CHILD FRIENDLY CITIES
The case of Wrocław in Poland

Stef Pieterse | P5 presentation | 20 April 2012
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INTRODUCTION

About Wrocław - Past and future urban development
Introduction

Wrocław (before Breslau) is a historic city in the South-West of Poland on the river Oder.
In the beginning of the 20th century, Breslau was the 6th largest city in the German empire.
At the end of the 2nd World War, 70% of all buildings in the city were damaged or destroyed.
During the communist time (until 1989), Wrocław's image changed into a real socialist one.
Introduction

Now, since Poland's EU admittance, Wrocław's image is becoming a Western European one.
Wrocław aims to become a modern European city that offers a high quality of living.
PROJECT DEFINITION

The livability of children in Wrocław
Wroclaw suffers from a high intensity of car use, which threatens the livability of children.
The usability of the street for children is threatened by the high demand on space for cars.
There is a high demand on space for parking, which limits children's ability to move outside.
Car parking also leads to undefined public space, which threatens children's ability to play.
Project definition

◆ The livability of children
  ○ Reduced street safety
  ○ Reduced usability of the street
  ○ Reduced walk- and cyclability
  ○ Unattractiveness of public space
  ○ Reduced social safety

◆ Improving children’s livability
  ○ Reducing car use
  ○ Improving walk- and cyclability
  ○ Providing attractive public space
Project definition

- Improving children’s livability
  - Providing attractive public space
Project definition

- Improving children’s livability
  - Providing attractive public space
  - Reducing car use
  - Improving the ability to cycle

Map | Wrocław’s new bypass and the network of cycling paths in 2012
An undiminished high demand on space for cars is leading to measures that are ineffective.
Project definition

Social safety issues have appeared that threaten children’s ability to use new playgrounds.
There is a lack of social control, which is caused by changed social structures in the centre.
Project definition

There is a lack of investment, which is caused by changed economic structures in the centre.
Project definition

- The ineffectiveness of measures
  - High demand on space for cars
  - Lack of social control
  - Lack of investment
Project definition

◆ The outflow of families

- 0-2 years: + 32.9%
- 3-6 years: - 3.9%
- 7-14 years: - 31.1%
- 15-19 years: - 41.5%
- 20-24 years: - 31.0%
- 25-29 years: + 22.8%
- 30-34 years: + 62.4%
- 35-39 years: + 22.5%
- 40-44 years: - 31.1%
- 45-49 years: - 37.2%
- 50-54 years: - 1.5%
- 55-60 years: + 88.8%
- 60-65 years: - 22.4%
- 65+ years: - 8.2%

Map | Wrocław's population change per city borough (between 2000-2009)
Project definition

- Reasons to leave the city
  - Safety (32%)
  - Unattractive for children (23%)
  - Traffic intensity (20%)
  - Lack of public green (17%)
  - No housing (5%)

Wroclaw was enlisted as the 3rd worst congested city in Europe. (TomTom, 2010)
Project definition

- Housing development until 2020
  - Safety (32%)
  - Unattractive for children (23%)
  - Traffic intensity (20%)
  - Lack of public green (17%)
  - No housing (5%)

- Development mode
  - EU Regional Dev. Program
Project definition

- The effects of the outflow
  - Increased travelling distances
  - Distance constraints
  - Increased need to travel by car
  - High demand on space for cars

Map | Accessibility to primary school (6-8 year old children)
The effects of ineffective measures

- Ongoing outflow of families
- Ongoing increase in car use
- Vicious circles

Map | Average yearly in- and outflow of inhabitants (between 2000-2009)
Project definition

- **Problem definition**
  - Ongoing outflow of families increasingly threatens the livability of children in the city
  - There is a need to restore the balance between in- and outflow of families from the city centre
  - Effective measures to improve the livability of children are acquired

- **Project aim**
  - To reduce the need for children to travel by car
    - Reduce the demand on space for cars in the city
    - Enable sustainable urban mobility measures to be effective
    - Create an attractive environment for children to live in

- **Research question**
  - Where in Wrocław do children have accessibility to their activity places and where not?
    - Which specific development needs and constraints define the spatial requirements of children?
  - Implement interventions that reduce children's reliance on car use
  - Defining the likeliness of Wrocław's planned measures to become ineffective as well
THEORETIC FRAMEWORK

The spatial requirements of children
Theoretic framework

- Preschoolers
  - Between 3 and 4 years old

- Development needs
  - To play outside
  - To interact with other people

- The abilities
  - Traffic insight - Novice
  - Undeveloped skills
  - Only accompanied trips
Theoretic framework

- Activity places
  - Kindergarten
  - Playground (sandbox/ slide)

- Distance constraints
  - < 200 m.  Walking
  - < 1000 m.  Cycling
  - < 100 m.  Public transport stop
Theoretic framework

- Young school-aged children
  - Between 5 and 8 years old

- Development needs
  - To play with other children
  - To be physically active

- Safety constraints
  - Traffic insight - Basic
  - Basic physical/motor skills
  - Individual & accompanied trips
Theoretic framework

- Activity places
  - Primary school
  - Playground (e.g. climbing frame)
  - Swimming pool

- Distance constraints
  - < 400 m. Walking
  - < 1000 m. Cycling
  - < 200 m. Public transport stop
Theoretic framework

- Older school-aged children
  - Between 9 and 12 years old

- Development needs
  - To be active and try new things
  - To make friendships

- Safety constraints
  - Traffic insight: Intermediate
  - Semi-developed skills
  - Able to make individual trips
Theoretic framework

- **Activity places**
  - Primary school
  - Playground (e.g. pitch/field)
  - Sports club

- **Distance constraints**
  - < 800 m. Walking
  - < 2000 m. Cycling
  - < 400 m. Public transport stop
Theoretic framework

- Teenagers
  - Between 13 and 15 years old

- Development need
  - To find recognition
  - To 'socialize' with friends

- Safety constraints
  - Traffic insight: Advanced
  - Developed skills
  - Able to make individual trips
Theoretic framework

- Activity places
  - Secondary school
  - Playground (e.g. pitch/field)
  - Sports club

- Distance constraints
  - < 1200 m. Walking
  - < 3000 m. Cycling
  - < 400 m. Public transport stop
Theoretic framework

- Accompanied trips
  - Parents’ time-travel budgets
  - Choice for mode of transport
  - The need to link destinations

- Distance constraints
  - < 400 m. Public transport stop
Theoretic framework

- Analysis setup
  - Distance constraints
  - Children’s need to travel by car

- Main facilities
  - Kindergartens
  - Primary schools
  - Secondary schools

- Parents’ demand
  - Accompanied trips
  - < 400 m. Public transport stop
ANALYSIS

Children’s need to travel by car in Wrocław
Analysis

- Inventory
  - Facilities - public schools
  - Children’s homes
  - Travelling networks

- Public schools in Wrocław
  - Kindergarten (98)
  - Primary schools (67)
  - Secondary schools (40)

Map | The public schools in Wrocław at the beginning of 2012
Analysis

- Children’s homes
  - Demographic data
  - Wrocław’s building entrances
  - Layer per age groups

- Population count
  - 13081 Preschoolers
  - 13436 Young school-aged
  - 20042 Older school-aged
  - 18208 Teenagers

Map | The entrances of buildings/ houses in Wrocław at the end of 2005
Analysis

- Defining the walking network
  - Dedicated walking paths
    - *Only for walking purposes*
Analysis

- Defining the walking network
  - Dedicated walking paths
    - Only for walking purposes
  - Informal walking paths
    - Only for walking purposes
Analysis

- Defining the walking network
  - Dedicated walking paths
    - Only for walking purposes
  - Informal walking paths
    - Only for walking purposes
  - Cycling paths
    - Cycling & walking purposes
Analysis

◆ Defining the walking network
  ○ Dedicated walking paths
    ◦ Only for walking purposes
  ○ Informal walking paths
    ◦ Only for walking purposes
  ○ Cycling paths
    ◦ Cycling & walking purposes
  ○ Roads & streets
    ◦ Sidewalks beside busy roads
Analysis

- Defining the walking network
  - Dedicated walking paths
    - Only for walking purposes
  - Informal walking paths
    - Only for walking purposes
  - Cycling paths
    - Cycling & walking purposes
  - Roads & streets
    - Sidewalks beside busy roads
    - On residential streets
Analysis

- Defining the walking network
  - National roads
Analysis

- Defining the walking network
  - National roads
  - Regional disclosing roads

Map | Regional disclosing roads running through Wrocław
Analysis

- Defining the walking network
  - National roads
  - Regional disclosing roads
  - City disclosing roads

Map | City disclosing roads running through Wrocław
Analysis

- Defining the walking network
  - National roads
  - Regional disclosing roads
  - City disclosing roads
  - Residential streets

Map | Residential streets in Wrocław
Analysis

- Defining the walking network
  - National roads
  - Regional disclosing roads
  - City disclosing roads
  - Residential streets

Map | Residential streets in Wrocław
Defining the walking network

- National roads
- Regional disclosing roads
- City disclosing roads
- Residential streets
- Cycling paths

Map | Dedicated cycling paths in Wrocław
Analysis

Defining the walking network

- National roads
- Regional disclosing roads
- City disclosing roads
- Residential streets
- Cycling paths
- Walking paths

Map | Dedicated & informal walking paths and sidewalks in Wrocław
Analysis

- Defining the cycling network
  - Dedicated cycling paths
    - *Only for cycling purposes*
Analysis

- Defining the cycling network
  - Dedicated cycling paths
    - Only for cycling purposes
  - Residential streets
    - In traffic calm areas
Analysis

- Defining the cycling network
  - Dedicated cycling paths
    - Only for cycling purposes
  - Residential streets
    - In traffic calm areas
  - Informal cycling paths
    - On sidewalks/walking paths
Analysis

- Defining the cycling network
  - National roads
  - Regional disclosing roads
  - City disclosing roads
  - Residential streets
  - Cycling paths
  - Walking paths

Map | The cycling network in Wrocław
Analysis

- The public transport network
  - Railway network
    - Train stations
Analysis

- The public transport network
  - Railway network
  - *Train stations*
  - Tram network
    - *Tram stops*
Analysis

- The public transport network
  - Railway network
    - Train stations
  - Tram network
    - Tram stops
  - Bus network
    - Bus stops
Analysis

- The public transport network

- Railway network
- Tram network
- Train stations
- Tram stops
- Bus stops

Map | The public transport network in Wroclaw
Analysis

- Methodology
  - Catchment areas
  - Network accessibility
  - Adjusted network accessibility

- Network accessibility
  - Distance X over network Y

- Adjusted network accessibility
  - Time X over the network Y
  - Cycling paths
    - 12 kilometers/hour
  - Residential streets
    - 8 kilometers/hour
  - Walking paths
    - 5 kilometers/hour

Legend
- Public school
- Able to cycle
- Car/public transport reliant
- No network accessibility
- Transport network Y
- Catchment area - cycling
Analysis

- Preschoolers
  - Network accessibility
  - Catchment areas

LEGEND
- Kindergarten
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport
- Oder river
- Walking network
- Map background

Map | Network accessibility - catchment areas
Analysis

- Preschoolers

  - Building entrances

LEGEND

- Kindergarten
- Car
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport

- Oder river
- Walking network
- Map background

Map | Network accessibility - building entrances
Analysis

- Preschoolers
  - Population count

Diagram | Network accessibility - preschoolers

Diagram | Network accessibility - building entrances

Map | Network accessibility - building entrances

LEGEND
- Kindergarten
- Car
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport
- Oder river
- Walking network
- Map background

> The Results

<table>
<thead>
<tr>
<th>Transport Mode</th>
<th>preschoolers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycling, Walking, Public Transport</td>
<td>229</td>
</tr>
<tr>
<td>Cycling, Walking</td>
<td>1024</td>
</tr>
<tr>
<td>Cycling, Public Transport</td>
<td>1121</td>
</tr>
<tr>
<td>Cycling</td>
<td>7506</td>
</tr>
<tr>
<td>Public Transport</td>
<td>260</td>
</tr>
<tr>
<td>Private Car</td>
<td>3741</td>
</tr>
</tbody>
</table>
Analysis

- Preschoolers
  - Adjusted network accessibility
  - Catchment areas

Legend
- Kindergarten
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport
- Oder river
- Walking network
- Map background

Map | Adjusted network accessibility - catchment areas
Analysis

- Preschoolers
  - Building entrances

LEGEND

- Kindergarten
- Car
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport

Map | Adjusted network accessibility - building entrances
Analysis

- Preschoolers
  - Population count

Diagram | Adjusted network accessibility - preschoolers

LEGEND
- Kindergarten
- Car
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport
- Oder river
- Walking network
- Map background

Map | Adjusted network accessibility - building entrances
Analysis

Preschoolers
- Public transport

Public transport - 1810 preschoolers (from who 753 reliant)
- 17 kindergartens - accessible
- 81 kindergartens - not accessible
- 12 kindergartens - not accessible (incl. parents)

The Results
Analysis

- Preschoolers
  - Reliance on car use

LEGEND
- Kindergarten
- Able to cycle
- Car/public transport - adj. network accessibility
- Car/public transport - network accessibility
- Catchment area - adj. network accessibility
- Oder river
- Walking network
- Map background

Map | Preschoolers' need to travel by car
Analysis

Preschoolers
- Reliance on car use

The Results
- Preschoolers - 13081
  - 6533 - Able to cycle (at least)
  - 3557 - Car/public transport (adj. network accessibility)
  - 3001 - Car/public transport (network accessibility)

LEGEND
- Kindergarten
- Able to cycle
- Car/public transport - adj. network accessibility
- Car/public transport - network accessibility
- Catchment area - adj. network accessibility
- Oder river
- Walking network
- Map background

Map | Preschoolers’ need to travel by car
Analysis

- **Conclusion**
  - 75767 children in Wrocław
  - 20194 (26.7%) not able to walk/cycle

- **Problem allocation**
  - 8516 children - no network acc.
  - 11678 children - no adjusted network acc.

- **Public transport**
  - 7521 public transport reliant
  - 132 from 205 schools not accessible
  - 35 schools ➔ no ability to link destinations

- **The need to travel by car**
  - 12673 children reliant on car use
  - 1.5 child per car trips
  - 16,000 daily car trips to school
  - High demand on space for cars

<table>
<thead>
<tr>
<th>Age groups</th>
<th>network</th>
<th>total</th>
<th>adj. network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschoolers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car reliant</td>
<td>2741</td>
<td>5805</td>
<td>3064</td>
</tr>
<tr>
<td>Public transport</td>
<td>260</td>
<td>753</td>
<td>493</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>3001</td>
<td>6558</td>
<td>3557</td>
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<tr>
<td>Young school-aged</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car reliant</td>
<td>2079</td>
<td>4581</td>
<td>2502</td>
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<tr>
<td>Public transport</td>
<td>884</td>
<td>2971</td>
<td>2087</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>2963</td>
<td>7552</td>
<td>4589</td>
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<tr>
<td>Older school-aged</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Car reliant</td>
<td>411</td>
<td>976</td>
<td>565</td>
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<tr>
<td>Public transport</td>
<td>365</td>
<td>1719</td>
<td>1354</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>776</td>
<td>2695</td>
<td>1719</td>
</tr>
<tr>
<td>Teenagers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car reliant</td>
<td>750</td>
<td>1311</td>
<td>561</td>
</tr>
<tr>
<td>Public transport</td>
<td>1026</td>
<td>2078</td>
<td>1052</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>1776</td>
<td>3389</td>
<td>1613</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>8516</strong></td>
<td><strong>20194</strong></td>
<td><strong>11678</strong></td>
</tr>
</tbody>
</table>

Table | Children’s need to travel by car in Wrocław
INTERVENTIONS

Reducing the need for children to travel by car in Wrocław
Interventions

- Additional analysis
  - Potential accessibility
  - Network accessibility
  - Adjusted network accessibility

LEGEND
- Public school
- Able to cycle
- Car/ public transport reliant
- No potential/ network accessibility
- Transport network Y
- Catchment area - cycling

Diagram | Potential accessibility
Diagram | Network accessibility
Diagram | Adj. net. accessibility
Interventions

◆ Preschoolers
  ○ Potential accessibility
  ○ Catchment areas

LEGEND
  ○ Kindergarten
  Yellow Public transport
  Green Cycling
  Blue Cycling/public transport
  Orange Walking/cycling
  Red Walking/cycling/public transport
  Blue Oder river
  Gray Walking network
  Green Map background

Map | Potential accessibility - catchment areas
Interventions

- Preschoolers
  - Building entrances

LEGEND

- Kindergarten
- Car
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport

Map | Potential accessibility - building entrances
Interventions

- Preschoolers
  - Population count
Interventions

- Methodology (1)
  - Potential accessibility
  - Network accessibility
  - Adj. network accessibility

- Possible interventions
  - Spreading of schools
    - Relocation of schools
    - New schools

- Problem allocation
  - Closest facility analysis

Diagram | Potential accessibility - decision making process

- No potential accessibility
- Can a school be relocated?
- YES
  - Relocate school
- NO
  - New school
Interventions

- Potential accessibility
  - Closest facility analysis

**LEGEND**
- Able to walk/ cycle
- Car/ public transport reliant
- Route closest school
- Potential catchment area - cycling
- Car reliant - 0
- Car reliant - 1 to 30
- Car reliant - 31 to 60
- Car reliant - 61 to 90
- Car reliant - 91 to 120
- Car reliant - 120+
Interventions

- Potential accessibility
  - Selection > 30 preschoolers
  - 9 Research areas
  - 1539 - not able to walk/ cycle
  - Aim - reduction with 1471

**LEGEND**
- Kindergarten
- Car/public transport reliant
- Able to walk/cycle
- Car/public transport reliant
- Route closest schools
- Research area
- Oder river
- Walking network
- Map background

Map | Potential accessibility - research areas
Interventions

- Research area 1
  - Wrocław Psie Pole
  - 167 preschoolers
    - 83 - no alternative
    - 8 - with alternative
    - 76 - car reliant
- Preferred intervention
  - Relocate kindergarten
Interventions

- Research area 2
  - Wrocław Swojszyce
  - 190 preschoolers
    - 109 - no alternative
    - 0 - with alternative
    - 81 - car reliant
- Preferred intervention
  - Provide new kindergarten

Map | Wrocław Swojszyce

Map | Potential accessibility - Wrocław Swojszyce
Interventions

- Research area 3
  - Wrocław Brochów
  - 161 preschoolers
    - 46 - no alternative
    - 17 - with alternative
    - 98 - car reliant

- Preferred interventions
  - Relocate kindergarten
  - Provide new kindergarten
Interventions

- Research results
  - 10 - relocated kindergartens
  - 12 - new kindergartens
  - 294 - not able to walk/ cycle
  - Reduction of 1271 preschoolers

**LEGEND**

- Kindergarten - existing
- Kindergarten - relocated
- Kindergarten - new
- Able to walk/ cycle
- Car/ public transport reliant
- New potential catchment area - cycling
- Oder river
- Walking network
- Map background
Interventions

- **New potential accessibility**
  - Population count

---

**LEGEND**
- Kindergarten
- Car
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport
- Oder river
- Walking network
- Map background

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**The Results**

Diagram | New potential accessibility - preschoolers

Map | New potential accessibility - building entrances
Interventions

- Methodology (2)
  - Potential accessibility
  - Network accessibility
  - Adj. network accessibility

- Possible interventions
  - Network directness
    - New infra connection
    - New crossing
  - Spreading of schools
    - Relocation of schools
    - New schools

- Problem allocation
  - Closest facility analysis

Diagram | Network accessibility - decision making process
Interventions

- Network accessibility
  - Closest facility analysis

**LEGEND**
- Green: Able to walk/cycle
- Red: Car/public transport reliant
- Orange: Route closest school
- Black: Potential catchment area - cycling
  - Car reliant: - 0
  - Car reliant: 1 to 30
  - Car reliant: 31 to 60
  - Car reliant: 61 to 90
  - Car reliant: 91 to 120
  - Car reliant: 120+

Map | Network accessibility - closest facility analysis
Interventions

- **Network accessibility**
  - Selection > 30 preschoolers
  - 9 Research areas
  - 1478 - not able to walk/Cycle
  - Aim: Reduction with 756

**Legend**
- Kindergarten
- Car/public transport reliant
- Able to walk/Cycle
- Car/public transport reliant
- Route closest schools
- Research area
- Oder river
- Walking network
- Map background

Map | Network accessibility - research areas
Interventions

- Research area 1
  - Wrocław Psie Pole
- Preferred interventions
  - Network directness
    - 3 - new connections
    - 4 - new crossings
Interventions

- Research area 2
  - Wrocław Swojszyce

- Preferred intervention
  - Spreading of schools
    - 1 - new kindergarten
Interventions

- Research area 3
  - Wrocław Leśnica
- Preferred interventions
  - Spreading of schools
    - 3 - new connections
    - 5 - new crossings
  - Network directness
    - 2 - reloc. kindergartens
    - 1 - new kindergarten

Map | Wrocław Leśnica

Map | Network accessibility - Wrocław Leśnica
Interventions

- Research results
  - 15 relocated kindergartens
  - 3 new kindergartens
  - 558 not able to walk/cycle
  - Reduction of 920 preschoolers

**LEGEND**
- Kindergarten - existing
- Kindergarten - relocated
- Kindergarten - new
- Able to walk/cycle
- Car/public transport reliant
- New potential catchment area - cycling
- Oder river
- Walking network
- Map background

Map | Network accessibility - all interventions
Interventions

- New network accessibility
  - Population count

The Results

Diagram | New network accessibility - preschoolers

Map | New network accessibility - building entrances

Legend
- Kindergarten
- Car
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport

Oder river
- Walking network
- Map background

Map background
Interventions

- Methodology (3)
  - Potential accessibility
  - Network accessibility
  - Adj. network accessibility

- Possible interventions
  - Network usability
    - New cycling path

- Problem allocation
  - Closest facility analysis
  - Intensity of use

Diagram | Adjusted network accessibility - decision making process
Interventions

- Adjusted network accessibility
  - Closest facility analysis
  - Defining school routes
  - 4245 - not able to walk/ cycle

**LEGEND**
- Able to walk/ cycle
- Car/ public transport reliant
- Route closest school
- Potential catchment area - cycling
  - Car reliant - 0
  - Car reliant - 1 to 30
  - Car reliant - 31 to 60
  - Car reliant - 61 to 90
  - Car reliant - 91 to 120
  - Car reliant - 120+

Map | Adjusted network accessibility - closest facility analysis
Interventions

- The need for new cycling paths
  - Intensity of use
    - Intersection of routes
    - Population count

**LEGEND**
- Kindergarten
- Car/public transport reliant
  - Car reliant - 0 to 5
  - Car reliant - 6 to 10
  - Car reliant - 11 to 20
  - Car reliant - 21 to 40
  - Car reliant - 41 to 80
  - Car reliant - 80+

Map | Adjusted network accessibility - intensity of use
Interventions

- Intensity of use
  - Selection > 10 preschoolers
  - Redefining the cycling network

**LEGEND**
- Kindergarten
- Car/public transport reliant
- Route closest school - selection
- Oder river
- Walking network
- Map background
Interventions

- New adjusted network accessibility
  - 3751 - not able to walk/cycle
  - Reduction with 1338
  - 558 - no network accessibility
  - 292 - no potential accessibility

LEGEND
- Kindergarten
- Car
- Public transport
- Cycling
- Cycling/public transport
- Walking/cycling
- Walking/cycling/public transport
- Oder river
- Walking network
- Map background

The Results

Diagram | New adjusted network accessibility - preschoolers

Map | New adjusted network accessibility - building entrances
Interventions

 Conclusion preschoolers

 Before interventions
  - 6558 - not able to walk/ cycle

 After interventions
  - 3751 - not able to walk/ cycle

 Reduction - 2807 presch.
  - 4000 - less daily car trips

 LEGEND

 Kindergarten - existing
 Kindergarten - relocated
 Kindergarten - new
 Able to walk/ cycle
 Car/ public transport reliant
 Infrastructural intervention
 New adjusted network catchment area - cycling
 Oder river
 Walking network
 Map background

 P5 presentation
Interventions

- All interventions (1)
  - Kindergartens
    - 20 - relocated
    - 15 - new
  - Primary schools
    - 22 - relocated
    - 22 - new
  - Secondary schools
    - 1 - relocated
    - 5 - new

**LEGEND**

- Kindergarten - relocated/ new
- Kindergarten - relocated/ new
- Kindergarten - relocated/ new
- Centre of development
- Oder river
- Walking network
- Map background

Map | All interventions - spreading of schools
Interventions

- All interventions (2)
  - Network directness
    - 54 - infra interventions
    - 17 - multiple age groups
  - Cycling paths
    - Multiple age groups

**LEGEND**
- △ Infra intervention
- △ Infra intervention - multiple ages
- ○ Centre of development
- — New cycling path - 1 age group
- — New cycling path - 2 age groups
- — New cycling path - 3 age groups
- — New cycling path - 4 age groups
- + Oder river
- — Walking network
- ● Map background

Map - All interventions - network directness/ cycling paths
Interventions

- The result
  - Before interventions
    - 12573 - not able to walk/cycle
  - After interventions
    - 6774 - not able to walk/cycle
  - Reduction - 5799 children
  - 7000 - less daily car trips

Table | Children's reduced need to travel by car in Wroclaw
CONCLUSION

THE USABILITY AND RELEVANCE OF THIS PROJECT
Conclusion

- Before the implementation of interventions
  - 16,000 daily car trips between children's homes and public schools
  - High demand on space for cars in the city/around schools
  - Sustainable urban mobility measures to improve the livability of children that are ineffective

- After the implementation of interventions
  - 9,000 daily car trips between children's homes and public schools
  - Reduced demand on space for cars in the city/around schools
  - Ability to discourage car use and thus improve the livability of children in Wrocław

- Usability of this project
  - Wrocław's planning authority is able to strategically improve the livability of children
  - Other cities are able to use the applied methodology to measure and reduce children's need to travel by car as well
  - To illustrate that child friendly city development acquires an integrated urban development strategy
Conclusion

◆ Average school size (before)
  ○ 13081 - preschoolers
  ○ 98 - kindergartens
  ○ 133 - presch./kindergarten

◆ Average school size (after)
  ○ 15 - new kindergartens
  ○ 116 - presch./kindergarten

◆ Preferred housing development
  ○ Kindergarten size < 120 preschoolers
  ○ New housing ▶ 1792 preschoolers

Map | Preschoolers - preferred housing development
Conclusion

- Preferred housing development
  - Overlay of preferred housing areas
  - New housing ➔ 12350 children
  - ~ 6000 new families

LEGEND
- Kindergarten
- Primary school
- Secondary school
- Preferred housing - 1 age group
- Preferred housing - 2 age groups
- Preferred housing - 3 age groups
- Preferred housing - 4 age groups
- Oder river
- Walking network
Conclusion

- Planned housing development
  - Limited overlap preferred/planned housing
  - Car reliance will remain intact
  - Car use is likely to increase

**LEGEND**
- Kindergarten
- Primary school
- Secondary school
- Wrocław's planned housing development
- Preferred housing - 1 age group
- Preferred housing - 2 age groups
- Preferred housing - 3 age groups
- Preferred housing - 4 age groups
- Oder river
- Walking network

Map | All children - preferred and planned housing development
Conclusion

◆ Relevance
  ○ There is a need for a land use development strategy that is based on the spatial requirements of children
  ○ Without a change in strategy, the livability of children in Wrocław remains increasingly threatened

◆ Recommendations - Wrocław
  ○ To develop an integrated strategy of sustainable urban mobility and land use development for children
  ○ To take a more active role in urban development (e.g. housing development)
  ○ To redefine the centres (e.g. educational) in a decentralizing society

◆ Recommendations - Methodology
  ○ To increase research on the spatial requirements of children, which will improve the accuracy of the method
  ○ To use the methodology in more cities to be able to compare children’s reliance on car use in cities
  ○ To increase the amount of factors to research (e.g. more activity places, public transport)
THE END

Wrocław - the road towards becoming a child friendly city