Integrating land-use planning and transportation modeling

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Urban form and transportation system are intrinsically linked

Inner city
Dense network of tram and bus routes
FAR 2.64

Suburban residential area
Predominantly bus service
FAR 0.57
Why connecting land-use and transportation planning is important?

Development of large areas is supported by transit:

- Allows to create sustainable, urban, transit-oriented districts
- Accessibility and high level of service attract development
Why connecting land-use and transportation planning is important?

Conversely, large public transit projects could be supported by a strategy of targeted development:

- Increases the ridership of system and its economic performance
- Pays a part of infrastructure costs through a value-capture or the development in major nodes
Current planning process

Different departments, softwares, professional cultures
Plan and provide paradigm
Integrated design process

Interprofessional communication

5-7 iterations significantly improve design — Carl Steinitz
Study case: Orbital Raide-Jokeri light rail line in Helsinki and Espoo, Finland

Replaces 550 Bus Rapid Transit (BRT) route

Traverses inner suburbs of Helsinki
HELMET: Transportation model for the Helsinki region

Region-wide model is maintained by the Helsinki Transportation Authority (HSL)

Model is implemented in INRO’s Emme transport forecasting software

Spatial elements include links and transportation analysis zones (TAZ)

Four-step analysis
2D workflow

- FAR zones
- Geoprocessing
  ArcMAP
- Import / forecast
  Emme
1. The number of residents in the Raide-Jokeri corridor increases from 189 000 to 230 700, an increase of 41 700.

2. The demand on the most loaded section increases from 2273 passengers in the morning peak hour to 3168.

3. Increase in travel demand supports increase from 8 departures per hour to 12, reducing headway time from 7.5 min to 5 min.
Boarding difference
Trips increase

Trip increments using Raide-Jokari line

Origins
Destinations
Conclusions

1. Significant increase in the ridership demonstrates that the coordination of land-use and transportation planning increases performance of both systems

2. Design and export of population estimates with ArcGIS Pro tasks

3. Need for the 3D modeling of building volume configuration in order to evaluate if target FAR parameters can be realised
Potential 3D workflow

FAR zones → Geoprossing (ArcMAP) → Import / forecast (Emme)

Urban design
- 3D building
- volume
- configurations

Geoprossing
- Aggregate population for TAZ

Import / forecast (Emme)

CityEngine rule / ArcGIS Pro task
Contacts

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Get information on INRO’s Emme transport forecasting software at www.inrosoftware.com/emme