

# Integrating GMB and Games in London's Built Environment

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# Summary

1. Project context
2. Applied problem and theoretical gap
3. Methods and data
4. Overview of workshops
5. Results and interpretation
6. Limitations
7. Directions for future work



# A Call for Reduced Emissions

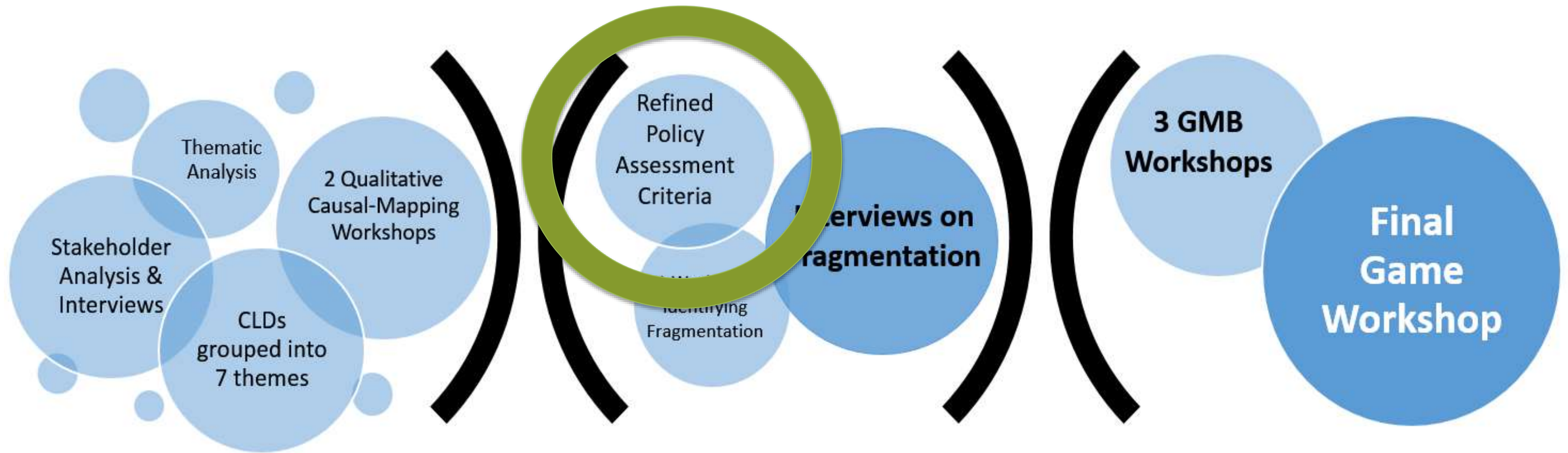


**Housing emissions** account for more than **one quarter of total emissions.**

**14 million homes** in the U.K. are targeted for improvements in energy **efficiency by 2020.**



# HEW Project Context



Previous HEW Work

This Study

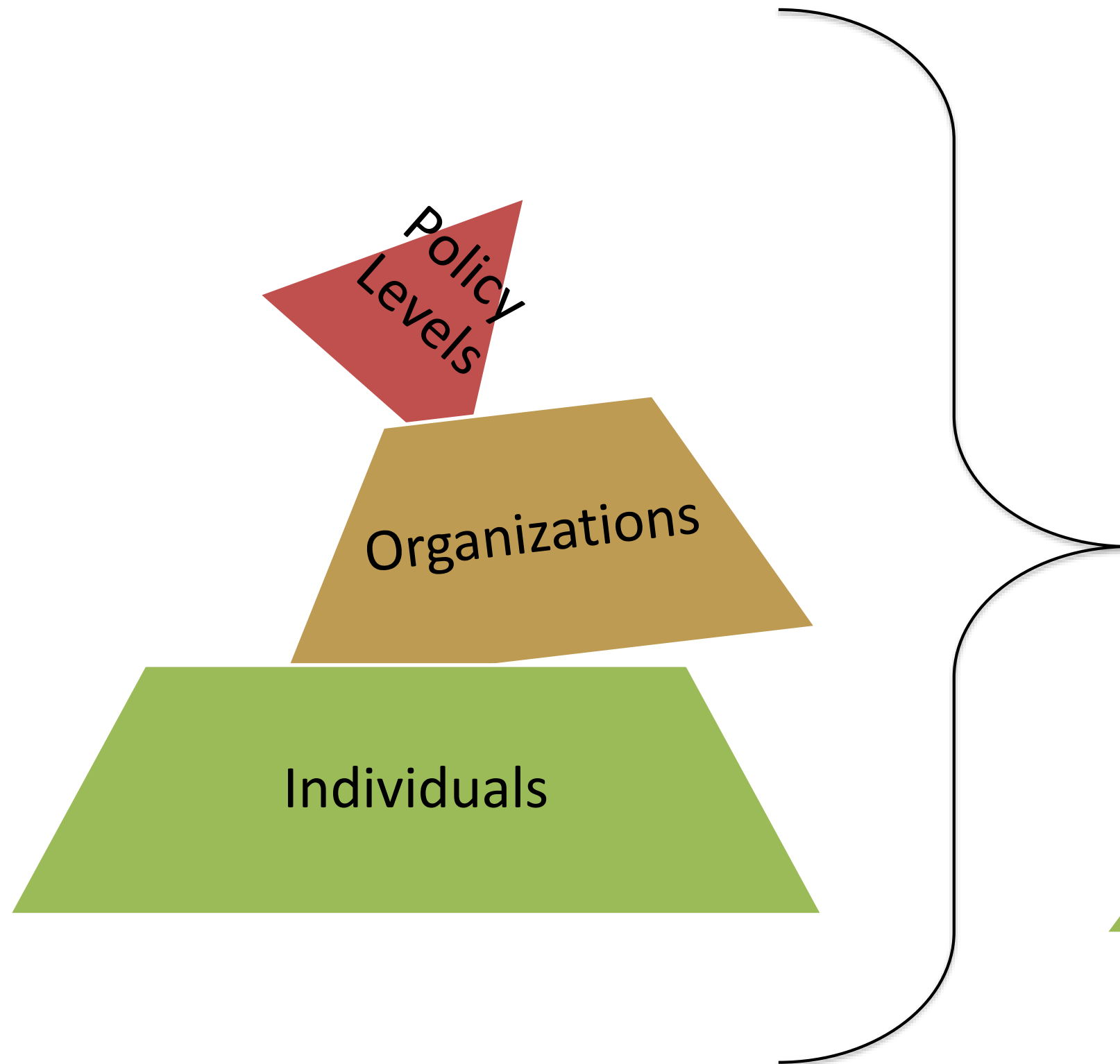
# Policy Criteria

1. Carbon emissions from housing
2. **Community connection**
3. Fuel poverty
4. Housing adaptation to climate change

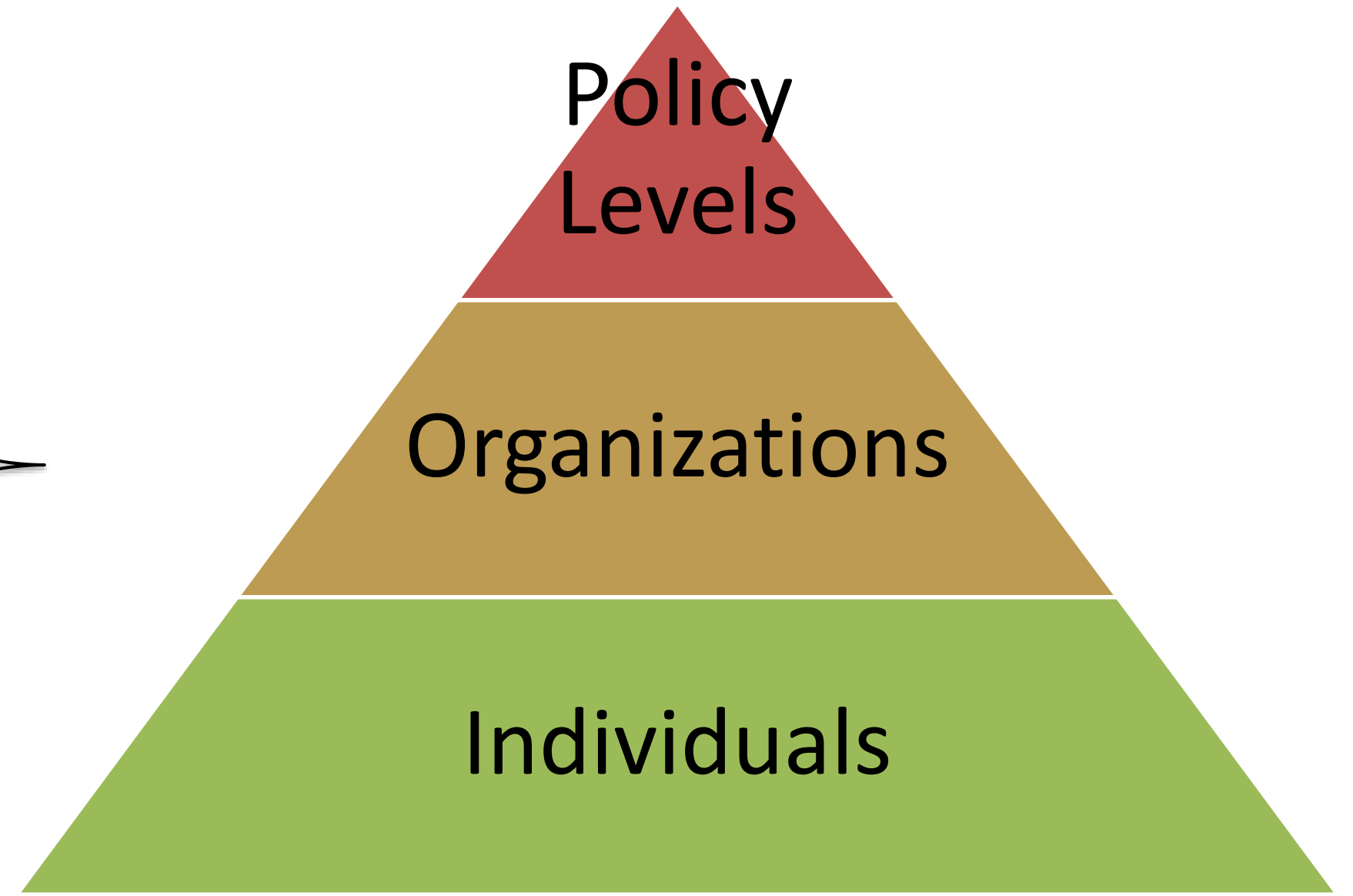


5. Housing affordability
6. **Mental and emotional wellbeing**
7. **Physical wellbeing/health**
8. Policy coherence
9. Social and Income Equality

## *Fragmentation*



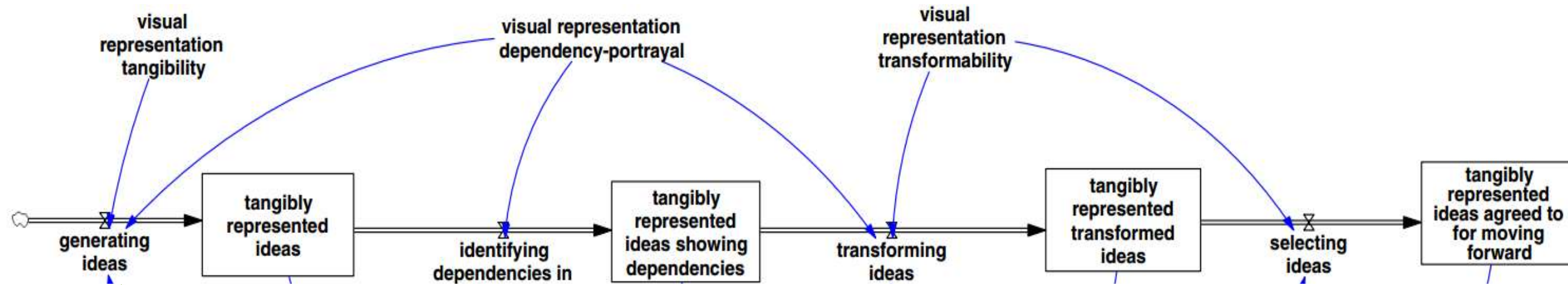
## Integrated Planning



## GMB and Games

	GMB	Games
<i>Learning</i>	✓ (Vennix, 1996)	✓ (Kopainsky et al., 2015)
<i>Building consensus</i>	✓ (Rouwette et al., 2011)	? (Ruud & Baakken, 2003)
<i>Improving communication</i>	✓ (Rouwette et al., 2011)	? (Ruud & Baakken, 2003)
<i>Use of boundary objects</i>	✓ (Black & Andersen, 2012)	? (Black, 2013; Zimmermann et al., 2015)





**1. GMB Workshops:** Variable Elicitation/Sticky Dots

**2. GMB Workshops:** Concept model + structure elicitation

**3. Game Workshop**

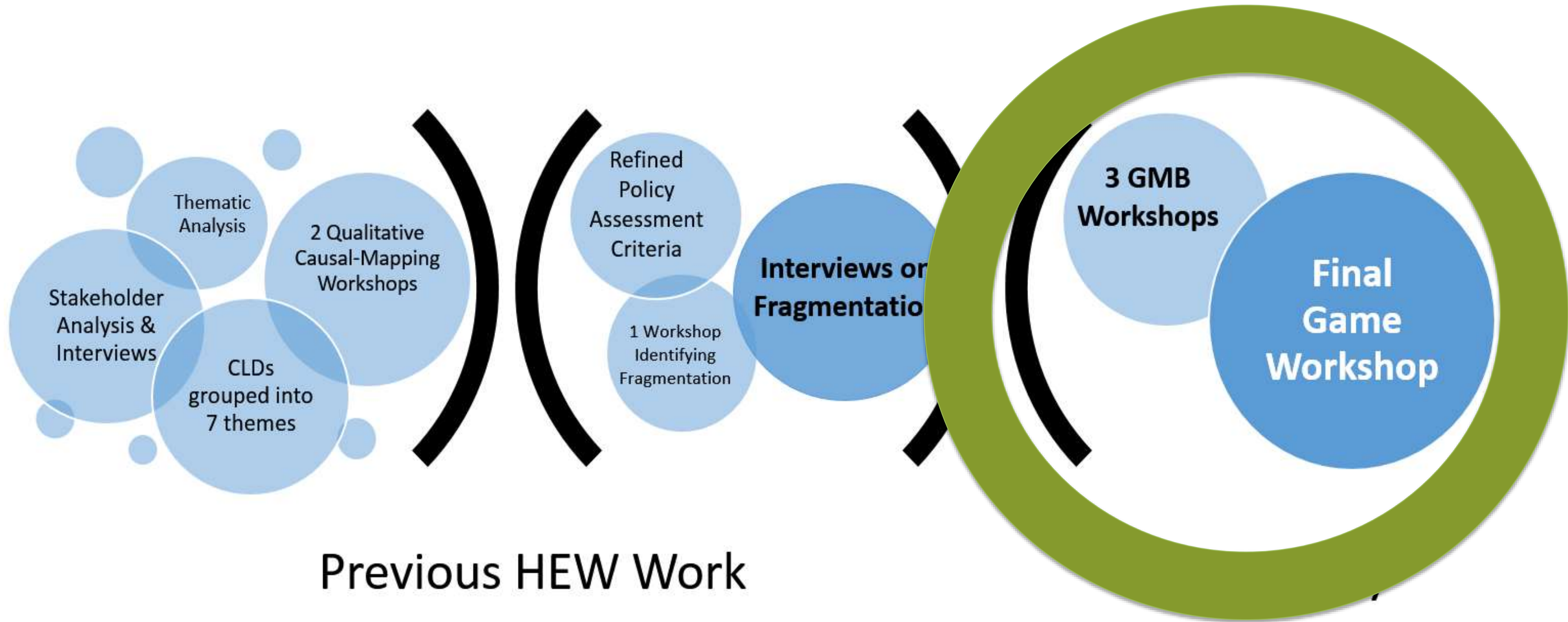


## Research Objectives

The objectives of the study are to improve stakeholder *capacity for integrated decision-making* by addressing the *multiple objectives* of the built environment and to examine the *relative contributions* of group model building and simulation games to group processes.

This is done in order to *reduce fragmentation* among London's built environment decision makers and to add to the understanding of *how simulation games can be used effectively in participatory GMB process*.

# HEW Project Context

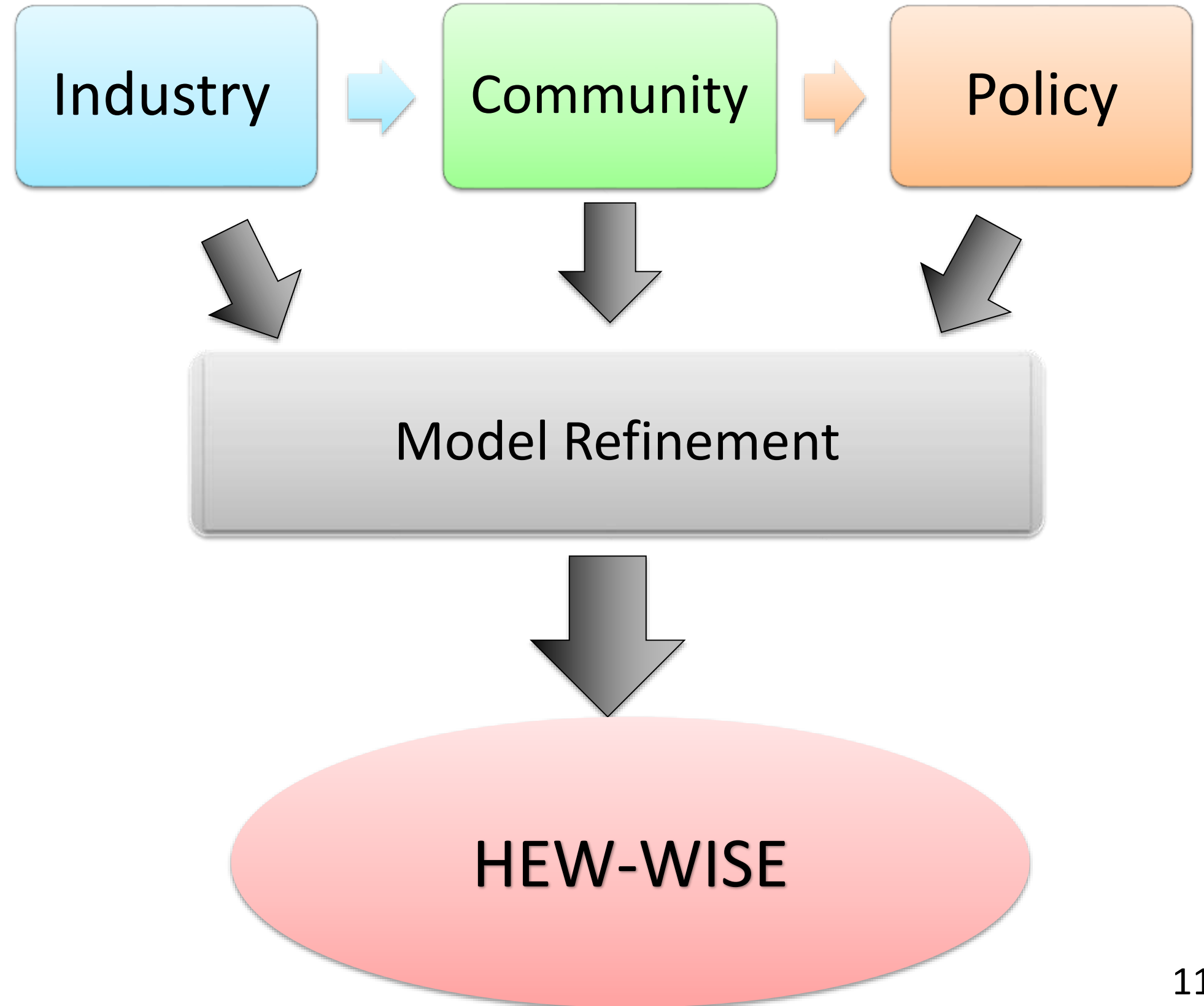


Previous HEW Work

Group Model  
Building



Game





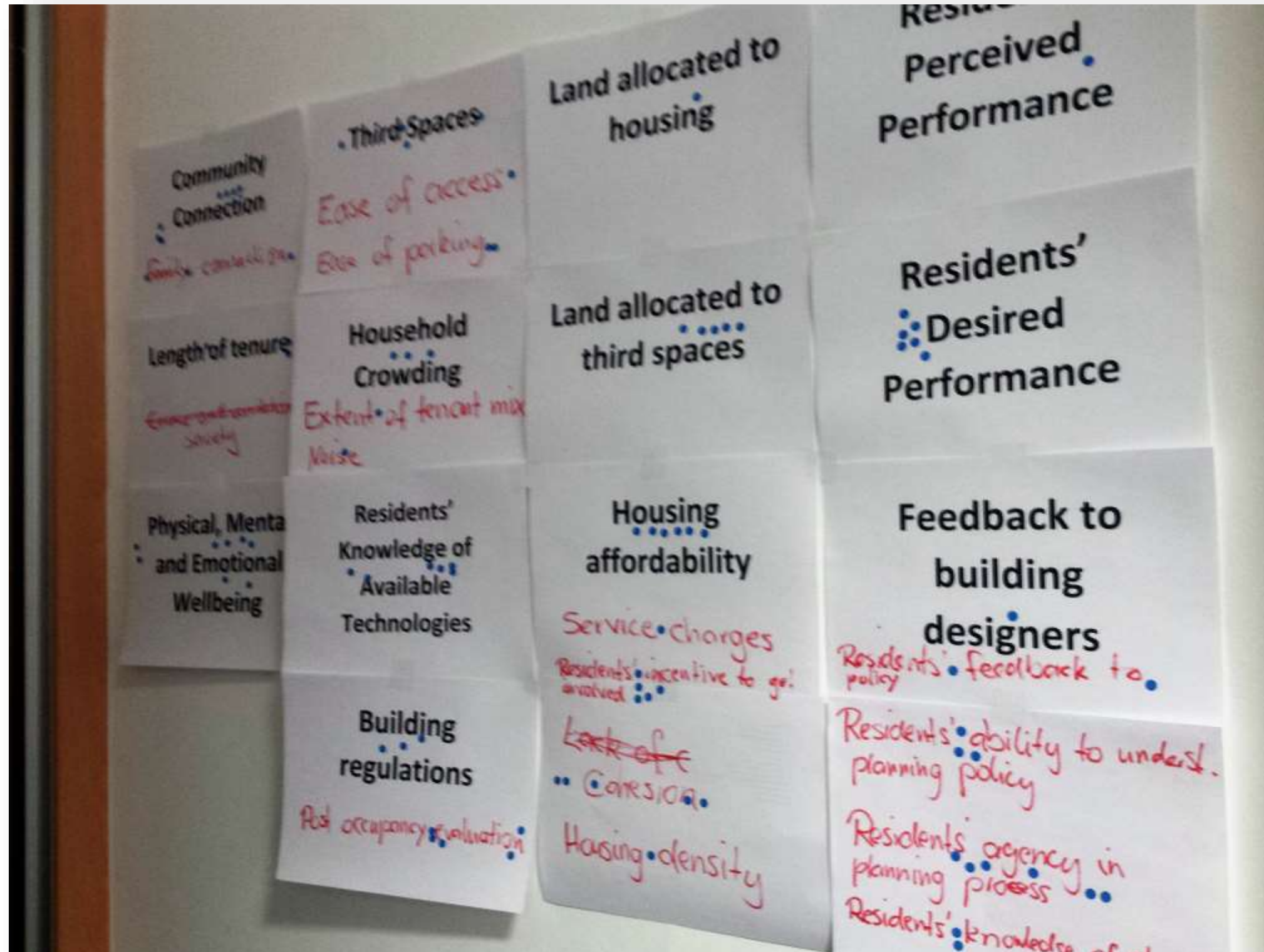
# Data Collection

Data Collected	Point in Process
Consensus, Insight and Commitment to Conclusions (CICC) Questionnaire	After each small workshop, and after gaming workshop.
Investment decisions	Before* and after gaming workshop
Gaming log-sheets (includes group investment decisions)	During the game
Observational Data	During each workshop
Audio Data	During each workshop
Swing Weights	During community & policy workshops

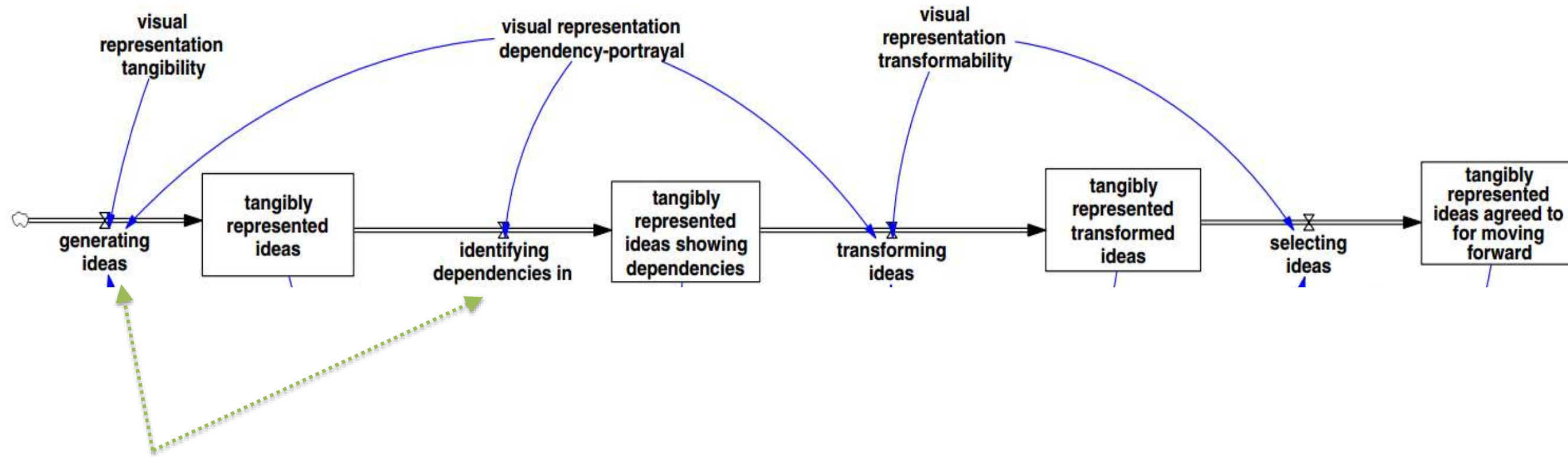
# GMB Workshops



# Disconfirmatory Dots

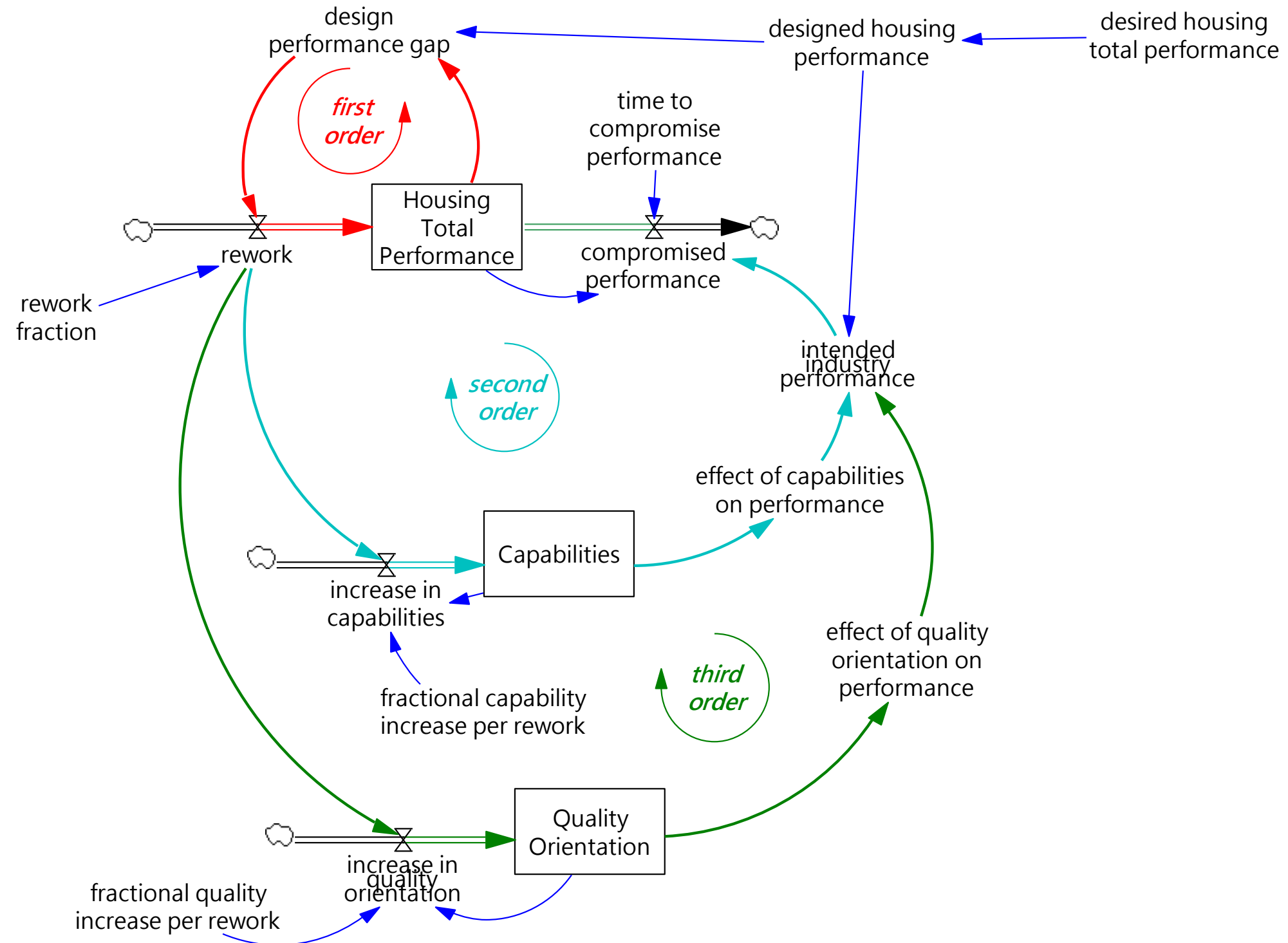






## 1. GMB Workshops: Variable Elicitation/Sticky Dots

# Example Concept Model



# Structure Elicitation

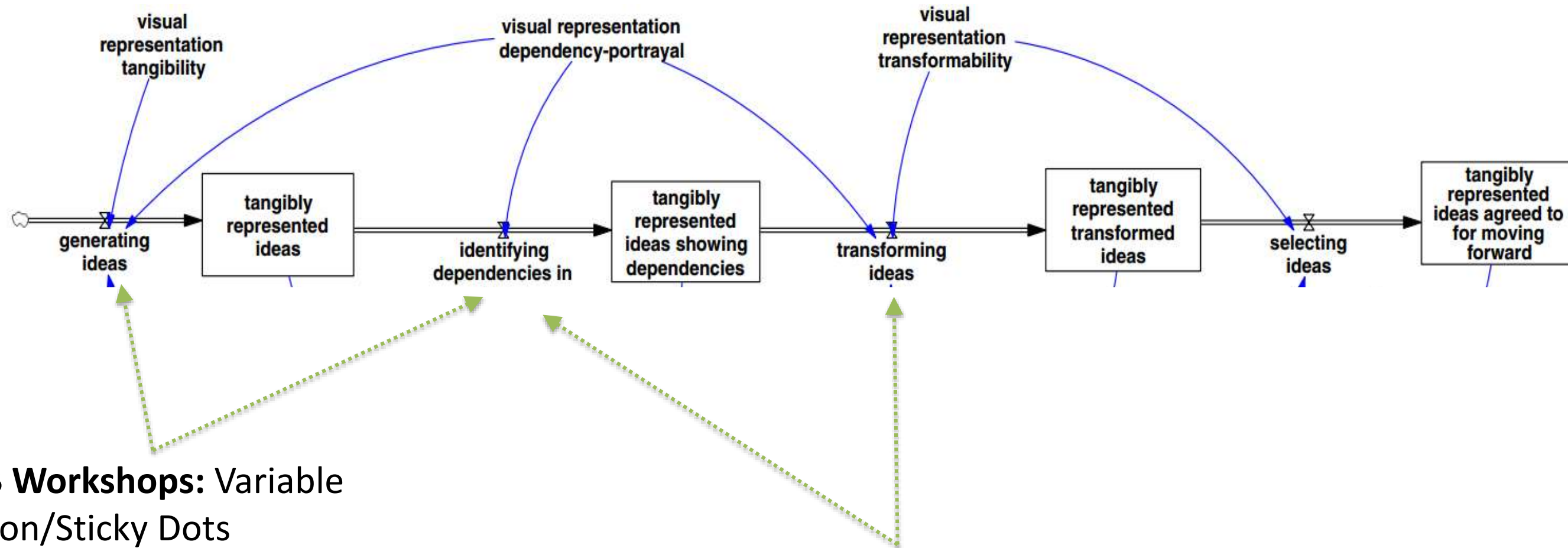












**1. GMB Workshops:** Variable Elicitation/Sticky Dots

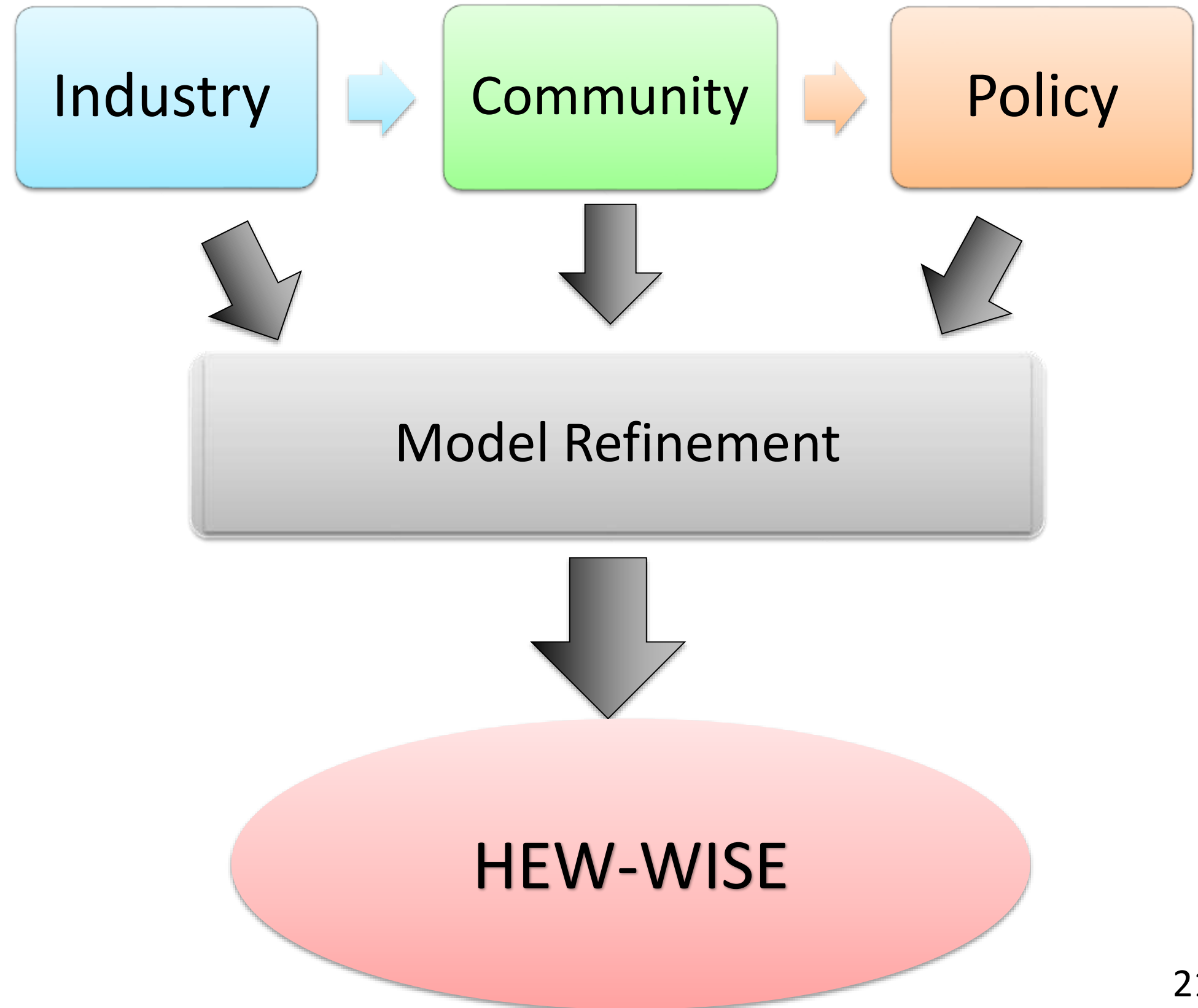
**2. GMB Workshops:** Concept model + structure elicitation



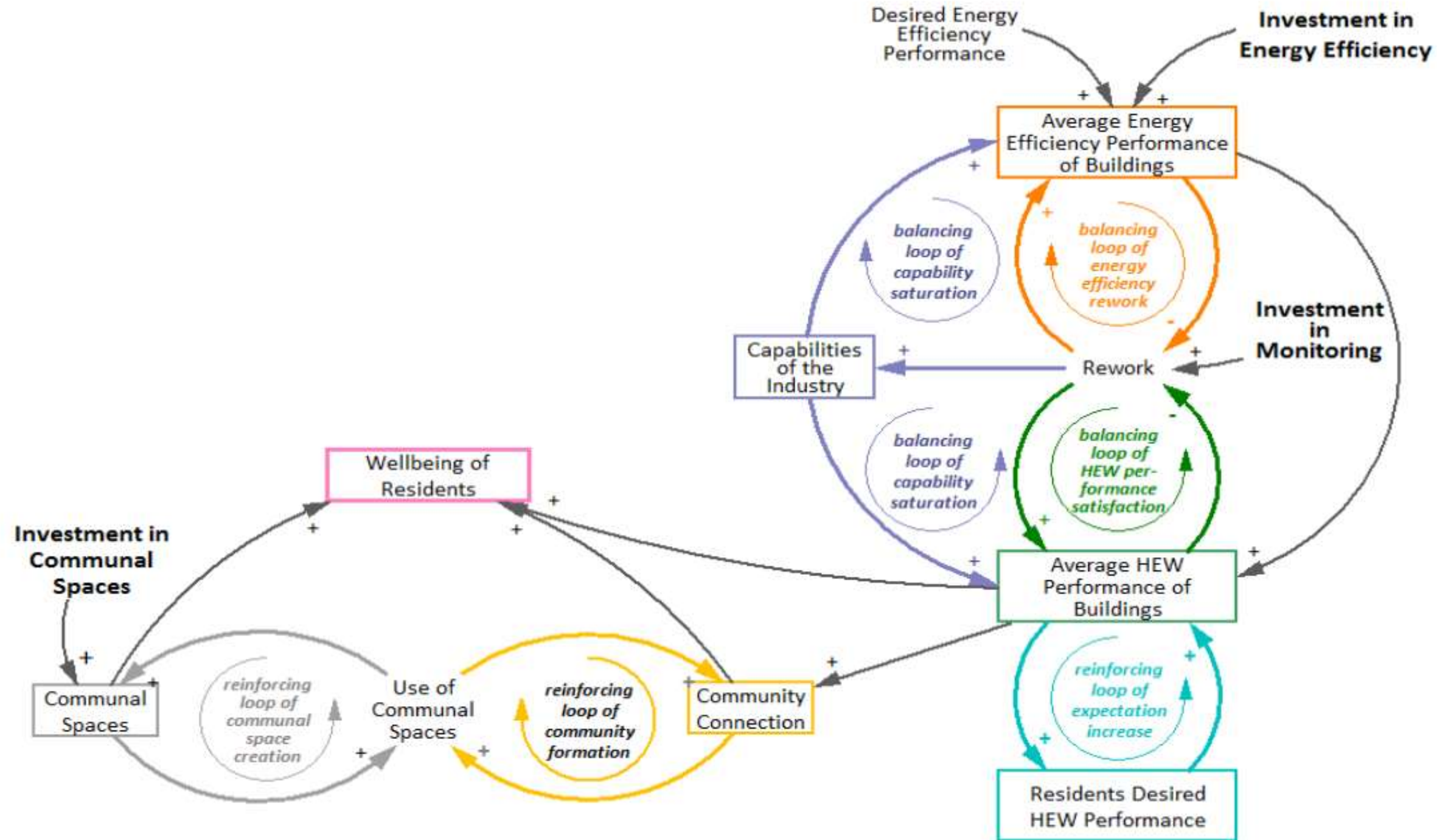
Group Model  
Building



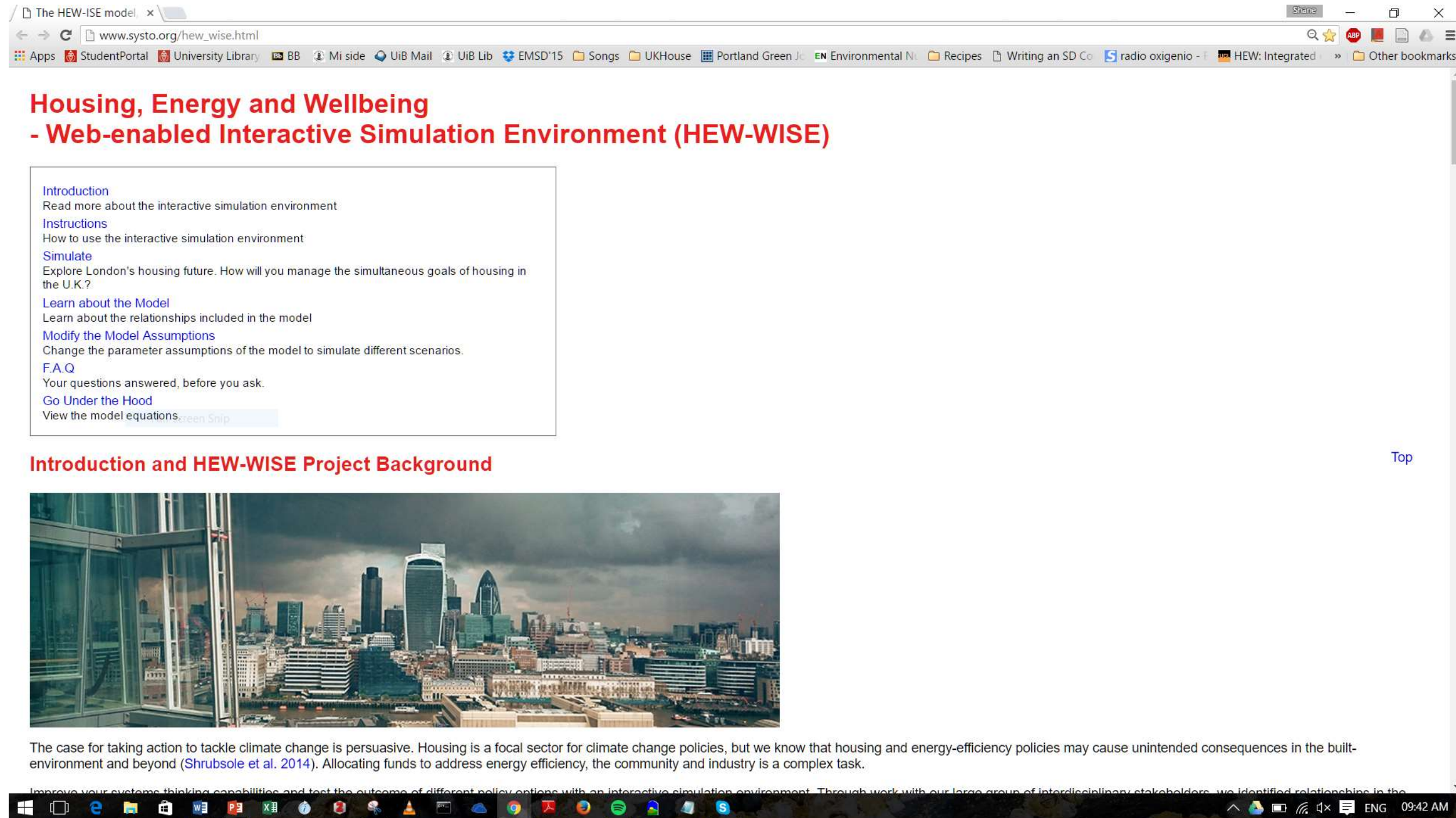
Game



# Debrief Utilizing Causal Diagram



# HEW-WISE Website with Systo®




The HEW-ISE model

www.systo.org/hew\_wise.html

## Housing, Energy and Wellbeing - Web-enabled Interactive Simulation Environment (HEW-WISE)

- [Introduction](#)  
Read more about the interactive simulation environment
- [Instructions](#)  
How to use the interactive simulation environment
- [Simulate](#)  
Explore London's housing future. How will you manage the simultaneous goals of housing in the U.K.?
- [Learn about the Model](#)  
Learn about the relationships included in the model
- [Modify the Model Assumptions](#)  
Change the parameter assumptions of the model to simulate different scenarios.
- [F.A.Q](#)  
Your questions answered, before you ask.
- [Go Under the Hood](#)  
View the model equations.

### Introduction and HEW-WISE Project Background [Top](#)



The case for taking action to tackle climate change is persuasive. Housing is a focal sector for climate change policies, but we know that housing and energy-efficiency policies may cause unintended consequences in the built-environment and beyond (Shrubsole et al. 2014). Allocating funds to address energy efficiency, the community and industry is a complex task.

Improve your systems thinking capabilities and test the outcome of different policy options with an interactive simulation environment. Through work with our large group of interdisciplinary stakeholders, we identified relationships in the

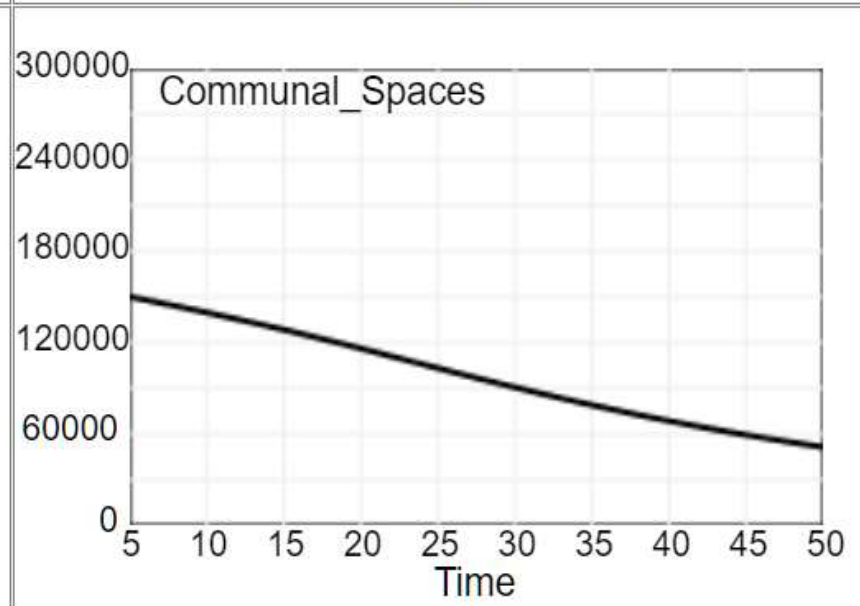
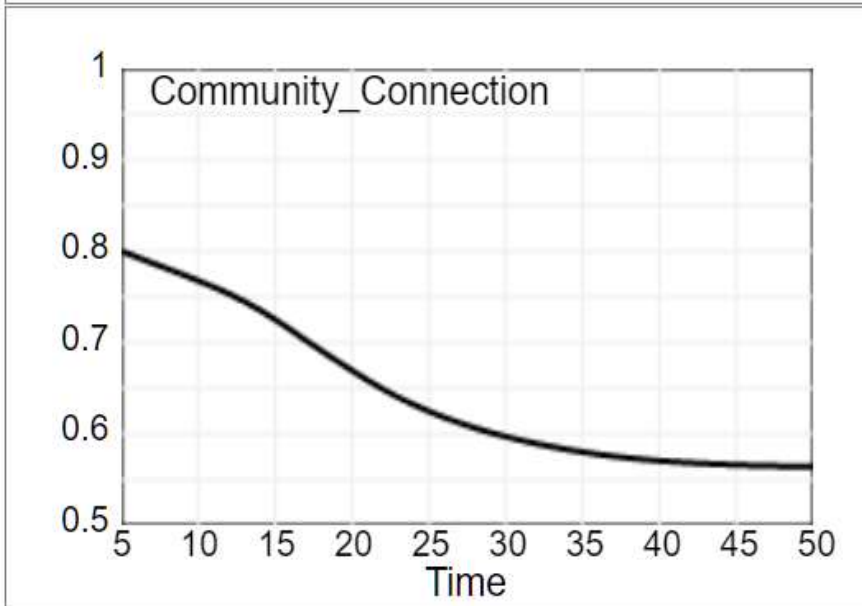
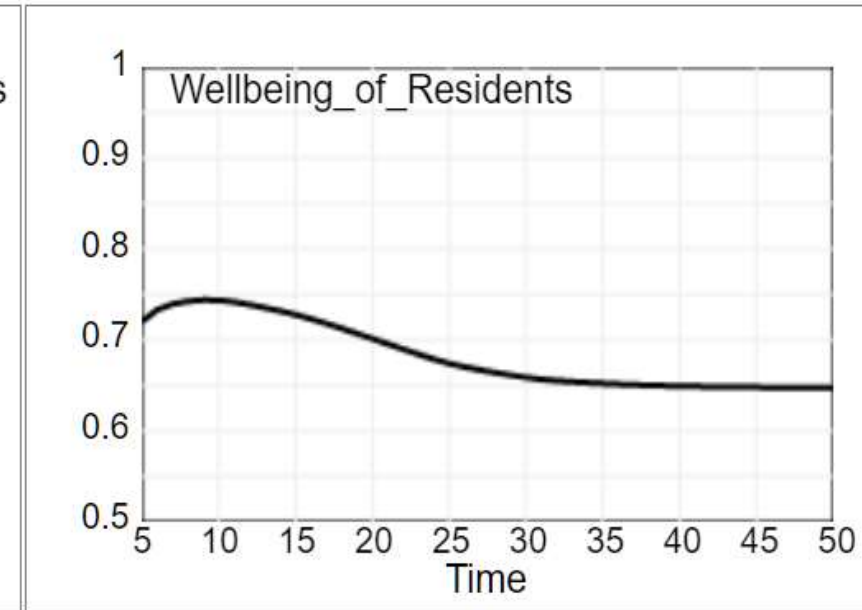
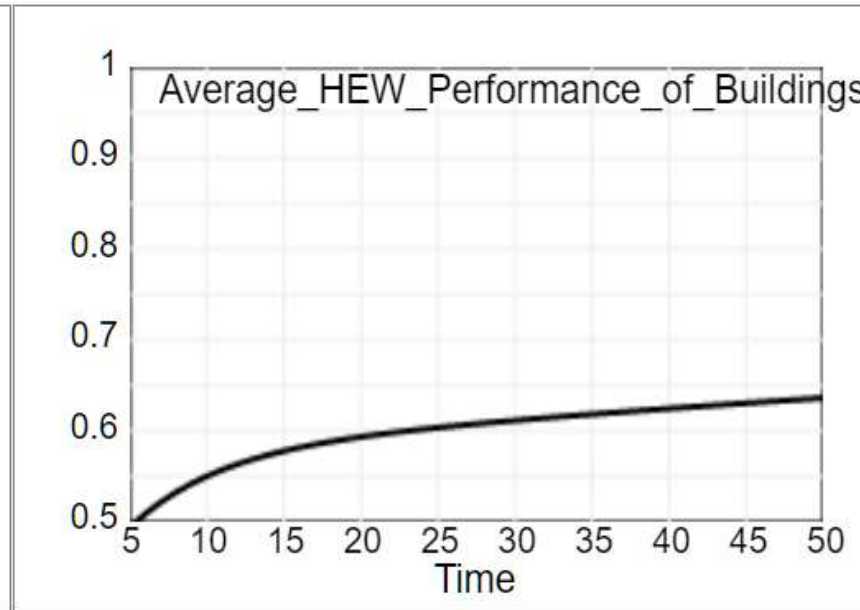
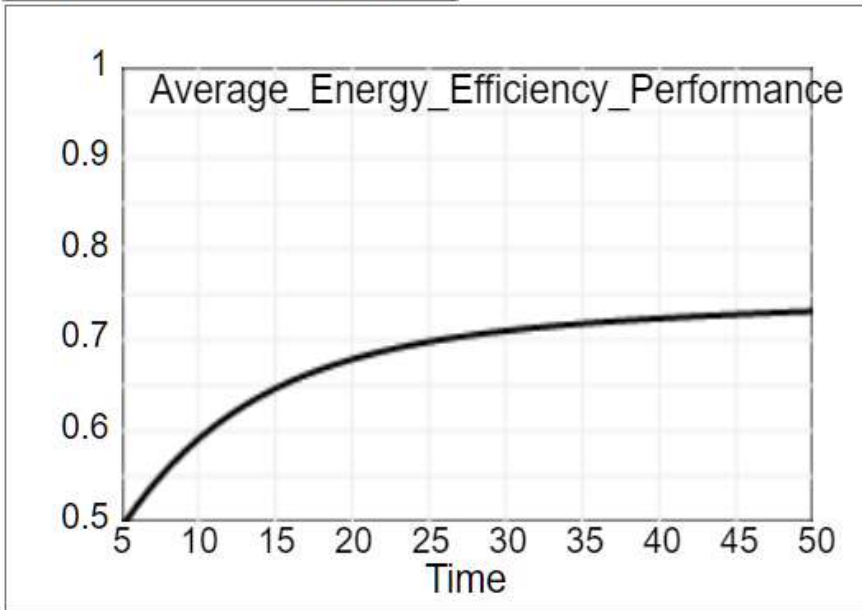


# Interface

**Simulate**

[Top](#)

How to use the interface

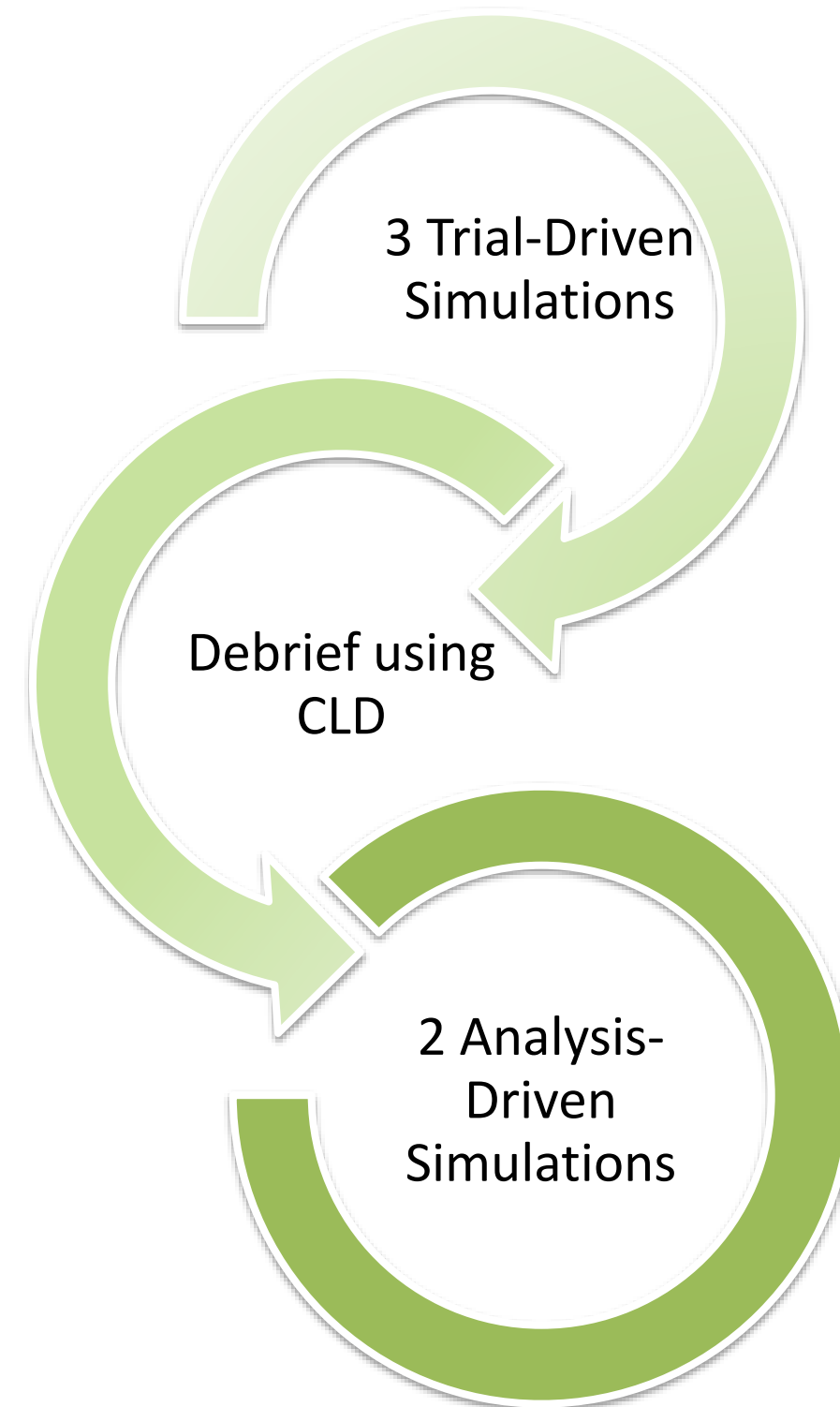


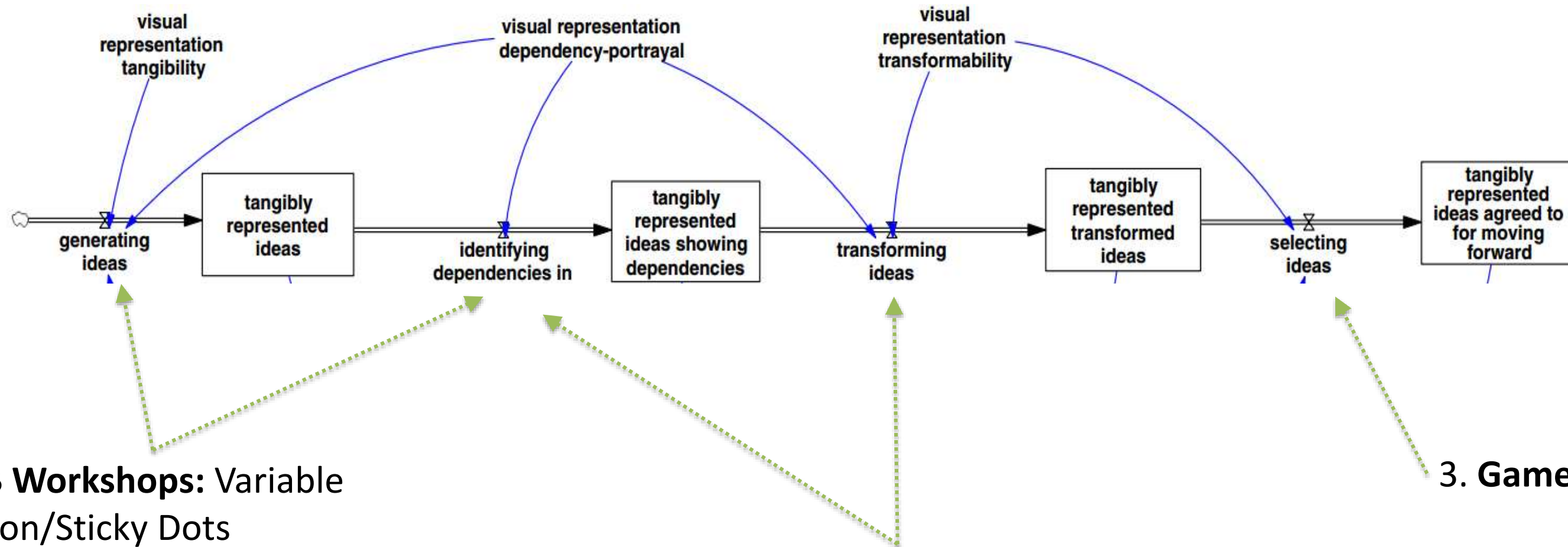
**Investment\_in\_Energy\_Efficiency**

**Investment\_in\_Communal\_Spaces**

**Investment\_in\_Monitoring**

# Game Workshop





**1. GMB Workshops:** Variable Elicitation/Sticky Dots

**2. GMB Workshops:** Concept model + structure elicitation

**3. Game Workshop**



## Questionnaire Results Summary

- ✓ All workshops showed significant positive results regarding consensus and communication → fragmentation reduced → significantly higher for GMB workshops.
- ✓ Insight and commitment were also significant and positive for all workshops → significantly higher for the game workshop
- ✓ All were significant vs. MAU → no differences between GMB & game
- ✓ All elements seen to positively contribute → facilitator and computer model simulations higher for game.

# Audio Data Results

	GMB Community	GMB Policy	Group 1 Game	Group 2 Game	Group 3 Game
Transcript Length	1:58	2:40	1:34	1:42	01:33
Number of Participants	5	7	3	4	4
Multiple Objectives Positive:	12 (1)*	<b>10 (.84)</b>	15 (1)*	36 (.95)*	19 (1)*
Multiple Objectives Total:	12	12	15	38	19
Learning (Insight) Positive:	<b>4 (1)</b>	8 (1)*	21 (1)*	37 (.95)*	<b>10 (.63)</b>
Learning Total:	4	8	21	39	16
Fragmentation Positive:	20 (.87)*	36 (.76)*	22 (.88)*	28 (.74)*	17 (.85)*
Fragmentation Total:	23	47	25	38	20
Boundary Object Positive:	20 (.77)*	41 (.64)*	<b>21 (.63)</b>	<b>26 (.55)</b>	<b>29 (.62)</b>
Boundary Object Total:	26	64	33	47	47

# Audio Data Results

	Trial	Analysis
Multiple Objectives Positive	44 (.95)*	26 (1)*
Multiple Objectives Total	47	26
Learning Positive	36 (.97)*	32 (.82)*
Learning Total	37	39
Fragmentation Positive	39 (.83)*	28 (.78)*
Fragmentation Total	47	36
Boundary Object Positive	<b>36 (.65)</b>	44 (.63)*
Boundary Object Total	57	70



## Limitations

- Small sample size due to applied nature, busy stakeholders & possibly Brexit
- Failure to collect pre and post-test questionnaires due to not being allowed on UCL campus.
- Time constraints to analyze a large amount of data prevented re-training to boost reliability.

## Future Work

- Controlled, direct comparison of group process with GMB and Games
  - Include a scale for empathy
- Use of the boundary object framework to compare current GMB scripts.
- Use of the online tool to assess participants after the fact could be useful.