

MULTIMODAL ROADS AND INFRASTRUCTURES ADJUSTED TO TRANSPORT AND SETTLEMENT PLANNING PRINCIPLES

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- Member of the association of Austrian scientists for environmental protection
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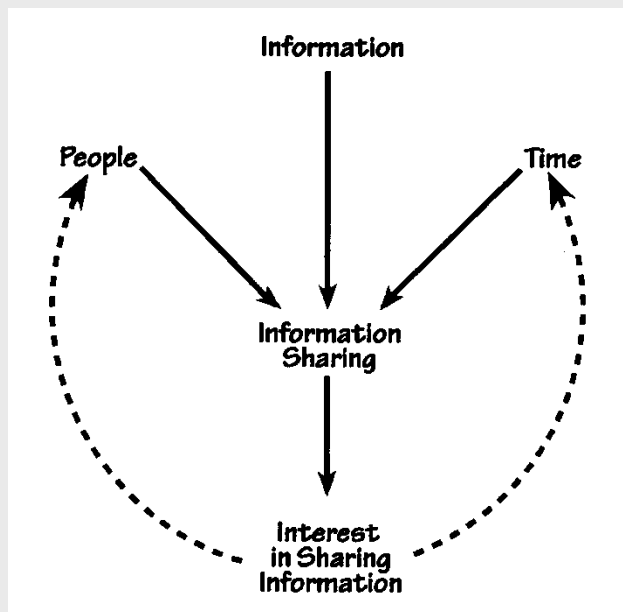


- Variety and cooperation (various solutions for similar duties)
- Maximum efficiency with a minimum of energy amount
- Self-control (control of growth by feedbacks, control of inner-executive values, self-organization, any positive causal loop will be confronted with a negative causal loop, selective fight against exponential growth)
- Recycling, closed causal loops
- Complex, long life-cycles
- High grade of information
- Network of stabilizing self-regulating interactions
- Regionalization (local and regional optimized system parts forming the whole system)

Source: Ecology - Ecologic Principles



- ⇒ **COMPLEX SYSTEMS REQUIRE INFORMATION TO KEEP THEIR SYSTEMS IN BALANCE**
- ⇒ **SYSTEMS CANNOT EXIST WITHOUT INFORMATION**
- ⇒ **INFORMATION SERVES THE INTERNAL CONTROL OF A SYSTEM AS WELL AS THE SURVIVING OF THE SYSTEM AS A WHOLE**
- ⇒ **INFORMATION MUST WORK BY A EFFICIENT FEEDBACK SYSTEM**



The Informal Information System
(dotted arrows represent feedbacks)

MULTIMODALITY

Car



Cultural Land
commerce and craft
try
s
and

Pedestrian



Bike



Bus

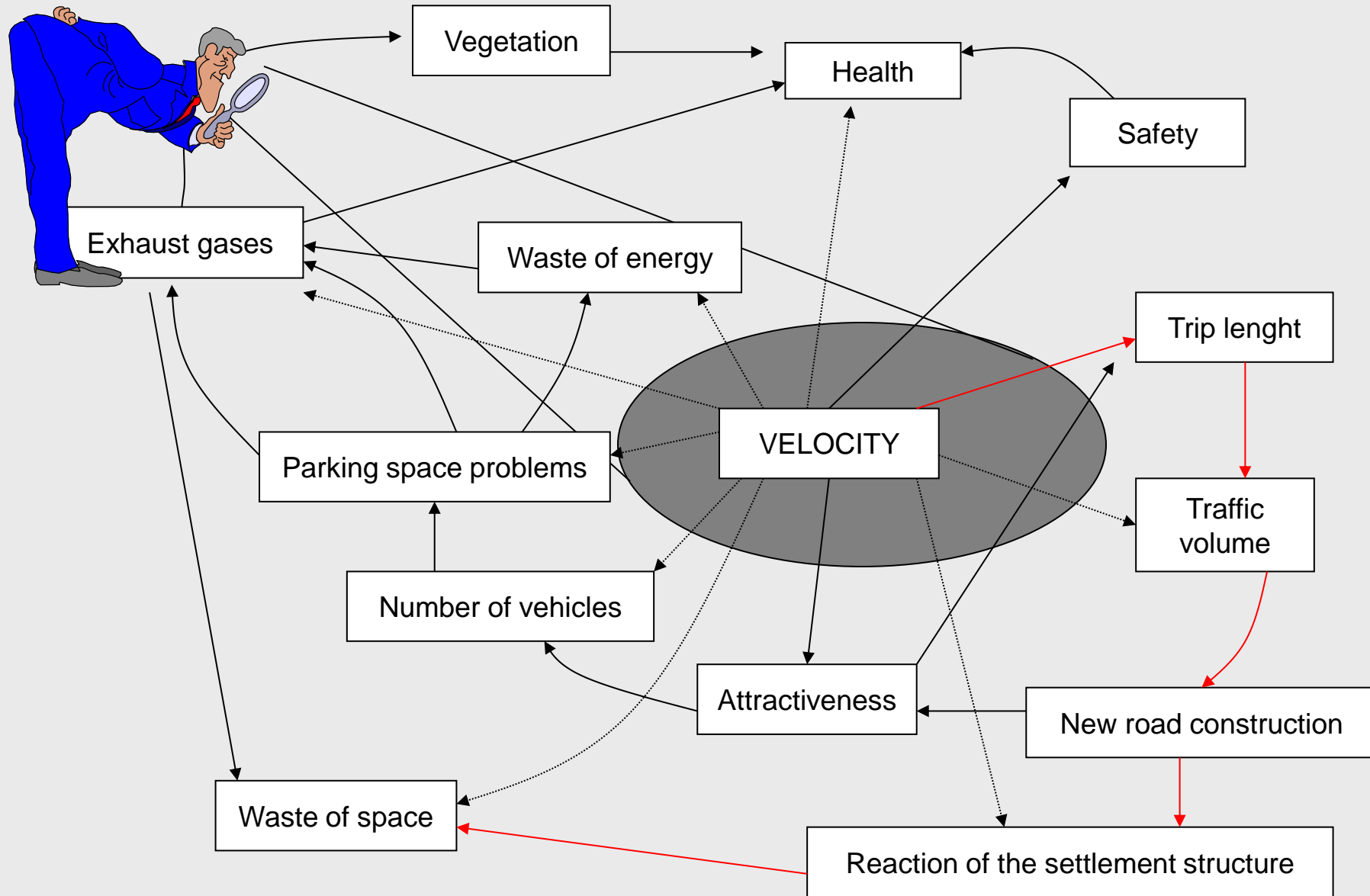


Tram



Metro





SYSTEM THEORY dealing with

SYSTEM EFFECTS

Identify intelligent KEY - Indicators

Constants and **Variables** in a System of
Feedbacks and Side Effects

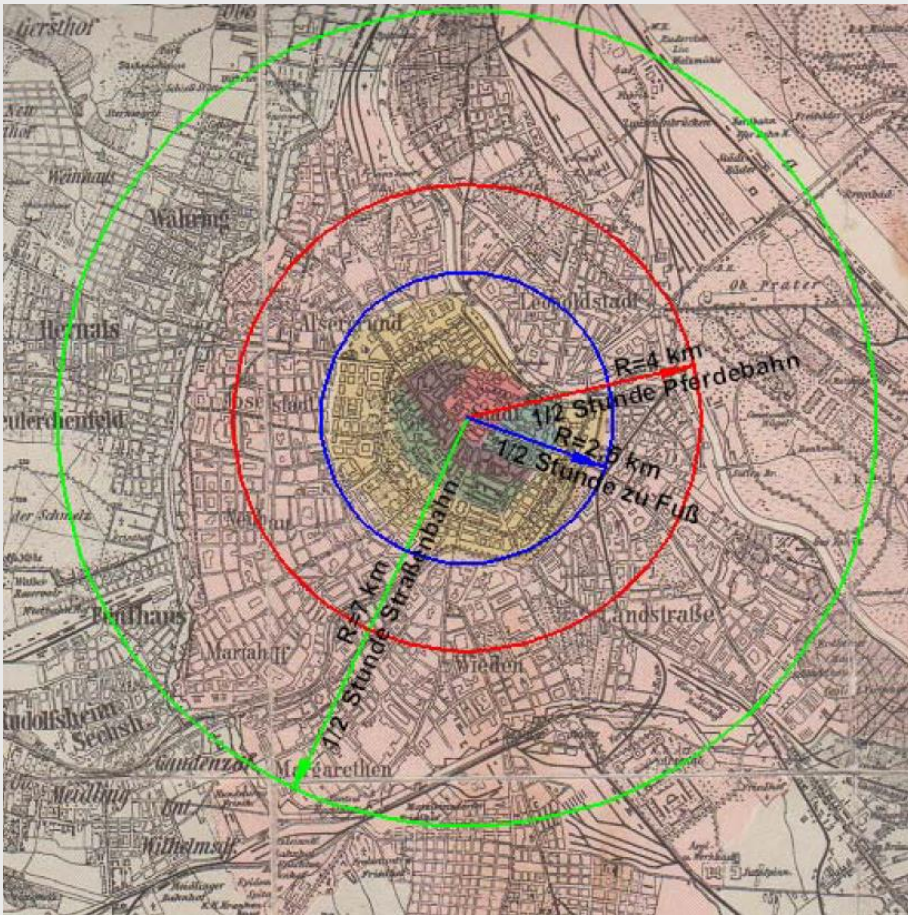
SYSTEM BOUNDARIES

Limited Resources (Global \Rightarrow Individual)

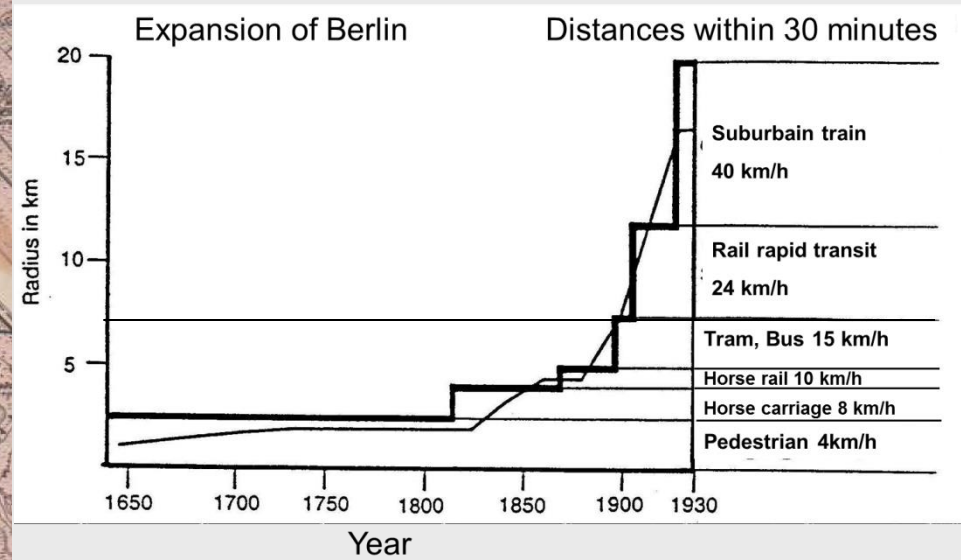
Flux balance in an ecologic sense



SETTLEMENT STRUCTURES AND DOMINANT TRANSPORT MODE OF THE ERA



Vienna



Berlin

Different Cities – same Result

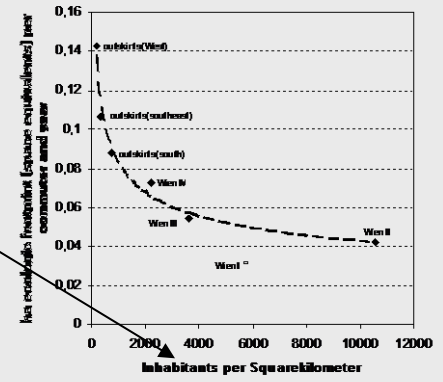
Source: Examples of an Europeanwide survey





Problem: planners design the environment corresponding to the most important transport mode of that time.

Ecologic Footprint (Space equivalents) for different groups of districts of Vienna and Viennese outskirts.

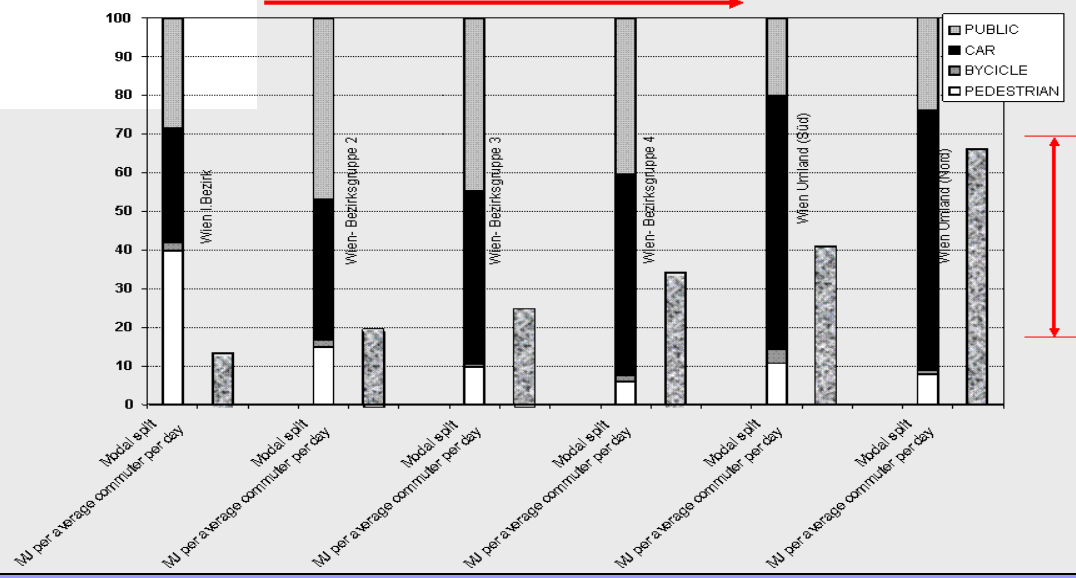


Vienna figured upside down

Increasing Distance from the center →

Districts grouped by distances to the center

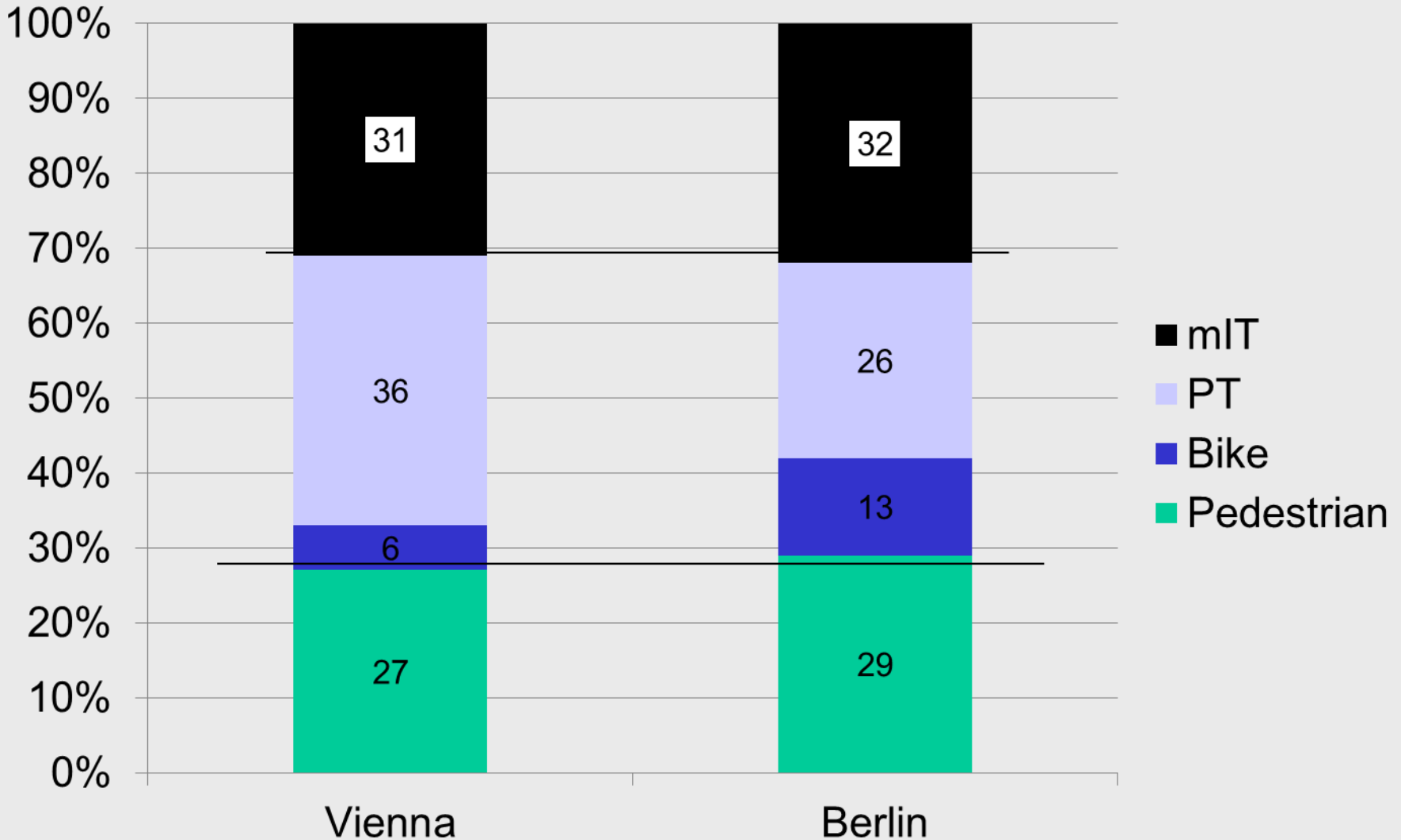
Changing Structures – Increasing necessary amount of energy (up to 400 Percent)



+425 %



Modal Split



CONSTANTS AND VARIABLES OF MOBILITY

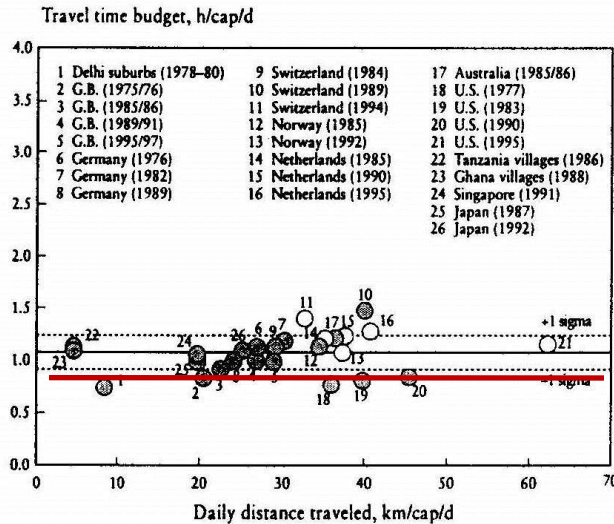
CONSTANTS

- Travel Time Budget
- Mobility

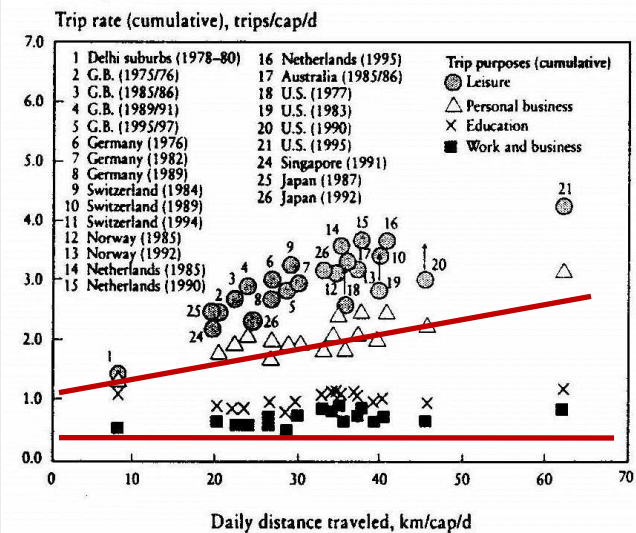
VARIABLES

- Modal Split
- Trip Length

a: Travel Time **TRAVEL TIME BUDGET**



c: Trip Rate **MOBILITY**



Source: Schafer 2000, homepage; US Ministry of Transportation

There is **no increasing Mobility!**

The number of trips is a constant.

There are only changes in forms of mobility – from one mode of transport to another (modal split)

There is **no Time Saving** by increasing Speed

Peoples travel time per day is a constant (about 60 to 70 minutes per day). Therefore: Increasing speed only leads to increasing trip distances

MECHANISM

- Feedbacks
- Closed Loop Control
- Knowledge of human behaviour

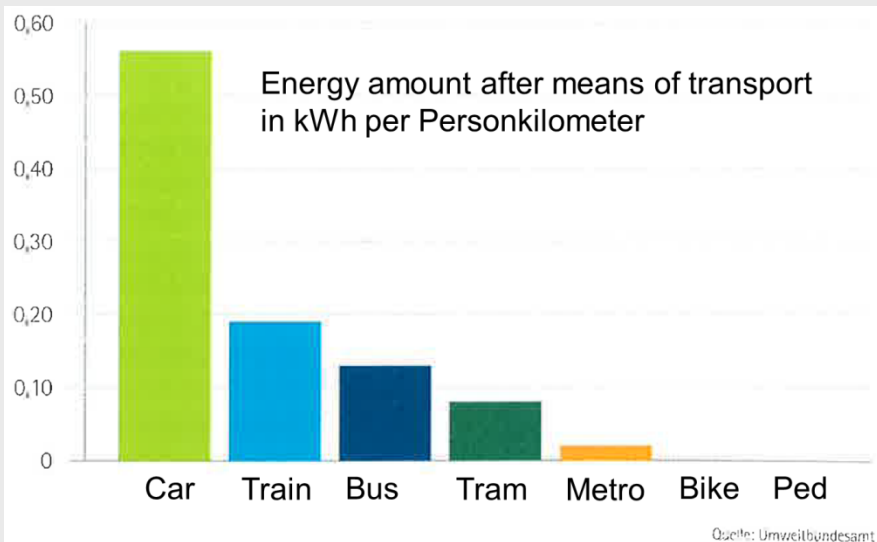
Main Targets

- Comprehensive Transport Policy till 2025
- Including all means of transport and traffic carrier
 - Cooperation of all participants (Federation, Provinces and Community)
 - Traffic and Mobility
 - Reduction of emissions, Accidents, Consumption of resources, Waste of Space



Transportation System shall be

- More social (affordable, tailored to suit, barrier-free),
- safer



- More environmentally friendly (CO₂, particulate matters, NO_x)
- and more efficient (eg. Reduction of energy consumption, Reduction of travel time in railroad traffic)

Other measures

- Synchronized Timetables (inkl. Buses,...)
- Consideration to different requirements Barrier-free, Accessibilities, gender adapted
- Environment protection (Elektromobility, Shift of goods from road to rail)
- Verity of costs
- Noise Reduction
- Settlement Structures (50% of new buildings within 500 m of existing and projected stops of PT)



- Increasing Efficiency of the current Infrastructure
- Avoidance of Congestion
- Combination of advantages of modes of transport (Rail, Road, Bike,) heading for a integrated Concept (Modal Split)
- Increasing of Traffic Safety (Reduce Accidents and Congestion)
- Reduction of Environmental loads by control of traffic and Driving behaviour (e.g. Eco Drive - System)

Source: Wikipedia



- Smart City Vienna stands for “intelligent City”, intelligent, innovative and sustainable solutions
- to reduce Energy Amount and Emissions by Integrated Strategy and intelligent Technologies without losses of live quality, comfort and mobility
- Smart City Vienna has to be seen as a constant growing dynamic Process
- Efficient and sustainable use of ressources like energy, Transport infrastructure, (public) road spaces but also knowledge and data.
- The smart approach stand for the connection of innovative (information) technologies and the knowledge of people and companies intelligently

USERS OF A SYSTEM

- are acting rational (optimizing ones own benefit)
- Information (in this respect): How to get best, cheapest, quickest, most reliable from point A to point B, raise ones own profit
 - Traffic information systems are trying to optimize these demands

PLANNERS OF A SYSTEM

- Have to create and design an environment in which sustainable behavior and motion will be „rational“
 - Information (in this respect): Behaviour of the system, Constants (e.g. mobility, daily mobility time budget), and variables (e.g. Modal-Split, Daily trip length)

THERE IS A FUNDAMENTAL DIFFERENCE BETWEEN INFORMATION DEMANDS OF USERS AND PLANNERS



Indicators

- Values, symbolizing the state of a greater system network
 - Reducing the complex reality to a few values,
(which part of the truth will be cut away depends on the assessment of the developer)
 - orientated to human needs (or greeds?),
- Adaptable to changing conditions (societal, economical,)
 - must be at least compareable on different levels
 - must be sensible to a minimum.

Special problems are given by **determining indicators of Sustainability**

- The reasons are given in a lack of consciousness for borders of development
„Distance-to-target Indicators“
- Sector-crossing key-indicators must be found. A division of indicators analog to the „Brundtland Report is not helpful.
- First of all the connections and feedbacks must be clear. These must be judged by their strength
- Ideal key-indicators are always combined indicators *„Linkage -indicators“*.



THANK YOU FOR YOUR ATTENTION

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