two car lanes be converted into a bus lane?" have often resulted in endless debates.

The awareness that the Mobility Strategy needs rules of conduct on a more specific level has led to the development of a transport process complementary to the ordinary infrastructure building process.

The main goal is to ensure that aspects of mobility are continuously integrated along with the definition of any infrastructure project. This new process has just been established, and its future application will show whether the implementation of the Mobility Strategy has thus been facilitated to the desired extent.

4.3. Public spaces: functionality vs. appearance

Public spaces are limited. The implementation of the Mobility Strategy aims to manage traffic efficiently and in a sustainable way, and it thus arranges public spaces in a rather functional manner. Urban planning, on the other hand, strives for a high quality of public spaces in terms of individual perception, aesthetics and recreation. This has to some degree opened up a field of friction and diverging interests when implementing the Mobility Strategy.

In order to solve this basic conflict, it was necessary to broadly analyze the public spaces in Zurich according to functionality, aesthetics, comfort and the quality of time spent there. A strategy for designing public spaces was then derived, and it consists of standards for the design and significance of different places in terms of a clear hierarchy and a checklist to attain a higher quality of time spent there.

The application of the strategy "Designing Zurich's Public Spaces" [9] at the same level as the Mobility Strategy will show to what extent the above-mentioned conflicts can be resolved in the future.

4.4. Financial matters involve an additional player

The City of Zurich is part of the State (Canton) of Zurich, which is responsible for the operation of the national and main roads as well as the strategic planning and operational aspects of the primary public transport network. In this function, the Canton directly or indirectly funds a considerable part of the transportation network. The implementation of the Mobility Strategy often interacts with the primary transportation network, e.g. when traffic is routed away from residential areas to main roads, or when traffic management within the city limits causes congestion on state roads. The financial role of the Canton of Zurich makes it an additional and important player in the city's transportation policy.

As long as the interests of the City and the ones of the Canton are aligned, be it on a technical or political level, solutions to problems that arise are easily found. Divergent interests, however, can lead to time-consuming processes and sometimes deadlocks for

specific projects. Early and transparent involvement of cantonal representatives in major projects has proven to be a key factor for the success of these projects.

5. VISIONS FOR THE FUTURE

Zurich is expected to grow in the near future by an additional 10% in terms of inhabitants and 15% in terms of workplaces, which will lead to a similar growth in the demand for mobility. This raises questions as to whether the Zurich Mobility Strategy is suitable and ready to handle this challenge, or how it needs to be adapted or further developed, and which other visions and requirements for the near and far term exist for the Mobility Strategy.

5.1. Zurich's Transportation in 2050

A review has shown that the Zurich Mobility Strategy with its 19 sub-strategies will be able to meet the requirements and new challenges that will arise in the short- and medium-term. However, in today's times of sudden change and surprising events, will the Strategy be able to react to challenges and developments not foreseen today and in a long-term perspective?

To answer this question, the project "Zurich's Transportation in 2050" [10] was launched, in which three different images of Zurich were sketched out for the year 2050. The three pictures are intended to differ strongly from each other and were roughly sketched out through formative characteristics: "Individuality" (great increase in the demand for mobility), "Resource shortage" (strong decline in the demand for mobility) and "Online and disintegration" (demand for mobility unknown and to be defined). With a great bit of creativity, the pictures were then concretized and described in detail with regard to population, society and values, economy, technology, land use and transportation policy. In order to bring the pictures to life, seven virtual persons from today's world were hypothetically put into the three images and a (mobility) day in their lives in 2050 was written in a diary.

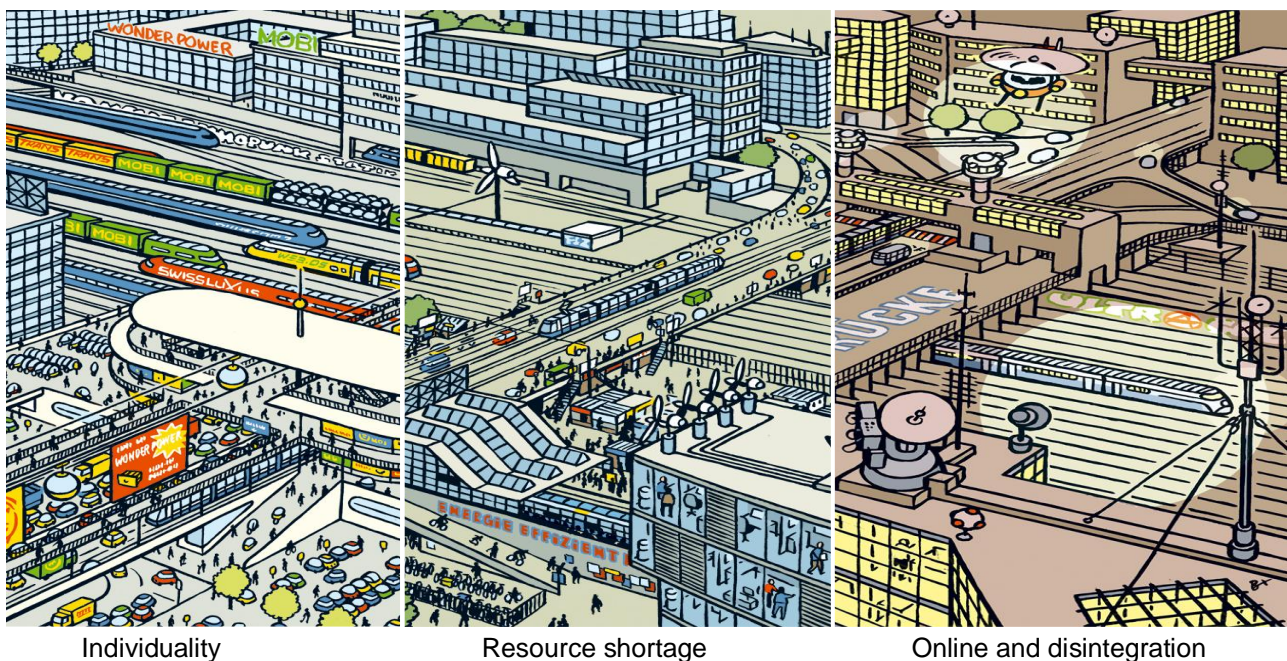| Individuality | Resource shortage | Online and disintegration |

Figure 12 - Future images of Zurich's Transportation in 2050 [10]

Among other things, the findings showed a need for further action in the context of the Mobility Strategy for the following topics:

- impacts of the widespread use of electric vehicles in city transportation
- the possible need and impact of an additional para-transit system above or underground to satisfy the future demand for public transportation
- the need for a monitoring and an indicator system to closely observe actual developments in order to identify which of these pictures reflects the path in which development is moving

5.2. Toward a "2000 watt society" and 1 ton per capita CO_2 emissions

In 2009, the City Constitution was amended with an article and a "contract with the people" to attain the goal of a 2000 watt society and annual per capita emissions of 1 ton of CO_2.

Zurich's actual energy consumption of 6000 watts and per capita emissions of 6 tons of CO_2 [11] give a good picture of the great challenge the city faces in reaching these goals. First calculations have shown that the transportation and mobility sector, according to its share of the overall emissions and energy consumption, needs to reduce its energy consumption by 30% and its CO_2 emissions by 60%. With today's mainly oil-driven car fleet, traffic would have to be reduced by approximately 50%.
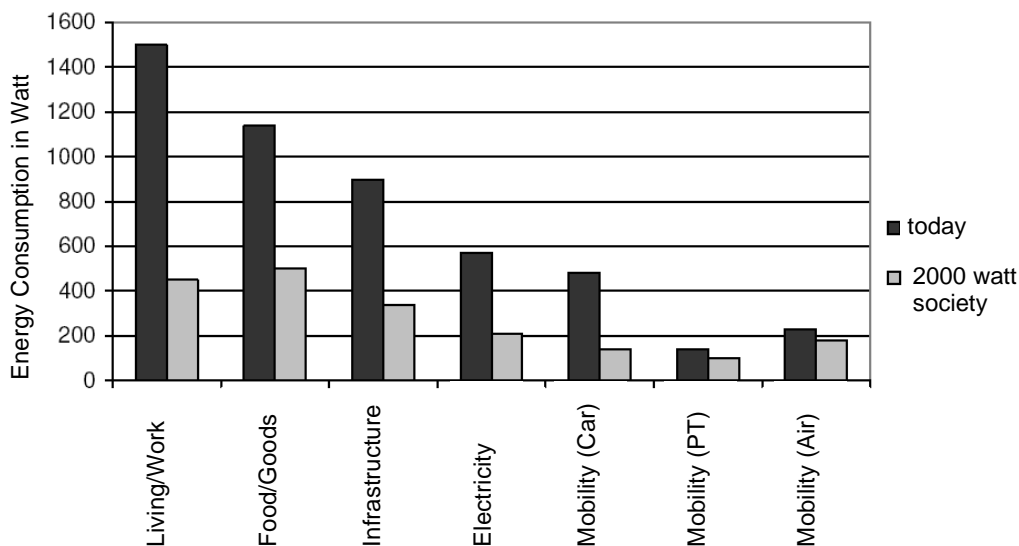

Figure 13 - Energy consumption of a 4-person household today
and in a 2000 watt society [11]

Mid- and long-term strategies and action plans are currently being developed, and the efforts necessary to achieve these ambitious goals and the specific contribution of each citizen of Zurich are yet to be defined.

5.3. Capacity of public transportation

The ever-growing demand for mobility and the aim to shift demand towards public transportation is about to raise fundamental questions of how – or whether at all – the future demand for mobility can be satisfied by existing public transportation systems (rail, tramway and buses). Despite great investments and expansions of Zurich's main railway station and the railway network, the capacities of the feeder and distributing tramway and

bus network in the city seem to be critical. Studies in the near future might show the need to complement the existing infrastructure with an additional public transportation system (possibly above or underground).

5.4. Speed vs. co-existence

Speed of movement is an important factor of transportation efficiency yet also a source of negative impacts such as noise emissions and accident risks. The concept of co-existence of the different means of transportation in public spaces requires a substantial adjustment of speeds, especially a reduction in motorized individual traffic, even on main roads. Since all means of transportation use the same public spaces, this strategy contradicts the aim to speed up public transportation in order to save costs and make it more competitive. These fundamentally different requirements must be negotiated and compromised in transportation planning processes to come.

5.5. Impacts of electrification of car transport

The 19th (and latest) sub-strategy deals with "electric mobility" [2]. Hybrid cars and e-bikes are already established in the Swiss transportation market, and e-scooters and plug-in-vehicles can be expected to be the next vehicle segments to enter the transportation market. However, a vast breakthrough of electric vehicles is not probable in the very near future. Nevertheless, the promotion of electric vehicles serves to offer a substitute to conventional oil-driven vehicles; it can support the reduction of environmental impacts (noise and air pollution) and can contribute to the goal of the 2000 watt society (higher efficiency). It's important to mention that the electricity needed to operate electric vehicles must come from renewable sources (e.g. wind, water, solar, geothermal).

The key requirements for a market breakthrough – availability of vehicles, distribution grids, financial structures – lie beyond the task of the city's administrative body. Even so, the city can support the high-level development at the local level, for instance by supporting battery-charging infrastructures and pilot projects, or by spreading knowledge and information to gain acceptance for electric mobility.

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