Computational Models in Land Consolidation

As used by Kadaster from to 1960s to present

Frederik Rosman, Delinea, The Netherlands
Research into computational models spans two eras: pre-internet era and internet era

OICRF (www.oicrf.org)

Some of the interesting publications from the 70s only in Dutch and not digitised

“What is the relevance of some of these old papers?”
Back when...

Hoofddirectie Kadaster
directie Landinrichting
afdeling Werkmethoden en Systemen

Van: Lammen
Voor: Rosman (TU Delft)
de Wolf (TU Delft)
Moolenaar
Datum: 7 oktober 1986

Case study: Toepassing kortste-route (afstanden) algoritmen in de landinrichting
Voorstel onderzoekspunt:

[2] H 1 blz 140 Shor, MATH.
H 4 blz 138/61 Brandts.

Overzicht van de bekende algoritmen met betrekking in (a-cyclische) netwerken.

Niet in de mogelijkheden tot integratie van be-
t INOK-systeem.

* FW Dijkstra. A note on two problems in
connections with graphs. "Numerische
Mathematik 1 (1959) 269-271.

* GB Dantzig. "All shortest route in a
graph, "JACM 1 (1957) 253-261."
Design support models

- ATOR
- AVL
- TRANSFER
- LIS + GIS
- Automated Sketch Plan
General Approach to LC

- Project: bounded area, divided in Compartments
- Owners: Claim Values, buildings, locations
- Goals: project goals, policies
- Constraints: law, local customs
- Computational Model: Balance supply and demand
- Value Allocation Plan
### Basics

#### Before

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<tr>
<th>Owner</th>
<th>Claim</th>
<th>Parcel</th>
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#### Compartment

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Comparison

- **ATOR**
  - Heuristic method, using transfers
  - Start at most preferred locations
  - Easy to explain to stakeholders
  - Unlinked parts

- **AVL**
  - Mathematical Programming, optimisation
  - Alternatives, resizable parts
  - Small input change big change
  - Black box, difficult to explain

- **TRANSFER**
  - Heuristic method, using transfers
  - Start at most preferred locations
  - Alternatives, resizable parts
  - Easy to explain, map interface
Current model: TRANSFER

- Farmer preferences translated into Alternatives
- Parts can transfer from one Compartment to another based on preferences

Claim Value

Alternative 1

Alternative 2

Alternative 3
Design Criteria

- Allocation goals can be dependent on national/local context
- Example: effect of consolidation on “competition” relative to farm location

\[ V_i = AP_i \times (R_v + R_w + AP_i) \times 10^{-G+g+R-r} \]
Selection of Model Settings

- Difficult to select multiple settings, because effects are not linear
- Solution: let system suggest settings
- Consequence: no need to see settings, select on basis of results