



# Willkommen zu **UNFOLDING SPACES**

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# Unfolding Spaces

*Problem*



▶ Fehlende Grünflächen

▶ Viel ungenutzter öffentlicher Raum



Problem-  
Identifikation



# Unfolding Spaces

## AR als Werkzeug



▶ Augmented Reality

▶ Neugestaltung des öffentlichen Raums

▶ Verknüpfung mit der täglichen Nutzung öffentlicher Verkehrsmittel



Problem-  
Identifikation

Idee und  
Zweck



# Unfolding Spaces

## Methodologie



### First Idea

**Goal**

- Giving feedback to public transportation users with the help of VR
- VR evaluates the alternate scenario, where there give way for every person user public transportation
- The user can visualize their impact in the world with the help of the visualization
- We will use a furniture with sensors, that can count people
- The number of the people correlates with the growth in the virtual world.

**Benefits of activation of Public Spaces**

- Support local economies
- Attract business investments
- Encourage tourism
- Provide cultural opportunities
- Encourage entrepreneurship
- Reduce crime
- Increase pedestrian safety
- Increase use of public transportation

### Literature Review

**Human Factors in AR**

- Scarcity of contextual VR research with Ecological validity
- General user-centred design principles
- Inclusive and adaptive interface with familiar icons, avoidance of cognitive overhead, feedback and support features to guarantee user control. (Lang, Wick & Yang, 2020)
- AR can foster customer immersion (Kim, 2015)

**Technical Aspects of AR**

- Various AR development tools available
- Google's ARCore supports both Android and iOS
- Apple's ARKit AR apps can include web browsers and do not require app installation

**Public Space in AR**

- AR apps, ability to enhance reality with further information might mitigate technology's harm in disconnecting people from their surroundings.
- The critical aspect in AR is to use the relevant information to present it.
- Controlling the overlaid AR information within right context is the prime challenge. The experience and the project's relationship with the site.

**Sensors in AR**

- Counting the crowd by U, J, M. Median
- Evaluation of other counting technologies and their energy usage performance through demand-controlled ventilation by José Raúl F. Gil in Biomimetic and Smart E. Buildings
- People counting system using wireless sensor nodes by Marco Iannace

### Expert Interviews

**Human Factors in AR**

- Case study describing how perceiving, device access mode, possible interaction
- General guideline to avoid cluttering and cognitive overload
- Study of the environment to guarantee compatibility of virtual elements and physical space (problems of relations and variable conditions)
- AR research with paper-based scenarios to define virtual elements and choose among scenarios with high fidelity devices
- User test with high fidelity devices

**Technical Aspects of AR**

- We should use the 3D tag based tracking, as it runs more reliable on smartphones, compared to geometry-based tracking
- We should research if development tools like Unity or Lightship SDK can be used to create web browser-based AR applications instead of native Android/iOS apps

**Public Space in AR**

- We need to design the furniture in a way that creates interest and motivation.
- Potential users should be able to recognize the project in their busy life.
- The need to download an app will create a barrier to user experience.
- Once the project launch out, the project's cost should be explained

**Sensors in AR**

- We should use other CCTV or method based in a crowd team.
- There is a great potential in counting users of public spaces. It helps to organize and develop our built environment.
- We have to be sure in what our furniture is an addition facility.
- Obligatory is to provide power supplier either battery or electrical connection both to the counter and some possible lights.

### Design Workshop

**Goal**

- Define how the pieces of furniture would look like
- Discuss how the virtual environment would be modified by users

**Results**

- We talked about the ratio for the number of trees automatically planted in environment based on the detected number of commuters passing through the metro station, we need to raise the average to create this and will be this aspect in the future
- Came up with the idea of having a "special tree" as a sort of prize when a high number of commuters was tracked.

### Cultural Probes

**Experience**

- Successful validation (proof of concept) with the prototype, the participant understood and liked the probe correctly.
- Design of actual cultural probes in the form of 2 challenges, 1 track and visualize personal use of sustainable (e.g. method vs. non sustainable means of transport (e.g. car) 2. imaginative redesigning of best-sell writing and reading new facilities in the area (e.g. cards with trees, benches, like paths etc.)

**Results**

- Assessed levels are sensitive to environmental issues, and choose green mobility, are satisfied with the current state of the district, but some said more trees, child zones with benches and tables and playgrounds for kids and tables/benches

### Provocative Requisites

**Location**

- All the entrance of the U-Bahn station.

**Methodology**

- Using the appropriate idea, make testing
- Walking from distance, make testing
- Interviewing afterwards.

### Scenarios

**Made as Proof-of-concept**

- Accessibility: furniture height, QR code placement, 30x30x150
- usability: on-screen-App, not oversteered
- Clear On-boardings temperature built

### Design Games



Problem-Identifikation

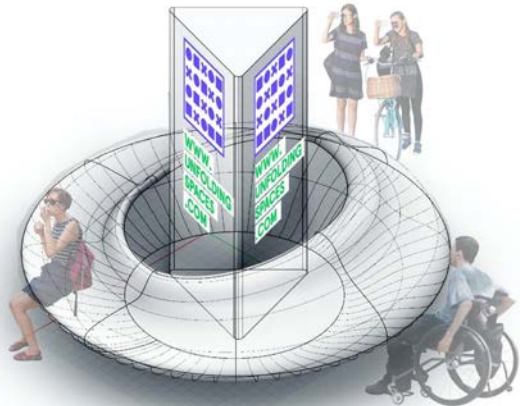
Idee und Zweck

Methodologie



# Unfolding Spaces

Möbelstück



Problem-  
Identifikation

Idee und  
Zweck

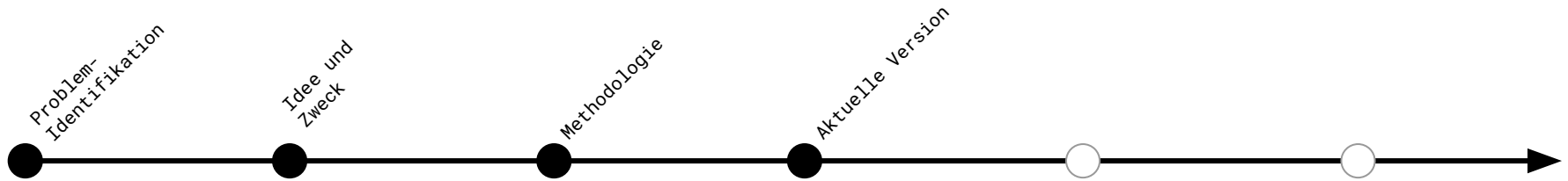
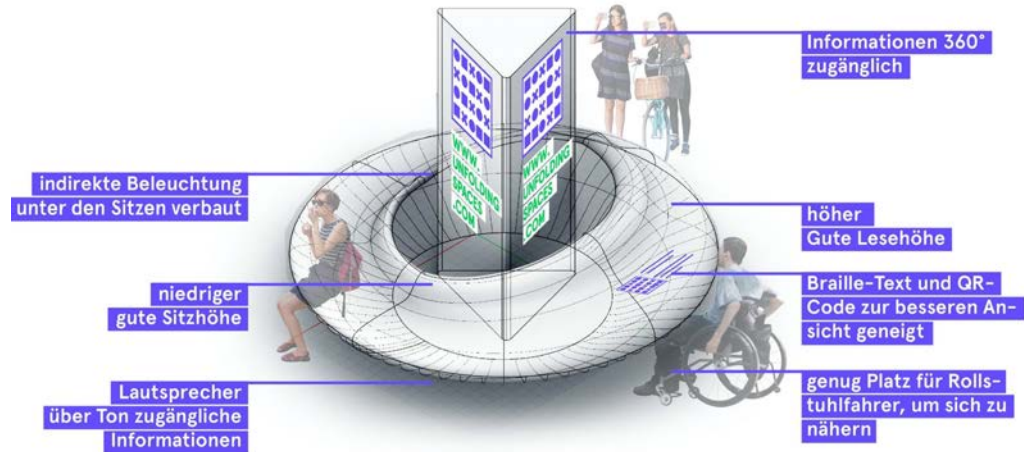
Methodologie

Aktuelle Version



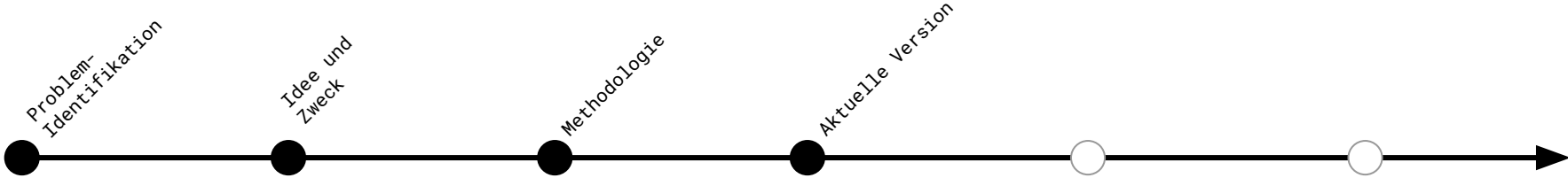
# Unfolding Spaces

## Möbelstück



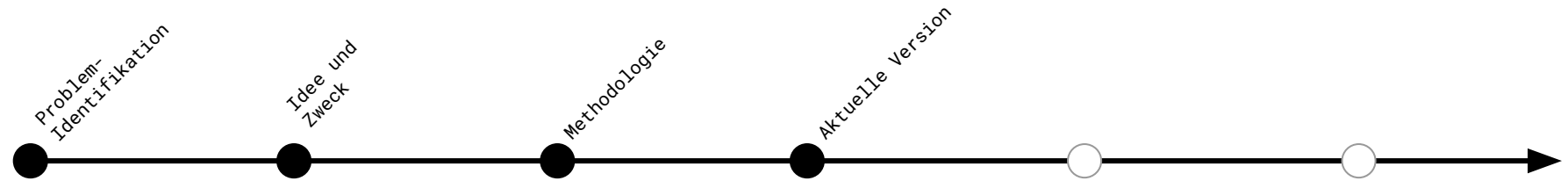
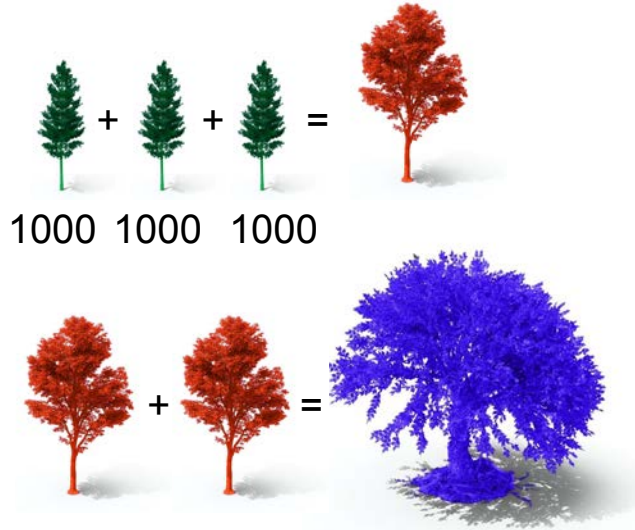
# Unfolding Spaces

Erste Schicht



# Unfolding Spaces

*Erste Schicht*





# Unfolding Spaces

## Zweite Schicht



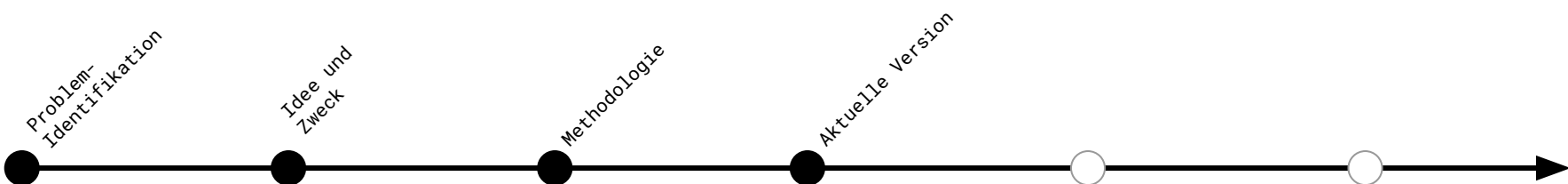
Bench



Bicycle  
rack

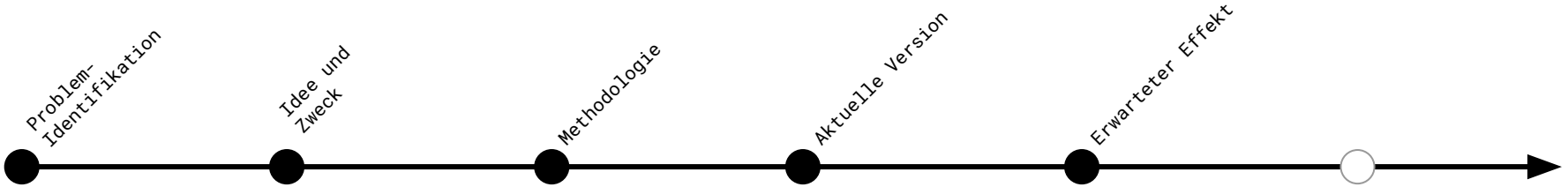
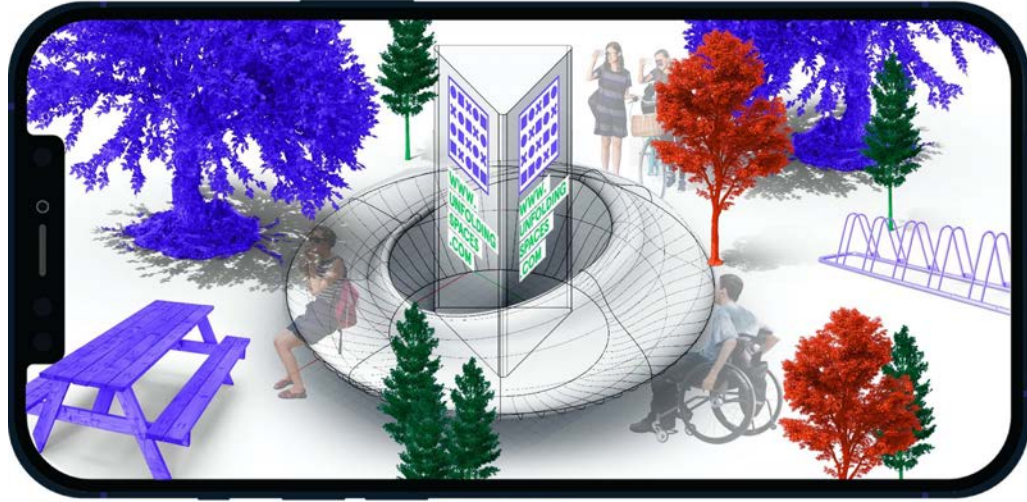


Picknick  
Table



# Unfolding Spaces

Effekt



# Unfolding Spaces

*Danke für Ihre Aufmerksamkeit*



TECHNISCHE  
UNIVERSITÄT  
WIEN

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## Rückmeldungen und Fragen

