Industrial Revitalization and Complex Adaptive Systems: A framework for exploring the context of collaborative planning

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Planning Support Systems

Planner’s perspective of PSS

IT Developer’s perspective of collaborative planning

Gap between planning environment and PSS design environment
Aim: to explore the context of collaborative planning to inform PSS design
Collaborative planning describes a range of planning practices that are dynamic and context specific.

What does collaborative planning look like in practice?
Research Method

- Choice of field problem to be addressed
- Systematic Review
- Research synthesis
- Design proposition
- Test to develop further
Exploring the Collaborative Planning Process

**Project X**

**Collaborative Planning Process**

- **Objective setting**
  - Stakeholder analysis
  - SWOT analysis
  - ... (omitted)
- **CAS Framework**
  - €
  - Environment (tree, windmill)
  - Infrastructure
  - People
  - Industry (truck)

**CAS Framework benefits**
- Uses standard analysis methods
- Views context holistically
- Emphasizes interactions

**Implementation**

**Time**

- $t_1$
- $t_2$
- $t_3$
Lizards with sticky tongues will catch more insects. Insects with slick feet will do better to avoid predators. (Lansing, 2003)

**ENVIRONMENT**
- Determined by CAS
- Introduces complexity

**AGENT 1**
- Attribute: sticky tongue
- Behavioral rule: eats insects

**AGENT 2**
- Attribute: (no) slick feet
- Fitness: better at avoiding predators

**INTERACTION**
Dynamically (evolution)

**Complex Adaptive System (CAS)**
CAS Application: Gaxel case study

Symposium participation | documentation review

Sketch planning workshops | Planner interviews

Netherlands
Step 1: Identify and select contextual variables & interactions

Step 2: Define central CAS using intensity and symmetry of interactions

Internal interactions

Step 3: CAS interactions define the environment

External interactions
CAS Framework Implications & Future Research

Framework Implications:

- Method of exploring both content and process of a project
- We can better identify *when* and *where* to engage *which* stakeholders
- Supports communication between planners and IT developers
- Behavioral rules can be easily transferred in projects and also into IT environments

Future Research:

- Longitudinal studies are needed to observe stakeholder interactions during future planning tasks
- Explore application of framework in more case studies
Bibliography


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Appendix: CAS Framework for Industrial Environments

Table 2. Framing Revitalization Environment as A Complex Adaptive System

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<tr>
<th>CAS Principles</th>
<th>CAS Description</th>
<th>Application to Revitalization Environment</th>
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| **Agents**     | Basic entities of action who act or react to other agents and the environment | The Stakeholders:  
- Dutch and German municipal planners and aldermen who are the key decision makers on the project  
- There are more than 120 employers either already active in the industrial terrain or interested in investing  |
| **Attributes** | Individual differences that determine fitness |  
- Planners have high influence throughout the process and possess comprehensive knowledge of the planning environment  
- Employers have high influence on specific issues and have tacit knowledge of the planning environment  |
| **Behavioral rules** | Schema that determine agent behaviors and attributes |  
- Planners take decisions on ideas according to strategic vision and regulatory frameworks; seek to maximize system fitness  
- Employers support or reject ideas according to self-interest; seek to maximize personal fitness  |
| **Interactions** | Mutually adaptive behaviors between agents | These are the interrelations between stakeholders that constitute the stakeholder network (or Stakeholder CAS)  
- High-intensity connections between Dutch planners and German planners via frequent telecommunication, meetings and objective setting workshops  
- Planners host employers to periodic workshops/symposia; German planners and employers interact on regulatory/economic matters  |
| **Linkages** | Paths of resource movement and level of connectivity it provides |  
- Knowledge flows between Dutch and German planners to gain common understandings of regulatory frameworks and to agree upon strategic objectives  
- Knowledge is expressed by employers in terms of interests and level of demand for planner ideas; during workshops they also engage in idea creation and strategic objective validation  |
| **Flows** | Movements of resources through agent networks and through system interactions with the environment |  
- Knowledge flows between Dutch and German planners to gain common understandings of regulatory frameworks and to agree upon strategic objectives  
- Knowledge is expressed by employers in terms of interests and level of demand for planner ideas; during workshops they also engage in idea creation and strategic objective validation  |

*System fitness is measured by the ability of agents in the stakeholder network to build a strategic vision and create new ideas*

<table>
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<tr>
<th>Environment</th>
<th>Is external to the CAS of focus and consists of other interacting agents and contextual variables that influence the CAS</th>
<th>The stakeholder CAS defines this environment which consists of external stakeholders and their networks, physical structures socio-political norms and regulatory instruments</th>
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<tbody>
<tr>
<td><strong>Dimensioning effect</strong></td>
<td>The freedom of variation that the environment provides</td>
<td>NL land use plan- flexible process, rigid tool, DE land use plan- rigid process, flexible tool</td>
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<tr>
<td><strong>Complexity factor</strong></td>
<td>Optimal fitness of the CAS is reached through high interdependence. The reverse is often the case for the environment as a whole</td>
<td>Through frequent interaction, the planners and employers have established a set of strategic objectives. However, complications as the result of regulations and agreements to other networks have complicated and slowed the process</td>
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