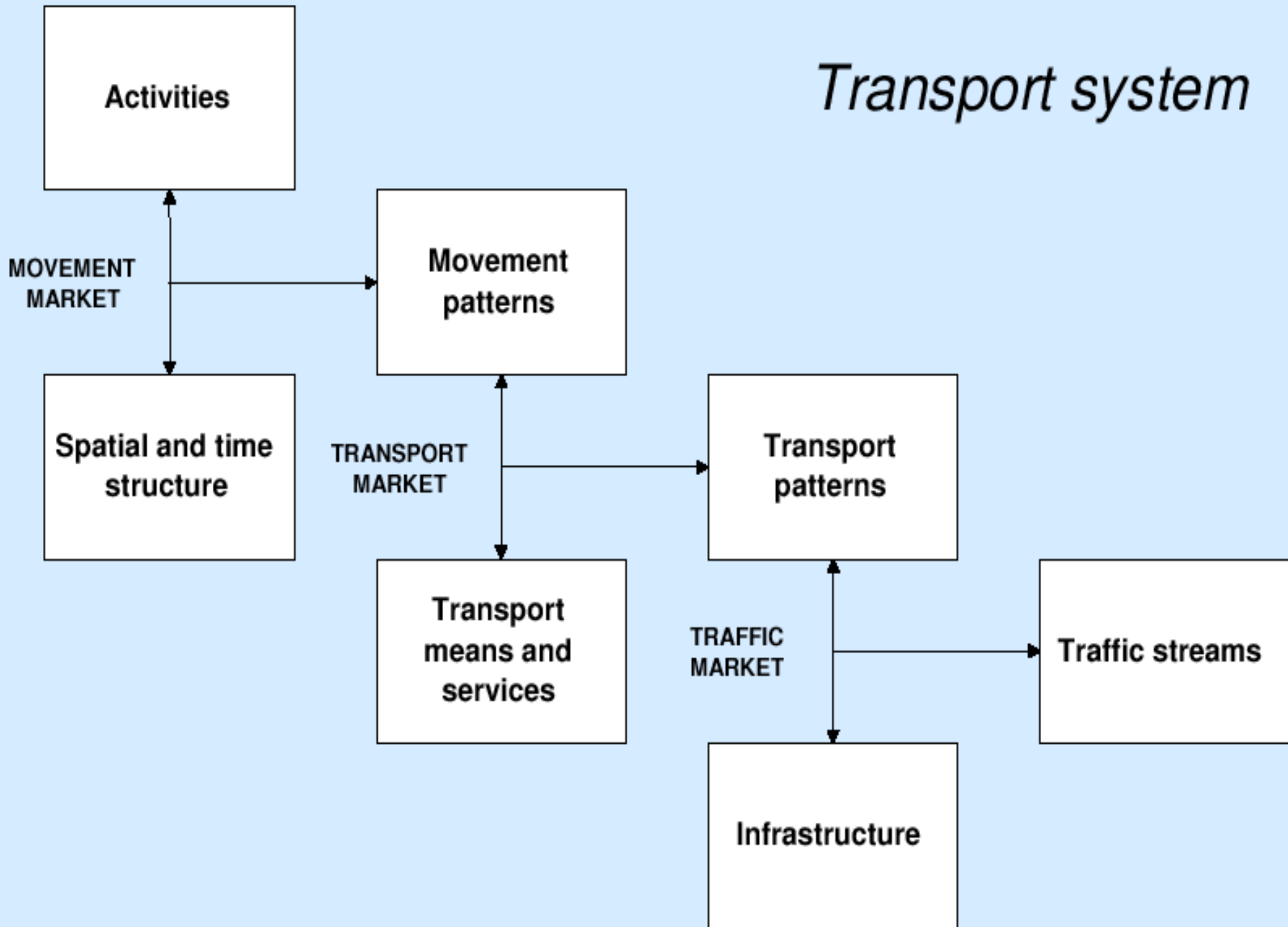


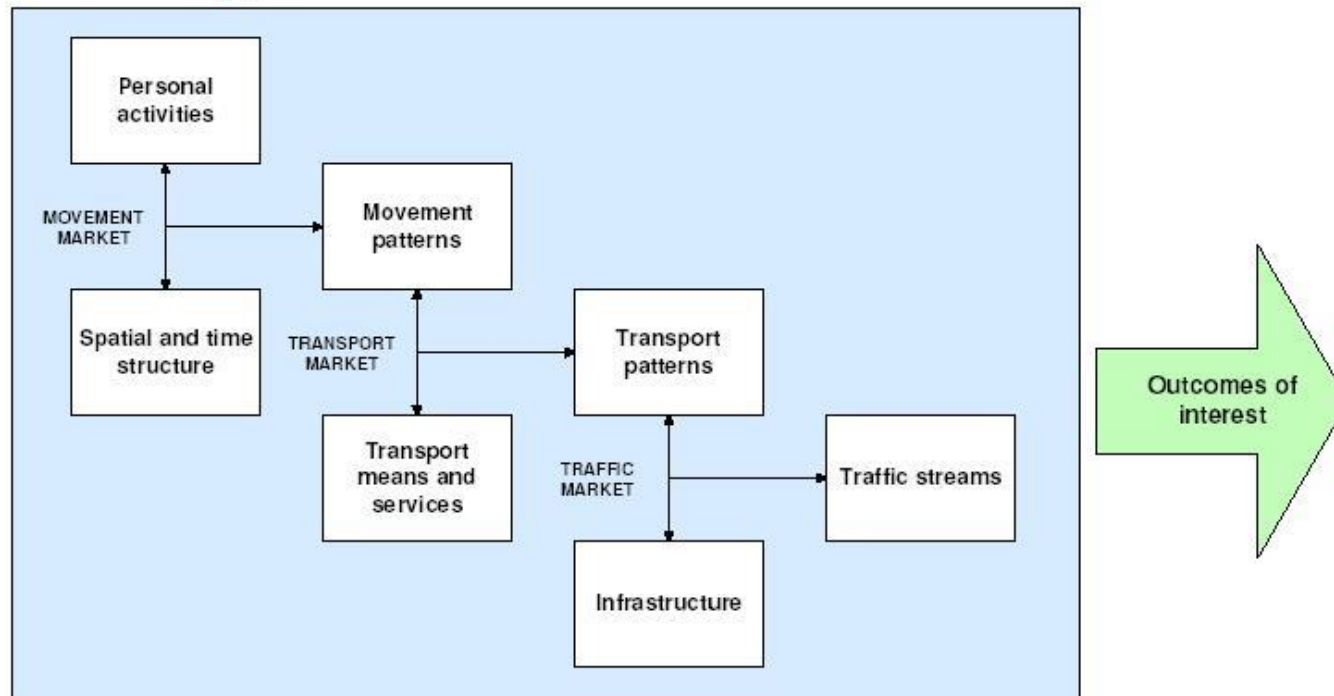
ENVIRONMENT IMPACT OF TRANSPORT

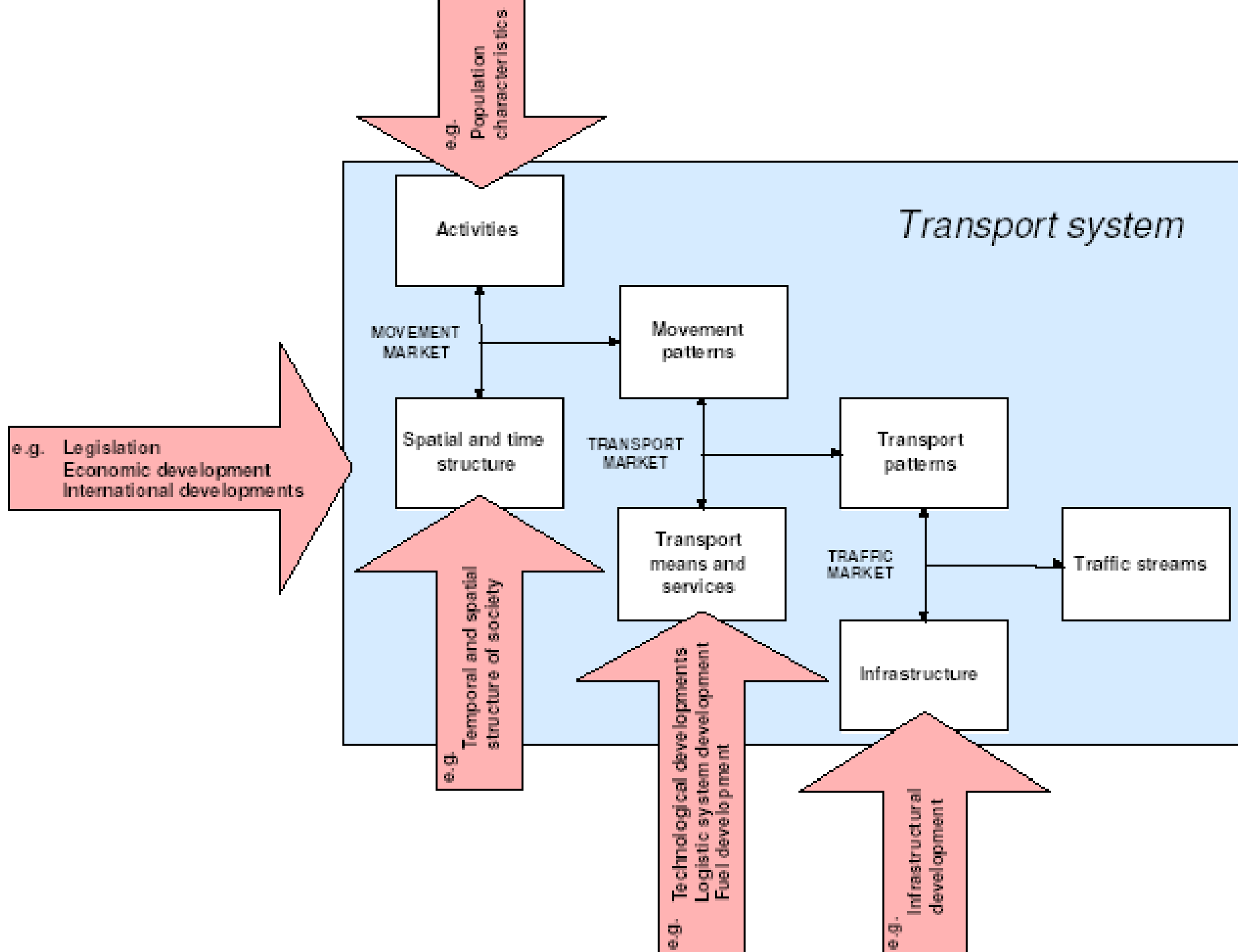


Transport system



Outline





Transport Market Outcomes

Economic Outcomes	Environmental Outcomes	Social Outcomes

Negative influences of traffic

➤ Emissions

- Producing traffic means
- Construction and operation of roads
- Colours and paint coat of traffic signs
- Chemical de-icing materials
- Abrasion of tyres and surface of road
- Fragmentation of landscape
- Storage and transport of fuels
- Transport of dangerous substances
- Land use

Negative influences of traffic on different levels

- Global (contribution to greenhouse effect)
- Regional (damage of vegetation, acid and nitrogen deposition)
- Local (direct pollution, noise, pollution of soil and water, barrier effect)

Traffic emission

- Exhaust gasses contain many chemical substances in different concentrations with effect on human health
- Toxic, genotoxic and mutagenic effects
- Mass unit of air pollutants from road traffic is 10 times higher in cities and big agglomerations in comparison with air pollutants from the other sources (industry)

Contamination of the air by emissions

Pollutants

- With limits: NO_x , CO , SO_2 , PM
- Without limits: CO_2 , N_2O , CH_4
- Others: PAHs, PCDDs, PCDFs, PGE(Pt, Pd, Rh), phenols, ketone, tar, benzene, toluene, xylene, 1,3- butadiene

Negative effects of selected pollutants

- Greenhouse effect (CO , CO_2 , CH_4 , N_2O)
- Respiratory disease (NO_x , SO_2)
- Toxicity (benzene)
- Mutagenity, carcinogenity (PAHs, n-PAHs, aldehyde)

Impacts on human health caused by transport

- NO_x : Damage to respiratory tracts (bronchitis, asthma, whooping cough, lung diseases) ¹
- CH: Irritation of mucous membranes, carcinogenic¹
- SO_2 : Irritation of skin and mucous membranes, respiratory trouble¹
- CO: reduces oxygen uptake in blood (dizziness, headaches, nausea)¹
- Noise pollution: irritability, nervousness, damage to hearing, disturbed sleep, circulatory disorders, high blood pressure, risk of heart attacks²
- Soot and VOCs: carcinogenic

Trends and prognosis of emissions

- Limited emissions decrease excepting particular matters, which have variable trend
- The main problem - greenhouse gasses and POPs: In these cases, measures (catalytic converters, promotion of public transport, emission limits EURO, etc.) do not manage the rapid increase of transport performance especially in road traffic

Traffic influences on human health

➤ Direct

- Noise, air pollution, accidents, annoyance

➤ Non-direct

- Restriction of active transport means
- Restriction of spontaneous motional activities
- Epidemiological risk of international mobility
- Restriction of social contacts

Influences of noise on human health

- Acute effects: stress-defence
- Increase of blood pressure
- Accelerated pulse
- Contraction of blood-vessels
- Increase of the adrenalin level
- Loss of magnesium
- Effect on psychics - tiredness, depression, annoyance, aggressivity, unwillingness
- Decrease of performance, memory, attention

Influences of noise on human health

- Chronic effects: civilization disease
- Fixing acute effects
- Origin of hypertension
- Damage of blood-vessels
- Decrease of immune ability
- Feeling tiredness
- Existence of civilization disease is direct rule of noise

Physical inactivity

- Significant health problem
- Estimation:
 - - Takes part in 1.9 million of deads and 19 millions DALYs (disability adjusted life years)
 - - Takes part in 10-16 % of events of breast and bowel carcinoma, diabetes and in 22% of ischaemic heart disease
 - - Share of deaths, where physical inactivity takes part is about 5-10 % with important subregional differences; that is around 600.000 a year, what is approximately 5 times more than due to traffic accidents

Travel trend in Europe

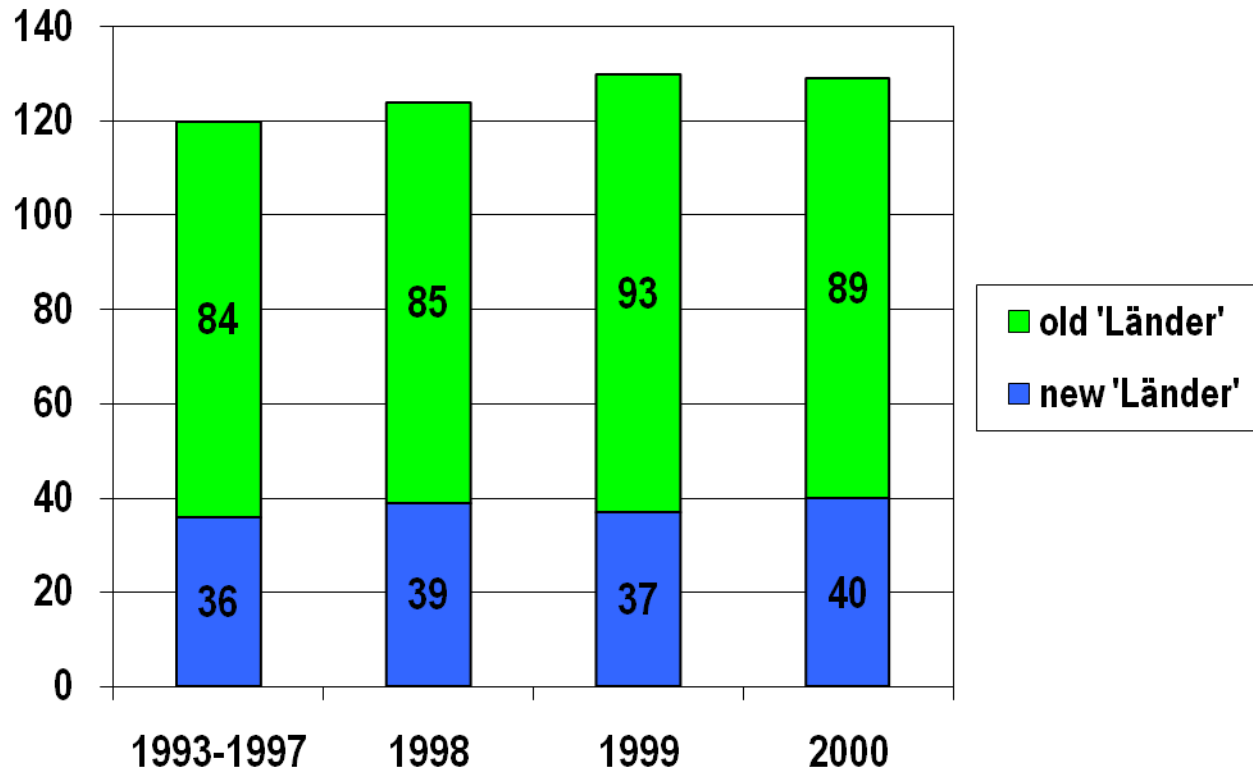
- More than 50% of car journeys is shorter than 5 km that's 15 minutes by bicycle
- More than 30% of car journeys is shorter than 3 km that's 20 minutes of walk
- During one day, an average European living in a city:
 - Rides a bicycle for 0,5 km
 - Walks 1 km
 - Travels by car a distance of 27,5 km

Factors that influences the choice of traffic

- Availability
- Speed
- Comfort
- Pertinence

Land consumption

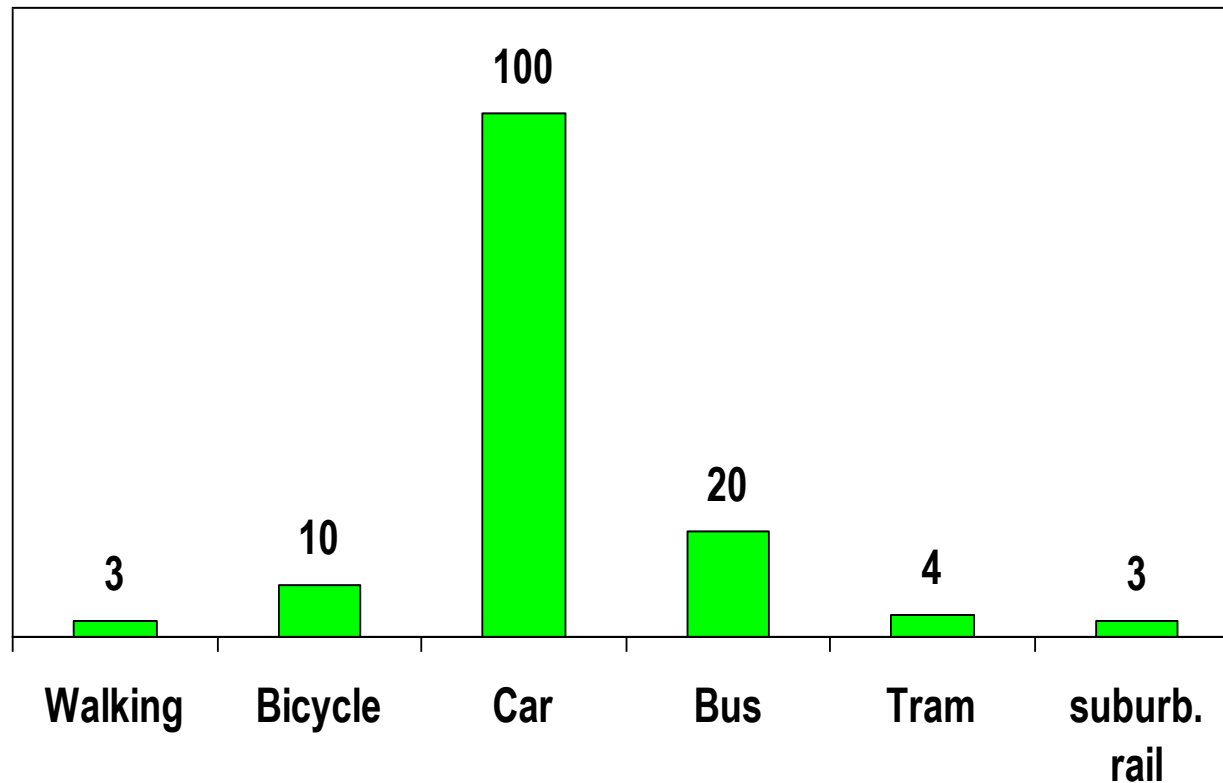
Daily re-allocation of lands for housing and transport in Germany (in ha)



39% of this is devoted to transport

Area needed for urban transport

(in m^2 per person transported,
without parking)



Parking time

Parking time during daytime hours for cars parked on roadsides in the inner city (example of Munich)

up to 2 hours

22%

2 – 4 hours

11%

more than 4 hours

67%

Noise pollution

- 50% of Germany's inhabitants are exposed to noise pollution from road traffic at a level which can impact on their physical and psychological well-being ($\geq 55 \text{ dB(A)}$)¹.
In urban areas this percentage is well over 70%.²
- The figure is 20% for noise pollution from rail transport¹
- > In Germany c. 2,000 people die every year from noise pollution-related heart attacks.³

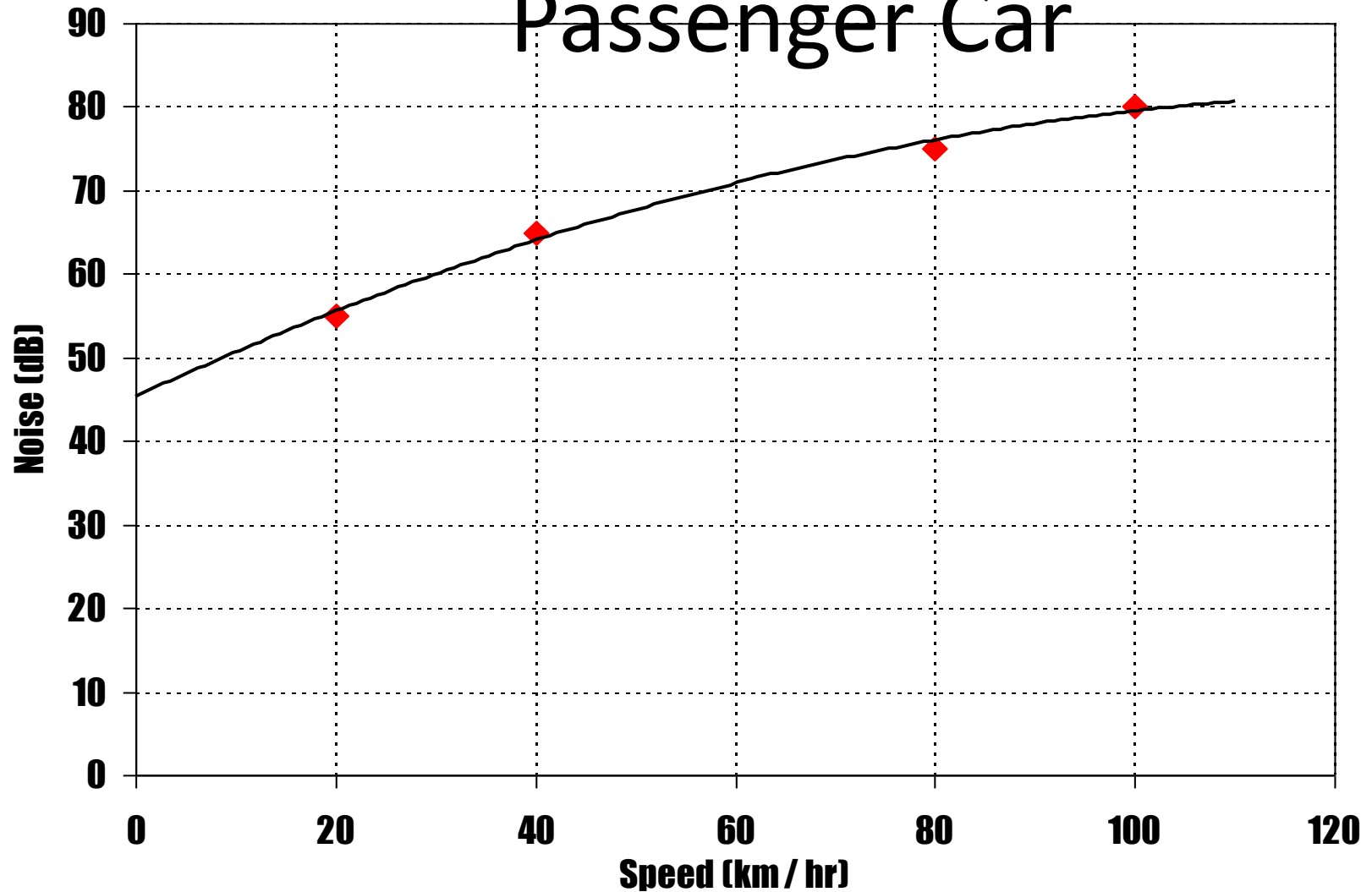
Noise

- Road transportation noise
 - Accounts for about 70% or all noise emitted by transportation.
 - Road transportation modes have different scales of noise emissions.
 - Main sources of noise come from the engine and the friction of the wheels over the road surface.
 - One truck moving at 90 km/hr makes as much noise as 28 cars moving at the same speed.
- Ambient noise
 - Frequent result of road transportation in urban areas.
 - Addition of all the noise generated by cars, trucks and buses.
 - Permanent ambient noise (ranging from 45 to 65 db).
 - Impairs the quality of life in urban areas and thus the property values of residences.
 - Nearby road arterials, ambient noise is replaced by direct noise and vibrations.

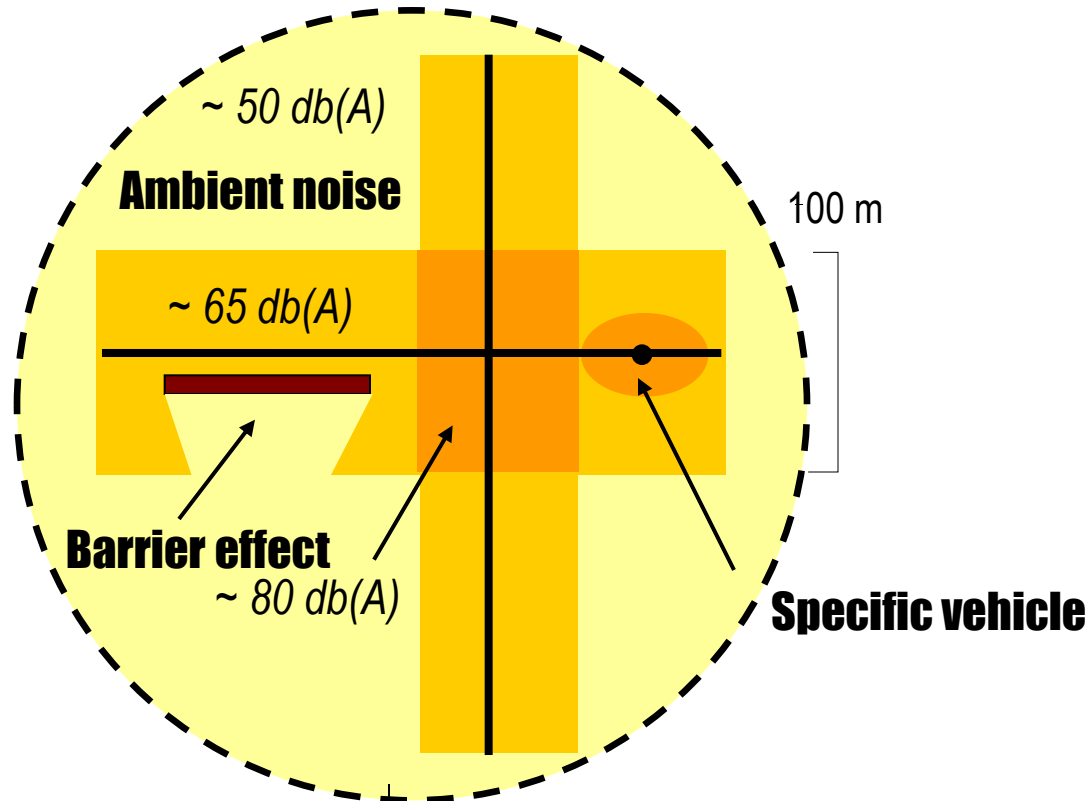
Noise

- The acoustics created by the surrounding environment (hills, buildings, trees, open space, etc.) alleviate or worsen local conditions.
- Noise level
 - Travel speed and the intensity of traffic are directly linked with its intensity of noise.
 - Grows arithmetically with speed.
 - Around 45% of the population in developed countries live in high levels of noise intensity (over 55 db) generated by road transportation.

Noise Generated by a Passenger Car



Road Transportation Noise

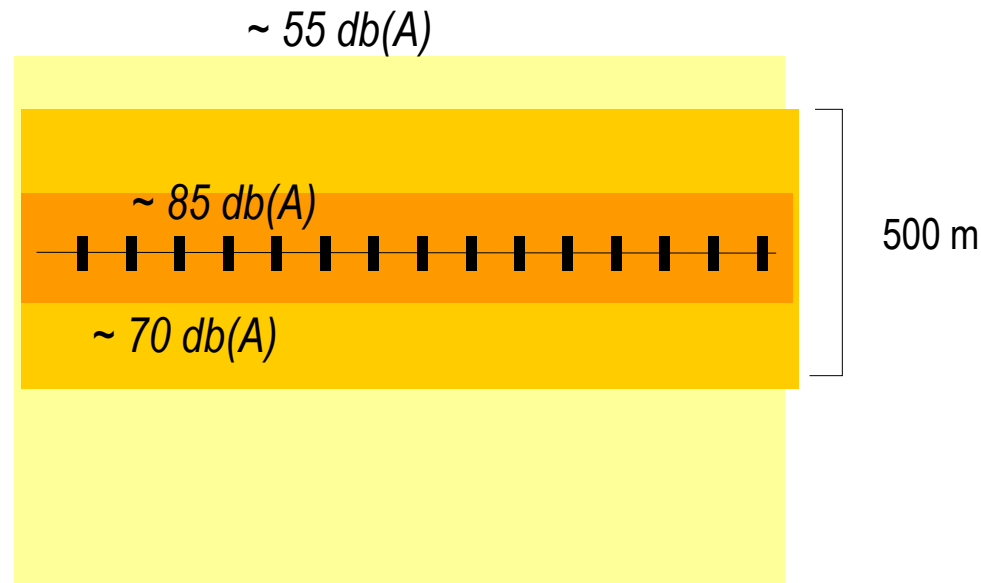


Noise

- Rail transportation noise
 - Accounts for about 10% of all noise emitted by transportation.
 - Noise comes from the engine (mostly diesel), the friction of wheels over the rails, and whistle blowing.
 - Trains moving at high speed, aeroacoustic noise becomes more important than other sources.
 - Depending of the train aerodynamics, noise emissions are from 50 to 80 times the logarithm of train speed.
 - Become significant at speeds higher than 200 km/hr.
 - Convergence of trucks towards railyards provides an additional source of noise.

Noise

- Level of exposure related to the importance and location of rail transportation infrastructure.
- Important impacts are in urban areas where the majority transshipment functions are performed.
- Rail terminals are often located in the central and high density areas of cities.



Factors influencing travel choice

- Real and perceive danger of a traffic accident (where is safety, where could I let go children)
- Environment of roads affect negatively and dangerously, cyclists and pedestrians are at a bump in the higher danger of healthy effects over against users of cars
- Danger bump of pedestrian and cyclist with car is indirect rule of proportion in quantity of pedestrians and the cyclists, which are on a road

Influencing needs of transport by the land planning

- Responsibility of the municipality for the behaviour of the citizen in transport
 - The way of the organization of activities in the area - transport distances
 - Suburbanization
 - Commercial zones in the vicinity of cities

Moving past the State of traditional concrete...

- Why?
 - Cost of keeping traditions
 - A new world of materials in development
 - Ability to have choices / provisional options
- What?
 - plastic – metal – composite – wood - transparent – translucent – absorptive – canted – recycled – easily replaced – lower cost – light weight - and more...
- Where?
 - Vertical and horizontal
- How?
 - Use the process & criteria that fit your organization...

The possibilities decreasing of negative effect

- Restriction of increase of total volume of transportation
- Changing of modal split to rail transport
- Including external cost to total cost of traffic
- Adoption of stricter norms for exhaust and noise emissions
- Using of alternative fuels
- Restriction of traffic operation in resident agglomerations

social impacts of transport

- Displacement of pedestrians from street space
- Barrier effect of major roads
- Impact on leisure time and recreation
- Chronic illnesses

Potential solutions I

- Traffic reduction through mixed/overlapping land use and decentralisation
→ most cost-effective approach
- Strengthening of non-motorised transport
 - Extension of traffic-restrained zones
 - Urban green spaces,
 - legal protection for pedestrians
- Intermodality
- Awareness-raising

Potential solutions II

- Internalising the external costs
 - Tax on oil
 - Tax / levy on emissions, CO_2 air pollutants, noise
 - Road user fee
 - Parking fee
 - Subsidising environmentally friendly transport modes
- Legal provisions

Potential solutions III

→ public transport

- Customer orientation
- Regionally coordinated services
- Frequent and regular service
- Fast and reliable service
- Product differentiation
- Attractive price
- Comfortable vehicles and stops

Potential solutions IV

→ motorised individual transport

- Speed limit
- Technological approaches:
 - lower fuel use by entire fleet
 - alternative propulsion methods (e.g. hydrogen fuel cells)
- “down-sizing”
- Increased capacity utilization rate of vehicles
 - Car sharing
 - Car pools

Conclusion:

“Now it is time for less concrete and more intelligence in the transport system.”