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Böhm, Cornelia

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#### Simulations in Service Design Prototyping: Drone Deliveries with Society-in-the-Loop

Cornelia Böhm<sup>1</sup>, Mattias Arvola<sup>2</sup>, and Jonas Lundberg<sup>2</sup>

1 Informiq AB

2 Linköping University

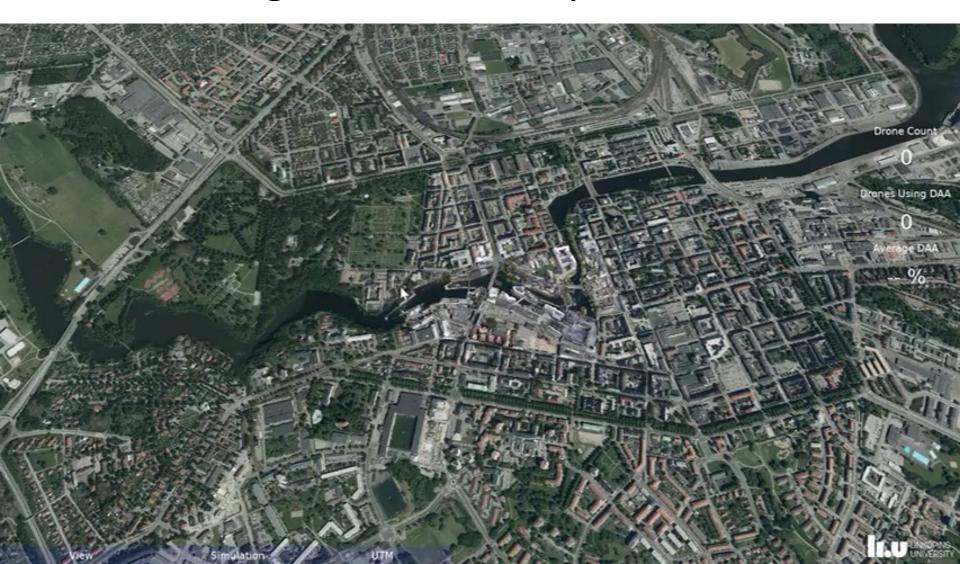


#### Purpose

- To explore
  - · how computer simulations can be used
  - as collaboratively divisible object
  - for citizen engagement
  - in service design of drone deliveries
  - for students in a Swedish university city.



### Simulating Drone Delivery Services



#### Prototypes manifest design ideas (Lim et al., 2008)

- **Filter** some aspects:
  - Appearance
  - Data
  - Functionality
  - Interactivity
  - Structure

- Can serve the **purpose** of:
  - Evaluation
  - Exploration of user experience, needs, and values
  - Generation of ideas
  - Communication



#### Simulations in Service Design

- **Test** a system before implementation
- **Visualize** multiple events, multiple agents, and dynamic processes
- Potential complement to desktop walkthrough



#### **Research Questions**

- How can computer simulations be used
  - for citizen engagement
  - in the evaluation
  - of drone delivery services for students in a university city?
- How can such computer simulations
  - inform the design process in comparison to a desktop walkthrough?



#### An Instrumental Case

- The design of a drone service for food delivery for students in a university city.
- Divergent concept sketching and selecte concept was illustrated using:
  - Service blueprint
  - Storyboard
  - Assumed persona



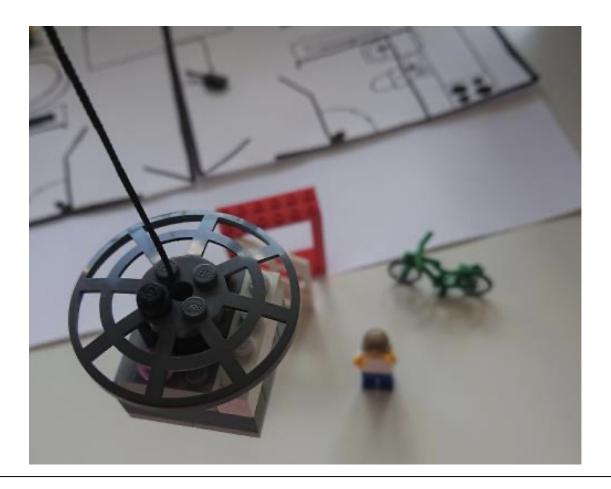
#### Four Workshop Sessions

- 7 participants split into two workshops with desktop walkthrough
- 6 participants split into two workshops with the simulation
- Five scenarios of use were discussed in each workshop:
  - 1. Order food from home

- 2. The neighbour orders food at the same time
- 3. The food is delivered to drop-off point down the street
- 4. The food is dropped down by a wire from the drone
- 5. Many want to order food on New Year's Day.



## Desktop Walkthrough





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#### Simulation



Background generated from GSD-Ortofoto25 and GSD-Höjddata, grid 2+ © Lantmäteriet.



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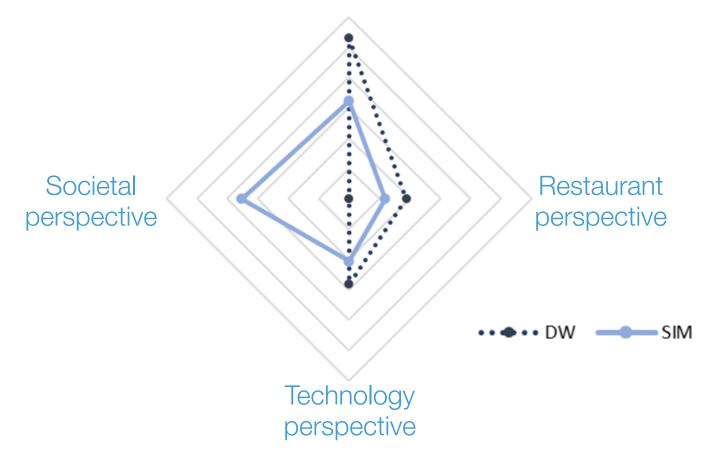
#### Data Analysis

- Selective verbatim transcription of AV-recordings
- Thematic analysis



#### Results

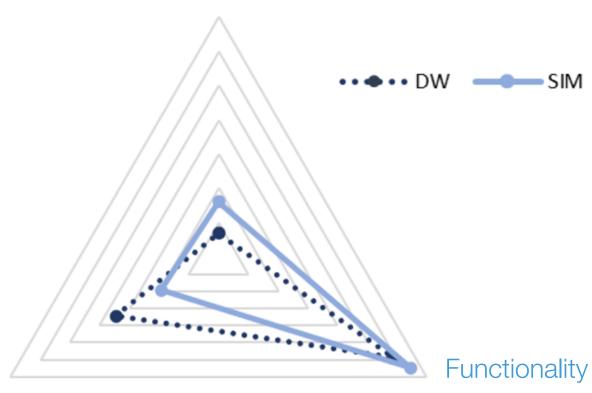
## Customer perspective





#### Results

#### Appearance







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#### Results

- The computer simulation:
  - Societal perspective
  - Multiple stakeholder's perspectives
- The desktop walkthrough:
  - Stakeholder perspectives
  - The technology in more detail, including ergonomics and accessibility.



#### **Hybrid Prototyping + Simulation**

- Useful for society-in-the-loop design and communication on how and where drones may fly and where possible delivery points should be located.
- Not useful for discussions on details of ergonomics and interaction between stakeholders and between stakeholders and the drones.
- Therefore, the simulation worked best with complementary prototypes.



#### Simulation for Society-in-the Loop Design

- **Broadened the perspective** to non-users of the service.
- **Counterweight** to focusing on the service encounters and the service users.
- A shared visual reference for dynamic aspects, like movement and speed, that might be hard to collectively imagine



# Potential Future Research on a Hybrid Prototyping+Simulation Approach

#### **Playing with Tensions**

- a. With varied base of **stakeholders**
- b. With people with **experiences** of the place
- c. Visualize particular **values**
- d. Vary the kinds of services



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