



**learning** for **sustainability**  
supporting engagement, co-design and adaptation

# An introduction to systems thinking and systemic design – concepts and tools

- it's a way of collaboratively talking about and designing real-world solutions

**Will Allen & Margaret Kilvington**

# Content guide

**01**

## Introduction

Why decision-makers are moving towards a systems thinking approach to better deal with complex situations in health, environment, education, etc.

**02**

## Basics

Basics of systems thinking

**03**

## Systemic design

linking systems thinking and design

**04**

## support systems

Introduction to range of tools/methods that support systems thinking and systemic design in practice

**05**

## Nurturing

Nurturing & supporting systems thinking in your practice

# 01

## Why the growing interest in a systems thinking approach

Proof  
ALL HANDS  
4/24/2018



# We are all systems thinkers



We all grew up exploring our natural and social worlds and asking questions born of curiosity. We can look at problems, see beyond the obvious, and explore otherwise hard to see connections.




But in many school and workplace settings today knowing the “right answers” is often rewarded over systems-based inquiry and creativity.



Yet in today’s more crowded, and rapidly changing, world there are fewer instances where all that is needed is a “right answer” – rather there are more perspectives, interconnections and interdependencies to consider!





Hence the growing interest in learning to strengthen systems thinking practices, and manage organisational cultures that encourage its use in both problem structuring and solution design.

# Systems thinking enables us to:



**Change our thinking** to match the interconnected, dynamic complexity of our communities and their environments



**Communicate with others** to create new ways of thinking and seeing - and develop shared understanding



**Change our behavior** to work with the complex forces in the system (instead of against them) to realize our vision



**Identify and test** a wider variety of **possible actions and solution pathways**



**Become more aware** of the potential for unintended consequences of our actions



Harness **social learning** processes to help us develop a shared understanding and take action collectively



**Expand the choices available to us** and identify those choices where we can **develop significant leverage**

# Of course - not all systems are the same!

There are different kinds of systems



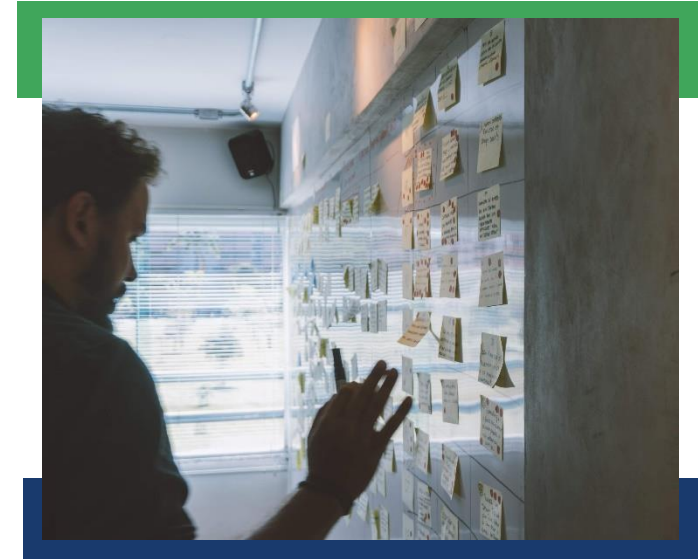
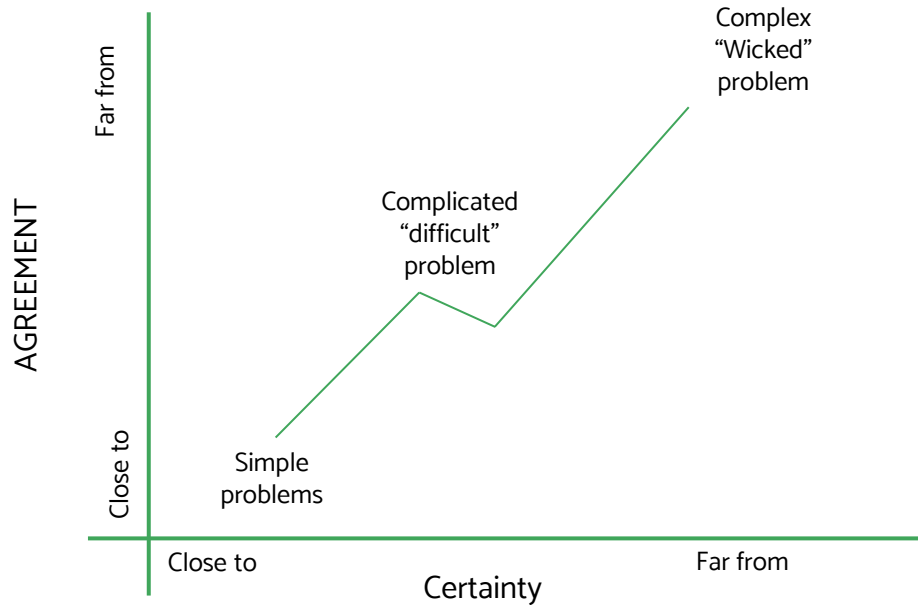
Simple / complicated



Complex and adaptive

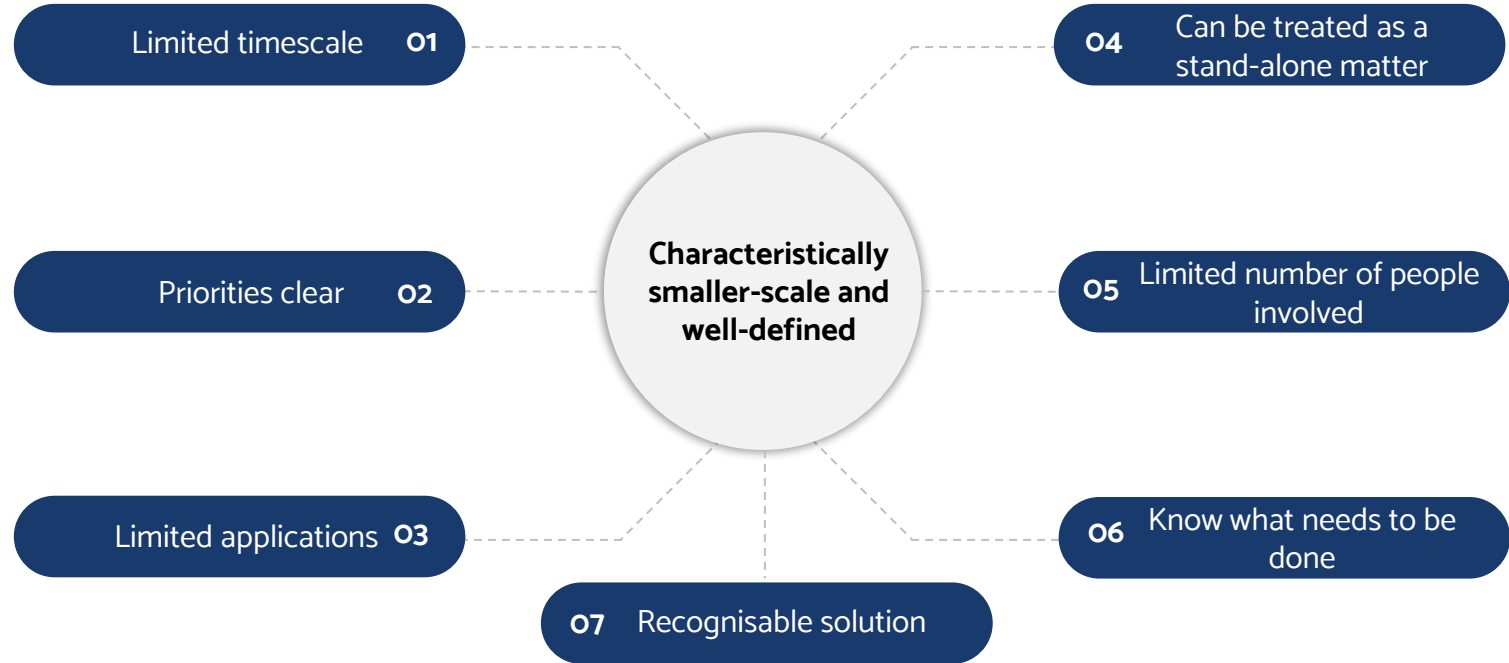
We need to understand them, and use different management styles for each

# A typology of problem situations

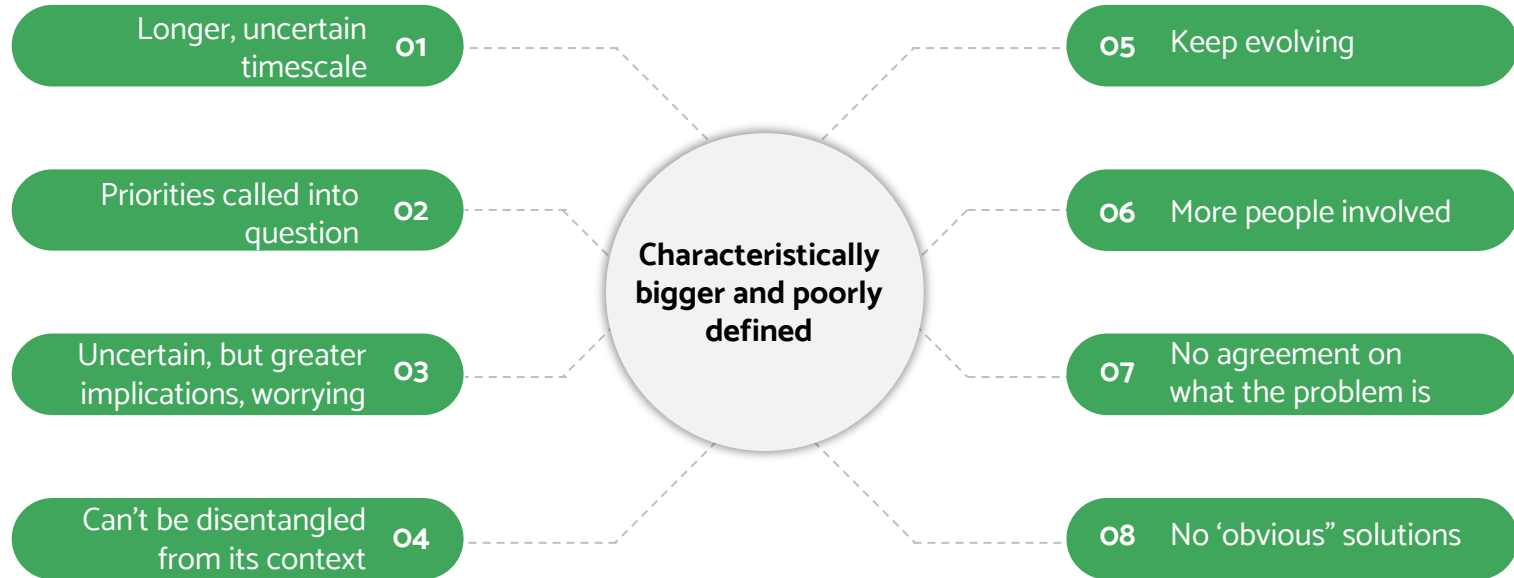




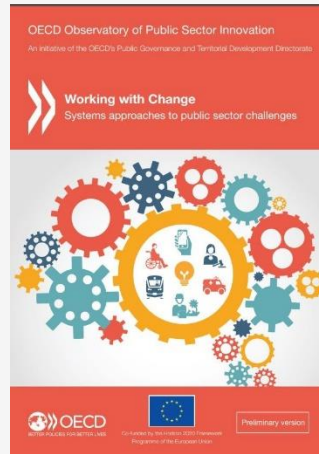
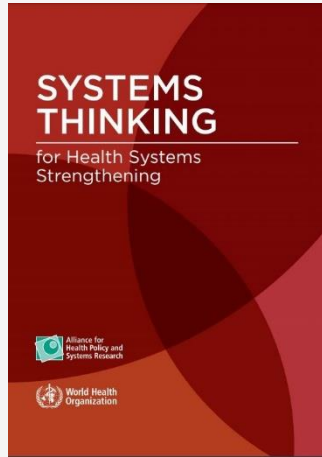
# Difficult problems



# Wicked problems



# International agencies and public sector organizations are moving towards systems thinking .....



To deal with complex or 'wicked' problems which



Go beyond range of any one organization to manage them



Are often characterised by disagreement about causes, and how to tackle them



Recognize the need to change behaviour or practice at multiple levels and scales (individuals to organizations)



Require innovative solutions that can be adapted in the light of experience and feedback

# Different systems require different management



## Managing a complicated system

- Develop explicit plans
- Plan then act
- Look for agreement & clear outcome
- Limit types of approaches & actions
- Set targets
- Drive implementation



## Managing a complex adaptive system

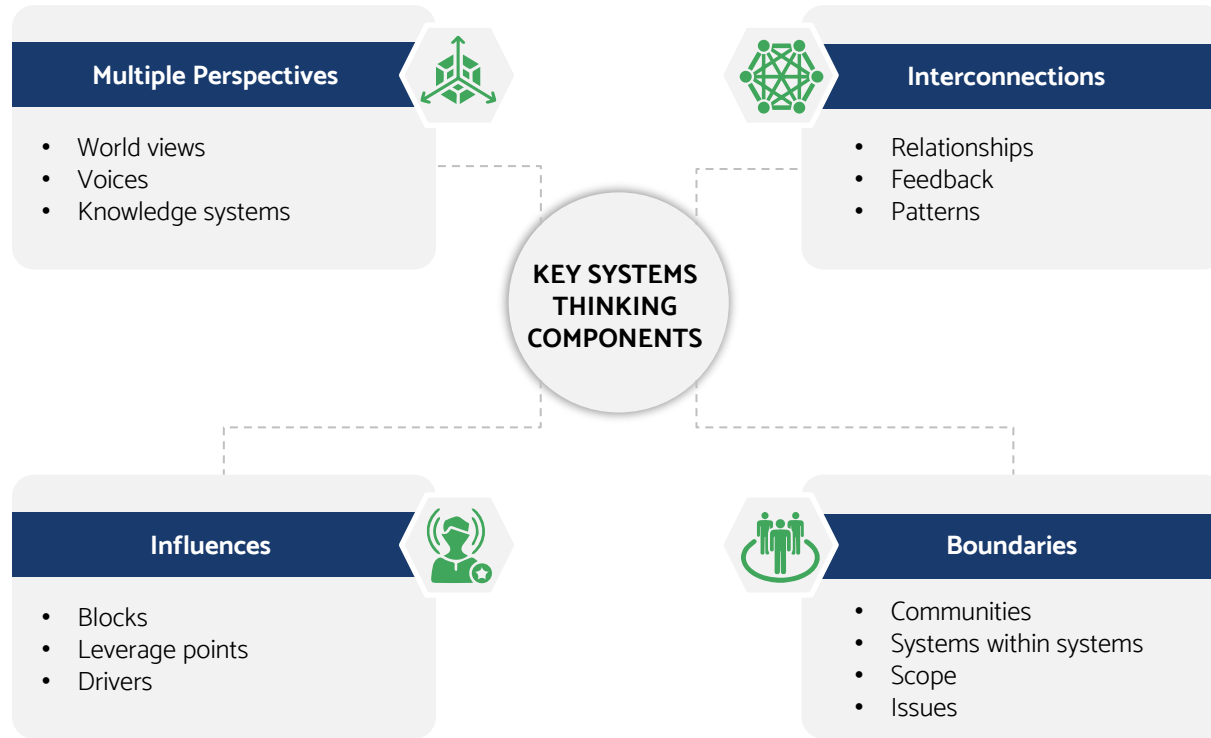
- Look for divergence
- Act, learn, and plan at the same time
- Use minimum specifications
- Work on multiple leverage points
- Be creative with opportunities at the boundaries
- Build on what emerges and grows

A photograph of a field of young green plants in a field, with a green overlay on the left side containing text.

**02**

**Basics of  
systems thinking**

# Key systems thinking components



# Multiple Perspectives



Who or what are the key stakeholders in this situation?



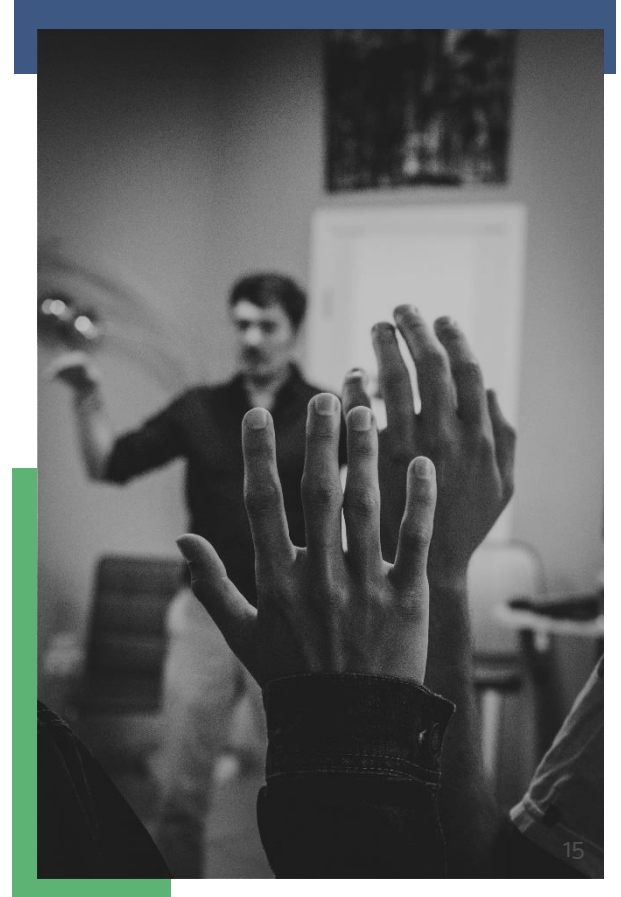
What stakes (individual values and motivations) do they have?



What are the different ways in which the situation can be framed or understood – by whom?



What stakes (individual values and motivations) do they have?



# Interconnections



How do the elements within the situation (components, stakeholders, knowledge, etc.) interconnect?



Leverage points are seen as key points with which to intervene in complex systems



What patterns emerge from these relationships in action - with what consequences, and for whom?



# Boundaries



Define scope and scale (and from what/whose perspective is this developed.)



Are other boundaries possible – and feasible?



Agree on how to structure the problem situation



Discuss what constitutes an improvement – and how this might be different for different stakeholders?



# Influences



What drives the systems in question in particular directions

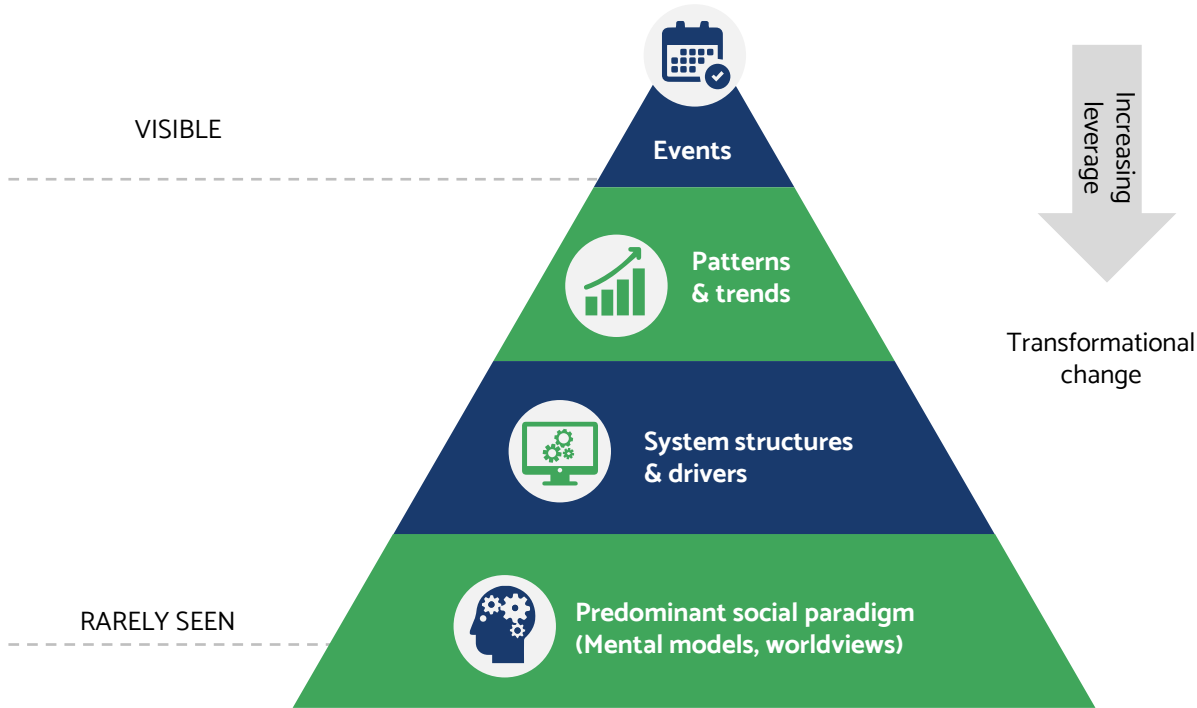


Identify .... drivers, trends, enablers, blocks, leverage points



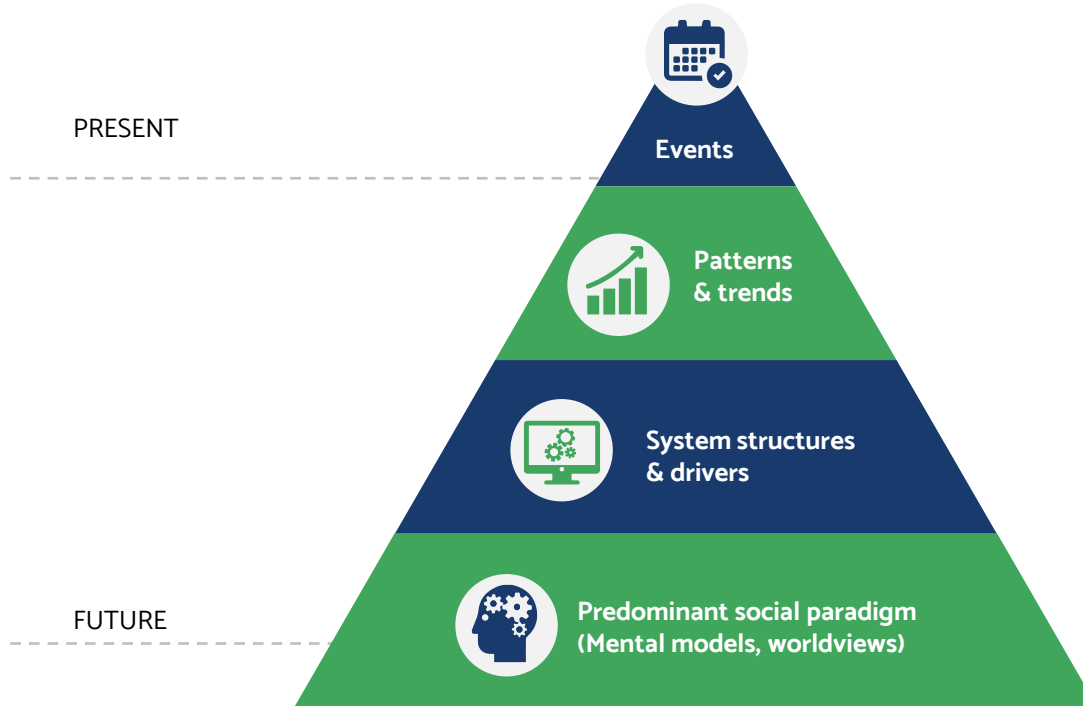
Leverage points are seen as key points with which to intervene in complex systems

# The iceberg model for systems thinking















The iceberg model is a systems thinking tool designed to help an individual or group discover the patterns of behaviour, supporting structures, and mental models that underlie a particular event.

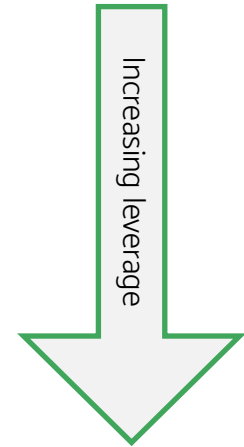
# Some questions to help unpack the system

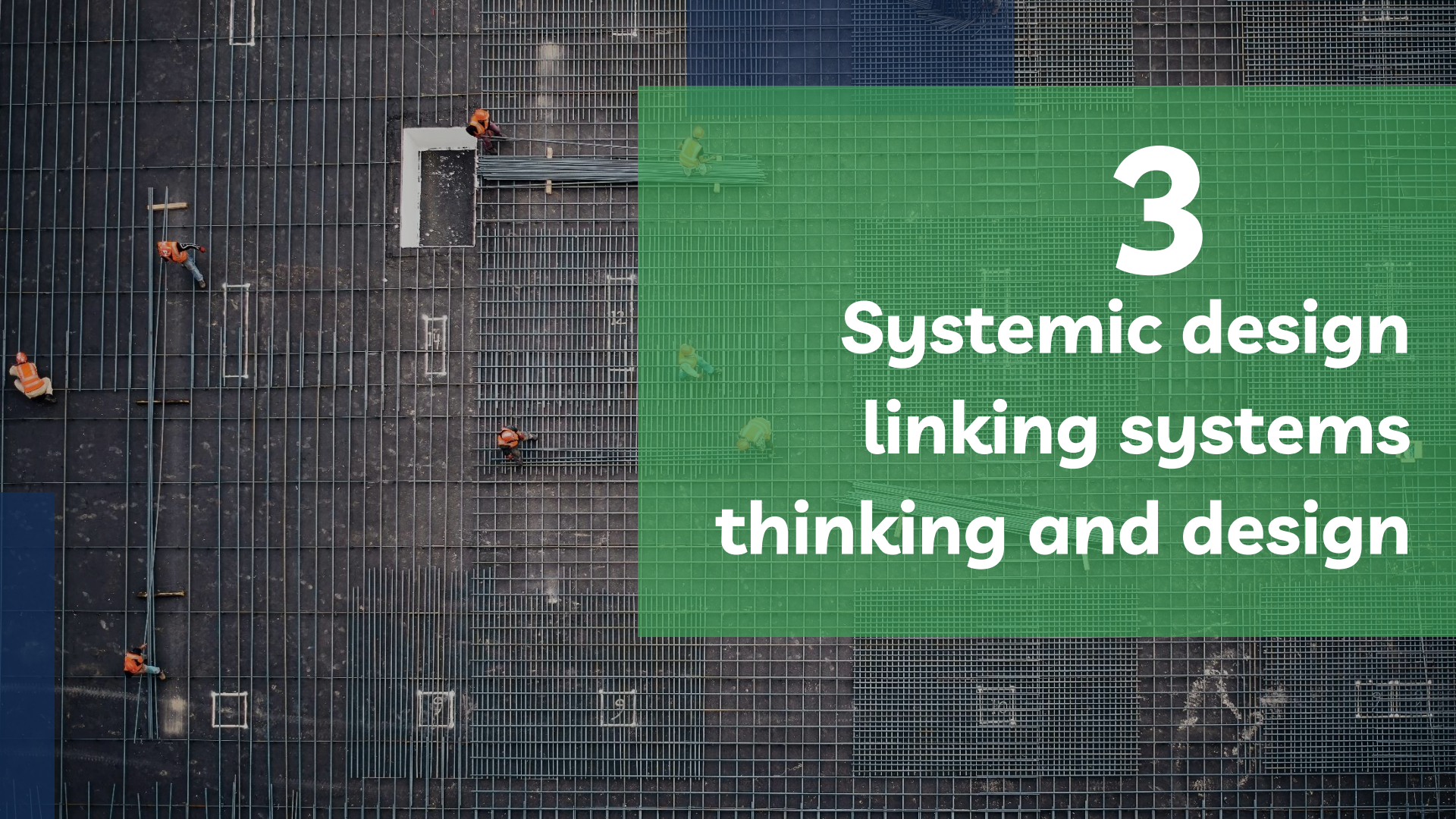


- What is the fastest way to react to this event NOW?
- What trends and/or patterns are occurring?
- What mental/organizational structures create the patterns?
- What are the stated/unstated visions that generate this structure?

# Donella Meadows' 12 leverage points: places to intervene in a system

-  Numbers
-  Buffers
-  Stock and flow structures
-  Delays
-  Balancing feedback loops
-  Reinforcing feedback loops
-  Information flows
-  Rules
-  Self-organization
-  Goals
-  Paradigms
-  Transcending Paradigms

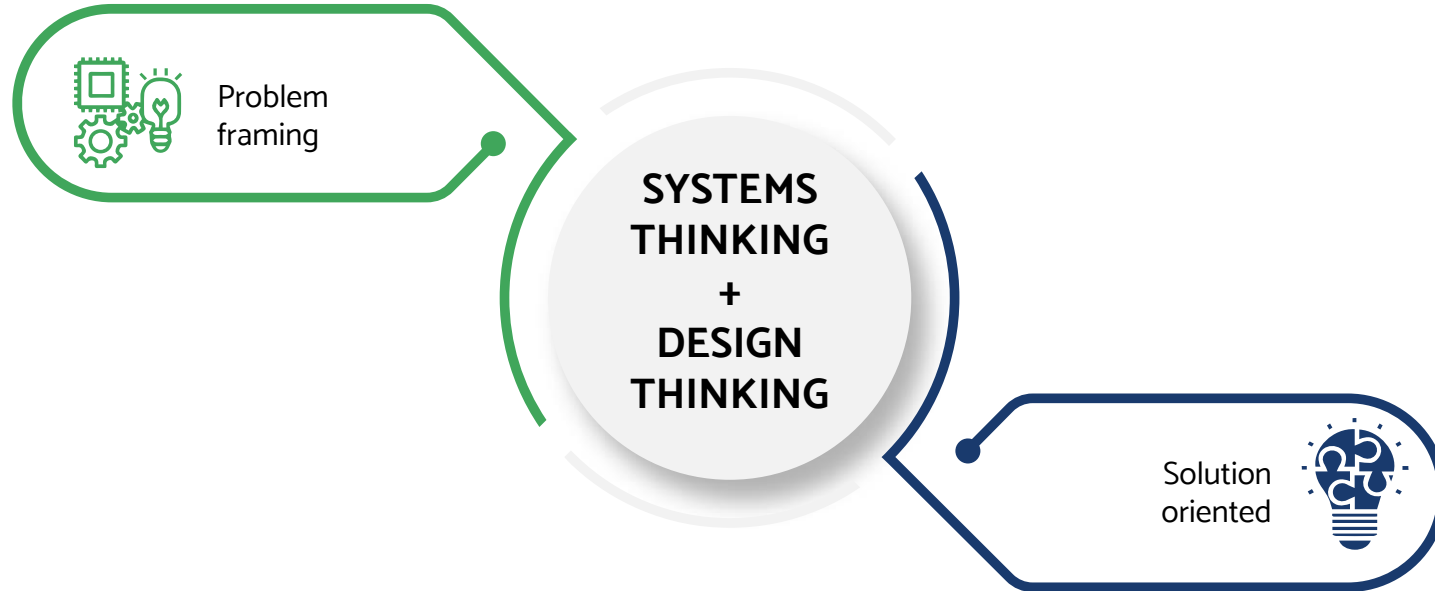




# 3

**Systemic design  
linking systems  
thinking and design**

# Linking systems thinking and design



**Systemic design** - Integrating the mindsets and toolsets of systems thinking and design thinking to encourage learning and innovative systems change

# Systemic design



These frameworks link together to support collaborative decision-making. For example key functions in a typical adaptive management/policy setting process may include:



[Systems thinking] Involving participants in understanding issue and wider context (recognizing different perspectives/problem structuring, potential leverage points)



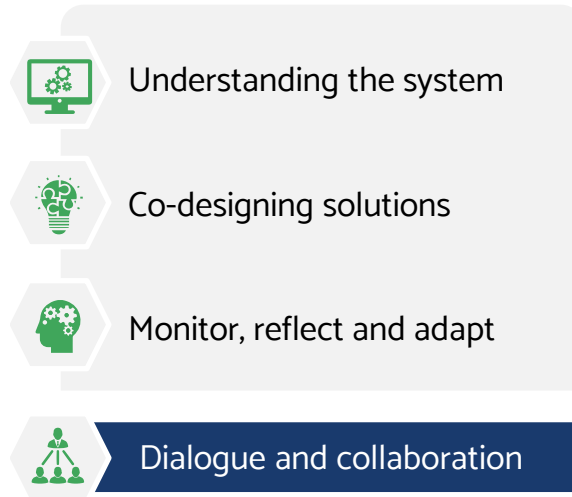
[Design thinking] Jointly develop action plans (identify activities, outcomes, and assumptions) and M&E plans



[Reflective thinking] Learn and refine (adaptive management)

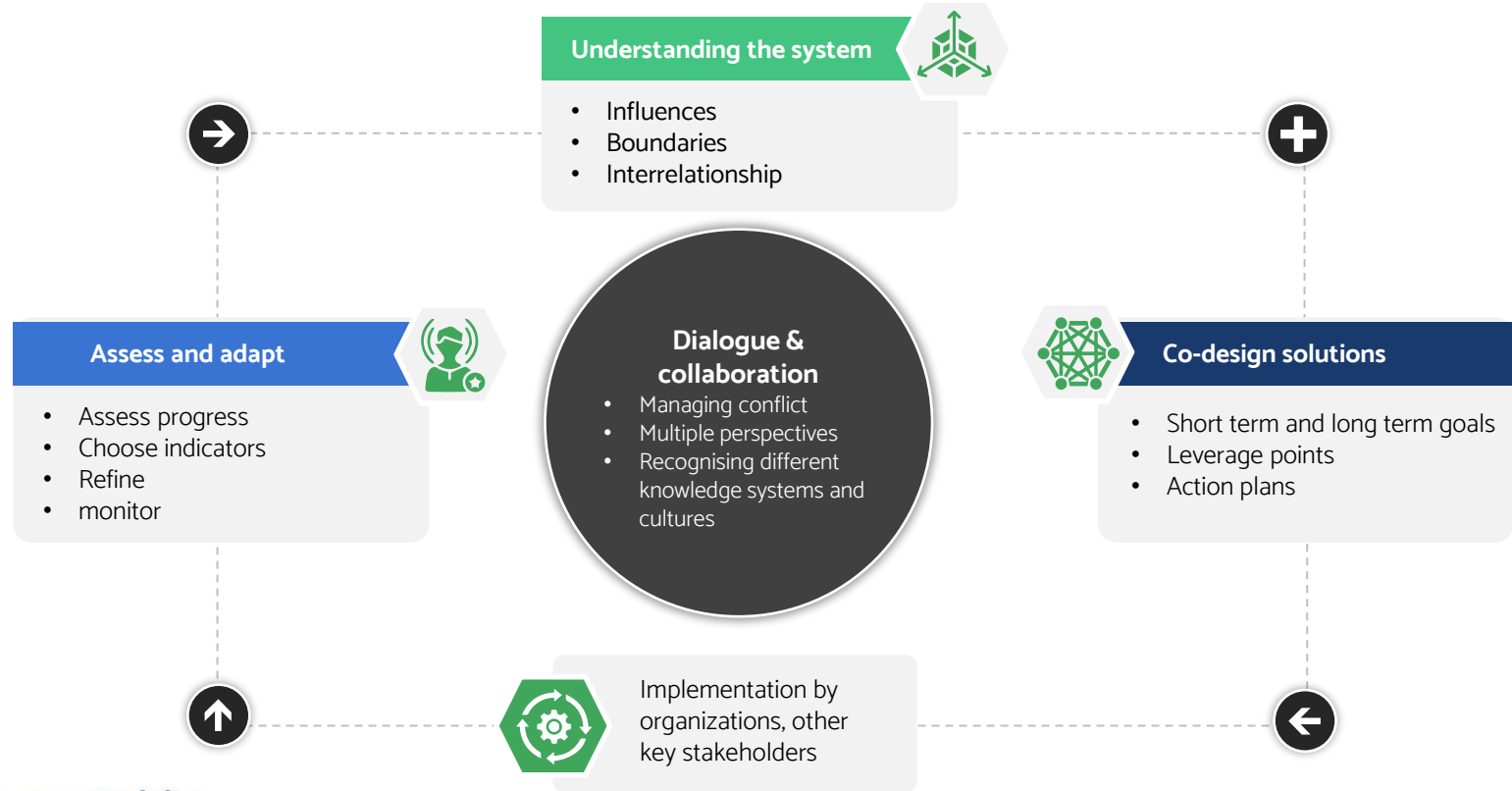


# Tools/methods for systems thinking and systemic design can be grouped by function



The first three functions essentially can be seen as linked elements in an iterative and experiential learning cycle – in a systems approach each is best carried out using tools that support dialogue and collaboration among the stakeholder groups involved.

# Key systems thinking components



# 04

## Tools and methods for systems thinking and systems design

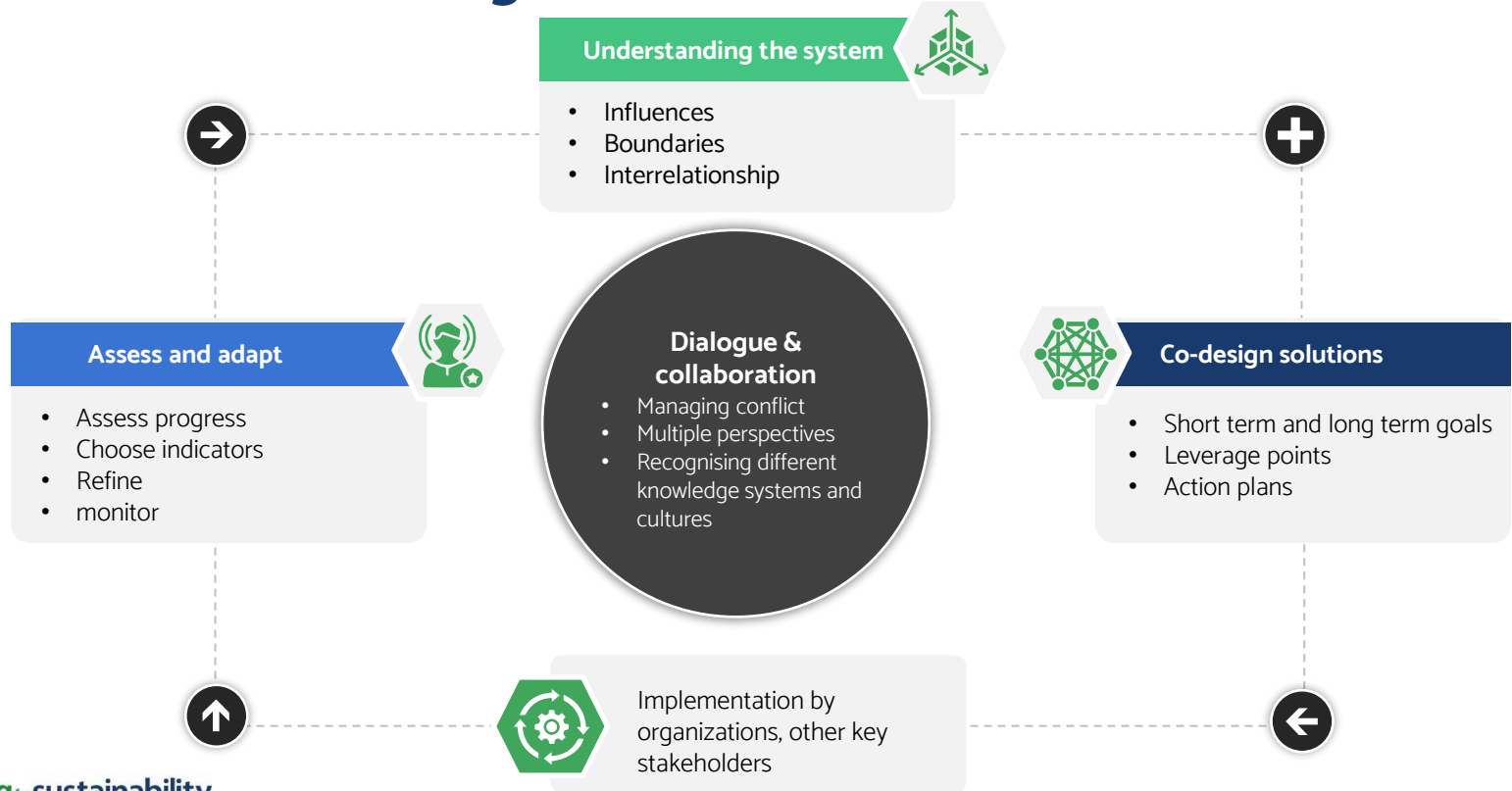
There are so many!

“ Over the years, I’ve found that starting with methods, whether causal loop diagrams or Soft Systems Methodology or Social Network Analysis, often confuses or exasperates novices  
....

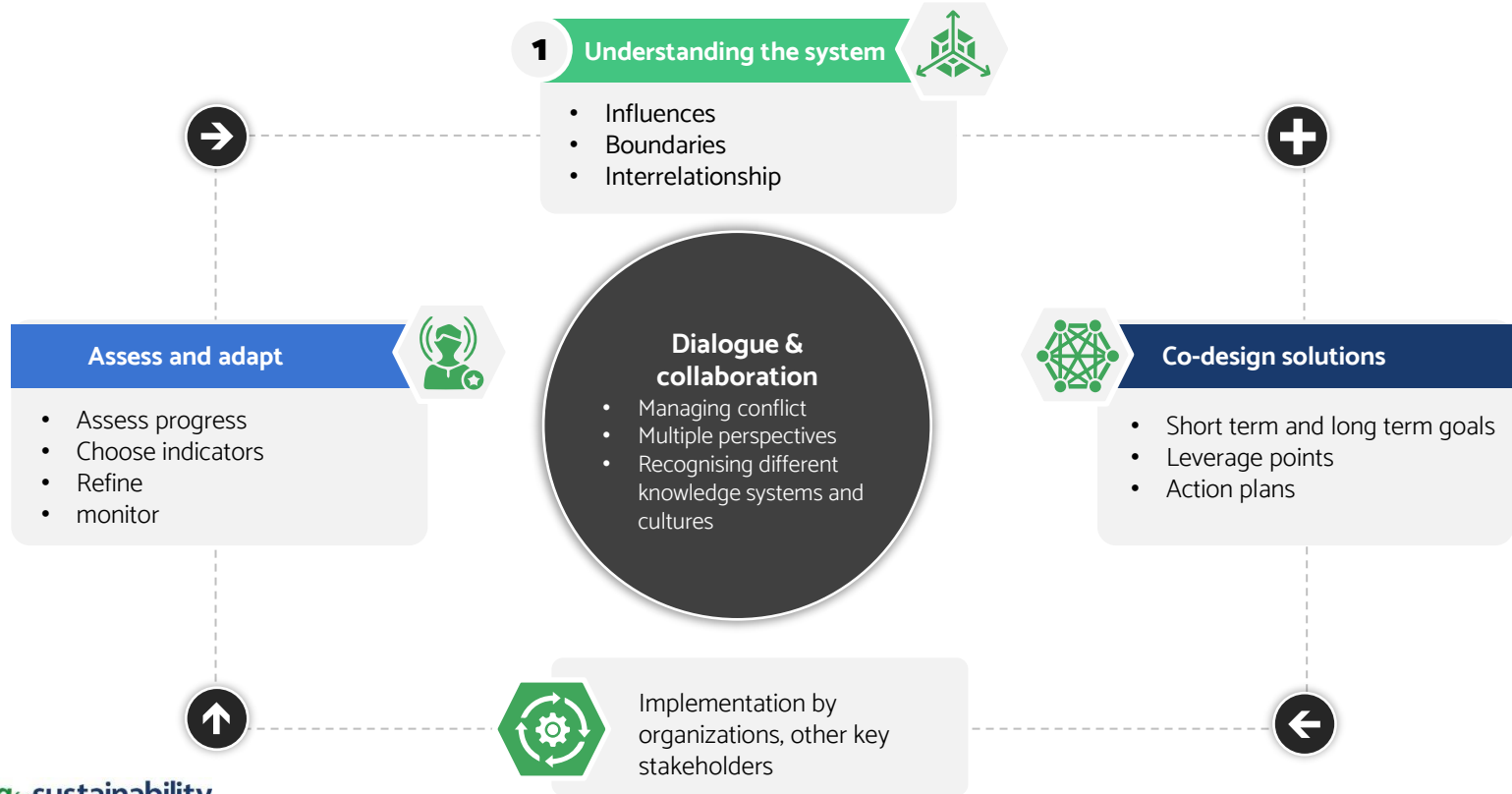
... furthermore, no single method will equip them with the power of the systems field. ”

~ **Bob Williams**

# Important to see how sets of tools / methods fit in the bigger process in which they are used



# 1. Tools for understanding the system



# Understanding the system

## tools for seeing things



Timelines



Trend analysis



System archetypes



Rich pictures



Cynefin framework/Stacey diagram



Concept mapping



Social network analysis



Causal loop diagrams



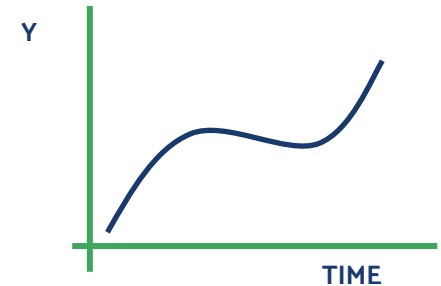
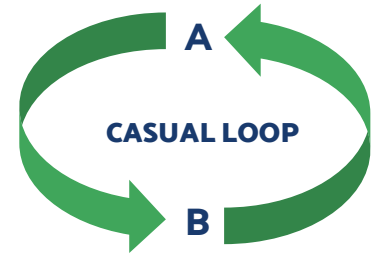
Bayesian belief networks



Computer models



etc



# Understanding the system tools for thinking strategically



CATWOE



Iceberg model



System archetypes



Soft Systems Methodology (SSM)



Scenarios and visioning



Problem structuring methods



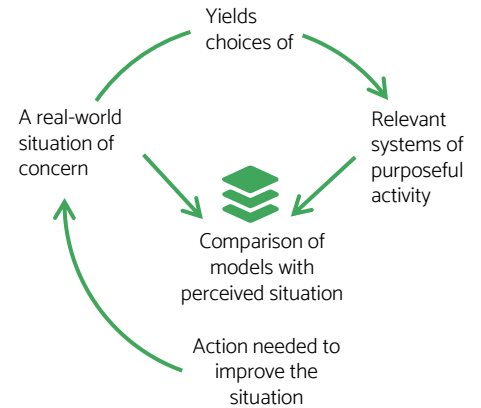
SWOT/TOWS analysis



STEEP  
(PEST, PESTLE, STEP, etc.)

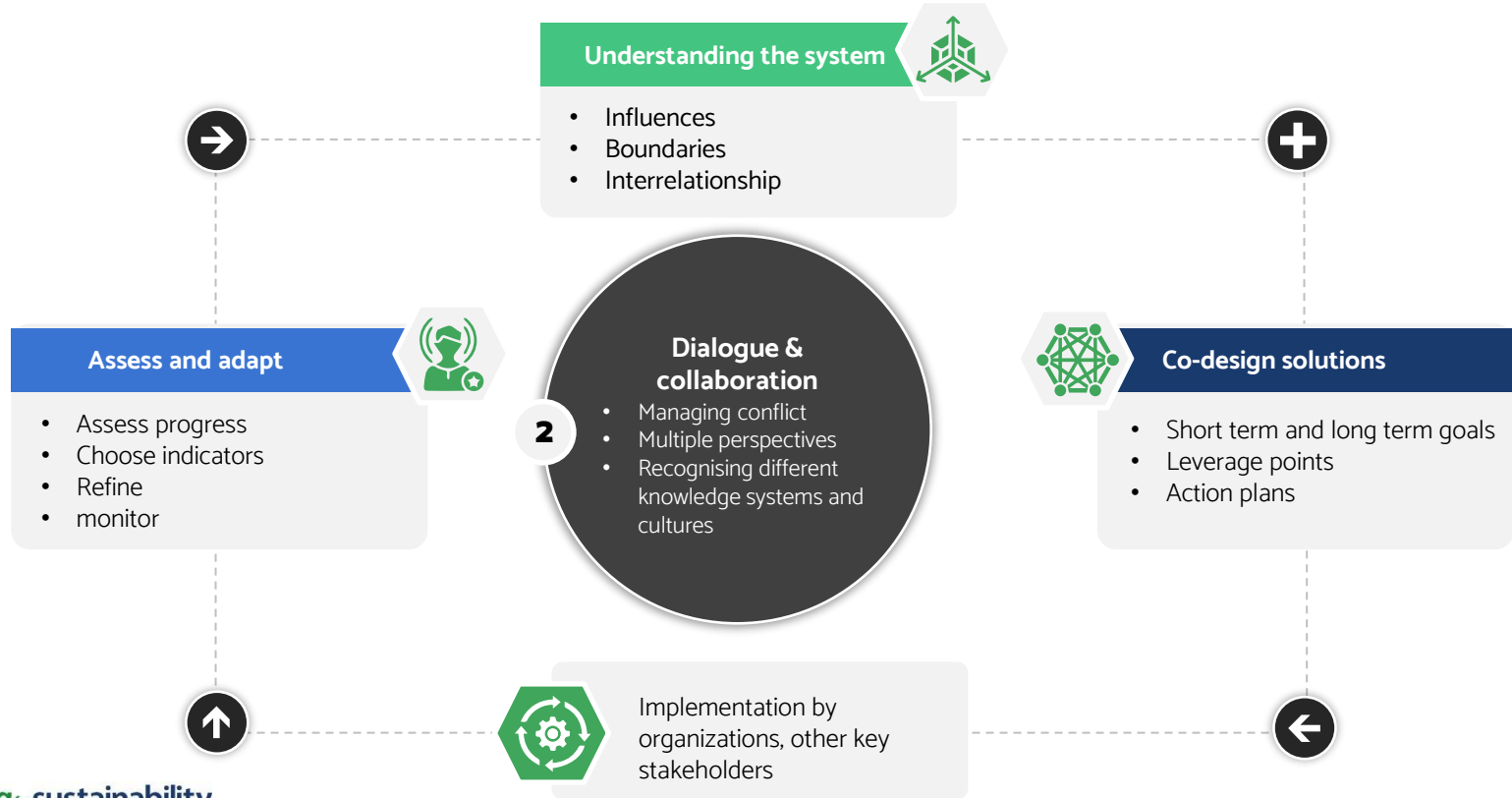


etc





# 2. Tools for dialogue and collaboration



# Dialogue & collaboration tools for involving the right people include:



“It’s not just who you could get to come at the time”



Stakeholder analysis



Engagement planning



Networking



Relationship building & management

# Dialogue & collaboration tools for working together

Use multiple methods and always have a plan. Tools include:



Facilitation



Kitchen workshops  
and meetings



Informal  
conversations



Networks

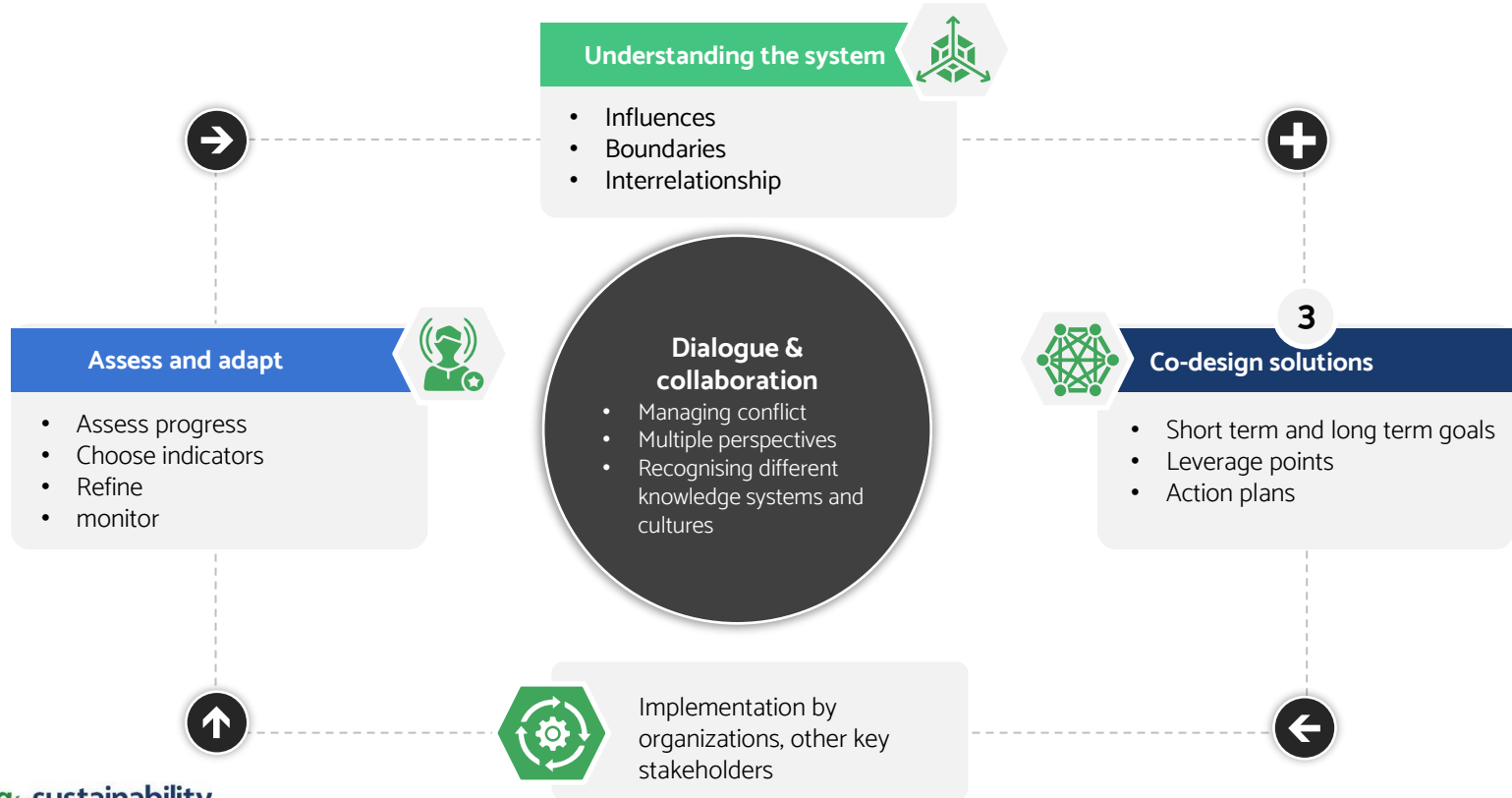


Social media



Active listening,  
appreciative inquiry

# 3. Tools for co-designing solutions



# Tools for co-design

## finding desirable solutions

Usually both a product and a process. Approaches include:



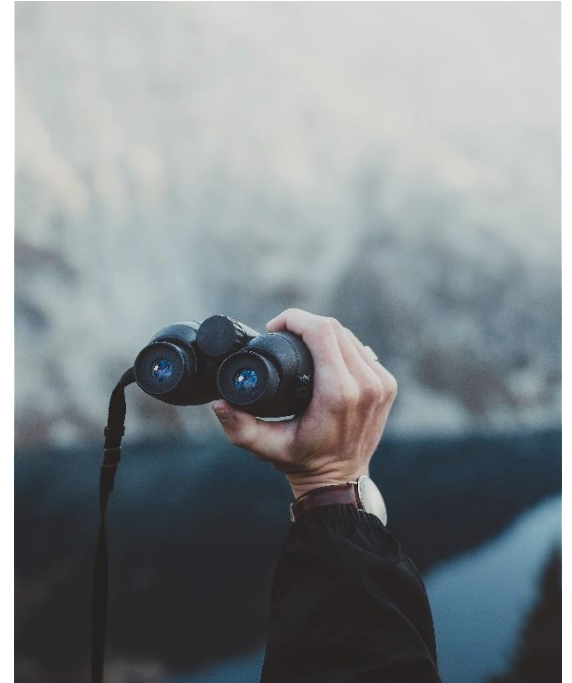
Agile planning (scrums & sprints) .... as opposed to waterfalls



The five stages of [Design Thinking](#) (Empathise, Define – the problem, Ideate, Prototype, and Test)

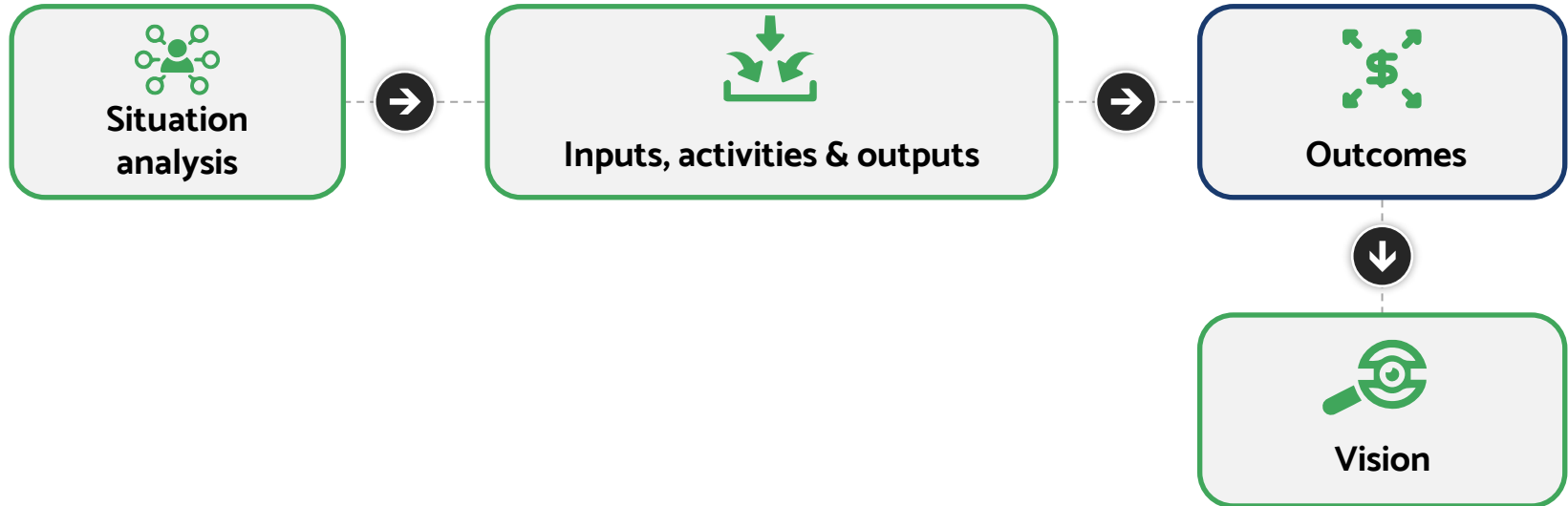


Along with a whole host of methods .... [problem structuring methods \(PSMs\)](#), [conceptual models](#), [scenario development](#), [\(participatory\) system dynamic modelling and simulation](#), etc.



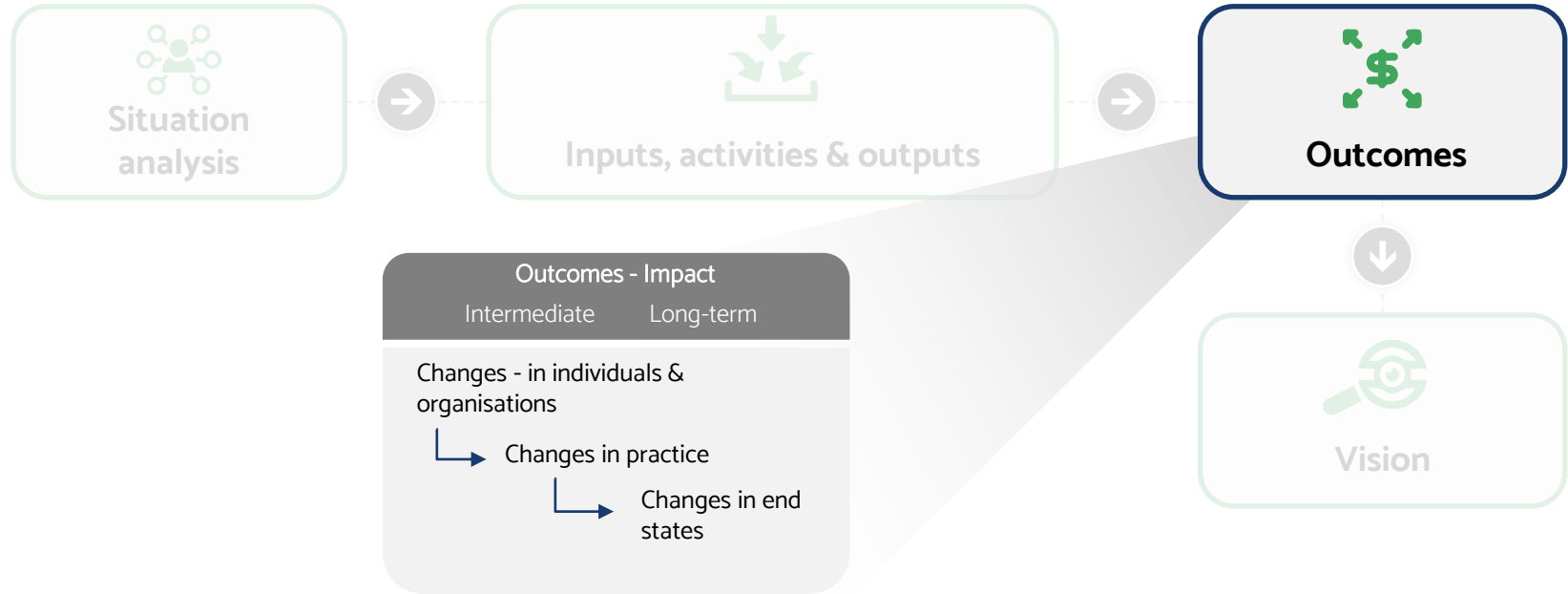
# Tools for co-design – outcomes modelling

## [Theory of Change (ToC) and logic models]

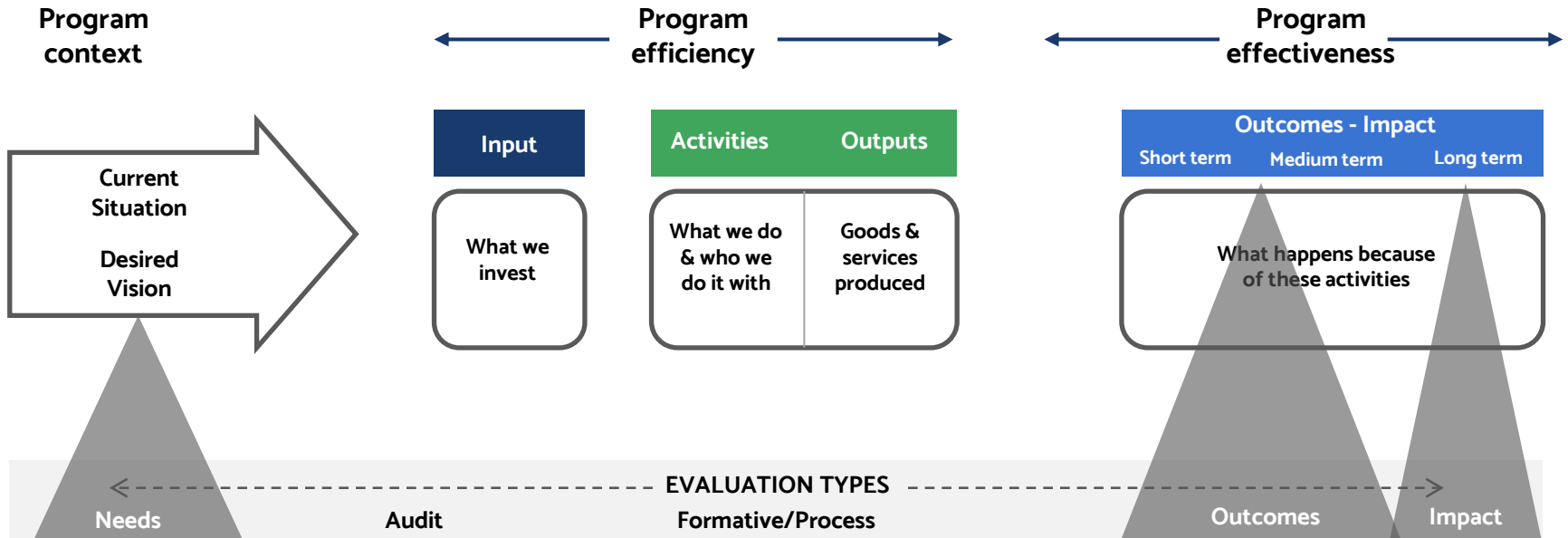


# Tools for co-design – outcomes modelling

## [Theory of Change (ToC) and logic models]

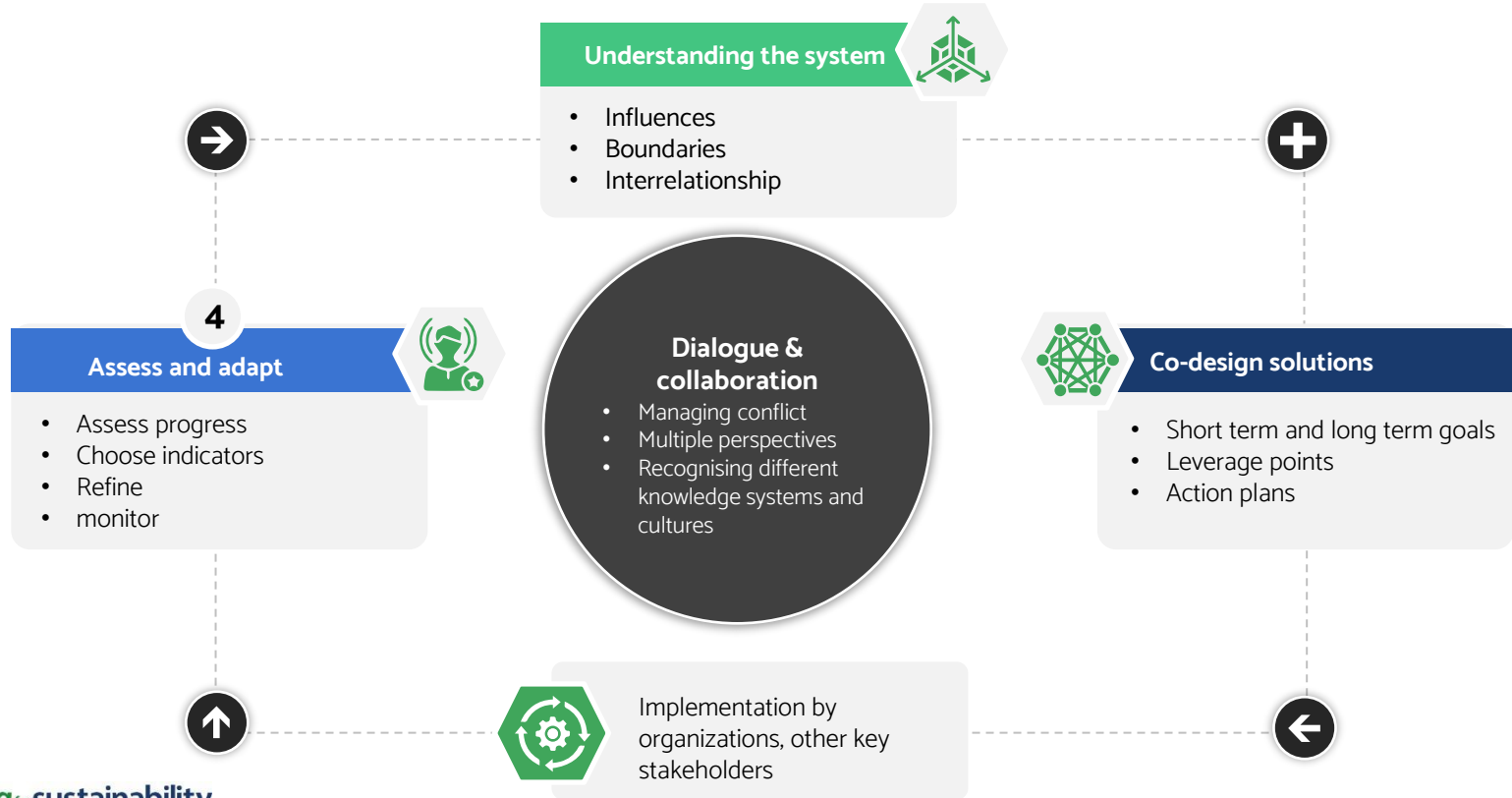


# ... and helps develop monitoring and evaluation plans along with activity plans





# 4. Tools/methods for assessing progress



# Tools for assessing and adapting include:



[Theory of change](#) and accompanying [logic models](#)



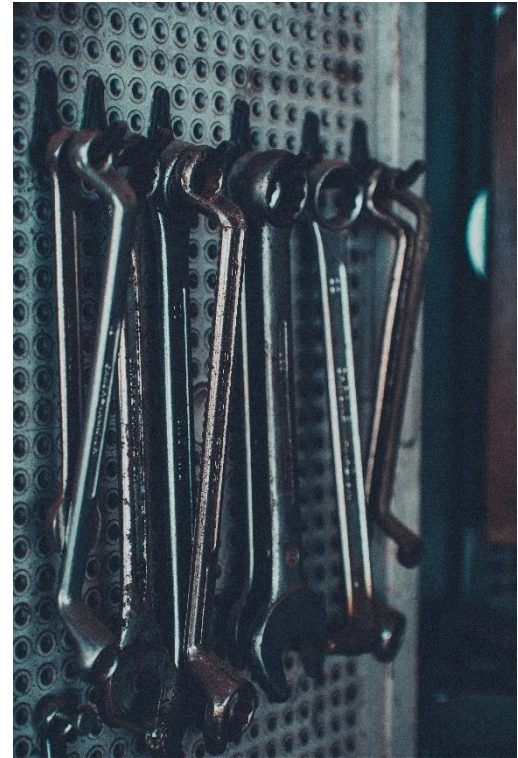
[Complexity-aware monitoring](#) (outcomes mapping, MSC, etc.)



Using [rubrics](#) to assess complex tasks and behaviors (intermediate outcomes)



Facilitating [reflective practice](#) (After Action Reviews – AARs and Strategic Learning Debriefs)



# 05

## Embedding systems thinking in practice

# It is important to create a learning organization where:



People continually expand their capacity to create the results they truly desire



New and expansive patterns of thinking are nurtured



Collective aspiration is set free ... and



People are continually learning to see the whole together.



~ Peter Senge 1990 - The Fifth Discipline

# Common challenges that often have to be faced include



The perception that learning (collaboration and dialog) takes too long



Too few people with the skillsets and resources required to follow through



Exploring one's personality and goals in a group can sometimes seem threatening and daunting



A lack of safe spaces for groups to work in this different way



A lack of formal commitment to the process from organizational leadership

# Senge: the five core disciplines required for a successful learning organization



Systems Thinking



Personal Mastery



Mental Models

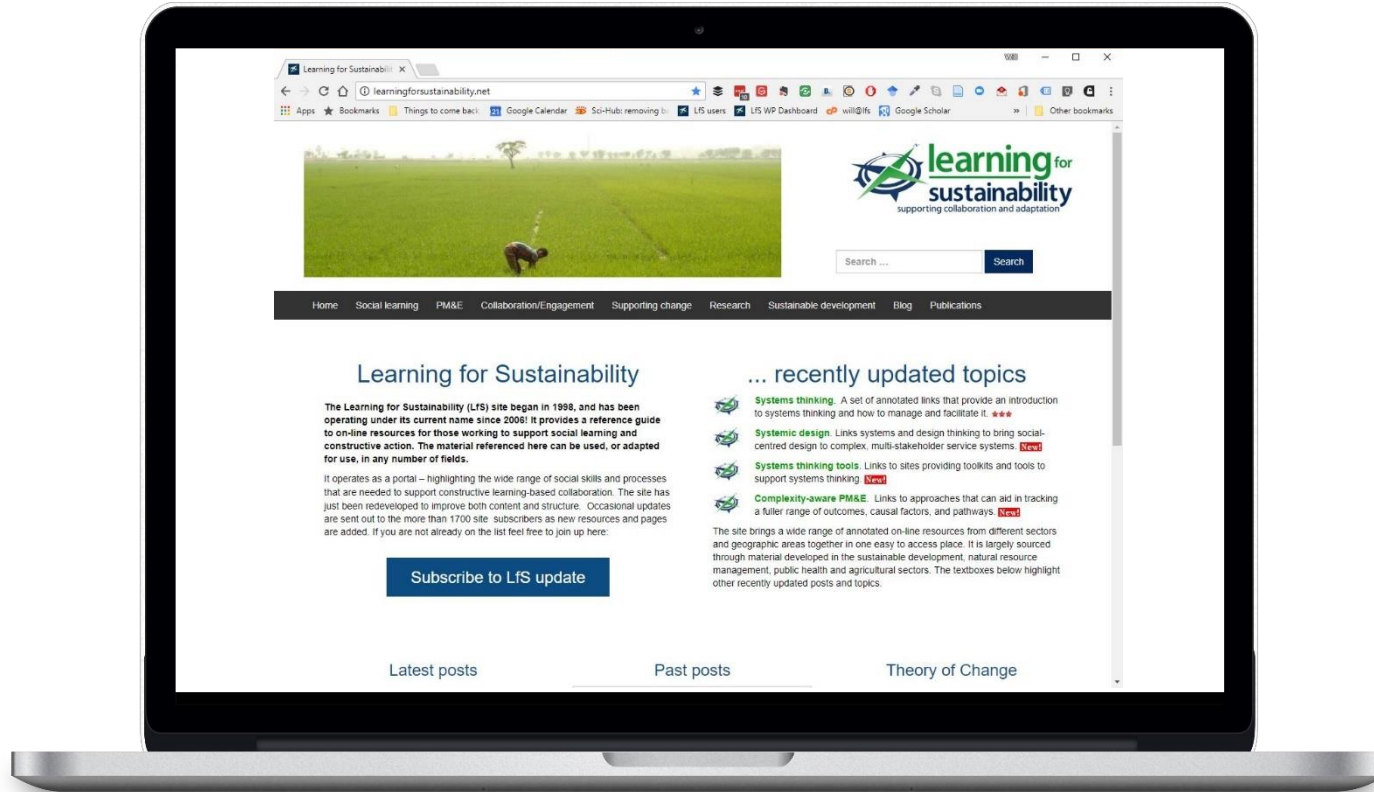


Building Shared Vision



Team Learning









## Learning for Sustainability

The Learning for Sustainability (LFS) site began in 1998, and has been operating under its current name since 2008! It provides a reference guide to on-line resources for those working to support social learning and constructive action. The material referenced here can be used, or adapted for use, in any number of fields.

It operates as a portal – highlighting the wide range of social skills and processes that are needed to support constructive learning-based collaboration. The site has just been redeveloped to improve both content and structure. Occasional updates are sent out to the more than 1700 site subscribers as new resources and pages are added. If you are not already on the list feel free to join up here:

[Subscribe to LFS update](#)

## ... recently updated topics

-  **Systems thinking.** A set of annotated links that provide an introduction to systems thinking and how to manage and facilitate it. [New!](#)
-  **Systemic design.** Links systems and design thinking to bring social-centred design to complex, multi-stakeholder service systems. [New!](#)
-  **Systems thinking tools.** Links to sites providing toolkits and tools to support systems thinking. [New!](#)
-  **Complexity-aware PM&E.** Links to approaches that can aid in tracking a fuller range of outcomes, causal factors, and pathways. [New!](#)

The site brings a wide range of annotated on-line resources from different sectors and geographic areas together in one easy to access place. It is largely sourced through material developed in the sustainable development, natural resource management, public health and agricultural sectors. The textboxes below highlight other recently updated posts and topics.

[Latest posts](#)

[Past posts](#)

[Theory of Change](#)

# For more information

- Dr Margaret Kilvington – [margaret.kilvington@gmail.com](mailto:margaret.kilvington@gmail.com)  
- [Independent Social Research, Evaluation & Facilitation](#)
- Dr Will Allen – [willallenz@gmail.com](mailto:willallenz@gmail.com)  
- [Will Allen & Associates](#) / [Learning for Sustainability](#)
- Annotated links to a wide range of related on-line material can be found via the Learning for Sustainability clearinghouse - <https://learningforsustainability.net/>

Reference as: Allen & Kilvington (2018) Summary: An introduction to systems thinking and systemic design – concepts and tools (Presentation). Based on material for an introductory workshop. Available online <https://learningforsustainability.net/post/systemicdesign-intro/>



# Topic information:

- SLIDE 8: See: [Ralph D. Stacey](#) and [Dave Snowden](#)
- SLIDE 12: [Complicated or complex – knowing the difference is important](#)
- SLIDE 19: [Systems thinking: what, why when, where and how](#)
- SLIDE 21: [Leverage points – places to intervene in a system](#)
- SLIDE 23: [Systemic design](#)
- SLIDE 24: [Systemic design](#)
- SLIDE 28: [All methods are wrong - some methods are useful](#)
- SLIDE 31: [Systems methods and tools](#)
- SLIDE 32: [Strategy tools and approaches](#)
- SLIDE 34: [Stakeholder mapping and analysis](#)
- SLIDE 35: [Using dialogue and negotiation](#)
- SLIDE 38: [Theory of Change](#) and [logic models](#)
- SLIDE 41: [Planning, monitoring & evaluation – closing the loop](#)
- SLIDE 45: [Organizational learning](#)
- SLIDE 47: [Learning for Sustainability website](#)

# Graphics & photos:

- SLIDE 1: Photo by [Will Allen](#)
- SLIDE 3: Photo by [Austin Distel](#) on [Unsplash](#)
- SLIDE 4: Photo by [Alina Grubnyak](#) on [Unsplash](#)
- SLIDE 5: Photo by [Alina Grubnyak](#) on [Unsplash](#)
- SLIDE 7: Photo by [Sveta Fedarava](#) on [Unsplash](#)
- SLIDE 8: Photo by [Startaê Team](#) on [Unsplash](#)
- SLIDE 13: Photo by [Dylan de Jonge](#) on [Unsplash](#)
- SLIDE 15: Photo by [Artem Maltsev](#) on [Unsplash](#)
- SLIDE 16: Photo by [Dan Meyers](#) on [Unsplash](#)
- SLIDE 17: Photo by [Kaleidico](#) on [Unsplash](#)
- SLIDE 18: Photo by [Bill Oxford](#) on [Unsplash](#)
- SLIDE 22: Photo by [Saad Salim](#) on [Unsplash](#)
- SLIDE 24: Photo by [Maksym Kaharlytskyi](#) on [Unsplash](#)
- SLIDE 3: Photo by [Austin Distel](#) on [Unsplash](#)
- SLIDE 34: Source: <http://weird-vintage.com>
- SLIDE 37: Photo by [Nathan Thomassin](#) on [Unsplash](#)
- SLIDE 42: Photo by [Markus Spiske](#) on [Unsplash](#)
- SLIDE 43: Photo by [Kaleidico](#) on [Unsplash](#)
- SLIDE 44: Photo by [Edwin Andrade](#) on [Unsplash](#)
- SLIDE 46: Source: [Peter Senge Systems Thinking](#)