Urban transportation
Approaches to improve the traffic situation in urban areas
Urban ecology SE, (WS11/12)
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1_ Introduction

Nearly every city has some kind of traffic problem. The most obvious issue is the increasingly common use of passenger cars (PKW) with the aim of maximal individual mobility. This development is very advanced in the so-called industrialized countries, but also in the new global megacities. As looking at the issues on a global scale would probably exceed the scale of this paper, the focus is set on Austrian and German urban areas. These don't belong to the mega cities of the world, but it is still possible to see how several little actions can have a huge effect on the whole system. So we can assume the strategies that are proposed for following areas, can also work in a bigger scale, with some modification.

I will put the emphasis on regional and communal possibilities, because I think that change and innovation in a national and international scale is often blocked by political barriers and lobby work. I hold that on these smaller scale levels improvements can be made rapidly, some of them relatively cheap and simple, but in connection and addition very effective and powerful. But still I will present some strategies, that base on larger scales, roughly, to show that there are a lot of connections and dependencies between the different administrative layers. Over this work I will show examples of cities that have changed things and show some results to prove the effectiveness of the interventions.

2_ Current situation and development

Traffic affects the health of many people in many different ways. 80% of disturbing noise is created by traffic in Europe. A big problem, also in Austrian urban areas is fine dust (German: Feinstaub), which can cause heart attacks especially to older people. Pollutants, such as nitrogen dioxide can affect the functioning of the lung and have several other negative effects on health and environment. Car traffic causes a lot of deadly accidents. In 2009 34500 people died on the streets in the European Union. In Austria 3% of all deaths are assigned to pollution damage through traffic. This rises costs for health supply. The unfair thing about the health risks is, that even if persons choose to take the bike or go by foot, they can't escape the toxic pollutant and might also get sick. Another factor concerning health problems is the lack of movement, that is connected to the new behaviours in mobility.

Living space and public space are in a close relation to each other. Disturbing factors like noise and bad air push people back into their houses and flats with closed windows. The space outside their private boundaries does not satisfy the demands of many people, so also the responsibility for it and identification with it gets lost.

Currently the number of cars in Germany is 51.7 Mio, which makes 633 passenger cars on 1000 people. In a „business as usual“ scenario of the Umweltbundesamt in Berlin this number rises up to 68 Mio by 2030. So obviously if we don’t change our strategies for mobility, problems according noise and spaceconsumption will get worse. The total traffic load for personal transport will be 77% higher than in 1990 and less people will sit in the cars. New technologies will lower emissions of gases and noise, but that probably doesn’t solve the heavy issues due to the growing armada of cars. (graphs: the development in the BAU-scenario, the amount of people concerned by noise disruption in the EU, the actual costs of cars).

4 http://www.kba.de/cln_032/hr_125264/DE/Statistik/Fahrzeuge/Bestand/bestand__node.html?__nnn=true
5 Dauerhaft umweltgerechter Verkehr Deutsche Fallstudie zum OECD Projekt Environmentally Sustainable Transport (EST), Umweltbundesamt Berlin, 2001. S. 12
6 Dauerhaft umweltgerechter Verkehr Deutsche Fallstudie zum OECD Projekt Environmentally Sustainable Transport (EST), Umweltbundesamt Berlin, 2001. S. 14
3 Strategies for improvement

3.1 Structural and technological, long term approaches

3.1.1 Structures around and between cities, national and private sector

As a pig part of intercity street traffic is caused by trucks, one important step would be, to shift the commercial transport to railways. Railsway infrastructure is much more energy efficient and and causes less pollution. A drastic but probably possible measure is to double the railway system and seperate commercial railway from personal railway infrastructure. If this would happen, both fields could work more efffectively and a high capacity train system could be a strong competitor to passenger car mobility.\(^9\)

In order to make public transportation systems more attractive, it would be nessecary to take several messures. It is important to have good information systems, that work in realtime and can advise the users of delays and alternatives. Another thing to establish is a clear price design whith an uncomplicated ticketing system, maybe in form of some electonic ticketing. A fixed cycle operation system (german: Taktverkehr) could make the complete traveling time shorter, even if people have to change trains. It doesn't make much sense just to make a certain section faster if it doesn't fit into the whole system.\(^10\)

Building back streets means more safety for the surrounding area and lowers the cost for mainrainance. As railway systems are much cheaper to maintain they are a more sustainable and longterm soultion especially for long distances (graphic \(^11\)).

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\(^9\) Dauerhaft umweltgerechter Verkehr Deutsche Fallstudie zum OECD Projekt Environmentally Sustainable Transport (EST), Umweltbundesamt Berlin, 2001, S. 32


3.1.2 Structures inside urban areas regional and communal sector

The separation of functions that has developed on base of a regional planning for the last decades has led to monofunctional areas like „neighborhood in the green“ and „downtown working space“. This implicates spatial distance between living, working, supplying and leisure and forces the use of passenger cars. Appart from that the infrastructure to reach spread homes is very expensive and has to be paid mainly by the community.

On the graph above the number of towns in Austria without food supply are displayed.

The level of motorization is highest in urban sprawl regions.
Not only have the districts become monofunctional, but also the buildings themselves have often just one specific function. This has large influences on the public space, whose only purpose seems to be providing infrastructure for motorized traffic. But these numerous and growing streets have the effect of barriers. Kids in a carfree surrounding spend 45% more of their time outside, and have more friends in the neighborhood (9:2) and stronger social interactions 16.

Another argument that can be brought up in this discussion is the fact, that the society is getting older. The over 75 year old will be the fastest growing group in Austria 17, which will need small-scale, dense structures to have close and cheap supply guaranteed. And the number of persons that can't or don't want to drive a car will be rising. Old people, who are forced to use cars, due to a lack of alternatives, but don't feel quite capable of driving anymore, can be a danger for in traffic.

With the concept of local centralization (german: dezentrale Zentralisierung) the different functions can be brought together again. One approach is, to revitalize groundfloor levels, as an important link between the private and the public.

City centers should try to reanimate their historical character and create attractive space with manifold mix of usage. New centers can be created in residential areas if supply, education and culture is granted within a certain range. Central building projects can help to condense the urban structures even more effective if they are promoted properly. A denser city makes it much more easy to provide sustainable mobility 18.

Compact structures reduce the use of passenger cars in everyday life 19
In Austria, the amount of bicycle traffic in everyday life sank from 10% in 1983 to 4% in 2002, which was probably caused by the level of motorization, but also the lack of bike-friendly infrastructure. With the growing awareness of ecological issues, the bike as a transportation means seems to have a revival and got back to 7% in 2011. 47% percent of covered distances of passenger cars are shorter than 5 km, so the potential for bikes is huge, as we can see in cities of Germany and the Netherlands, where the amount of bike ride distances range from 15% - 20%. Infrastructure for bikes is very cheap to build up and needs a lot less space than streets for cars. Not only the infrastructure for bike riding, like cycling paths, underpasses or bridges are important, but also the parking space for bikes. It is important, that this is close to the residence and provides certain conditions concerning roofing and burglary protection. Laws to obligate such constructions can be made by the city, like in Berlin or Zürich where a 80 square meter flat has to provide at least 2 such spaces. The status quo in Vienna for example, where every flat has to provide a minimum one car parking lot, is very counterproductive and advances the ownership of cars. This commitment is subventioning car ownership, and keeping prices for parking artificially low. One interesting solution was realized in the district Vauban in Freiburg, where collective car garages were built at the border of the residential area. The distance between homes and garage should be at least the same as between homes and next bus stop or station. Like this, public transport and private passenger car are in a fair competition.

Also the connection between bike infrastructure and public transportation should be improved. In Dornbirn the station was renovated in 2004 bearing in mind user friendliness for bicyclists. This modification had the effect of a 46% increase of usage of trains and the number of bikes parking at the station doubled.

The architect Markus Ostertag describes his design like this:

„Buses, the railway and bicycles form a multimodal network at the Station in Dornbirn, Austria. A new design for the square and entry approach area, a Bike & Ride garage with a bicycle underpass and a Park & Ride zone. An innovative concept for multimodal transport, connecting railway, car and bike traffic at one joint intersecting point. Furnishings: waiting boxes, information systems, seating.“

Multimodality and intermodality are an important key factors to an holistic sustainable mobility. It means that people use different means of transport in a certain time (multimodal) or even during one route (intermodal).
The station in Dornbirn with its focus on intermodality and especially on the connection between bike and train\textsuperscript{25}

In the example of multimodal concepts different means of transportation are mixed in a certain time by individuals. If we mix the same means of transportation in a spacial and simultaneous context we might get to the concept of shared spaces.

Shared space advances responsibility and considerateness of individuals and can make infrastructures safer than conventional ones. This concept presents integrative solutions for street space. Streets, other paths, and squares together are considered as living space, where meeting communication and social interaction can occur. Outdoor furniture can structure the new spaces, in which car traffic is a guest and not the driving force \textsuperscript{26}.

\textsuperscript{25} Pictures found on URL http://www.ostertagarchitekten.at/architecture/railwayandbus/dornbirn/
\textsuperscript{26} VCÖ:Infrastrukturen für nachhaltige Mobilität. Wien: VCÖ 2011 (=MobilitätZukunft 3/2011), S. 31
In sprawled urban areas streets are insufficiently equipped with infrastructures for pedestrians. I think this shows a twisted situation in our developed surroundings, because walking is the most basic and natural form of mobility and should have a much higher priority in infrastructure planning.

The graph above shows the number of car accidents with pedestrians in Austria.

The numbers of car accidents with pedestrians is high, even on the footpaths. Speed limit 30 would be one simple and effective measure to increase the safety of walking people. Better organization of red lights and shorter waiting times for pedestrians could bar them from dangerous street crossings due to impatience.

Especially for children and aged persons walking is essential for good growing up and health. Kids have to experience unplanned movements, bumpy paths, sudden running and stopping, getting exhausted, playing etc. to develop certain fine and raw motor skills. In this context it sounds rather alarming that 41% of 5 year old can’t play outside on their own because of the dangers car traffic.

As we see on this graph, the percentage of pedestrian mobility is higher in cities like Vienna. So what can be concluded here is, if the conditions are better and schools and shops are closer together in a multifunctional area, people actually start walking again.

3.2 Regulatory administrative methods, with short- and longterm effects

How can it be possible to reduce traffic in cities without loosing the mobility that modern humans got used to, and how can these solutions be affordable by the cities and the customers? If we have a quick look at what causes a big part of urban traffic problems the answer would be obvious: the private cars. So one self-evident conclusion would be making individual car rides more expensive, to finance more collaborative solutions for mobility. Of course every citizen should still have the right for social contacts and communication, as well as the safe access to goods and services. One counter-argument is that poor people would suffer under the increase in cost for car rides and for this reason lose their mobility. This is an error, because households with low income use cars way less than the ones with higher incomes. This makes the taxation socially fair.

The graph above shows that poor people spend the less money on cars.  

So these concepts of finding new ways of financing public transport and ecological mobility can have two useful effects. On the one hand the rise in cost for car driving will reduce the load of passenger cars, on the other hand an appropriation of the additional earnings could help developing and modernising infrastructure for sustainable mobility as well as financing programmes for sensitization and research.

3_2_1 National control

The road tax sticker (german: Vignette) as it is in use nowadays in austria favours people who drive frequently on highways, which is ecologically and economicaly counterproductive. Taxes in relation to consumption would be a much more efficient tool 33. One idea is to establish a flexible fee system for streets based on CO2 or pollutant production, petrol consumption, driven kilometers, or even day of the week and time of the day. With a temporal taxation, traffic jams at peaks can be eased. If the fees for trucks apply for all roads and not just for highways there will be an additional source of income and the noise polluting trucks keep away from smaller streets that go though living areas34. CO2 limits and other stricter regulations for cars could be standard. At the end of this process only the cars, that are conform to the new requirements get a licence35. Petroleom tax, an engine- and consumption based car tax and road charges can be important sources of income on a national level. Especialy the petroleom tax is connected to actual energy consumption of a person, so it will probably have the bigges effects on its behaviour in terms of saving energy36.

![Diagrams of certain chemicals in the air: Germany](http://elib.uni-stuttgart.de/opus/volltexte/2001/795/pdf/Allmendi.pdf)  

On these diagram you can see, how reglementations could solve certain issues in the past. It shows the power of those political tools.

33 Dauerhaft umweltgerechter Verkehr Deutsche Fallstudie zum OECD Projekt Environmentally Sustainable Transport (EST), Umweltbundesamt Berlin, 2001, S. 29
35 Dauerhaft umweltgerechter Verkehr Deutsche Fallstudie zum OECD Projekt Environmentally Sustainable Transport (EST), Umweltbundesamt Berlin, 2001, S. 29
3.2.2 Regional and comunal control

A general approach of communal control is traffic calming. The aim is to slower speeds for cars in cities down to 30 km/h for example and to create different space layout of streets, for the benefit of pedestrians bicyclists and public transportation. The speed of the neighboring street has a strong effect on social interaction of the people who live there. While in speed 50 km/h areas only 20% know their neighbours from opposite the street, in speed 20 km/h areas this rate lies at 35%. Also the level of noise is much lower and the surrounding automatically becomes a bicyclist and pedestrian friendly place.

Spaces with few or no cars animate people to spend time outside.

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38 Same as before: S. 34
The city maut has several advantages. In cities like London and Stockholm the number of car rides have been reduced by 15 – 19 %, and the gains flow also into public transport investments. For the city of Graz a decrease of 20 % was predicted. 21 Mio Euros of additional income would face only 3 Mio Euros of additional costs, and the savings in domain of accident- traffic holdup- health- and car producing- costs would even be way higher.

Stockholm started its congestion tax in 2005 and as we can see on the graphs the results were rather good. (Graphics: above, below)

A reform of parking space organization can have very big effects. If a city reduces the area for parking cars or raises the prices for parking, people will start thinking about using their car or choosing a less stressful or expensive alternative. In Paris parking space was reduced by -8.1% from 2003 to 2007, what led to a reduction of car use of -10.1% and an increase of public transport usage of 21.7 percent 45.

Carsharing presents a more sustainable solution involving passenger cars, than conventional car ownership, and makes it possible for carfree households to use passenger cars every once in a while. A car in Germany gets used during 40 min a day, more than 23 hours it just stands somewhere, taking away precious space. Using the concept of carsharing can replace 4-8 cars by one shared car. Usually Carsharing participants design their mobility more consciously and use more public transport and bike. Many of the users are young and couldn’t afford new, economic cars, so through Carsharing the potential of these new effective engines unfolds earlier. Carsharing can and should be supported by the cities, for example with special parking lots only for shared cars. This happened in Amsterdam, that has a big parking space problem. The Carsharing-provider Greenwheels has 310 reserved carsharing stations all over the city, most of them quite small but in a dense network that creates a good reachability by foot 46.

4_ Conclusion

As I tried to show in this work, there are numerous possibilities on a small scale level to change urban mobility. Some of the approaches are more expensive than others and some need a political backbone to have the possibility to evolve. Every city has different potentials and should choose the right strategies from a large catalogue, that is allway in development. But the goals of all different tactics should be the same and determined by a higher level of administration, like the state. Certain modal splits could be national guidelines, that are addapted to the regional potentials. Regions and cities should have the freedom to choose their specific way reach the goals and maybe try out new ideas.