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
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
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!

We are all systems thinkers
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

- Simple problems: Close to certainty, Close to agreement.
- Complicated “difficult” problem: Far from certainty, Close to agreement.
- Complex “Wicked” problem: Far from certainty, Far from agreement.

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Difficult problems

Limited timescale 01

Priorities clear 02

Limited applications 03

Can be treated as a stand-alone matter 04

Limited number of people involved 05

Know what needs to be done 06

Recognisable solution 07

Characteristically smaller-scale and well-defined
Wicked problems

01 Longer, uncertain timescale
02 Priorities called into question
03 Uncertain, but greater implications, worrying
04 Can’t be disentangled from its context
05 Keep evolving
06 More people involved
07 No agreement on what the problem is
08 No ‘obvious’ solutions

Characteristically bigger and poorly defined
International agencies and public sector organizations are moving towards systems thinking .....
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
02 Basics of systems thinking
Key systems thinking components

Multiple Perspectives
- World views
- Voices
- Knowledge systems

Influences
- Blocks
- Leverage points
- Drivers

Interconnections
- Relationships
- Feedback
- Patterns

Boundaries
- Communities
- Systems within systems
- Scope
- Issues

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
Systemic design linking systems thinking and design
Linking systems thinking and design

**Problem framing**

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

**Solution oriented**
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.

- Understanding the system
- Co-designing solutions
- Monitor, reflect and adapt
- Dialogue and collaboration

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

Understanding the system
- Influences
- Boundaries
- Interrelationship

Dialogue & collaboration
- Managing conflict
- Multiple perspectives
- Recognising different knowledge systems and cultures

Co-design solutions
- Short term and long term goals
- Leverage points
- Action plans

Assess and adapt
- Assess progress
- Choose indicators
- Refine
- Monitor

Implementation by organizations, other key stakeholders

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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

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Implementation by organizations, other key stakeholders
1. Tools for understanding the system

1. Understanding the system
- Influences
- Boundaries
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Implementation by organizations, other key stakeholders
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

CASUAL LOOP

TIME
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

A real-world situation of concern
Comparison of models with perceived situation
Action needed to improve the situation
Relevant systems of purposeful activity

Yields choices of

Strengths
Weaknesses
Opportunities
Threats
2. Tools for dialogue and collaboration

- Understanding the system
  - Influences
  - Boundaries
  - Interrelationship

- Dialogue & collaboration
  - Managing conflict
  - Multiple perspectives
  - Recognising different knowledge systems and cultures

- Assess and adapt
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- Co-design solutions
  - Short term and long term goals
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- Implementation by organizations, other key stakeholders
Dialogue & collaboration tools for involving the right people include:

- Stakeholder analysis
- Engagement planning
- Networking
- Relationship building & management

“It’s not just who you could get to come at the time”
## Dialogue & collaboration tools for working together

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

<table>
<thead>
<tr>
<th>Facilitation</th>
<th>Kitchen workshops and meetings</th>
<th>Informal conversations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networks</td>
<td>Social media</td>
<td>Active listening, appreciative inquiry</td>
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3. Tools for co-designing solutions

**Dialogue & collaboration**
- Managing conflict
- Multiple perspectives
- Recognising different knowledge systems and cultures

**Assess and adapt**
- Assess progress
- Choose indicators
- Refine
- Monitor

**Co-design solutions**
- Short term and long term goals
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**Understanding the system**
- Influences
- Boundaries
- Interrelationship

Implementation by organizations, other key stakeholders

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Supporting engagement, co-design and adaptation
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]

1. Situation analysis
2. Inputs, activities & outputs
3. Outcomes
4. Vision
Tools for co-design – outcomes modelling
[Theory of Change (ToC) and logic models]

- Situation analysis
- Inputs, activities & outputs
- Outcomes

Outcomes - Impact
Intermediate
Long-term

Changes - in individuals & organisations
- Changes in practice
- Changes in end states

Vision
... and helps develop monitoring and evaluation plans along with activity plans
4. Tools/methods for assessing progress

**Understanding the system**
- Influences
- Boundaries
- Interrelationship

**Assess and adapt**
- Assess progress
- Choose indicators
- Refine
- monitor

**Dialogue & collaboration**
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**Co-design solutions**
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**Implementation by organizations, other key stakeholders**
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

Learning for Sustainability (LFS) is a website that was developed in 1998 and has been operating under its current name since 2009. It provides a reference guide to online 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.

As a website, it offers a wide range of social tools and processes that are needed to support constructive learning and collaboration. The site has been developed 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 but feel free to join in now...

... recently updated topics

- **Systems thinking**. A set of annotated links that provide an introduction to systems thinking and how to manage and facilitate it.
- **Systemic design**. Links to systems and design thinking to bring socially-determined design to complex, multi-stakeholder service systems.
- **Systems thinking tools**. Links to tools providing techniques and tools to support systems thinking.
- **Complexity-aware PRM**. Links to approaches that can aid in tracking a full range of outcomes, causal factors, and pathways.

The site brings a wide range of annotated online 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 toolboxes below highlight other recently updated posts and topics.
For more information

- Dr Margaret Kilvington – margaret.kilvington@gmail.com
  - Independent Social Research, Evaluation & Facilitation

- Dr Will Allen – willallennz@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/
