TOWARDS A DESIGN RESEARCH METHODOLOGY: AGENT-BASED MODEL DEVELOPMENT THROUGH STAKEHOLDER PARTICIPATION IN THE CASE OF DECENTRALIZED URBAN VERMICOMPOSTING FACILITIES

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VERMICOMPOSTING

“Turning food scraps and other organic material into a valuable soil amendment called vermicompost, or worm compost.” (Fong & Hewitt, 1996)
SYMBIOTIC URBAN AGRICULTURE NETWORKS (SUANS)

- Mainly self-organizing network, local for local, closing loops
- Dynamic heterogeneous network (public, private, civil)
- Sociotechnical complex adaptive system

Aim: value creation through symbiosis with urban environment

(Lange, Korevaar, Oskam and Herder, 2017)
DESIGN INTERVENTIONS

“Design interventions are the systematic set of technological and non-technological activities that intend to impose a change from the existing situation to the desired situation” (Lange et al., 2017)

Note: this definition acknowledges emergent and disruptive contextual behaviour

From: http://www.karlsims.com/marbles/
ITERATIVE DESIGN RESEARCH APPROACH

- **CONTEXT**
- **INTERVENTION**
- **MECHANISMS**
- **OUTCOMES**

Modelling or model improvement
If yes, how?

Insights in effect of tech and organisational interventions?

Design research approach from: Lange et al. (2017)

CIMO from: Van Aken & Andriessen (2011)

Picture Amsterdam from: shutterstock (sd)
CONTEXT

**Methods**
Workshop, personal interviews, literature, policy documents

**Results**

Technical:
- Materials, water and energy supply and demands and links
- Legislation, NPV, biochemical parameters

Social:
- Initial attitude for symbiosis (Trust, Willingness, Acceptance, Knowledge, Awareness), perceived behavioural control (inspired by Ghali et al., 2017)
CONTEXT AND INTERVENTION: (RE)DESIGN

Methods and results
Serious game for:

1. Context: Validation of stakeholder information
2. Intervention: synthesis of several technological and organizational concepts
INTERVENTION: CONSTRUCT

Methods
Conceptual modelling

Results
• Description of in situ vermicomposting, including:
• Technological rules regarding possible material exchanges
• Social rules to create or delete links between agents
MECHANISMS AND OUTCOMES: ABM OUTPUT ANALYSIS
SUMMARY

(Lange et al., 2017)

- Participatory modelling method for researcher and consultants to facilitate closing loops

- Tech. and organisational design rules and scenario’s for stakeholders in SUANs

- More cases: generic agent-based model of SUANs
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Thank you

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