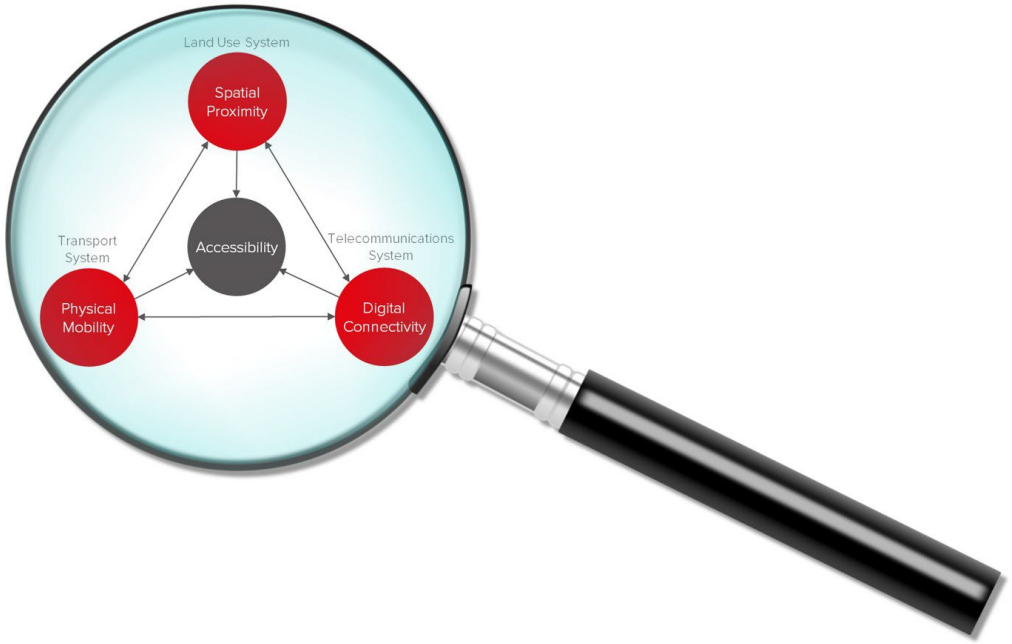
Workshop 6 – Reflecting upon our mental model of urban access and how it could help us

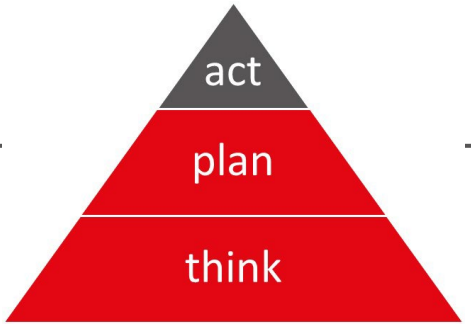
5 October 2021 – 1100-1230 CET (1000-1130 BST)

Triple Access Planning for Uncertain Futures

Purpose of the workshop



- *Thinking* together about the Triple Access System
- Developing a deeper appreciation and understanding of the *variables* affecting triple access and the *links* between them
- Producing a representation of the system of systems as a Causal Loop Diagram



Today:

- To share a simplified representation of the product of our systems thinking
- To test its credibility as a mental model
- To consider its application merit
- To flag outstanding questions

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Agenda (1100-1230 CET)

1100	Welcome and purpose of workshop
1110	A reminder of our systems thinking journey together
1125	From ‘too complex’ to ‘simple enough to be useful’
1135	Exercise 1 - walking and talking around our simplified mental model
1155	Exercise 2 – starting to inform urban mobility (thinking about) planning
1215	Questions and reflections
1230	Close

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A reminder of our systems thinking journey together 1110-1125

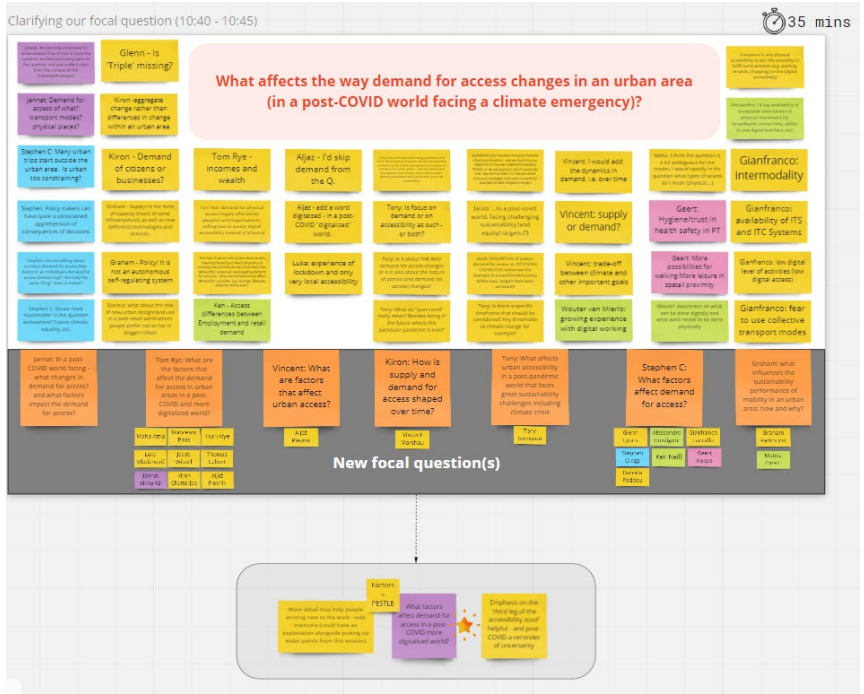
Workshop1

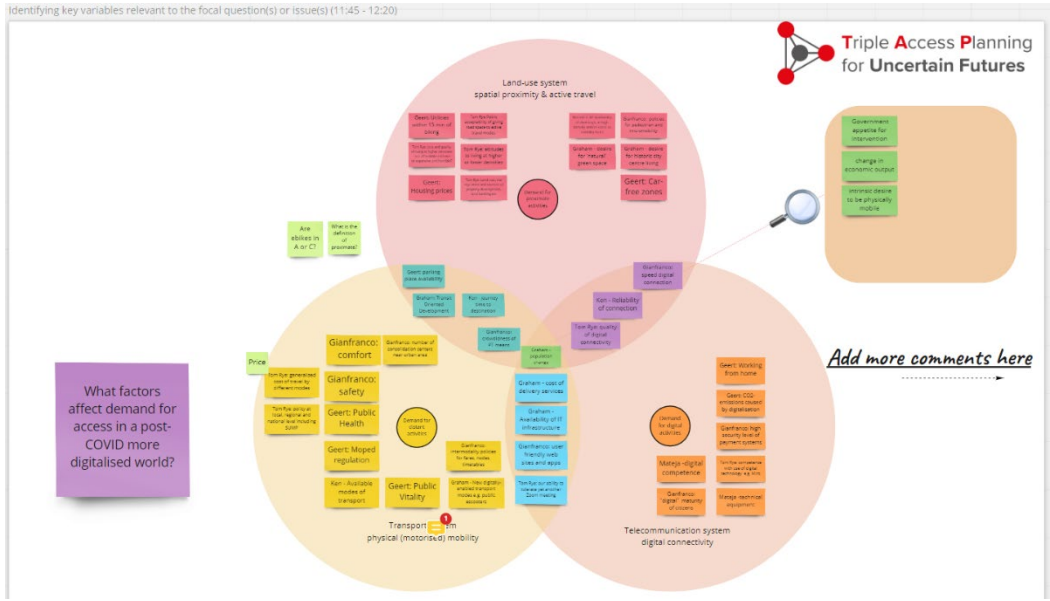
Purpose and Building Blocks

- we (re)defined our focal question:

  "What factors affect demand for access in a post-COVID more digitalised world?"

- we Identified key variables relevant to the focal question(s) and the three access sub-systems: *transport, land-use, telecommunications*





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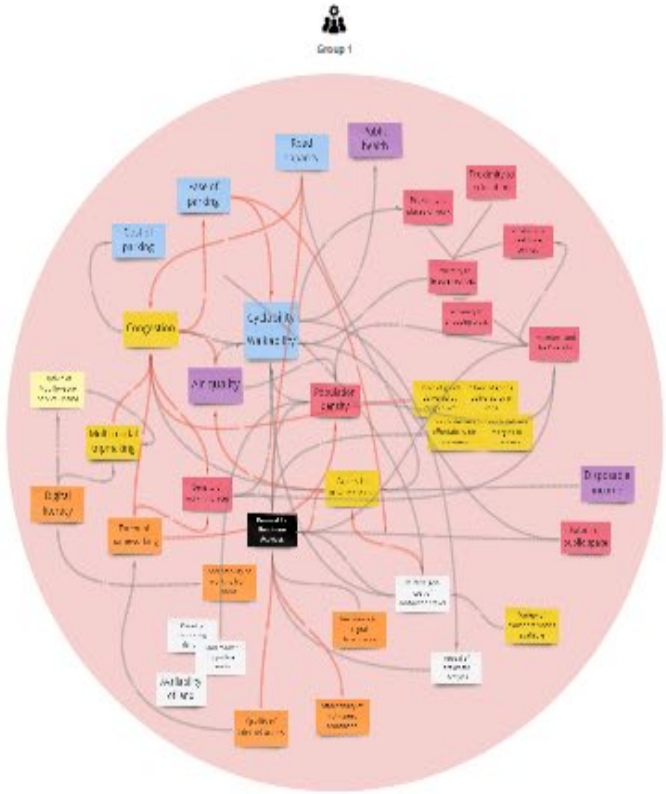
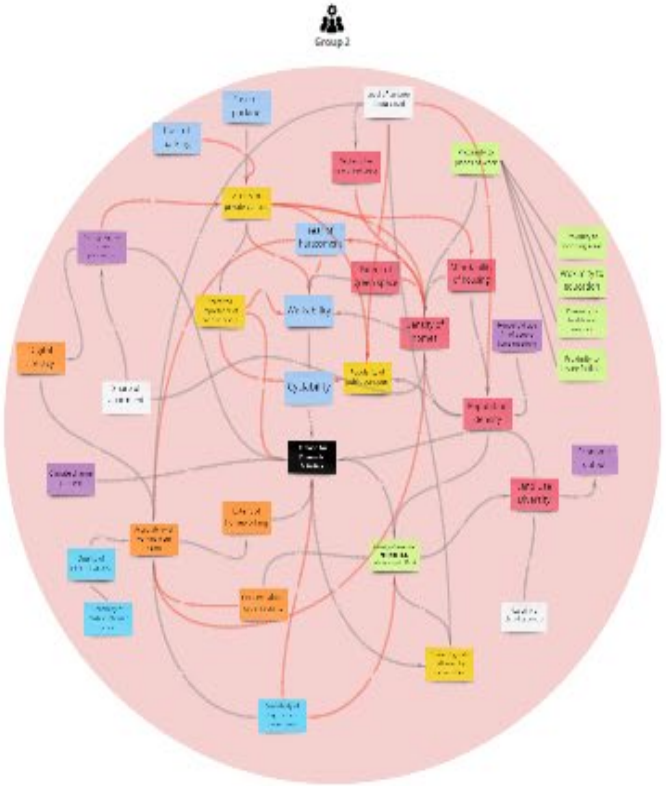
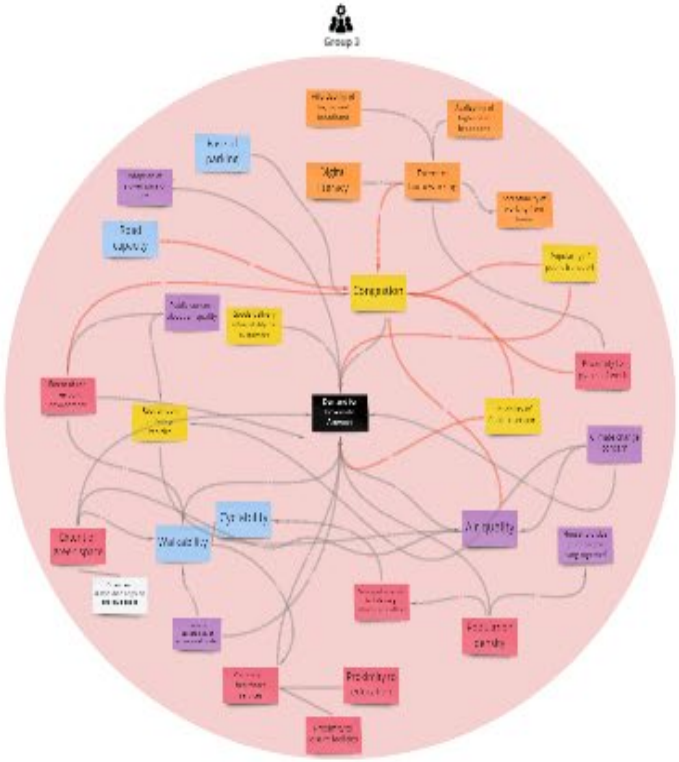
Workshop2

Access requiring spatial proximity - we focused on the **Land Use System** and created three CLDs (drawing upon and extending the pool of variables from Workshop 1)

What factors affect demand for spatial proximity <<in urban areas>>in a post-COVID more digitalised world?







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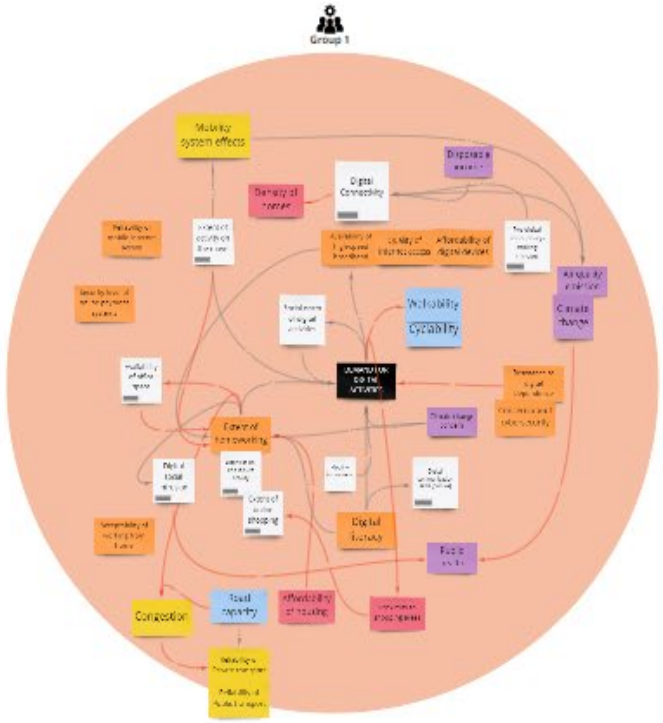
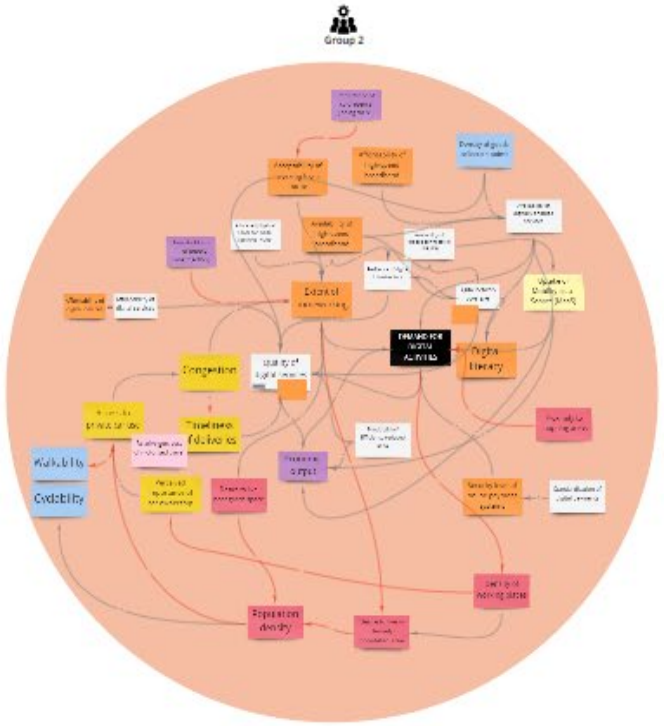
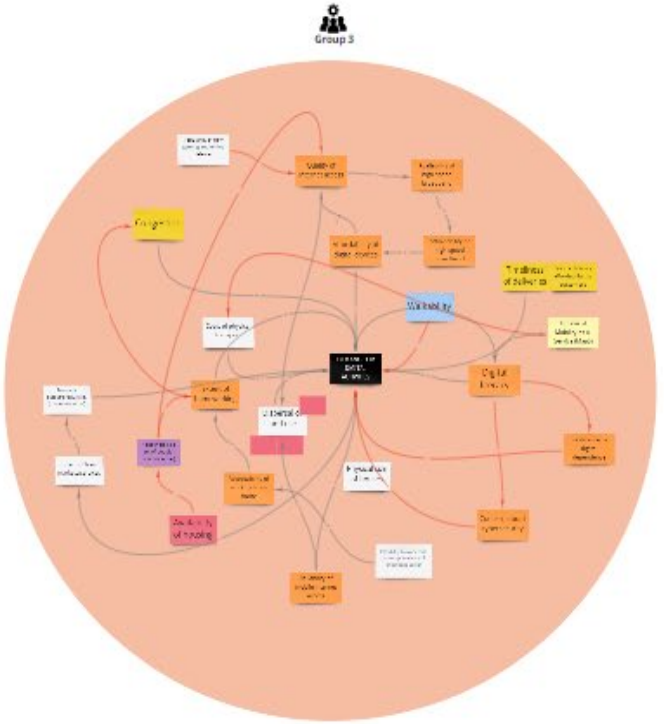
Workshop3

Access requiring digital connectivity - we focused on the **Telecommunication System** and created three CLDs (drawing upon and extending the pool of variables from Workshop 1 and 2)







What factors affect demand for digital connectivity <<in urban areas>>in a post-COVID more digitalised world?

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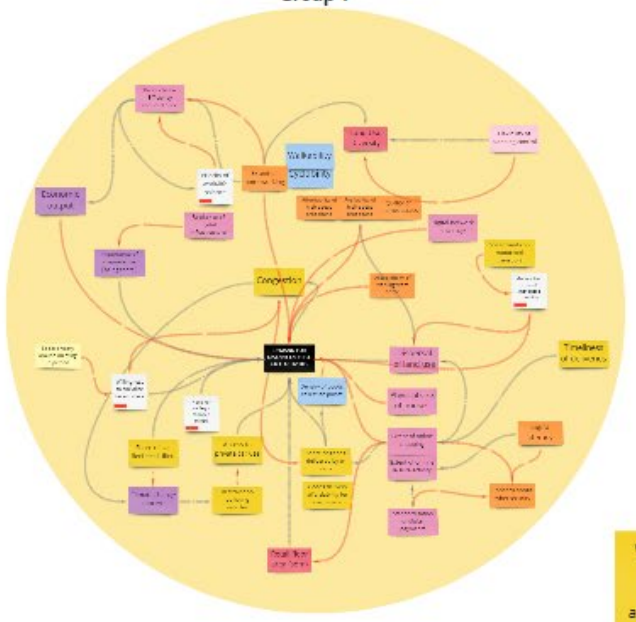
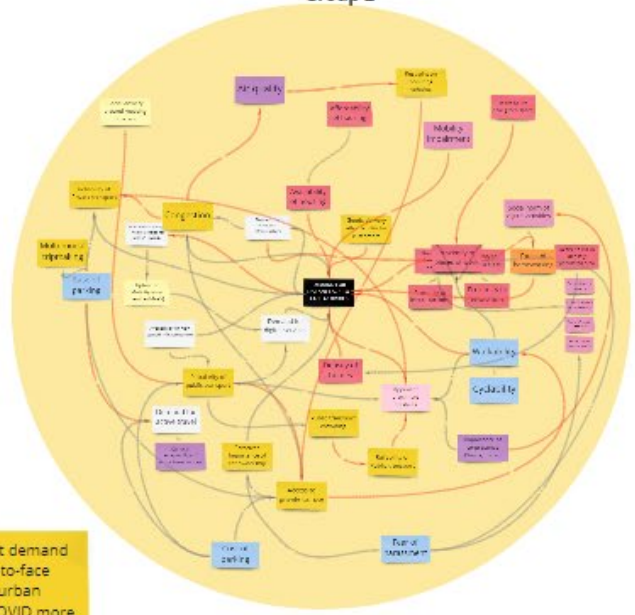
Workshop4

Access requiring physical mobility - we focused on the **Transport System** and created three CLDs (drawing upon and extending the pool of variables from Workshop 1, 2 and 3)

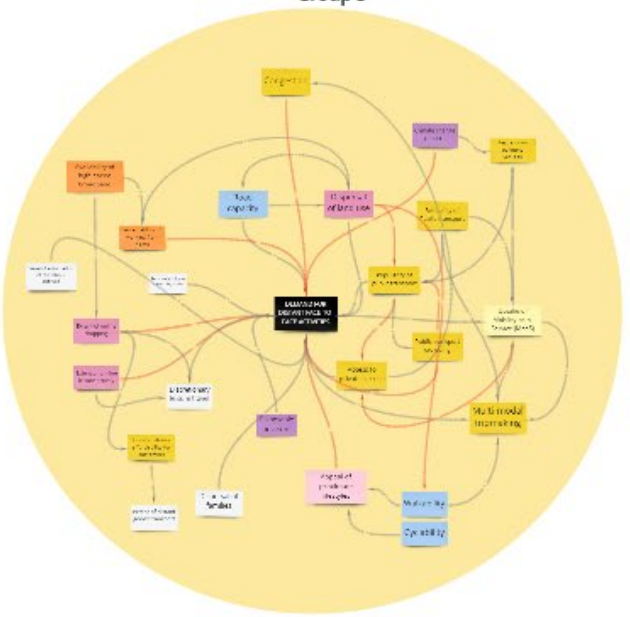
Group 1



Group 2



Group 3



What factors affect demand for distant face-to-face activities <<in urban areas>>in a post-COVID more digitalised world?

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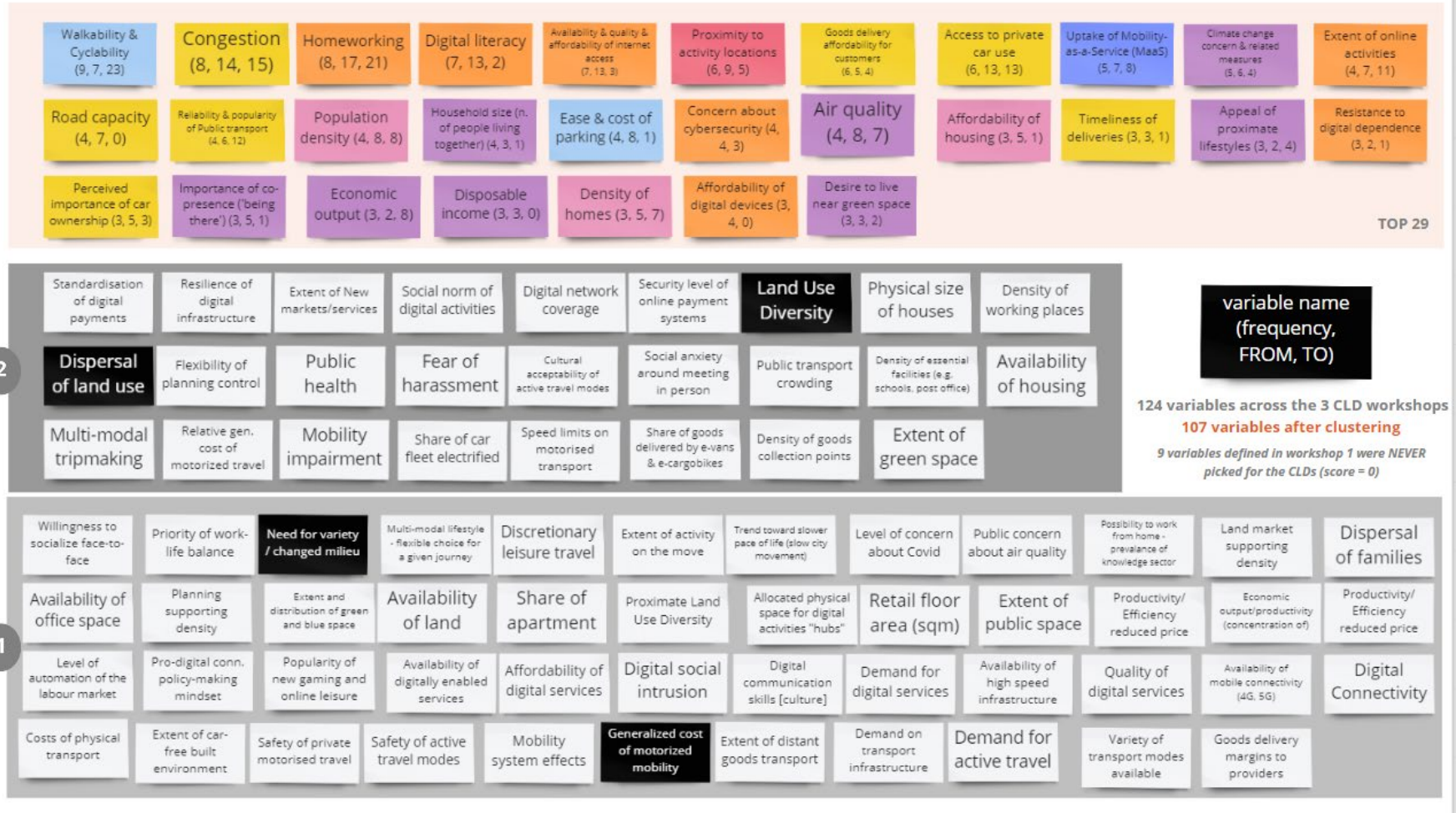
Consolidation of results by UWE (1)

- We **clustered variables** that behaved similarly in the system(s), and reduced the original set of 124 variables, to a set of 104 variables
- We **evaluated** and **ranked** the variables defined across the 4 workshops by considering their importance (how many times they appeared in the 9 CLDs) and impact (number of in/out connections to other variables)
- For each of the 20 TOP variables we indicated **frequency** (n. of times they appear in the 9 CLDs), **FROM** (n. of connections generated from that variable to others in the system(s), **TO** (n. of connections generated from other variables in the system(s) to that specific variable). This allowed each variable's complexity and importance to be highlighted



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Workshop5

Important and Uncertain Variables - from the set of 107 variables, we picked 33 variables (9-12 per group * 3 groups) and identified their importance and uncertainty with respect to the question: "**What factors affect demand for access in a post-COVID more digitalised world?"**

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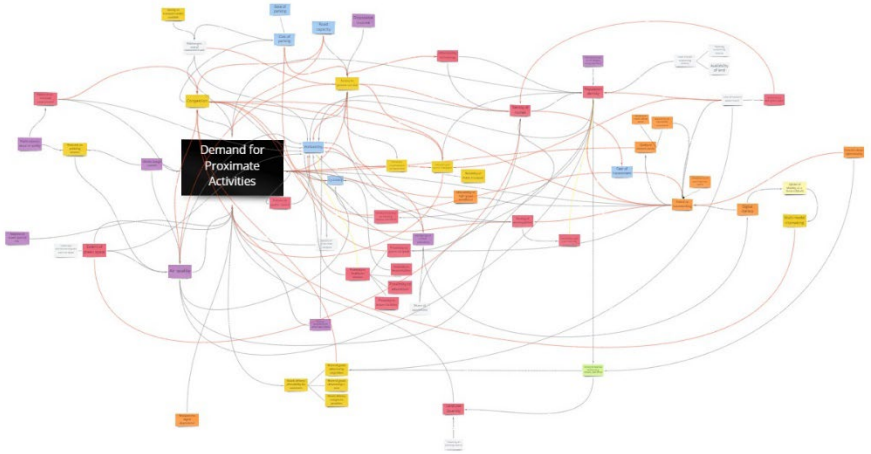
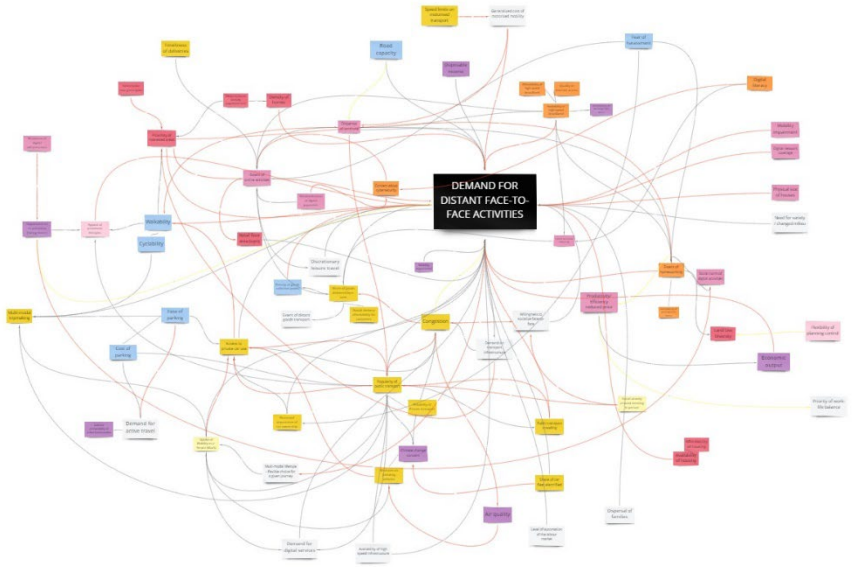
Consolidation of results by UWE (2)

From the workshop outputs we created three consolidated Causal Loop Diagrams

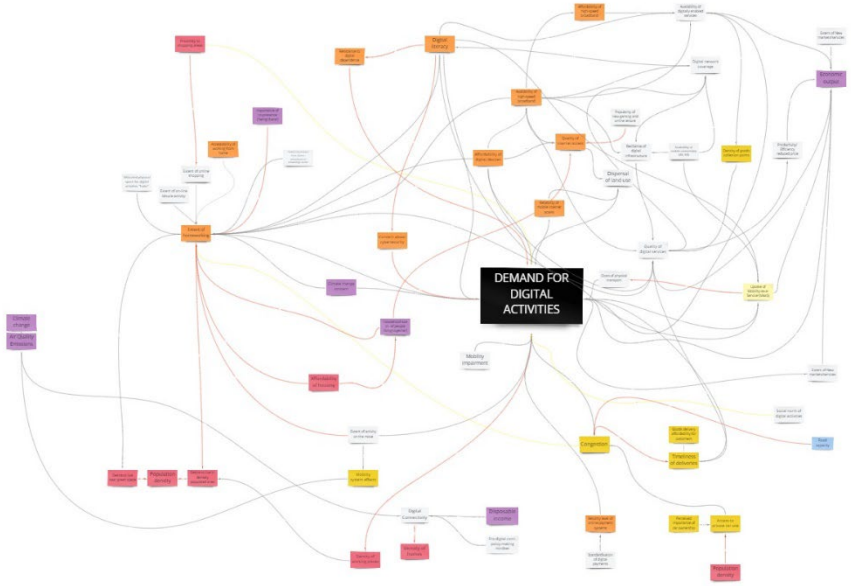
Land Use



Transport



Telecommunication



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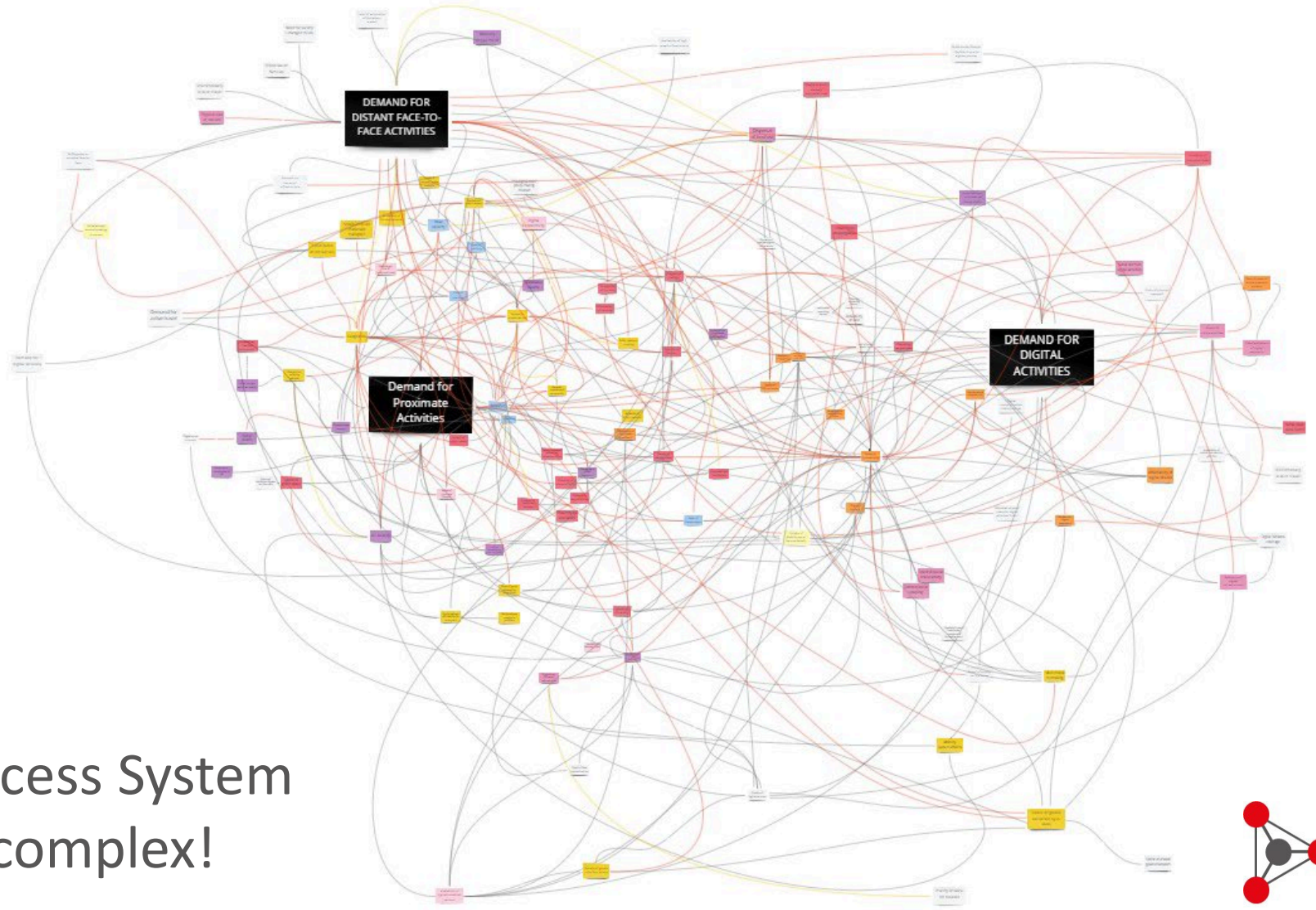
Consolidation of results by UWE (3)

We then combined those CLDs into an overall Triple Access CLD



Conclusion:

The Triple Access System is very (too) complex!

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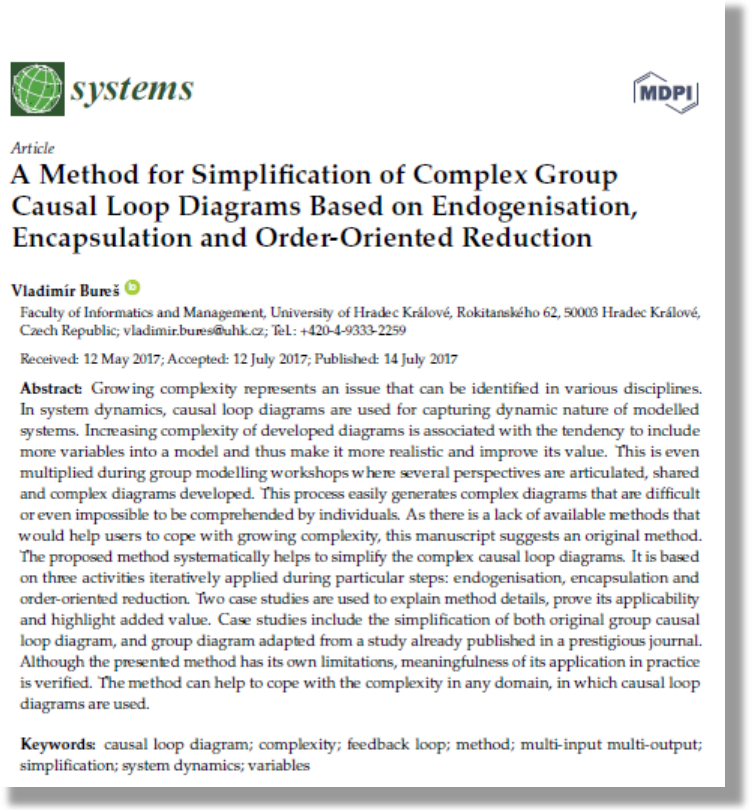
From ‘too complex’ to ‘simple enough to be useful’ 1125-1135

A process of simplification

- A systematic and iterative means to reduce the number of links and variables
- A decision to revert to the sub-system CLDs to apply this simplification process
- A choice to prevent the culling of:
  - any of the 11 important and uncertain variables (workshop 5)
  - variables that appeared in at least six of the nine CLDs produced by the earlier workshops
- A presentational means chosen to further simplify the resulting sub-system CLDs
- The resulting simplified CLDs are intended to be simple enough to be usable and useful



systems

MDPI

Article

A Method for Simplification of Complex Group Causal Loop Diagrams Based on Endogenisation, Encapsulation and Order-Oriented Reduction

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Abstract: Growing complexity represents an issue that can be identified in various disciplines. In system dynamics, causal loop diagrams are used for capturing dynamic nature of modelled systems. Increasing complexity of developed diagrams is associated with the tendency to include more variables into a model and thus make it more realistic and improve its value. This is even multiplied during group modelling workshops where several perspectives are articulated, shared and complex diagrams developed. This process easily generates complex diagrams that are difficult or even impossible to be comprehended by individuals. As there is a lack of available methods that would help users to cope with growing complexity, this manuscript suggests an original method. The proposed method systematically helps to simplify the complex causal loop diagrams. It is based on three activities iteratively applied during particular steps: endogenisation, encapsulation and order-oriented reduction. Two case studies are used to explain method details, prove its applicability and highlight added value. Case studies include the simplification of both original group causal loop diagram, and group diagram adapted from a study already published in a prestigious journal. Although the presented method has its own limitations, meaningfulness of its application in practice is verified. The method can help to cope with the complexity in any domain, in which causal loop diagrams are used.

Keywords: causal loop diagram; complexity; feedback loop; method; multi-input multi-output; simplification; system dynamics; variables

https://doi.org/10.3390/systems5030046

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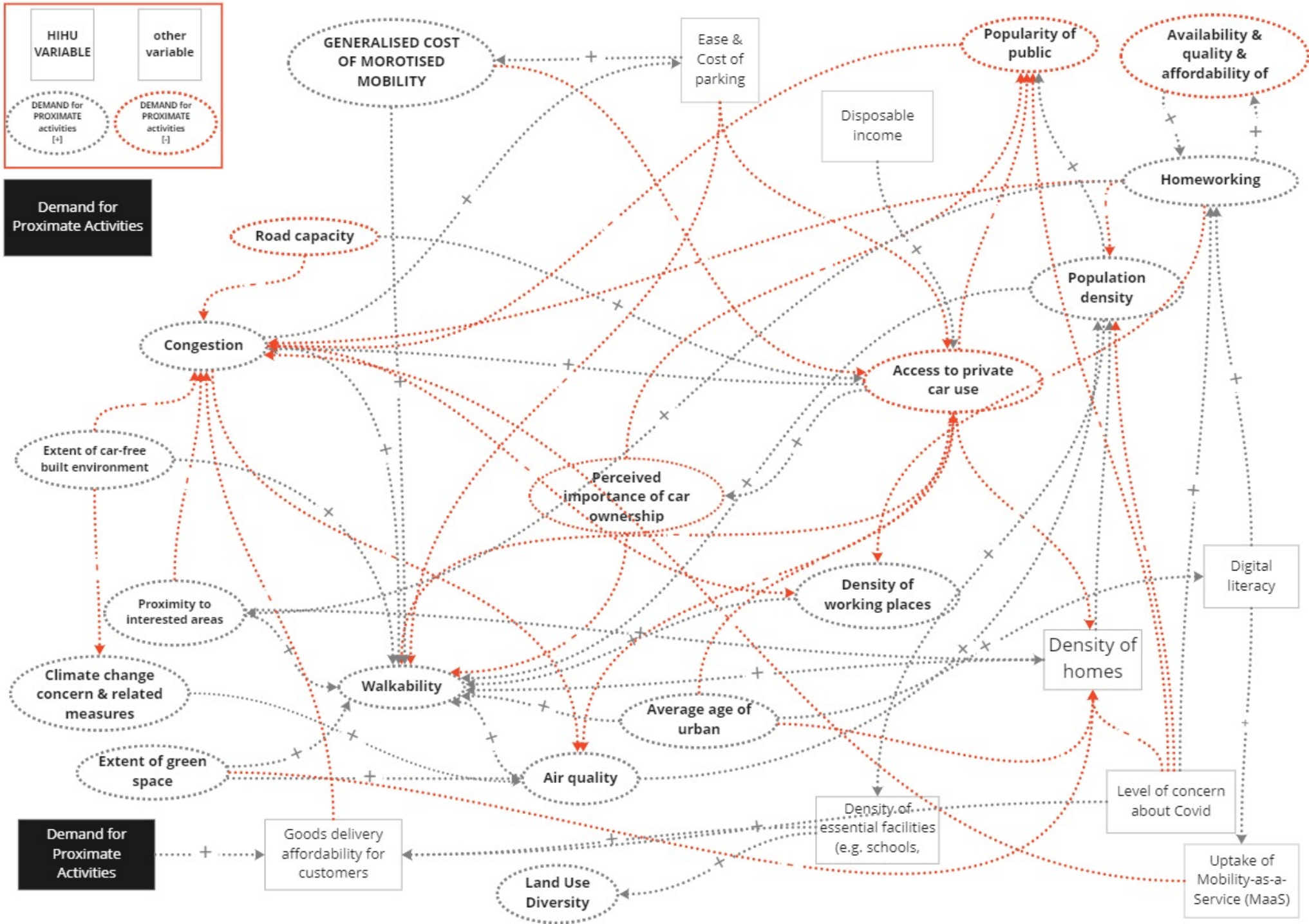
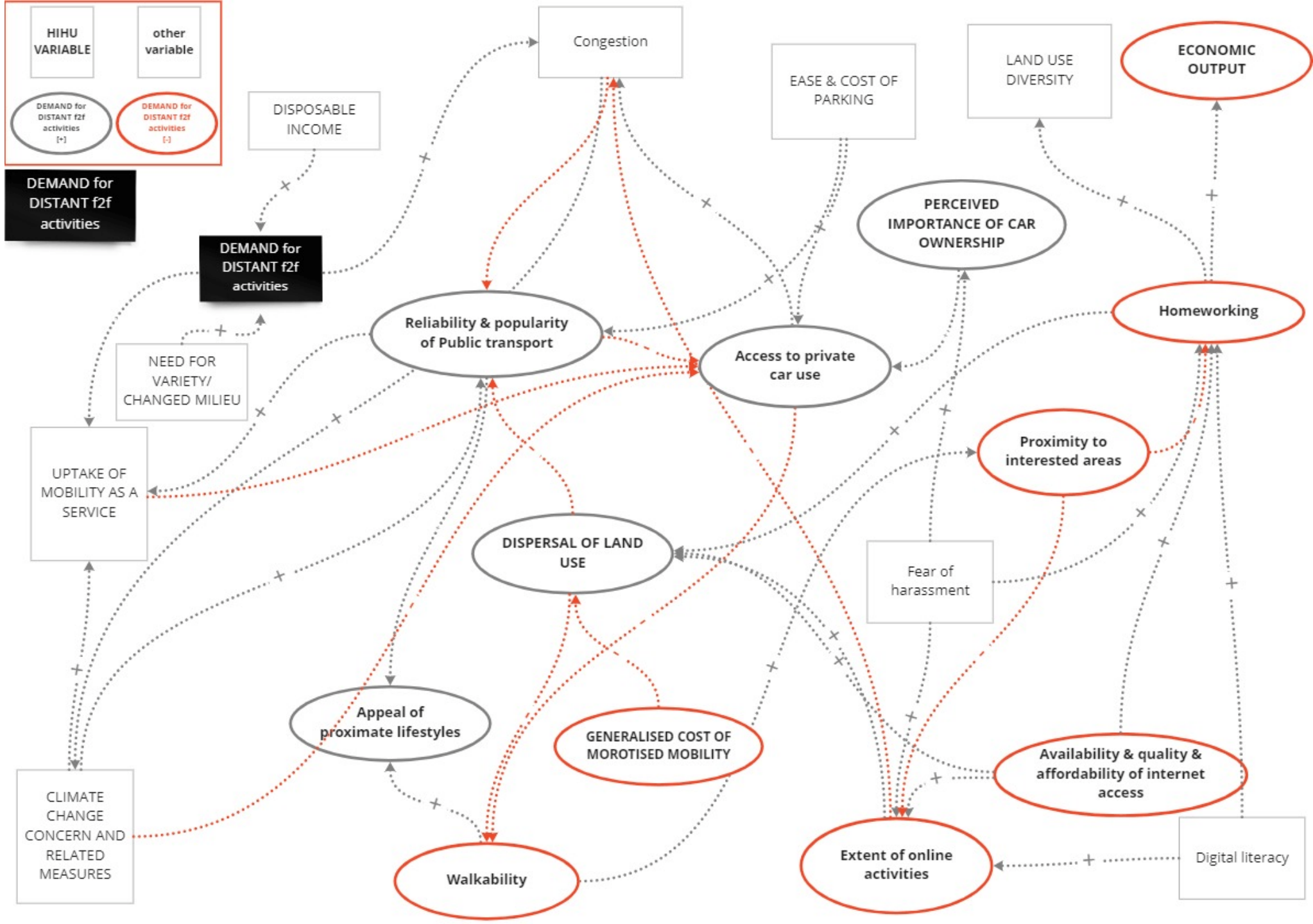
Simplified Land Use System

N. of variables	
Before simplification	50
After simplification	**27**



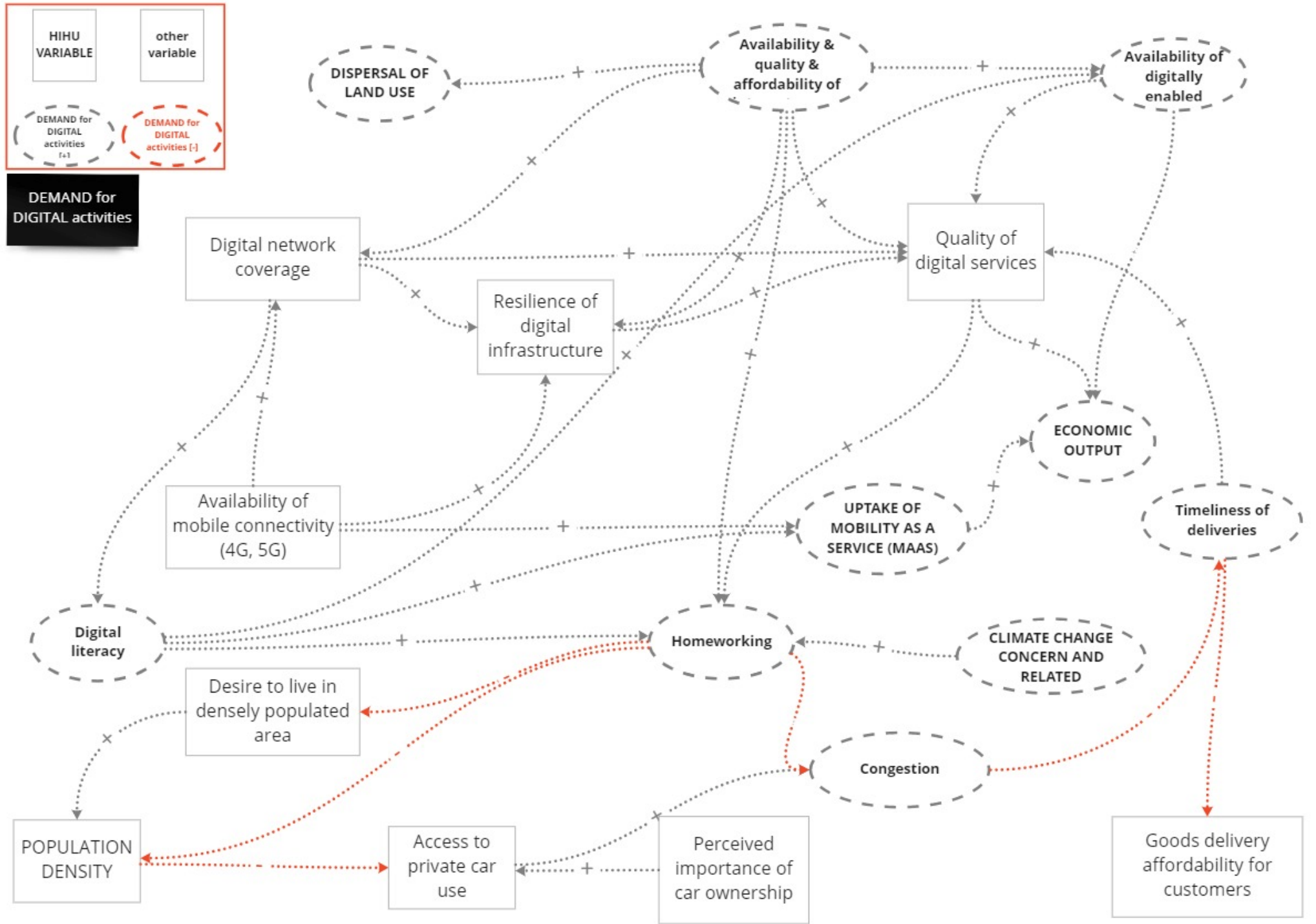
Simplified Transport System

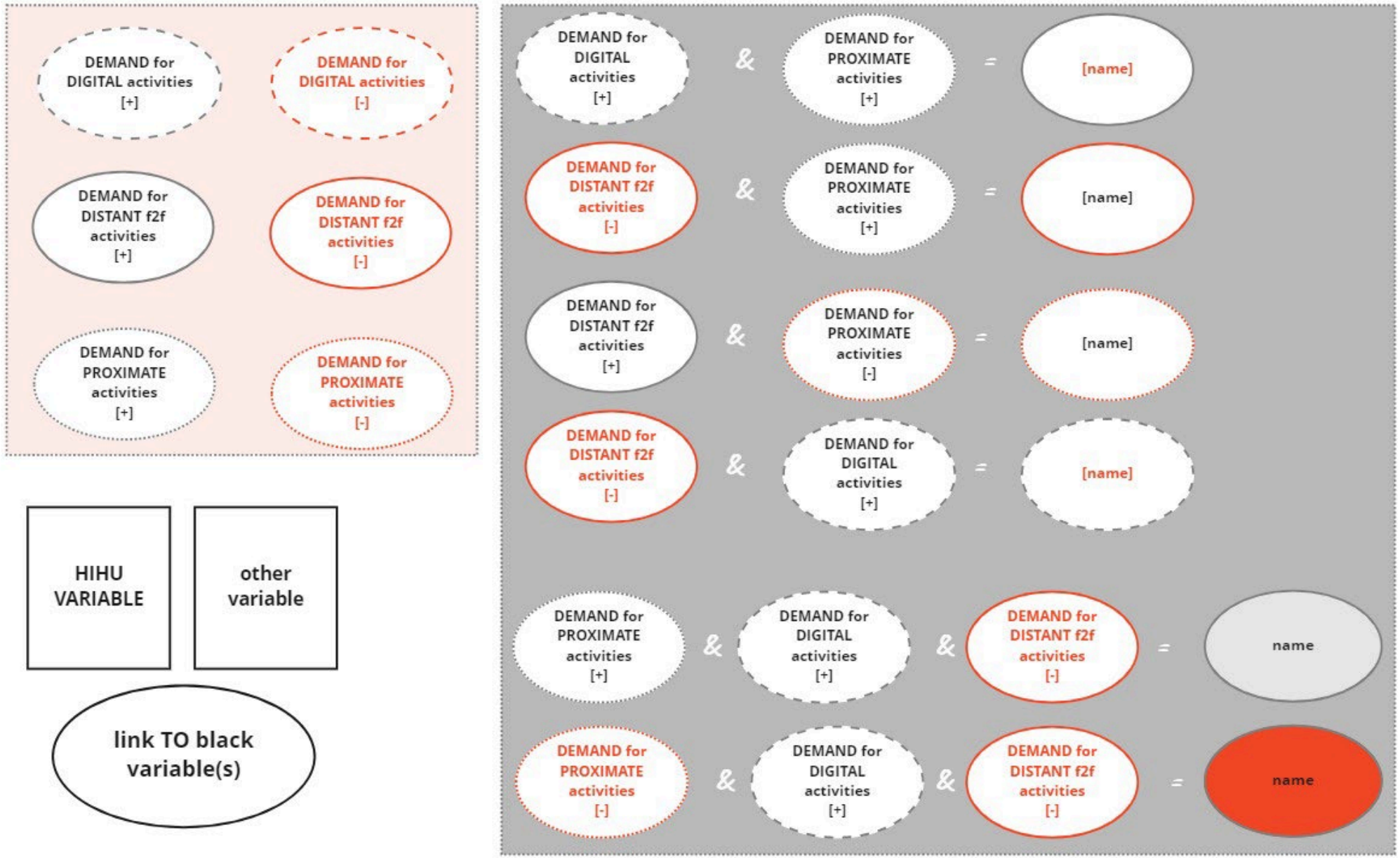
N. of variables	
Before simplification	61
After simplification	**22**



Simplified Telecommunications System

N. of variables	
Before simplification	49
After simplification	**19**

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HIHU VARIABLE
other variable
link TO black variable(s)
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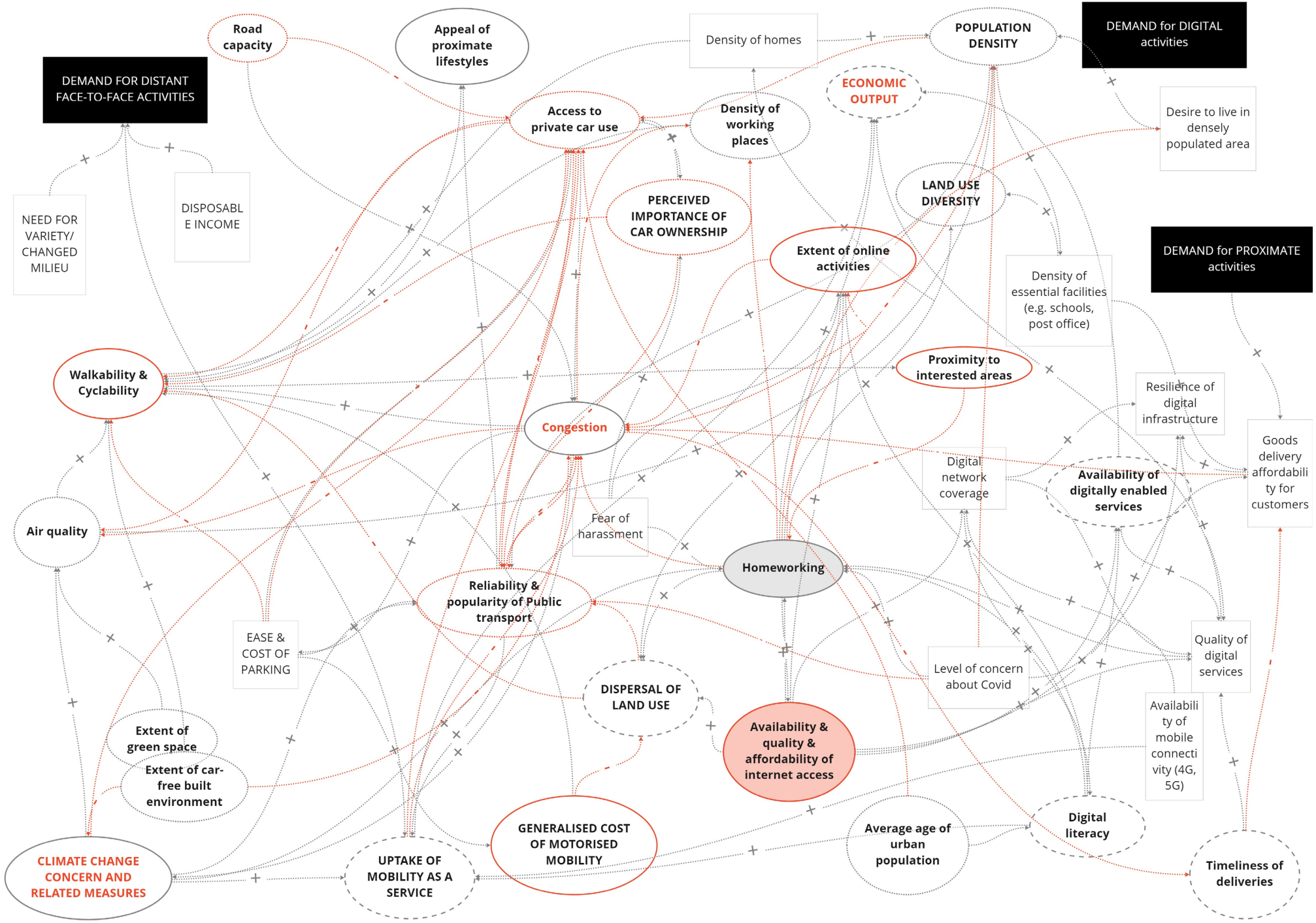
Triple Access System On A Page

N. of variables	
Before simplification	98
After simplification	**39**



Exercise 1 - walking and talking around our simplified mental model

1135-1155

Walking and talking around the mental model

- Volunteers to play
- You are given a starting variable in the mental model
- Please navigate from that variable around part of the diagram and talk through what is happening
- When you wish to stop, please pick someone else and give them a new starting variable

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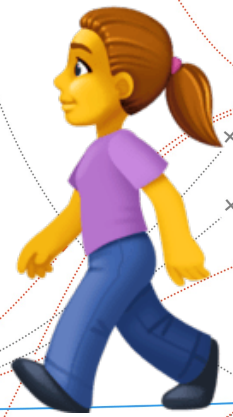

Road capacity
Appeal of proximate lifestyles
Density of homes
POPULATION DENSITY
DEMAND for DIGITAL activities
DEMAND FOR DISTANT FACE-TO-FACE ACTIVITIES
ECONOMIC OUTPUT
Density of working places
Desire to live in densely populated area
Access to private car use
LAND USE DIVERSITY
NEED FOR VARIETY/ CHANGED MILIEU
DISPOSABLE INCOME
PERCEIVED IMPORTANCE OF CAR OWNERSHIP
Extent of online activities
Density of essential facilities (e.g. schools, post office)
DEMAND for PROXIMATE activities
Walkability & Cyclability
Proximity to interested areas
Congestion
Resilience of digital infrastructure
Goods delivery affordability for customers
Digital network coverage
Availability of digitally enabled services
Air quality
Fear of harassment
Homeworking
Reliability & popularity of Public transport
EASE & COST OF PARKING
Quality of digital services
Level of concern about Covid
DISPERSAL OF LAND USE
Availability of mobile connectivity (4G, 5G)
Extent of green space
Extent of car-free built environment
Availability & quality & affordability of internet access
GENERALISED COST OF MOROTISED MOBILITY
Average age of urban population
Digital literacy
CLIMATE CHANGE CONCERN AND RELATED MEASURES
UPTAKE OF MOBILITY AS A SERVICE
Timeliness of deliveries

Exercise 2 – starting to inform urban mobility (thinking about) planning 1155-1215

So what?

- We each had a mental model of the Triple Access System that was informing our thinking about urban mobility
- We have tried to use a participatory process to generate a more developed 'shared' mental model
- IF the 'shared' mental model is credible, how can it help us in our urban mobility planning?
  - It has been a means to help identify our 'critical uncertainties' that will form the basis of creating a set of plausible triple access futures
  - Does it provide a way of allowing us to (through causal chains of influencing variables) identify which variables we may need to influence and through what policy measures if we wish to bring about change in a particular variable?
  - Does it provide a way of better appreciating how triple access might be affected by influencing features of the urban system?

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Policy goal example

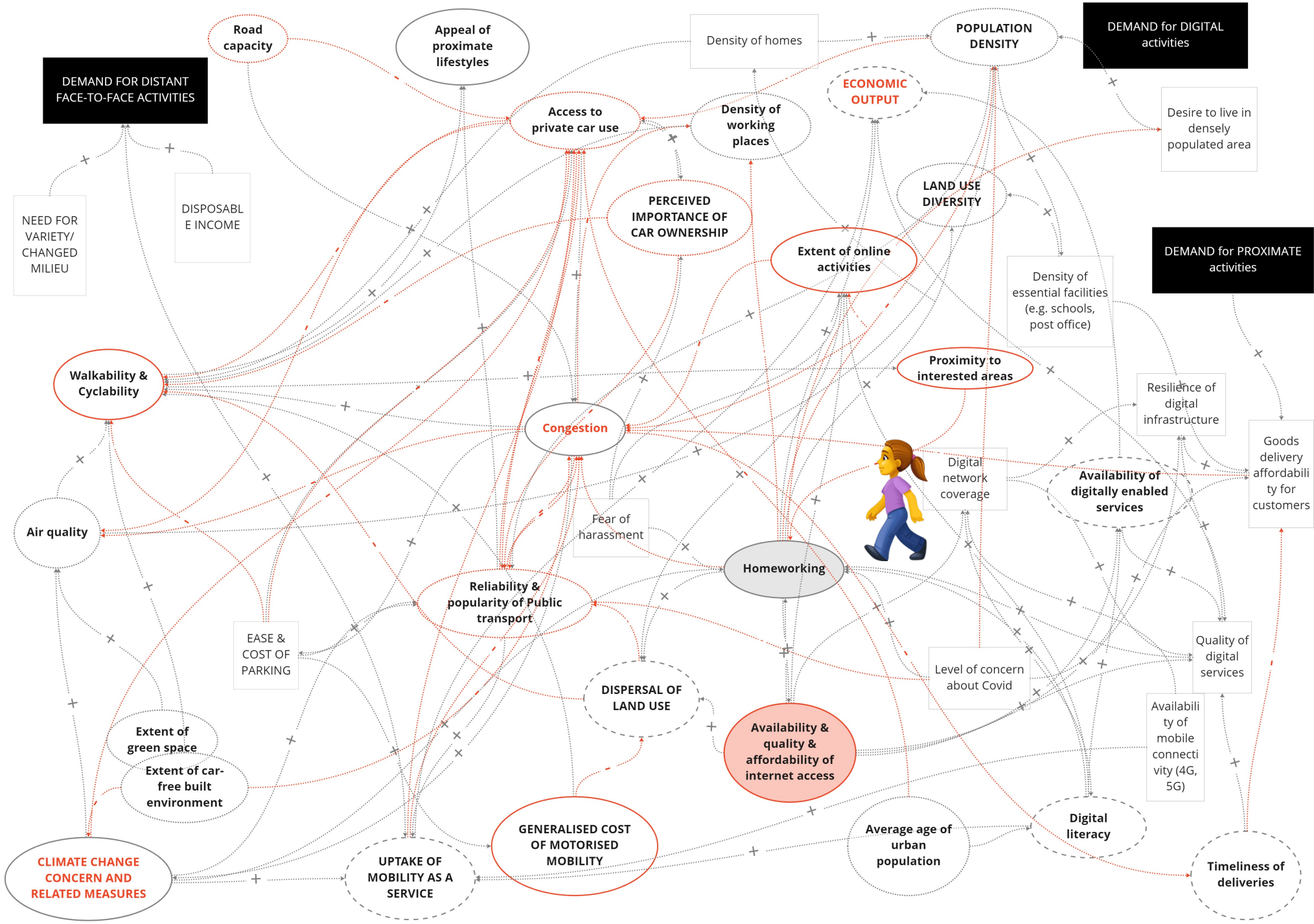
A wish to encourage a higher level of homeworking

(e.g. note Welsh Government's aim to see 30% WFH post-pandemic)

- Which aspects of the urban system may need to be addressed in order to help achieve this goal?
- What consequences could there be from achieving the goal?

Which aspects of the urban system may need to be addressed in order to help achieve this goal?

What consequences could there be from achieving the goal?



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Questions and reflections
1215-1230

Questions and reflections

1. Does the mental model we have derived make sense?
2. Has simplification enabled or reduced its usefulness?
3. Are there obvious shortcomings to what we currently now have?
4. Should the model be left as ‘faithful’ reflections of our process or should it be further modified to improve usefulness?
5. If the Triple Access System is complex (which as we saw earlier it is), does this representation of the mental model offer any help to urban mobility (thinking about) planning?
6. Anything else?

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1230 - Close

THANK YOU!