Webinar Series on Soft Systems Methodology (SSM)

Session 1: Introduction to Soft Systems Methodology

➡ Session 2: Applications of SSM in Public Health

Dr Natalie Clewley, Dr Tim Forsyth
Complex Systems Group, Cranfield University

4th February 2026, 10:30-12:30

Cranfield University

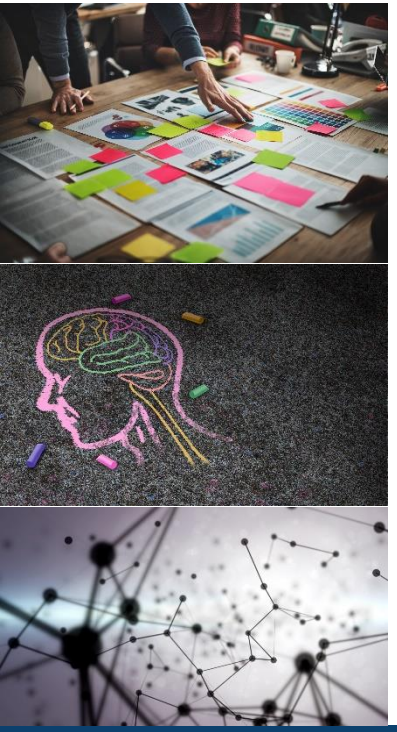
COMPLEX SYSTEMS AND NETWORK SCIENCE FOR PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES
A WHO COLLABORATING CENTRE FOR RESEARCH AND TRAINING

GroundsWell
Transforming our cities from the ground up

UKPRP Prevention Research Partnership
Joint action for a healthier, fairer future

Session Aim

The first session in this series introduced you to Soft Systems Methodology (SSM) and looked at what types of problems it can help you address. The purpose of this session is to demonstrate how SSM can be applied in practice to explore, interpret and learn from complex public-health systems and community initiatives.



Who is it for?

- Researchers, students and practitioners working in complex environments who are interested in applying systems thinking to public health contexts.
- Public health professionals working in complex, multi-stakeholder environments.
- Community partners and practitioners engaged in health-systems improvement.
- Anyone curious about using systems approaches to support reflective inquiry.

© Cranfield University

1. Recap of SSM

2. Applications of SSM

a) Shared Language and Ice Breaker

b) Aligned Purpose

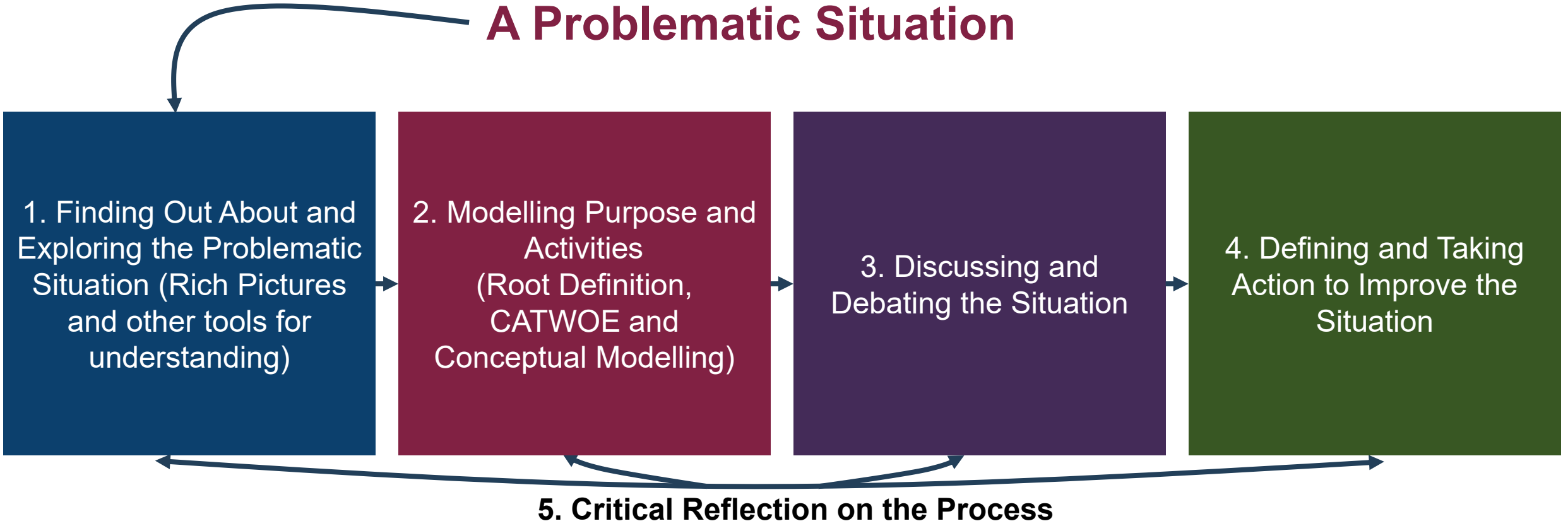
c) Organisational Design

What is Soft Systems Methodology (SSM)?

- A qualitative and interpretive approach to appreciating wicked, messy, ill-structured, complex problems where there is no single agreed definition of the problem.
- A methodology (a structured framework and system of principles, methods and underpinning philosophy)
- Defines several tools:
    - Rich Pictures
    - Root Definitions
    - CATWOE Analysis
    - Conceptual Models

© Cranfield University

A Practical Approach to SSM



This is not just a linear process – it should be iterative and each step should build and influence the others.

© Cranfield University

1. Recap of SSM

2. Applications of SSM

a) Shared Language and Icebreaker

b) Aligned Purpose

c) Organisational Design

The Scale of SSM Applications

Checkland (1981, p.162) – Methodology is not as general as a philosophy, not as specific as a method.

- Provides a set of guiding principles to help you apply it to a given context.
- Allows for flexibility and adaptation to a specific situation.
- A practical application that sits between abstract philosophy and rigid methodology.

Abstract Philosophy
Academic Thought
Leadership

Rigid Methodology
Systems Specification

© Cranfield University

SSM Guiding Principles (Checkland and Poulter, 2020)

- Treat ‘problems’ as problematic situations, not as pre-given problems.
- Acknowledge multiple worldviews as equally valid.
- Use models as thinking devices, not representations of reality.
- Learning (not problem solving) is the central purpose.
- Improvement (not solution) is the goal.
- Inquiry must include both the real-world and systems thinking modes.
- Action arises from accommodation (or consensus) among stakeholders.
- Analysts are participants, not detached experts.
- Use formal devices (CATWOE, Root Definitions, Conceptual Models) to support structured thinking.

© Cranfield University

1. Recap of SSM

2. Applications of SSM

a) Shared Language and Icebreaker

b) Aligned Purpose

c) Organisational Design

SSM as an Icebreaker

At its very simplistic form, the beginning stage of SSM is good as an introductory icebreaker to rapidly surface different worldviews involved in a situation in a structured way and learning to communicate with a shared language.

- Rich pictures can be employed in small groups (up to 5 works best).
- Great opportunity to get everyone around the table.
- Give everyone a pen so they have an opportunity to share their views.
- Not so great drawing skills can be a barrier, but also a bonding experience.

Relevant SSM Principles

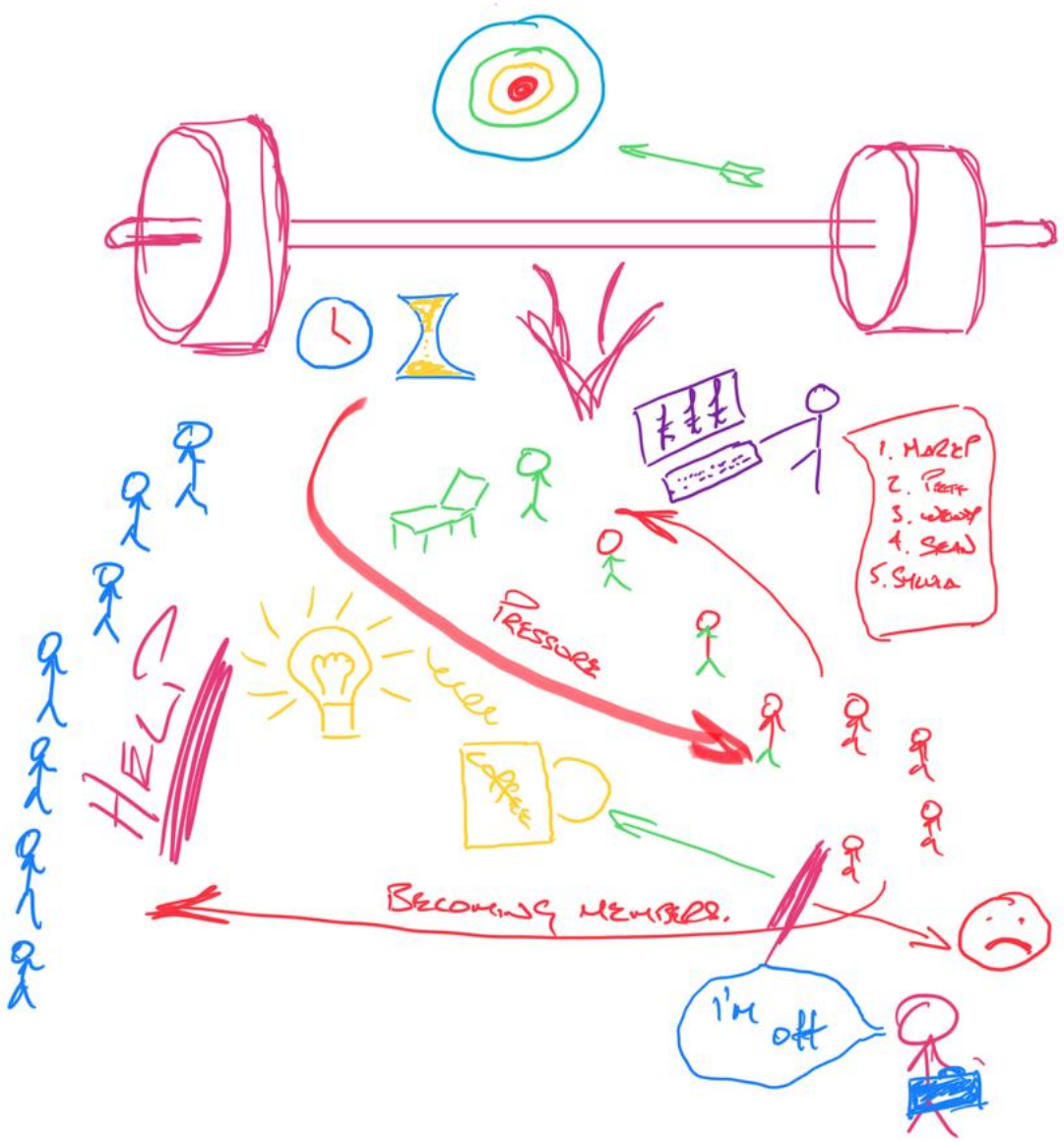
1. Treat ‘problems’ as problematic situations, not as pre-given problems.
2. Acknowledge multiple worldviews as equally valid.

© Cranfield University

SSM as an Icebreaker

Example task:

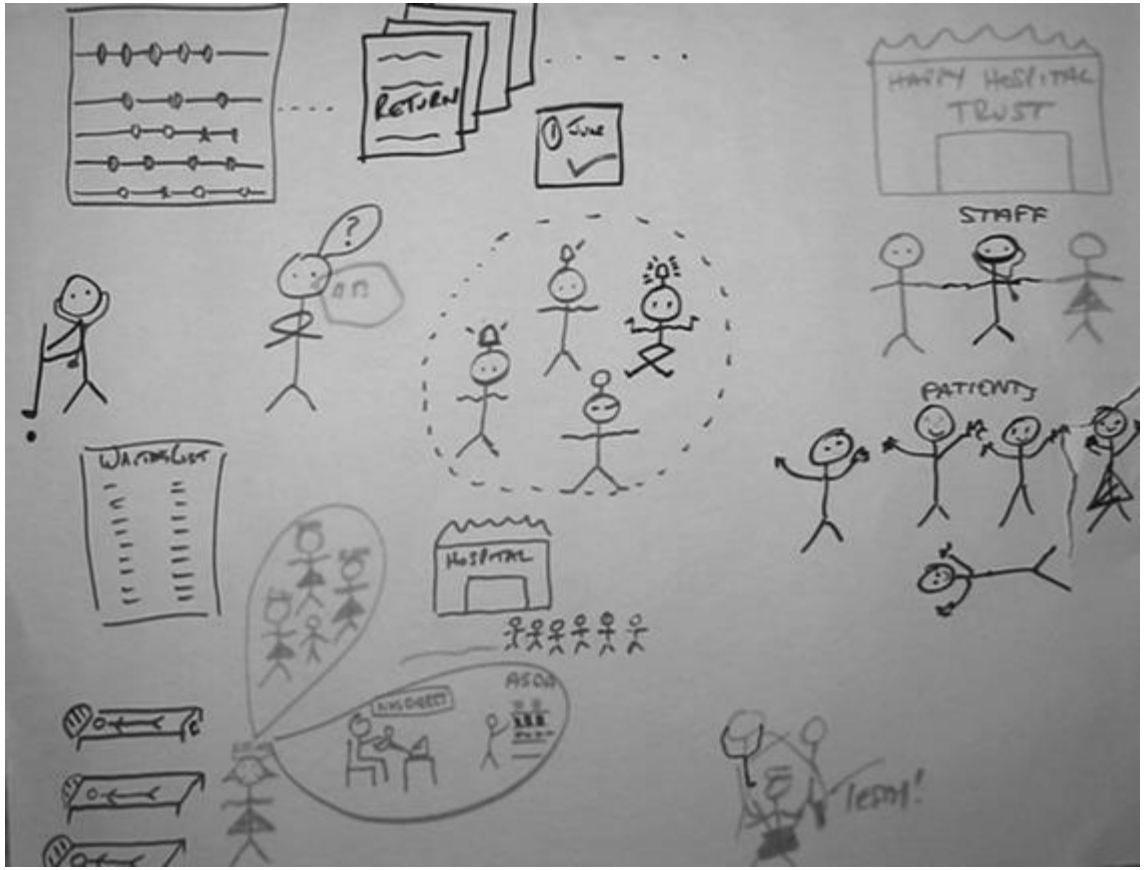
- Take 15 minutes in your groups to discuss the situation. Think about both the successes and challenges. Capture your thoughts on the flipcharts/tablecloth with pens on the tables. Try to minimise the use of words – instead, use pictures, metaphors, colour and emoticons.
- Each group will have a couple of minutes to brief back to the room about the highlights of your discussion.



Example Rich Picture for Radiotherapy Capacity and Demand (Clewley and Forsyth, 2026)

© Cranfield University

Example Rich Pictures



Example of NHS Rich Picture (Bell and Morse, 2013)

Example of Rich Picture for Population Health Information Management Systems (Conte and Davidson, 2020)

© Cranfield University

Some Useful Rich Picture References

- **Practical Guidance and Tips:** Barbrook-Johnson, P. and Penn, A.S. (2022). 'Rich Pictures'. Pp. 21–32 in *Systems Mapping: How to build and use causal models of systems*, edited by P. Barbrook-Johnson and A. S. Penn. Cham: Springer International Publishing. https://link.springer.com/chapter/10.1007/978-3-031-01919-7_2
- **More Academic, with some examples:** Bell, S. and Morse, S. (2013). 'How People Use Rich Pictures to Help Them Think and Act'. *Systemic Practice and Action Research* 26(4):331–48. doi:10.1007/s11213-012-9236-x.
- **More 'Polished' Rich Picture example:** Conte, K.P. and Davidson, S. (2020). 'Using a "Rich Picture" to Facilitate Systems Thinking in Research Coproduction'. *Health Research Policy and Systems* 18(1):14. doi:10.1186/s12961-019-0514-2.

© Cranfield University

1. Recap of SSM

2. Applications of SSM

a) Shared Language and Icebreaker

b) Aligned Purpose

c) Organisational Design

SSM for Aligned Purpose

Root definitions are a great way of succinctly developing a statement of purpose to cohere thinking and focus for action amongst a group.

- A tool like CATWOE or Six Cohering Questions can help structure group discussion.
- A clear ‘outcome’ for a session.
- Something to take away to then focus further action.

Relevant SSM Principles

Use models as thinking devices, not representations of reality.

Improvement (not solution) is the goal.

Inquiry must include both the real-world and systems thinking modes.

Action arises from accommodation (or consensus) among stakeholders.

Use formal devices (CATWOE, Root Definitions, Conceptual Models) to support structured thinking.

© Cranfield University

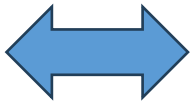
Structuring Discussions for Root Definitions

Example task (after having completed Rich Picture exercise):

- In your groups, take 15 minutes to think about the CATWOE elements OR answer the Six Cohering Questions.
- Take 5 minutes to format your answers into PQR/Wilson root definition format and write on the flipchart.
- Each group will be asked to read out their root definitions to the rest of the room.

Six Cohering Questions (Hilton et al., 2021)

1. What are we trying to achieve?
2. What do we think needs to be done to achieve this?
3. Who is going to get this done?
4. Who benefits or is impacted by it?
5. Who is in charge (can start/stop it)?
6. What constraints apply?



CATWOE Analysis (Checkland, 1999)

T – Transformation

W – Worldview

A – Actors

C – Customers/Beneficiaries

O – Owner

E – Environmental Constraints

© Cranfield University

Example Root Definitions

Checkland's PQR Structure:

"A trust owned system to deliver sustainable Radiotherapy Services by coordinating staffing, meeting service demand and fostering interprofessional learning to maintain patient outcomes and staff wellbeing."

(Clewley and Forsyth, 2025)

Wilson's Structure:

"A joint Eastside Partnership (ESP) and Belfast City Council (BCC) owned system, operated by skilled and experienced ESP and BCC staff together with qualified, reputable and experienced contractors, to maximise the potential of the Connswater Community Greenway (CCG) Living Landmark as a catalyst for the ongoing physical, social and economic regeneration of east Belfast, by ensuring the sustainability of the Connswater Community Greenway as a living landmark, securing sustainable funding streams for ongoing maintenance, enhancing and conserving the local CCG environment, promoting and facilitating active engagement activities on the CCG, and creating new opportunities through links to the Eastside Greenways network and other future initiatives, for the benefit of Local Belfast residents (current and future), local school children, visitors/tourists, local East Belfast investors, the Protestant and Catholic communities and the wider Belfast area, within the financial, social, geographical, political, and collaborative partner constraints." *(Clewley et al., 2026)*

© Cranfield University

1. Recap of SSM

2. Applications of SSM

a) Shared Language and Icebreaker

b) Aligned Purpose

c) Organisational Design

Organisational Design

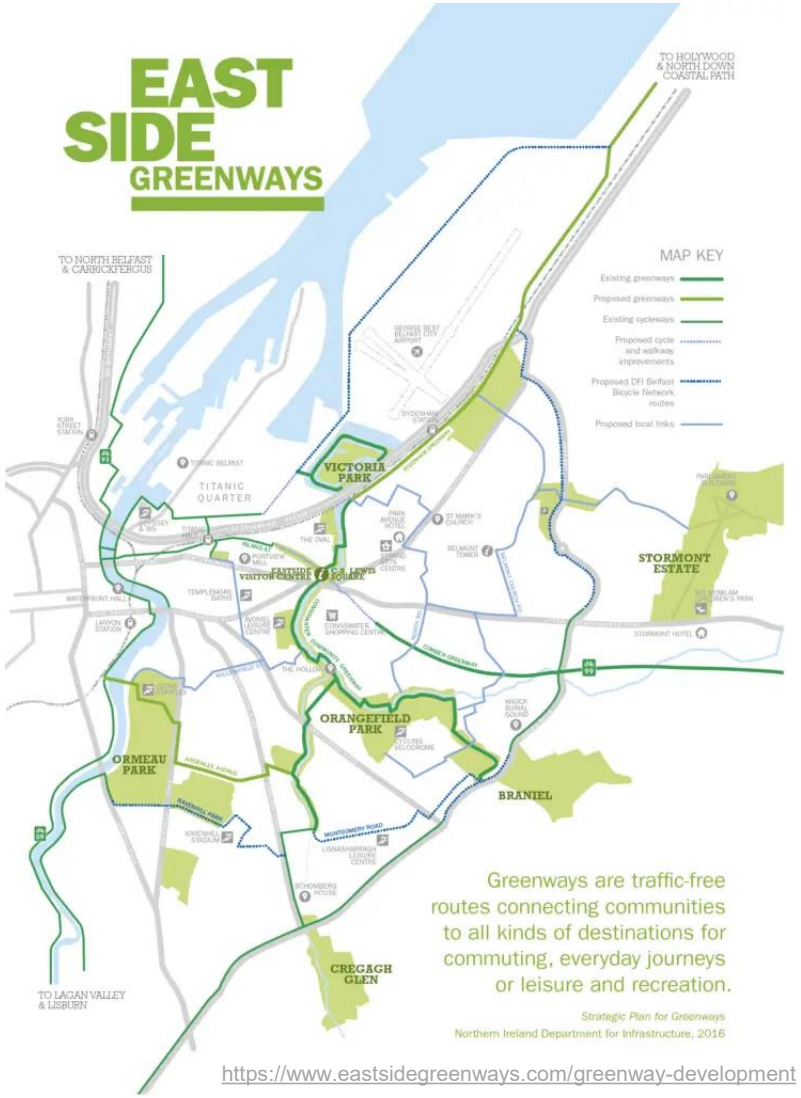
SSM is a wonderful tool for taking people on a journey during organisational design (or redesign).

- Appreciates multiple perspectives (worldviews).
- Structured process.
- Provides clear ‘outputs’ to take forward at each stage.
- Provides something to base discussions on for difficult ‘imaginary’ future states.

© Cranfield University

Example: GroundsWell – Connswater Community Greenway (CCG) Urban Green and Blue Space (UGBS) Redevelopment

The Connswater Community Greenway (CCG) is a 9 km linear park in East Belfast connecting communities, parks, rivers, and people. Originally conceived as part of a flood alleviation scheme, the Greenway has evolved into a major example of how urban regeneration can improve health, wellbeing, and equality. Developed through partnership between EastSide Partnership, Belfast City Council, the Department for Infrastructure and the Northern Ireland Environment Agency, the Greenway was designed with local residents to ensure that social, environmental, and health benefits were embedded from the outset. Led by Queen's University Belfast in collaboration with local partners, the Connswater Community Greenway has become an internationally recognised 'living laboratory' for understanding how urban regeneration influences physical activity, wellbeing and inequalities - a real-world setting where researchers and communities work together to appreciate how changes to the urban environment can transform daily life.



https://www.qub.ac.uk/sites/groundswell/Projects/TheConnswaterCommunityGreenway15YearsofResearchPartnershipandImpact

https://www.eastsidegreenways.com/greenway-development

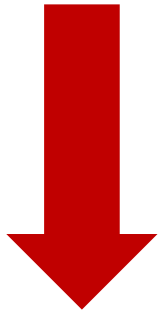
© Cranfield University

SSM Application

Three phases were identified. We looked at the Management and Maintenance Phase and how we might think about the future sustainability of the CCG.

SSM is perfect for this application as:

- It helps us identify WHAT our purpose is;
- It helps us decide HOW we might meet this purpose.



Project Design and Community Planning (2007-2010)

Construction and Implementation (2011-2017)

Management and Maintenance (2017+)

© Cranfield University

SSM Application

1. Finding out about and exploring the situation

- Group Model Building (GMB) workshop with CCG stakeholders: Rich Pictures, Causal Loops, Priorities
- 1-2-1 Interviews with key stakeholders involved in the CCG

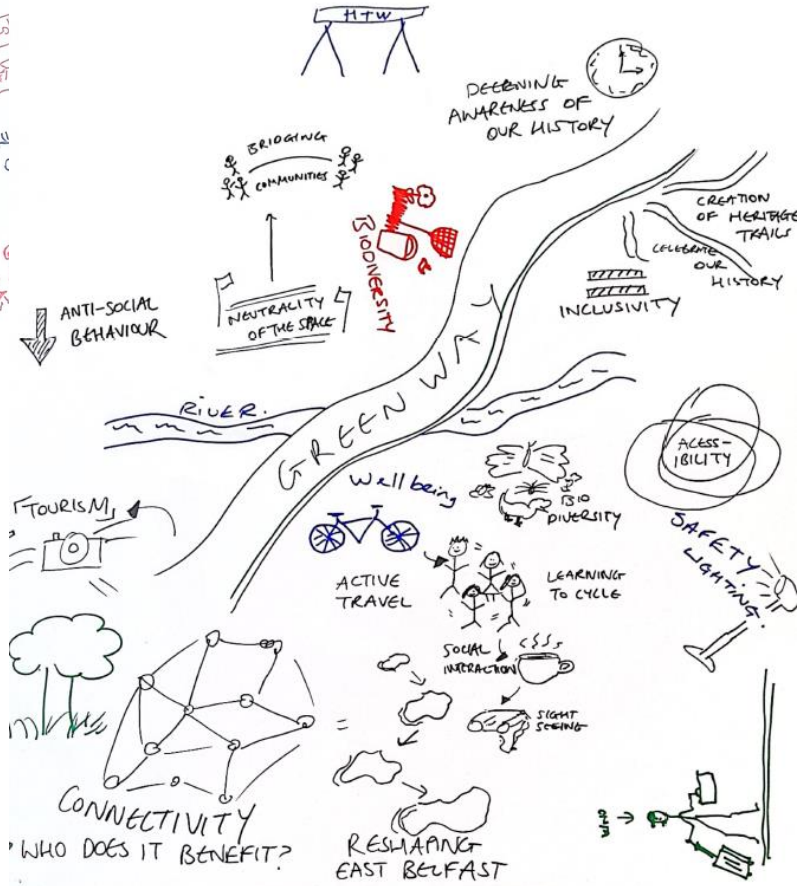
© Cranfield University

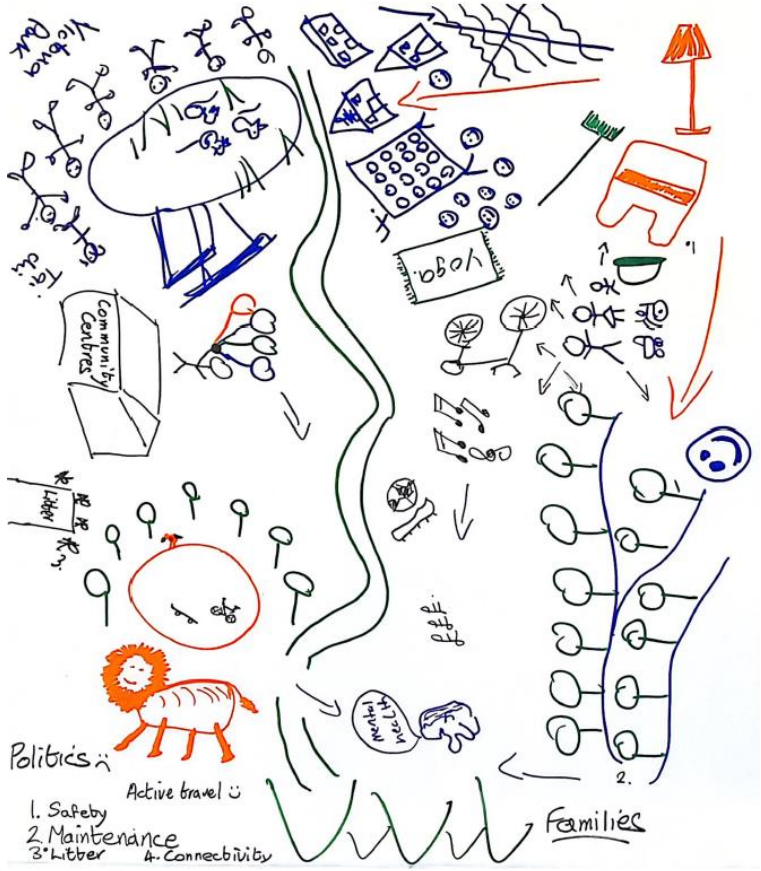
Step 1: Finding out about and exploring the situation

Rich Pictures (Groundswell Project)

(Clewley et al., 2026)

What are the successes and issues you see around the Connswater Community Greenway?





© Cranfield University

SSM Application

1. Finding out about and exploring the situation
- Group Model Building (GMB) workshop with CCG stakeholders: Rich Pictures, Causal Loops, Priorities
- 1-2-1 Interviews with key stakeholders involved in the CCG

2. Modelling purpose and activities
- Root definitions
- Conceptual Models

© Cranfield University

Root Definitions

A joint **Eastside Partnership (ESP) and Belfast City Council (BCC)** owned system, operated by **skilled and experienced ESP and BCC staff together with qualified, reputable and experienced contractors**, to **maximise the potential of the Connswater Community Greenway (CCG) Living Landmark as a catalyst for the ongoing physical, social and economic regeneration of east Belfast**, by **ensuring the sustainability of the Connswater Community Greenway as a living landmark, securing sustainable funding streams for ongoing maintenance, enhancing and conserving the local CCG environment, promoting and facilitating active engagement activities on the CCG, and creating new opportunities through links to the Eastside Greenways network and other future initiatives**, for the benefit of **Local Belfast residents (current and future), local school children, visitors/tourists, local East Belfast investors, the Protestant and Catholic communities and the wider Belfast area**, within **the financial, social, geographical, political, and collaborative partner constraints**.

A **community-owned system** operated by **community leaders, skilled and experienced staff from Belfast City Council and regional government departments, supportive businesses, and the East Side Partnership**, to **provide a good living environment and enhanced health, exercise and recreation opportunities, accessible by the people of East Belfast**, through **improved access, safety and quality of green and open space, including walking trails, heritage trails, public art and in which wildlife can thrive, ensuring the potential of the Connswater river is realised, increased pedestrian and cycle facilities and links in East Belfast with alternative and healthier transport options, maintaining strong relationships between fragmented local communities**, for the benefit of **Local Belfast residents (current and future), local school children, local East Belfast investors, the Protestant and Catholic communities and the wider Belfast area** within the constraints of **available funding, BCC priorities and community involvement**.

CATWOE Anaysis: **Customer**, **Actors**, **Transformation**, **Worldview**, **Owner**, **Environmental Constraints**

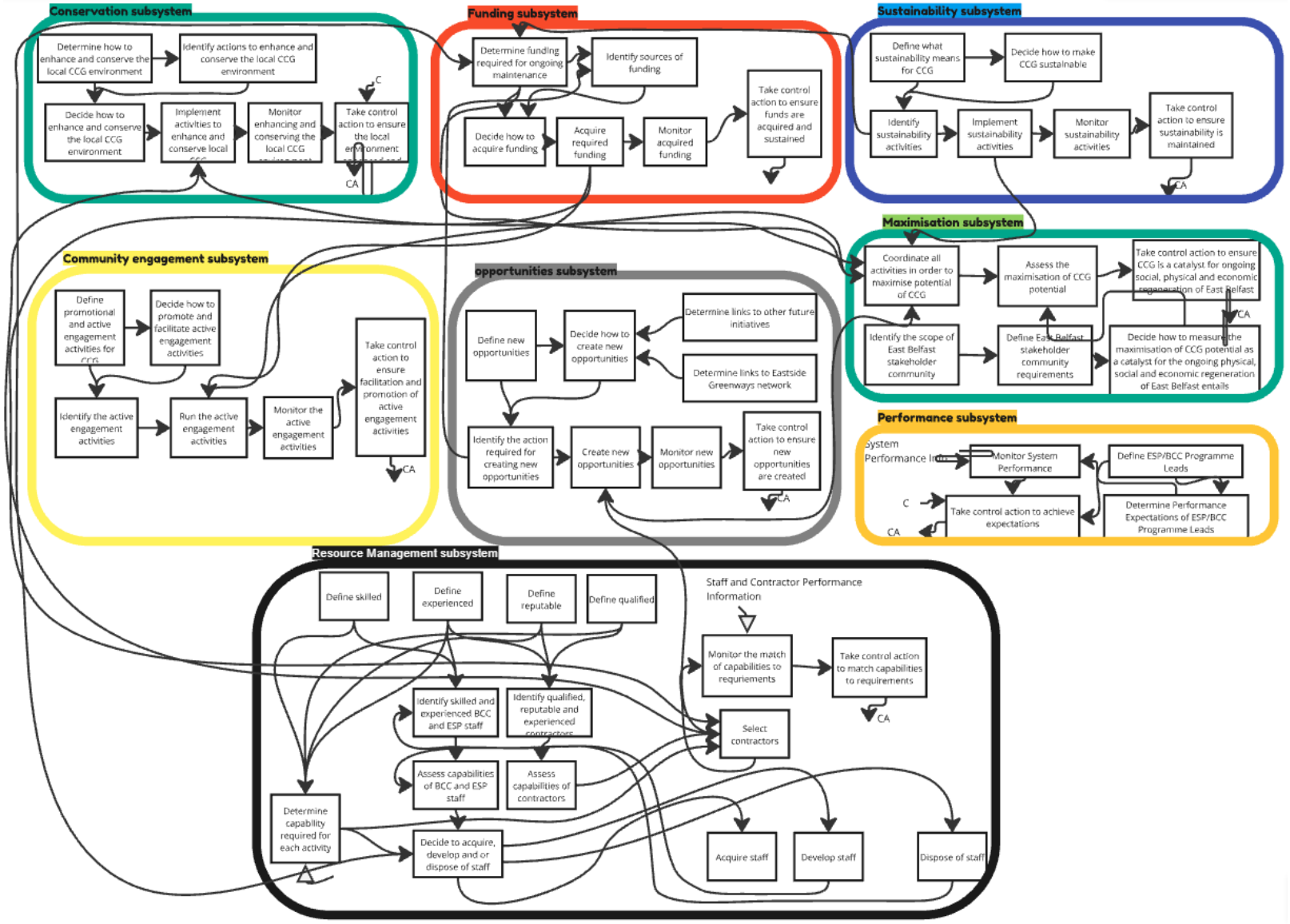
© Cranfield University

Conceptual Modelling

Step 2: Modelling Purpose and Activities (Clewley et al., 2026)

8 Sub-systems identified:

- Conservation
- Funding
- Sustainability
- Community Engagement
- Opportunities
- Maximisation
- Performance
- Resource Management



© Cranfield University

SSM Application

1. Finding out about and exploring the situation
- Group Model Building (GMB) workshop with CCG stakeholders: Rich Pictures, Causal Loops, Priorities
- 1-2-1 Interviews with key stakeholders involved in the CCG

2. Modelling purpose and activities
- Root definitions
- Conceptual Models

3. Discussing and debating the situation
- Validating and refining models
- Identifying ways forward

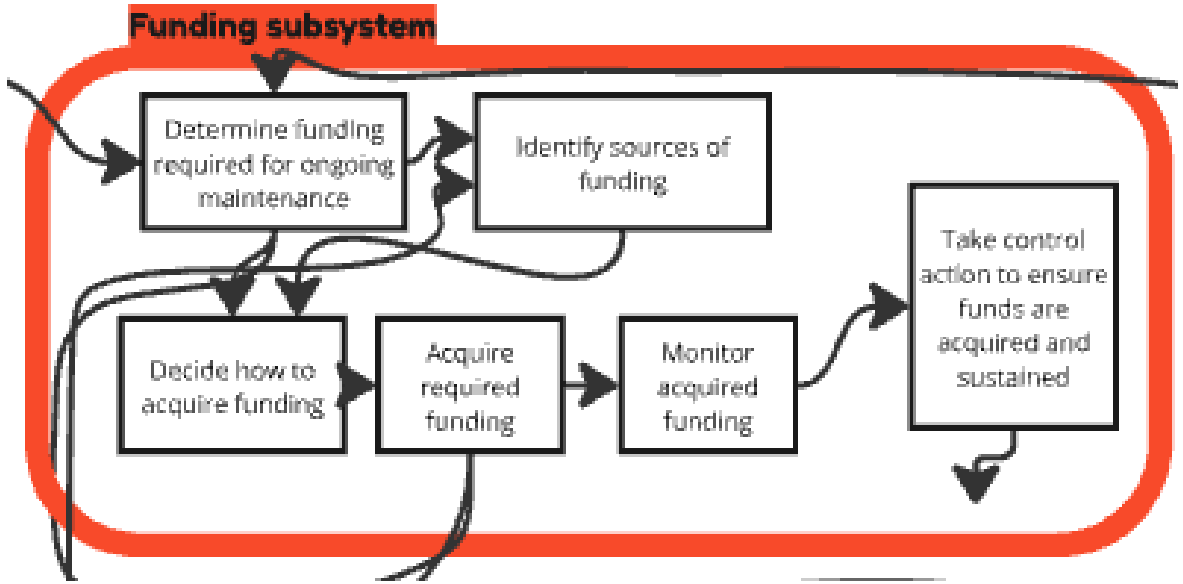
© Cranfield University

Discussion and Validation

Take each of the subsystems and their activities and evaluate them.

1. Do they make sense? Do we need to change the activity?
2. Is it being done, by whom and how well?

Validated by: research team at QUB, key stakeholders on the CCG project.



Activity	Is it done?	Who by?	How?	How is it measured?
Determine funding required for ongoing maintenance	Y	…		
Identify sources for funding	N			
Decide how to acquire funding	N			
Acquire required funding	Y			
Monitor acquired funding	Y			
Take control action to ensure funds are acquired and sustained	N			

© Cranfield University

SSM Application

1. Finding out about and exploring the situation
- Group Model Building (GMB) workshop with CCG stakeholders: Rich Pictures, Causal Loops, Priorities
- 1-2-1 Interviews with key stakeholders involved in the CCG

2. Modelling purpose and activities
- Root definitions
- Conceptual Models

3. Discussing and debating the situation
- Validating and refining models
- Identifying ways forward

4. Defining and taking action to improve the situation
- Identification of best practice to take on for similar UGBS regeneration projects (work in progress!)

© Cranfield University

SSM Outputs

This stage is still in progress, but emerging outputs are around identification of best practice. CCG is a successful project and we want to share the learning to take to other projects.

Emerging themes include:

- Personal 'skin in the game' and motivations of stakeholders;
- Continued and prolonged involvement of key stakeholders;
- Real understanding of user need.

Full details to follow in future publication.

© Cranfield University

Summary

Soft Systems Methodology (SSM) is a powerful tool to promote collaborative approaches for addressing problematic situations in complex environments like Public Health.

Careful planning when employing SSM to a given situation and bringing all of the diverse groups of stakeholders together that you may need to address a complex problematic situation is critical to a successful application that promotes learning.

You will need to reflect on your behaviours as a practitioner to ensure behaviour aligns with purpose (e.g. expert consultant vs. coach or systems practitioner).

Keep a diary of decision and learning points throughout the process.

It is about collaborative learning.

© Cranfield University

References

Barbrook-Johnson, P. and Penn, A.S. (2022). ‘Rich Pictures’. Pp. 21–32 in Systems Mapping: How to build and use causal models of systems, edited by P. Barbrook-Johnson and A. S. Penn. Cham: Springer International Publishing. https://link.springer.com/chapter/10.1007/978-3-031-01919-7_2

Bell, S. and Morse, S. (2013). ‘How People Use Rich Pictures to Help Them Think and Act’. Systemic Practice and Action Research 26(4):331–48. doi:10.1007/s11213-012-9236-x.

Checkland, P. (1981) Systems Thinking, Systems Practice. John Wiley and Sons: Chichester.

Checkland, P. and Poulter, J. (2020). ‘Soft Systems Methodology’. Pp. 201–53 in Systems Approaches to Making Change: A Practical Guide, edited by M. Reynolds and S. Holwell (Retired). London: Springer.

Checkland, P. and Scholes, J. (1999) Soft Systems Methodology in Action: A 30 Year Retrospective. John Wiley and Sons: Chichester.

Clewley, N., et al. (2026). Soft Systems Modelling in GroundsWell (Work in Progress).

Clewley, N. and Forsyth, T. (2025). Radiotherapy Workforce Capacity and Demand Modelling (Work in Progress).

Conte, K.P. and Davidson, S. (2020). ‘Using a “Rich Picture” to Facilitate Systems Thinking in Research Coproduction’. Health Research Policy and Systems 18(1):14. doi:10.1186/s12961-019-0514-2.

Wilson, B. (2001). Soft Systems Methodology: Conceptual Model Building and its Contribution. John Wiley and Sons: Chichester.

Wilson, B. and Van Haperen, K. (2015) Soft Systems Thinking, Methodology and the Management of Change. Palgrave: UK.

© Cranfield University

Contact:
Natalie.Clewley@cranfield.ac.uk
Tim.Forsyth@cranfield.ac.uk

© Cranfield University

Online Workshop: Introduction to Viable Systems Modelling

COMPLEX SYSTEMS AND NETWORK SCIENCE FOR PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES
A WHO COLLABORATING CENTRE FOR RESEARCH AND TRAINING

Workshop 1:
Wednesday 18 February 2026 10:30 – 12:30 (GMT)

Workshop 2:
Wednesday 25 February 2026 10:30 – 12:30 (GMT)

REGISTER NOW

SESSION 1

SESSION 2

QUEEN'S UNIVERSITY BELFAST

Cranfield University

qub.ac.uk/sites/who

whocc@qub.ac.uk

© Cranfield University

Future WHOCC Webinars

Online Workshop: Introduction to Systems Maps and Causal Loop Diagrams

COMPLEX SYSTEMS AND NETWORK SCIENCE FOR PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES
A WHO COLLABORATING CENTRE FOR RESEARCH AND TRAINING

Workshop 1:
Wednesday 25 March 2026 10:30 – 12:30 (GMT)

Workshop 2:
Wednesday 1 April 2026 10:30 – 12:30 (BST)

REGISTER NOW

SESSION 1

SESSION 2

QUEEN'S UNIVERSITY BELFAST

qub.ac.uk/sites/who

whocc@qub.ac.uk

Online Workshop: Introduction to Stakeholder Network Analysis

COMPLEX SYSTEMS AND NETWORK SCIENCE FOR PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES
A WHO COLLABORATING CENTRE FOR RESEARCH AND TRAINING

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

QUEEN'S UNIVERSITY BELFAST

qub.ac.uk/sites/who

whocc@qub.ac.uk

© Cranfield University

https://dspace.org/

Webinar Series on Soft Systems Methodology (SSM) (Session 2 of 2): Applications of SSM in Public Health

Clewley, Natalie; Forsyth, Tim

2026-02-04
Cranfield University
https://dspace.lib.cranfield.ac.uk/handle/1826/25200
Clewley N, Forsyth T. (2026) Webinar Series on Soft Systems Methodology (SSM): Session 2: Applications of SSM in public health. Presented on the 4th February 2026

Downloaded from a DSpace repository. https://dspace.org/