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Introducing developer agents

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SustainCity

EUROPEAN COMMISSION
European Research Area
SEVENTH FRAMEWORK PROGRAMME
Funded under Socio-economic Sciences & Humanities

Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Why focusing on building stock?

- People live in built environment
- Chance for sustainable development
  - Land consumption
  - Energy issues
    - Efficient buildings
    - Efficient distribution
- Redevelopment

Why focusing on real estate developers?

- Acting entities / Driving forces
- Reacting on
  - regulations
  - Interventions
  - Public authority as market player
- New opportunities for policy testing
- Supply side weakest point of modelling frameworks (Hunt 2005, 358)

What is a developer?

Development process	Actors	Output
• Land		
• Parcel (Regulations)	Spatial planner (Developer)	Parcel, lot

• Infrastructure
  • Maintenance
  • Streets
  • Buildings
	Real estate developer (builder)	Infrastructure

Heterogeneity of real estate developers

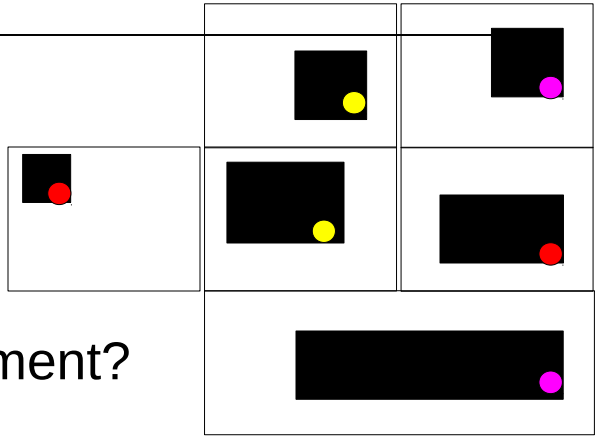
Differing aspects:

- Purpose
  - Commercial, public authority
- Size
  - Management strategy

Market supply structure

- Composition of different developers
- Different reaction and interaction dynamics

Research questions



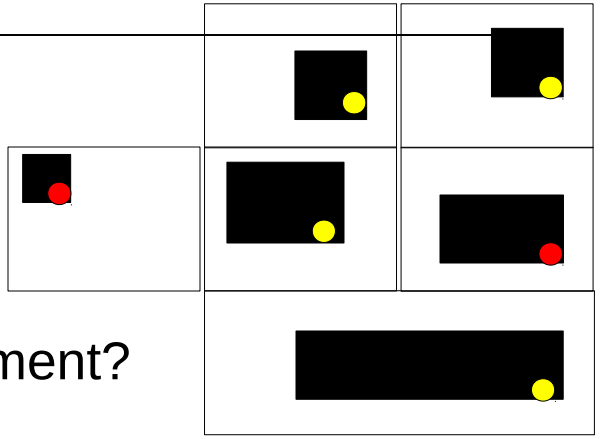
What is the market structure?

Is the consolidation going to foster redevelopment?

Can the prisoners dilemma be overcome by enough public investment?

→ Introduce developer agents

Research questions



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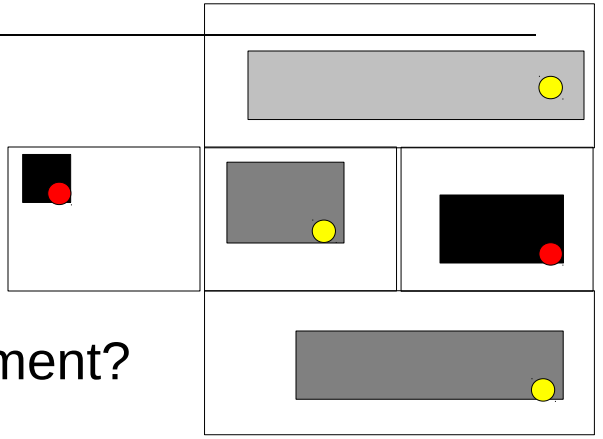

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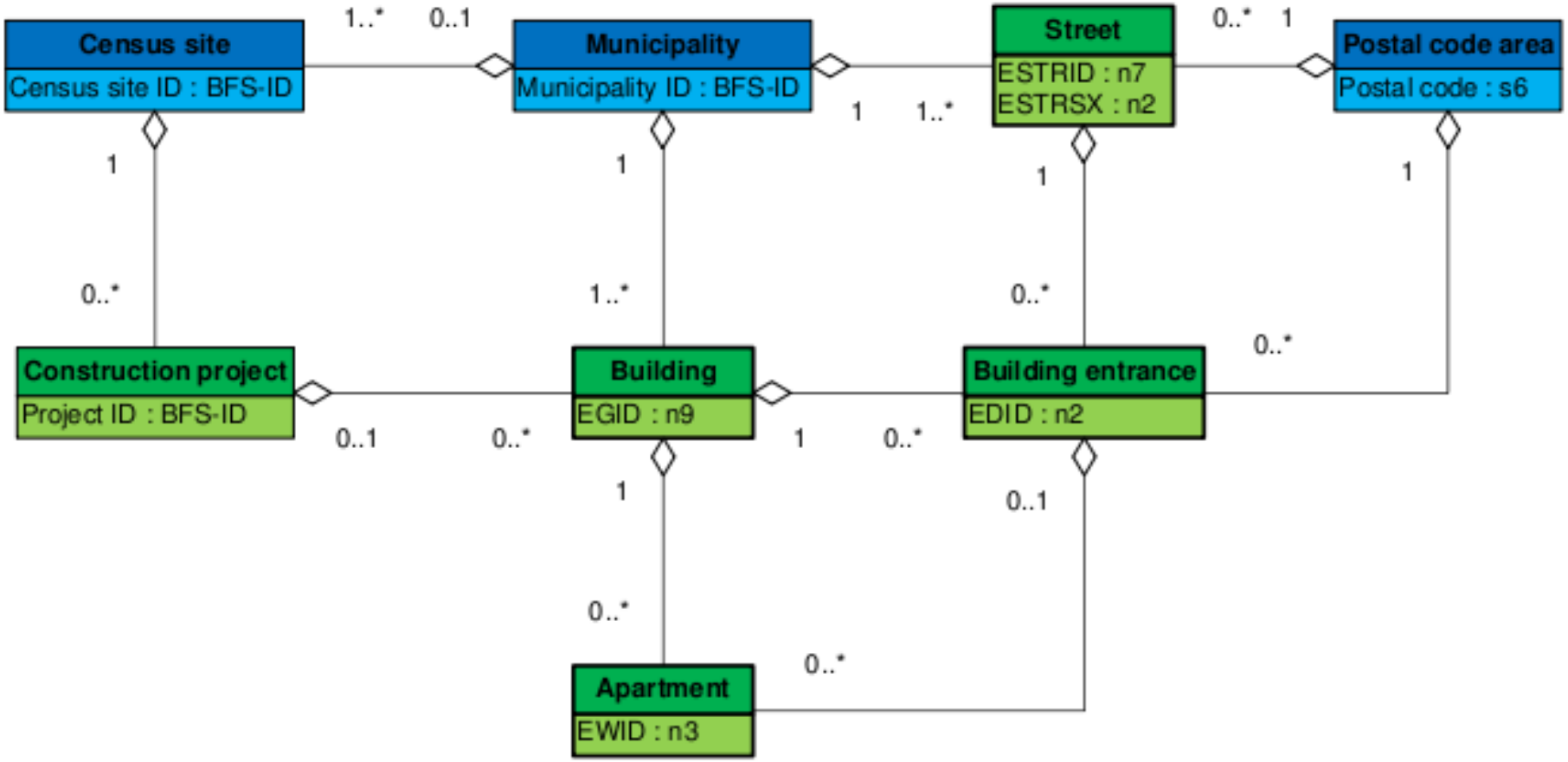
Data


Census site
Census site ID : BFS-ID
Municipality
Municipality ID : BFS-ID
Street
ESTRID : n7
ESTRSX : n2
Postal code area
Postal code : s6
Construction project
Project ID : BFS-ID
Building
EGID : n9
Building entrance
EDID : n2
Apartment
EWID : n3
1..*
0..1
0..*
1
1..*
1
1
1
1
0..*
1..*
0..*
0..*
0..1
0..*
1
0..*
1
0..1
0..*
0..*

Data

National survey BAU

Entity *construction project*

- Private and public investors
- Requirement of permit
- Attributes:
  - Identifier
  - Parcel identifier
  - Community

Why micro-simulation?

- City as complex system (Batty, 2007)
  - Emergence
  - Non-ergodicity
  - Phase transition
  - Universality
- Path dependence

➔ Constructive research tool

Reasons to use micro-simulation

- Based on behavioural theories
- Quantitative results
- Aggregation on desired levels
- Various modelling approaches can be combined
- Increased computational power

Reasons to choose UrbanSim

- Explicit representation of real estate market
- Parcel level
- Composite structure (Integration with MATSim)
- Open source
- Dynamic equilibrium
- Experience
- Support

Work packages

Description of real estate developers

Develop a behavioural model of portfolio optimisation

Implementation of parcel level UrbanSim

Implementation of prototype UrbanSim model with real estate developer agents

Tasks – Description of Real Estate Developers

Identify real estate developers

Describe market conditions and trends

Acquire data on real estate developments

Analyse developments

Tasks – Develop a Behavioural Model of Portfolio...

Literature review

Sample of in depth personal interviews

Conceptual model of portfolio optimisation

Tasks – Implementation of parcel level UrbanSim

Perform first simulations

Obtain and prepare parcel level data

Migration to parcel level implementation

Initial validation

Tasks – Implementation of Prototype UrbanSim

Estimate submodels

Integrate real estate developer agents

Synthesise developer population

Test and refine the implementation

Perform simulations with real estate developer agents

Analyse and validate model results

Challenges

Data collection

Long time span of processes

Validation

Significance

Scientific community:

- Developers with different strategies
- Improve understanding of land use and transport interaction

Non-scientific (real estate) community:

- Decisions support system
- Risk assessment tool

Thanks for listening!