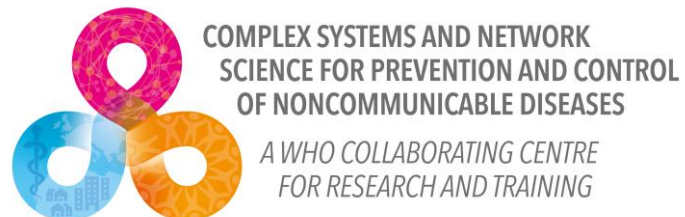


Introduction to Systems Maps and Causal Loop Diagrams

Prof Ruth Hunter, Queen's University Belfast (ruth.hunter@qub.ac.uk)

Dr Leandro Garcia, Queen's University Belfast (l.garcia@qub.ac.uk)



Outline of the day

Introduction to the WHO CC (5 min) – Ruth

Foundations of systems thinking (15 min) – Ruth

Introduction to system mapping (20 min) – Leandro

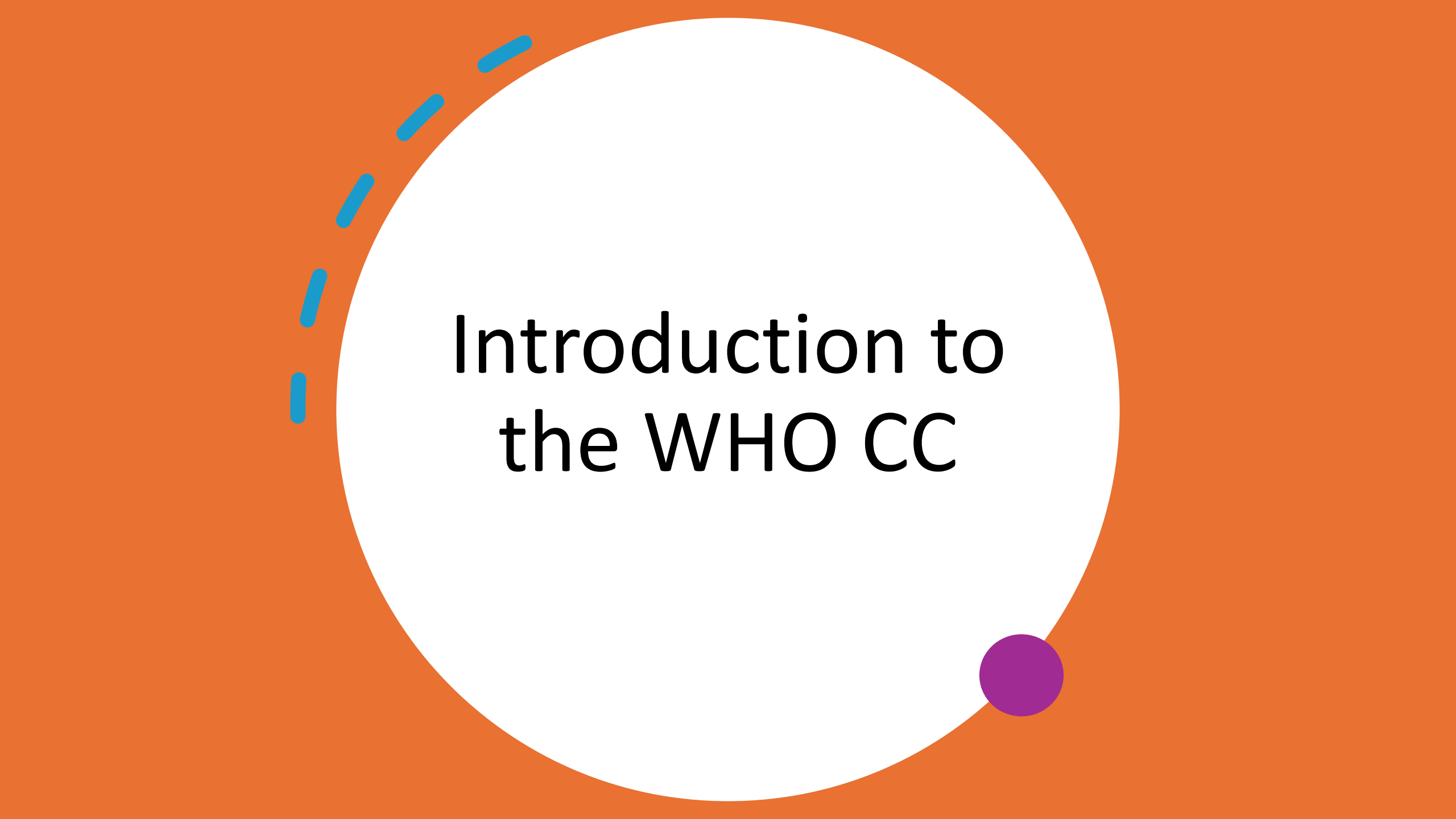
Q&A (10 min)

Hands-on examples (30 min) – Leandro

Q&A (15 min)

Warm-up for causal loop diagrams (10 min) – Ruth

Closing (5 min) – Ruth



Introduction to the WHO CC

Support the WHO in:

- **building capacity** in the application of complex systems and network science by offering training
- research involving the **application** of complex systems and network science approaches in NCD prevention and control
- development and provision of an online tool for undertaking **stakeholder network analyses** to support implementation research

Members:

- Ruth Hunter, public/planetary health
- Neil Anderson, computer science
- Mike Clarke, evidence synthesis
- Leandro Garcia, complexity science
- Frank Kee, public health medicine
- Ciaran O'Neill, health economist
- Niamh O'Kane, complexity science
- Sophie Jones, complexity science
- Roisin Corr, administrator



The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

Member States

Albania	Greece	Republic of Moldova
Andorra	Hungary	Romania
Armenia	Iceland	Russian Federation
Austria	Ireland	San Marino
Azerbaijan	Israel	Serbia
Belarus	Italy	Slovakia
Belgium	Kazakhstan	Slovenia
Bosnia and Herzegovina	Kyrgyzstan	Spain
Bulgaria	Latvia	Sweden
Croatia	Lithuania	Switzerland
Cyprus	Luxembourg	Tajikistan
Czechia	Malta	Turkey
Denmark	Monaco	Turkmenistan
Estonia	Montenegro	Ukraine
Finland	Netherlands	United Kingdom
France	North Macedonia	Uzbekistan
Georgia	Norway	
Germany	Poland	
	Portugal	

53 countries

Work mainly eastern European including Albania, Armenia, Azerbaijan, Bulgaria, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Lithuania, Poland, Romania, Russia, Tajikistan, Ukraine, Uzbekistan

Capacity Building And Training

- Training:
<https://www.qub.ac.uk/sites/who/training/>
- To date, over 1000 people have taken part in our training



SNA Workshop 1 - 21 May 2024

Introduction to Stakeholder Network Analysis



SNA Workshop 2 - 29 May 2024

Introduction to Stakeholder Network Analysis (advanced)



SNA Workshop 1 - 22 Oct 2024

Introduction to Stakeholder Network Mapping and Analysis



SNA Workshop 2 - 29 Oct 2024

Introduction to Stakeholder Network Mapping and Analysis (advanced)



Summer School: 16-19 July 2024

Systems Thinking And Innovation For The Prevention Of Noncommunicable Diseases



Workshop 1 - 24 January 2024

Online Training: Introduction to Systems Thinking and Causal Loop Diagrams



Workshop 2 – 26 January (Group 1) and 2 February 2024 (Group 2)

Online Training: Introduction to Systems Thinking and Causal Loop Diagrams



Summer School: 18 - 20 July 2023

A Systems Approach To The Promotion Of Healthy Lifestyles

Further information



QUEEN'S UNIVERSITY BELFAST

Research and Training on Complex Systems and Network Science for NCD Prevention and Control

A WHO Collaborating Centre

Home The Team Stakeholdernet Capacity Building and Training What's On Reports and Publications Useful Resources Contact Us



STAKEHOLDER.NET

More Details →

<https://www.qub.ac.uk/sites/who/>

Keep in touch



WHO Collaborating Centre for Research and Training on Complex Systems and Network Science for NCDs

A WHO Collaborating Centre to build capacity in systems science skills, and to formulate innovate ways to address NCDs.

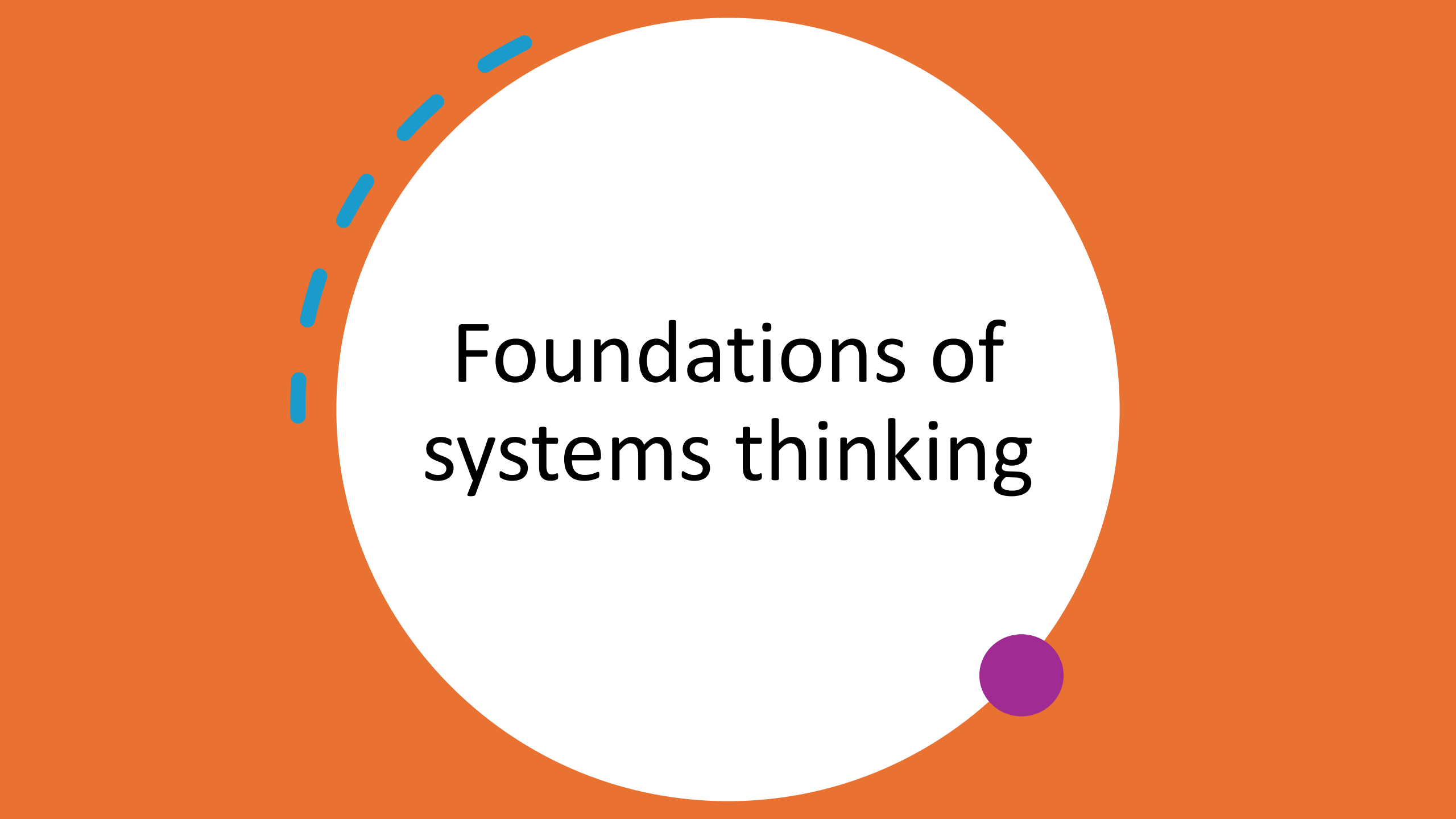
<https://www.linkedin.com/company/who-collaborating-centre-for-research-and-training-on-complex-systems-and-network-science-for-ncds/>



Member group: WHOCC for Research and Training on Complex Systems and Network Science for NCDs

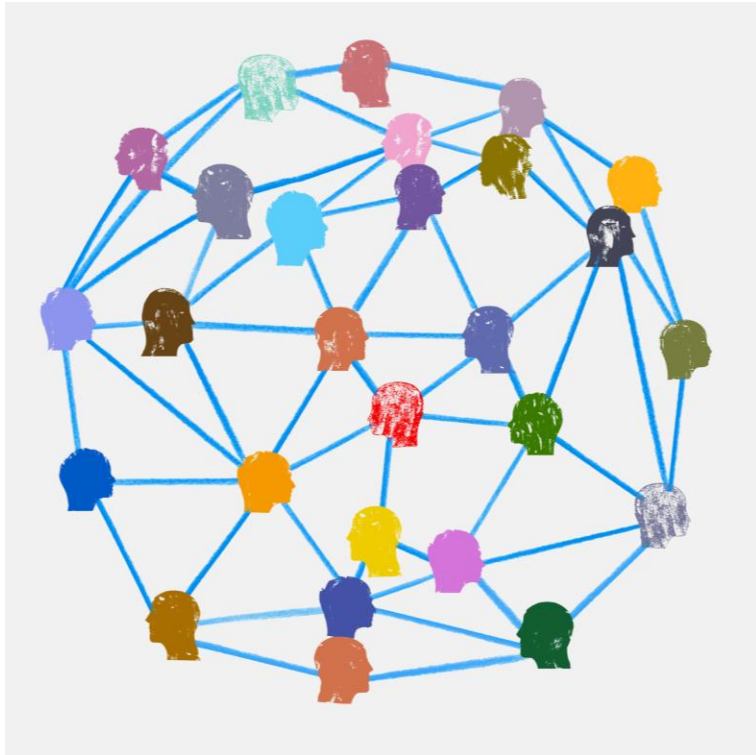
Private Listed

<https://www.linkedin.com/groups/13214019/>



Foundations of systems thinking

Systems thinking in public health



What is systems thinking?

- Way of thinking and doing based on systems concepts and methods
- **Core principle:** breaking the system down to its parts does not allow us to fully understand the whole system
- Active focus on structures, interconnections, processes, mechanisms, and context
- It is about seeing the 'bigger picture'



What is a system?

Integrated whole (defined by the observer)

- With structure (interconnected parts)
- New behaviour(s) at the system's scale
- Porous boundaries (interaction with context)

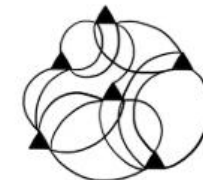
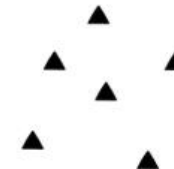
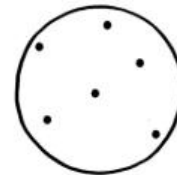
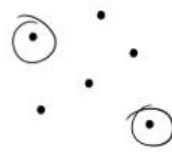
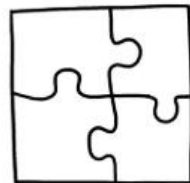
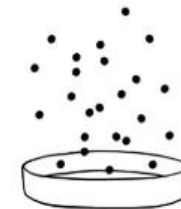
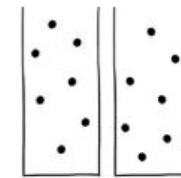
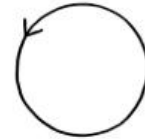
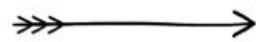
The system's structure determines its behaviour
(system as cause)



A system's
boundaries is given
by the observer



Mindset of a systems thinker



Why use systems thinking?

- Investigate systems problems
- Identify ways to address systems problems
- Broadening perspectives



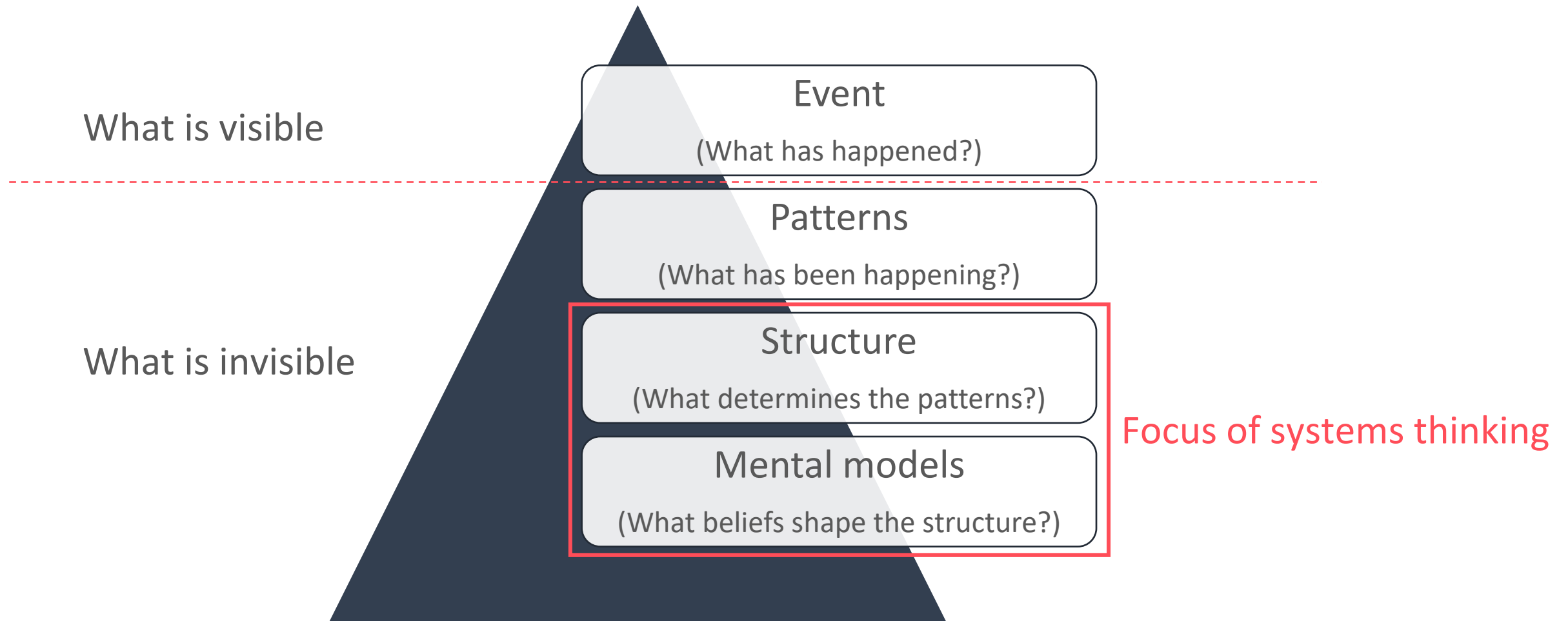
Why systems-based public health?

Proposition: Modern societies are complex systems

Implication 1: Many public health challenges emerge from how modern societies (complex systems) are organized

Implication 2: Interventions are actions within a complex system



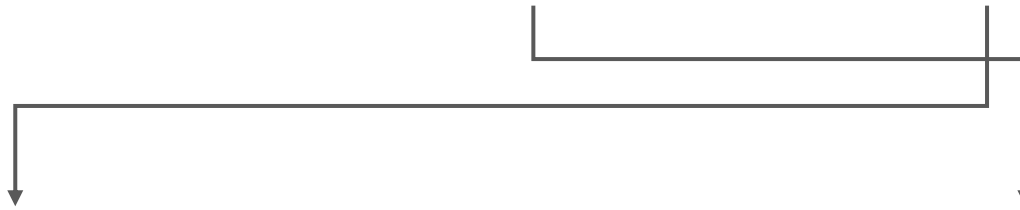


“Instead of asking whether an intervention works to fix a problem, we should aim to identify if and how it contributes to reshaping a system in favourable ways.”



Introduction to system mapping

Systems Map



Visual representation...

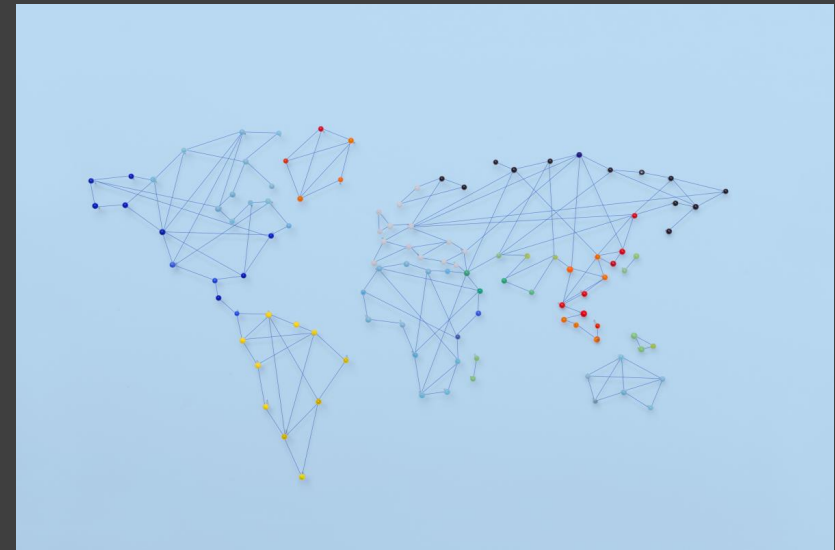
...of the interdependencies between a set of elements.

What is and what is not a map?



A map is...

a model!



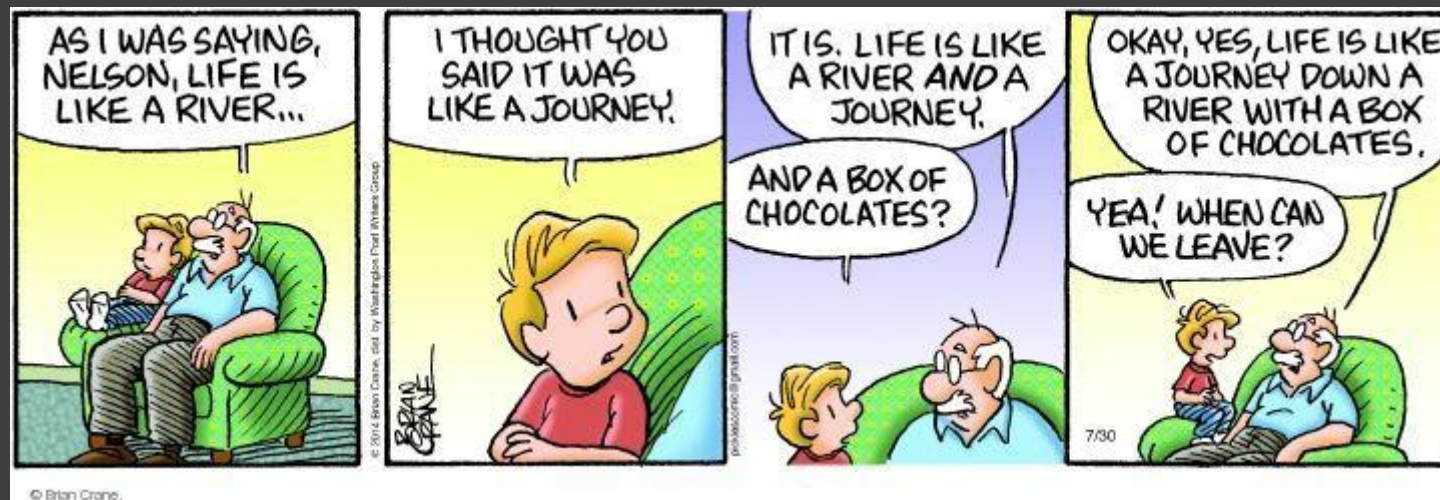
And a model is...

...a purposeful simplification of some aspect or perception of reality.

metaphor

What should be displayed in a good map (model) of Belfast?

There is no such a thing as a 'good model' of something!
Only models (metaphors) fit for a purpose



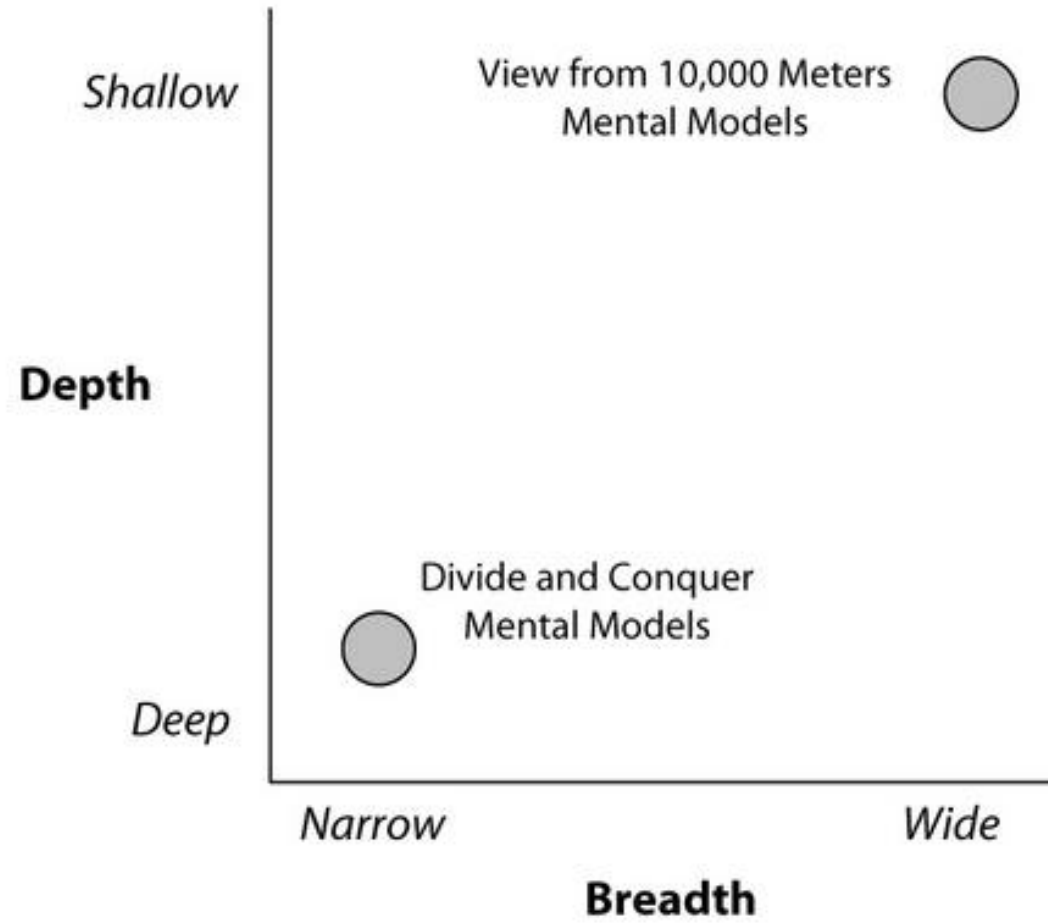
Modelling is creating fit-for-purpose metaphors

‘All models are wrong, but some are useful.’

The most common mistake

“I am drawing a model about a complex thing. Hence, I need to put everything about the problem in my model, otherwise it will be incomplete, too simple, insufficient.”

TWO KINDS OF MENTAL MODELS



Good modelling requires

- 1) Clarity about purpose
- 2) Ability to distinguish what should be in – and equally importantly, out – of the model
- 3) Ability to interpret the model's outputs in relation to the real world
- 4) Practice ('baking without a recipe')

How can systems mapping be useful?

Helping us...

- think and be more specific about our assumptions, beliefs, and understanding
- synthesise and connect different types of data, evidence, and information
- communicate our mental models
- orient ourselves
- extrapolate from assumptions to implications





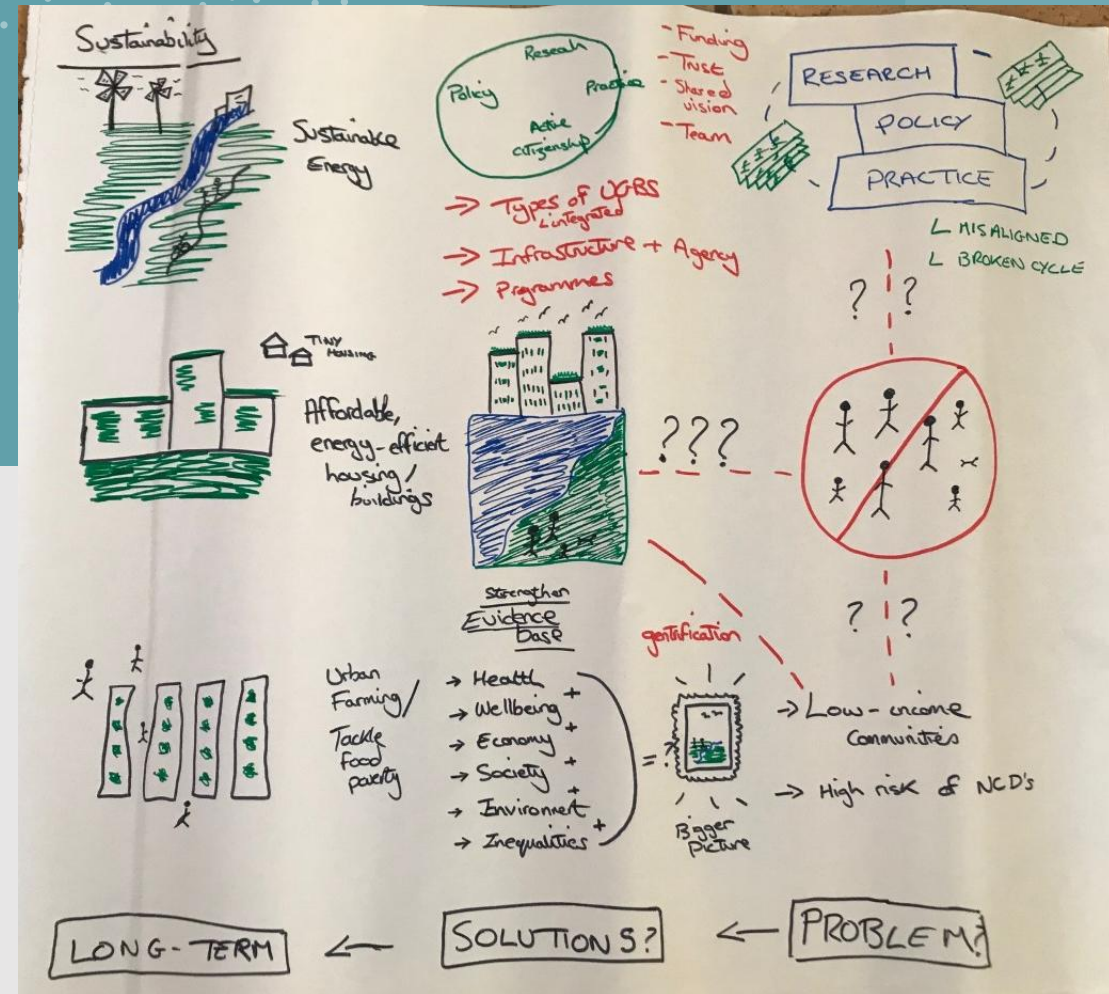
Hands-on examples

General instructions

- We will experiment 3 methods
- Individual exercise
- Any means works (pen and paper, digital whiteboard, etc.)
- 10 minutes for each method
- As you experiment the methods, reflect on when and how they can be useful and what you can get from them
- At the end, we will share reflections

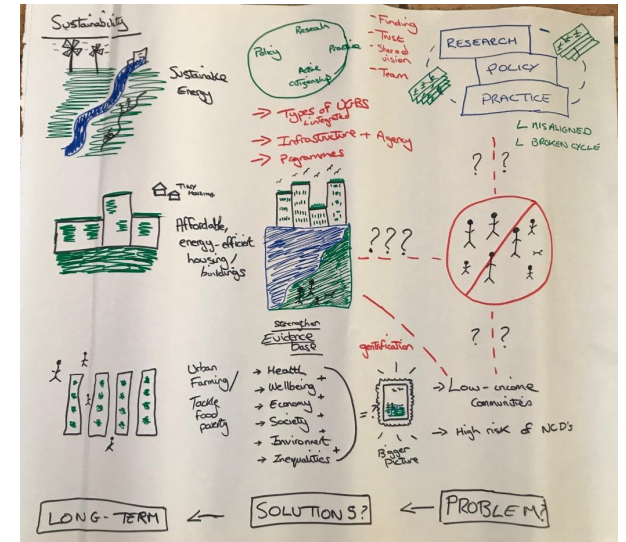
Rich pictures

Drawing or picture of a system or “situation”



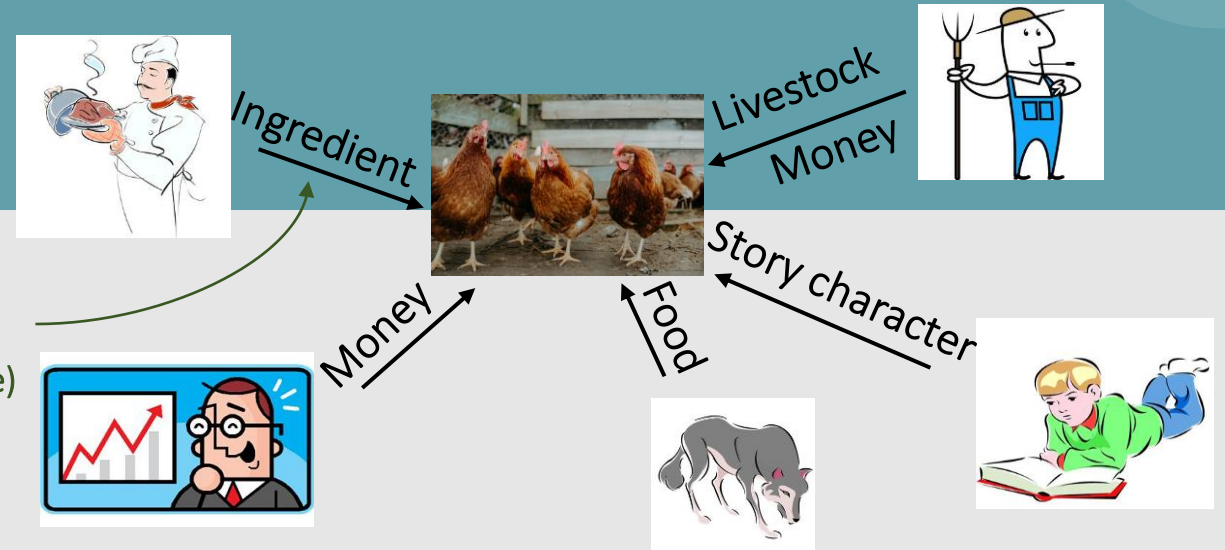
Rich pictures - instructions

- **Topic: childhood obesity**
- Simply draw what you feel represents the situation
- There are no rules or standard formats
- Adopt whatever styles you feel comfortable with and that help you to explore the problematic situation openly
- Use whatever symbols and/or metaphorical icons you feel seems to fit with the situation
- Try to represent stuff as well as what lies between stuff – emotional icons are allowed and encouraged
- Don't worry if it looks chaotic, e.g., with different flows of time and different views/perceptions



Multi-perspective model

What the stakeholder sees the chicken as (line of perspective)



Used to explore different perspectives and agents within a system

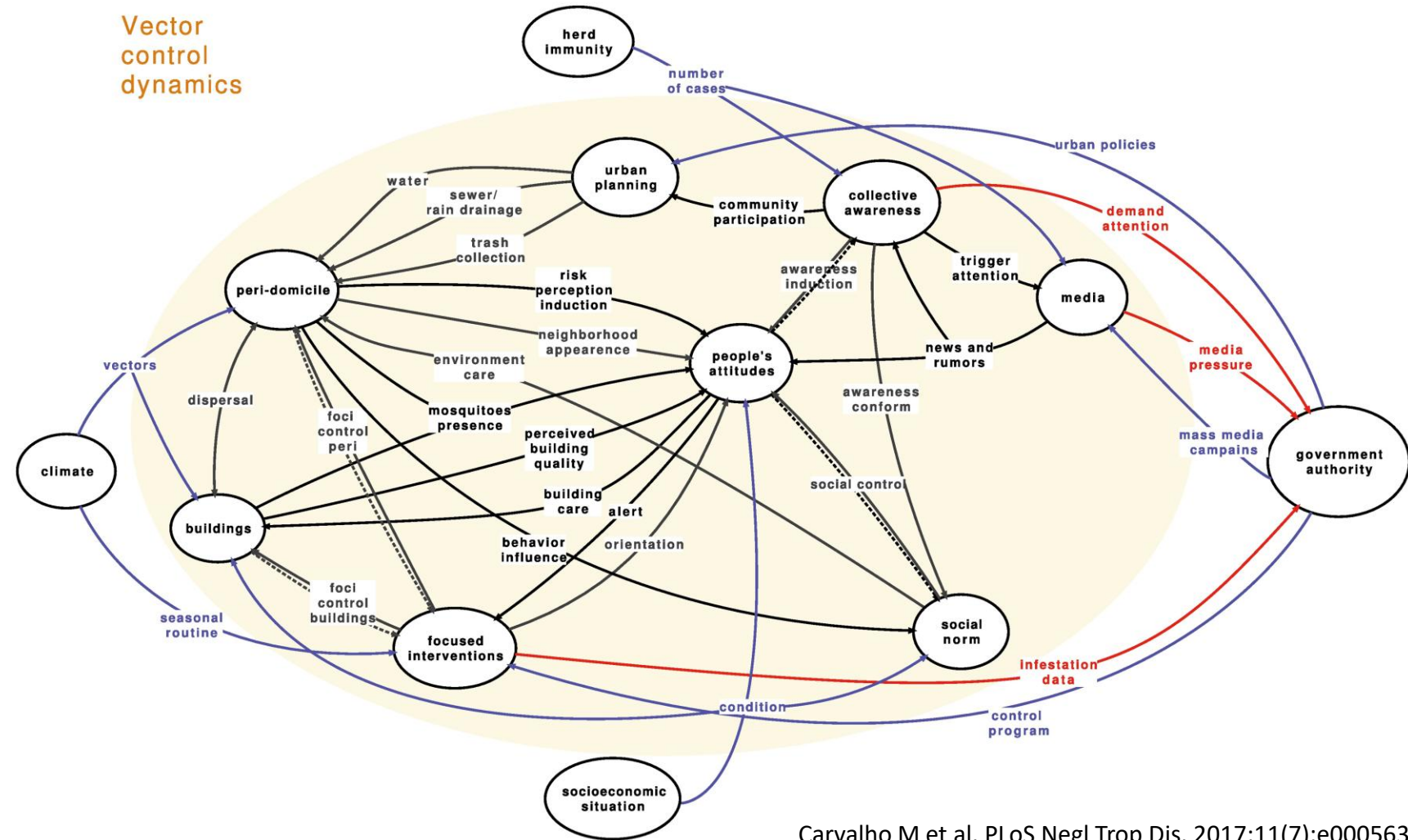
Multi-perspective model - instructions

- **Topic: childhood obesity**
- Draw a box/circle in the centre of the sheet and write “childhood obesity” inside
- Identify at least five people and organizations (stakeholders) who are linked with topic. Place them around the box/circle in the centre, with an outgoing arrow from each stakeholder towards the box/circle in the centre
- Reflect on what sort of perspective(s) each of these stakeholders might hold in relation to childhood obesity. Summarize the perspective of each stakeholder in no more than a few words and place near the correspondent arrow



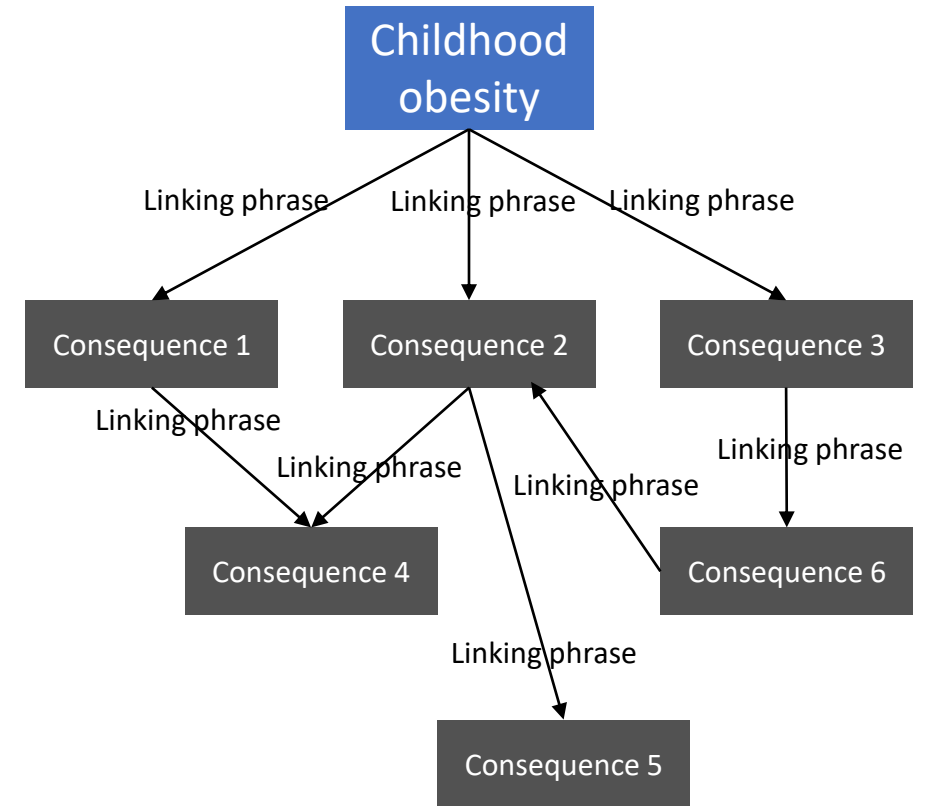
Concept mapping

Used for organising, visualising, and linking concepts and ideas



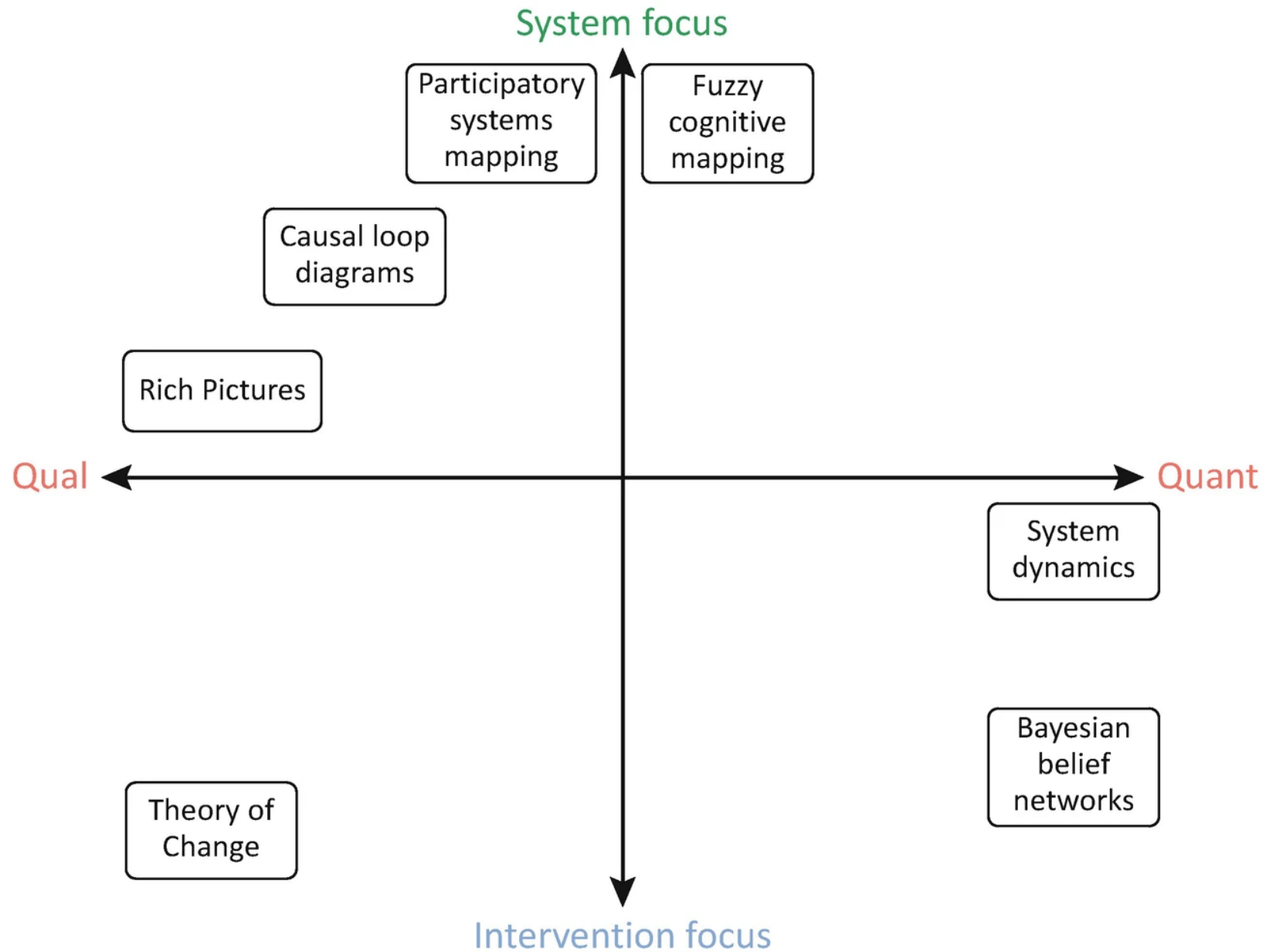
Concept mapping - instructions

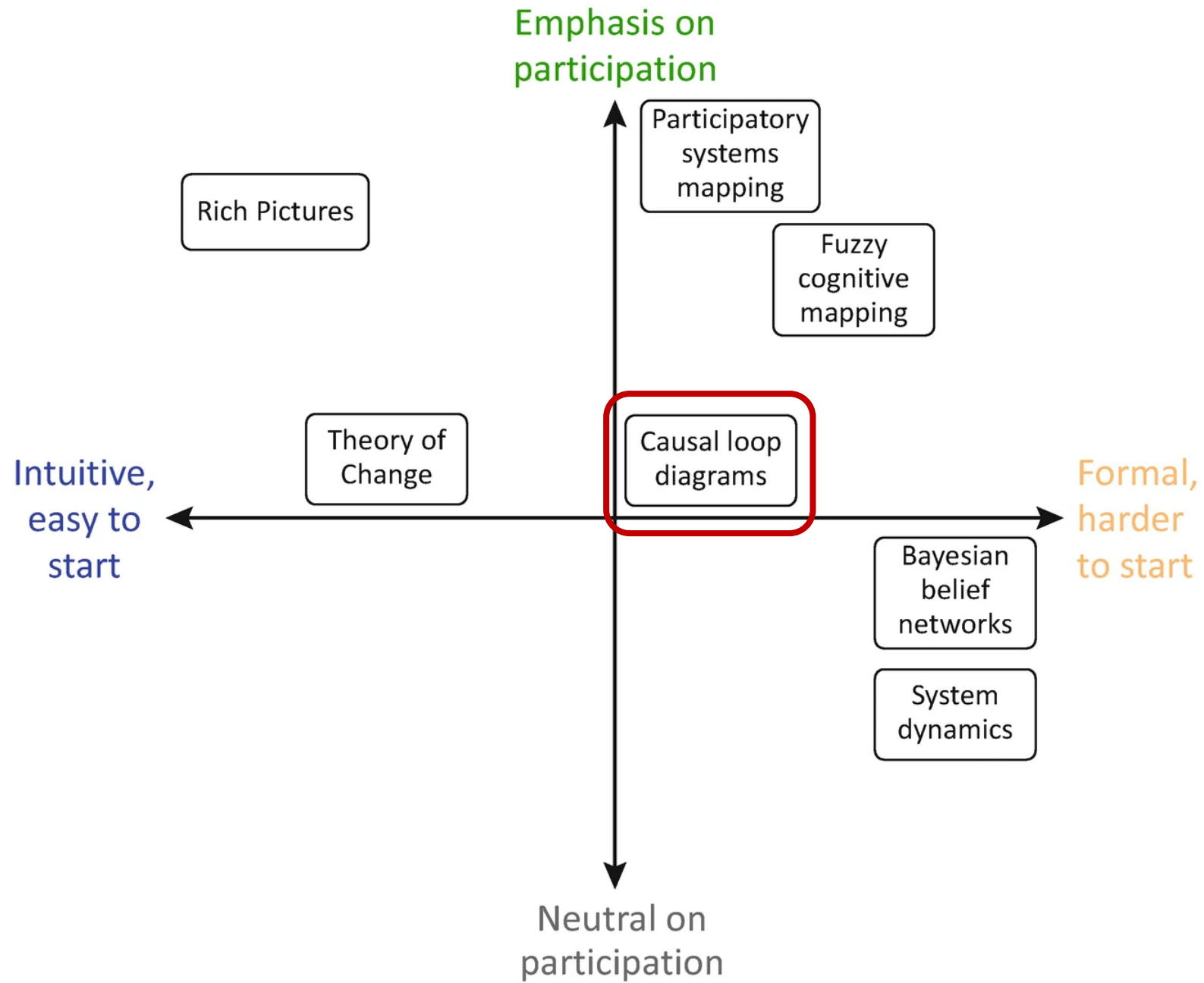
- **Topic: consequences of childhood obesity**
- Draw a box on the top of the sheet and write “childhood obesity” inside
- Identify some direct effects of childhood obesity. Place them below the top node
- Draw an outgoing arrow from “childhood obesity” to its direct effects, with short linking phrases describing the causal mechanism
- Do the same with consequences of first-order effects, and so on



The background is a dark blue-grey color with several faint, light-colored decorative elements. There are two large, overlapping circles on the left and right sides. In the bottom left corner, there are three vertical dashed lines. In the top right corner, there are four horizontal dashed lines. The text "Sharing your reflections" is centered in the middle of the page in a white, sans-serif font.

Sharing your reflections





Useful resources

- Habits of a systems thinker
- Systems mapping: how to build and use causal models of systems

Tools for systems mapping

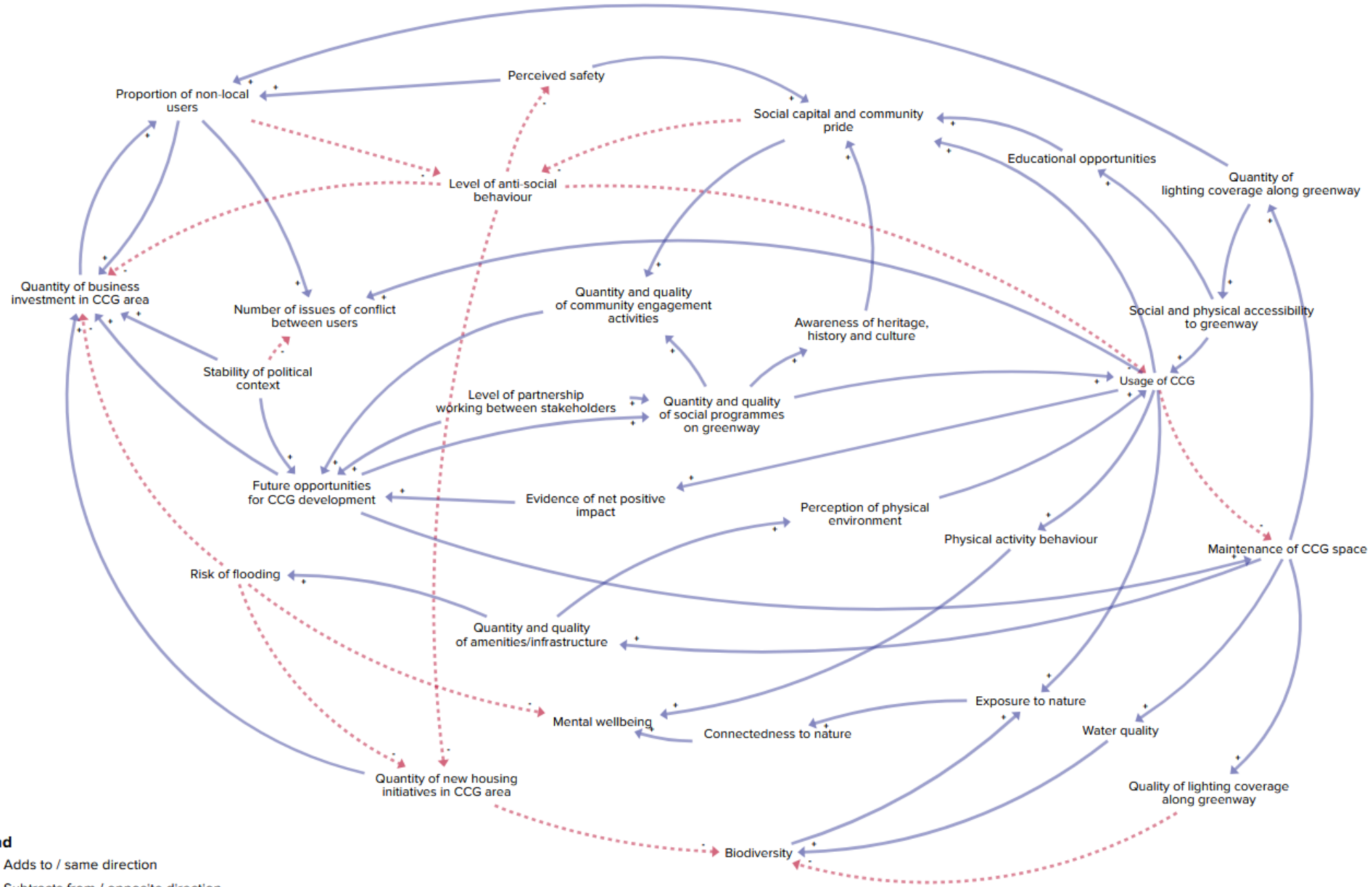
- Kumu (<https://kumu.io/>)
- Loopy (<https://ncase.me/loopy/>)
- Mural (<https://www.mural.co/>) or Miro (<https://miro.com/>)
- Whiteboard applications
- Power Point

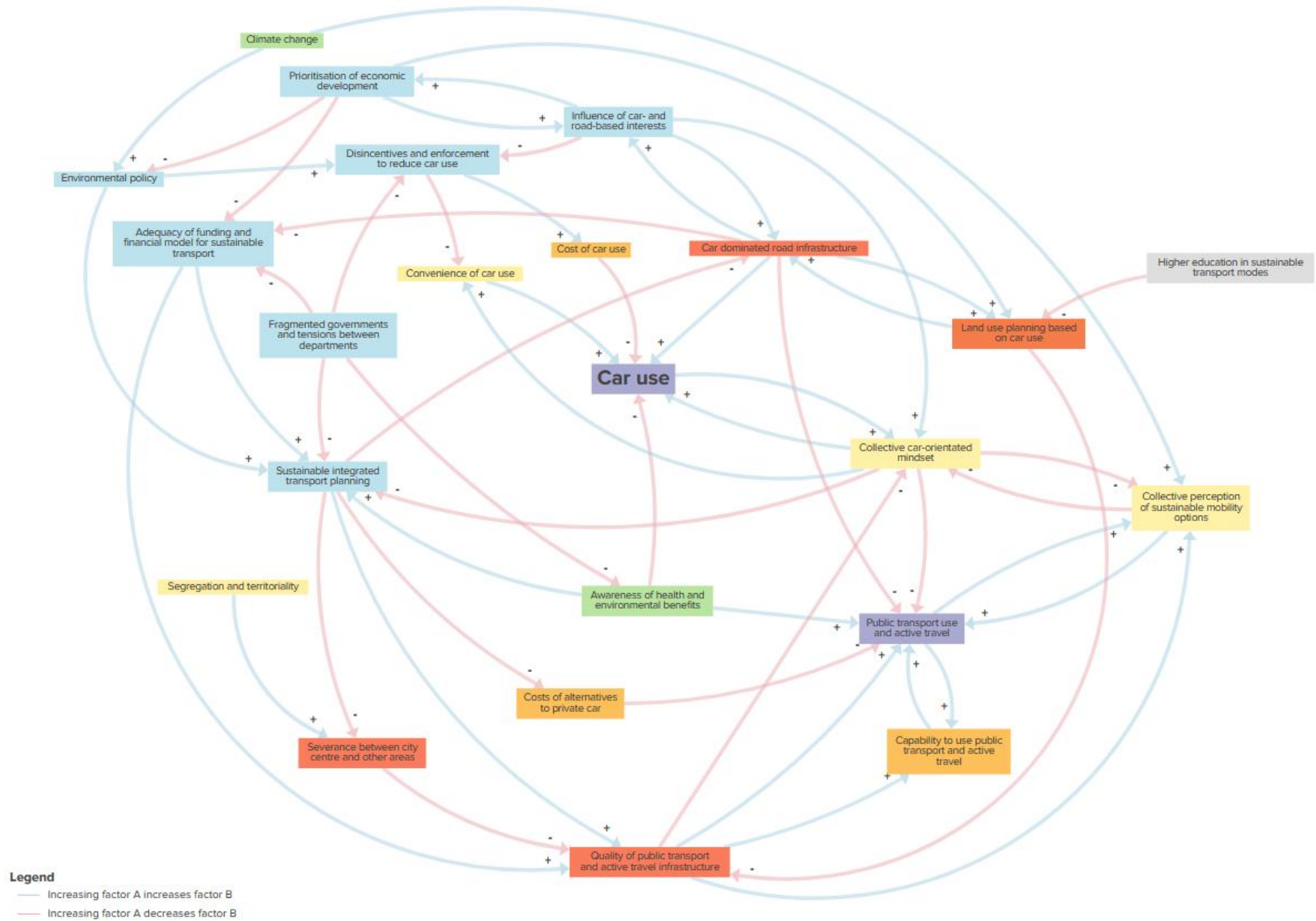
You can always use pen and paper!





Warm-up for causal
loop diagrams









Closing

Next session

Wednesday 01 April 2026 @ 10:30 (UTC +1)

Recap of session 1

What causal loop diagrams are

Principles and steps for developing causal loop diagrams

Public health application

Q&A

Short feedback survey

<https://forms.office.com/e/WkbQBi21T6>



Online Workshop: Introduction to Stakeholder Network Analysis



Workshop 1:

Wednesday 22 April 2026 10:30 – 12:30 (BST)

Workshop 2:

Wednesday 29 April 2026 10:30 – 12:30 (BST)

REGISTER NOW



SESSION 1



SESSION 2



SCAN ME



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 whocc@qub.ac.uk

Online Workshop: Tools for General Systems Understanding



Workshop 1:

Wednesday 20 May 2026 10:30 – 12:30 (BST)

Workshop 2:

Wednesday 27 May 2026 10:30 – 12:30 (BST)

REGISTER NOW



SESSION 1



SESSION 2



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Online Workshop: Introduction to Critical Systems Heuristics



Workshop 1:

Wednesday 24 June 2026 10:30 – 12:30 (BST)

Workshop 2:

Wednesday 1 July 2026 10:30 – 12:30 (BST)

REGISTER NOW



SESSION 1



SESSION 2



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