A conceptual, agent-based model of land development for UrbanSim

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Outline

• Motivation

• Development process and heterogeneous actors

• Developers in Zurich

• Conceptual model for UrbanSim

• Outlook
Motivation

- Potentials for sustainable development
  - Land consumption
  - Energy efficient buildings
  - Efficient distribution of uses

- Developers are key actors (catalysers, increasingly driving force)

- Supply side weakest point of LUTI modelling frameworks (Hunt, 2005, 358)

- Better understanding of supply processes
  -> Improved governance
Research goals

• Identify real estate developers

• Investigate behavioural differences

• Reveal the composition of the market
Developers within the development process

Processes | Actor | Output
---|---|---
Population | People, Firms | Society
Infrastructure
• Maintenance
• Streets
• Buildings | Real estate developer (builder) | Buildings
Parcel (Regulations) | Spatial planner (Developer) | Parcel, lot

LAND
The developer as a role

Source: adapted from Healey, 1991, 225
Development process and its actors

Healey (1991) identifies 4 types of models:

- Equilibrium models
- Event sequence models
- Agency models
- Structural models
An agency model by Bryant et al.

Pressures for change:
- population growth
- transportation development

Public intervention

Predevelopment owners:
- e.g., farmers
- non-farm residents

Intermediate actors:
- e.g., builders
- developers
- realtors
- investment companies

Final consumers:
- e.g., householders
- firms
- government agencies
- institutions

Secondary agents:
- e.g., planners
- politicians
- institutions
- realtors
- lawyers

Response:
- e.g., property transfer
- changing expectations

Impacts:
- e.g., changing property structure
- land speculation
- price increase

Source: Healey, 1991
A structural model by Harvey

Source: Healey, 1991
Previous studies, international

LUTI models
• Until recently focusing on projects

Considering developer information
Haider and Miller (2004)
• Different utility functions per housing type
• Spatial inertia present

Dong and Gliebe (2010)
• Clear taste variations across developers and projects
• Models work best with 3 segments
• Attachment to familiar locations (spatial inertia)
Previous studies focusing on developers, CH

• Ott et al., 2005; Van Wezemael, 2005
  • Renewal of housing
  • What owner types in terms of investment behaviour exist?
  • Types: Owner-occupier, contractors
  • Motivation: Emotional, rational

• Schüssler and Thalmann, 2005
  • Housing supply
  • What hinders housing supply?
  • Types: Promoters, owner-occupier
  • Motivations: Provision of work (ca. 70%), spontaneous opportunities (ca. 55%), market analysis (ca. 20%)
Heterogeneity of real estate developers

Possible differentiations
- Legal status (Public, Private)
- Objective (Profit, non-profit)
- Strategy (Portfolio, object-oriented)
- Size
- Professionalism (Work oriented, non-work oriented)
- Purpose / Business plan (Promoter, self-owning)
- Organisation (Privat person, company)

Hypothesised types
- Promoters
- Self-owning with portfolio
- Self-owning without portfolio
Developers in Zurich
DOCUMEDIA Dataset

• Entity: building project announcements
• Approx. 60'000 records
• From 2000 - 2010
• Attributes:
  • Number of floors
  • Area of parcel
  • Volume
  • Detailed information on construction
• Addresses of construction site, developer and planer
• Business plan
Many small, few big developers
Shares of business plans (DOCUMEDIA)

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In-depth interviews

• Open, semi-structured
• Five blocks:
  • Developers' information
  • Decision process
  • Type of projects
  • Location of projects
  • Opinion on market
• Telephone or personal interviews
• 30-45 Minutes

First results
• Specialisation
• Different strategies
• Groups and alliances
A conceptual model for UrbanSim

Developer role

- Purpose
- Location
- Developed properties (Owned properties)
- Look for opportunities
- Evaluate opportunities

Object store

- Persons
- Policy Overlays
  - Households
  - Buildings
  - Businesses
  - Environmental Overlays
    - Jobs

Aggregation/Translation layer

Model Coordinator

- Transition Models
- Relocation Models
- Location Choice Models
- Land Price Model
- Development Models
Next steps

• Finish and evaluate interviews

• Data enrichment
  • Geocoding
  • Matching with parcels
  • Neighborhood analysis
  • Combine with ownership structure

• Data analysis
• Modelling
Questions!


