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# Transport geography basic concepts and their applications

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# GEOGRAPHY OF TRANSPORT

Explores the spatial relationships of transport and society

## Key topics

- Transport networks and infrastructure
- Movement of people, goods and information
- Accessibility and mobility

## Use

- Spatial planning
- Regional development
- Logistics

# BASIC CONCEPTS

Transport = movement of people and things in space

Means of transport = tool of transportation

Transport network = set of routes (roads, tracks, public transport lines)

Transport hub = place where networks intersect (station, port, airport)

# TRANSPORT SYSTEMS

## Types of transport

- Road, rail, water, air
- Passenger, freight
- Individual, collective

Multimodality = combination of transport modes

Intermodality = use of multiple modes of transport on one route

# MOBILITY AND TRANSPORT BEHAVIOR

Mobility = ability/possibility to move in space

Transport behavior

- People's choices – parameters of the journey?

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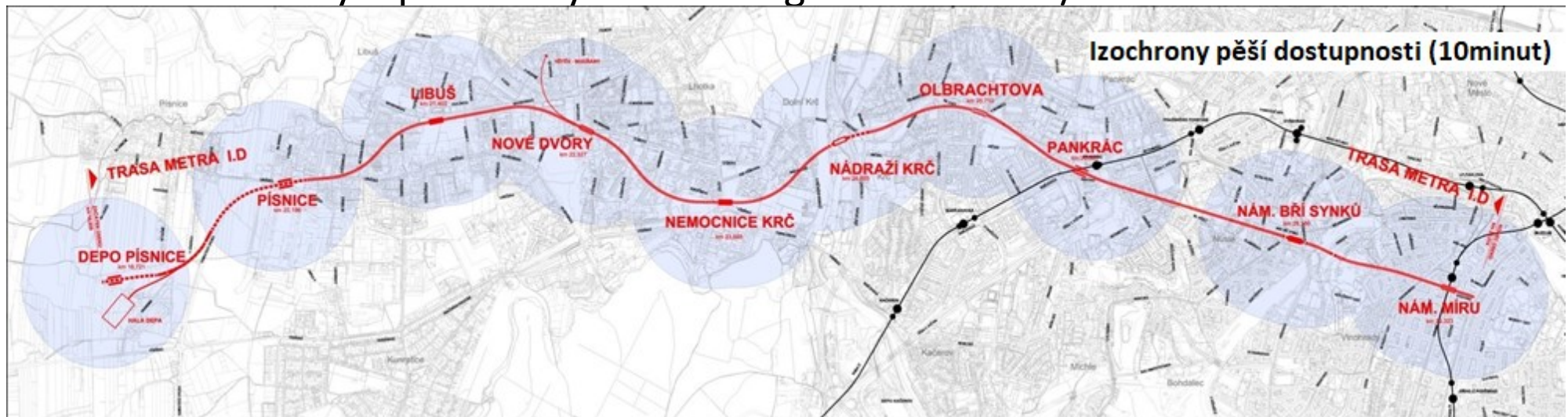
- ❑ People's choices - travel parameters - transport mode, travel time, route
- ❑ What influences the choice of means of transport?
  - Price, time, availability, habits, purpose of the trip, fellow travelers, ...

# DISTANCE AND ACCESSIBILITY

## Distance types

- Geometric (Euclidean)
- Time
- Economical
- Functional

Accessibility = possibility of reaching a destination/service



# CENTRALITY AND PERIPHERALITY

Centrality – good location in the transport network

- Easy accessibility, access to services

Periphery – marginal position

- Worse transport accessibility, fewer opportunities

It changes over time, depends on the method of measurement, and the scale of study (e.g. micro, meso and macro regions)

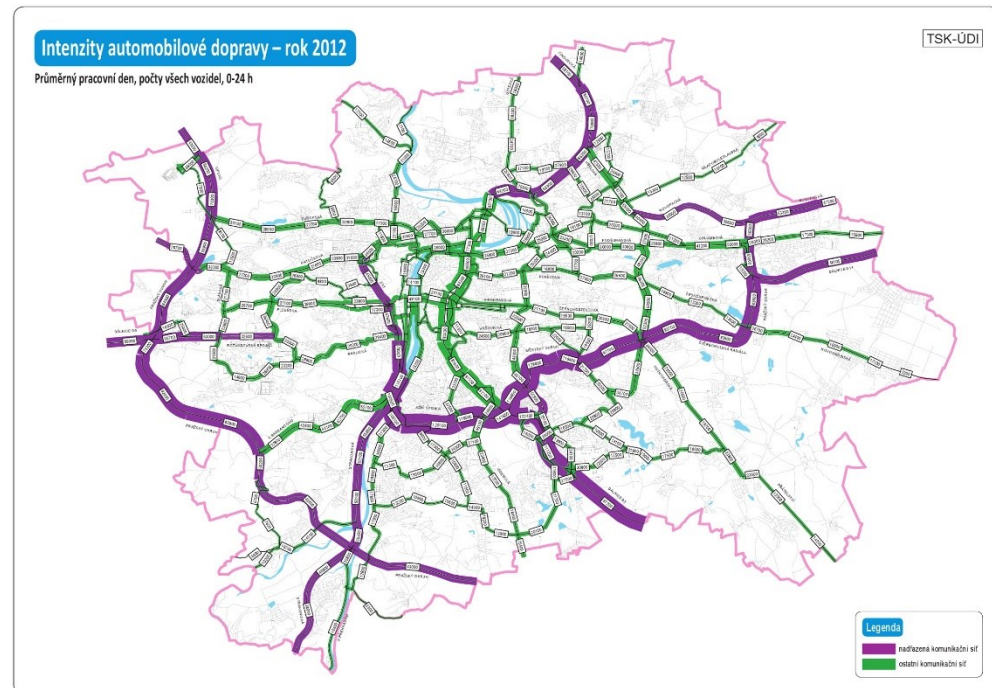
# TRAFFIC FLOWS AND INTENSITY

Traffic flow – the amount of people or goods between two locations

Traffic intensity – number of vehicles/people per unit of time

Key indicator for

- Infrastructure sizing
- Transportation modeling
- Road safety



# TRAFFIC FLOWS IN SPATIAL

## Gravity models

- Traffic between two cities is greater if they are large and spatially close

## Network models

- They analyze where traffic is actually moving

## Use

- Transport infrastructure planning – capacity
- Public transport capacity planning
- Importance also for spatial planning

# GRAVITY MODELS IN TRANSPORT GEOGRAPHY

Newton's law of gravity

The flow between two places depends on

- Size of both places (e.g. population, economic strength)
- Distances between the two locations (longer distance → smaller flow)

$$T_{ij} = k \cdot \frac{P_i \cdot P_j}{d_{ij}^\beta}$$

$T_{ij}$  = dopravní tok mezi místy i a j

$P_i, P_j$  = velikost míst (např. populace)

$d_{ij}$  = vzdálenost

$\beta$  = parametr citlivosti na vzdálenost

Use, e.g., for estimating commute times

# NETWORK ANALYSIS IN TRANSPORT GEOGRAPHY

Network analysis – using graph theory to evaluate transport

## Basic concepts

- Nodes = cities, stops, airports
- Edges = roads, railways, lines

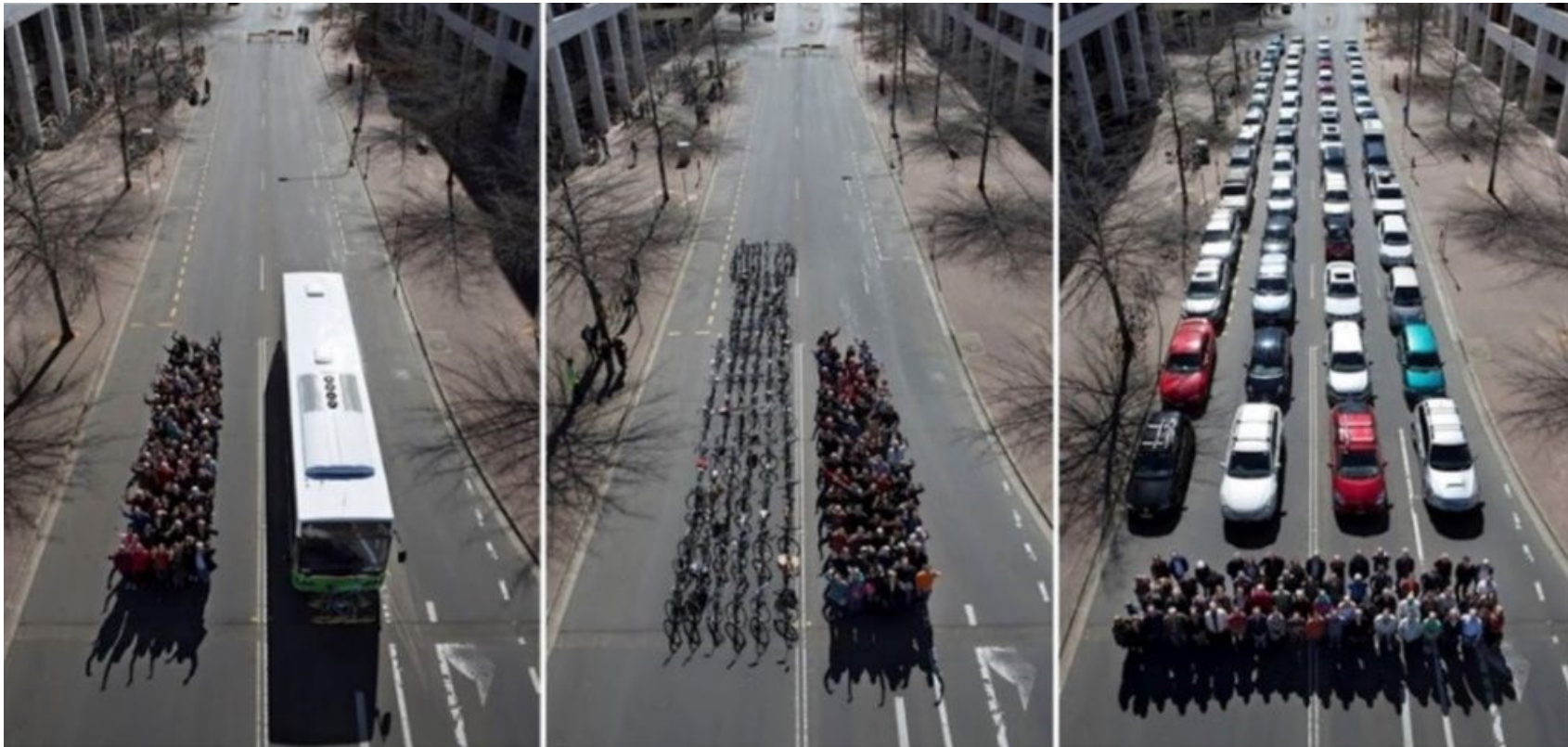
## Typical methods

- The shortest path
- Node centrality
- Identification of key nodes

## Practical use

- Route planning and public transport
- Logistics optimization
- Transport network vulnerability assessment

# IMPACT OF TRANSPORT ON SPACE?



# IMPACT OF TRANSPORT ON SPACE

## Positive

Economic development

Service availability

Connecting regions

Necessary emphasis on sustainable transport

## Negative

Emission

Noise

Traffic jams

Land grabbing and landscape fragmentation

# USE OF TRANSPORT GEOGRAPHY

## Spatial planning

- Where to build new roads, stops, logistics centers, ...

## Commuting analysis

- Labor market, schools

## Transport policy

- Public transport fares, route planning (e.g. high-speed lines)

## Logistics

- Route selection, warehouse planning, intermodal terminals

# TASK

Select the four largest cities in the county where you live.

Find the population numbers for these cities (on the Czech Statistical Office website) and measure the distance between them in km.

Calculate the gravity model for each pair according to the formula on the slide on Gravity Models in Transport Geography and evaluate between which two cities the commuting link should be the strongest.

Compare your results with commuting data from SLDB 2021