



# What's in a railway station? Developing a scientific model for sustainable railway stations of the future

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# Railway stations as sustainability promoters



- **Key role of railway stations** for rail transportation to become an attractive means of mobility in everyday life
- **Unique position of stations in the urban environment**, provision of integration between different transport networks and physical urban spaces – **“gate” for transit-oriented development (TOD)** (Otsuka & Reeve, 2023; Pucci, 2019)
- However: Stations fall in **the gap between transport and urban agendas**, as well as diverging responsibilities, being overlooked by planners and policymakers (Lunardon et al. 2023)

## But... why?

To date, no cohesive model for railway stations that

- Looks at stations as promoters of sustainable mobility
- Identifies context-specific transformation pathways
- Is highly applicable for different stakeholders



**RAIL4CITIES: RAILway stations for green and socially-inclusive CITIES**



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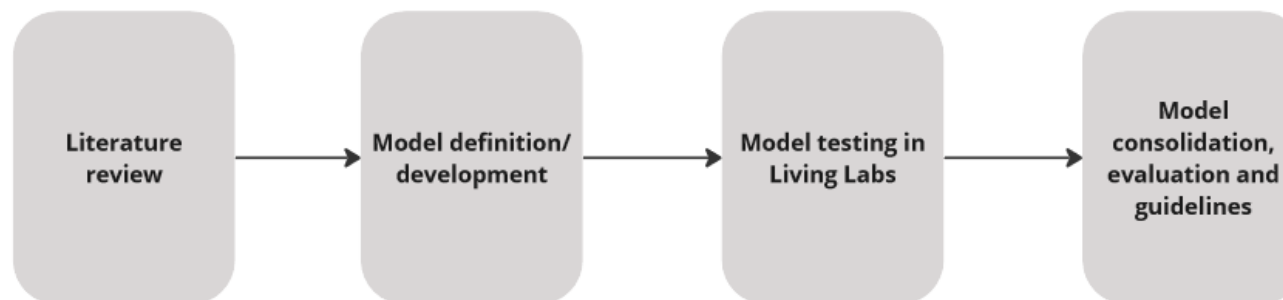


# The RAIL4CITIES project

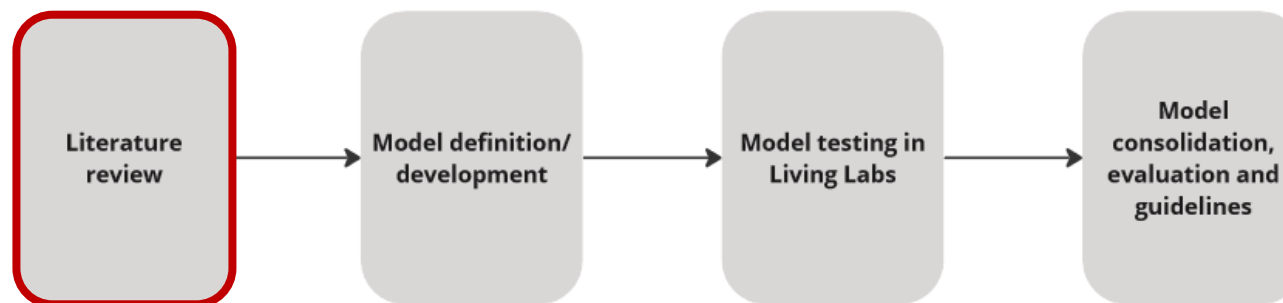
?

MODEL

# The RAIL4CITIES project



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# Methodological approach for literature review



# Methodological approach for literature review



- European geographical context
- Publications had to include a classification system which can be/is applied to more than N=1 railway stations and/or catchment areas
- Only passenger stations
- No classification methodologies originating from railway companies aiming to be used in internal operations



# Characteristics examined

- **Railway type** where the classification approach was tested
- **Goal** of the classification approach
- Possible connection to the **Node-Place model** (if any)
- **Method** of the station classification
- Classification **criteria**
- **Subject** of classification and **catchment area**
- **Number of stations** of the classification case study
- **Location** of the case study
- **Number and naming** of the resulting **categories/classes**
- Use of **spatial graphical representation** methods within the classification approach/case study

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Classification approach

Case study application characteristics

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# Characteristics examined

- Railway type where the classification approach was tested
- Goal of the classification approach
- Possible connection to the Node-Place model (if any)
- Method of the station classification
- Classification criteria
- **Subject of classification and catchment area**
  - Duality of either node and/or place characteristics
  - From 700m (Bertolini, 1999) to 25 km (Marti-Henneberg, 2015)
  - Comparison of different catchment areas
    - Isochrones or fixed radius
- Number of stations of the classification case study
- Location of the case study
- Number and naming of the resulting categories/classes
- Use of spatial graphical representation methods within the classification approach/case study

# Characteristics examined

- Railway type where the classification approach was tested
- Goal of the classification approach
- Possible connection to the Node-Place model
- Method of the station classification
- **Classification criteria**
  - Mostly quantitative criteria
  - Criteria about station as a transport hub or about station context
- Subject of classification and catchment area
- Number of stations of the classification case study
- Location of the case study
- Number and naming of the resulting categories/classes
- Use of spatial graphical representation methods within the classification approach/case study



# Characteristics examined

- Railway type where the classification approach is applied
- **Goal** of the classification approach
- Possible connection to the **Node-Place model**
- **Method** of the station classification
- Classification **criteria**
- **Subject** of classification and **catchment area**
- **Number of stations** of the classification case study
- **Location** of the case study
- **Number and naming** of the resulting categories
- Use of **spatial graphical representation** methods within the classification approach/case study

- Basis for the transit-oriented development of station areas
- Integration between land-use and transport
- Urban design scale (e.g. integration between transportation accessibility)
- Develop/complement a classification method (e.g. add pedestrian friendliness)
- Specify requirements for station equipment/services
- Specific goals (e.g. bicycle and train intermodality, station and 15-minute city)

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  - Goal of the classification approach
  - Possible connection to the **Node-Place model**
  - **Method** of the station classification
  - Classification **criteria**
  - **Subject** of classification and **catchment area**
  - **Number of stations** of the classification case study
  - **Location** of the case study
  - **Number and naming** of the resulting categories
  - Use of **spatial graphical representation** methods within the classification approach/case study
- Type of train (stations) mostly not defined
  - HSR specific studies (e.g. Wenner & Thierstein, 2021)
  - Suburban train specific studies (e.g. Pucci, 2019)
  - Regional train specific studies (Caset et al., 2018)
  - Integrating other means of mobility (e.g. ferry stops, Vale, 2015)



# Characteristics examined

- Railway type where the classification approach was tested
  - Goal of the classification approach
  - Possible connection to the **Node-Place model** (if any)
  - Method of the station classification
  - Classification criteria
  - Subject of classification and catchment area
  - Number of stations of the classification case study
  - **Location of the case study**
  - Number and naming of the resulting categories
  - Use of spatial graphical representation methods in the study
- Mostly urban regions
  - Varying from all stations in a country (e.g. Reusser et al. 2008) to 4 selected stations in a region (Borghetti, Longo, et al., 2021)
  - Comparing stations and/or areas in the European context (e.g. (Wenner & Thierstein, 2021))

# Characteristics examined

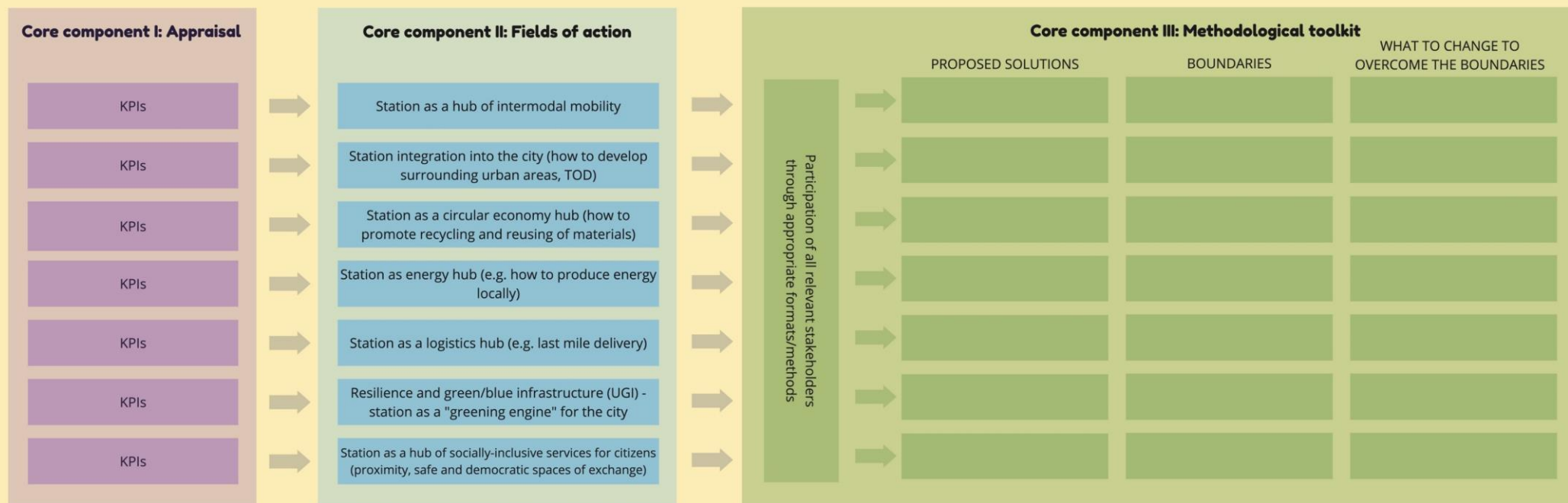
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# (Some) results

- Challenges of conceptualizing a model for railway stations, which is applicable in a variety of situations
- No uniform naming of “classification” approaches -> challenge for the identification of relevant papers
- Limitations of solely quantitative description of station contexts
- Importance of urban design and built environment of catchment area
- Different goals of classification call for different and specific criteria
- Limited/no application of academic classification systems by railway companies and/or other stakeholders

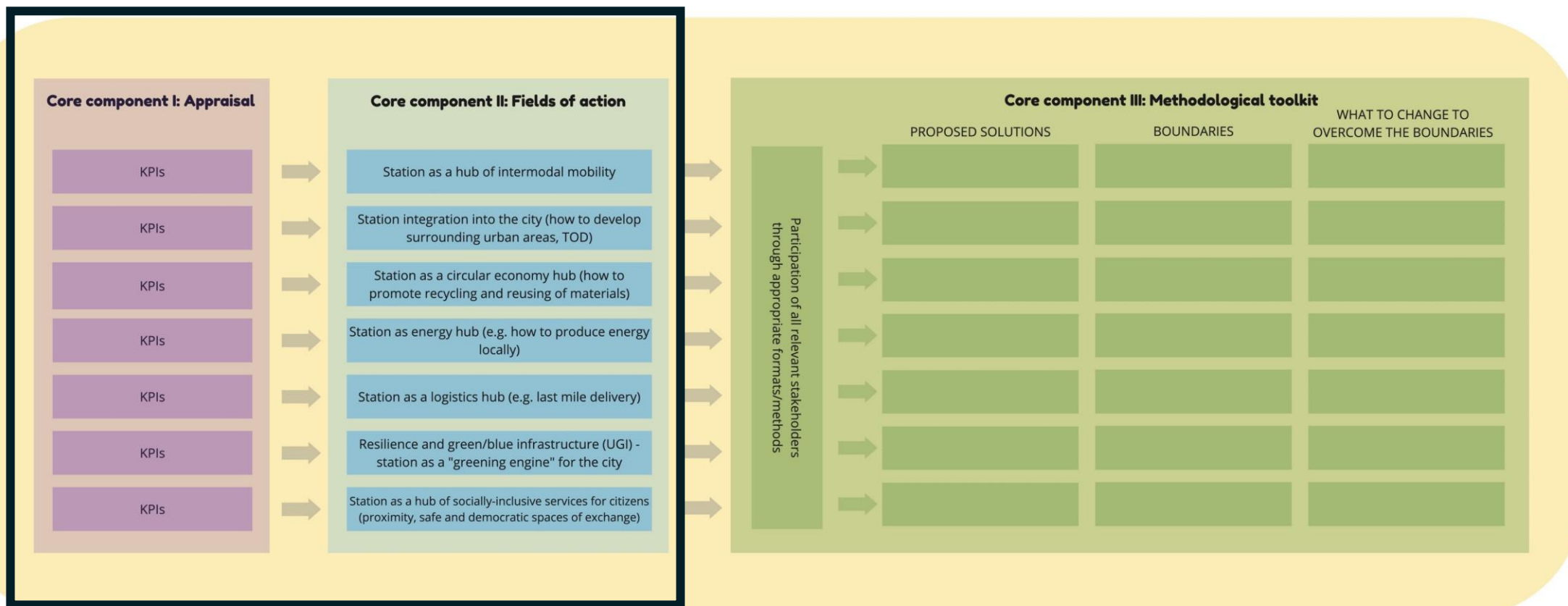
# Railway station (draft) model

MODEL



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THANK YOU  
FOR YOUR ATTENTION



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