Improving Improvement

Professor John Clarkson FREng
January 2022

Executive Summary

The challenges facing the health and social care system are considerable – with competing pressures from an ageing population, increasing numbers of patients with multiple morbidities, new technologies, and the need for increasing efficiencies. The complexity of the system, along with the multiple pressures it faces, mean that efforts to improve it often achieve only limited benefits and can have unforeseen consequences. Over the past two decades, there have been numerous calls to implement a more holistic systems approach to transform health and care to address the needs of a changing patient population. However, there has been no clear definition of what this might mean in practice.

Engineers routinely use a systems approach to address challenging problems in complex projects. This allows them to work through the implications of each change or decision they make for the project as a whole. They consider the layout of the system, defining all the elements and interconnections, to ensure that the whole system performs as required. One example is the successful delivery of the London 2012 Olympic and Paralympic Games. Physical infrastructure and practical organisation were brought together, with innovative physical engineering, modelling and simulation of people flows, early testing of venues, and extensive risk management. A systems approach, combined with tried and tested engineering methods and tools, delivered real success on a massive scale.

"Systems that work do not just happen — they have to be planned, designed and built"

All health and care improvement initiatives involve people, processes, technologies, the physical environment and systems that, in turn, are part of other systems. For example, the care pathway of an elderly frail patient must meet the needs of the patient, their immediate carer and wider family. Care must also coordinate across community support, a GP practice and hospital teams, and manage the patient's medication, their physical journey to and around healthcare facilities, home care technologies and associated health and care data. Such complexity means that health and care will benefit from using an approach that considers each relevant element of the system and, critically, the nature and performance of the interfaces between them.

The Royal Academy of Engineering report titled "**Engineering Better Care** – a systems approach to health and care design and continuous improvement", was co-produced with engineers, clinicians, and healthcare leaders to explore how an engineering approach could be applied in health and social care to develop systems that meet the needs of patients, carers and NHS staff. It presents a new framework to support ongoing work in service design and improvement in health and care.

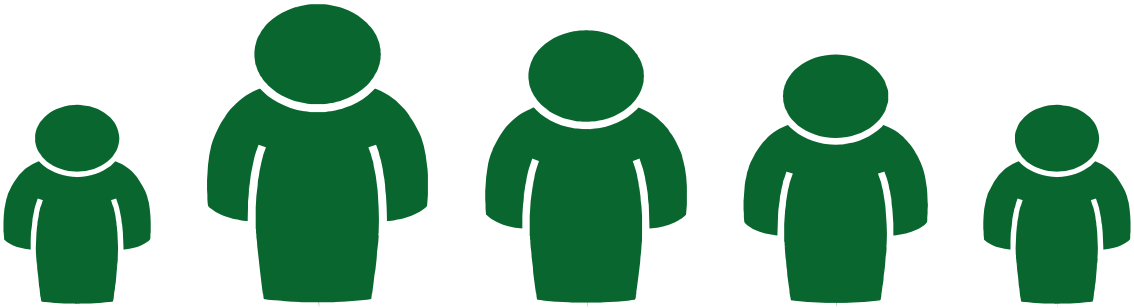
Executive Summary

Comparing current health and care improvement processes with engineering systems approaches, the report found that:

- There was the potential for health and care improvement to benefit from the rigour of the engineering approach to systems, particularly with respect to:
  - **systems being centred on people** – an effective systems approach is centred on people, their needs, their capabilities and ultimately their role in understanding, designing, delivering and maintaining success
  - **iteration before implementation** – the behaviour of complex systems is not easily understood and improvement is most often the result of successive iterations targeted at maximising the chance of success prior to implementation
  - **design as an exploratory process** – improvement results from a creative process that seeks not only to explore the real need, but also to evaluate a range of possible solutions in order to select the best option
  - **risk management as a proactive process** – the identification of possible opportunities for and threats to a system before they arise is more likely to lead to the delivery of robust and adaptable systems.
- While islands of excellence exist in the use of a systems approach in healthcare, the common sense thinking presented in the report is still far from being common in practice.

The findings from this collaborative project were integrated into a framework, that has the potential to support the work of transformation teams and individuals, and tools, that can help facilitate the methodical application of a systems approach to improvement. This approach can be applied to systems across all scales in the healthcare system, from service level improvement, through to organisational, cross-organisational, or cross-sector level change, dealing with complexity and improving performance.

This toolkit develops the approach presented in the **Engineering Better Care** report, providing practical guidance and resources to facilitate the application of a rigorous systems approach to health and care improvement. It is intended for improvers of all levels of experience and for challenges of all levels of complexity, and has the potential to have a transformative effect on health and care, with benefits for patients, service users, and providers.



Professor John Clarkson FREng
January 2022

Quick Start Guide

Engineers routinely use a systems approach to address challenging problems in complex projects. This allows them to work through the implications of each change or decision they make for the project as a whole. They consider the layout of the system, defining all the elements and interconnections, to ensure that the whole system performs as required.

"Systems that work do not just happen — they have to be planned, designed and built"

The following steps, described in more detail below, describe a systems-based approach for planning an improvement process, supporting small-scale or system-wide change, as well as rapid decision-making.

(A) Stakeholder Map – knowledge about the people

Identify key stakeholders, their essential needs and their potential to influence the outcome of the process.

(B) Improvement Canvas – knowledge about the system

Capture the context and nature of the challenge and current ideas for improvement and measurement.

Agree the scope of the proposed improvement or decision-making process and identify the team required to deliver it.

(C) Improvement Plan – agreed actions for improvement

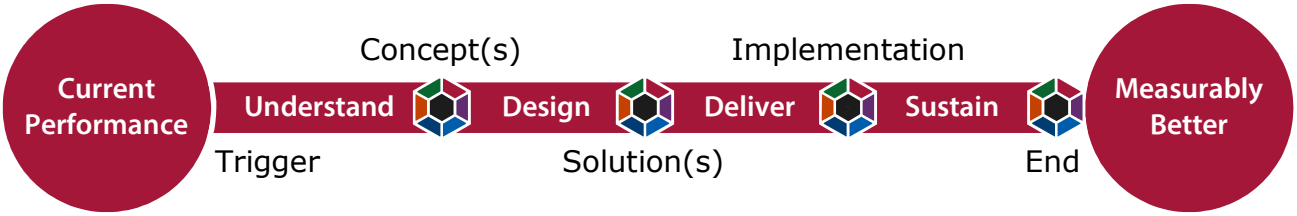
Define the outputs or outcomes required for the each of the elements of the improvement or decision-making process.

Describe the activities and tools required to deliver these outputs and the critical dependencies between them.

Quick Start Guide

This guide is part of the University of Cambridge **Improving Improvement Toolkit**, which develops the approach presented in the Royal Academy of Engineering report titled "**Engineering Better Care** – a systems approach to health and care design and continuous improvement". The report and toolkit were co-produced with engineers, clinicians, and healthcare leaders to explore how an engineering approach could be applied in health and social care to develop systems that meet the needs of patients, carers and NHS staff. They present a new framework to support ongoing work in service design and improvement in health and care.

The toolkit uses an **Improvement Model** to highlight the most important elements of the improvement process. This model then underpins the stage gates and activities of an **Improvement Programme** which facilitates a change from the current performance of a system to something measurably better.



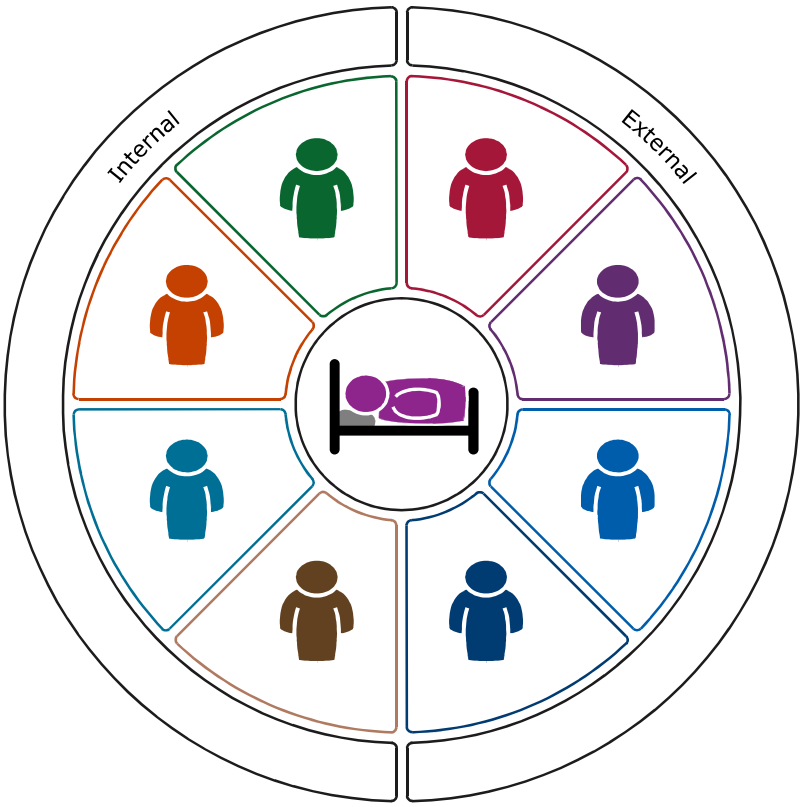
This process may be executed as a whole or in stages, in each case guided by a **Stakeholder Map** and **Improvement Canvas** leading to an **Improvement Plan**.

Quick Start Guide

(A) Stakeholder Map – knowledge about the people

Identify key stakeholders, their essential needs and their potential to influence the outcome of the process.

(1) Use a **Stakeholder Map** to identify users and other system stakeholders (p1-58);



Stakeholders have a unique role in understanding and improving systems, where a particularly important category is the system user. They may have interest in, concern about, influence on, permission for or expectations of changes proposed to a system. It is useful to identify as many stakeholders as possible in the early stages of an improvement programme.

Patients or user stakeholders are often shown at the centre of the map, while other stakeholders may be categorised as internal (within the system of direct interest) or external (outside the system), although these conventions need not be strictly applied. Stakeholders may have multiple needs, interests and influences which can be captured on a **Stakeholder Influence** grid and **Stakeholder Needs** table.

Quick Start Guide

(2) Use a **Stakeholder Influence** grid to characterise these stakeholders (p1-59);

Low Interest and High Influence (satisfy)	High Interest and High Influence (manage)
Low Interest and Low Influence (monitor)	High Interest and Low Influence (inform)

(3) Use a **Stakeholder Needs** table to capture these stakeholders' needs (p1-58);

As a …	… I need …	… so that …

Quick Start Guide

(B) Improvement Canvas – knowledge about the system

Capture the context and nature of the challenge and current ideas for improvement and measurement.

Agree the scope of the proposed improvement or decision-making process and identify the team required to deliver it.

(4) Use an **Improvement Canvas** to capture the team's current knowledge about the system and agree the scope of the change required (p1-73);

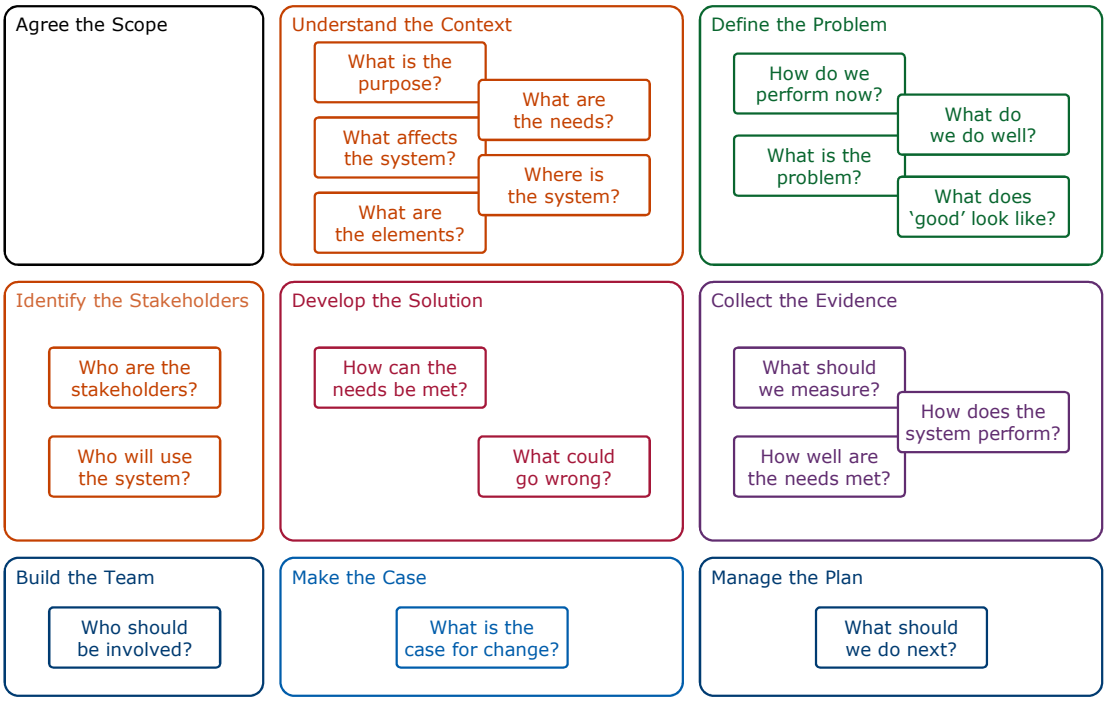
Agree the Scope *Describe the ambition for change and the boundary of the system of interest*	Understand the Context *Describe the circumstances and setting of the system of interest and the factors that could influence the improvement/redesign of the system*	Define the Problem *Describe the details of a particular challenge(s) within the system and the requirements for change necessary to improve/redesign the system*
Identify the Stakeholders *Identify the people who have an interest in any aspect of the system and their needs*	Develop the Solution *Describe the idea(s) that will resolve the challenge(s) within the system and the risk(s) associated with changes needed to improve/redesign the system*	Collect the Evidence *Describe the information and the measures required to show the effect(s) of the changes proposed to improve/redesign the system*
Build the Team *Identify the team who will deliver the project*	Make the Case *Prepare an argument(s) to justify the improvement/redesign of the system*	Manage the Plan *Create a plan to facilitate the improvement/redesign of the system*

A clear articulation of the scope helps to define the boundary between what is in and what is out of the system of interest. It also reflects the prioritised needs of the stakeholders that should drive any improvement. The scope will also be influenced by the context of the system, primary focus of the challenge, core themes of possible solutions and level of detail required to describe the system and its stakeholders.

The canvas may be completed in any order, with input from the **Stakeholder Map** informing the stakeholder and team boxes. All entries are important in capturing the team's current knowledge about the challenge, and in determining a sensible starting point and scope of interest for improvement.

Quick Start Guide

(5) Use the **Improvement Questions** poster to identify the key questions that would help to compete the Improvement Canvas (p1-75);



(6) Alternatively, use the **Preliminary Activities** poster to identify activities that would help to compete the Improvement Canvas (p1-74);

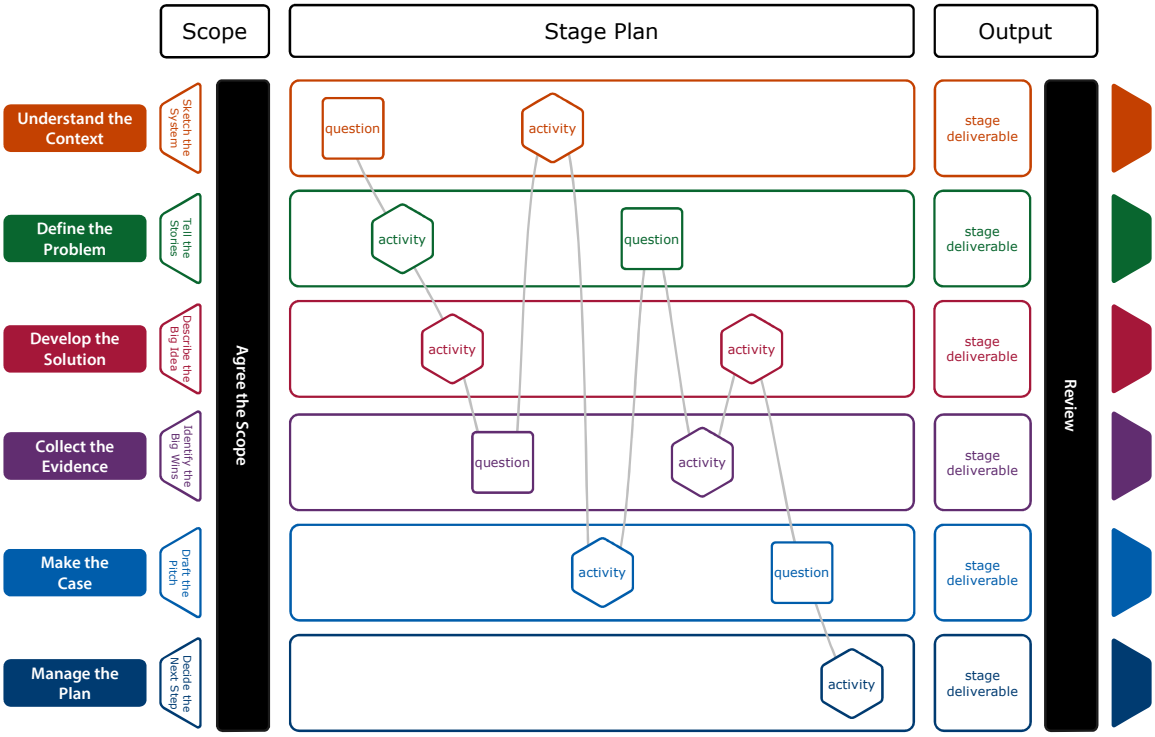
Quick Start Guide

(C) Improvement Plan – agreed actions for improvement

Define the outputs or outcomes required for the each of the elements of the improvement or decision-making process.

Describe the activities and tools required to deliver these outputs and the critical dependencies between them.

(7) Use an **Improvement Plan** to highlight the most important elements of the improvement process required to deliver the desired outputs.

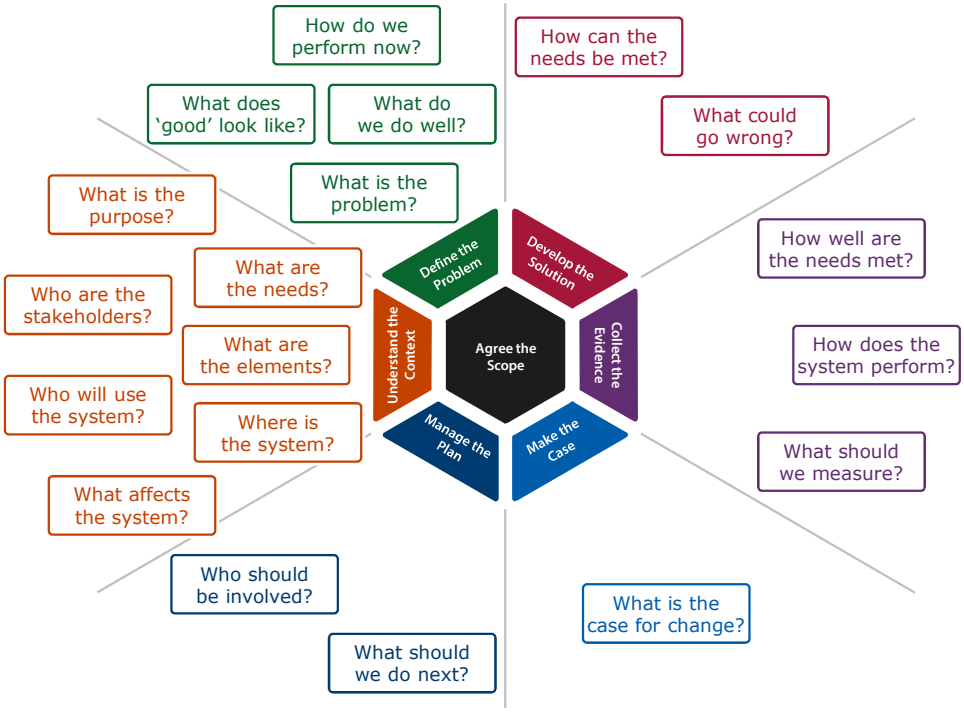


This model underpins the stage gates of an **Improvement Programme**, where progress is driven by clear objectives for each of the key elements at each stage of the programme. These desired outputs or outcomes are identified based on the contents of the **Improvement Canvas**, the overall scope of the change required and the number of stages in the **Improvement Programme**.

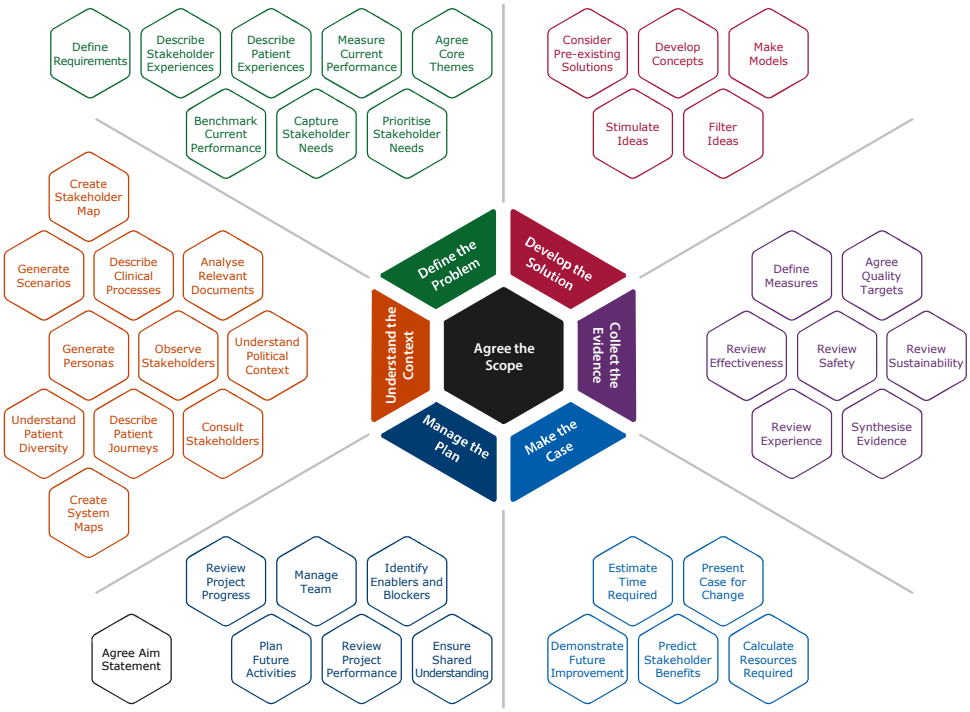
A **Stage Plan** may be used for each of the stage gates to determine the questions and activities that are required to achieve the corresponding stage deliverables. Early stages are more likely to focus on the understanding the context and defining the problem, with later stages on developing the solution and collecting the evidence. All stages should reflect the need to make the case and manage the plan.

Quick Start Guide

(8) Use the **Questions Map** poster to identify the key questions that would help to deliver the outputs required (p1-75);



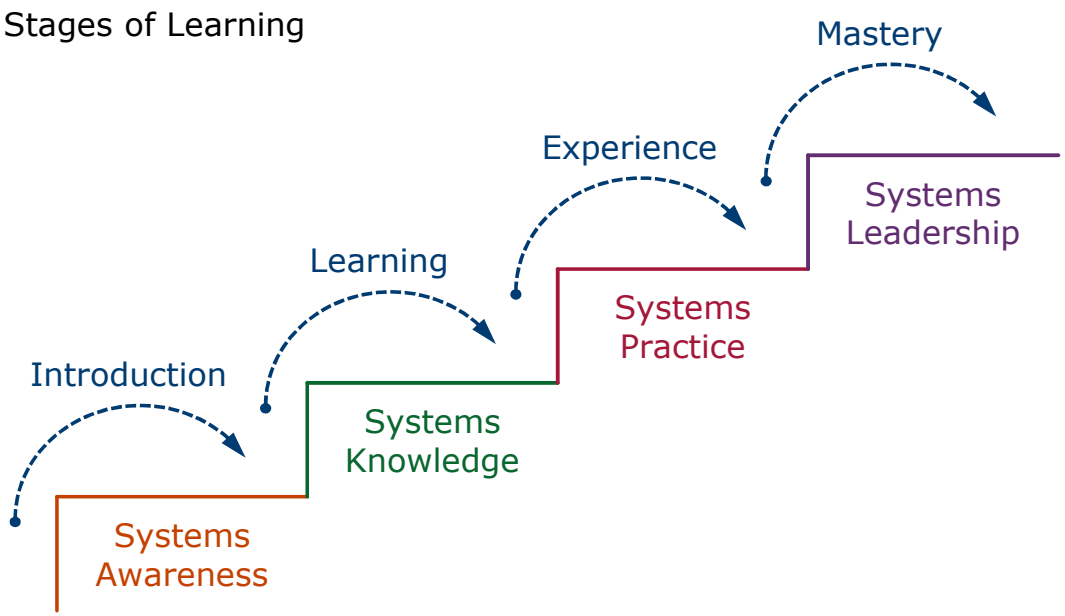
(9) Alternatively, use the **Stage Activities** poster to identify the improvement activities that would help deliver the outputs required (p1-77);



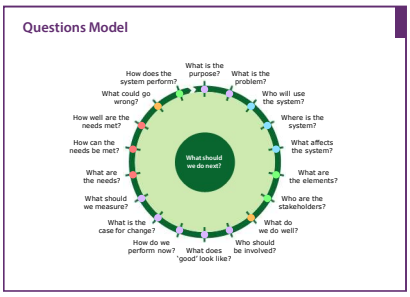
(10) Repeat steps (1) to (9) as necessary to deliver each stage of a complete **Improvement Programme**.

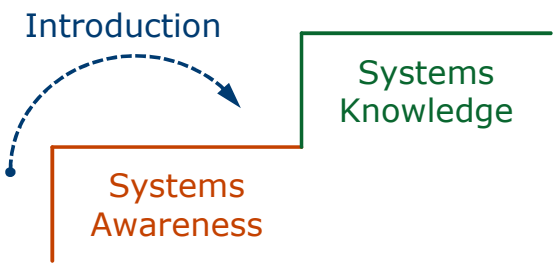
Systems Leadership

The pathway to systems leadership includes a number steps, from increasing systems awareness through to attaining a level of mastery that is only achievable with considerable practical experience. This toolkit contains many of the elements necessary to complete these steps, especially when accompanied by programs of directed learning. The relationship between the toolkit and this journey provides insight into how the various elements of the toolkit can be used.



Systems Awareness comes from an understanding of the elements of a systems approach to health and care design and continuous improvement. The team that drafted the [Engineering Better Care](#)[1] report, lead by the Royal Academy of Engineering, worked with health and care professionals and engineers to capture this understanding through a series of questions relating to people, systems, design, risk and management perspectives on a systems approach. This cycle of questions encourages systems thinking and enables to first steps towards systems practice. Details of these questions may be found in the original **Engineering Better Care** report and in the **Improving Improvement** and **Improvement Questions** sections of this toolkit.



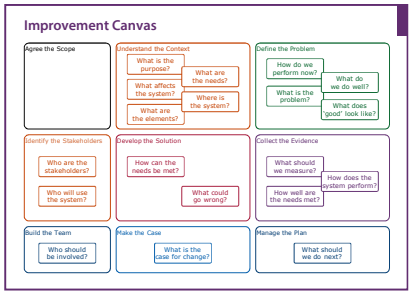


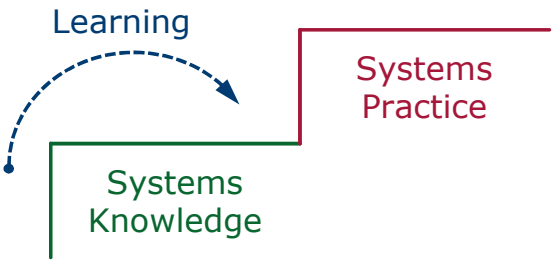
Short courses to raise systems awareness can be provided by the Cambridge Engineering Design Centre and its partner organisations.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement. Royal Academy of Engineering,* London, UK, 2017.

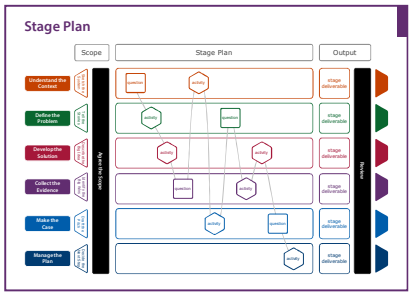
Systems Leadership

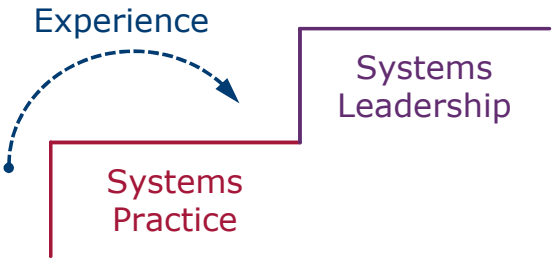
Systems Knowledge comes from learning how the elements of a systems approach to health and care design and continuous improvement can be applied to real challenges. The Improving Improvement Toolkit develops the principles described in the Engineering Better Care report in a practical guide for improvement, based on a set of improvement activities and associated tools. These situate the original questions, relating to people, systems, design, risk and management perspectives, within an iterative **Improvement Process**. Details of this process, including the **Improvement Canvas**, may be found in the **Improvement Process** section of this toolkit.



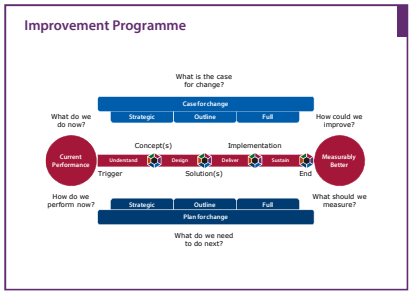


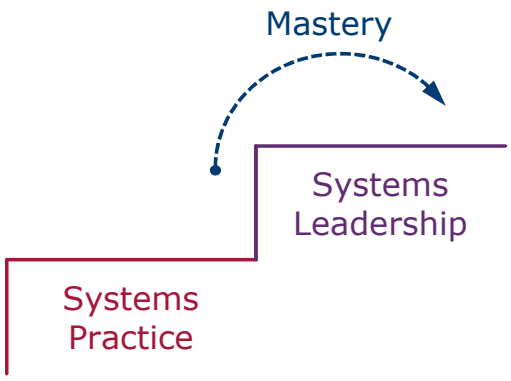
Systems Practice comes from the experience of applying the elements of a systems approach to health and care design and continuous improvement to a variety of real challenges. The Improving Improvement Toolkit provides guidance on a wide range of activities and tools which facilitate the delivery of an improvement process. These support all the stages Improvement Process, with particular focus on the development of a practical plan for improvement. Details of these activities and tools, including the **Stage Plan**, may be found in the **Improvement Process** and **Improvement Resources** sections of this toolkit.





Systems Leadership comes from knowledge and practice-based mastery of all the elements of a systems approach to health and care design and continuous improvement. The combination of expensive practical experience of systems improvement, knowledge of systems improvement approaches and successful leadership of improvement programmes is a mark of systems leadership.

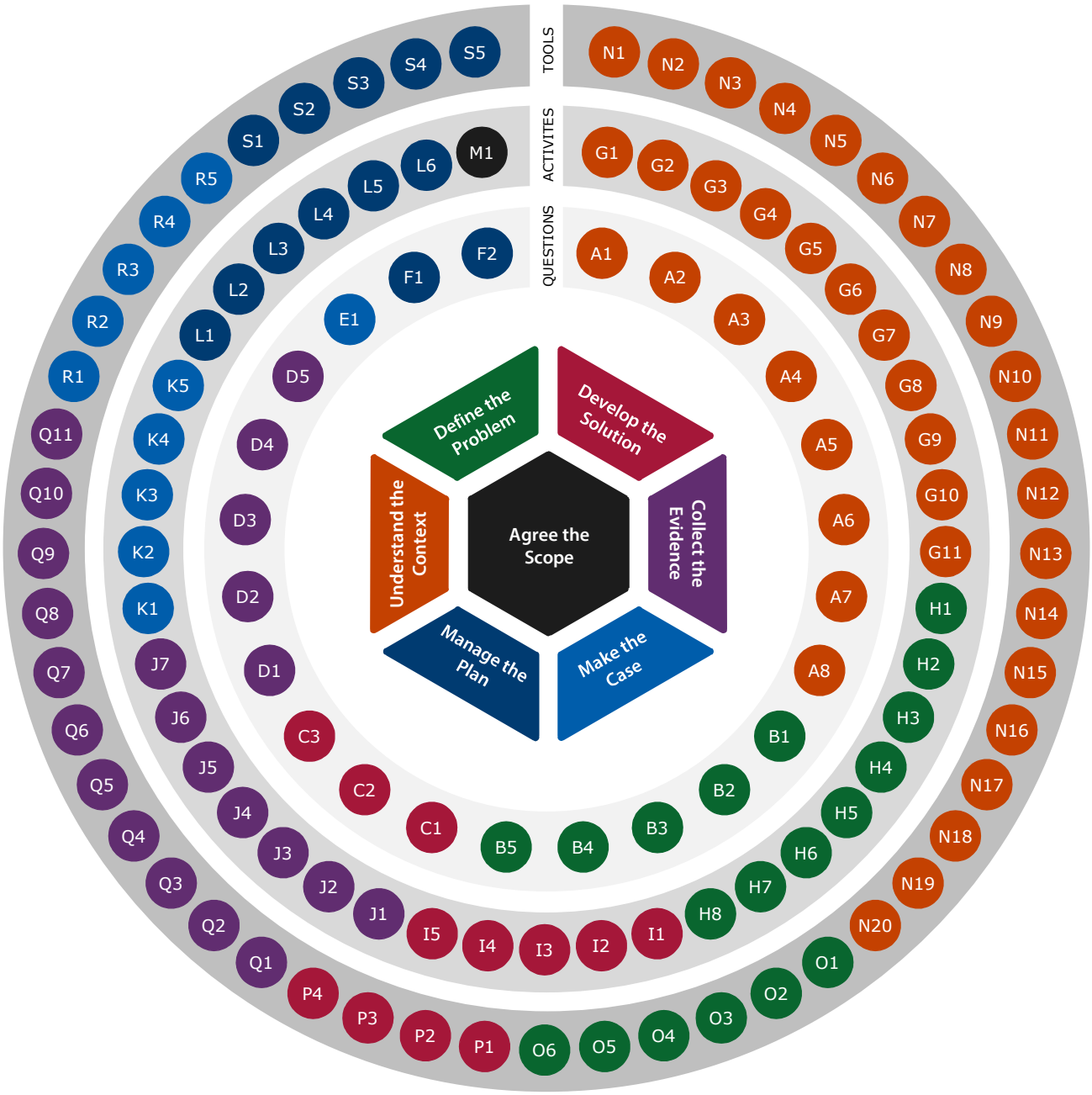




Short courses to increase systems knowledge, support systems practice and mentor systems leadership can be provided by the Cambridge Engineering Design Centre and its partner organisations.

What is in this Toolkit

The diagram shows the **questions**, **activities** and **tools** contained within this toolkit. In later sections they are also mapped to the **IHI Model for Improvement**, **Lean Thinking**, and **Six Sigma** models. The colours of the circles reference those used later to identify the strands of the improvement process, namely: **Understand the Context**, **Define the Problem**, **Develop the Solution**, **Collect the Evidence**, **Make the Case**, **Manage the Plan** and **Agree the Scope**. The strands are all described within the **Improvement Process** section.



The **questions**, **activities** and **tools** are described in the sections titled **Improvement Questions**, **Improvement Process** and **Improvement Resources** respectively.

What is in this Toolkit

Key

X	**Topic covered in detail in the systems approach**
X	Topic mentioned in the systems approach
X	Topic not mentioned in the systems approach

Colour

A, G, N	Understand the Context
B, H, O	Define the Problem
C, I, P	Develop the Solution
D, J, Q	Collect the Evidence
E, K, R	Make the Case
F, L, S	Manage the Plan
M	Agree the Scope

Questions

A1. Trigger
A2. Purpose
A3. Identify
A4. Locate
A5. Situate
A6. Understand
A7. Organise
A8. Current
B1. Success
B2. Performance
B3. Problem
B4. Explore
B5. Improve
C1. Examine
C2. Create
C3. Better
D1. Integrate
D2. Evaluate
D3. Assess
D4. Seek
D5. Measure
E1. Case
F1. Team
F2. Plan

Activities

G1. Understand Political Context
G2. Analyse Relevant Documents
G3. Observe Stakeholders
G4. Consult Stakeholders
G5. Describe Clinical Processes
G6. Describe Patient Journeys
G7. Create System Maps
G8. Create Stakeholder Map
G9. Understand Patient Diversity
G10. Generate Personas
G11. Generate Scenarios
H1. Describe Stakeholder Experiences
H2. Describe Patient Experiences
H3. Measure Current Performance
H4. Benchmark Current Performance
H5. Capture Stakeholder Needs
H6. Prioritise Stakeholder Needs
H7. Agree Core Themes
H8. Define Requirements
I1. Consider Pre-existing Solutions
I2. Stimulate Ideas
I3. Filter Ideas
I4. Develop Concepts
I5. Make Models
J1. Define Measures
J2. Agree Quality Targets
J3. Review Effectiveness
J4. Review Safety
J5. Review Experience
J6. Review Sustainability
J7. Synthesise Evidence
K1. Demonstrate Future Improvement
K2. Predict Stakeholder Benefits
K3. Calculate Resources Required
K4. Estimate Time Required
K5. Present Case for Change
L1. Identify Enablers and Blockers
L2. Manage Team
L3. Ensure Shared Understanding
L4. Review Project Performance
L5. Review Project Progress
L6. Plan Future Activities
M1. Agree Aim Statement

Tools

N1. Literature Review
N2. Rich Picture
N3. Soft Systems Method
N4. Causal Loop Diagram
N5. Influence Diagram
N6. Entity Relationship Diagram
N7. Data Flow Diagram
N8. State Transition Diagram
N9. Flow Chart
N10. Swimlane Diagram
N11. Spaghetti Diagram
N12. Value Stream Mapping
N13. Dependency Structure Matrix
N14. One-to-one Interviews
N15. Facilitated Discussion
N16. Delphi Study
N17. Participant Observation
N18. Observational Study
N19. Designing Personas
N20. Designing Scenarios
O1. Life Café
O2. Public Involvement
O3. MoSCoW
O4. Data Analysis
O5. Storyboarding
O6. Fishbone Diagram
P1. Brainstorming
P2. Disney
P3. Six Thinking Hats
P4. Morphological Chart
Q1. Exclusion Audit
Q2. User Trials
Q3. Expert Review
Q4. Life Cycle Assessment
Q5 Root Cause Analysis
Q6. Failure Mode and Effects Analysis
Q7. Fault Tree Analysis
Q8. Hazard and Operability Analysis
Q9. Structured What-if Technique
Q10. Bowtie Method
Q11. Risk Matrix
R1. PEST(LE) Analysis
R2. SWOT Analysis
R3. Stakeholder Analysis
R4. The Five Ws and two Hs
R5. Wardley Map
S1. Driver Diagram
S2. Gantt Chart
S3. Activity Dependency Diagram
S4. Project Canvas
S5. LoMo

How to Use this Toolkit

Engineers routinely use a systems approach to address challenging problems in complex projects. This allows them to work through the implications of each change or decision they make for the project as a whole. They consider the layout of the system, defining all the elements and interconnections, to ensure that the whole system performs as required.

The **Engineering Better Care**[1] report, which forms the basis of this toolkit, was co-produced with engineers, clinicians, and healthcare leaders to explore how an engineering approach could be applied in health and social care to develop systems that meet the needs of patients, carers and NHS staff.

The **Improving Improvement Toolkit**, developed by the University of Cambridge, develops the content of the **Engineering Better Care** report into a novel framework to support ongoing work in service design and improvement in health and care. It comprises four sections:

1. **Improving Improvement** - An introduction to the toolkit, with reference to existing improvement approaches, to highlight tools and resources that could further improve their use. This section will appeal to those with experience of improvement who are interested in developing their skills further.
2. **Improvement Questions** - A summary of the systems approach described in the Engineering Better Care report, to facilitate its use in existing improvement projects and approaches. This section will appeal to those with no formal background in improvement, but who have a desire to deliver change in their organisations.
3. **Improvement Process** - A detailed description of an improvement process based on the systems approach, to enable the delivery on systems that are measurably better. This section will appeal to those with experience of improvement who are not constrained in their thinking to the existing approaches.
4. **Improvement Resources** - A selection of tools and resources useful in delivering a systems approach, to enhance any improvement approach. This section should appeal to all readers, whatever their level of experience or skill in improvement.

Sections of this guide and the accompanying tools may be particularly helpful to different readers:

A. Experienced improvers who wish to continue to use their existing improvement approaches should read the **Improving Improvement** section and, in particular the sections relevant to their current approaches. They should also find the **Improvement Resources** section useful.
B. Novice or experienced improvers who wish to investigate a system-based improvement approach should read the **Improving Improvement**, **Improvement Questions** and **Improvement Process** sections. They will also benefit from exploring the **Improvement Resources** section.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement. Royal Academy of Engineering,* London, UK, 2017.

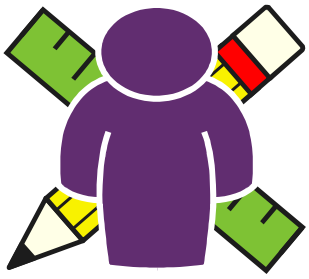
How to Use this Toolkit

Improving Improvement

Improvement Questions

Improvement Process

Improvement Resources



Acknowledgements

This toolkit was inspired not only by the **Engineering Better Care**[1] report, but also by the extended team of people who have continued to work on the development and application of a systems approach to health and care improvement.

The Royal Academy of Engineering working group, David Bogle, John Dean, Mark Tooley, Louella Vaughan, Emma Adams, Peter Dudgeon, Penny Pererira, Philippa Shelton and Alexandra Smyth, have provided valuable guidance on the emerging toolkit and organised a healthcare QI community launch event in October 2019. The Royal College of Physicians, Academy of Medical Sciences and Royal College of Anaesthetists have also supported the development of this toolkit.

The University of Cambridge Engineering Design Centre team, James Ward, Alexander Komashie, Asli Gunay, Ian Hosking, Guillaume Lamé, Tom Bashford, Nicholas Boddy, Chris Christou, Joseph Masters, Daniel Stubbs, Katharina Kohler, Carrie Bedingfield, Eugenia O'Kelly, Sam Waller and Diana Probst, have been tireless in their support of the drafting process and in applying the principles of Engineering Better Care to a range of local and global challenges. The National Institute of Health Research (NIHR), Health Foundation, Engineering and Physical Sciences Research Council (EPSRC), Marie Curie, THIS Institute and Wellcome Trust and have contributed to the funding of the Cambridge research team. In addition, the University has provided seed funding to establish an Engineering Better Care centre at Cambridge University Hospitals to facilitate close collaboration with clinical service providers.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement. Royal Academy of Engineering,* London, UK, 2017.

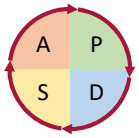
Professor John Clarkson FREng
January 2022

Improving Improvement

Introduction

Page 1-1 onwards

Applying a systems approach to health and care design and continuous improvement.



IHI Model for Improvement

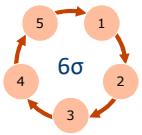
Page 1-5 onwards

The IHI Model is a tool for accelerating improvement, based on three fundamental questions and the Plan-Do-Study-Act cycle to test changes in real work settings.

Lean Thinking

Page 1-13 onwards

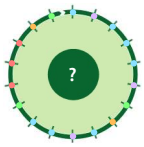
The Lean Thinking model is a process to facilitate improvement in patient care with existing resources, meaning the same things can be achieved using fewer people.



Six Sigma

Page 1-21 onwards

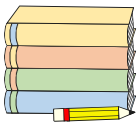
The Six Sigma model is a continuous improvement approach that has a proven commercial pedigree that can be traced back to the quality revolution of the 1940's.



Engineering Better Care

Page 1-29 onwards

Engineering Better Care is a framework for improvement, based on a set of questions addressing people, systems, design, risk and management perspectives.



Important Topics

Page 1-55 onwards

A number of important topics, including stakeholders, requirements, mapping, creativity and risk, typically arise in the context of improving of complex systems.

This Toolkit

Page 1-69 onwards

This toolkit contains a pragmatic systems approach to health and care improvement based on the Engineering Better Care report.

Case Studies

Page 1-81 onwards

The case studies explore the use of a Systems Approach in the development, delivery or improvement of a range of engineering and healthcare systems.

Introduction

Summary

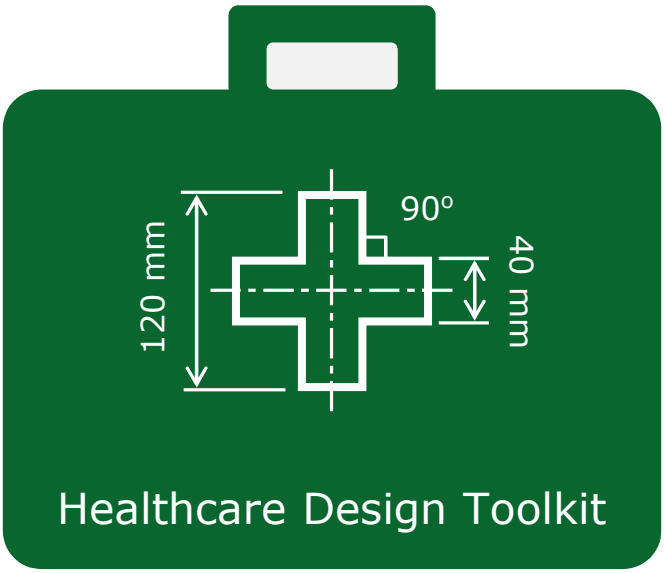
This introduction provides a brief description to the application of a systems approach to health and care design and continuous improvement.

Introduction

The pressures facing the health and social care system are considerable and the complexity of the system makes improvement challenging. In recent years there have been numerous calls for the use of a systems approach in efforts to transform health and care. However, until the publication of the Engineering Better Care[1] report by the Royal Academy of Engineering, there had been a lack of a clear definition of what this might mean in a health and care context.

The **Engineering Better Care** report aimed to describe the engineering systems approach and explore, in partnership with healthcare leaders, whether such an approach could be applied to health and care. While healthcare professionals know intuitively that there is a need to involve stakeholders in decisions and think across pathways, and many people working to improve health and care are aware of and use systems techniques, lessons could be learned from the different perspectives of the engineering sector and the analysis and rigour applied in engineering systems. The **Engineering Better Care** report was based on an extended conversation within a unique forum of experts, in collaboration with the Royal College of Physicians and the Academy of Medical Sciences. It brought together systems engineers, health and care professionals, quality improvement experts, and patient representatives to develop a new and integrated systems approach for health and care service design and improvement.

The framework and tools described in the **Engineering Better Care** report aimed to stimulate conversations with funders, healthcare provider leaders, teams and individuals delivering quality improvement and service design. This toolkit is the direct result of these ongoing conversations and work continues with the Royal Academy of Engineering, the Royal College of Physicians, the Royal College of Anesthetists, the Academy of Medical Sciences and the Health Foundation, led by the University of Cambridge Engineering Design Centre, on its development and application to improvement practice.



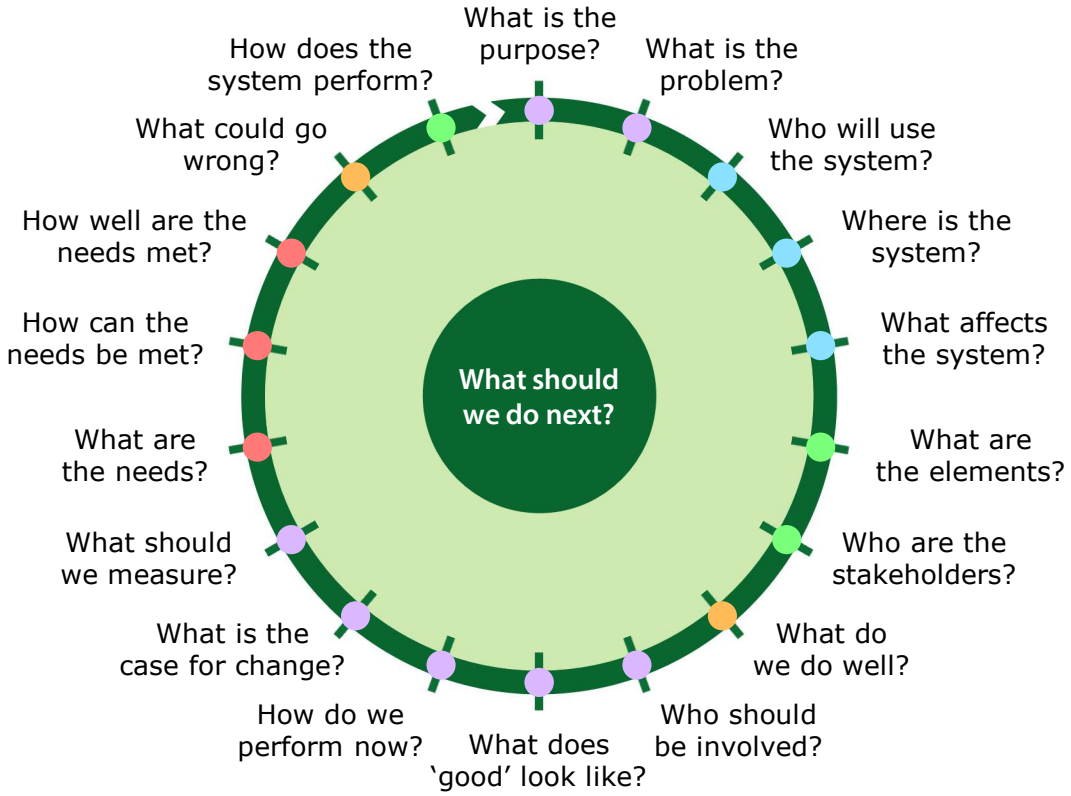
1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*, Royal Academy of Engineering, London, UK, 2017.

Introduction

Engineering Better Care[1] describes the development of a systems approach to health and care design and continuous improvement, taking inspiration from both the healthcare and engineering sectors. It takes a broad view of systems (or systems of systems) as a set of elements that include people, processes, information, organisations and services, as well as software, hardware and other systems that, when combined, have qualities that are not present in any of the elements themselves. It then proposes that a systems approach is a process that integrates four key and complementary perspectives:

- **People**: understanding of interactions among people, at the personal, group and organisational levels, and other elements of a system in order to improve overall system performance
- **Systems**: addressing complex and uncertain real world problems, involving highly interconnected technical and social elements that typically produce emergent properties and behaviour
- **Design**: focusing on improvement by identifying the right problem to solve, creating a range of possible solutions and refining the best of these to deliver appropriate outcomes
- **Risk**: managing risk, based on the timely identification of threats and opportunities in the system, assessment of their associated risks and management of necessary change.

Each of the four perspectives of **people**, **systems**, **design** and **risk** can be seen as individual components within an overall improvement process. However, while each uniquely contributes to a systems approach, they are inextricably linked and the challenge is to integrate them within a useful, versatile and systematic process that repeatedly delivers results. The **Engineering Better Care** report presents the improvement process as an ordered set of questions, based on the individual perspectives, that should be asked until the **current system** is improved to delivered something **measurably better** into service. That sequence of questions has been extended to introduce questions related to the **management** of the improvement process. More details are provided in the Engineering Better Care section of this toolkit.



1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Introduction

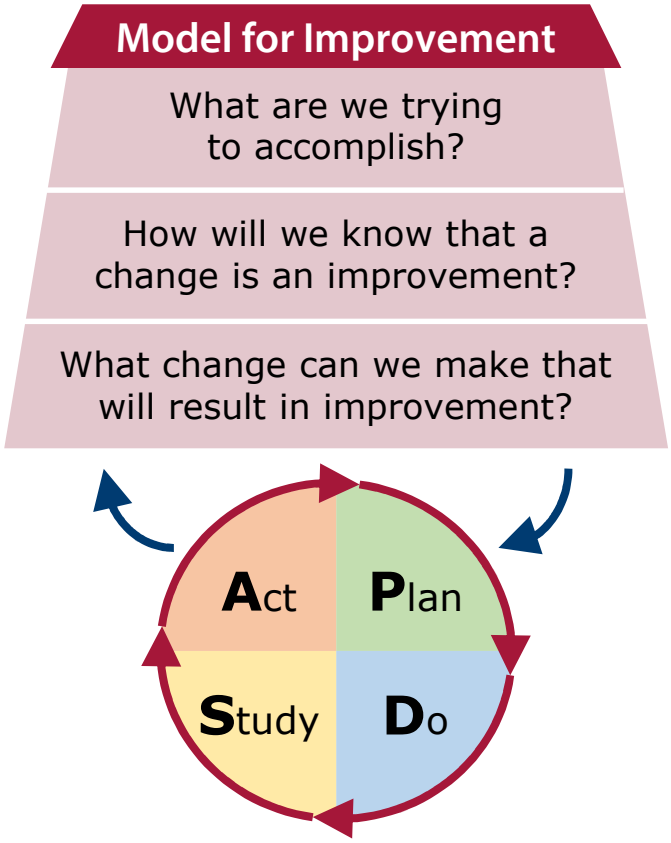
An improvement process may also be characterised by the key activity **strands** required to transform the **current system** into something **measurably better**. These are likely to focus on particular aspects of a successful improvement process:

- **Understand the Context** — describes the circumstances or setting that surround a system and all the factors that could influence the system and its improvement.
- **Define the Problem** — describes the detail of a particular challenge within a system and all the requirements for change necessary to improve the system.
- **Develop the Solution** — describes a way of solving a particular problem within a system and all the elements of change necessary to improve the system.
- **Collect the Evidence** — describes the information and all the measures used to evidence the validity of a particular solution(s) to a problem within a system.
- **Make the Case** — describes the set of facts or arguments in support of improving a system and delivering a particular solution(s) to a problem within the system.
- **Manage the Plan** — describes a detailed proposal for enabling change to a system and delivering a particular solution(s) to a problem within the system.
- **Agree the Scope** — describes the context of the improvement envisaged in terms of the extent of the ambition for improvement and the boundary of the system of interest.

These **strands** will be present throughout the improvement process, but the emphasis given to each one should vary. At different stages of the improvement process there will be different targets for each of the strands, with early focus more likely on the **context** and **problem** and later emphasis on the **solution** and **evidence**. The strands will be delivered through the selection of specific, individual **activities** supported, where appropriate, by the use of standard **tools**. An initial set of activities and tools are included in the toolkit, along with resources to assist with the overall planning of the improvement process and the planning and execution of individual activities.

The Improvement Process section provides more details on the specific activities that might be performed within of these strands.

IHI Model for Improvement



Summary

The IHI Model is a tool for accelerating improvement, based on three fundamental questions and the Plan-Do-Study-Act cycle to test changes in real work settings.

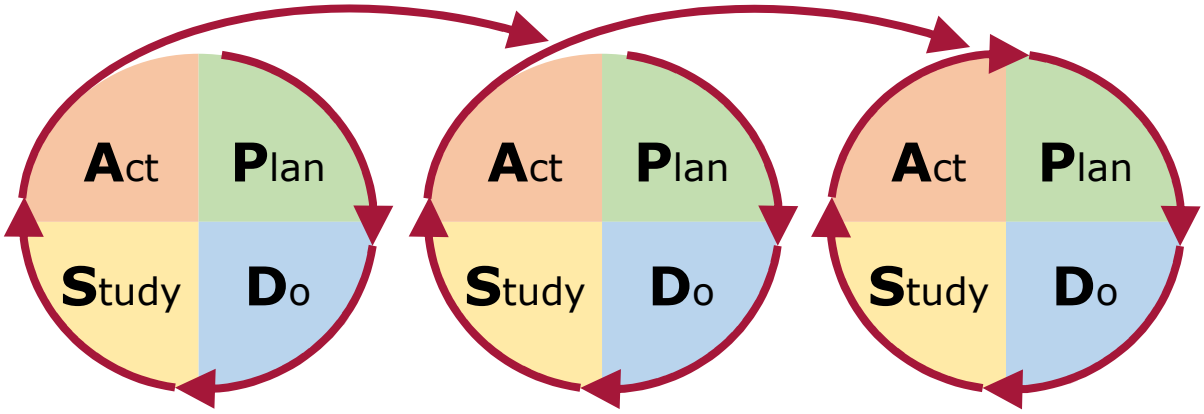
Contents

Introduction

The model for improvement was developed by the Associates in Process Improvement as a tool for accelerating improvement and has been adopted by the Institute of Healthcare Improvement as its primary framework for improvement in healthcare. The model has two parts: three fundamental questions, which can be addressed in any order; and the Plan-Do-Study-Act cycle to test changes in real work settings in order to determine if the change is an improvement.

Use of the model is widespread within the NHS due to its simplicity and ability to bring about rapid testing of ideas. Some criticism of its effectiveness has been raised, suggesting that it is poorly applied and often pursued through time-limited, small-scale projects, led by professionals who may lack the expertise, power or resources to instigate the changes required.

The model for improvement ensures that teams know the purpose behind what they are trying to accomplish, understand what success will look like and identify those changes that will result in improvement. It also guides them through the process of establishing appropriate measures, creating changes, evaluating changes, implementing changes and spreading changes. Following the initial questions, multiple Plan-Do-Study-Act cycles may be used to achieve the level of improvement desired.



1. *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance*. Langley, Moen, Nolan, Nolan, Norman and Provost, John Wiley & Sons (2nd edition), 2009.

Getting Started

Improvement teams in health and care already have a range of theories of change and improvement approaches available: the IHI model for improvement, human factors in healthcare, lean in healthcare, experience-based co-design, root cause analysis, and six sigma to name a few.

While a number of these approaches already include tools, such as Failure Modes and Effect Analysis (FMEA) and mapping techniques that may be found in engineering methods, the systems approach presented in this toolkit has the potential to add further value to the improvement agenda in two distinct forms. The provision of new tools and ways of thinking can supplement existing approaches and the adoption of a systems approach can guide a design from a set of complex needs through to validated, effective operational systems.

There are other key areas in which new ways of thinking, derived from a systems approach, can supplement existing methods. This includes, measuring and designing system interfaces to alleviate service integration issues and using systems safety assessment to proactively design risk out of systems and avoid incidents rather than merely reactively preventing a recurrence. In such cases, existing improvement approaches may be enhanced by using techniques from a systems approach.

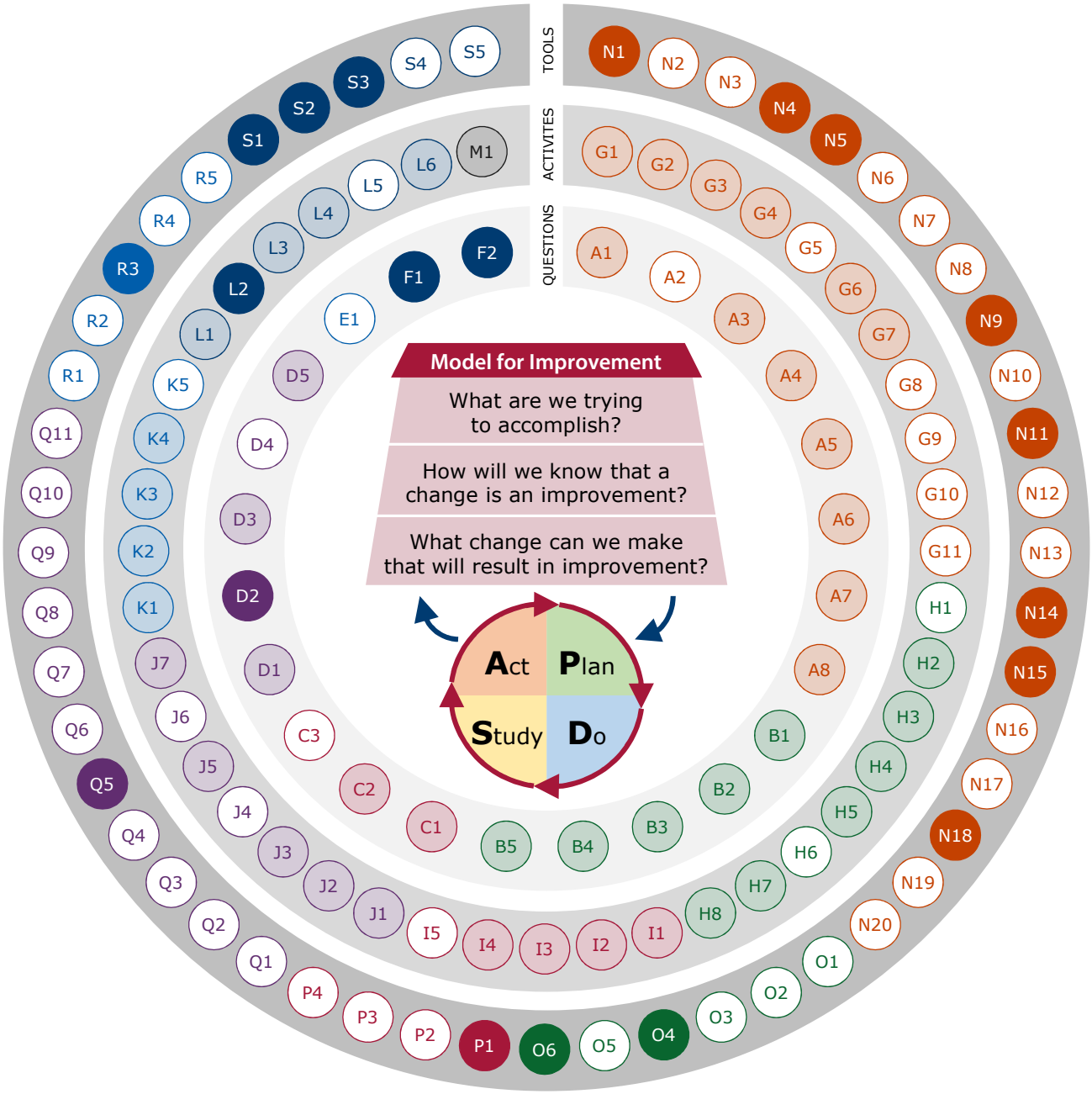
The Systems Approach is also a method in its own right that applies tools to answer a series of questions in an iterative and systematic way in order to guide a design from a set of complex needs through to validated, effective operational systems.

During this process, experienced improvers can use their own tools, frameworks and experiences of change to help teams understand **people**, deliver **systems**, facilitate **design** and manage **risk**. A systems approach can enhance existing approaches through additional tools and techniques, encouraging improvements to be guided by a series of critical questions or simple stage gate processes.

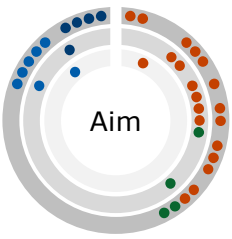
The following map can be used to understand the coverage of the IHI model and to suggest areas where a systems approach may assist in the provision of additional questions, activities and tools to supplement existing practice.

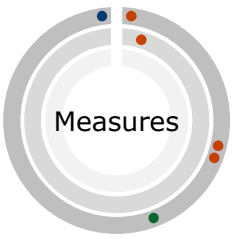
Comparison

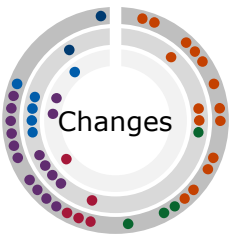
The **questions**, **activities** and **tools** from this toolkit can be mapped to the **IHI Model for Improvement** to better understand the relative coverage of the two approaches. Resource material for the IHI model has been analysed in detail to ascertain how it relates to the systems approach in this toolkit, both in terms of the mention of common topics and in terms of the provision of detailed descriptions or advice relating to the same topics.

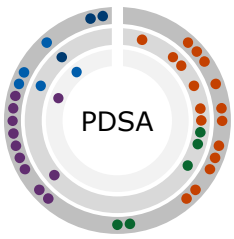


Questions, **activities** and **tools** that have particular potential to add value to the **IHI** model:









Comparison

Key

X	**Topic covered in detail in the IHI model**
X	Topic mentioned in the IHI model
X	Topic not mentioned in the IHI model

Colour

A, G, N	Understand the Context
B, H, O	Define the Problem
C, I, P	Develop the Solution
D, J, Q	Collect the Evidence
E, K, R	Make the Case
F, L, S	Manage the Plan
M	Agree the Scope

Questions

A1. Trigger
A2. Purpose
A3. Identify
A4. Locate
A5. Situate
A6. Understand
A7. Organise
A8. Current

B1. Success
B2. Performance
B3. Problem
B4. Explore
B5. Improve
C1. Examine
C2. Create
C3. Better

D1. Integrate
D2. Evaluate
D3. Assess
D4. Seek
D5. Measure
E1. Case
F1. Team
F2. Plan

Activities

G1. Understand Political Context
G2. Analyse Relevant Documents
G3. Observe Stakeholders
G4. Consult Stakeholders
G5. Describe Clinical Processes
G6. Describe Patient Journeys
G7. Create System Maps
G8. Create Stakeholder Map
G9. Understand Patient Diversity
G10. Generate Personas
G11. Generate Scenarios
H1. Describe Stakeholder Experiences
H2. Describe Patient Experiences
H3. Measure Current Performance
H4. Benchmark Current Performance

H5. Capture Stakeholder Needs
H6. Prioritise Stakeholder Needs
H7. Agree Core Themes
H8. Define Requirements
I1. Consider Pre-existing Solutions
I2. Stimulate Ideas
I3. Filter Ideas
I4. Develop Concepts
I5. Make Models
J1. Define Measures
J2. Agree Quality Targets
J3. Review Effectiveness
J4. Review Safety
J5. Review Experience
J6. Review Sustainability

J7. Synthesise Evidence
K1. Demonstrate Future Improvement
K2. Predict Stakeholder Benefits
K3. Calculate Resources Required
K4. Estimate Time Required
K5. Present Case for Change
L1. Identify Enablers and Blockers
L2. Manage Team
L3. Ensure Shared Understanding
L4. Review Project Performance
L5. Review Project Progress
L6. Plan Future Activities
M1. Agree Aim Statement

Tools

N1. Literature Review
N2. Rich Picture
N3. Soft Systems Method
N4. Causal Loop Diagram
N5. Influence Diagram
N6. Entity Relationship Diagram
N7. Data Flow Diagram
N8. State Transition Diagram
N9. Flow Chart
N10. Swimlane Diagram
N11. Spaghetti Diagram
N12. Value Stream Mapping
N13. Dependency Structure Matrix
N14. One-to-one Interviews
N15. Facilitated Discussion
N16. Delphi Study
N17. Participant Observation

N18. Observational Study
N19. Designing Personas
N20. Designing Scenarios
O1. Life Café
O2. Public Involvement
O3. MoSCoW
O4. Data Analysis
O5. Storyboarding
O6. Fishbone Diagram
P1. Brainstorming
P2. Disney
P3. Six Thinking Hats
P4. Morphological Chart
Q1. Exclusion Audit
Q2. User Trials
Q3. Expert Review
Q4. Life Cycle Assessment

Q5 Root Cause Analysis
Q6. Failure Mode and Effects Analysis
Q7. Fault Tree Analysis
Q8. Hazard and Operability Analysis
Q9. Structured What-if Technique
Q10. Bowtie Method
Q11. Risk Matrix
R1. PEST(LE) Analysis
R2. SWOT Analysis
R3. Stakeholder Analysis
R4. The Five Ws and two Hs
R5. Wardley Map
S1. Driver Diagram
S2. Gantt Chart
S3. Activity Dependency Diagram
S4. Project Canvas
S5. LoMo

Comparison

What are we trying to accomplish?

The focus of the first question in the IHI Model of Improvement is the agreement of a SMART aim statement that is meaningful to the users and stakeholders, and aligned with organisational goals. General project issues are also addressed at this stage, such as creation of the team, initial exploration of the problem area and needs, definition of a clear scope for the improvement, and engagement of key stakeholders.

Activities from the systems approach, not frequently mentioned in the literature on the IHI Model of Improvement relating to this question, that may add value include: Describe Clinical Processes, Describe Patient Journeys, Create Stakeholder Map, Understand Patient Diversity, Generate Personas, Generate Scenarios, Describe Stakeholder Experiences, Prioritise Stakeholder Needs, Present Case for Change and Review Project Performance.

Tools from the systems approach that may be useful include: Literature Review, Rich Picture, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Swimlane Diagram, Value Stream Mapping, Dependency Structure Matrix, Facilitated Discussion, Delphi Study, Participant Observation, Designing Personas, Designing Scenarios, Life Café, Public Involvement, PEST(LE) Analysis, SWOT Analysis, Stakeholder Analysis, The Five Ws and two Hs, Wardley Map, Gantt Chart, Activity Dependency Diagram, Project Canvas and LoMo.

How will we know that a change is an improvement?

The second question relates to the identification and definition of appropriate measures to test ideas for improvement and studied. These may include outcome, process and balancing measures, proposed by the stakeholders, to ensure the agreed improvement aim is met.

Activities from the systems approach that may add value include: Analyse Relevant Documents.

Tools from the systems approach that may be useful include: Literature Review, Facilitated Discussion, Delphi Study, MoSCoW and LoMo.

Comparison

What change can we make that will result in improvement?

The third question addresses the development of change ideas, linked to users' and stakeholders' needs and the agreed aim and measures. The use of creative thinking and exploration, along with the visualisation of current processes and evidence, are proposed as a means to stimulate ideation, concept development and selection.

Activities from the systems approach that may add value include: Describe Clinical Processes, Generate Personas, Generate Scenarios, Describe Stakeholder Experiences, Make Models, Review Effectiveness, Review Safety, Review Experience, Review Sustainability, Demonstrate Future Improvement, Predict Stakeholder Benefits, Calculate Resources Required, Estimate Time Required, Present Case for Change and Review Project Performance.

Tools from the systems approach that may be useful include: Rich Picture, Soft Systems Method, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Swimlane Diagram, Value Stream Mapping, Dependency Structure Matrix, Delphi Study, Participant Observation, Designing Personas, Designing Scenarios, Life Café, Public Involvement, Storyboarding, Disney, Six Thinking Hats, Morphological Chart, Exclusion Audit, User Trials, Expert Review, Life Cycle Assessment, Failure Mode and Effects Analysis, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-if Technique, Bowtie Method, Risk Matrix and LoMo.

Plan-Do-Study-Act

Plan-Do-Study-Act (PDSA) initially focuses on testing the proposed changes at limited scale to reduce risk, and then on learning from subsequent cycles to inform the scale-up of the changes. Hence, PDSA cycles also relate to second question on measures, measurement and data, and to the third regarding the current system and processes.

Activities from the systems approach that may add value include: Analyse Relevant Documents, Describe Clinical Processes, Describe Patient Journeys, Create Stakeholder Map, Generate Personas, Generate Scenarios, Describe Stakeholder Experiences, Describe Patient Experiences, Benchmark Current Performance, Review Safety, Present Case for Change and Ensure Shared Understanding.

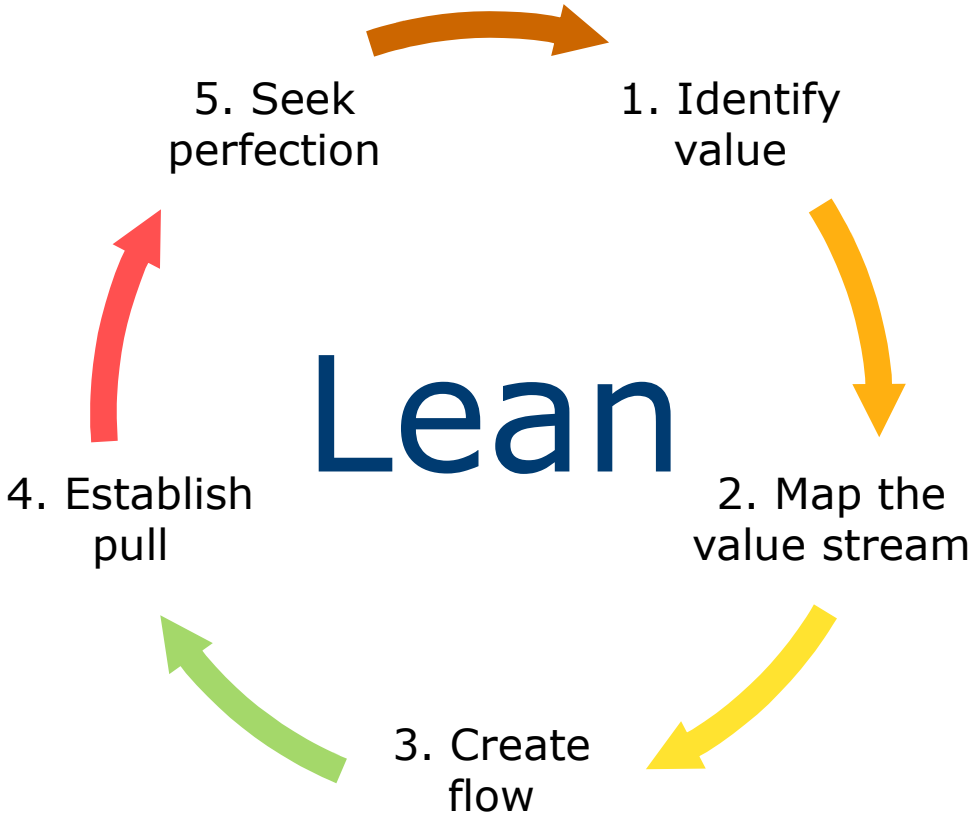
Tools from the systems approach that may be useful include: Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Swimlane Diagram, Value Stream Mapping, Dependency Structure Matrix, Facilitated Discussion, Delphi Study, Participant Observation, Designing Personas, Designing Scenarios, Storyboarding, Fishbone Diagram, User Trials, Expert Review, Exclusion Audit, Life Cycle Assessment, Root Cause Analysis, Failure Mode and Effects Analysis, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-if Technique, Bowtie Method, Risk Matrix, PEST(LE) Analysis, SWOT Analysis, Wardley Map, Project Canvas and LoMo.

Literature

Dixon-Woods M & Martin G (2016) Does quality improvement improve quality? *Future Hospital Journal*, **3**(3):191-194.

Langley GL, Moen R, Nolan KM, Nolan TW, Norman CL, Provost LP (2009). *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance* (2nd edition). San Francisco: Jossey-Bass Publishers.

Lean Thinking



Summary

The Lean Thinking model is a process to facilitate improvement in patient care with existing resources, meaning the same things can be achieved using fewer people.

Contents

Introduction

Lean thinking is an approach to improvement developed at Toyota in the 1950s to create the Toyota Production System. It is a strategic approach that focuses on dramatically improving flow in the value stream and eliminating waste. It initially came to prominence in health and care systems through The Productive Series: Releasing Time to Care[1], a programme developed by the NHS institute for Innovation and Improvement and has been the subject of other reports on methods for improvement[2].

Lean is typically a team process involving many people across an organisation. The Virginia Mason Medical Center in Seattle, Washington has been using lean thinking principles since 2002. By working to eliminate waste, they have created more capacity in existing programmes and practices so that planned expansions were scrapped, saving significant capital expenses. Using lean principles, staff, providers and patients have continuously improved or redesigned processes to eliminate waste, reduce rework and improve quality. Five UK Trusts are now piloting Virginia Mason's approach.

Lean thinking is founded on five principles designed to:

- Specify the value desired by the patient,
- Map the value stream and identify those steps that do not create value,
- Create a smooth flow through the value-added steps,
- Establish pull between the steps,
- Seek perfection so that the number of steps and the amount of time and information needed to serve the patient are minimised.

In essence, it focuses on improving patient flow, reducing opportunities for error, developing standards and engaging teams in improvement, and it is increasingly used in conjunction with Six Sigma[3].

1. *Putting patients first – The Productive Series*. NHS Institute for Improvement, 2012.

2. *Lean thinking for the NHS*. Jones and Mitchell, The NHS Confederation, 2006.

3. *Lean Six Sigma: some basic concepts*. Bevan, Westwood, Crowe and O'Connor, NHS Institute for Improvement, 2013.

Getting Started

Improvement teams in health and care already have a range of theories of change and improvement approaches available: the IHI model for improvement, human factors in healthcare, lean in healthcare, experience-based co-design, root cause analysis, and six sigma to name a few.

While a number of these approaches already include tools, such as Failure Modes and Effect Analysis (FMEA) and mapping techniques that may be found in engineering methods, the systems approach presented in this toolkit has the potential to add further value to the improvement agenda in two distinct forms. The provision of new tools and ways of thinking can supplement existing approaches and the adoption of a systems approach can guide a design from a set of complex needs through to validated, effective operational systems.

There are other key areas in which new ways of thinking, derived from a systems approach, can supplement existing methods. This includes, measuring and designing system interfaces to alleviate service integration issues and using systems safety assessment to proactively design risk out of systems and avoid incidents rather than merely reactively preventing a recurrence. In such cases, existing improvement approaches may be enhanced by using techniques from a systems approach.

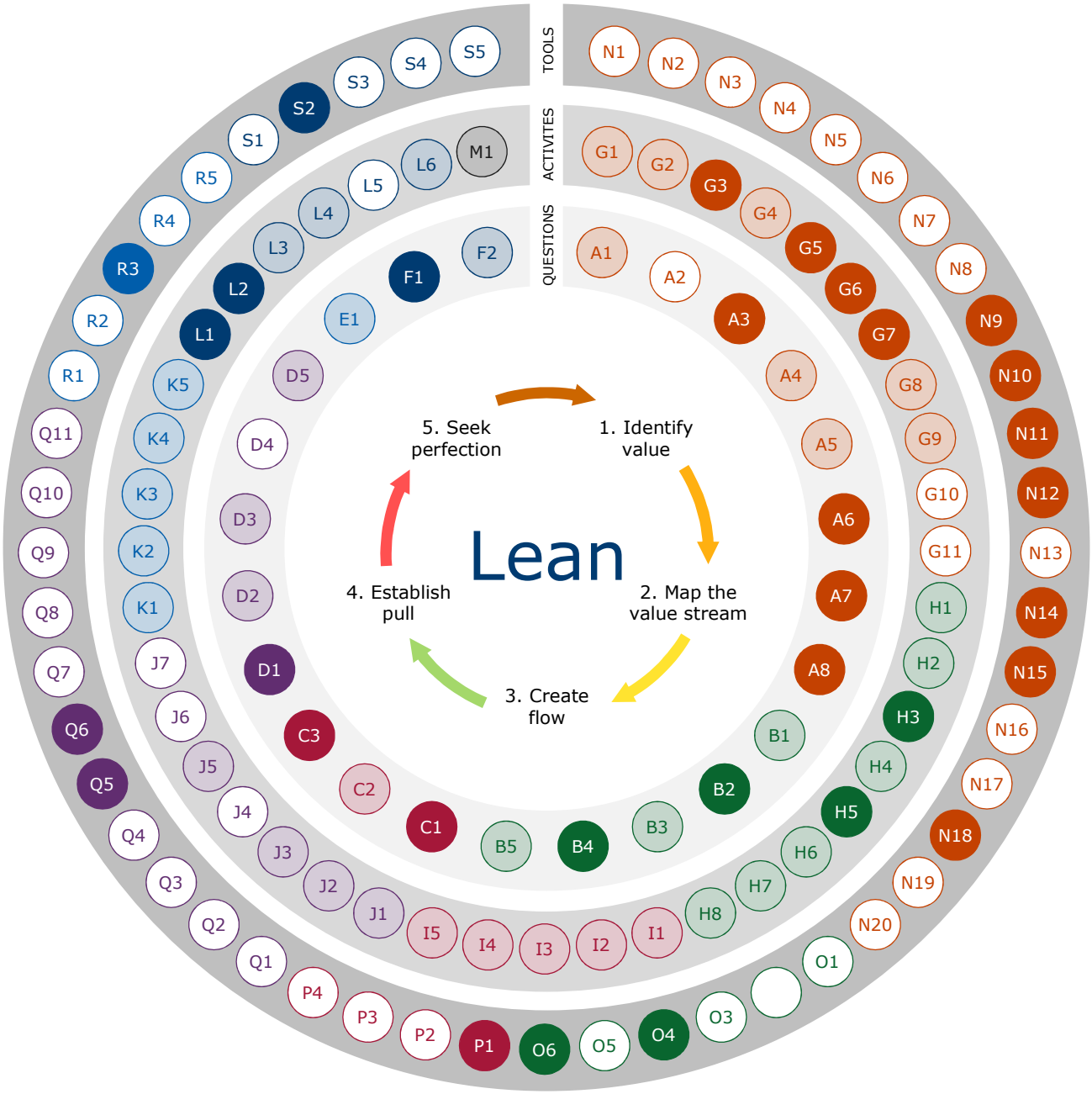
The Systems Approach is also a method in its own right that applies tools to answer a series of questions in an iterative and systematic way in order to guide a design from a set of complex needs through to validated, effective operational systems.

During this process, experienced improvers can use their own tools, frameworks and experiences of change to help teams understand **people**, deliver **systems**, facilitate **design** and manage **risk**. A systems approach can enhance existing approaches through additional tools and techniques, encouraging improvements to be guided by a series of critical questions or simple stage gate processes.

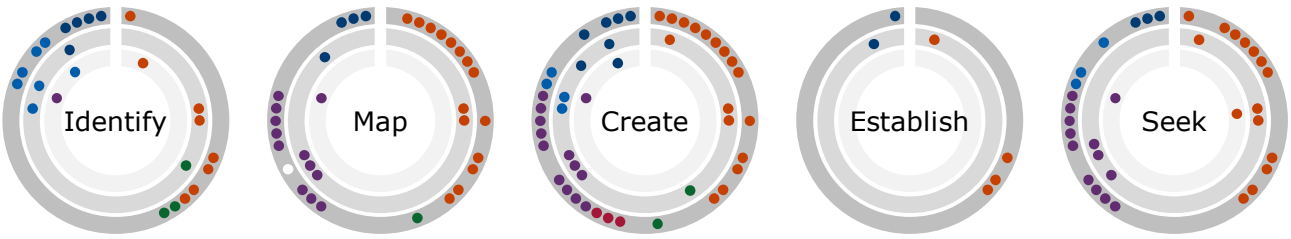
The following map can be used to understand the coverage of the Lean model and to suggest areas where a systems approach may assist in the provision of additional questions, activities and tools to supplement existing practice.

Comparison

The **questions**, **activities** and **tools** from this toolkit can be mapped to the **Lean Thinking** model of improvement to better understand the relative coverage of the two approaches. Resource material for the Lean Thinking model has been analysed in detail to ascertain how it relates to the systems approach in this toolkit, both in terms of the mention of common topics and in terms of the provision of detailed descriptions or advice relating to the same topics.



Questions, **activities** and **tools** that have particular potential to add value to the **Lean Thinking** model:



Comparison

Key

X	**Topic covered in detail in the Lean Thinking model**
X	Topic mentioned in the Lean Thinking model
X	Topic not mentioned in the Lean Thinking model

Colour

A, G, N	Understand the Context
B, H, O	Define the Problem
C, I, P	Develop the Solution
D, J, Q	Collect the Evidence
E, K, R	Make the Case
F, L, S	Manage the Plan
M	Agree the Scope

Questions

A1. Trigger
A2. Purpose
A3. Identify
A4. Locate
A5. Situate
A6. Understand
A7. Organise
A8. Current

B1. Success
B2. Performance
B3. Problem
B4. Explore
B5. Improve
C1. Examine
C2. Create
C3. Better

D1. Integrate
D2. Evaluate
D3. Assess
D4. Seek
D5. Measure
E1. Case
F1. Team
F2. Plan

Activities

G1. Understand Political Context
G2. Analyse Relevant Documents
G3. Observe Stakeholders
G4. Consult Stakeholders
G5. Describe Clinical Processes
G6. Describe Patient Journeys
G7. Create System Maps
G8. Create Stakeholder Map
G9. Understand Patient Diversity
G10. Generate Personas
G11. Generate Scenarios
H1. Describe Stakeholder Experiences
H2. Describe Patient Experiences
H3. Measure Current Performance
H4. Benchmark Current Performance

H5. Capture Stakeholder Needs
H6. Prioritise Stakeholder Needs
H7. Agree Core Themes
H8. Define Requirements
I1. Consider Pre-existing Solutions
I2. Stimulate Ideas
I3. Filter Ideas
I4. Develop Concepts
I5. Make Models
J1. Define Measures
J2. Agree Quality Targets
J3. Review Effectiveness
J4. Review Safety
J5. Review Experience
J6. Review Sustainability

J7. Synthesise Evidence
K1. Demonstrate Future Improvement
K2. Predict Stakeholder Benefits
K3. Calculate Resources Required
K4. Estimate Time Required
K5. Present Case for Change
L1. Identify Enablers and Blockers
L2. Manage Team
L3. Ensure Shared Understanding
L4. Review Project Performance
L5. Review Project Progress
L6. Plan Future Activities
M1. Agree Aim Statement

Tools

N1. Literature Review
N2. Rich Picture
N3. Soft Systems Method
N4. Causal Loop Diagram
N5. Influence Diagram
N6. Entity Relationship Diagram
N7. Data Flow Diagram
N8. State Transition Diagram
N9. Flow Chart
N10. Swimlane Diagram
N11. Spaghetti Diagram
N12. Value Stream Mapping
N13. Dependency Structure Matrix
N14. One-to-one Interviews
N15. Facilitated Discussion
N16. Delphi Study
N17. Participant Observation

N18. Observational Study
N19. Designing Personas
N20. Designing Scenarios
O1. Life Café
O2. Public Involvement
O3. MoSCoW
O4. Data Analysis
O5. Storyboarding
O6. Fishbone Diagram
P1. Brainstorming
P2. Disney
P3. Six Thinking Hats
P4. Morphological Chart
Q1. Exclusion Audit
Q2. User Trials
Q3. Expert Review
Q4. Life Cycle Assessment

Q5 Root Cause Analysis
Q6. Failure Mode and Effects Analysis
Q7. Fault Tree Analysis
Q8. Hazard and Operability Analysis
Q9. Structured What-if Technique
Q10. Bowtie Method
Q11. Risk Matrix
R1. PEST(LE) Analysis
R2. SWOT Analysis
R3. Stakeholder Analysis
R4. The Five Ws and two Hs
R5. Wardley Map
S1. Driver Diagram
S2. Gantt Chart
S3. Activity Dependency Diagram
S4. Project Canvas
S5. LoMo

Comparison

Identify value

The first principle of lean thinking relates to general project issues, such as: the creation of the team, definition of the project aim, scope and plans, and creation of a sense of urgency; exploration of the problem and its context; and investigation of the high-level system processes, their elements, interfaces and boundaries. There is particular focus of the definition of value from the users' perspective, through the identification of patients and other stakeholders, capture of their views, and understanding of their problems, needs and expectations.

Activities from the systems approach, not frequently mentioned in the literature on lean thinking relating to this principle, that may add value include: Generate Personas, Generate Scenarios, Benchmark Current Performance, Calculate Resources Required, Present Case for Change and Review Project Performance.

Tools from the systems approach that may be useful include: Literature Review, Delphi Study, Participant Observation, Designing Personas, Designing Scenarios, Life Café, Public Involvement, PEST(LE) Analysis, SWOT Analysis, The Five Ws and two Hs, Wardley Map, Gantt Chart, Activity Dependency Diagram, Project Canvas and LoMo.

Map the value stream

The second principle focuses on the elaboration of the high-level system processes previously captured. Process maps are used to visualise the current end-to-end processes in some detail, distinguishing value-add and non-value-add steps. For a step to add value, a user or stakeholder must care about it, it must change them or knowledge about them, and it must executed right first time. If these criterion are not met, that step is deemed to be waste. The timing of the process steps is also reviewed in the light of identifiable priorities, potential bottlenecks and constraints.

Activities from the systems approach that may add value include: Generate Personas, Generate Scenarios, Review Safety, Review Experience, Review Sustainability and Ensure Shared Understanding.

Tools from the systems approach that may be useful include: Rich Picture, Soft Systems Method, Causal Loop Diagram, Influence Diagram, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Flow Chart, Dependency Structure Matrix, Delphi Study, Participant Observation, Designing Personas, Designing Scenarios, MoSCoW, Exclusion Audit, User Trials, Expert Review, Life Cycle Assessment, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-if Technique, Bowtie Method, Risk Matrix, Gantt Chart, Activity Dependency Diagram, Project Canvas and LoMo.

Comparison

Create flow

The third principle focuses on the elimination of waste, avoidance of uneven flow, batching and queuing, and establishment of a smooth flow of users or other entities in the value stream. Lean fundamentals and standard solutions to common problems are considered to develop ideas for the elimination of waste and improvement of flow. A new value stream is proposed and gaps between this and the current state identified and reviewed.

Activities from the systems approach that may add value include: Analyse Relevant Documents, Generate Personas, Generate Scenarios, Benchmark Current Performance, Review Safety, Review Experience, Review Sustainability, Calculate Resources Required, Estimate Time Required, Manage Team and Review Project Progress.

Tools from the systems approach that may be useful include: Literature Review, Rich Picture, Soft Systems Method, Causal Loop Diagram, Influence Diagram, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Flow Chart, Dependency Structure Matrix, Delphi Study, Participant Observation, Designing Personas, Designing Scenarios, Storyboarding, Disney, Six Thinking Hats, Morphological Chart, Exclusion Audit, User Trials, Expert Review, Life Cycle Assessment, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-If Technique, Bowtie Method, Risk Matrix, PEST(LE) Analysis, SWOT Analysis, Driver Diagram, Activity Dependency Diagram, Project Canvas and LoMo.

Establish pull

The fourth principle focuses on letting the users or stakeholders pull value rather than pushing it, without delay or reliance on excessive resources. Creation of a pull mechanism aligns with the need for smooth flow, where every step in the process should pull people, skills, materials and information as required. This requires good evaluation of resource usage against demand, and communication and visibility of the progress being made.

Activities from the systems approach that may add value include: Analyse Relevant Documents and Review Project Progress.

Tools from the systems approach that may be useful include: One-to-one Interviews, Delphi Study, Participant Observation and LoMo.

Seek perfection

The fifth principle emphasises the importance of maintaining the gains made after the implementation of changes and the continuous effort for achieving perfection. The performance of the revised system, along with the perceptions of users and stakeholders about the new practices, are monitored. This involves a mix of training, measurement, documentation and visualisation in order to remove barriers, and sustain and spread improvements.

Activities from the systems approach that may add value include: Analyse Relevant Documents, Create Stakeholder Map, Generate Personas, Generate Scenarios, Review Safety, Review Sustainability and Synthesise Evidence.

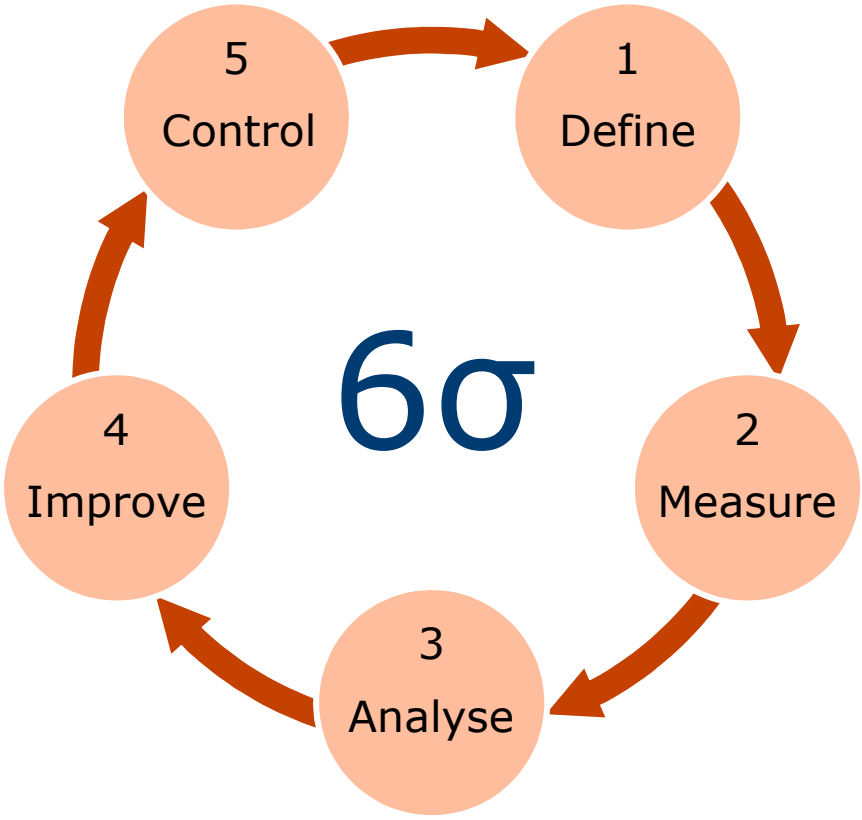
Tools from the systems approach that may be useful include: Literature Review, Causal Loop Diagram, Influence Diagram, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Flow Chart, Participant Observation, Designing Personas, Designing Scenarios, Exclusion Audit, User Trials, Expert Review, Life Cycle Assessment, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-If Technique, Bowtie Method, Risk Matrix, PEST(LE) Analysis, SWOT Analysis, Wardley Map, Activity Dependency Diagram, Project Canvas and LoMo.

Literature

Moraros J, Lemstra M & Chijioke N (2016) Lean interventions in healthcare: do they actually work? A systematic literature review. *International Journal for Quality in Health Care*, **28**(2):150-165.

NHS Institute (2012) *Putting patients first – The Productive Series*. NHS Institute for Innovation and Improvement.

Six Sigma



Summary

The Six Sigma model is a continuous improvement approach that has a proven commercial pedigree that can be traced back to the quality revolution of the 1940's.

Contents

Introduction

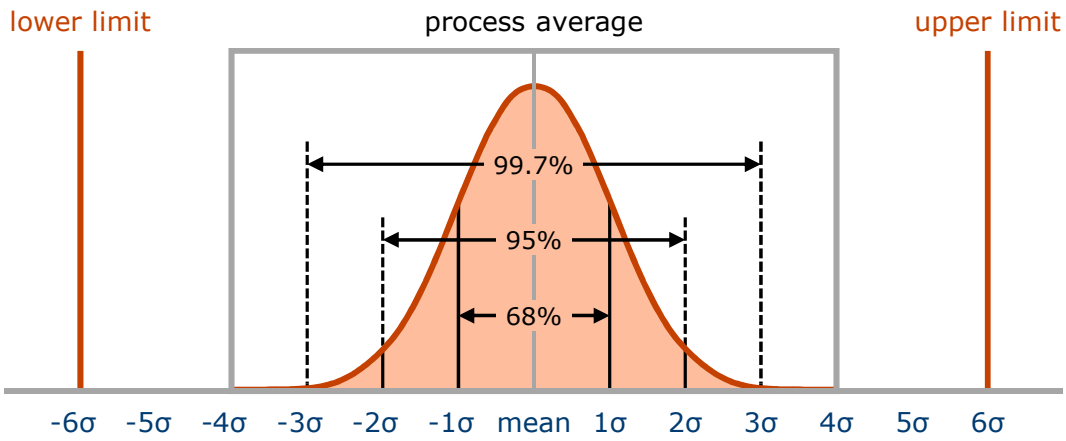
Six sigma is an approach to improvement developed at Motorola in the 1980s, which focuses on removing the causes of defects and reducing variation in processes. It has a meticulous focus on understanding wide-ranging customer needs, prioritising these and designing processes and systems to deliver to those needs. Its purpose is derived from the desire to achieve a performance level equivalent to a defect rate of 3.4 defects per million opportunities. Six sigma uses a disciplined and systematic approach to look at the improvement journey from a number of related perspectives: define; measure; analyse; improve; and control (DMAIC).

Six sigma is typically a facilitated process where experts use qualitative and quantitative techniques to drive process improvement. Although the tools themselves are not unique, the way they are applied and integrated as part of a system is. Six sigma professionals undergo extensive training to be able to select and use tools to evaluate a process from various perspectives and determine which activities are to be improved. It has been embraced by a number of US companies, while application in the UK health system is more limited[1].

Six sigma tools help to:

- define a problem, improvement opportunity or requirements
- measure process performance
- analyse processes to determine root causes of variation, defects or poor performance
- improve process performance by addressing root causes
- control the improved process and future performance.

The principles of six sigma are fundamentally based on a statistical approach to process control which limits unnecessary variation in performance, and it is increasingly used in conjunction with lean thinking[2].



1. Lessons for Lean in Healthcare from Using Six Sigma in the NHS. Proudlove, Moxham and Boaden, *Public Money and Management*, **28**(1):27-34, 2010.

2. *Lean Six Sigma: some basic concepts*. Bevan, Westwood, Crowe and O'Connor, NHS Institute for Improvement, 2013.

Getting Started

Improvement teams in health and care already have a range of theories of change and improvement approaches available: the IHI model for improvement, human factors in healthcare, lean in healthcare, experience-based co-design, root cause analysis, and six sigma to name a few.

While a number of these approaches already include tools, such as Failure Modes and Effect Analysis (FMEA) and mapping techniques that may be found in engineering methods, the systems approach presented in this toolkit has the potential to add further value to the improvement agenda in two distinct forms. The provision of new tools and ways of thinking can supplement existing approaches and the adoption of a systems approach can guide a design from a set of complex needs through to validated, effective operational systems.

There are other key areas in which new ways of thinking, derived from a systems approach, can supplement existing methods. This includes, measuring and designing system interfaces to alleviate service integration issues and using systems safety assessment to proactively design risk out of systems and avoid incidents rather than merely reactively preventing a recurrence. In such cases, existing improvement approaches may be enhanced by using techniques from a systems approach.

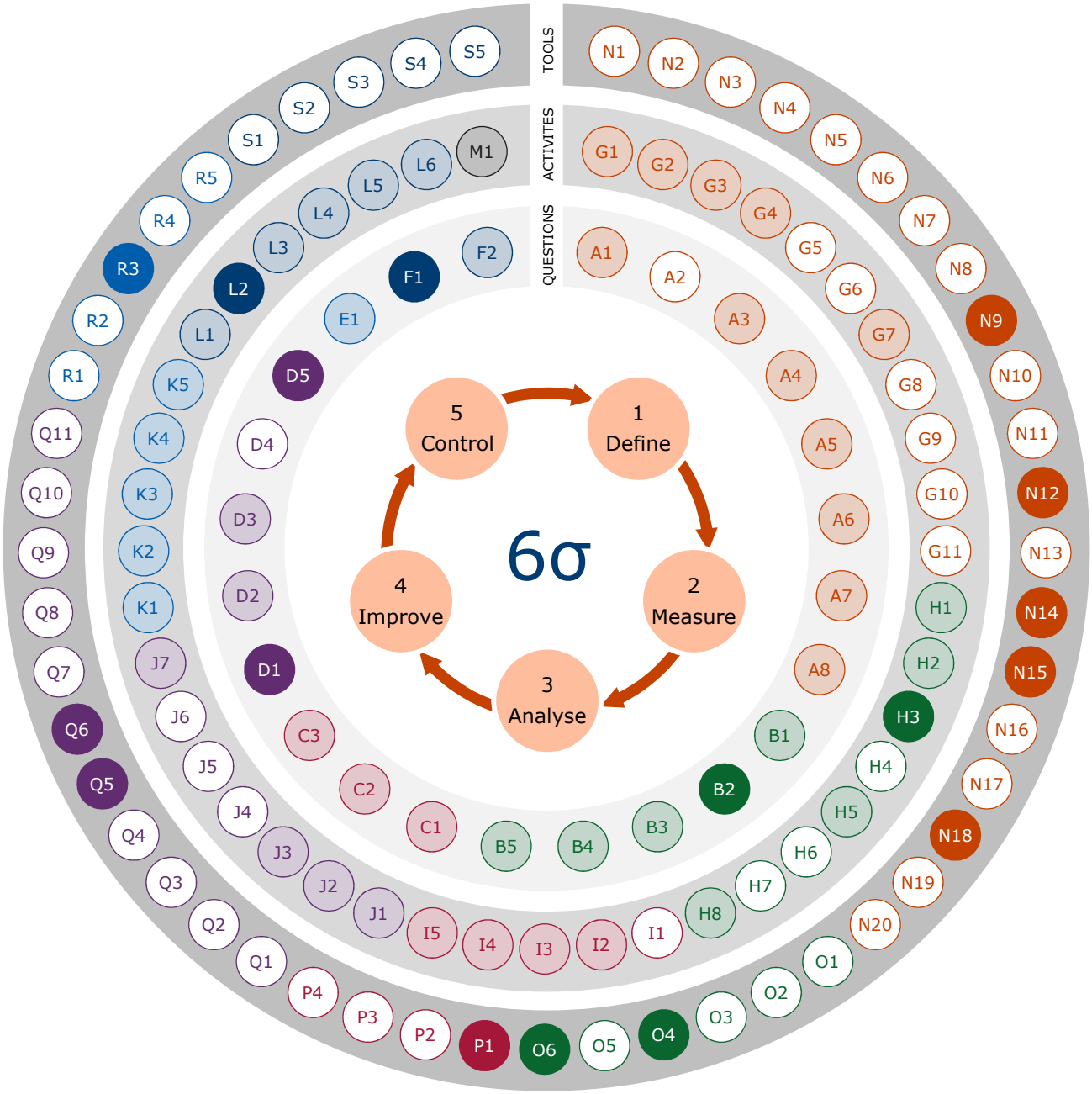
The Systems Approach is also a method in its own right that applies tools to answer a series of questions in an iterative and systematic way in order to guide a design from a set of complex needs through to validated, effective operational systems.

During this process, experienced improvers can use their own tools, frameworks and experiences of change to help teams understand **people**, deliver **systems**, facilitate **design** and manage **risk**. A systems approach can enhance existing approaches through additional tools and techniques, encouraging improvements to be guided by a series of critical questions or simple stage gate processes.

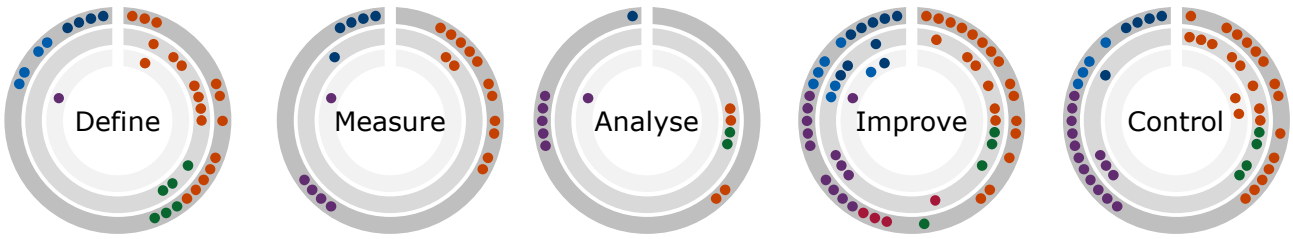
The following map can be used to understand the coverage of the Six Sigma model and to suggest areas where a systems approach may assist in the provision of additional questions, activities and tools to supplement existing practice.

Comparison

The **questions**, **activities** and **tools** from this toolkit can be mapped to the **Six Sigma** model of improvement to better understand the relative coverage of the two approaches. Resource material for the Six Sigma model has been analysed in detail to ascertain how it relates to the systems approach in this toolkit, both in terms of the mention of common topics and in terms of the provision of detailed descriptions or advice relating to the same topics.



Questions, **activities** and **tools** that have particular potential to add value to the **Six Sigma** model:



Comparison

Key

X	**Topic covered in detail in the Six Sigma model**
X	Topic mentioned in the Six Sigma model
X	Topic not mentioned in the Six Sigma model

Colour

A, G, N	Understand the Context
B, H, O	Define the Problem
C, I, P	Develop the Solution
D, J, Q	Collect the Evidence
E, K, R	Make the Case
F, L, S	Manage the Plan
M	Agree the Scope

Questions

A1. Trigger
A2. Purpose
A3. Identify
A4. Locate
A5. Situate
A6. Understand
A7. Organise
A8. Current

B1. Success
B2. Performance
B3. Problem
B4. Explore
B5. Improve
C1. Examine
C2. Create
C3. Better

D1. Integrate
D2. Evaluate
D3. Assess
D4. Seek
D5. Measure
E1. Case
F1. Team
F2. Plan

Activities

G1. Understand Political Context
G2. Analyse Relevant Documents
G3. Observe Stakeholders
G4. Consult Stakeholders
G5. Describe Clinical Processes
G6. Describe Patient Journeys
G7. Create System Maps
G8. Create Stakeholder Map
G9. Understand Patient Diversity
G10. Generate Personas
G11. Generate Scenarios
H1. Describe Stakeholder Experiences
H2. Describe Patient Experiences
H3. Measure Current Performance
H4. Benchmark Current Performance

H5. Capture Stakeholder Needs
H6. Prioritise Stakeholder Needs
H7. Agree Core Themes
H8. Define Requirements
I1. Consider Pre-existing Solutions
I2. Stimulate Ideas
I3. Filter Ideas
I4. Develop Concepts
I5. Make Models
J1. Define Measures
J2. Agree Quality Targets
J3. Review Effectiveness
J4. Review Safety
J5. Review Experience
J6. Review Sustainability

J7. Synthesise Evidence
K1. Demonstrate Future Improvement
K2. Predict Stakeholder Benefits
K3. Calculate Resources Required
K4. Estimate Time Required
K5. Present Case for Change
L1. Identify Enablers and Blockers
L2. Manage Team
L3. Ensure Shared Understanding
L4. Review Project Performance
L5. Review Project Progress
L6. Plan Future Activities
M1. Agree Aim Statement

Tools

N1. Literature Review
N2. Rich Picture
N3. Soft Systems Method
N4. Causal Loop Diagram
N5. Influence Diagram
N6. Entity Relationship Diagram
N7. Data Flow Diagram
N8. State Transition Diagram
N9. Flow Chart
N10. Swimlane Diagram
N11. Spaghetti Diagram
N12. Value Stream Mapping
N13. Dependency Structure Matrix
N14. One-to-one Interviews
N15. Facilitated Discussion
N16. Delphi Study
N17. Participant Observation

N18. Observational Study
N19. Designing Personas
N20. Designing Scenarios
O1. Life Café
O2. Public Involvement
O3. MoSCoW
O4. Data Analysis
O5. Storyboarding
O6. Fishbone Diagram
P1. Brainstorming
P2. Disney
P3. Six Thinking Hats
P4. Morphological Chart
Q1. Exclusion Audit
Q2. User Trials
Q3. Expert Review
Q4. Life Cycle Assessment

Q5 Root Cause Analysis
Q6. Failure Mode and Effects Analysis
Q7. Fault Tree Analysis
Q8. Hazard and Operability Analysis
Q9. Structured What-if Technique
Q10. Bowtie Method
Q11. Risk Matrix
R1. PEST(LE) Analysis
R2. SWOT Analysis
R3. Stakeholder Analysis
R4. The Five Ws and two Hs
R5. Wardley Map
S1. Driver Diagram
S2. Gantt Chart
S3. Activity Dependency Diagram
S4. Project Canvas
S5. LoMo

Comparison

Define

The first stage of the six sigma process involves clarification of the project opportunity, creation of the team, definition of the problem aim and scope, identification of the users and stakeholders, description of measures of success, and agreement of the major milestones. Particular importance is given to the voice of users and stakeholders, and its translation to critical-to-quality (CTQ) trees which illustrate how their needs map to actionable system performance requirements, and facilitates understanding about the current processes and opportunities for improvement. Potential benefits to the users and stakeholders are also considered in the light of the resources and time required to deliver such improvement.

Activities from the systems approach, not frequently mentioned in the literature on six sigma relating to this stage, that may add value include: Observe Stakeholders, Describe Clinical Processes, Describe Patient Journeys, Create Stakeholder Map, Understand Patient Diversity, Generate Personas, Generate Scenarios, Benchmark Current Performance, Prioritise Stakeholder Needs and Agree Core Themes.

Tools from the systems approach that may be useful include: Literature Review, Rich Picture, Soft Systems Method, Swimlane Diagram, Spaghetti Diagram, Dependency Structure Matrix, Delphi Study, Participant Observation, Observational Study, Designing Personas, Designing Scenarios, Life Café, Public Involvement, MoSCoW, PEST(LE) Analysis, SWOT Analysis, The Five Ws and two Hs, Wardley Map, Gantt Chart, Activity Dependency Diagram, Project Canvas and LoMo.

Measure

The second stage establishes the detailed requirements and techniques for measurement of the current system performance, in order to capture a true picture of the process. This will include the identification of measures of variance and different types of data, definition of key process input and output variables, development of a data collection plan, and an initial system analysis on data collected.

Activities from the systems approach that may add value include: Describe Clinical Processes, Describe Patient Journeys and Ensure Shared Understanding.

Tools from the systems approach that may be useful include: Causal Loop Diagram, Influence Diagram, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Swimlane Diagram, Spaghetti Diagram, Dependency Structure Matrix, One-to-one Interviews, Delphi Study, Exclusion Audit, User Trials, Expert Review, Life Cycle Assessment, Gantt Chart, Activity Dependency Diagram, Project Canvas and LoMo.

Analyse

The third stage focuses on the detailed analysis of system performance data, examination of different sources of variability, determination of cause and effect relationships and root causes of problems, and identification of specific opportunities for improvement.

Activities from the systems approach that may add value include: Generate Personas, Generate Scenarios, Describe Stakeholder Experiences and Describe Patient Experiences.

Tools from the systems approach that may be useful include: Designing Personas, Designing Scenarios, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-If Technique, Bowtie Method, Risk Matrix and LoMo.

Comparison

Improve

The fourth stage involves creative thinking and the generation of improvement concepts that address the root causes of the variations and problems observed. These concepts are subsequently evaluated, prioritised, piloted and implemented. A future-state system process map is used to visualise the impact of the proposed changes, identify the gaps between the current and future states, and enable risk assessment of the proposed system. Cost/benefit analysis and planning for full-scale implementation are also undertaken at this stage.

Activities from the systems approach that may add value include: Analyse Relevant Documents, Describe Clinical Processes, Describe Patient Journeys, Create Stakeholder Map, Generate Personas, Generate Scenarios, Describe Stakeholder Experiences, Describe Patient Experiences, Benchmark Current Performance, Consider Pre-existing Solutions, Review Safety, Review Experience, Review Sustainability, Estimate Time Required, Present Case for Change, Identify Enablers and Blockers, Manage Team and Review Project Progress.

Tools from the systems approach that may be useful include: Literature Review, Rich Picture, Soft Systems Method, Causal Loop Diagram, Influence Diagram, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Swimlane Diagram, Spaghetti Diagram, Dependency Structure Matrix, One-to-one Interviews, Delphi Study, Designing Personas, Designing Scenarios, Storyboarding, Disney, Six Thinking Hats, Morphological Chart, Exclusion Audit, User Trials, Expert Review, Life Cycle Assessment, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-if Technique, Bowtie Method, Risk Matrix, PEST(LE) Analysis, SWOT Analysis, Stakeholder Analysis, Wardley Map, Driver Diagram, Gantt Chart, Activity Dependency Diagram, Project Canvas and LoMo.

Control

The final stage focuses on institutionalising and controlling the improved processes. This includes process monitoring, preparation of training documents, control and reaction plans, and documentation of before and after results and updated process maps.

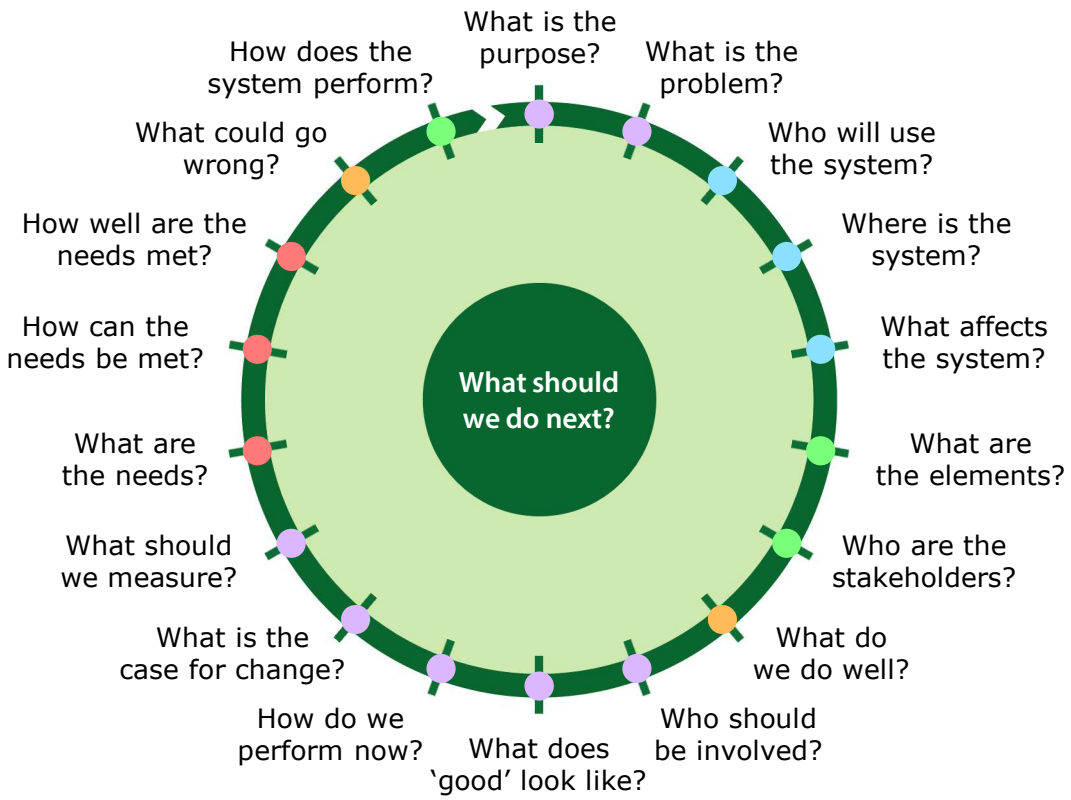
Activities from the systems approach that may add value include: Understand Political Context, Analyse Relevant Documents, Observe Stakeholders, Describe Clinical Processes, Describe Patient Journeys, Create Stakeholder Map, Generate Personas, Generate Scenarios, Describe Stakeholder Experiences, Describe Patient Experiences, Benchmark Current Performance, Capture Stakeholder Needs, Review Safety, Review Experience, Review Sustainability and Identify Enablers and Blockers.

Tools from the systems approach that may be useful include: Literature Review, Causal Loop Diagram, Influence Diagram, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Swimlane Diagram, Spaghetti Diagram, One-to-one Interviews, Delphi Study, Participant Observation, Observational Study, Designing Personas, Designing Scenarios, Exclusion Audit, User Trials, Expert Review, Life Cycle Assessment, Root Cause Analysis, Failure Mode and Effects Analysis, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-if Technique, Bowtie Method, Risk Matrix, PEST(LE) Analysis, SWOT Analysis, Stakeholder Analysis, Wardley Map, Gantt Chart, Activity Dependency Diagram, Project Canvas and LoMo.

Literature

Pande, PS, Neuman RP & Cavanagh RR (2000). *The Six Sigma Way: How GE, Motorola, and Other Top Companies are Honing Their Performance*. McGraw-Hill Education.

Engineering Better Care



Summary

Engineering Better Care is a framework for improvement, based on a set of questions addressing people, systems, design, risk and management perspectives.

Contents

Introduction

The **Engineering Better Care**[1] report was developed by the Royal Academy of Engineering in collaboration with the Royal College of Physicians and the Academy of Medical Sciences as a framework, based on a series of questions related to **people**, **systems**, **design**, **risk** and **management** perspectives on a systems approach to design and continuous improvement.

Use of the approach is increasing with an ongoing collaboration with the Royal Academy of Engineering, the Royal College of Physicians, the Royal College of Anesthetists, the Academy of Medical Sciences, the Health Foundation and the University of Cambridge Engineering Design Centre. This Toolkit is the first prototype derived directly from the original report and is currently undergoing evaluation and improvement within the improvement community. This Toolkit makes a number of changes to the original systems approach presented in the **Engineering Better Care** report, which have resulted from extending the original work and applying it to a number of practical examples. These changes do not impact the consensus achieved in drafting the original report, rather ensure it remains coherent in its expanded and more practical form.

The **Engineering Better Care** report has the sub-title **a systems approach to health and care design and continuous improvement**, and the approach described in this toolkit is intended to accommodate both design, where there is a desire to develop something new, and continuous improvement, where there is a desire to improve an existing system. In practice, it is rare that a completely new system is designed, rather such a system is typically derived from a mix of pre-existing, improved and new elements, where a combination of improvement and design is then required. In particular, this toolkit focuses on the early stages of design and improvement where decisions are made regarding the scope, aims and key themes for the improvement process.

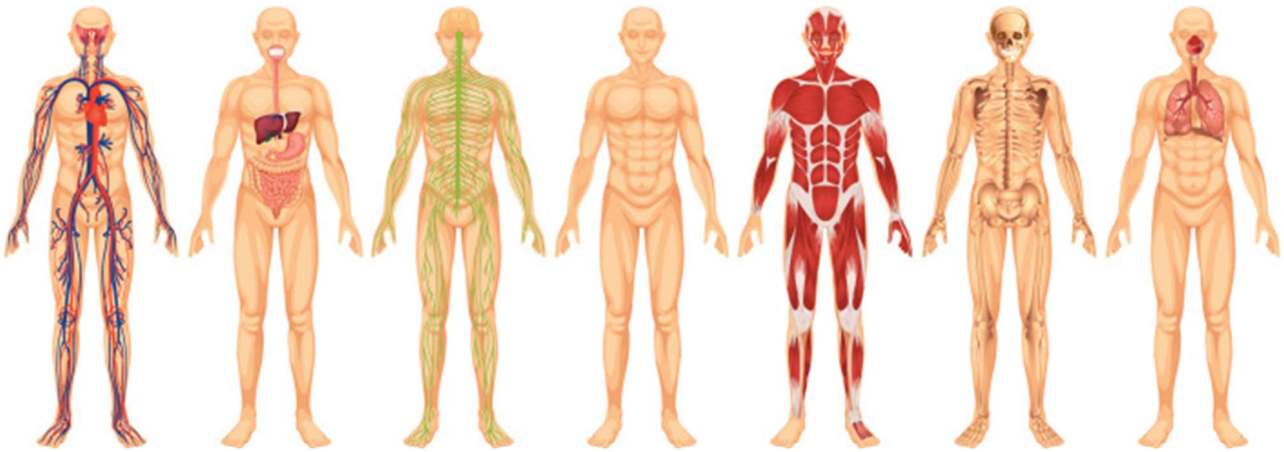
This section will introduce and describe the thinking that underpins the **spiral** model of improvement described in **Engineering Better Care** report. This model is then extended and integrated with a **hexagon** model of the improvement process.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Introduction

A **system** (or system of systems) is a set of elements: people, processes, information, organisations and services, as well as software, hardware and other systems that, when combined, have qualities that are not present in any of the elements themselves.

A system is delineated by its spatial and temporal boundaries, surrounded and influenced by its environment, described by its structure and purpose, and expressed in its functioning. In other words, the whole is very likely to be greater than the sum of the parts. For example, the human body is a system of systems where each has its own purpose and function. When combined, the systems produce for the body qualities not present in any of the individual elements. Conversely, if any individual system is compromised or a part of the body is damaged, the overall function may be significantly or terminally impaired.



circulatory system | digestive system | nervous system | integumentary system | muscular system | skeletal system | respiratory system

The engineered world is full of systems. From the simple water heater to the fully integrated international airport, from ancient irrigation systems to modern communication networks, all systems share one key feature: their elements together produce results not obtainable by the same elements alone. These elements, or parts, can include people, processes, information, organisations and services, as well as software, hardware and other systems.

Introduction

A **systems approach** uses a range of techniques to determine requirements for the system, organise its structure, create and evaluate alternative designs, produce quantitative analyses and predictions where appropriate, assess possible threats to and opportunities for people and other systems, integrate all the individual elements and deliver a system that is shown to be fit for its intended purpose. A true systems approach does not deliver solely technical solutions; rather it ensures the appropriate alignment of technology, processes, interactions and policy to deliver innovative responses to today's most complex and pressing challenges.

The layout of the system, defining all the elements and their interconnections, needs to be carefully considered to ensure that each element on its own and in combination with others performs as required. In response to this challenge and the ever increasing complexity of modern systems, a new discipline of systems engineering has evolved as an interdisciplinary approach to enable the realisation of successful systems.

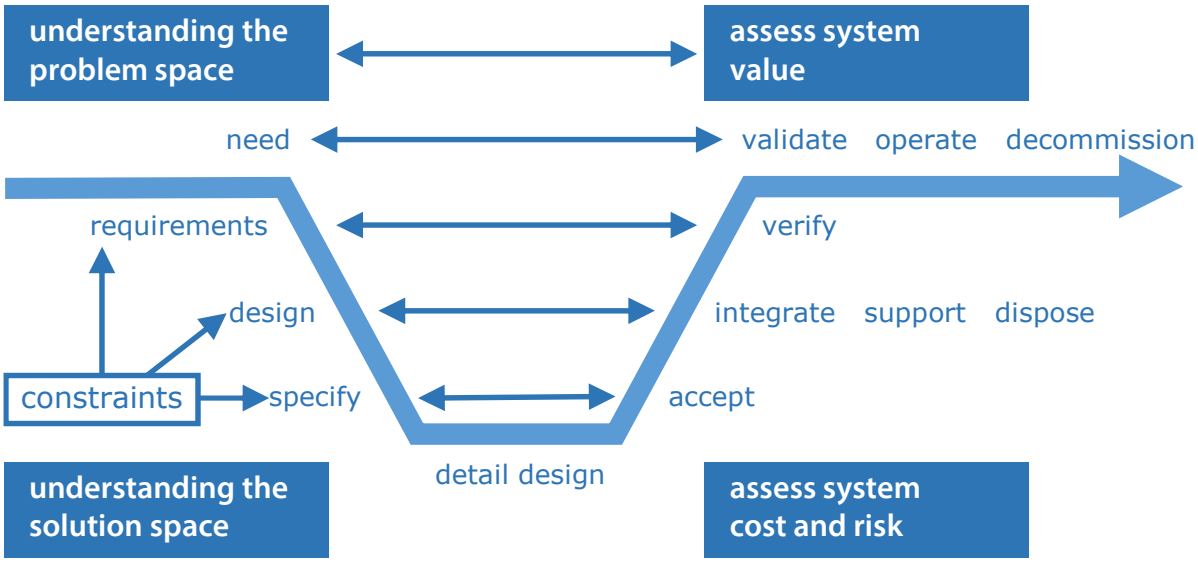
"Systems that work do not just happen — they have to be planned, designed and built[1]"

Engineers routinely use a systems approach to address challenging problems in complex projects. This allows them to work through the implications of each change or decision they make for the project as a whole. They consider the layout of the system, defining all the elements and interconnections, to ensure that the whole system performs as required. One example is the successful delivery of the London 2012 Olympic and Paralympic Games. Physical infrastructure and practical organisation were brought together, with innovative physical engineering, modelling and simulation of people flows, early testing of venues, and extensive risk management. A systems approach, combined with tried and tested engineering methods and tools, delivered real success on a massive scale.

1. *Creating systems that work: Principles of engineering systems for the 21st century*. Royal Academy of Engineering, London, UK, 2007.

Introduction

Systems engineering focuses on defining stakeholder needs and required functionality early in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the complete problem[1]. It integrates all the necessary disciplines and specialty groups into a team responsible for using a structured development process that proceeds from needs to requirements to concepts, and from design to production to operation, addressing all the stakeholders' business and technical needs.



A successful system delivery process brings together technical specialists and system architects to ensure a holistic system perspective is maintained throughout; not only in terms of the overall layout of the system and its elements, but also with regard to the whole system lifecycle. Some will provide a focus on individual elements and their role in the system, others will take a holistic view of the system and its performance. Both will play a part in defining the boundary of the system, its requirements, the partitioning of its elements and interfaces, its integration and evaluation, and ultimately its release into service. Typically, different and yet coherent perspectives of the system are developed and held by different teams and stakeholders.

1. *INCOSE (International Council on Systems Engineering) UK Z-Guide 1: What is Systems Engineering*. INCOSE UK, 2009.

Systems Perspectives

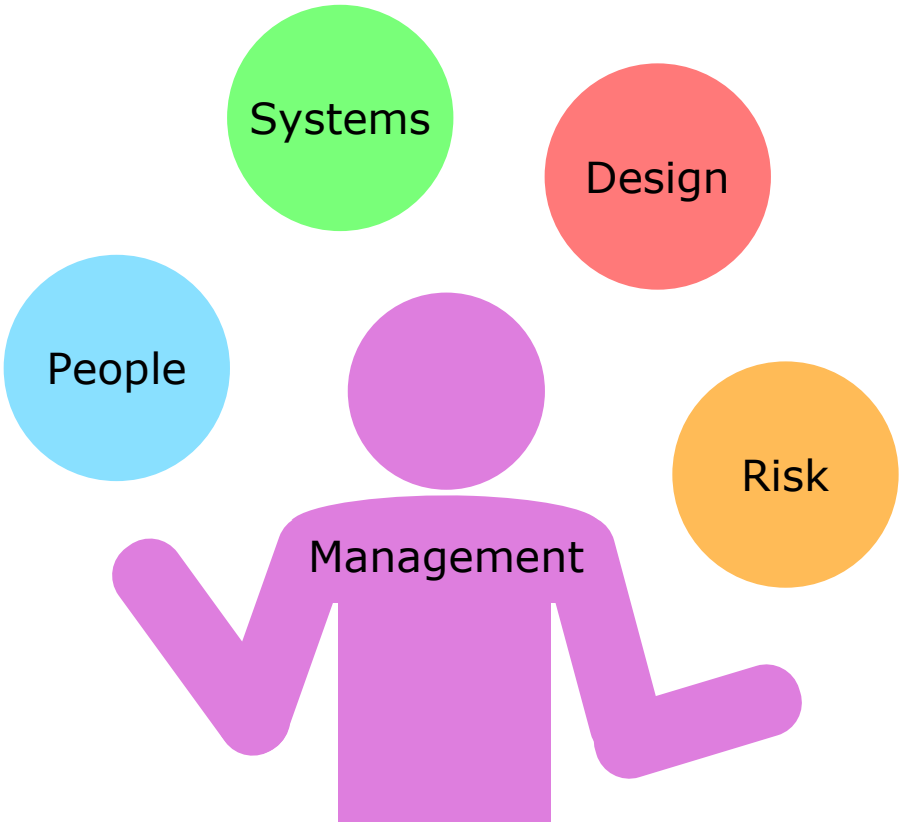
A **systems approach** uses a range of techniques to determine requirements for the system, organise its structure, create and evaluate alternative designs, produce quantitative analyses and predictions where appropriate, assess possible threats to and opportunities for people and other systems, integrate all the individual elements and deliver a system that is shown to be fit for its intended purpose. A systems approach, built on these perspectives of **people**, **systems**, **design** and **risk**, can be applied to the design and improvement of systems across many areas of health and care.

Ultimately, a systems approach aims to determine the system design and implementation that delivers the best service. It has the potential to drive greater efficiency and a better understanding of threats and opportunities present when shaping the delivery of health and care services, and brings together the four key and complementary perspectives of:

- **People**: understanding of interactions among people, at the personal, group and organisational levels, and other elements of a system in order to improve overall system performance (identify, locate, situate)
- **Systems**: addressing complex and uncertain real world problems, involving highly interconnected technical and social elements that typically produce emergent properties and behaviour (understand, organise, integrate)
- **Design**: focusing on improvement by identifying the right problem to solve, creating a range of possible solutions and refining the best of these to deliver appropriate outcomes (explore, create, evaluate)
- **Risk**: managing risk, based on the timely identification of threats and opportunities in the system, assessment of their associated risks and management of necessary change (examine, assess, improve).

Systems Perspectives

All these perspectives are inextricably linked and uniquely contribute to a systems approach. It is only when all four are robustly understood that a systems approach will have the greatest success. Their scope, purpose and operation can be summarised through the answers to a number of high-level questions that were developed and agreed during the project workshops that preceded the **Engineering Better Care**[1] report.



A systems approach can be applied to the design and improvement of systems at all extremes of scale, with service level improvement taking place within a wider context that may subsequently require changes at the organisation level and cross-organisational level. Within the delivery of health and care, many systems are distinct and can be operated independently, yet are also connected to or integrated with other systems, either in layers or as part of a network. The strength of a systems approach is its ability to overcome the complexity associated with such systems of systems and deliver solutions at all levels of scale regardless of the form of the system. Its value has been recognised in health and care and increasingly referred to in national policies and used in improvement methods.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Improvement Questions

Adopting one or more of the perspectives on current practice can be done by simply asking the appropriate **people**, **systems**, **design** and **risk** guiding questions.

People

Identify: Who will use the system? — leads to an understanding of the diversity of people involved and their needs and capabilities.
Locate: Where is the system? — leads to an understanding of the physical, organisational and cultural context of the system.
Situate: What affects the system? — leads to an understanding of the political and policy landscape within which the system is situated.

Systems

Understand: Who are the stakeholders? — leads to a common view of the stakeholders and their individual interests, needs, values and perspectives.
Organise: What are the elements? — leads to an agreed system boundary, architecture and details of the interfaces between all the system elements.
Integrate: How does the system perform? — leads to an integrated, operational system that is proven to meet the stakeholder requirements.

Design

Explore: What are the needs? — leads to a common understanding of the needs for a system, taking account of the full range of stakeholders.
Create: How can the needs be met? — leads to a range of possible solutions that would help meet the needs identified by the explore phase.
Evaluate: How well are the needs met? — leads to an evaluation of possible concepts that could meet the needs identified by the explore phase.

Risk

Examine: What is going on? — leads to an understanding of the system architecture and details of the interfaces between the elements.
Assess: What could go wrong? — leads to a systematic assessment of the likelihood and potential impact of threats to the system.
Seek: What do we do well? — leads to a systematic assessment of the presence and potential impact of opportunities within the system.
Improve: How can we make it better? — leads to a range of possible solutions that would help mitigate the threats or exploit the opportunities.

Note, this toolkit expands the original **Assess** question from Engineering Better Care[1] report into two complementary approaches for reducing risk. The **What could go wrong?** question attempts to reduce risk by minimising things going wrong. The new **Seek** question, **What do we do well?**, reflects an alternative approach to reduce risk by maximising the things that are done right.

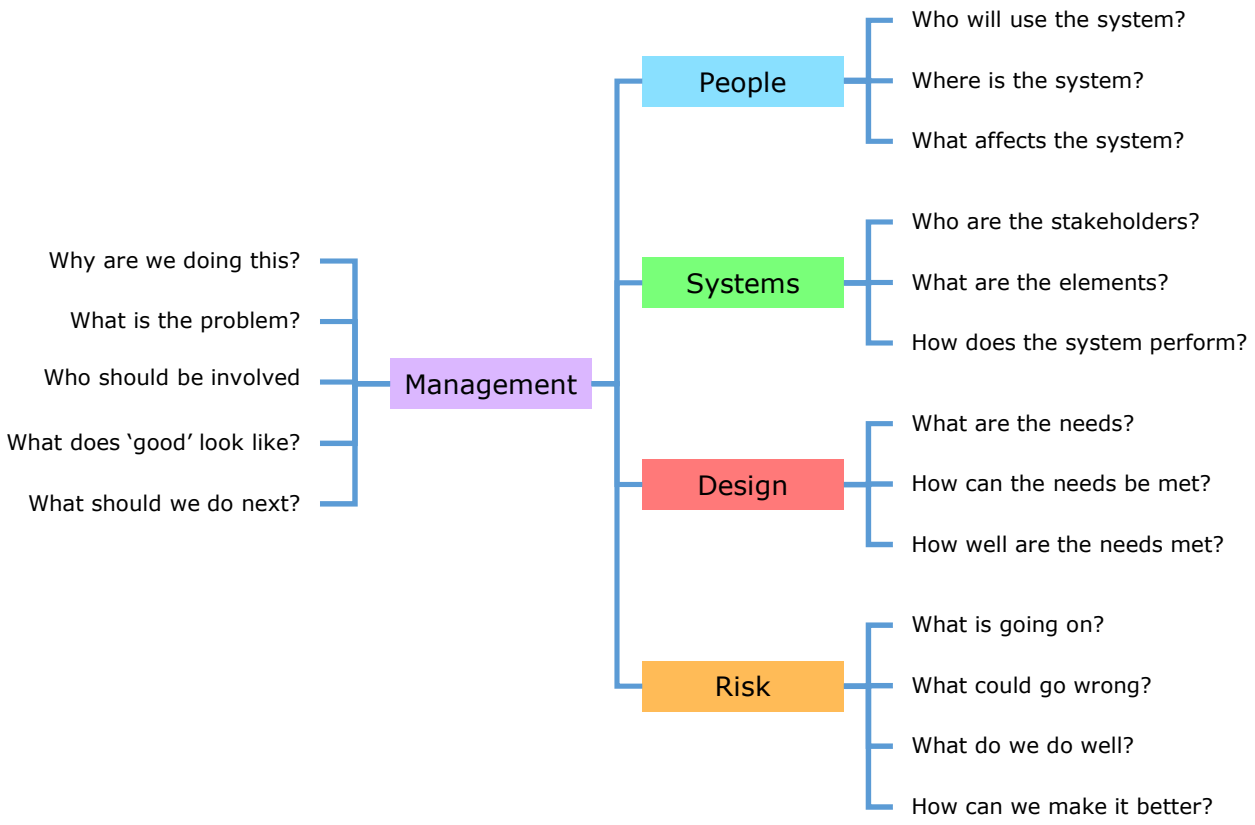
1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Improvement Questions

There should also be an emphasis on integrating **people**, **systems**, **design** and **risk** thinking within the context of the project **management** of the improvement process. Further questions are introduced later that address the broader challenges of such a process.

Management

Trigger: Why are we doing this? — leads to a documented rationale for improving an existing system or developing a new one.
Problem: What is the problem? — leads to a clearly articulated view of a better system based on an understanding of the current system.
Team: Who should be involved? — leads to a common and clearly articulated understanding of who should deliver the improved system.
Success: What does 'good' look like? — leads to a common and clearly articulated understanding of success and how it would be measured.
Plan: What should we do next? — leads to the ongoing development and execution of a plan of action to deliver the system in a timely manner.



Improvement Questions

A review of the **people**, **systems**, **design**, **risk** and **management** questions reveals a degree of overlap between them. This should be of no surprise, particularly due to the related nature of the systems, design and risk perspectives. Where an individual perspective is to be used for improvement, all the questions within that perspective have a purpose and enable a standalone introduction to that perspective. However, if an integrated view of the perspectives, or a systems approach, is required it is appropriate to remove any overlap or redundancy.

In a pragmatic attempt to rationalise the questions, there are a number of observations that can be made:

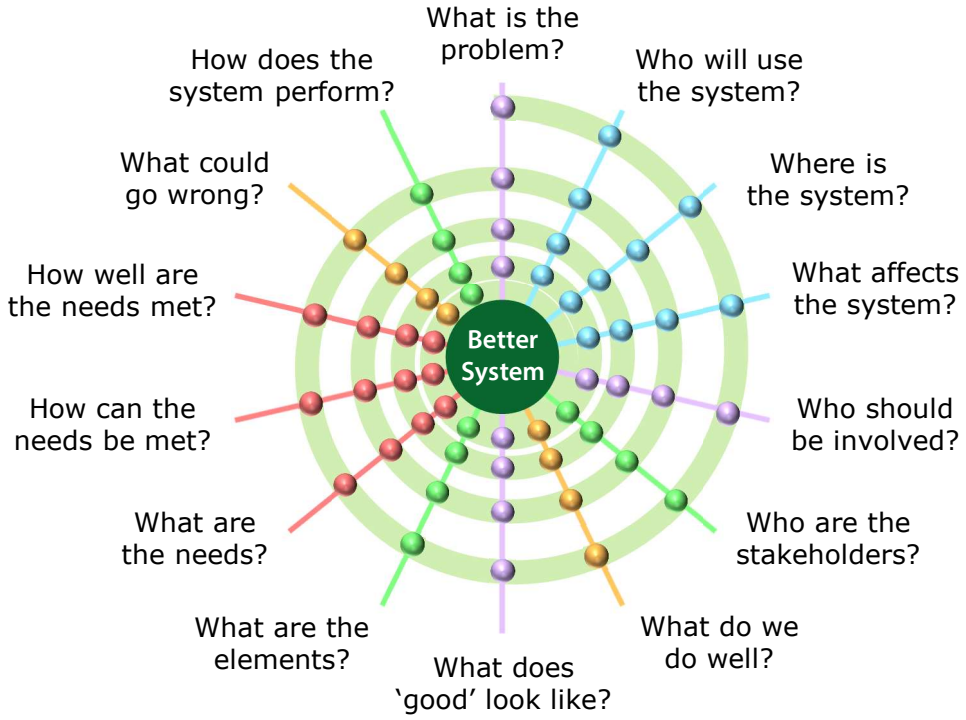
1. The **What is going on?** question from the risk perspective delivers a picture, or map, of the system and may be assumed to be incorporated within the **What are the elements?** question from the systems perspective.
2. The **How can we make it better?** question from the risk perspective delivers set or requirements for improvement and may be assumed to be incorporated within the **How can the needs be met?** question from the design perspective.
3. The **Why are we doing this?** question from the process perspective is a one-off question designed to capture the original rational for the improvement and is unlikely to be repeated. It does not appear in the following model, but is important later when discussing the broader improvement process.
4. The **What should we do next?** question from the process perspective is a recurrent question that should always be asked and not constrained to any particular point within the process. It also does not appear in the following model, but is integral to later discussions on the broader improvement process.
5. The questions form a natural cycle, beginning with those that are more about understanding the context and definition of the problem, and ending with those relating to the delivery and evidencing of a solution.
6. The questions within each perspective are iterative, as are those when combined to form an integrated systems approach.

In summary, the systems approach described in Section 5 of the **Engineering Better Care**[1] report includes a spiral diagram with 13 questions, which are a sub-set of all the questions from the different perspectives. The equivalent spiral diagram presented in this section includes the additional **What do we do well?** question, and thus contains 14 questions.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Improvement Questions

The spiral model shows a natural order for the steps. It also highlights that a systems approach is not a simple linear process, but an iterative process of continuous improvement. It suggests that the first question to be asked concerns the problem to be addressed by the system. This would be followed by questions based on people to understand the background and context to the new system. The questions on systems, design and risk are then interwoven with the management questions to provide an opportunity to specify, design and evaluate the system and its constituent elements, with a question on what a good outcome would look like early in this sequence.

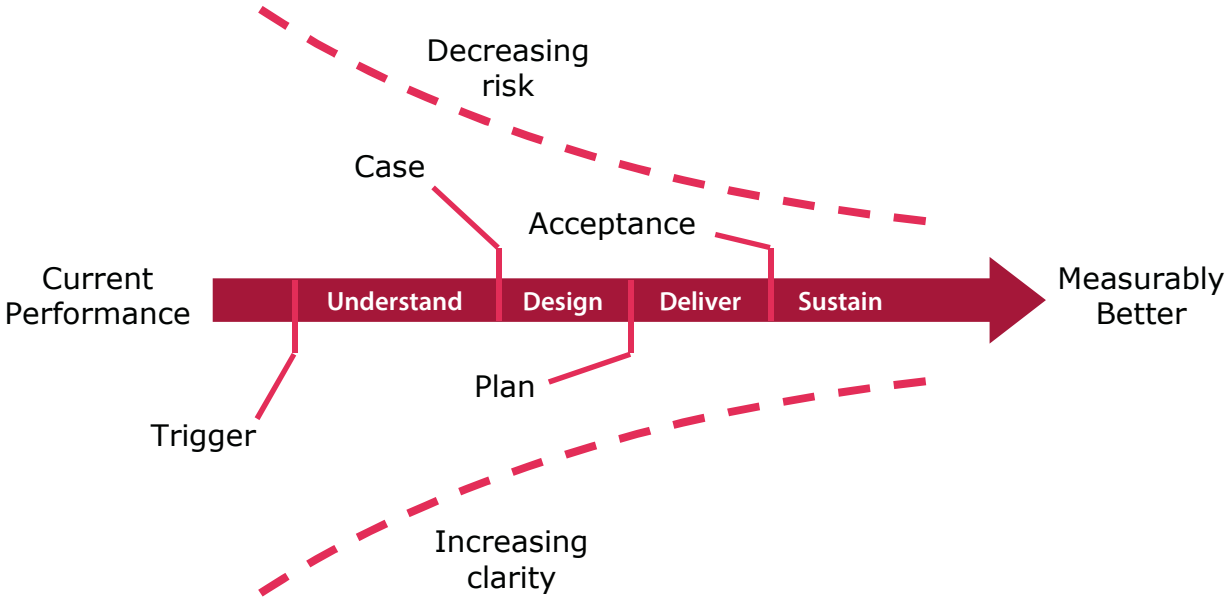


The idea would be that in the first **pass** of the questions, preliminary answers would be provided. Further passes would offer an opportunity to provide more detailed answers or again to **skip** and use the previous answer for that iteration. This process affords the opportunity to progressively increase knowledge of the problem, reduce uncertainty regarding the solution, and manage the implementation risk to an acceptable level. Ultimately, the answers would form a description of the improved system.

It is expected that the methods used to answer the questions would increase in complexity as each question is revisited, until further effort brings limited benefit to other questions in the cycle. For example, initial answers might be based on estimates or knowledge of previous solutions, while later answers could be determined by extensive investigation, advanced modelling and simulation, or evaluation of prototypes.

Improvement Stages

The spiral model provides a useful, but rather abstract view of improvement. It would be more helpful to elaborate this simple model, in the context of challenges of a broader systems improvement process, using a stage based approach that can be used to progressively increase the clarity of definition of the revised system while reducing the operational risk. Each of the improvement stages can then be inspired by the adoption and appropriate adaptation of the individual **people**, **systems**, **design**, **risk** and **management** perspectives.



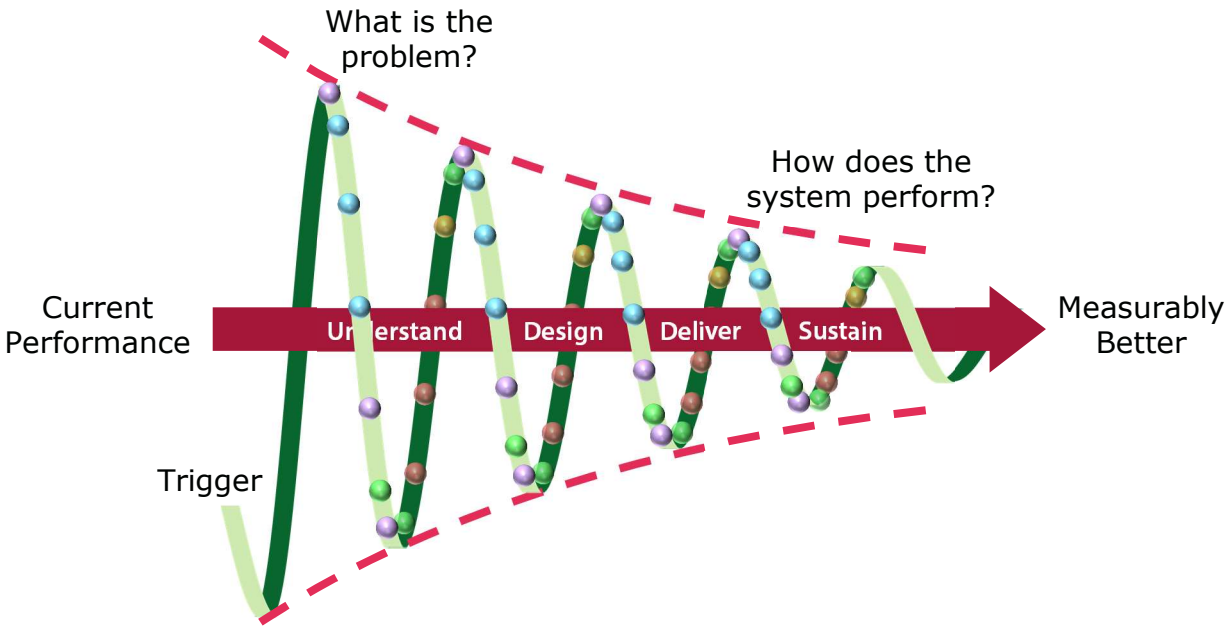
This approach is common to all improvement processes where the focus on moving a system from its current performance to a future, measurably better state. Such processes typically include a number of key stages to ensure success:

- **Understand** — leading to a description of the current system (now), a common understanding of the problem, a consensus view of what the future system might look like (better) and a clearly articulated case for changing the system.
- **Design** — leading to a clear description of the future system, based on the iterative design of the system architecture with its elements and interfaces, the evaluation through successive prototyping of its likely behaviour, and a plan for its delivery.
- **Deliver** — leading to the successful deployment of the new system with the levels of measurement necessary to evidence its success, and acceptance that it achieves appropriate value for its stakeholders.
- **Sustain** — leading to the continued operational success of the new system along with consideration of further improvement potential or wider deployment.

In this model of the improvement process, the **case**, **plan** and **acceptance** refer to the **delivery** of improvement, rather than to any performance targets for particular stages of this process. The accommodation of interim targets for each stage of the improvement process is described later.

Improvement Stages

The spiral model allows the questions to be overlaid on the existing improvement process, at sufficient intervals and to the level of precision required, while ensuring that they are asked in an appropriate order. The spiral model is also adaptable to all levels of scale, from the service level, through the organisation level to the cross-organisational level, and is sufficiently versatile to apply across all areas of health and care.



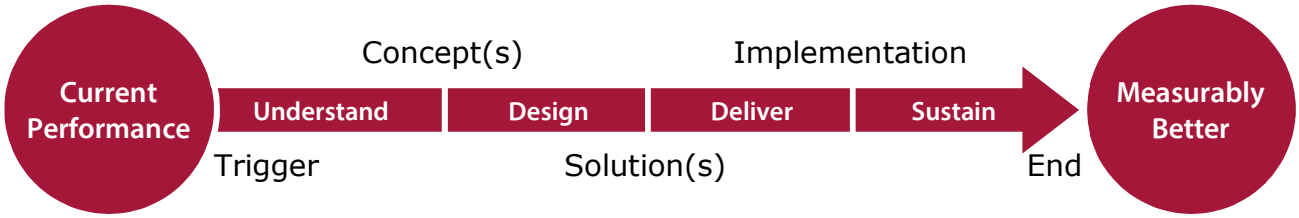
The early iterations of the spiral would focus on increasing understanding of the problem and, if a case for change is agreed, later iterations would provide more focus on the design and delivery of the system and its sustainability. The model also lends itself to the development of systems of systems, where early iterations of the spiral would focus on architecting the overall system, leading to parallel iterations to develop and deliver individual systems, and further iterations to ensure their integration and subsequent evaluation of the overall system.

The ultimate success of the systems approach would depend on keeping all of the relevant questions in mind on each iteration. In practice, a degree of concurrency across the stages is required. The understand stage requires adequate consideration of the design, delivery and sustain stages to create a clear view of the future system, while the sustain stage depends on consideration of sustainability issues throughout the previous stages. Such concurrency, or involvement of key stakeholders throughout the improvement process, is essential if new performance targets are to be realised in a safe, timely and cost-effective manner.

Improvement Process

The stages of the improvement process may also be considered as a collection of activities, executed in some form of order to ensure the efficient and effective running of the process based the desired outcome and the availability of resources. Each of the stages will have a specific beginning and corresponding goal to enable the delivery of an improved system.

The overall process may range from the improvement of a well defined local system to the design of a new extended system of systems. In all cases there is a need to understand the **current performance** (or absence of performance for a new system), define a target for what is **measurably better** and capture the **trigger** for the improvement. The process may also be divided into a number of stages: to focus delivery on interim outcomes; to review and accept such outcomes; and to authorise continuation of the improvement programme.



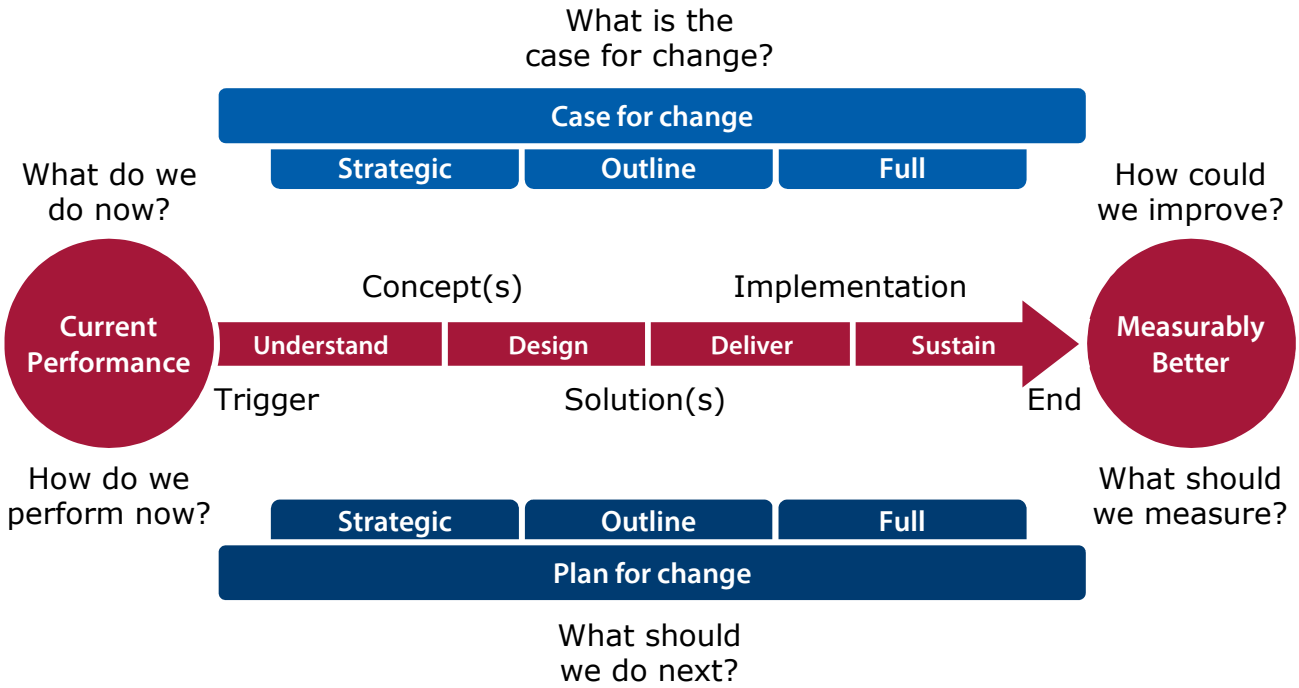
All improvement processes are initiated, and potentially shaped, by their **trigger**, which may be classed as:

- **Strategic** — where risk reduction and improvement is part of an ongoing strategic initiative.
- **Incident** — where an event has resulted in actual or potential harm to patients or clinicians.
- **Local** — where the potential for incidents has been identified locally.
- **Routine** — where a team or individual wishes to check the integrity of their service.
- **Improvement** — where changes are planned to an existing service or system.
- **New** — where a new service is to be introduced into practice or an existing one decommissioned.
- **Technology** — where new equipment or technology is to be introduced to an existing service.
- **Estates** — where estates or buildings are being built, refurbished or maintained.
- **Staff** — where new staff are to be introduced to an existing service or exiting staff levels are changed.
- **External** — where specific strategic changes or checks are externally requested.
- **National** — where teams are encouraged to propose and deliver national service improvements.

A clear understanding of the trigger helps to identify the initial scope of the improvement and ensures that an appropriate team is assembled to initiate any subsequent improvement process. Whether the trigger relates to **people**, **systems**, **design** or **risk**, a systems approach will consider all of these perspectives in a seamless and integrated way.

Improvement Process

The improvement process may be extended to include reference to the case required for change and programme or plan for change, both of which need updating through the different stages of the programme. For example, the **strategic** case might include only the case for undertaking the preliminary investigation and design while the **full** case would be that for the subsequent delivery of a better system.



The extended improvement process raises a number of additional **management** questions, including the previous **Trigger** and **Plan** questions:
Trigger: Why are we doing this? — leads to a documented rationale for improving an existing system or developing a new one.
Current: What do we do now? – leads to a detailed description of the current system architecture and its observable behaviour.
Performance: How do we perform now? – leads to the qualitative and quantitative evaluation of the performance of the current system.
Better: How could we improve? – leads to a preliminary description of a better system architecture and its intended behaviour.
Measure: What should we measure? – leads to the identification of possible performance indicators for the improved system.
Case: What is the case for change? – leads to the definition of a case for change from the current system to one that is measurably better.
Plan: What should we do next? — leads to the ongoing development and execution of a plan of action to deliver the system in a timely manner.

In addition, there is the a question relating to the strategic **purpose** of the current system or the system to be designed, as distinct from the purpose of the improvement process:
Purpose: What is the purpose? – leads to a detailed description of the purpose of the current system within its wider context.

Improvement Process

The **spiral model** of 14 questions (presented earlier in this section) is now reviewed in combination with the seven additional management questions that relate to the wider improvement process. Once again, it is no surprise that some of these questions overlap. A number of the additional **management** questions are similar to the **systems** and **design** questions and relate to descriptions of the improvement process at different levels of detail. Where the improvement process perspective is to be used on its own, the questions enable a standalone introduction to improvement. However, if an integrated view of the perspectives is required in order to deliver a complete improvement process, it is more appropriate to remove any overlap or redundancy.

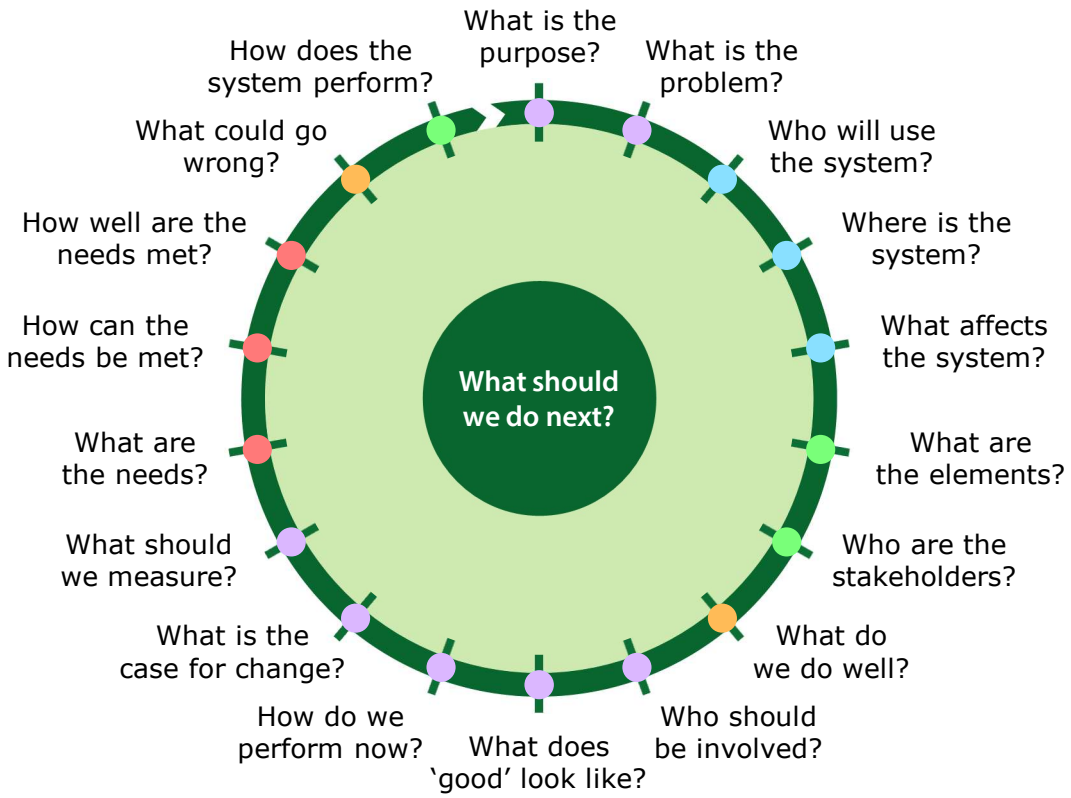
In a pragmatic attempt to rationalise the questions, there are a number of observations that can be made:

1. The **What do we do now?** question from the improvement perspective delivers a picture of the system and may be assumed to be incorporated within the **What are the elements?** question from the systems perspective.
2. The **How could we improve?** question from the improvement perspective delivers a set of requirements for improvement and may be assumed to be incorporated within the **What are the needs?** question from the design perspective.
3. The questions can be set in an order most likely to deliver a successful improvement programme, with those focused on understanding the problem preceding those focused on delivering a robust solution to the problem.
4. The questions within each perspective are iterative, as are those when combined to form an integrated systems approach.

In summary, the spiral presented in this section included 14 questions. A simplified cyclical form of this spiral (presented opposite) now contains 19 questions, resulting from the addition of further questions related to the wider improvement process, and the removal of overlapping questions.

Improvement Process

The cyclical model reinforces the view that a systems approach is not a simple linear process, but an iterative process of continuous improvement. It suggests that the first question to be asked concerns the purpose to be addressed by the system. This would be followed by questions based on the perceived problem and about people to understand the background and context to the new system. The questions on systems, design and risk are then interwoven with the management questions to provide an opportunity to specify, design and evaluate the system and its constituent elements, with a question on what a good outcome would look like early in this sequence.

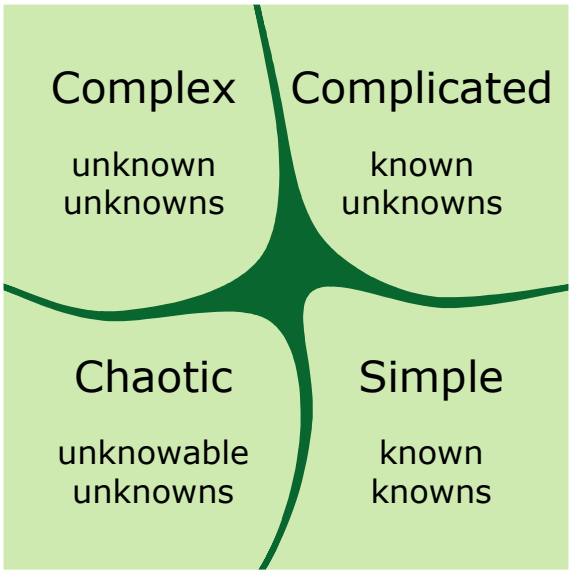


As with the spiral model, the idea would be that in the **first pass** of the cyclical model, preliminary answers would be provided to the questions. Further passes would offer an opportunity to provide more detailed answers or again to **skip** and use the previous answer for that iteration, with repeated reference to the question at the centre of the model. This process affords the opportunity to progressively increase knowledge of the problem, reduce uncertainty regarding the solution, and manage the implementation risk to an acceptable level. Ultimately, the answers would form a description of the improved system.

As with the earlier model, it is again expected that the methods used to answer the questions would increase in complexity as each question is revisited, until further effort brings limited benefit to other questions in the cycle. For example, initial answers might be based on estimates or knowledge of previous solutions, while later answers could be determined by extensive investigation, advanced modelling and simulation, or evaluation of prototypes.

Complex Systems

The world is made up of a set of highly interconnected technical and social elements that produce emergent behaviours and challenges for communication and control. Some systems are **simple**, others are **chaotic**. Some are **complicated** with many elements, but operate in patterned or predictable ways, others are **complex** with features whose interactions are continually changing and whose behaviour may only be understood in retrospect[1].



In health and care it is the co-production of health outcomes with the patient, often across a number of systems rather than with any individual health and care system, that can add significant complexity and uncertainty, leading to behaviours not expected when focus is limited to individual systems. Although the majority of individual health and care systems are **simple** or **complicated**, the combined behaviour of such systems working together is more likely to be **complex** or, in extreme cases, **chaotic**. This is particularly true when there is significant uncertainty or variation associated with the patient population accessing the system, both with regard to their medical conditions and the timing and choices they may exercise over their care.

1. The new dynamics of strategy sense-making in a complex world. Kurtz and Snowden, *IBM Systems Journal*, **42**(3):462-483, 2003.

Complex Systems

The sequence of questions in the cyclic model not only provide an excellent starting point for delivering a successful improvement process, but also address a number of other topics that should be considered when designing complex systems:

- **Behaviour** — when integrating people, processes, technology and the built environment, it is hard to predict all the behaviours that will subsequently emerge. It is important to design for intended behaviours and outcomes, observe the resultant system behaviours, identify unintended consequences and predict possible variations over time (questions: problem, identify, locate, organise, evaluate, assess, integrate).
- **Measurement** — systems behave in a variety of predictable and less predictable ways in response to internal and external data and events. It is important to understand the need for measurement of a system's performance, implement the means to facilitate such measurement and determine the way in which the resulting data will be used (questions: success, organise, explore, create, evaluate, integrate).
- **Communication** — dysfunctional teams are unlikely to deliver good systems; functional teams are more likely to do so. It is important that the team talks to one another, develops clear plans and instructions, ensures there is a common understanding of the system and engages with all the stakeholders, particularly the users, in the delivery of the system (questions: identify, locate, understand, organise, integrate, plan, team).
- **Learning** — the ability of individuals and organisations to learn enhances their chances of delivering and sustaining effective systems. It is important to develop a culture of continued learning for all stakeholders, build capacity within organisations to deliver effective systems and share stories of success to inspire future systems-based change (questions: identify, locate, situate, team).
- **Interfaces** — systems are only as good as their interfaces. Between every element of a system there are interfaces to other elements or systems. It is important to organise the elements of a system, define and maintain the necessary interfaces between them, and define and manage the interfaces between the system and its environment (questions: problem, identify, locate, organise, success, integrate).

A further issue that impacts, and is impacted by, all of the above topics is **emergence**, i.e. the principle that systems exhibit properties which are meaningful only when attributed to the whole, not to its elements or component parts[1]. Such behaviour is a consequence of the relationships between the elements, rather than the behaviour of individual elements, and is typically observed at the highest level of the system. **Emergence** is affected by the structural complexity of the system, the complexity of individual elements and the level of uncertainty present within the system.

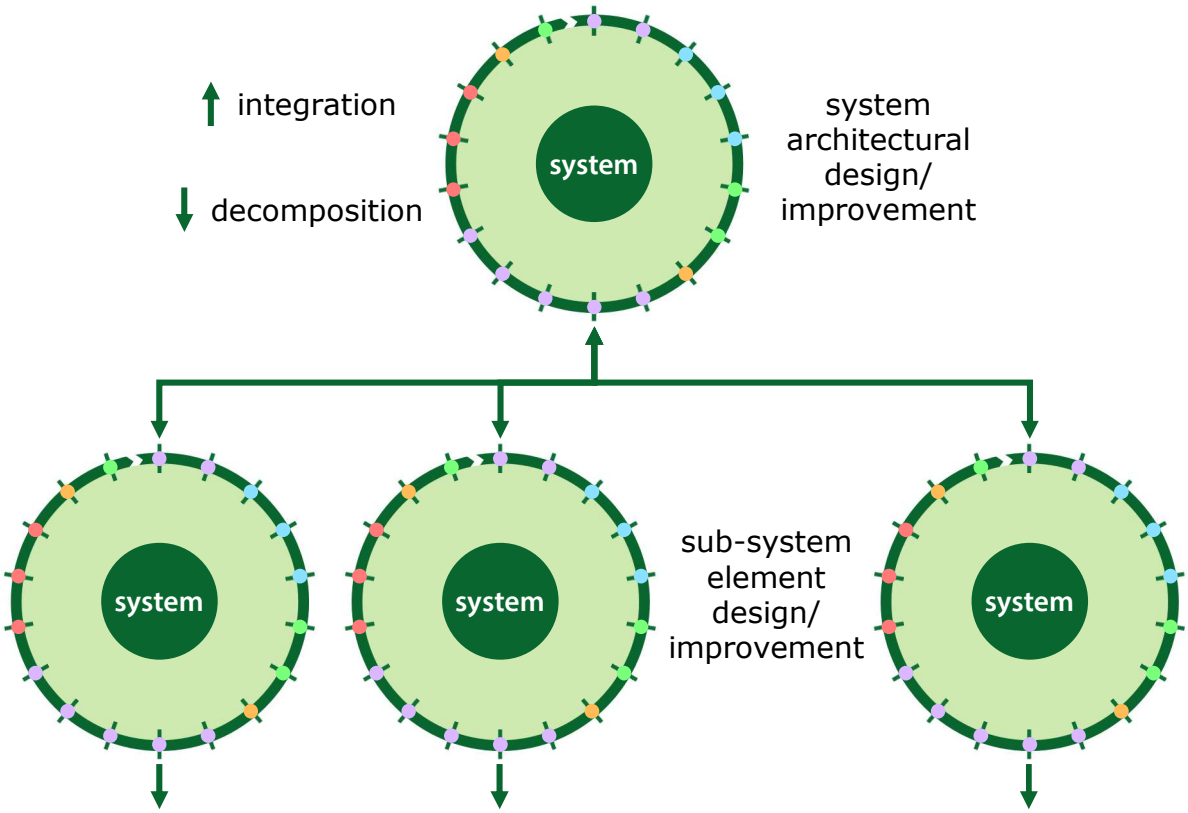
1. *Systems Thinking, Systems Practice*. Checkland, John Wiley & Sons, 1999.

Complex Systems

The improvement questions can be applied to simple systems as well as more complex systems of systems. As the complexity of a system increases it is important to consider the design of the architecture of the system as a whole as well as the detailed design of the corresponding elements or sub-systems. The **people**, **systems**, **design**, **risk** and **management** questions may then apply at all levels of abstraction of the system.

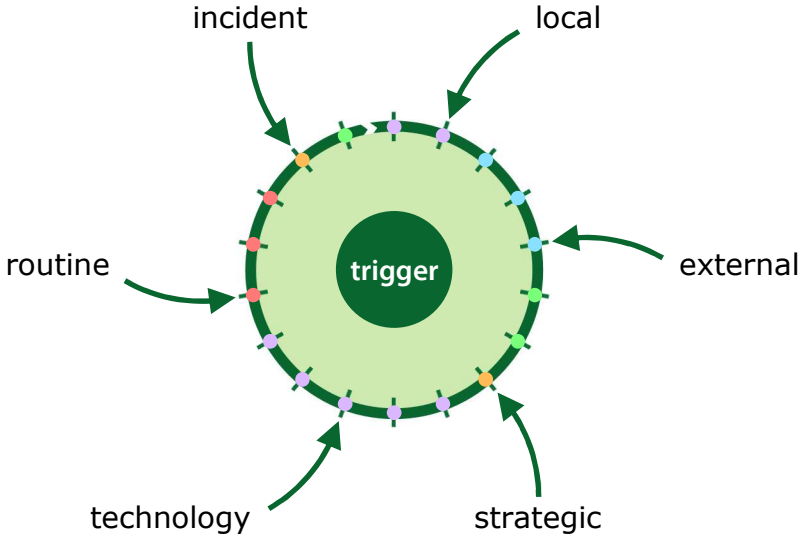
The architecture of the system may be influenced by a number of factors, including: local, regional or national organisational boundaries; geographical boundaries; technical disciplines; disease types; the **themes** of the higher-level, parent system; of some combination of the above. Systems may have any number of levels of hierarchy, but whatever the rationale for the system architecture, the answers to the **people**, **systems**, **design**, **risk** and **management** questions for each sub-system should be consistent with those for the parent system and other adjacent or lower-level sub-systems.

The improved system may comprise a mix of pre-existing, improved and new elements, where a combination of improvement and design is then required. The improvement **team** may also comprise a number of sub-teams, focused on different levels or elements of the system, where careful coordination of the teams will be necessary.

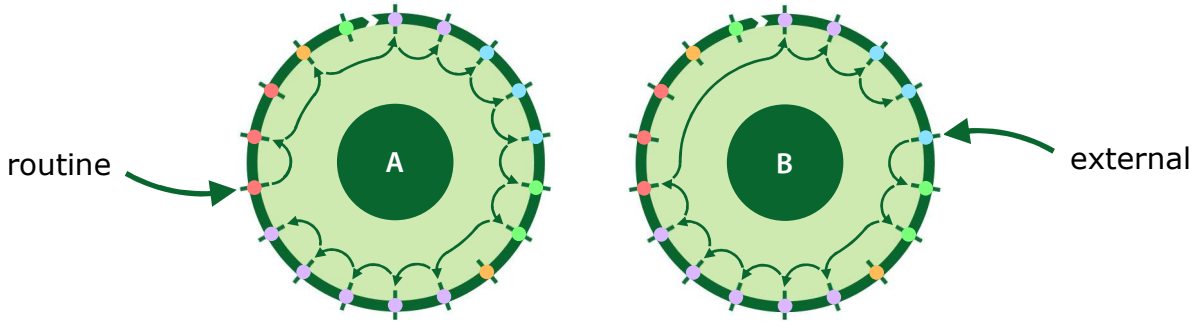


Complex Systems

The trigger for improvement may also come from a variety of sources. As a result there are numerous entry points for the cycle of questions, each one of which may result in a different initial sequence of questions. There is no absolute necessity to ask all the questions on each circuit of the cycle, rather it is appropriate to ask those that will give most value to the improvement team in gaining a rich picture of the particular needs for any subsequent improvement process.



A **routine** (A), internal service-led trigger may result in initial ideas and a rudimentary risk assessment before the full cycle of questions is undertaken. Conversely, an **external** (B), national, policy-led trigger may result in a swift cycle of questions up to the point that a design need is recognised before the full cycle is started. There is no right or wrong sequence of questions, more a pragmatic view of those that need to be answered and the means to do so. In practice, a number of questions may also be answered in a single meeting, while others may required a series of meetings to provide a single answer.



Improvement Model

In order to answer the questions associated with the process of improvement, it is helpful to examine the different activities that will be required to deliver this process. These are likely to include:

- **Understand the Context** — describes the circumstances or setting that surround a system and all the factors that could influence the system and its improvement.
- **Define the Problem** — describes the detail of a particular challenge within a system and all the requirements for change necessary to improve the system.
- **Develop the Solution** — describes a way of solving a particular problem within a system and all the elements of change necessary to improve the system.
- **Collect the Evidence** — describes the information and all the measures used to evidence the validity of a particular solution(s) to a problem within a system.
- **Make the Case** — describes the set of facts or arguments in support of improving a system and delivering a particular solution(s) to a problem within the system.
- **Manage the Plan** — describes a detailed proposal for enabling change to a system and delivering a particular solution(s) to a problem within the system.
- **Agree the Scope** — describes the context of the improvement envisaged in terms of the extent of the ambition for improvement and the boundary of the system of interest.

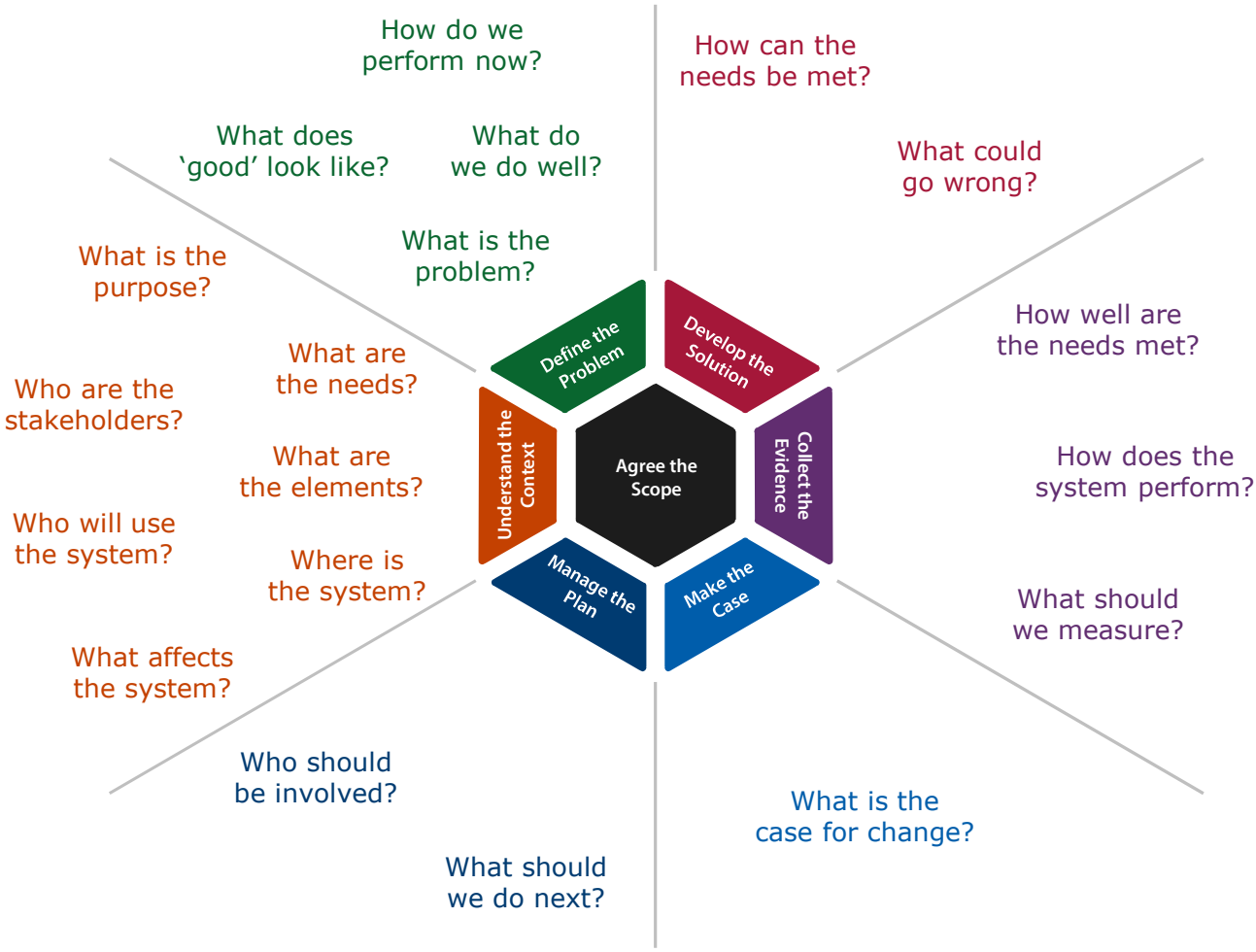
These activities will be present throughout the improvement process, where the emphasis given to each one will vary over time, and can be usefully thought of as activity **strands**. At different stages of the improvement process there will be different targets or deliverables for each of the strands, with early focus more likely on the **context** and **problem** and later emphasis on the **solution** and **evidence**.

The activity strands can be used to describe a simplified high-level process. An understanding of the **context** of the current system and its performance leads to the definition of the **problem(s)**, which in turn leads to the development a **solution(s)**, supported by the collection of **evidence** to demonstrate what is measurably better. A **case** has to be made and a **plan** and team managed, bounded by an agreed **scope**, to maximise the chances of success.

The Improvement Process section provides more details on the specific activities that might be undertaken within each of the strands.

Improvement Model

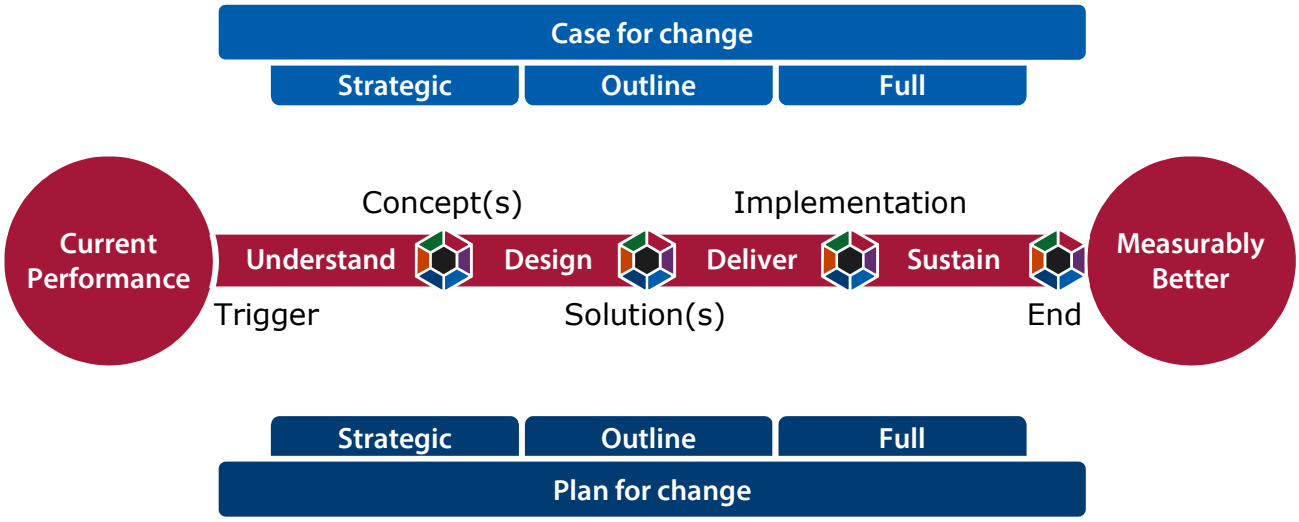
The activity strands are broadly related to the questions of the systems approach and this link may be exploited when planning an improvement programme. The questions can provide a way of framing the activities, which in turn are undertaken to provide the answers to the questions. A rough mapping of questions to strands is possible, but should not be seen as definitive.



The majority of the questions relate to the **Understand the Context** and **Define the Problem** strands, which focus on the early stages of the improvement process. This is to be expected as the primary emphasis of the systems approach described in this toolkit is the problem-seeking part of an improvement process. The remaining questions then focus on the problem-solving and management parts of the process.

Improvement Model

Stage-gates may be defined within the improvement process to provide targets and deliverables for attainment for each strand at each stage. These can be based on the activity model and should show progressive development of the targets as the programme progresses, again with early focus more likely on **context** and **problem** and later emphasis on **solution** and **evidence**.



As has been seen earlier, typical stages of an improvement process are likely to include:

- **Understand** — leading to a description of the current system (now), a common understanding of the problem, a consensus view of what the future system might look like (better) and a clearly articulated case for changing the system.
- **Design** — leading to a clear description of the future system, based on the iterative design of the system architecture with its elements and interfaces, the evaluation through successive prototyping of its likely behaviour, and a plan for its delivery.
- **Deliver** — leading to the successful deployment of the new system with the levels of measurement necessary to evidence its success, and acceptance that it achieves appropriate value for its stakeholders.
- **Sustain** — leading to the continued operational success of the new system along with consideration of further improvement potential or wider deployment.

Improvement Model

The delivery of each stage of the improvement process depends on the deployment of appropriate activities as part of a structured and coordinated plan to achieve the stage targets and deliverables. These activities may take the form of a series of questions or exercises, specifically aimed at developing a deeper understanding of the challenge, potential solutions and the means to deliver them into practice. They may be targeted initially at the management team or a broader stakeholder team, they may be addressed in sequence or out of sequence, and they may be formally presented or woven into the conversation with the team.

The activities are not designed to be rigid, rather they are intended to inspire enquiry across all areas of the improvement process in order to understand the context of the improvement challenge and the gap between the current performance of the system and its desired performance. Each activity may also be supported by one or more tools to provide structure and assist the delivery of useful outputs. The same tools may also be used for more than one activity.

The task of the facilitator or programme management team is to identify those activities which are essential to the improvement process, tailor the improvement programme to the particular improvement challenge and resource availability, and to configure and order them in such a way that they are most likely to deliver an effective improvement programme. It is also possible to combine activities and their associated tools with existing improvement approaches and models of change.

Literature

Clarkson PJ, Bogle D, Dean J, Tooley M, Trewby J, Vaughan L, Adams E, Dudgeon P, Platt N, Shelton P (2017). *Engineering better care: a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, ISBN: 978-1-909327-35-1.

Davidoff F, Dixon-Woods M, Leviton L and Michie S (2015). Demystifying theory and its use in improvement. *BMJ Quality and Safety*, bmjqs-2014-003627.

Dixon-Woods M & Martin G (2016) Does quality improvement improve quality? *Future Hospital Journal*, **3**(3):191-194.

Fillingham D, Jones B, Pereira P (2016), *The challenge and potential of whole system flow*. The Health Foundation, London UK.

Ham C, Berwick D and Dixon J (2016). *Improving quality in the English NHS: a strategy for action*. King's Fund, London, UK.

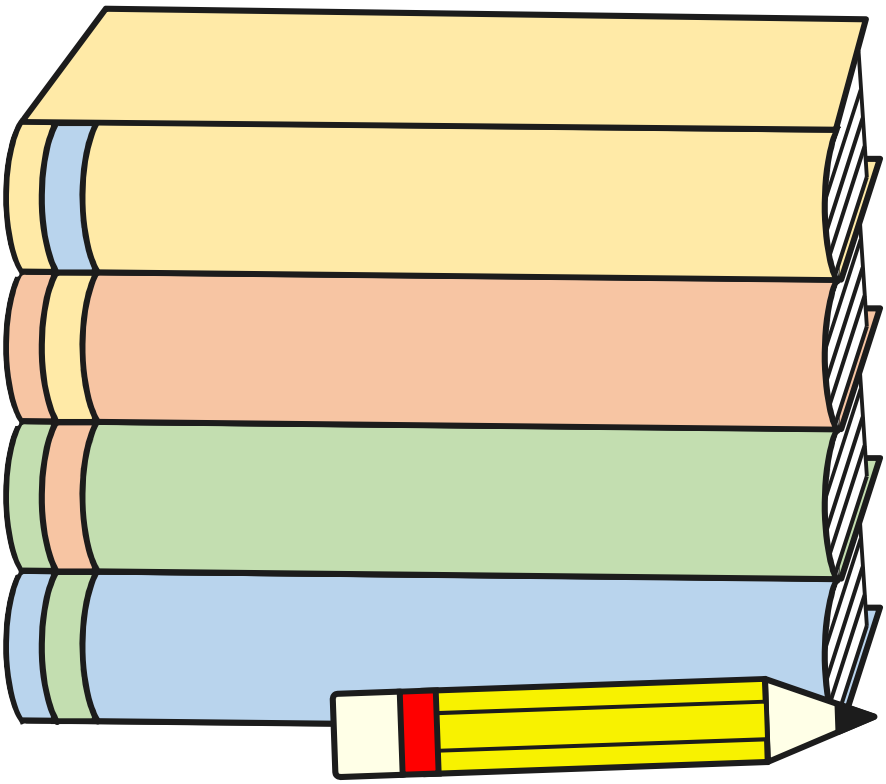
Langley GL, Moen R, Nolan KM, Nolan TW, Norman CL, Provost LP (2009). *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance* (2nd edition). San Francisco: Jossey-Bass Publishers.

McGuire KJ and Spear SJ (2015). Beyond the Jargon: architecture, process and clinical care, *SPINE*, **40**(16):1243-1246.

Snowden DJ, Boone ME (2007). A Leader's Framework for Decision Making. *Harvard Business Review*, BR0711.

The Health Foundation (2013). *Quality improvement made simple: what everyone should know about health care quality improvement*. The Health Foundation, London, UK.

Important Topics



Summary

A number of **important topics** typically arise in the context of improving of complex systems, regardless of the improvement model used or system perspective taken.

Contents

Introduction

The following short sections are intended to describe a range of topics that are important in the successful delivery of system improvement. They are intended to bridge the gap between the broad principles embodied in the sections on **Improvement Questions** and **Improvement Process**, and the activities and tools described in the section on **Improvement Resources**, while remaining relevant to other established improvement approaches.

The topics described here are not intended to be an exhaustive set sufficient for all improvement, rather they represent a starting set that cover the topics that the Toolkit authors have particular knowledge of in practice or have seen the Toolkit users struggle with during training sessions. More topics will be added in time as the users of this toolkit identify further areas of interest for the improvement community.

Planning Meetings

Meetings may take many forms, but all draw people together for a purpose. As a result there is always a need to plan meetings carefully to ensure that they fulfil expectations, whether they are for team building, fact finding, designing or reviewing. Typically, one or more activities define the purpose of the meeting, which then has to be carefully choreographed to ensure that there is:

- Clarity of purpose and a concise, time-stamped agenda,
- A shared expectation of what can be achieved in the time available,
- An appropriate list of attendees to match the purpose and expectations,
- A suitable location to accommodate the activities planned,
- Clear guidance for the meeting chair and facilitators,
- Pre-prepared presentations, posters, prompts and other resources,
- Appropriate communication to participants before the meeting,
- Adequate time for reflection and analysis after the meeting.

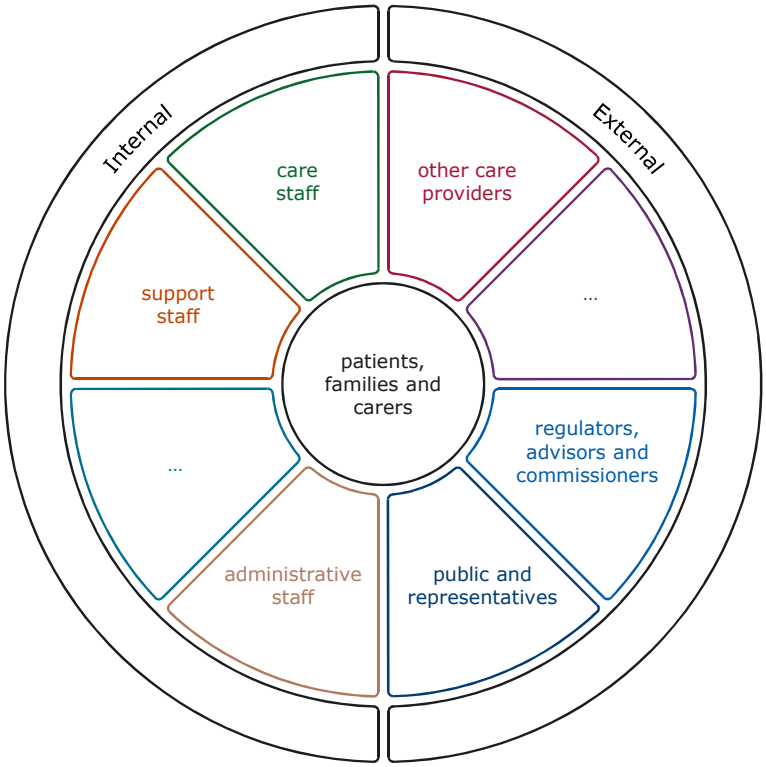
Experience shows that the best meetings are the result of careful preparation and planning with the team facilitating the improvement programme, key stakeholders and the meeting hosts. Similarly, it is important to spend time to reflect on the meeting when it is fresh in mind and later, when further analysis of the material generated has been completed, in order to:

- Discuss things that went well or could be improved,
- Identify people who were not present or should be included in the future,
- Consider how the meeting contributed to the overall improvement programme,
- Identity needs for further action or immediate follow-up,
- Discuss preliminary plans for subsequent meetings,
- Draft a summary communication to the meeting participants.

Again, experience shows that the best overall outcomes are the result of timely reflection by the team facilitating the improvement programme, key stakeholders and the meeting hosts. Above all else, the role and limitations of meetings should be understood in the context of the wider improvement programme and the activities required to deliver sustainable success.

Characterising Stakeholders

An important activity within any improvement programme is the identification of system users and **stakeholders**. There is particular value in identifying users and stakeholders in the early stages of a programme and ensuring the **team** continuously update knowledge of their needs. **Personas** may be developed to capture particularly important characteristics of representative users or stakeholders.



The **Stakeholder Map** is a living document which may be used in electronic form, as a large poster or an interactive worksheet.

Useful toolkit resources: a **Stakeholder Map** worksheet, **Stakeholder Map** poster and **Stakeholder** cards are included in the Resources part of this toolkit.

Characterising Stakeholders

Successful improvement involves and depends on a wide range of **stakeholders** and system users who, at any point in time, will have different levels of **interest** in and power to **influence** such improvement, There is value in characterising stakeholders, in terms of their interest and power, to ensure that they are sufficiently informed, engaged or managed during all stages of an improvement programme.

Low Interest and High Influence (satisfy)	High Interest and High Influence (manage)
Low Interest and Low Influence (monitor)	High Interest and Low Influence (inform)

The **Stakeholder Influence** map is a living document which may be used in electronic form, as a large poster or an interactive worksheet.

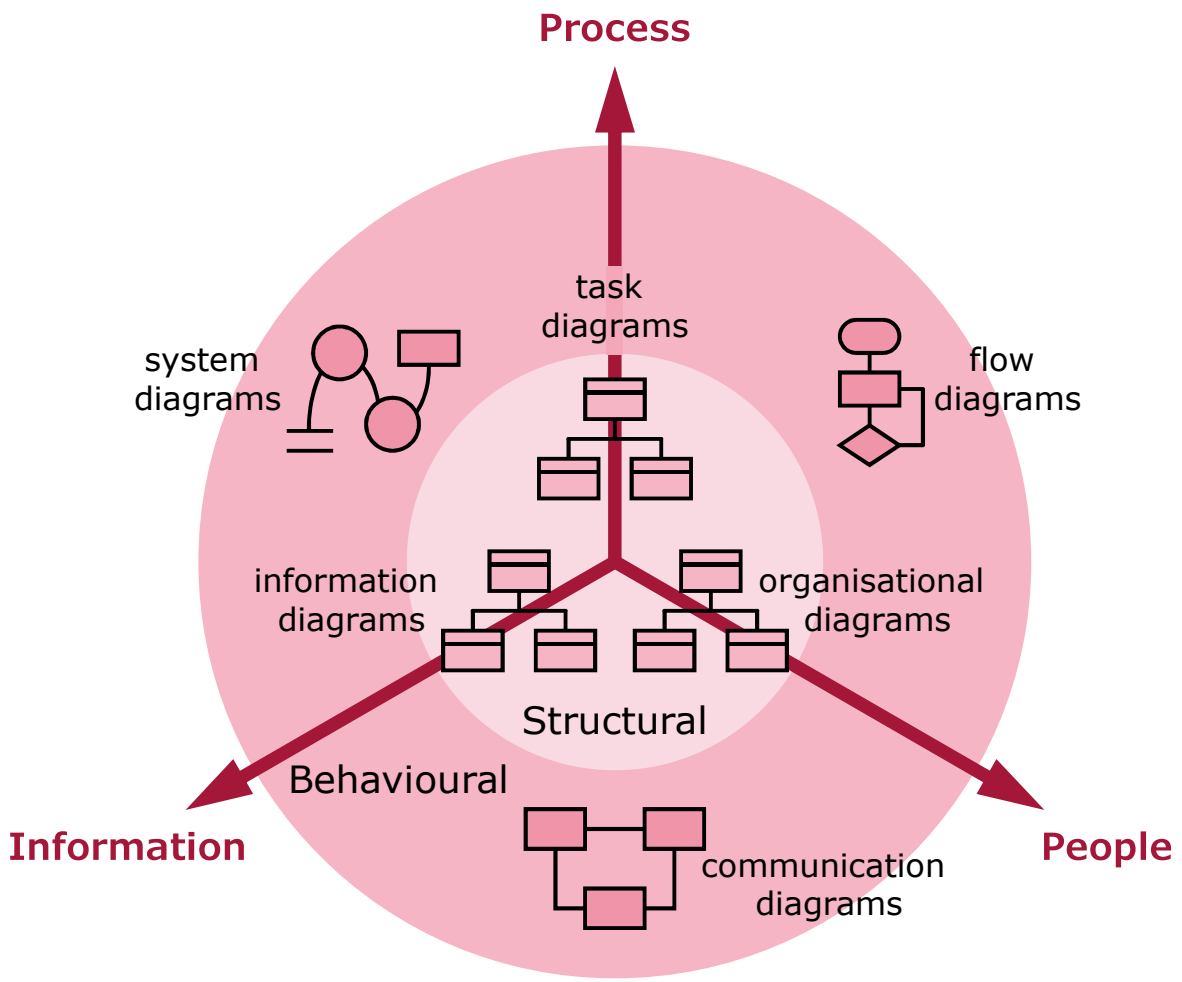
Useful toolkit resources: a **Stakeholder Influence** worksheet is included in the Resources part of this toolkit.

Mapping Systems

An effective systems approach to improvement relies on the communication of information to describe and interpret the current system, and any proposed changes to it, from a variety of different perspectives. There are a plethora of formal and informal diagramming and mapping approaches available to assist these activities, where each approach is likely to accentuate some features of the system it used to describe and to ignore many others. It is therefore important to select the diagramming or mapping approach(s) best suited to the information that is to be captured and shared.

Diagrams highlighting the structure of systems can be particularly useful in conveying an understanding of how things are connected, where the nature of the connection may be represented as a simple link or a directional or causal relationship. Similarly diagrams examining the behaviour of a system provide a richer picture of the nature and performance of people, processes and information flows in the system, and may range from static representations to dynamic simulation models.

In all cases, diagrams and mapping are typically limited to representing certain perspectives of a system and seldom capture everything. Multiple maps and diagrams may be required and a mix of formal and informal approaches may also be appropriate. For example, storytelling can provide a rich narrative when formal interview approaches or focus groups would be difficult to convene. In all cases, the process of building the pictures with the right team can provide significant benefit in itself, enabling a consensus view of the system to emerge.



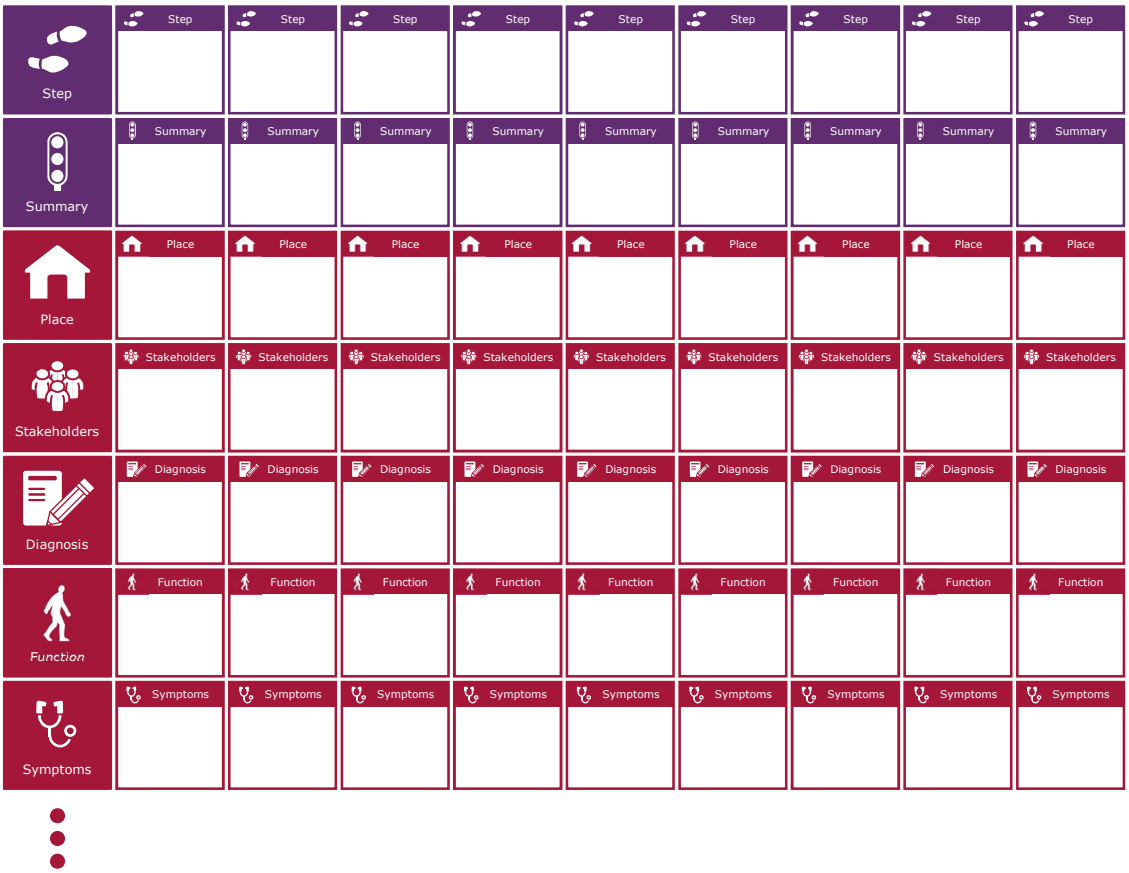
Mapping Systems

A rich picture of the patient journey can be very helpful in identifying the key steps of such a journey, particularly in terms of their location, the patient's condition at that point in time, and the people and treatment involved. A **Design Wall** is a graphical device that can assist in the capture of such a picture and its visualisation by the improvement team. The design wall is readily extensible to suit the length of the journey and can be drafted by an individual or, more usefully, the whole improvement team.

The **Design Wall** includes reference to the following key elements:

- **Step**: describe the particular step in the patient journey
- **Summary**: summarise the overall experience of the delivery of care associated with this step
- **Place**: describe the location(s) where this step happens
- **Stakeholders**: describe the stakeholders involved in this step
- **Diagnosis**: describe the primary diagnosis that the patient is likely to have at this step
- **Function**: describe the patient's current level of functioning at this step
- **Symptoms**: describe the patient's symptoms at this step
- **Changes**: identify causes of changes to the diagnosis/function/symptoms and if they are reversible
- **Prognosis**: describe the quality-adjusted life-years that might be achieved if changes were reversed
- **Wishes**: describe how the patient wishes to be cared for at this step
- **Plan**: describe the current management plan for the patient's future care
- **Information**: describe where the patient's information is recorded and/or how it is communicated
- **Resources**: describe the NHS and other resources being used at this step
- **Social**: describe the extent to which the patient's social network is able to provide appropriate care

The design wall is a living document which may be used in electronic form or as a worksheet.



Useful toolkit resources: a **Design Wall** worksheet is included in the Resources part of this toolkit.

Analysing Requirements

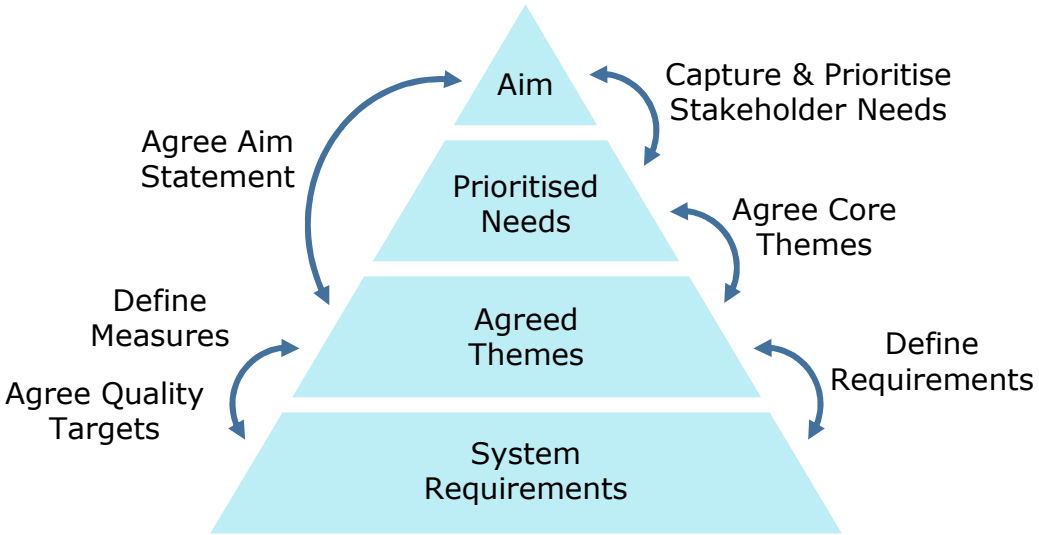
The management of the improvement process also requires careful management of the translation of the **aim** of the improvement into realisable system **requirements**. This is often a complex, iterative process in its own right, but one that is critical to success.

Every improvement should have a clear **aim**. This will not only align with the existing or proposed **purpose** of the system, but also with the desired improvement in **quality** to be delivered by the system. The aim may include a number of facets, relating to clinical and cost effectiveness, patient safety and patient experience, that align with the broad definition of quality commonly used in health and care. The aim will also be bound to the expectations of the service commissioner and relevant external targets.

The different **stakeholders** involved in the system and the improvement programme will inevitably have different **needs**, aligned with their interests and responsibilities. Any successful system will therefore satisfy some of these potentially conflicting needs more than others. Typically, it is the job of the service manager or improvement programme manager to capture, assess and ultimately rationalise and resolve conflicts, thus prioritising these **needs** in response to the expectations embodied in the **aim**.

The prioritised **needs** can usefully be organised into a number of core **themes** that represent the essence of the things the systems must do. These provide a practical reminder of what the system should deliver as a result of the improvement programme and how this might be measured. These **themes** are also likely to form the basis of the **case** for change, providing more detail on how the **aim** is to be achieved.

Finally, the **themes** are translated into individual system **requirements** that provide detailed, realisable performance targets for the improvement team. These can usefully be expressed as either **demands**, i.e. things it is imperative to satisfy, or **wishes**, i.e. things it would be desirable to satisfy.

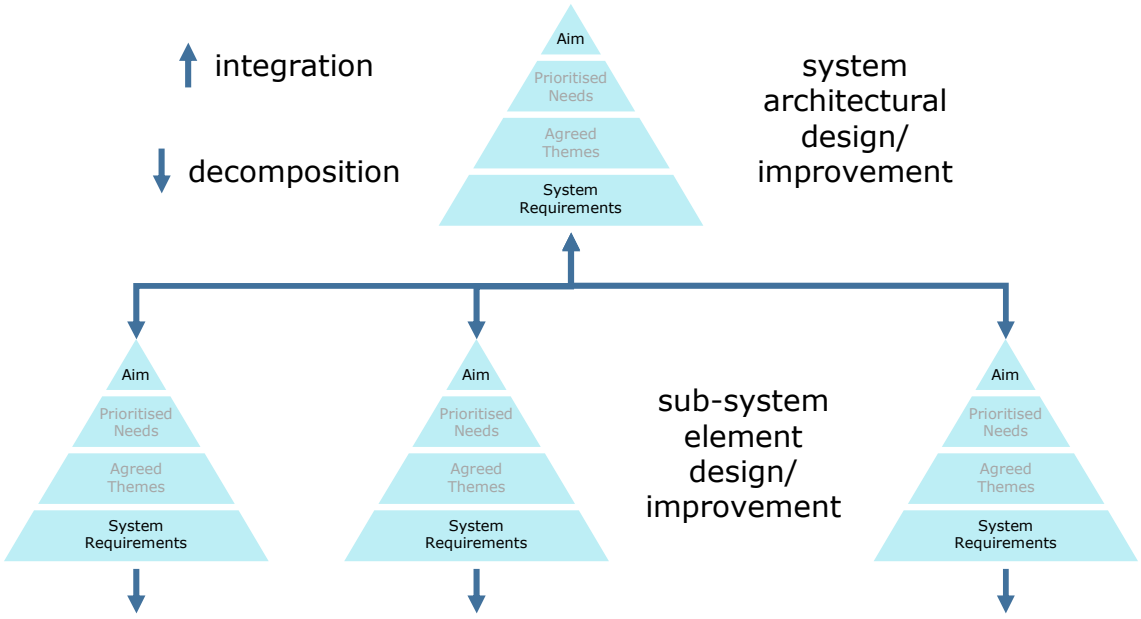


Analysing Requirements

As with the improvement questions, the principles of the requirements pyramid can be applied to simple systems as well as more complex systems of systems. As the complexity of a system increases it is important to consider the design of the architecture of the system as a whole as well as the detailed design of the corresponding elements or sub-systems. The **aim**, **needs**, **themes** and **requirements** may then apply at all levels of abstraction of the system and should be consistent with those for the parent system and other adjacent or lower-level sub-systems. Any improvement will then need to satisfy the requirements at all levels.

The system architecture, as part of the whole system requirements, will not only need to describe the system **decomposition** into key sub-systems and their associated aims, but also carefully specify the nature of the interfaces between these sub-systems. As the sub-systems emerge they will need to be evaluated against their individual requirements, before their **integration** into a single system and evaluation against the whole system requirements. In practice, interface management remains an essential and critical part of any system development.

The system **stakeholders** are also likely to vary according to the system or sub-system under consideration. As a result, it is imperative that the decomposition and subsequent integration of the requirements pyramids reflects this map of stakeholders, particularly in the derivation of the system architecture with its associated **aim**, **needs**, **themes** and **requirements**.



Creating Concepts

While there is always the temptation to take the first thing that is thought of and develop a solution based on that 'idea', creativity should be an exploratory process that initially generates a large number of ideas, which are then gradually filtered, refined and coalesced, to deliver the 'best' solution. A thorough exploration of the solution space inevitably challenges assumptions regarding the problem to be solved, and this is true of both improvement and new service design challenges. Once the process of exploration and refinement has been completed, it is extremely unlikely that the idea initially thought of as the 'best' remains through to completion.

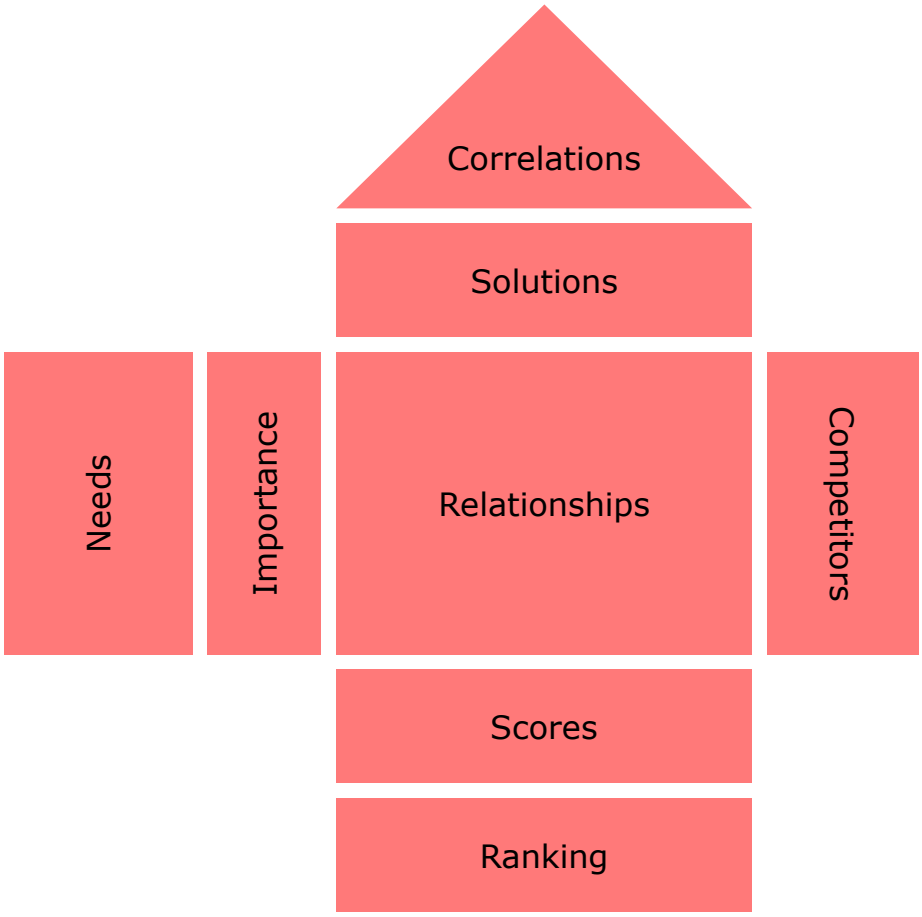
There are many creativity approaches and tools that inspire individuals or teams to come up with ideas. Most of these separate the initial creativity method from the inevitable filtering required to find ideas worth developing, and some focus particularly on avoiding fixation in order to maximise the search space. In all cases, the quality of the ideas created will depend critically on the understanding of the problem and the context within which it is set. This in turn allows the definition of a clear set of requirements and key themes for the improvement and new service design challenge. This is an iterative process that encourages the ongoing exploration of the problem alongside the exploration of the solution[1], while accepting that the emphasis inevitably moves from the former to the latter over time.

1. *Eleven lessons managing design in eleven global companies.* Design Council, London, UK, 2007.

Creating Concepts

Creativity may be the preserve of a few individuals or the whole project team. Yet, regardless of the origin of ideas, solutions typically need to satisfy a range of prioritised stakeholder needs articulated through the problem statement and system requirements. Throughout the improvement or design process, evaluation of ideas, concepts and emerging solutions needs to be made against these needs and requirements in order to provide a transparent rationale for the filtering and selection decisions made. The formality of such a process can depend on the scale and complexity of the problem to be solved and the importance of evidencing the development of the solution. A simple meeting note recording key decisions may be sufficient for small, low-risk improvements, where a more formal considered process is required for complex challenges.

The House of Quality[1] is a well-known process from product development that provides a framework for relating needs to possible solutions is such a way as to make the rational for selection decisions transparent. It enables the early evaluation of ideas before too much is invested in the development of deliverable solutions.



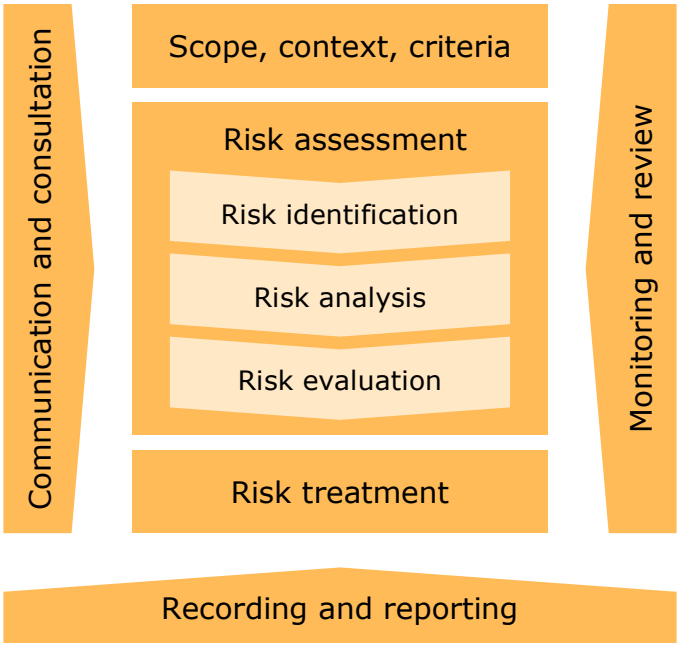
1. The House of Quality. Hauser and Clausing, *Harvard Business Review*, **66**(3): 63-73, 1988.

Managing Risk

The management of risk is an important part of any successful improvement programme, where any likely reduction in expected quality may be seen as a risk to the delivery of the improvement itself, in addition to the risk of operational failure of the actual programme. There is a risk that any of a number of programme requirements and stakeholder expectations will not be met, corresponding to deviations in performance related to patient safety, patient experience, clinical and cost effectiveness, or the improvement process.

In this context, risk assessment is a key component of risk management which may be thought of as the process of identifying, assessing and controlling opportunities for and threats against the performance of an organisation, product or service delivery system, where such performance may relate to a range of quality, safety, operational, financial or reputational measures. Such assessment is a component of existing models of healthcare improvement, such as the **IHI Model for Improvement**, **Lean Thinking** and **Six Sigma**, and also has a long history of development in engineering and service delivery. The Royal Academy of Engineering report, **Engineering Better Care**[1] highlighted risk as one of four key perspectives, alongside people, systems and design, necessary to deliver effective care.

Risk assessment, as a process to reduce the impact of threats against a system, involves a number of key elements which are usefully described by ISO/IEC 31010:2019, Risk management – Risk assessment techniques[2]. This standard describes a framework for risk management and introduces tools typically used in risk assessment.



1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

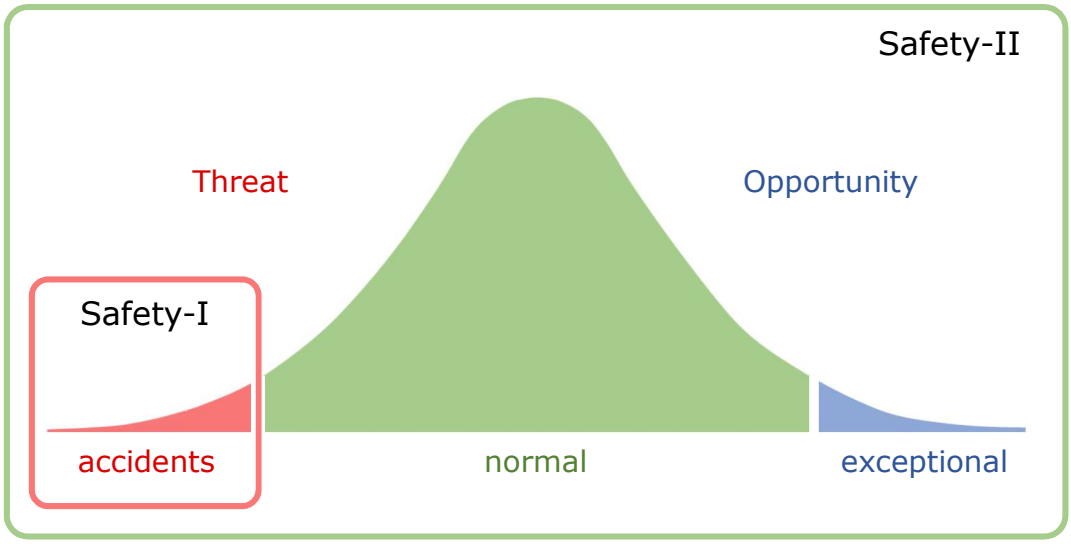
2. *ISO/IEC 31010:2019, Risk management — Risk assessment techniques*. International Organization for Standardization, 2019.

Managing Risk

In practice, risk management is a continuous process that begins at the inception of any improvement programme and can continue long after delivery. It may also be the trigger for improvement following an incident or routine safety review. The key to the success of the process is the availability of a clear and agreed description of the current system, and/or some future system, which can be systematically and rigourously assessed by a method attuned to the nature of that description. Such prospective risk assessment complements the more typical retrospective assessment and forms the heart of the 'Safety-I' approach to system safety management[1].

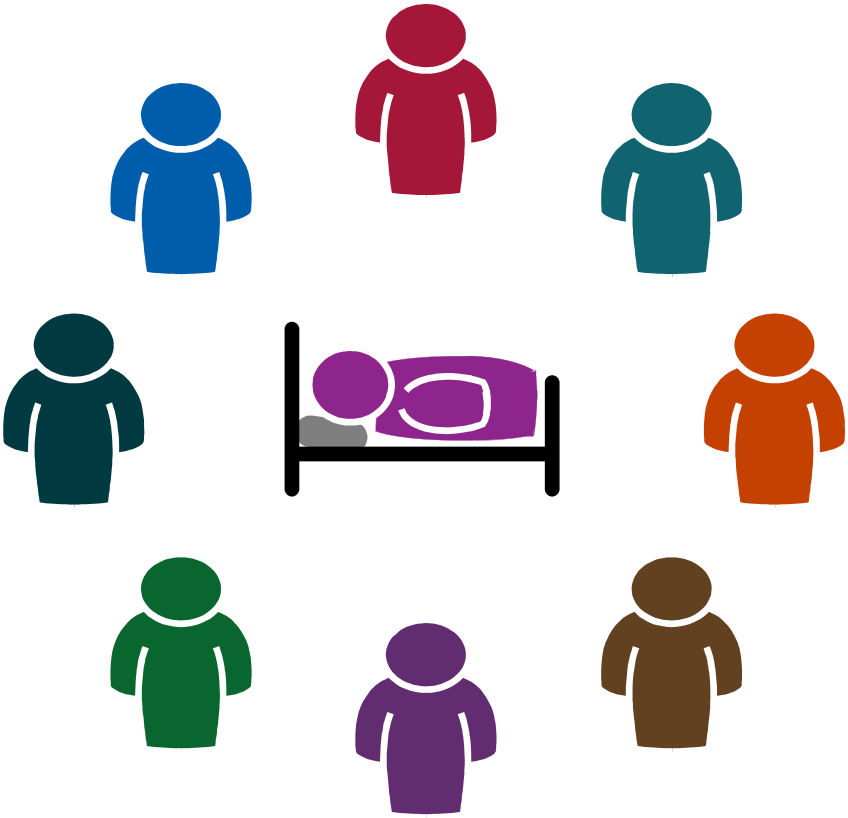
The identification and exploitation of opportunities to learn from normal performance (including adaptations) represents the alternative face of risk management. This view, known as 'Safety-II', has gained much traction in recent years as an activity that complements traditional 'Safety-I' methods by focusing on the system's ability to succeed under varying conditions[1]. In practice, both approaches should be used to encourage an holistic approach to reactive and proactive risk management. This requires a paradigm shift in the traditional priorities of safety management, expanding the focus beyond the need for incident investigations to active investigations into the variations in practice that might be exploited to consistently achieve good practice. The outcome curve for health and care practice needs to shift to the right.

Cultural and organisational change and adoption of knowledge of human factors, the discipline concerned with the understanding of interactions among humans and other elements of a system, are parts of the answer. They will facilitate a shift from a traditional Safety-I to a combined Safety-I and Safety-II approach, which aligns with the **Assess** and **Seek** questions described in the **Engineering Better Care** section.



1. *From Safety-I to Safety-II: A White Paper*. Hollnagel, Wears and Braithwaite, The Resilient Health Care Net, 2015. resilienthealthcare.net/onewebmedia/WhitePaperFinal.pdf.

This Toolkit



Summary

This toolkit contains a pragmatic systems approach to health and care improvement that is based on the Engineering Better Care report.

Contents

Introduction

This toolkit was developed as a means to translate the description of a systems approach from the **Engineering Better Care**[1] report into an actionable programme of improvement. In its physical form the toolkit comprises two folders, entitled (1) Guide and (2) Resources, housed in a sleeve. The guide contains this document, while the resources folder contains **cards**, **posters**, **worksheets** and workshop materials that enhance the facilitation of the improvement programme. Electronic versions of all these resources are also available at www.iitoolkit.com.

Presentations are also available to provide an introduction to:

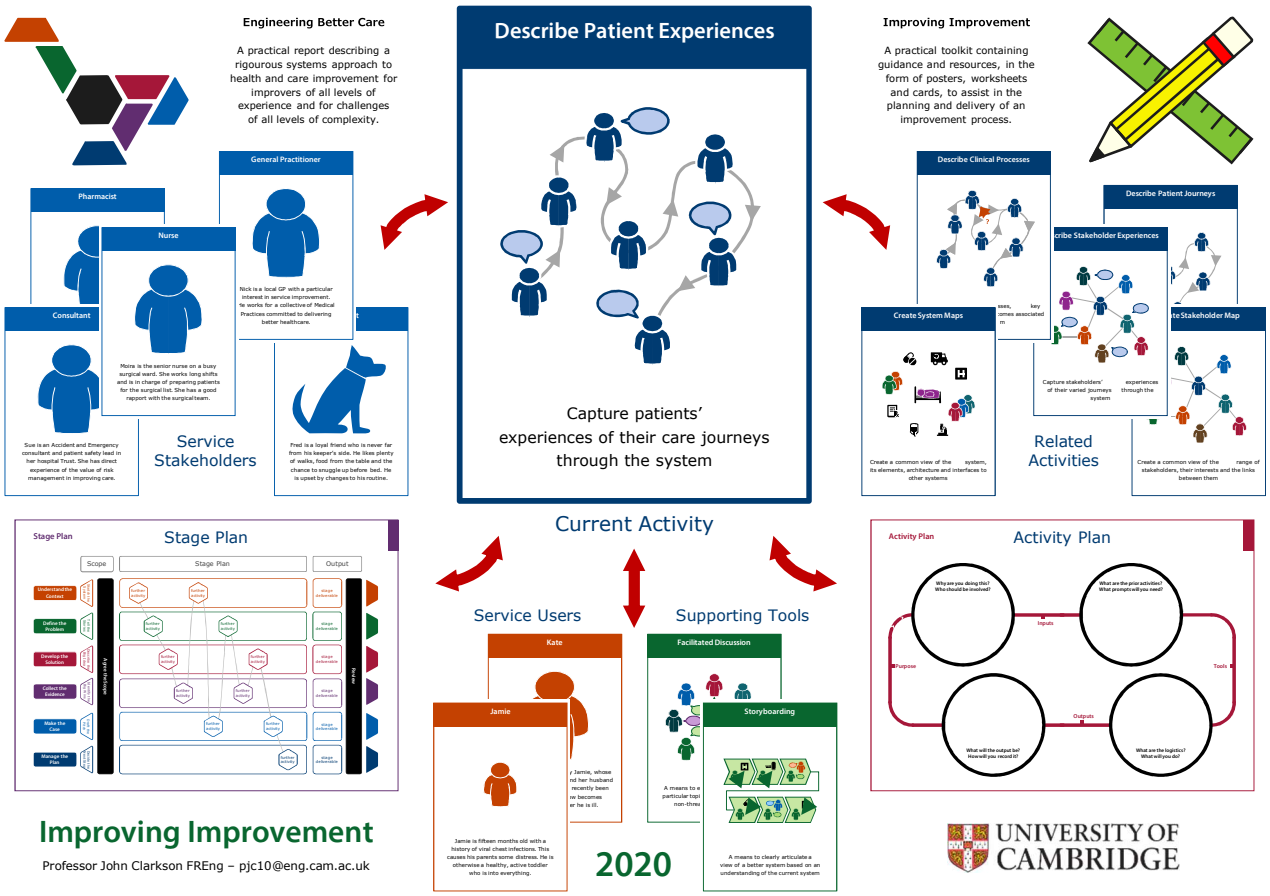
1. The **Engineering Better Care**[1] report - introducing the people, systems, design and risk perspectives and their respective improvement questions.
2. This toolkit - introducing the 'hexagon' model of improvement, the components of this toolkit, and comparisons with alternative approaches.
3. The worksheets, posters and cards – showing how these can be used to design and deliver specific programmes of improvement.

Interactive training courses that combine all of the above, with illustrative case examples, have been run by the authors on multiple occasions. Find out more at www.iitoolkit.com/training/courses.html.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Introduction

The [Resources](#) file contains **cards**, **posters**, **worksheets** and workshop materials to assist in the facilitation of improvement programmes.

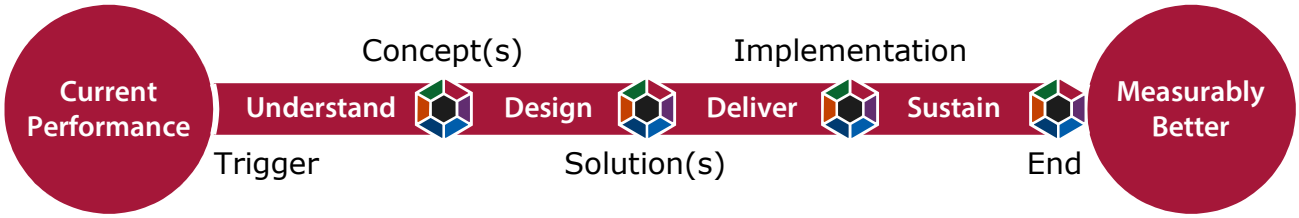


These provide a starting point to embellish existing improvement approaches or may provide a standalone systems-based framework for improvement, and include:

1. Eight sets of **cards** that describe service users, service stakeholders, service improvers, case studies, improvement questions, improvement activities, improvement tools and improvement terms.
2. A set of **posters** to illustrate the concepts and tools for improvement, including the planning of the improvement process and the use of the worksheets.
3. A set of blank **worksheets**, or working documents, to support the improvement process that are based on the posters and other supporting materials.
4. A selection of pens, post-its and other resources that can be used in support of a wide variety of interactive workshop activities.

Improvement Model

The heart of this toolkit integrates the key questions from the Engineering Better Care[1] report together with an **Improvement Model** that contains seven **activity strands** and a stage-based view of the improvement process.



As described previously in the Engineering Better Care section, the activity strands that focus on particular aspects of a successful improvement process include:

- **Understand the Context** — describes the circumstances or setting that surround a system and all the factors that could influence the system and its improvement.
- **Define the Problem** — describes the detail of a particular challenge within a system and all the requirements for change necessary to improve the system.
- **Develop the Solution** — describes a way of solving a particular problem within a system and all the elements of change necessary to improve the system.
- **Collect the Evidence** — describes the information and all the measures used to evidence the validity of a particular solution(s) to a problem within a system.
- **Make the Case** — describes the set of facts or arguments in support of improving a system and delivering a particular solution(s) to a problem within the system.
- **Manage the Plan** — describes a detailed proposal for enabling change to a system and delivering a particular solution(s) to a problem within the system.
- **Agree the Scope** — describes the context of the improvement envisaged in terms of the extent of the ambition for improvement and the boundary of the system of interest.

Useful toolkit resources: the **Improvement Model** poster is included in the Resources part of this toolkit.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Improvement Canvas

The current state of knowledge with regard to any of these stands can be summarised on an **Improvement Canvas** to allow the improvement team to see a snapshot of the progress towards a measurably better system. At the beginning of the improvement journey the canvas can be used to capture the **purpose** of the system to be improved, descriptions of service **users**, details of the improvement **team**, an initial **case** for improvement, a working **plan**, and early or existing information relating to the **context**, **problem**, **solutions** and **evidence** strands.

Agree the Scope *Describe the ambition for change and the boundary of the system of interest*	Understand the Context *Describe the circumstances and setting of the system of interest and the factors that could influence the improvement/redesign of the system*	Define the Problem *Describe the details of a particular challenge(s) within the system and the requirements for change necessary to improve/redesign the system*
Identify the Stakeholders *Identify the people who have an interest in any aspect of the system and their needs*	Develop the Solution *Describe the idea(s) that will resolve the challenge(s) within the system and the risk(s) associated with changes needed to improve/redesign the system*	Collect the Evidence *Describe the information and the measures required to show the effect(s) of the changes proposed to improve/redesign the system*
Build the Team *Identify the team who will deliver the project*	Make the Case *Prepare an argument(s) to justify the improvement/redesign of the system*	Manage the Plan *Create a plan to facilitate the improvement/redesign of the system*

The key **questions** or a set of **Preliminary Activities** may be used as a prompt to encourage completion of the canvas, with the answers recorded on a blank version of the canvas. The **Improvement Canvas** is a living document which may be used in electronic form, as a large poster or an interactive worksheet.

Useful toolkit resources: the **Improvement Canvas** poster and **Improvement Canvas** worksheet are included in the Resources part of this toolkit.

Preliminary Activities

One approach to completing the **Improvement Canvas** is to undertake a series of **Preliminary Activities**, specifically targeted to ensure the team have a shared understanding of the system, which is then followed by the main activities required to enable them to define and achieve the targets and deliverables for the stage.

For the **understand** stage of an improvement programme, the preliminary activities may include:

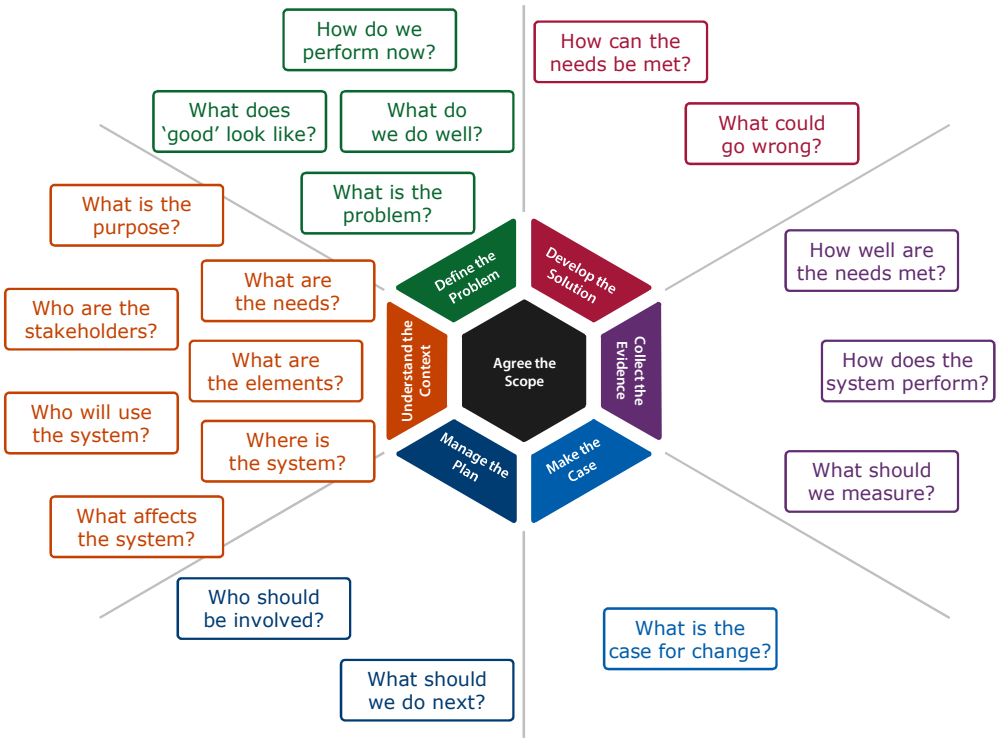
- **Sketch the System** — show the relationships between all the elements, people, locations, conditions, tasks and information
- **Tell the Stories** — communicate stories of patient and stakeholder experiences that bring life to the improvement challenges
- **Describe the Big Idea** — encourage people to think creatively and describe how the system could be improved
- **Identify the Big Wins** — identify the big wins and justify the resources required to make the system changes proposed
- **Draft the Pitch** — create a simple description of the problem, the process that will solve it, and the benefits that might be achieved
- **Decide the Next Step** — choose the activities most likely to improve the system and enable progress to the next stage gate
- **Challenge the Scope** — consider different levels of scope and pick the most appropriate level for the project to succeed.

These activities may be undertaken individually or as part of a longer meeting or workshop. While they are identified as individual activities they may also form part of a much more integrated narrative exploring the current state of the improvement programme. The particular order of the activities may vary in response to the state of knowledge at the start of the programme and there may also be considerable flexibility shown in moving between the activities.

Useful toolkit resources: the **Preliminary Activities** poster and **Improvement Activity** cards for each of these activities are included in the Resources part of this toolkit.

Questions Map

The **Questions Map** provides an alternative approach to completing the **Improvement Canvas** and capturing the current state of knowledge regarding an improvement programme. This can be particularly useful in the early stages of an improvement programme when the focus is on the **context** and **problem**, but can also offer insights relating to the other stands at any stage in the programme.



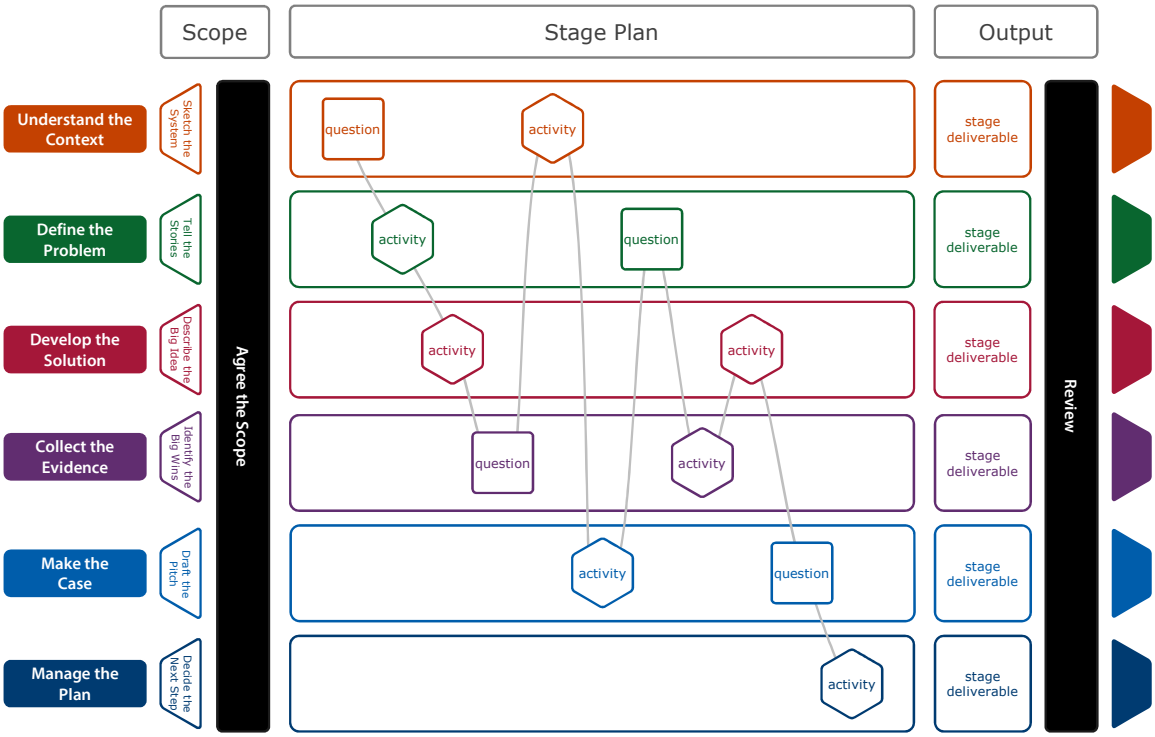
The activities required to answer these questions will likely take the form of a series of exercises, specifically aimed at building team ownership and commitment for a programme of improvement, targeted at the management team or a broader stakeholder team. The questions may be addressed in sequence or, more likely, out of sequence to encourage people to tell stories and talk about ideas for change before attempting to sketch the system or drafting the case for change. They may be formally presented or woven into the conversation with the team. They may be part of a formal project or be used simply to trigger a follow-on meeting.

In the later stages of the improvement process these early activities will take the form of a recap of the knowledge gained in the previous stage, a reiteration of the scope and direction of the programme and the planning of the now current stage.

Useful toolkit resources: the **Questions Map** poster and **Improvement Questions** cards are included in the Resources part of this toolkit.

Stage Plan

Each stage of the improvement programme can be divided into the seven activity **strands**, with the preliminary activities or key questions, through the **Improvement Canvas**, informing not only the scoping of each of these strands, but also identifying the desired outputs for the stage. Additional planning is then required to identify the key questions or activities to be pursued during the programme to deliver these outputs.

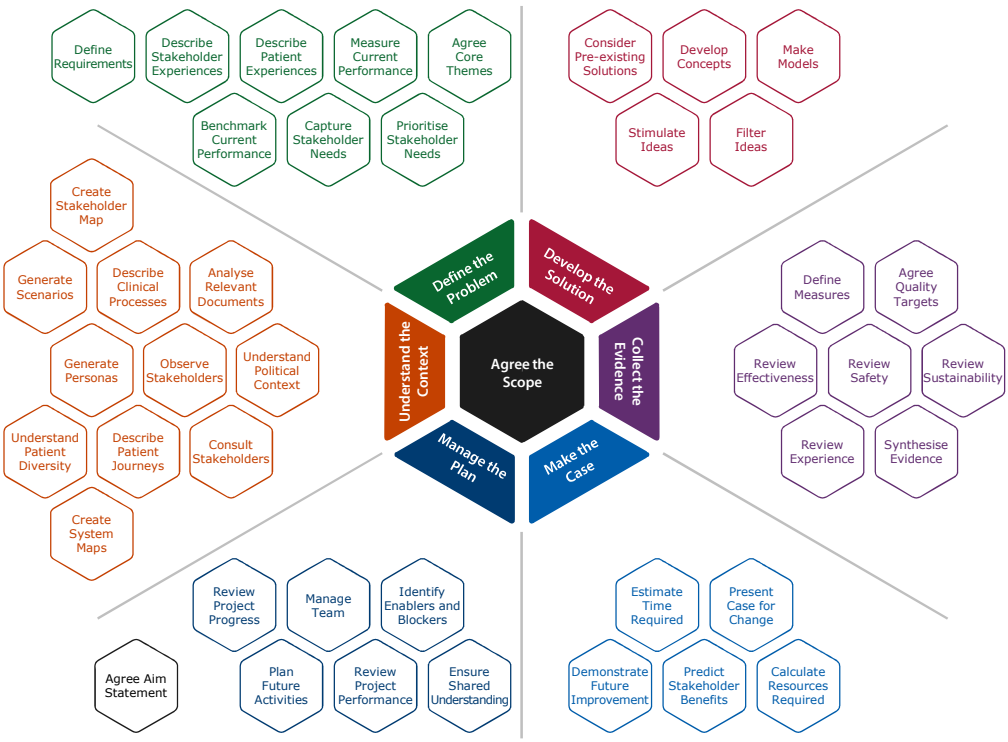


Planning involves not only the selection of the activities required to deliver the stage and strand outputs, but also the clustering, sequencing and scheduling of these activities based on the magnitude of the challenge and the resources available. Different programmes or different teams or different triggers are very likely to result in different plans for a given stage. Such plans will also vary considerably across the stages of a programme. In all cases, the plan(s) will need to be used as a guide to the timing of activities, which remains flexible to change as the programme progresses. The **Stage Plan** is a living document which may be used in electronic form, as a large poster or an interactive worksheet.

Useful toolkit resources: the **Stage Plan** poster, **Stage Plan** worksheet and **Improvement Activities** cards for each of the activities are included in the Resources part of this toolkit.

Selecting Activities

The **Stage Activities** enable the team to bridge the gap between what is learned from the preliminary activities and what is required to achieve the targets and deliverables for each stage-gate. These activities will in turn be supported by a number of generic **tools** which provide a range of options for the team in the execution of programme of work. The choice of tools will depend on the particular deliverables required and the competence and experience of the team to use them.



In the first instance, the choice of activities is part of the **Decide the Next Step** preliminary activity. Subsequently, the choice of process activities and tools for each stage of the programme is decided using the **Plan Future Activities** preliminary activity as part of the **Manage the Plan** strand, where the activities required for each strand of the programme, their detail planning, and their order, will critically depend on the particular challenges.

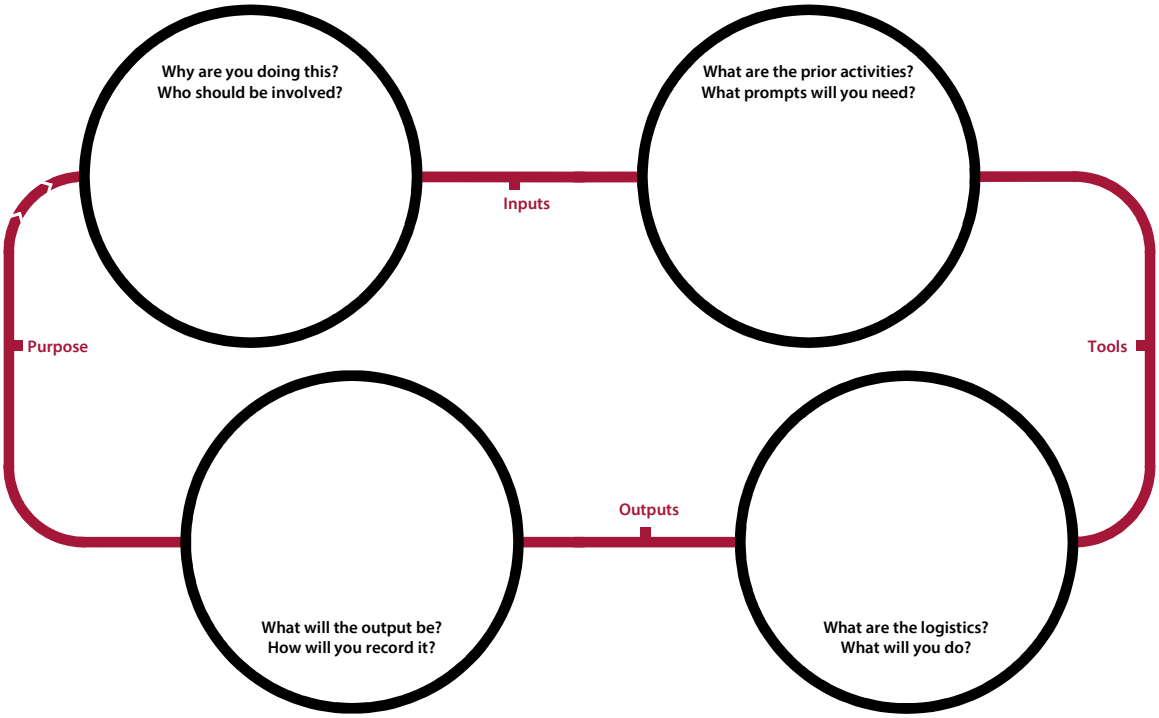
The **Stage Activities** are not designed to be rigid, rather they are intended to inspire enquiry across all areas of the improvement process in order to understand the context of the improvement challenge and the gap between the current performance of the system and its desired performance. Each activity may also be supported by one or more **tools** to provide structure and assist the delivery of useful outputs. The same tools may also be used for more than one activity.

The task of the facilitator or programme management team is to identify those activities which are essential to the improvement process, and to configure and order them in such a way that they are most likely to deliver an effective improvement programme. The combination of preliminary and process activities is designed to enable the most effective tailoring of the improvement programme to the particular improvement challenge and resource availability. It also allow activities to be combined with exiting improvement approaches and models of change.

Useful toolkit resources: Stage Activities poster, **Improvement Activities** cards and **Improvement Tools** cards are included in the Resources part of this toolkit.

Preparing Activities

A systematic approach may be used to prepare for each **activity**, in terms of the actions required before, during and after its execution. Each description is bespoke, reiterating the purpose of each individual activity, identifying prior activities and useful tools, and providing tips for the execution of the activity. Together these descriptions will enable the planning details of each activity to be recorded as an aid to delivering the overall process.

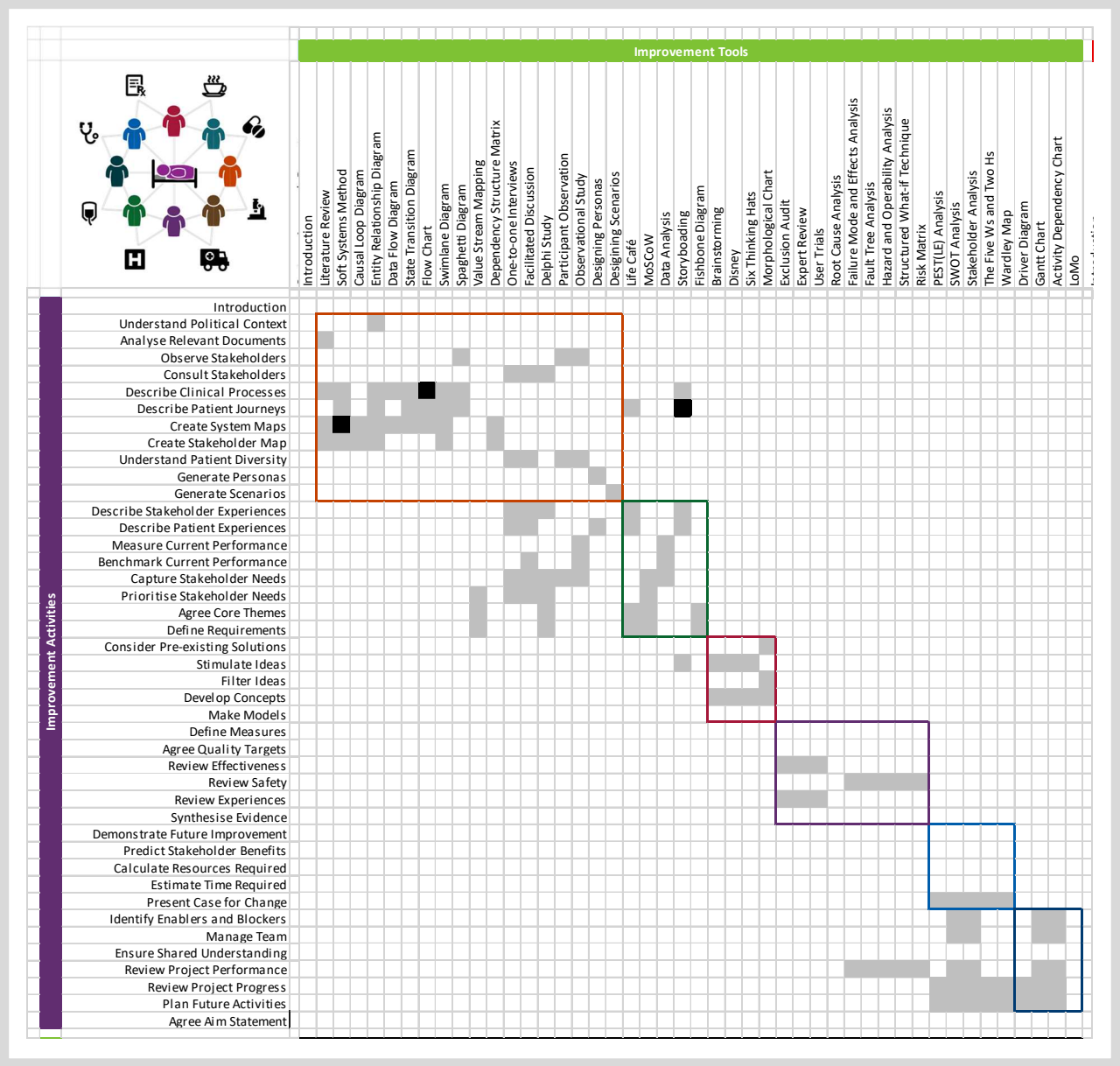


A set of **Activity Plans** complement the **Stage Plan** and provide a summary of all intended improvement actions. Additional information may be added where one or more activities form the basis of a project workshop or meeting to enable detailed timing of such an event. These are living documents which may be used in electronic form, as large posters or interactive worksheets.

Useful toolkit resources: the **Activity Plan** worksheet, **Improvement Activities** cards and **Improvement Tools** cards are included in the Resources part of this toolkit.

Preparing Activities

Tools may be mapped to **activities** to assist in their selection. More than one tool may be used for any particular purpose and this is often encouraged. The mapping provides clear indication as to how **tools** might be used to support **activities**, but is not expected to exhaustively show where tools have actually been used in practice. Note that the **activities** themselves may be alternates, dependent on one another, or inter-dependent, and that it is not necessary to undertake all the activities within a particular programme strand to ensure success.



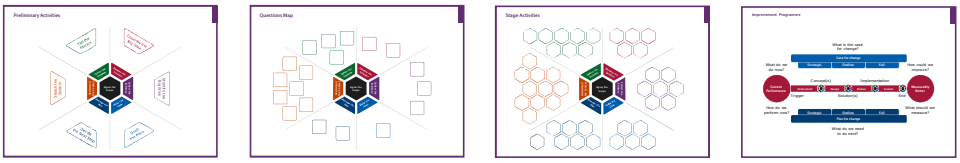
Useful toolkit resources: cards for each of the activities and tools are included in the Resources part of this toolkit.

Process Summary

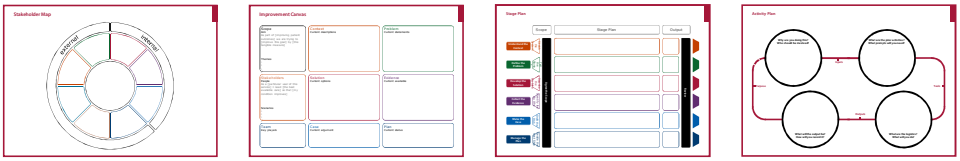
The improvement process, informed by **posters** and captured by **worksheets**, may be summarised as:

- Fill in the **improvement canvas** with known information
- Identify possible **knowledge** gaps and **outputs** to be created
- Select the **activities** (or **questions**) to be addressed
- Prepare the **activities** (and associated **tools**) for use
- Plan the improvement **programme** and **iterate** as appropriate

Posters inform



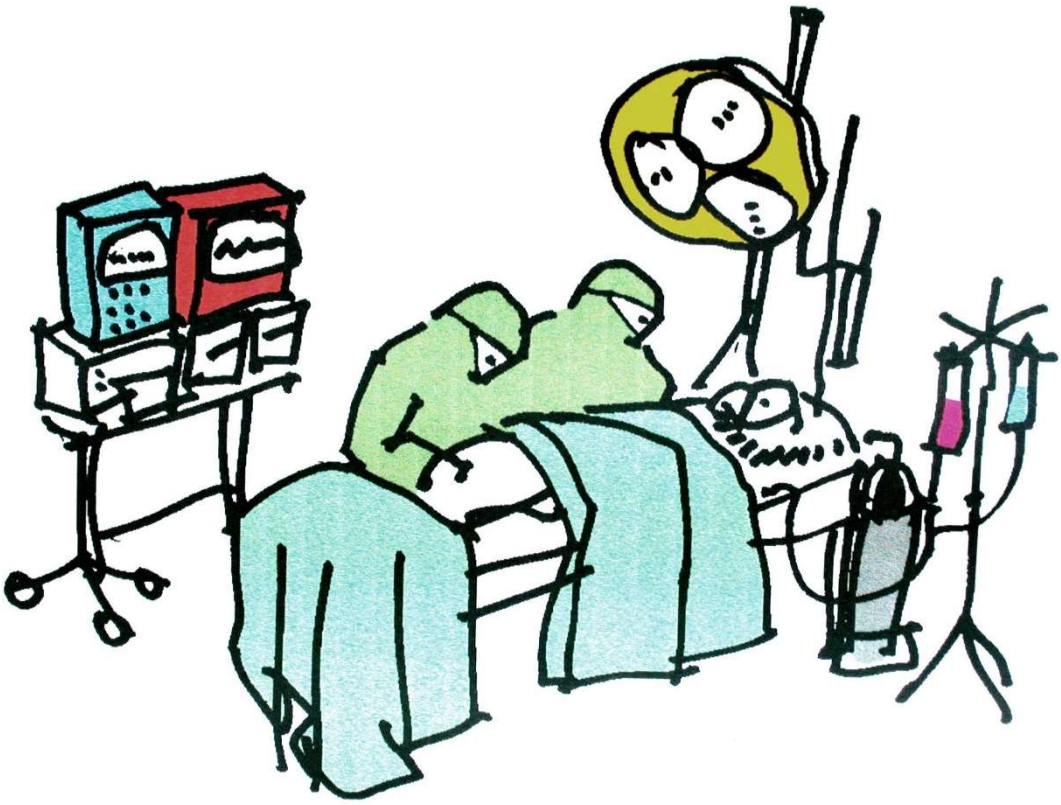
Worksheets capture



This process may be summarised as a linear, yet iterative process, that is designed to deliver improvement. It allows the improvement facilitator to weave interchangeably between focusing on the **Questions** and/or the **Activities** in order to successfully deliver an effective improvement process.

Useful toolkit resources: all the **posters**, **worksheets** and **cards** required to facilitate this process may be found in the Resources part of this toolkit.

Case Studies



Summary

These case studies explore the use of a systems approach in the development, delivery or improvement of a range of engineering and healthcare systems.

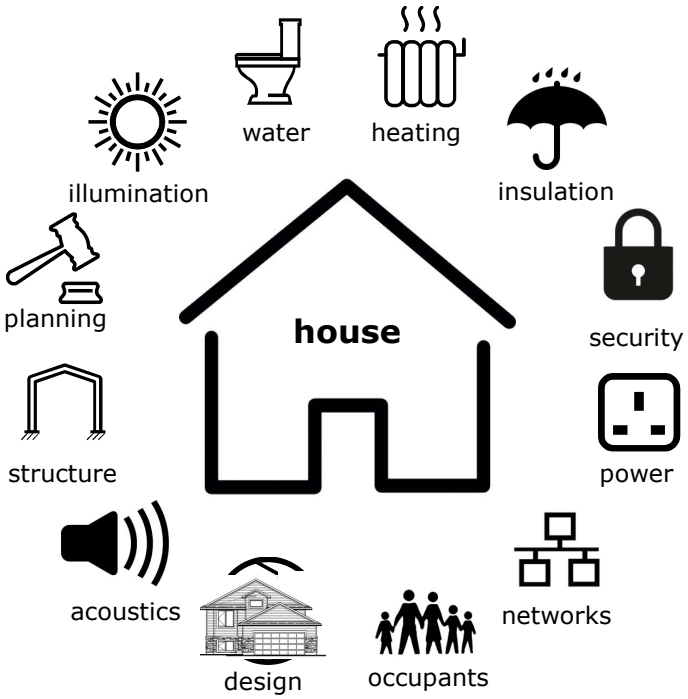
Contents

- Engineering
- Healthcare

Engineering

The Home

Consider a house that is made up of a number of systems that co-exist to ensure that a house becomes a home. Some are discrete yet interconnected (water, heating, power, security and networks) while others are naturally more holistic (design, structure, planning, illumination and insulation).



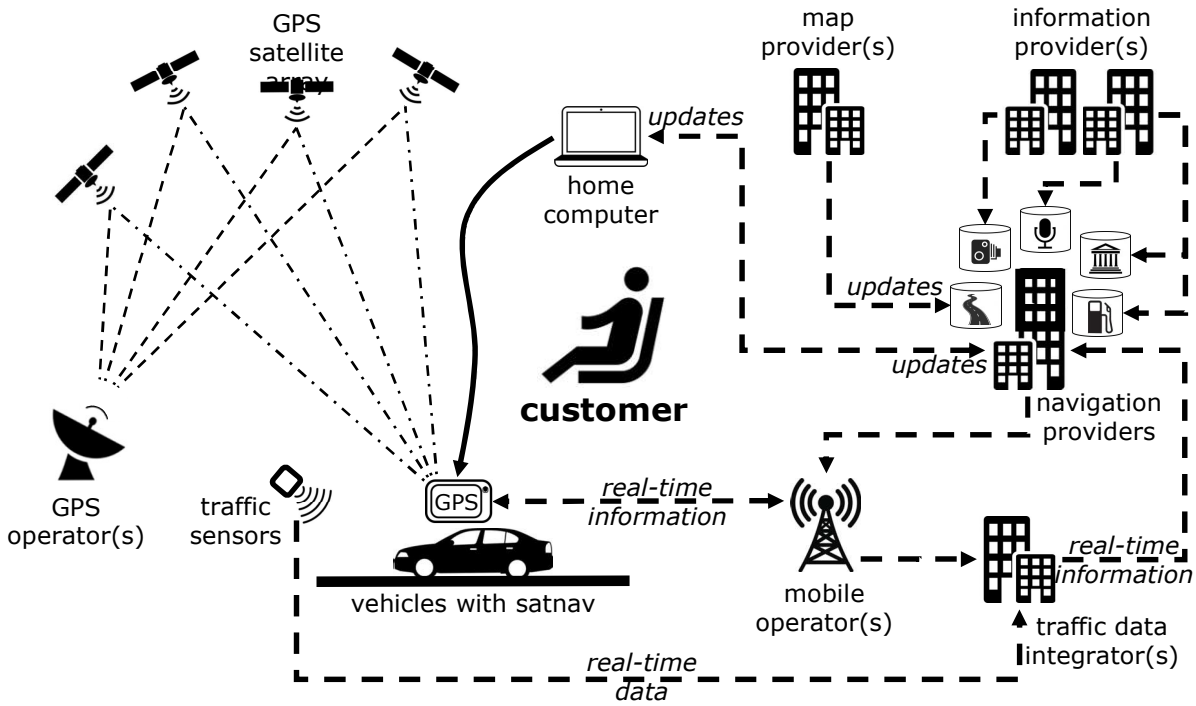
The delivery of any particular system requires expert knowledge of that system and how it will interface to the whole. The heating specialist cannot develop an appropriate solution without knowledge of the design, structure and insulation, nor can they deliver the solution without detail of the power and water systems. Each specialist will have a different perspective on the house, yet architects, and subsequently builders, act as system integrators, delivering homes with emergent properties greater than the sum of the individual parts. For example, the energy rating of a house depends on a combination of design, structure, insulation and heating, while its desirability may depend on these and many more factors.

A good house design is critically dependent not only on its architectural properties but also on engineers systematically evaluating its performance. Structural engineers model the resilience of the house under all expected loads, insulation specialists model its thermal properties and heating engineers size their systems based on these results and the likely behaviour of its occupants. Utility providers model the water, waste and power requirements, particularly where multiple houses are being built. Local authorities model the impact of new homes on the environment and on local services such as schools, hospitals, highways and waste collection. Governments model the demand for new homes based on expected patterns of migration. As a result, the house may be seen as an element in an extended system of systems.

Engineering

Satellite Navigation

Engineered systems often rely for their operation on a number of independent, but interrelated systems. For example, a satellite navigation system depends on the action and operation of a number of service providers. The degradation of any one of these systems or the interfaces between them will have an adverse impact on the navigation experience and possibly the safety of the vehicle occupants.

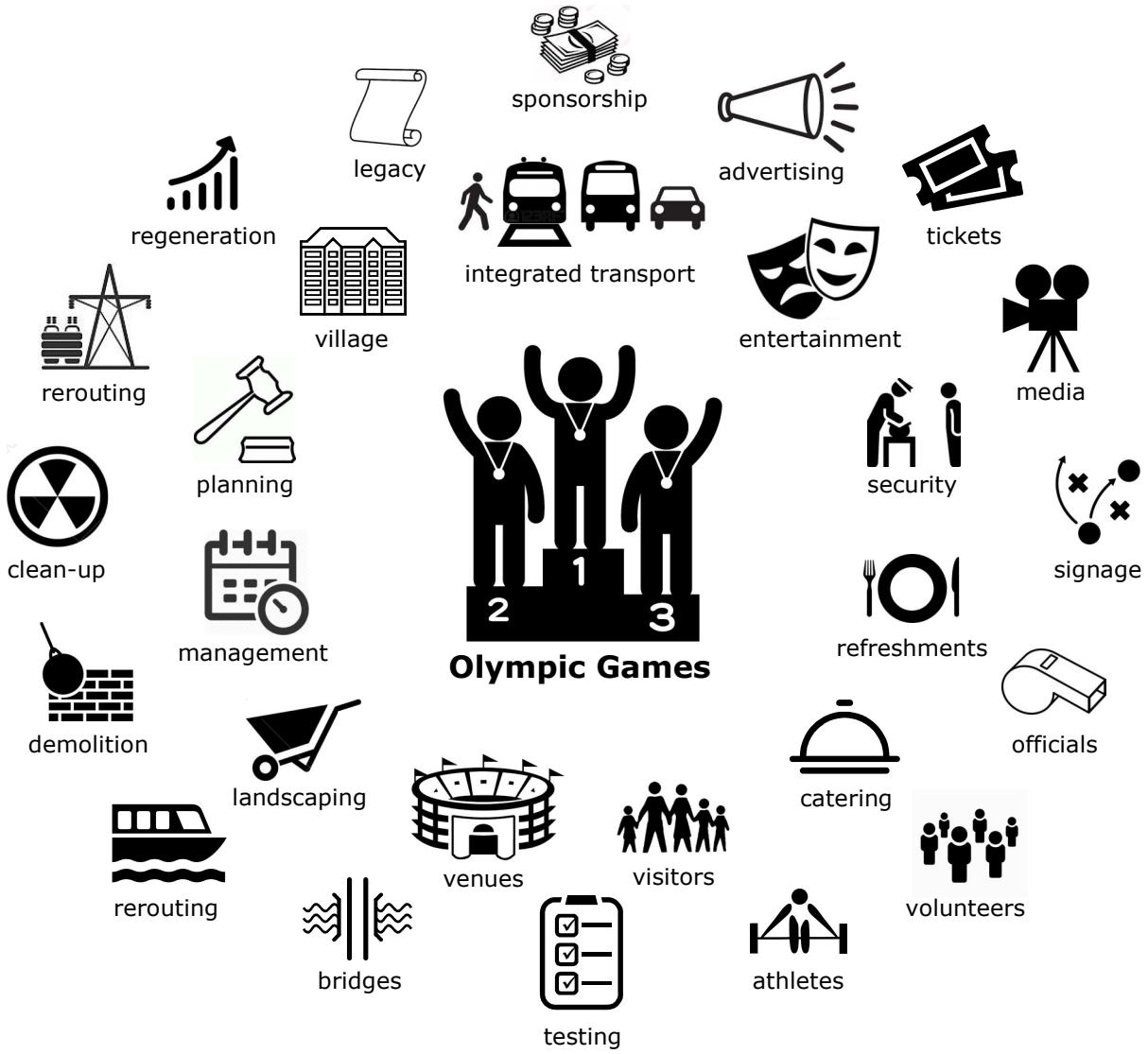


Further systems, such as rocket launch vehicles, mapping technologies and voice recording studios, are also required to enable the successful deployment of a navigation system. Inevitably, the focus of individual development teams for these systems would have been different, particularly since GPS satellite arrays and mobile telecommunication systems were not initially designed with commercial navigation systems in mind. However, the architects of satnav systems would have had a holistic vision for their system of systems and robust descriptions of the interfaces relevant to the individual elements and to the whole.

Engineering

The Olympics

Systems are designed at many levels of scale from the micro to the macro, where they often involve complex interactions between people, physical infrastructure and technology. This is exemplified by the London 2012 Olympic and Paralympic Games: 205 competing nations, 17,000 athletes and officials, 26 different sports, covered by 22,000 journalists and over 10 million tickets to be sold. An Act of Parliament established the Olympic Delivery Authority (ODA) with a budget of £8 billion to deliver the infrastructure, venues, athletes' village and transport in a sustainable manner and to leave a lasting legacy[1].



The ODA commissioned a delivery partner to manage the construction of the Olympic Park in East London and to manage the complex logistics on the site. Both were similarly incentivised to ensure an alignment of objectives between the two teams to deliver a programme over six stages: Plan, Demolish, Build, Test, Games and Legacy. Their common purpose was to deliver the best Games ever and a lasting legacy for London. A number of interrelated elements were developed relating not only to the physical infrastructure required, but also to the practical organisation of the Games.

1. Engineering the Olympics: The 2011 Lloyd's Register Educational Trust Lecture. Royal Academy of Engineering, London, UK, 2001

Engineering

The Olympics

The success of the Games and its legacy was critically dependent on early decisions relating to the Olympic Park, a challenging site that needed significant redevelopment. Both the immediate and future needs were realised through the provision of temporary or reconfigurable sports venues, removable bridges alongside permanent structures and landscaping for the longer term. Innovative engineering delivered world-class, cost-effective buildings. Modelling and simulation of people flows informed provision of signage, refreshments, security, helpers, transport and information for visitors. Testing of new venues identified problems early, leading to better provision for athletes, officials and visitors. Extensive planning and risk management by the engineering-led team made the complex merely complicated. A systems approach, combined with tried and tested engineering methods and tools, delivered real success on a massive scale.

Healthcare

A selection of examples from healthcare have been chosen and presented here to demonstrate that a systems approach is adaptable to all levels of scale, from service level through organisation to cross-organisation, and sufficiently versatile to apply across all areas of health and care. The case studies are representative of systems that are simple, complicated and complex and found at service, organisation and cross-organisation levels.

The following case studies of change or transformation projects aim to put the guiding questions and perspectives described in this toolkit into context. Whilst not all the projects described will have explicitly used a systems approach, the case studies highlight how they have taken into account the **people**, **systems**, **design** and **risk** perspectives in their work. Further case studies can also be found in the Engineering Better Care[1] report.

Esther

Esther inspired her local medical department to initiate a series of interviews and workshops to identify redundancies and gaps in medical and community care systems[2]

Insights:

- Esther represents elderly persons who have complex care needs
- Changes required the cooperation of a variety of stakeholders
- Deliver multi-provider care as if it were from the same provider

Esther

Esther inspired her local medical department to initiate a series of interviews and workshops to identify redundancies and gaps in medical and community care systems

Methotrexate

When a patient died as a direct result of failures in their own care an inquiry highlighted the need to review the use of oral methotrexate for the treatment of rheumatoid arthritis[3]

Insights:

- Patients' needs were at the heart of the system-wide review
- Changes required the cooperation of a variety of stakeholders
- Safety still relies in part on the actions of the patient

Methotrexate

When a patient died as a direct result of failures in their own care an inquiry highlighted the need to review the use of oral methotrexate for the treatment of rheumatoid arthritis

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

2. *Sweden's Esther Model: Improving Care for Elderly Patients with Complex Needs*. Gray, Winblad and Sarnak, The Commonwealth Fund, 2016.

3. *Methotrexate Toxicity. An Inquiry into the Death of a Cambridgeshire Patient in April 2000*. Cambridgeshire Health Authority, 2000.

Healthcare

Community Care

Understanding people's ability to respond to the challenges in accessing community care can lead to improvements that directly influence clinical outcomes

Insights:
- All health and care services make demands on their patients
- Patients need sufficient capabilities to meet service demands
- Making services more accessible improves patient outcomes

Community Care

Understanding people's ability to respond to the challenges in accessing community care can lead to improvements that influence clinical outcomes

Day Surgery

Perioperative care during day surgery is known to influence patient outcomes and understanding those factors that most effect the patient is of critical importance

Insights:
- Patient outcome data can inform the care of individual patients
- Delphi studies can lead to a consensus view of patients risks
- Data analysis can lead to a better understanding of clinical actions

Day Surgery

Perioperative care during day surgery is known to influence patient outcomes and understanding those factors that most effect the patient is of critical importance

Global Health

In low and middle income countries where healthcare resources are limited, improvements in care are likely to rely on systems changes as well as new technologies

Insights:
- Mapping the system is crucial in identifying areas for improvement
- A systems approach needs to be carefully translated for local use
- Lessons learned have to be used sensitively to transform practice

Global Health

Observing patterns of treatment in an emergency department led to the development of tools to identify and evaluate more robust patient flow management paradigms

Healthcare

Palliative Care

New approaches to palliative care are required in response to people's changing needs and expectations within an increasingly resource constrained health service

Insights:
- Palliative care is often distributed across multiple care providers
- Palliative thinking is not just for palliative specialists
- Current approaches to care are not universally accessible

Palliative Care

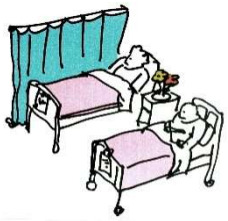
New approaches to palliative care are required in response to people's changing needs and expectations within an increasingly resource constrained health service

Patient Flow

Observing patterns of treatment in an emergency department led to the development of tools to identify and evaluate more robust patient flow management paradigms

Insights:
- Patient flow within the emergency department is complicated
- The physician in charge uses heuristics to manage flow
- Heuristics provide a classification of problem solving approaches

Patient Flow



Observing patterns of treatment in an emergency department led to the development of tools to identify and evaluate more robust patient flow management paradigms

Public Health

Obesity among children is a significant challenge, requiring families, schools, food, community and healthcare services to work together resolve the crisis

Insights:
- A recognition of systems is key to sustainable success
- The value of building capacity and encouraging engagement
- The need to introduce coordinated strategies across the whole system

Public Health

Obesity among children is a significant challenge, requiring families, schools, food, community and healthcare services to work together to resolve the crisis

Improvement Questions

Introduction

Page 2-1 onwards

Describes a set of questions appropriate for a health and care improvement process.

Managing Improvement

Page 2-5 onwards

A process perspective answers key questions in an iterative and systematic way to guide a set of complex needs through to validated and effective operational systems.

Describing People

Page 2-17 onwards

A people perspective uses knowledge of stakeholders' abilities, experience, competence and culture to enable the design of systems that are fit for their intended purpose.

Mapping Systems

Page 2-25 onwards

A systems perspective ensures the design and improvement of safe and efficient systems that satisfy their required purpose in the context of a wider system.

Inspiring Design

Page 2-33 onwards

A design perspective ensures that systems are delivered using a range of perspectives, creative approaches and evaluation strategies in order to meet stakeholder needs.

Assessing Risk

Page 2-41 onwards

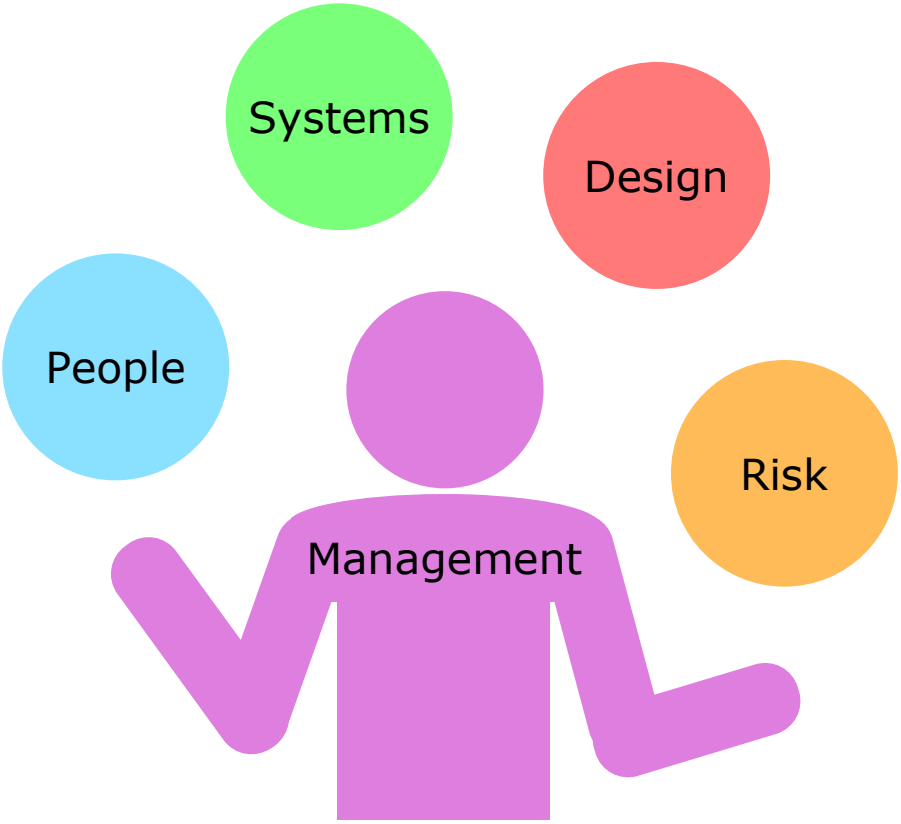
A risk perspective ensures that system threats and opportunities are identified and their consequent risks are managed in accordance with stakeholder expectations.

Using these Questions

Page 2-49 onwards

The case studies explore retrospectively how the questions from the spiral model of this toolkit's systems approach could be applied to large systems.

Introduction



Summary

This introduction describes a set of questions that form the basis of a systems approach to health and care design and continuous improvement.

Introduction

The engineered world is full of systems. From the simple water heater to the fully integrated international airport, from ancient irrigation systems to modern communication networks, all systems share one key feature: their elements together produce results not obtainable by the same elements alone. These elements, or parts, can include people, processes, information, organisations and services, as well as software, hardware and other systems.

A system (or system of systems) is a set of elements: people, processes, information, organisations and services, as well as software, hardware and other systems that, when combined, have qualities that are not present in any of the elements themselves. A system is delineated by its spatial and temporal boundaries, surrounded and influenced by its environment, described by its structure and purpose, and expressed in its functioning. In other words, the whole is very likely to be greater than the sum of the parts. The layout of the system, defining all the elements and their interconnections, needs to be carefully considered to ensure that each element on its own and in combination with others performs as required. In response to this challenge and the ever increasing complexity of modern systems, a new discipline of systems engineering has evolved as an interdisciplinary approach to enable the realisation of successful systems.

"Systems that work do not just happen — they have to be planned, designed and built"

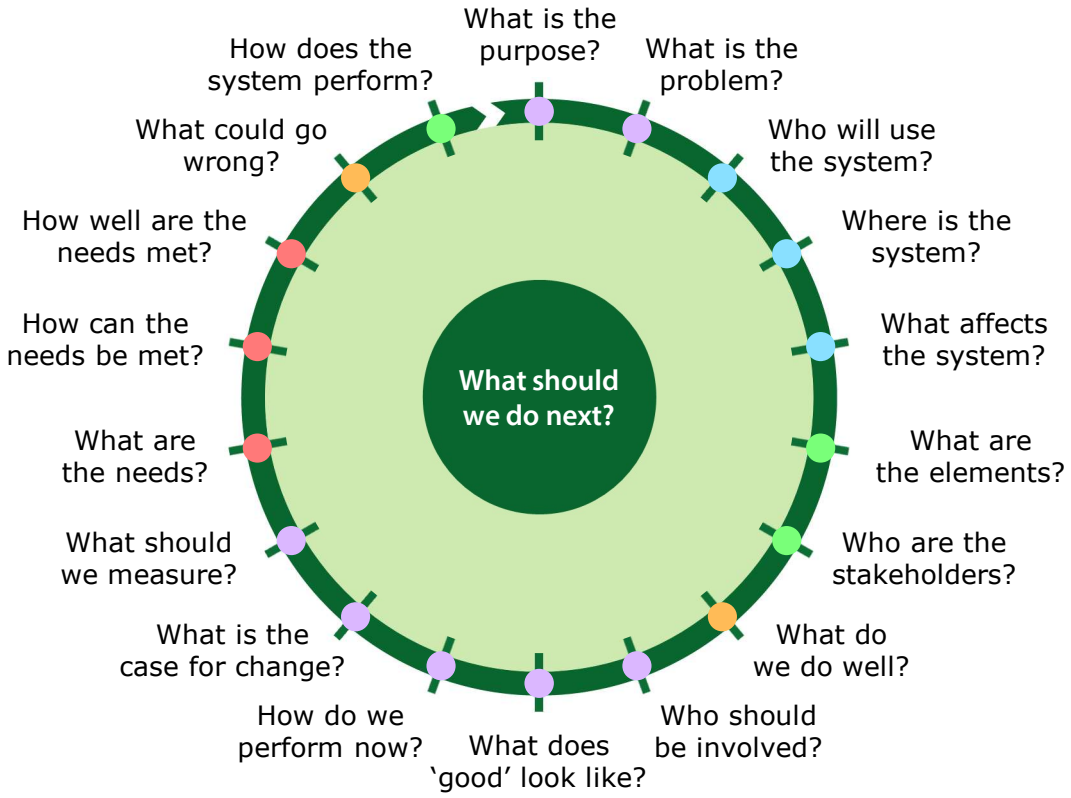
Engineers routinely use a systems approach to address challenging problems in complex projects. This allows them to work through the implications of each change or decision they make for the project as a whole. They consider the layout of the system, defining all the elements and interconnections, to ensure that the whole system performs as required. One example is the successful delivery of the London 2012 Olympic and Paralympic Games. Physical infrastructure and practical organisation were brought together, with innovative physical engineering, modelling and simulation of people flows, early testing of venues, and extensive risk management. A systems approach, combined with tried and tested engineering methods and tools, delivered real success on a massive scale.

Introduction

As already seen in the **Improving Improvement** section of this toolkit, The **Engineering Better Care**[1] report describes the development of a systems approach to health and care design and continuous improvement, taking inspiration from both the healthcare and engineering sectors. It takes a broad view of systems (or systems of systems) as a set of elements that include people, processes, information, organisations and services, as well as software, hardware and other systems that, when combined, have qualities that are not present in any of the elements themselves. It then proposes that a systems approach is a process that integrates four key and complementary perspectives:

- **People**: understanding of interactions among people, at the personal, group and organisational levels, and other elements of a system in order to improve overall system performance
- **Systems**: addressing complex and uncertain real world problems, involving highly interconnected technical and social elements that typically produce emergent properties and behaviour
- **Design**: focusing on improvement by identifying the right problem to solve, creating a range of possible solutions and refining the best of these to deliver appropriate outcomes
- **Risk**: managing risk, based on the timely identification of threats and opportunities in the system, assessment of their associated risks and management of necessary change.

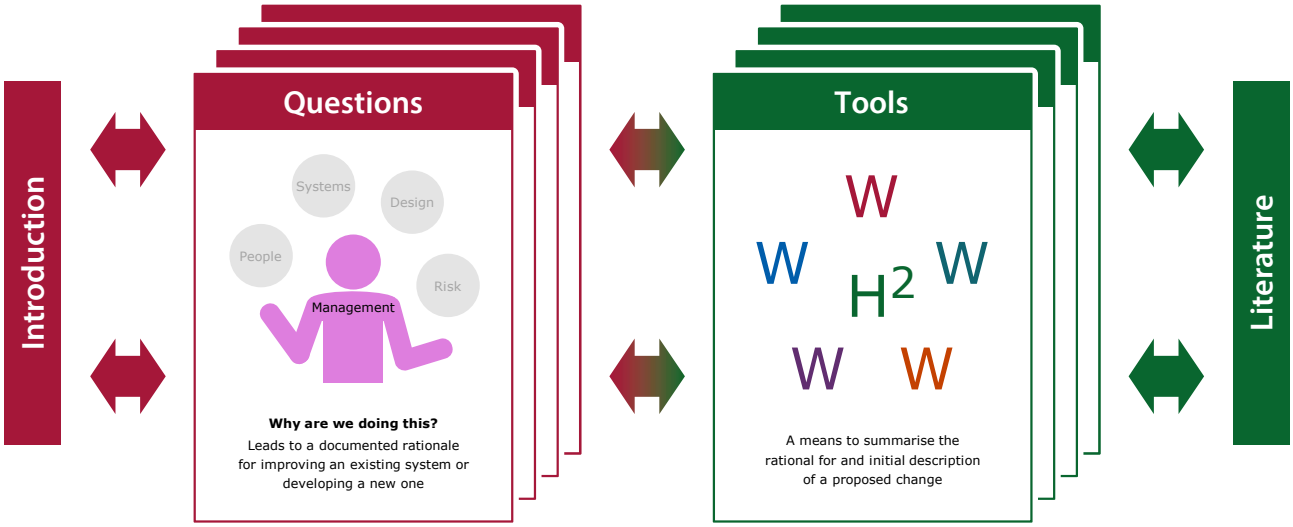
Each of the four perspectives of **people**, **systems**, **design** and **risk** can be seen as individual components within an overall improvement process. However, while each uniquely contributes to a systems approach, they are inextricably linked and the challenge is to integrate them within a useful, versatile and systematic process that repeatedly delivers results. The **Engineering Better Care** report presents the improvement process as an ordered set of questions, based on the individual perspectives, that should be asked until the **current system** is improved to delivered something **measurably better** into service. That sequence of questions has been extended to introduce questions related to the **management** of the improvement process.



1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Introduction

The following sections describe the contents of this toolkit relating to the **people**, **systems**, **design**, **risk** and **management** perspectives associated with improvement process. In each case, a brief introduction to the perspective is provided, along with details of the questions related to that perspective and tools that may be used to help answer those questions. An introduction to the literature related to each perspective is also provided.



Reference is made throughout to the contents of the [Improvement Resources]() section of this toolkit and to the cards, posters and worksheets included in the toolkit. The methotrexate and Esther case studies described in the [Improving Improvement]() section of this toolkit are also reintroduced and extended to provide insight as to how the questions might have been answered in these studies.

Managing Improvement

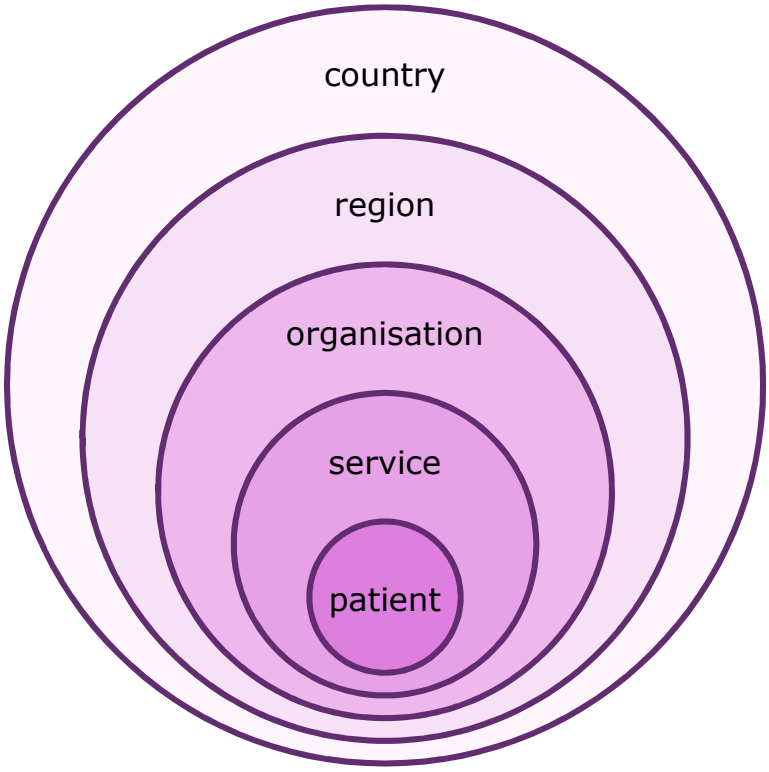
Summary

A process perspective answers key questions in an iterative and systematic way to guide a set of complex needs through to validated and effective operational systems.

Contents

Introduction

The successful management of improvement in complex systems is a practical challenge requiring an understanding of **people**, **systems**, **design** and **risk** perspectives along with improvement **management** skills. In this context, the questions associated with these perspectives have been rationalised where they overlap and improvement programme questions have been added. The have then been reordered to provide a natural sequence for all the questions. The resulting Systems Approach can be applied to the design and improvement of systems at all extremes of scale, with service level improvement taking place at a local level or within a wider context that may subsequently require changes at the organisation level and cross-organisational level.



It is useful to consider the process of improvement to be made up of a series of iterative **purpose / problem / performance**, **plan / team** and **success / measure / case** cycles that enable progress from understanding what is known about the system through to developing successful interventions to the system. This are preceded by a **trigger** and supported by the formation and ongoing management of a **team**. The **current** and **better** questions are assumed to be incorporated in the **organise** and **explore** questions described later in this section of this toolkit. Active management is appropriate at all stages of a product or service lifecycle, from early conception, through use to disposal.

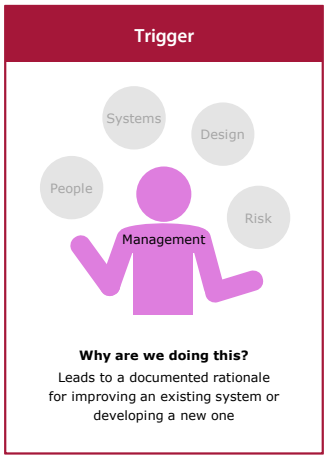
Questions

Trigger

Why are we doing this?

The **trigger** phase asks the question 'Why are we doing this?' and leads to a documented rationale for improving an existing system or developing a new one, with regard to the timing, source and particular nature of the trigger. It is likely to include a variety of activities that can help capture this rationale, for example:

- Record the trigger for the improvement process
- Identify the initial scope of the improvement process
- Ensure that an appropriate team is assembled



All improvement processes are initiated, and potentially shaped, by their **trigger**[1], which may classed as:

- **Strategic** — where risk reduction and improvement is part of an ongoing strategic initiative.
- **Incident** — where an event has resulted in actual or potential harm to patients or clinicians.
- **Local** — where the potential for incidents has been identified locally.
- **Routine** — where a team or individual wishes to check the integrity of their service.
- **Improvement** — where changes are planned to an existing service or system.
- **New** — where a new service is to be introduced into practice or an existing one decommissioned.
- **Technology** — where new equipment or technology is to be introduced to an existing service.
- **Estates** — where estates or buildings are being built, refurbished or maintained.
- **Staff** — where new staff are to be introduced to an existing service or exiting staff levels are changed.
- **External** — where specific strategic changes or checks are externally requested.
- **National** — where teams are encouraged to propose and deliver national service improvements.

A clear understanding of the **trigger** helps to identify the initial scope of the improvement and ensures that an appropriate team is assembled to initiate any subsequent improvement process. Whether the trigger relates to **people**, **systems**, **design** or **risk**, a systems approach should consider all of these perspectives in a seamless and integrated way.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Questions

Purpose

What is the purpose?

The **purpose** phase asks the question 'What is the purpose?' and leads to detailed description of the purpose of the current system within its wider context, based on an understanding of the system and the behaviour and level of performance it is expected to deliver. It is likely to include a variety of activities that can help develop this description, for example:

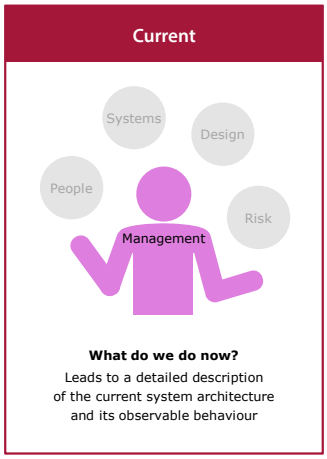
- Provide a detailed description of the purpose of the system
- Understand the wider context of care and therefore of the system
- Identify factors that influence the performance of the system

Current

What do we do now?

The **current** phase asks the question 'What do we do now?' and leads to a detailed description of the current system architecture and its observable behaviour based on observation, active enquiry and analysis of available information. It is likely to include a variety of activities that can help develop this description, for example:

- Provide a detailed description of the current system
- Understand the operation and behaviour of key pathways
- Identify stakeholders and users and their current needs

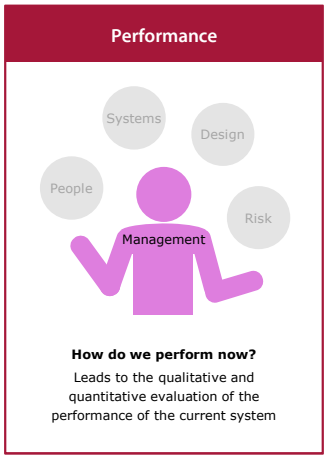


Performance

How do we perform now?

The **performance** phase asks the question 'How do we perform now?' and leads the qualitative and quantitative evaluation of the performance of the current system, with particular regard to the key elements of the system and their expected behaviour. It is likely to include a variety of activities that can help build this understanding, for example:

- Analyse available quantitative data relating to the current system
- Gather qualitative information relating to the current system
- Identify strengths and weaknesses of the current performance



Questions

Problem

What is the problem?

The **problem** phase asks the question 'What is the problem?' and leads to a clearly articulated view of a better system based on an understanding of the current system and the level of improvement desired to achieve acceptable system performance. It is likely to include a variety of activities that can help build this view, for example:

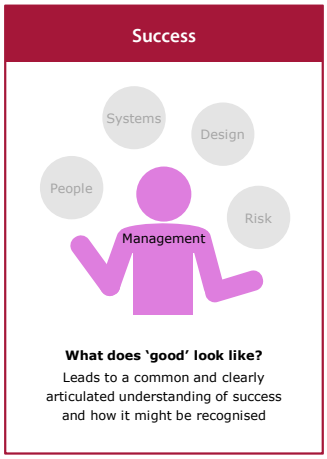
- Describe the current system and its performance
- Describe a future system and its potential performance
- Define the challenge based on the desired improvement

Success

What does 'good' look like?

The **success** phase asks the question 'What does 'good' look like?' and leads to a common and clearly articulated understanding of success and how it might be recognised, with particular regard to reasonable constraints on its delivery. It is likely to include a variety of activities that can help build this understanding, for example:

- Dream of an ideal goal where there are no constraints
- Define a feasible goal reflecting reasonable constraints
- Create a balanced and viable case for change

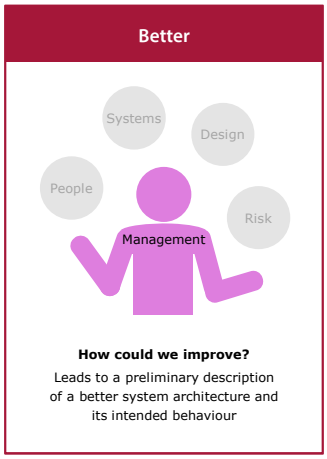


Better

How could we improve?

The **better** phase asks the question 'How could we improve?' and leads to a preliminary description of a better system architecture and its intended behaviour, with regard to the current system architecture and its behaviour. It is likely to include a variety of activities that can help develop this description, for example:

- Provide a preliminary description of a future improved system
- Describe the operation and behaviour of key pathways
- Identify stakeholders and users and their future needs



Questions

Measure

What should we measure?

The **measure** phase asks the question 'What should we measure?' and leads to the identification of possible performance indicators for the improved system, with regard to the proposed system architecture and its intended behaviour. It is likely to include a variety of activities that can help with this identification, for example:

- Describe the intended performance of the improved system
- Identify possible performance indicators for the improved system
- Outline approaches to measure the agreed performance indicators

Team

Who should be involved?

The **team** phase asks the question 'Who should be involved?' and leads to a common and clearly articulated understanding of who should deliver the improved system, with regard to the differing needs at different stages of the delivery. It is likely to include a variety of activities that can help build this understanding, for example:

- Choose a team that reflects the key stakeholders
- Include members who are active in the current system
- Include members who are able to facilitate change

Case

What is the case for change?

The **case** phase asks the question 'What is the case for change?' and leads to the definition of a case for change from the current system to one that is measurably better, with regard to the proposed system architecture and its intended behaviour. It is likely to include a variety of activities that can help with the development of the case for change, for example:

- Compare the current performance to that which is measurably better
- Estimate the value of the proposed system improvement
- Offset the likely value of the change against the cost of change

Questions

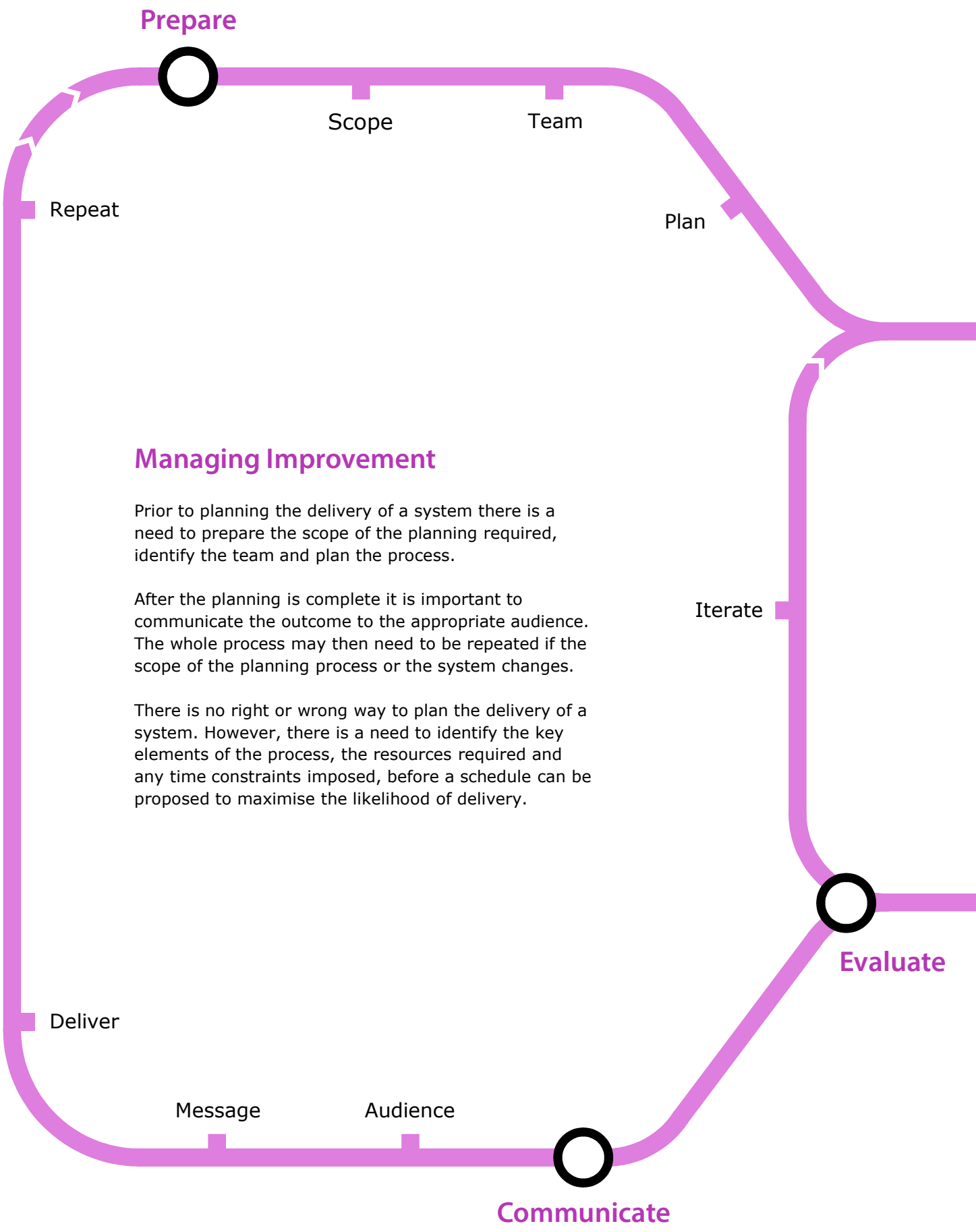
Plan

What should we do next?

The **plan** phase asks the question 'What should we do next?' and leads to the ongoing development and execution of a plan of action to deliver the system in a timely manner, with regard to the resources available for its delivery. It is likely to include a variety of activities that can help with this development, for example:

- Identify the next steps critical to achieving progress
- Build in iteration and contingency to allow for potential problems
- View the plan as a starting point rather than a fixed schedule

Process

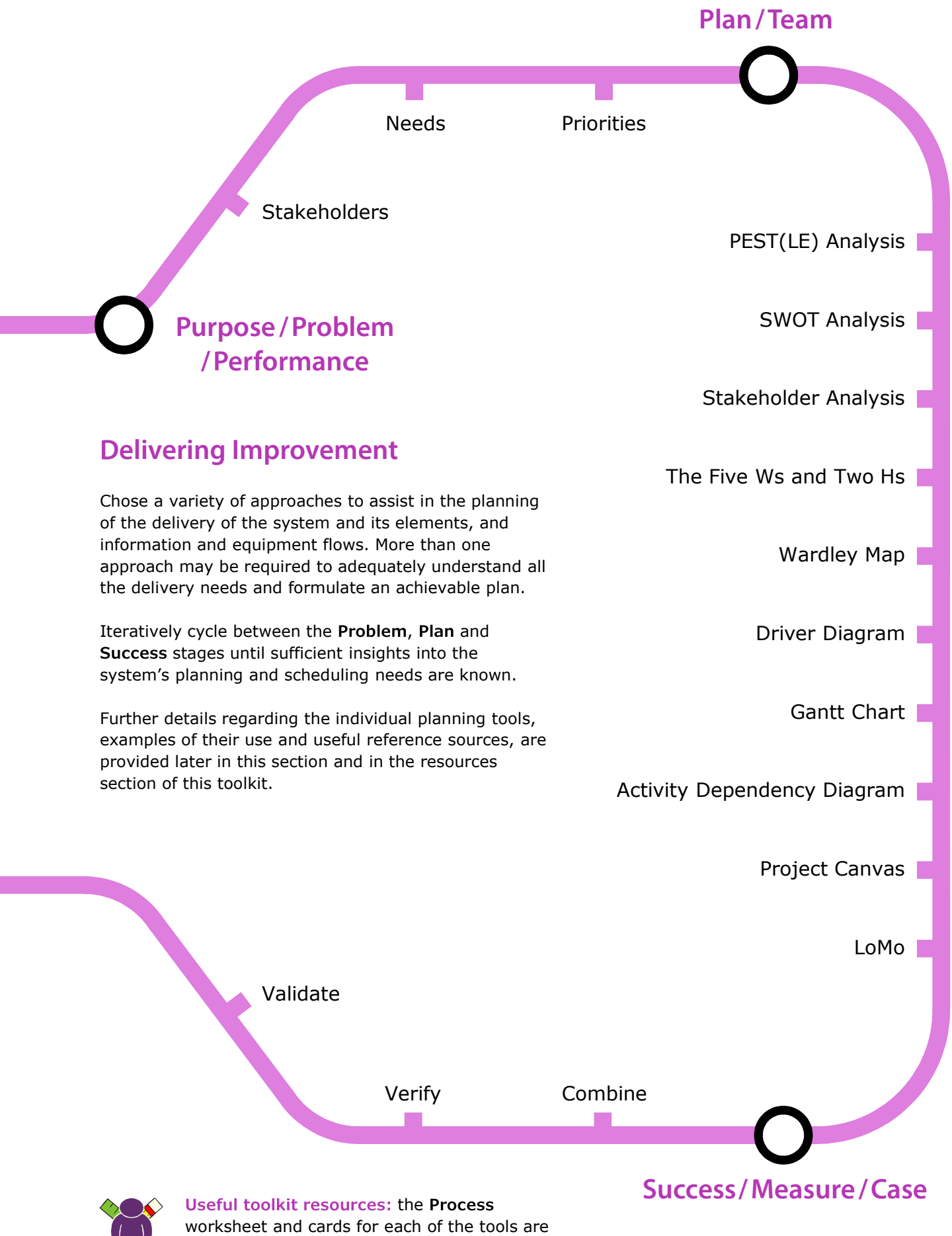


Managing Improvement

Prior to planning the delivery of a system there is a need to prepare the scope of the planning required, identify the team and plan the process.

After the planning is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the planning process or the system changes.

There is no right or wrong way to plan the delivery of a system. However, there is a need to identify the key elements of the process, the resources required and any time constraints imposed, before a schedule can be proposed to maximise the likelihood of delivery.



Delivering Improvement

Chose a variety of approaches to assist in the planning of the delivery of the system and its elements, and information and equipment flows. More than one approach may be required to adequately understand all the delivery needs and formulate an achievable plan.

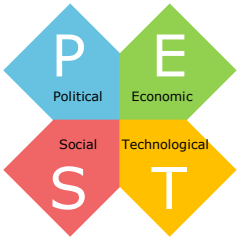
Iteratively cycle between the **Problem**, **Plan** and **Success** stages until sufficient insights into the system's planning and scheduling needs are known.

Further details regarding the individual planning tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

Useful toolkit resources: the **Process** worksheet and cards for each of the tools are included in the Resources part of this toolkit.

Tools

PEST(LE) Analysis

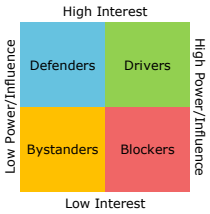


A broad approach to identify the external factors most likely to impact a proposed change

SWOT Analysis

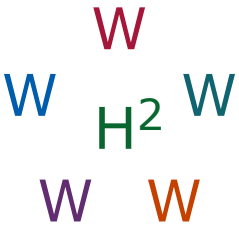
A means to identify the strengths, weaknesses, opportunities and threats associated with a change

Stakeholder Analysis



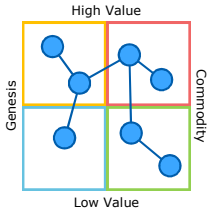
An analysis of the potential for stakeholders to drive or block the outcome of a proposed change

The Five Ws and Two Hs



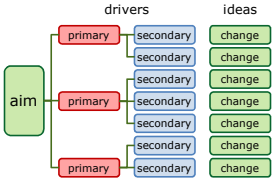
A means to summarise the rational for and initial description of a proposed change

Wardley Map



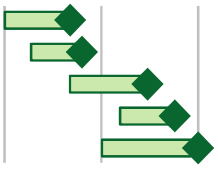
A linked map of stakeholder values set against the maturity of the elements that create them

Driver Diagram



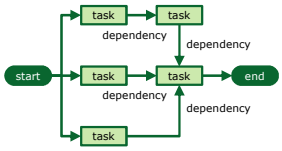
A theory-of-change that can be used to collaboratively plan improvement project activities

Gantt Chart



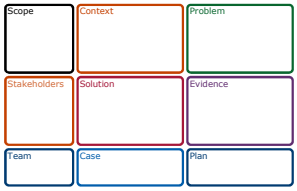
A bar chart to illustrate the schedule required to deliver a programme of improvement

Activity Dependency Diagram



A dependency network to map the activities required to deliver a programme of improvement

Project Canvas



A dynamic summary of a programme of improvement to encourage team consensus

Tools

LoMo

LoMo

A fundamental shift in thinking about the meetings required to deliver a programme of improvement

Literature

British Standards (2008). *BS ISO 7000-1:2008 Design management systems – guide to managing innovation.* British Standards, London, UK.

Davidoff F, Dixon-Woods M, Leviton L and Michie S (2015). Demystifying theory and its use in improvement. *BMJ Quality and Safety*, bmjqs-2014-003627.

Dixon-Woods M & Martin G (2016) Does quality improvement improve quality? *Future Hospital Journal*, **3**(3):191-194.

Fillingham D, Jones B, Pereira P (2016), *The challenge and potential of whole system flow*. The Health Foundation, London UK.

Ham C, Berwick D and Dixon J (2016). *Improving quality in the English NHS: a strategy for action*. King's Fund, London, UK.

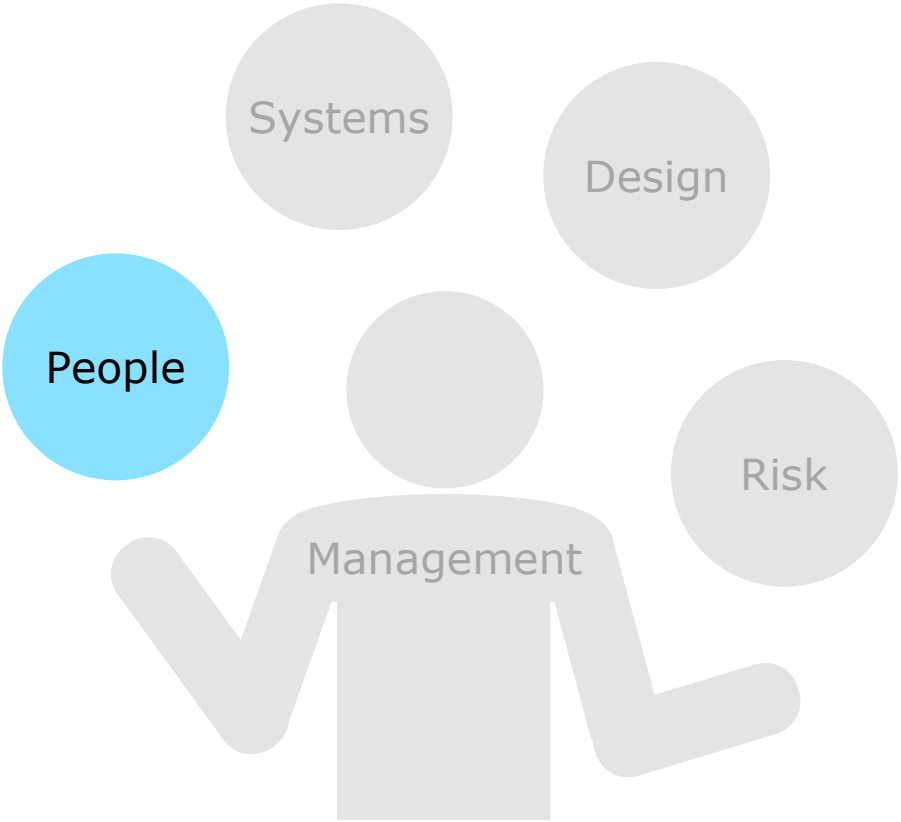
Langley GL, Moen R, Nolan KM, Nolan TW, Norman CL, Provost LP (2009). *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance* (2nd edition). San Francisco: Jossey-Bass Publishers.

McGuire KJ and Spear SJ (2015). Beyond the Jargon: architecture, process and clinical care, *Spine*, **40**(16):1243-1246.

Snowden DJ, Boone ME (2007). A Leader's Framework for Decision Making. *Harvard Business Review*, BR0711.

The Health Foundation (2013). *Quality improvement made simple: what everyone should know about health care quality improvement*. The Health Foundation, London, UK.

Describing People



Summary

A people perspective uses knowledge of stakeholders' abilities, experience, competence and culture to enable the design of systems that are fit for their intended purpose.

Contents

Introduction

The contribution of treatments, equipment, systems, processes and protocols are undeniably critical to health and care provision; however, it is people who ultimately affect the quality of that delivery. An appropriate awareness of people applies not only to the recipients of care, but also to the providers of care. It is important to acknowledge the diversity of the population and that health and care services should be accessible to, and usable by, as many people as reasonably possible, regardless of age or health condition. Equally, a chief executive can have a significant impact on an organisation, through their actions and behaviour, creating a culture that values the importance of the quality of relationships between employees and, most critically, the people in their care.

People are diverse in their size and capability, whether they are members of the public, patients or providers of care. Systems should be designed to be accessible to, and usable by, as many people as reasonably possible.

The success and effectiveness of a system are dependent on consideration of the people within the system, its context or place and the policy defining its operation. This can be represented as a series of iterative **identify**, **locate** and **situate** cycles where it is crucial to pay attention to provider/patient relationships as well as the relationships between health professionals, and how these can be enhanced by providing appropriate technologies, systems and policies to deliver a quality of care judged by the degree of warmth and reassurance shown to both colleagues and the people receiving care.

People are at the heart of an effective systems approach[1], permeate all stages of the development and delivery of a system, and are rightfully central to the systems, design and risk perspectives.

A people perspective serves to involve patients, practitioners and the public to ensure that the systems created are truly fit for their intended purpose and reflect a deep understanding of how knowledge, competence and culture enables people, individually and corporately, to deliver and receive health and care within a complex socio-technical environment[2].

1. *New care models: empowering patients and communities, a call to action for a directory of support.* NHS England, Redditch, UK, 2005.

2. *Implementing human factors in healthcare, 'taking further steps'.* Clinical Human Factors Group, 2013.

Questions

Identify

Who will use the system?

The **identify** phase asks the question 'Who will use the system?' and leads to an understanding of the diversity of people involved and their needs, capabilities and behaviours, including reference to the means by which they will engage with the design of the system. It is likely to include a variety of activities to develop this understanding, for example:

- Identify all the people who will use the system
- Co-create the system with system users and change facilitators
- Ensure accessibility for all systems users

Locate

Where is the system?

The **locate** phase asks the question 'Where is the system?' and leads to an understanding of the physical, organisational and cultural context of the system, including reference to organisation and culture, as well as the demographics and needs of the local population. It is likely to include a variety of activities to develop this understanding, for example:

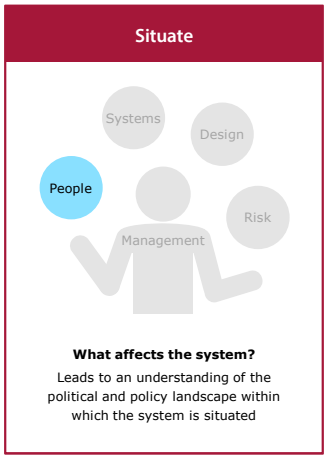
- Capture the needs of the local population
- Identify related or adjacent systems of care
- Understand the current culture relating to the delivery of care

Situate

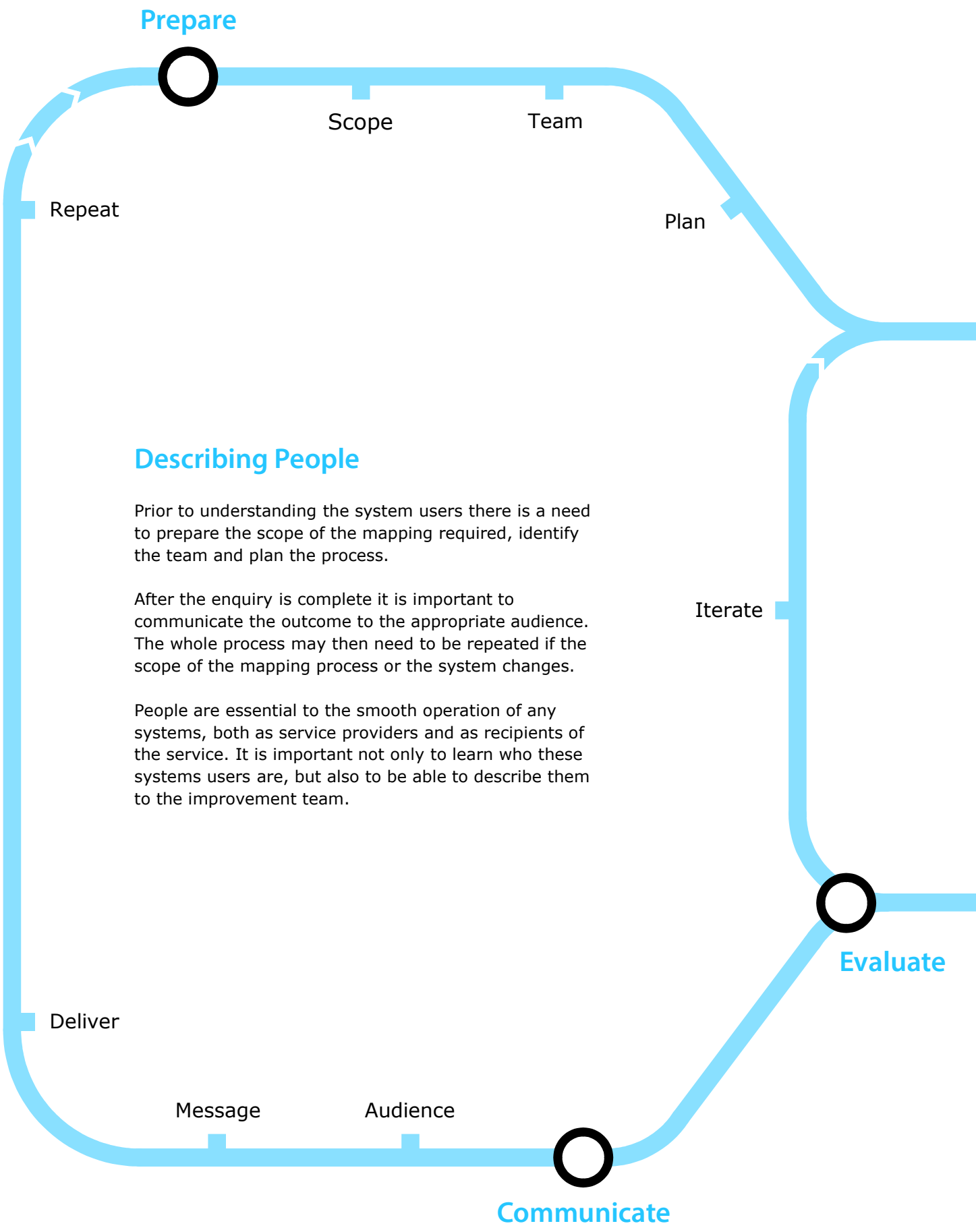
What affects the system?

The **situate** phase asks the question 'What affects the system?' and leads to an understanding of the political and policy landscape within which the system is situated, including reference to policy opportunities and constraints, and the political landscape. It is likely to include a variety of activities to develop this understanding, for example:

- Understand the local and national political landscape
- Encourage a systems approach to the provision of care
- Identify health and care policies that put patients first



Process

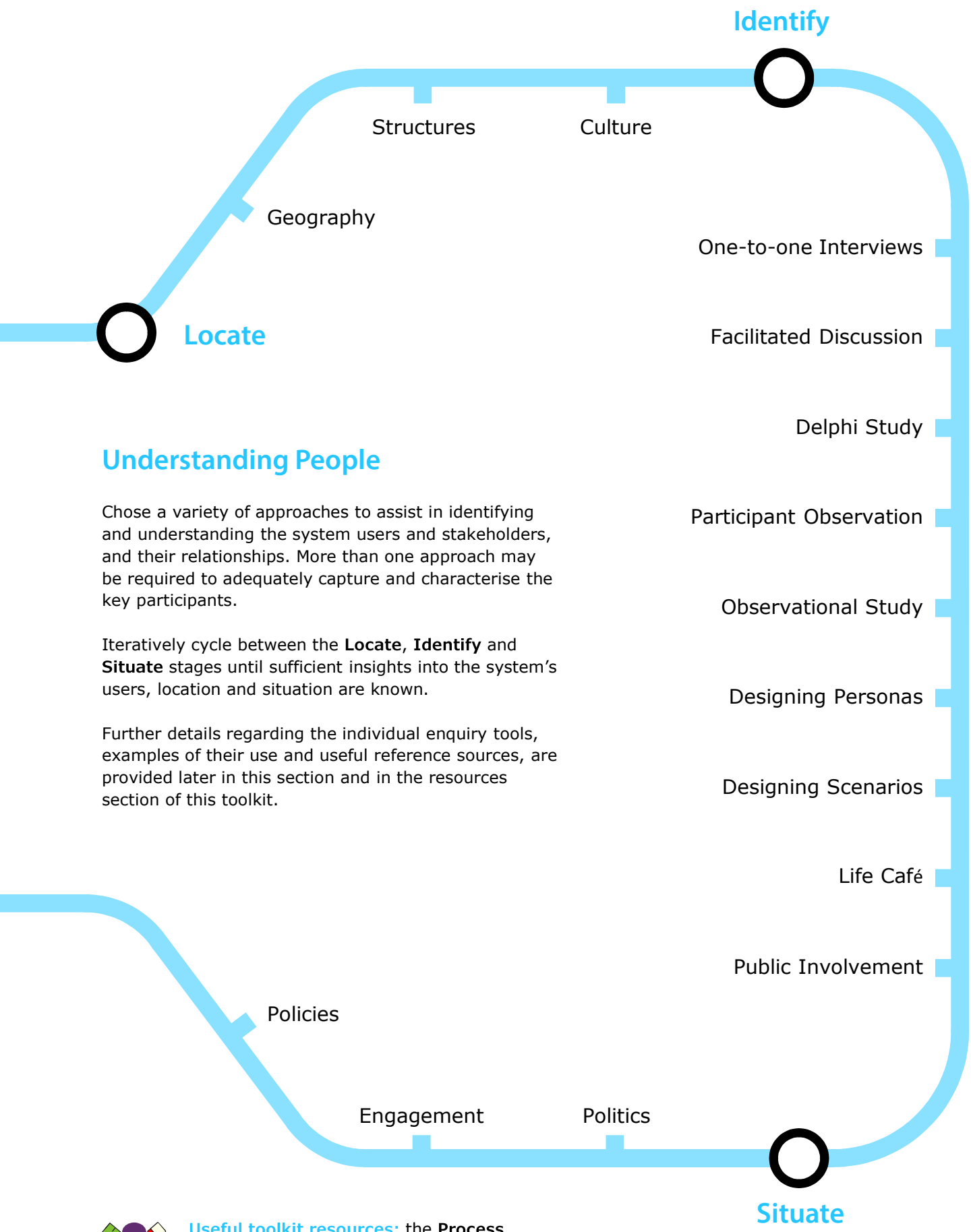


Describing People

Prior to understanding the system users there is a need to prepare the scope of the mapping required, identify the team and plan the process.

After the enquiry is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the mapping process or the system changes.

People are essential to the smooth operation of any systems, both as service providers and as recipients of the service. It is important not only to learn who these systems users are, but also to be able to describe them to the improvement team.



Understanding People

Chose a variety of approaches to assist in identifying and understanding the system users and stakeholders, and their relationships. More than one approach may be required to adequately capture and characterise the key participants.

Iteratively cycle between the **Locate**, **Identify** and **Situate** stages until sufficient insights into the system's users, location and situation are known.

Further details regarding the individual enquiry tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

Useful toolkit resources: the **Process** worksheet and cards for each of the tools are included in the Resources part of this toolkit.

Tools

One-to-one Interviews

A means to elicit information about a particular topic or area of interest in a one-to-one conversation

Facilitated Discussion

A means to elicit perceptions about a particular topic or area of interest in a non-threatening environment

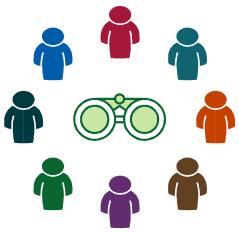
Delphi Study

An iterative approach to develop a consensus view regarding the current performance of the system

Participant Observation

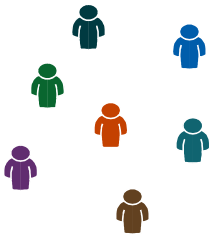
A means to understand how things are really done in a particular situation or area of interest

Observational Study



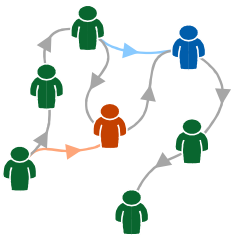
A means to observe how things are done in a particular situation or area of interest

Designing Personas



A means to create representations of stereotypical users and their conditions, capabilities or responsibilities

Designing Scenarios

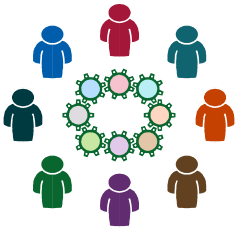


A means to create the stories of stereotypical users reflecting their conditions, capabilities or responsibilities

Life Café

A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

Public Involvement



A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

Literature

Coulter A (2005). What do patients and the public want from primary care? *BMJ*, **331**(7526):1199–1201.
Clinical Human Factors Group (2013). *Implementing human factors in healthcare, 'taking further steps'*. Clinical Human Factors Group.

CQC (2016). *Better care in my hands: A review of how people are involved in their care*. Care Quality Commission, Newcastle, UK.

Erwin K and Krishnan JA (2016). Redesigning healthcare to fit with people. *BMJ*, **354**(i4536).

HRET (2016). *Improving the patient experience through the health care physical environment*. Health Research and Educational Trust, Chicago, IL.

Healthwatch England (2015). *Safely home: What happens when people leave hospital and care settings?* Healthwatch England Special Inquiry, London, UK.

Lucas B and Nacer H (2015). *The habits of an improver Thinking about learning for improvement in health care*. Health Foundation, London, UK.

NHS England (2015). *New care models: empowering patients and communities, a call to action for a directory of support*. NHS England, Redditch, UK.

NHS England (2016). *People helping people: Year two of the pioneer programme*. NHS England, Redd.itch, UK.

Mapping Systems

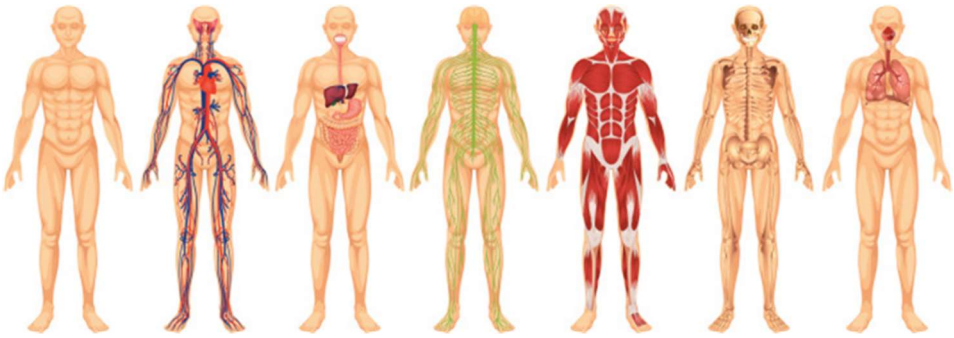
Summary

A systems perspective ensures the design and improvement of safe and efficient systems that satisfy their required purpose in the context of a wider system.

Contents

Introduction

A system is a set of elements: people, processes, information, organisations and services, as well as software, hardware and other systems that, when combined, have qualities that are not present in any of the elements themselves. A systems perspective takes a holistic approach to understanding this complexity that enables the delivery of intended outcomes based on the way in which a system's constituent parts relate to each other and to the wider system.



The design of a system can be considered to be made up of a series of iterative **understand**, **organise** and **integrate** cycles that enable a team to progress from identifying the stakeholders and their needs through to organising a system of elements and interfaces that are subsequently designed, integrated, validated and delivered to satisfy those needs.

Some systems are simple, others are chaotic[1]. Some are complicated with many elements, but operate in patterned ways, others are complex with features whose interactions are continually changing. It is the co-production of health outcomes with the patient, often across a number of systems rather than with any individual health and care system, that can add significant complexity and uncertainty, leading to behaviours not expected when focus is limited to individual systems. As a result, the solution to a challenge may actually involve changing another system and not the one where the problem or symptom is appearing, relying on collaboration and an integrated holistic view of the systems[2].

1. The new dynamics of strategy sense-making in a complex world. Kurtz and Snowden, *IBM Systems Journal*, **42**(3):462-483, 2003.

2. *Creating systems that work: Principles of engineering systems for the 21st century*. Royal Academy of Engineering, London, UK, 2007.

Questions

Understand

Who are the stakeholders?

The **understand** phase asks the question 'Who are the stakeholders?' and leads to a common and accepted understanding of the range of stakeholders and their individual interests, needs, values and perspectives. It is likely to include a variety of activities that can help build this understanding, for example:

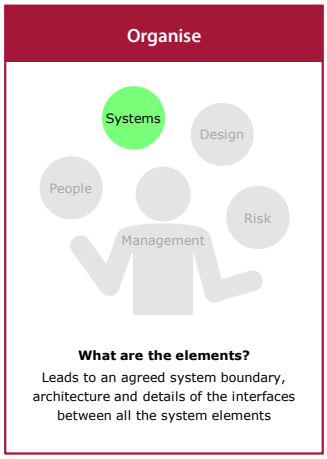
- Identify system stakeholders and capture their needs
- Analyse the stakeholder needs and define priorities
- Draft the business case(s) for system change

Organise

What are the elements?

The **organise** phase asks the question 'What are the elements?' and leads to an agreed system boundary and architecture comprising a description of existing systems, requirements for new systems and details of the interfaces between them. It is likely to include a variety of activities that can help deliver this architecture, for example:

- Agree functional and information requirements
- Define the system architecture, boundary and interfaces
- Agree the system integration and evaluation plan



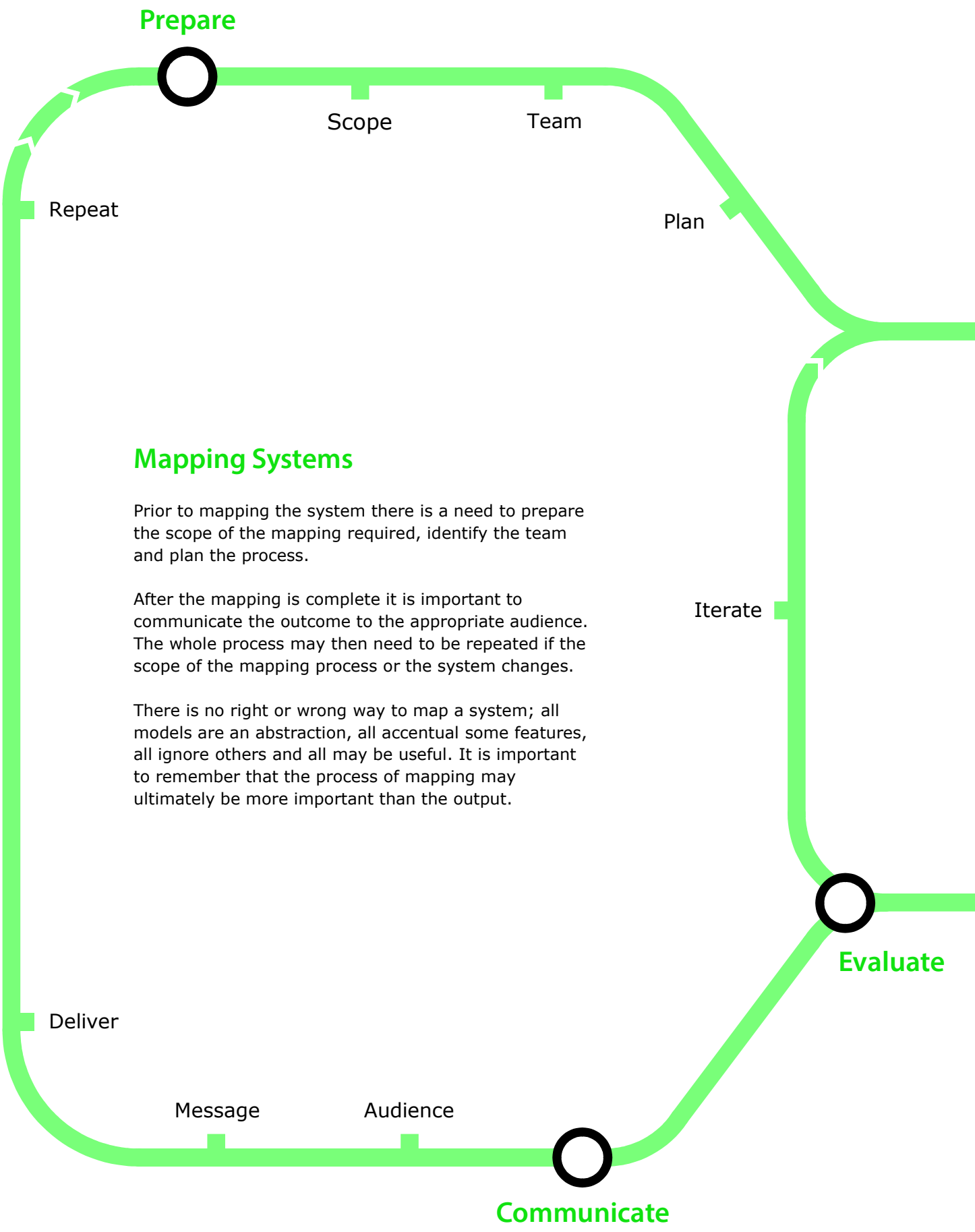
Integrate

How does the system perform?

The **integrate** phase asks the question 'How does the system perform?' and leads to a complete, operational system that is proven to meet the stakeholder requirements and is fit for its intended purpose. It is likely to include a variety of activities that can help deliver an integrated system, for example:

- Combine the system elements to build the complete system
- Verify and validate the system performance
- Monitor the system performance when it is in use

Process

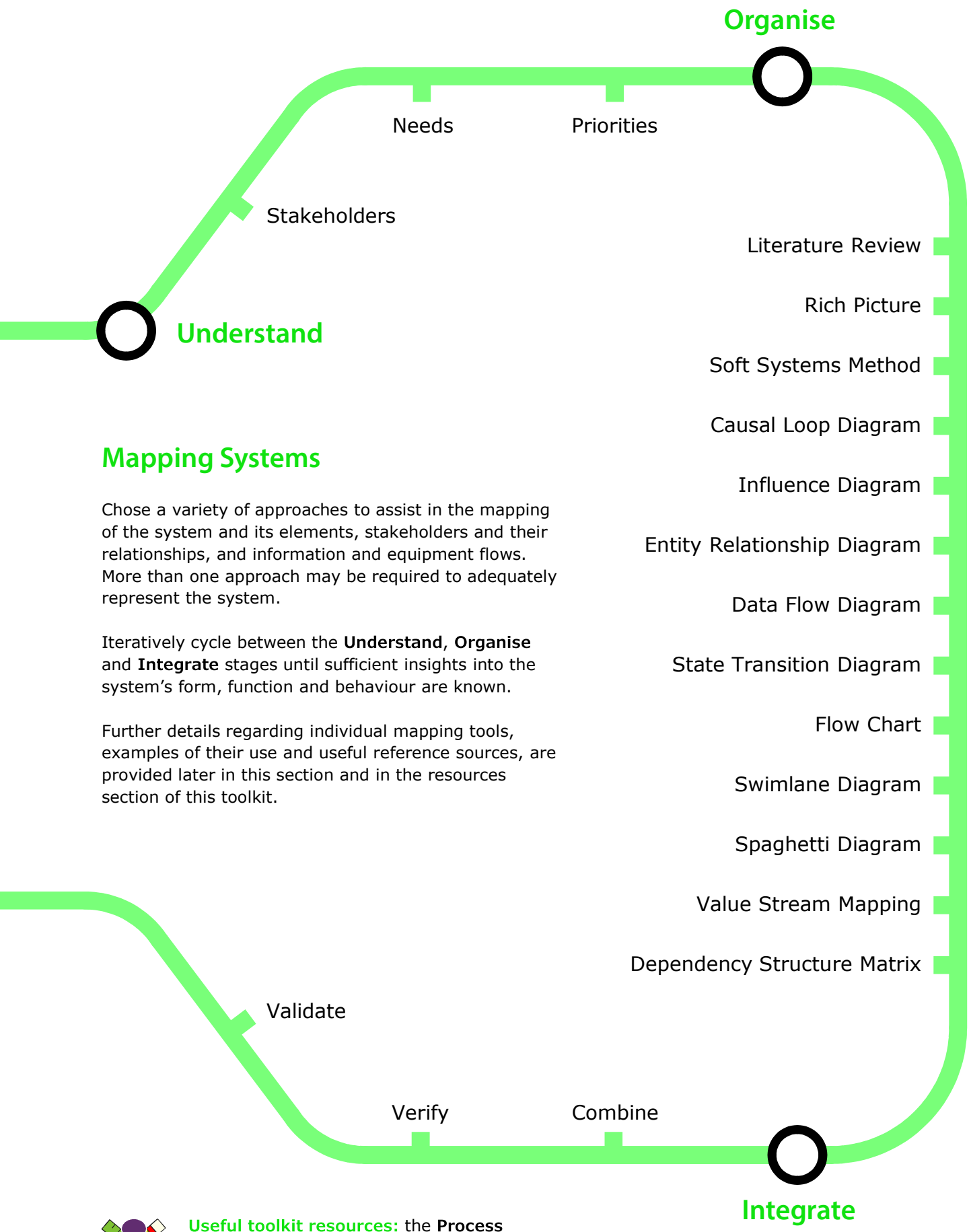


Mapping Systems

Prior to mapping the system there is a need to prepare the scope of the mapping required, identify the team and plan the process.

After the mapping is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the mapping process or the system changes.

There is no right or wrong way to map a system; all models are an abstraction, all accentual some features, all ignore others and all may be useful. It is important to remember that the process of mapping may ultimately be more important than the output.



Mapping Systems

Chose a variety of approaches to assist in the mapping of the system and its elements, stakeholders and their relationships, and information and equipment flows. More than one approach may be required to adequately represent the system.

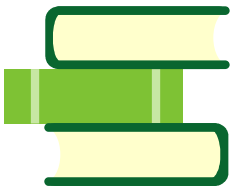
Iteratively cycle between the **Understand**, **Organise** and **Integrate** stages until sufficient insights into the system's form, function and behaviour are known.

Further details regarding individual mapping tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

Useful toolkit resources: the **Process** worksheet and cards for each of the tools are included in the Resources part of this toolkit.

Tools

Literature Review

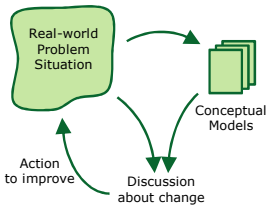


A systematic review of the literature describing the system being improved and its behaviour

Rich Picture

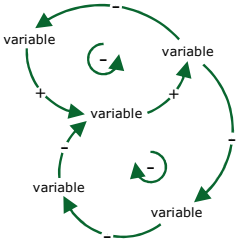
A means to understand a system using diagrams to create a preliminary mental model

Soft Systems Method



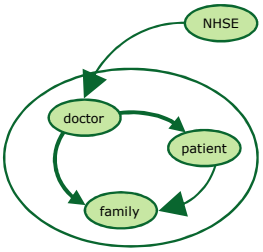
A means to foster learning and appreciation of the problem situation within a complex system

Causal Loop Diagram



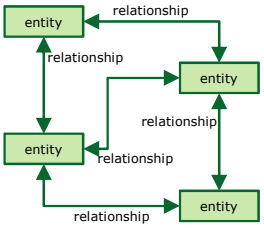
A means to capture the variables of interest in a complex system and understand their effect on outcomes

Influence Diagram



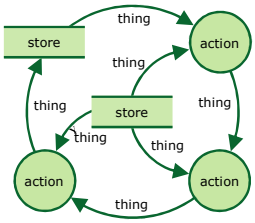
A means to map the main components or issues for a situation or system and the influences that exist between them

Entity Relationship Diagram



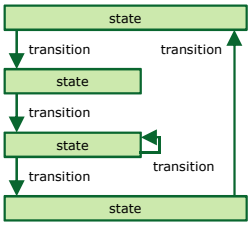
A means to identify and map the entities in a complex system and the relationships between them

Data Flow Diagram



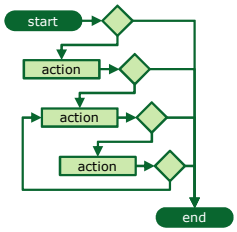
A means to identify and map the functions in a complex system and the things flowing between them

State Transition Diagram



A means to identify and map the states in a complex system and the transitions between them

Flow Chart

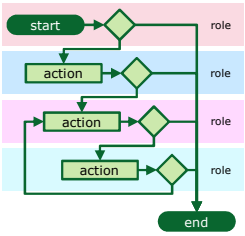


A means to map key activities and decisions in a system and understand their impact on performance

2-30

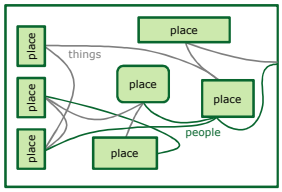
Tools

Swimlane Diagram



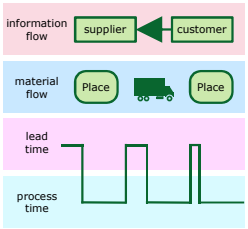
A means to map key activities and decisions in a system and understand their impact on performance

Spaghetti Diagram



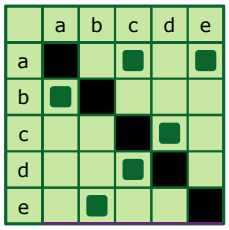
A tool to establish the optimum layout for a department based on observations of movement

Value Stream Mapping



A tool to help understand and improve the material and information flow within organisations

Dependency Structure Matrix



A structured representation of the dependencies between individual elements of a system

Literature

Bevan H, Plsek P and Winstanley L (2013). *Leading large scale change: A practical guide.* NHS Institute for Innovation and Improvement, Leeds, UK.

Cowper D, Kemp D, Elphick J and Evans R (2014). *To V or not to V – that MUST be the question: Knowing when to apply the right approach.* INCOSE International Symposium, Las Vegas, NV.

Dekker SWA, Leveson NG (2015). The systems approach to medicine: controversy and misconceptions. *BMJ,* **24**:7-9.

Hussain S and Dornhurst A (2016). *Integrated care – taking specialist medical care beyond the hospital walls.* Royal College of Physicians, London, UK.

INCOSE (2014). *A world in motion: Systems Engineering Vision 2025. International Council on Systems Engineering*, San Diego, CA.

IMechE (2016). *Healthcare: Engineering solutions for the NHS. Institution of Mechanical Engineers*, London, UK.

Kurtz CF and Snowden DJ (2003). The new dynamics of strategy sense-making in a complex world. *IBM Systems Journal*, **42**(3):462-483.

NASA (2016). *NASA Systems Engineering Handbook*, NASA, Washington, DC.

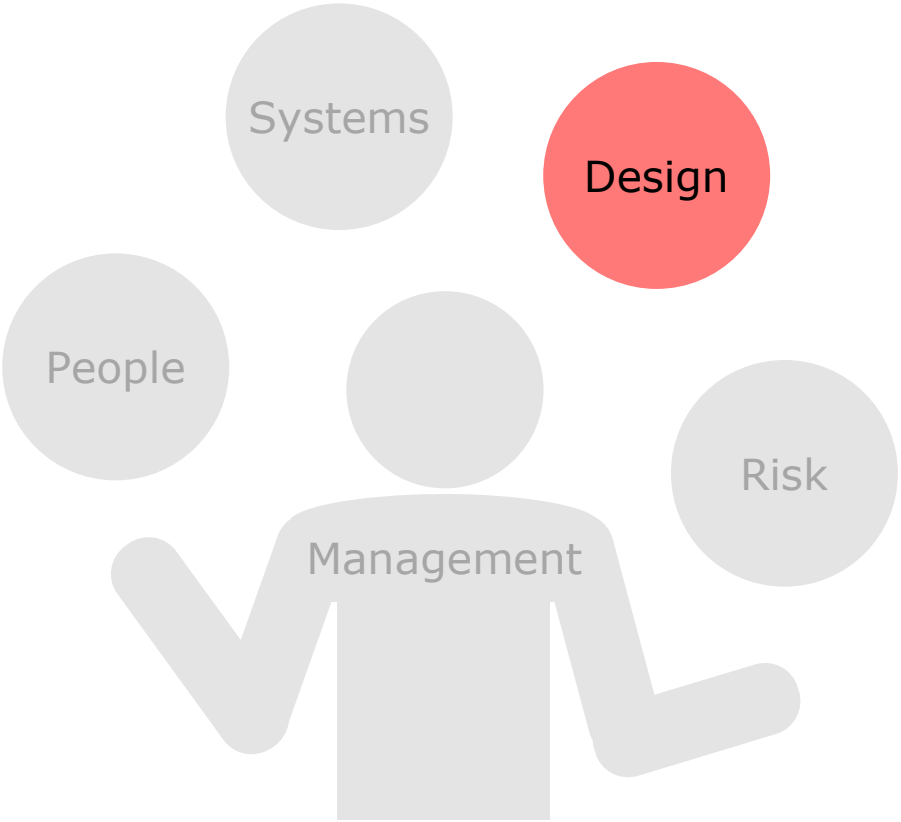
NHS England (2015). *Five Year Forward View – The Success regime: A whole systems intervention.* NHS England, Redditch, UK.

Pronovost PJ, Ravitz AD, Stoll RA and Kennedy SB (2015). *Transforming patient safety: A sector-wide systems approach.* World Innovation Summit for Health (WISH), Qatar.

RAEng (2007). *Creating systems that work: principles of engineering systems for the 21st Century.* Royal Academy of Engineering, London, UK.

Reid PP, Compton WD, Grossman JH and Fanjiang G (2005). *Building a better delivery system – A new engineering/health care partnership.* National Academy of Engineering and Institute of Medicine, The National Academies Press, Washington, DC.

Inspiring Design



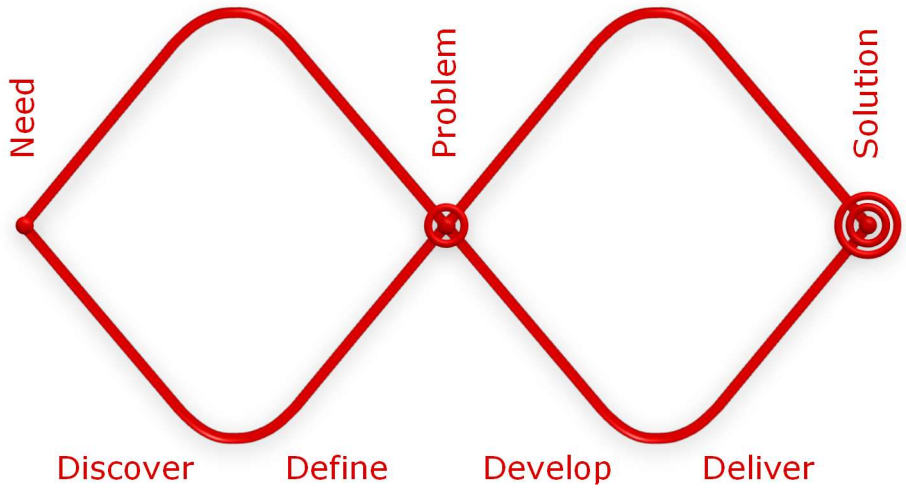
Summary

A design perspective ensures that systems are delivered using a range of perspectives, creative approaches and evaluation strategies in order to meet stakeholder needs.

Contents

Introduction

It has been argued that many problems addressed by designers are **wicked problems**, defined as a class of problems that are ill-formulated, where the information is contradictory, where there are many stakeholders with conflicting values, and where the behaviours in the system are confusing. In response, the Design Council's **double diamond**[1] comprises an initial **analytical** phase, which determines all of the elements of the problem and specifies the requirements for a successful solution, and a **synthesis** phase, which generates a range of possible conceptual solutions and an implementation plan.



In practice, design is iterative in nature, comprising multiple **explore**, **create** and **evaluate** cycles that enable a team to progress from understanding the need through to developing the solution. Design can be seen as a risk reduction exercise, set to maximise the chances of delivering the right solution to the right problem reflecting the right need.

The design process is typical of those used to address wicked problems[2], where it is not only highly creative, but also very likely to be highly iterative in order to deal with the intrinsic uncertainty in understanding the real needs and finding an appropriate solution. This is evidenced by the Institute for Healthcare Improvement's iterative model for improvement (Aim, Feedback, Changes, Plan, Do, Study, Act) often encountered in health and care, where the planning stage is particularly influential in ensuring the delivery of safe systems into practice.

1. *Eleven lessons managing design in eleven global companies.* Design Council, London, UK, 2007.

2. Dilemmas in a general theory of planning. Rittel and Webber. *Policy Sciences*, **4**(2):155-169, 1973.

Questions

Explore

What are the needs?

The **explore** phase asks the question 'What are the needs?' and leads to a common and accepted understanding of the likely needs for a system, taking account of the full range of stakeholders. It is likely to include a variety of activities that can help build this understanding and draw the findings together, for example:

- Observe users to reveal what they really need
- Generate personas to represent key users
- Describe typical user journeys within the system

Create

How can the needs be met?

The **create** phase asks the question 'How can the needs be met?' and leads to a range of possible concepts and corresponding system solutions that would help meet the needs and criteria for success identified by the explore phase. It is likely to include many of the activities commonly thought of as conceptual design, for example:

- Generate a wide range of solution ideas that could satisfy the needs
- Make prototypes to demonstrate the solutions' potential
- Select the best solution(s) for development

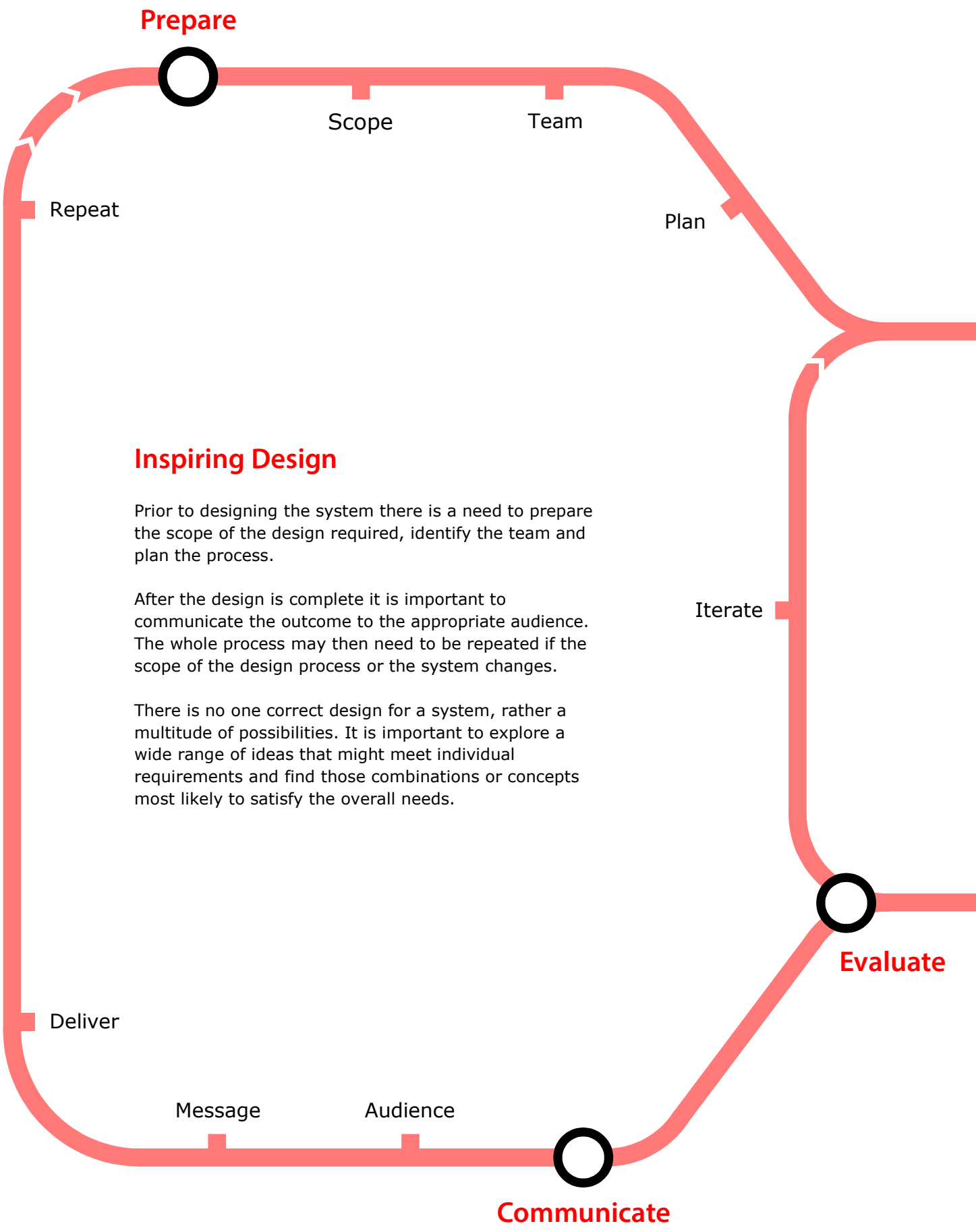
Evaluate

How well are the needs met?

The **evaluate** phase asks the question 'How well are the needs met?' and leads to an evaluation, both virtually and in practice, of possible system concepts that could meet the needs and criteria for success identified by the explore phase. It is likely to include activities to provide evidence that the needs are actually met, for example:

- Test the system with experts and users
- Evaluate how well the stakeholders needs are met
- Present evidence from the system evaluation

Process

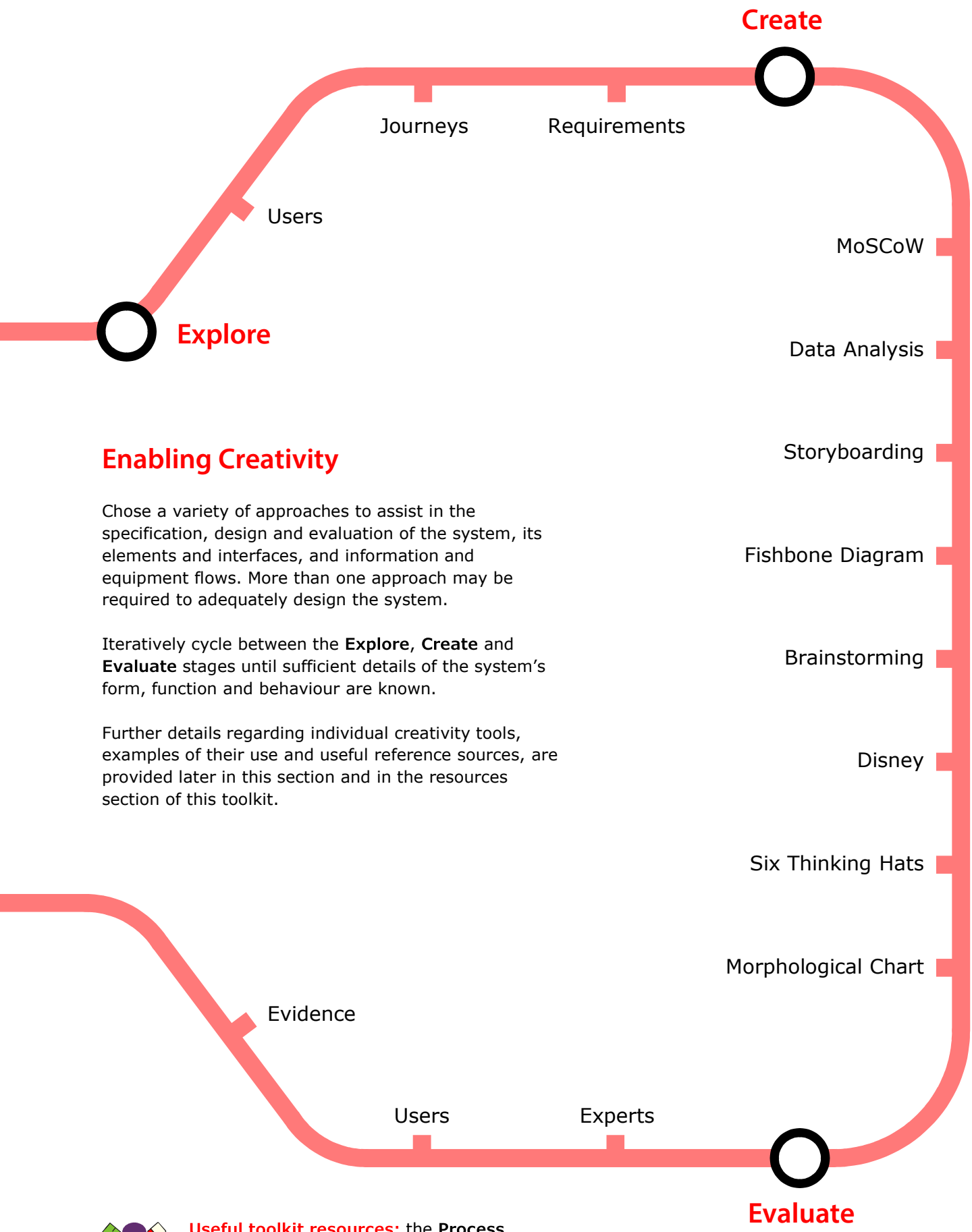


Inspiring Design

Prior to designing the system there is a need to prepare the scope of the design required, identify the team and plan the process.

After the design is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the design process or the system changes.

There is no one correct design for a system, rather a multitude of possibilities. It is important to explore a wide range of ideas that might meet individual requirements and find those combinations or concepts most likely to satisfy the overall needs.



Enabling Creativity

Chose a variety of approaches to assist in the specification, design and evaluation of the system, its elements and interfaces, and information and equipment flows. More than one approach may be required to adequately design the system.

Iteratively cycle between the **Explore**, **Create** and **Evaluate** stages until sufficient details of the system's form, function and behaviour are known.

Further details regarding individual creativity tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

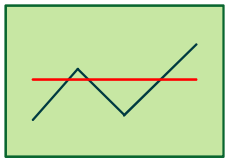
Useful toolkit resources: the **Process** worksheet and cards for each of the tools are included in the Resources part of this toolkit.

Tools

MoSCoW

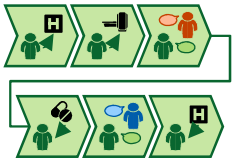
A means to capture a prioritised list of must, should, could and won't have requirements for improvement

Data Analysis



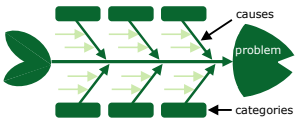
A means to analyse available data to understand the current levels of performance of the system

Storyboarding



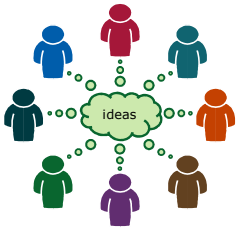
A means to clearly articulate a view of a better system based on an understanding of the current system

Fishbone Diagram



A method to think through the causes of a problem before starting to identify its root causes

Brainstorming



A means to encourage the generation of ideas and concepts to facilitate system improvement

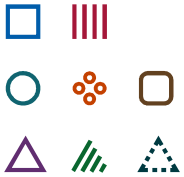
Disney

A means to encourage the dreamer, the realist and the critic to develop ideas for system improvement

Six Thinking Hats

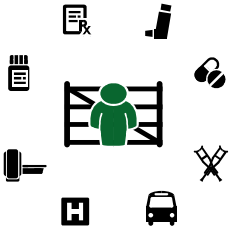
A means to encourage different ways of thinking to reach innovative concepts for system improvement

Morphological Chart



A means to help organise the presentation of ideas and concepts to facilitate system improvement

Exclusion Audit



A systematic approach to estimating potential levels of exclusion when using a system

Tools

Expert Review

A systematic approach to identifying potential causes of difficulty when using a system

User Trials

An experimental approach to identifying potential causes of difficulty when using a system

Literature

Brown T and Martin R (2015). Design for Action: How to use design thinking to make great things actually happen. *Harvard Business Review,* R1509C.

Burns C, Cottam H, Vanstone C and Winhall J (2006). *RED Paper 02: Transformation Design*. Design Council, London, UK.

Cottam H and Leadbeater C (2004). *RED Paper 01 Health: Cocreating Services.* Design Council, London, UK.

Design Council (2007). *Eleven lessons managing design in eleven global companies.* Design Council, London, UK.

Kolko J (2015). Design Thinking Comes of Age: The approach, once used primarily in product design, is now infusing corporate culture. *Harvard Business Review,* R1509D.

Rittel HWJ & Webber MM (1973). Dilemmas in a general theory of planning. *Policy Sciences,* **4**(2):155-169.

Assessing Risk

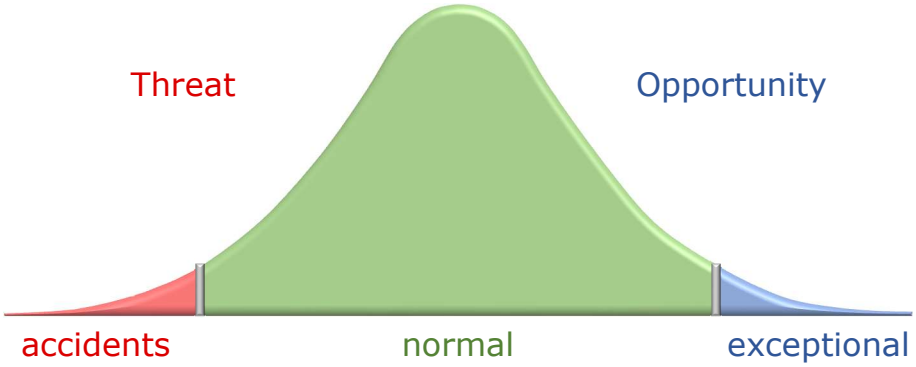
Summary

A risk perspective ensures that system threats and opportunities are identified and their consequent risks are managed in accordance with stakeholder expectations.

Contents

Introduction

Engineering risk and safety management methods, such as **Failure Mode and Effects Analysis**, **Hazards and Operability Analysis** and **Fault Tree Analysis**, are used to identify potential threats and opportunities within a system and to manage their likelihood and/or impact on people, property, progress or profit. The role of risk management is to identify, assess and control the level of known risk, accepting the inherent threat or opportunity that may be present within the system, in particular with complex medical interventions and in the distributed system of social care.



It is useful to consider the process of risk management to be made up of a series of iterative **examine**, **assess / seek** and **improve** cycles that enable a team to progress from understanding what is known about the system through to developing interventions to manage the risk presented by the system. Active risk management is appropriate at all stages of a product or service lifecycle, from early conception, through use to disposal.

Risk can be referenced to a system's ability to deliver high-quality, cost-effective care, where quality is defined as the combination of clinical and cost effectiveness, patient safety and patient experience[1]. Risk management is commonly used as a clinical tool for the prospective analysis of an individual patient's risk, with or without a particular intervention. However, it may also be used to evaluate the risk in sustaining or not achieving the desired outcomes for a population of patients, the efficiency of a care process or the finances of a care provider[2]. Different stakeholders may have different risk priorities within the same system and risk tolerance levels will vary with time and be dependent upon the context of each specific care delivery system or process. Risk may also be attributed to uncertainty in performance where mitigation will likely focus on the identification of the sources of such variation and their reduction.

The identification and exploitation of opportunities to learn from exceptional performance represents the alternative face of risk management. This view has gained much traction in recent years as a complementary activity alongside traditional methods of risk management[1]. In practice, both approaches should be used to be able to take an holistic approach to proactive risk management.

1. *From Safety-I to Safety-II: A White Paper*. Hollnagel, Wears and Braithwaite, The Resilient Health Care Net, 2015.

2. *Design for patient safety: a system-wide, design-led approach to tackling patient safety in the NHS.* Department of Health and Design Council, London, UK, 2003.

Questions

Examine

What is going on?

The **examine** phase asks the question 'What is going on?' and leads to an understanding of the system architecture and details of the interfaces between the elements, which takes account of the range of stakeholders and their needs. It is likely to include a variety of activities that can help build this understanding, for example:

- Outline the goals of the risk assessment
- Describe the system and identify critical risk stakeholders
- Agree acceptable levels of system risk

Assess

What could go wrong?

The **assess** phase asks the question 'What could go wrong?' and leads to a systematic assessment of the likelihood and potential impact of threats within a system, which takes account of the nature, frequency and source of the threats. It is likely to include a variety of activities that enable this assessment, for example:

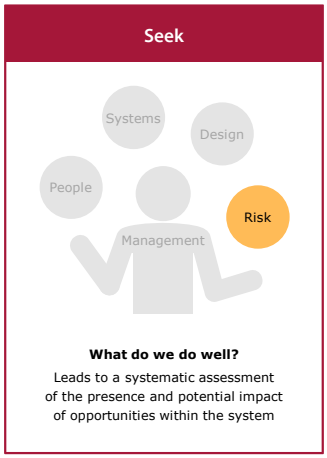
- Identify threats to the sustained performance of the system
- Evaluate risks associated with the threats and their detectability
- Specify mitigation needs to reduce unacceptable risks

Seek

What are we doing well?

The **seek** phase asks the question 'What are we doing well? and leads to a systematic assessment of the likelihood and potential impact of opportunities within a system, which takes account of the nature and source of the opportunities. It is likely to include a variety of activities that enable this assessment, for example:

- Identify opportunities to enhance the performance of the system
- Evaluate benefits linked to the opportunities and their achievability
- Specify improvement needs to exploit the opportunities



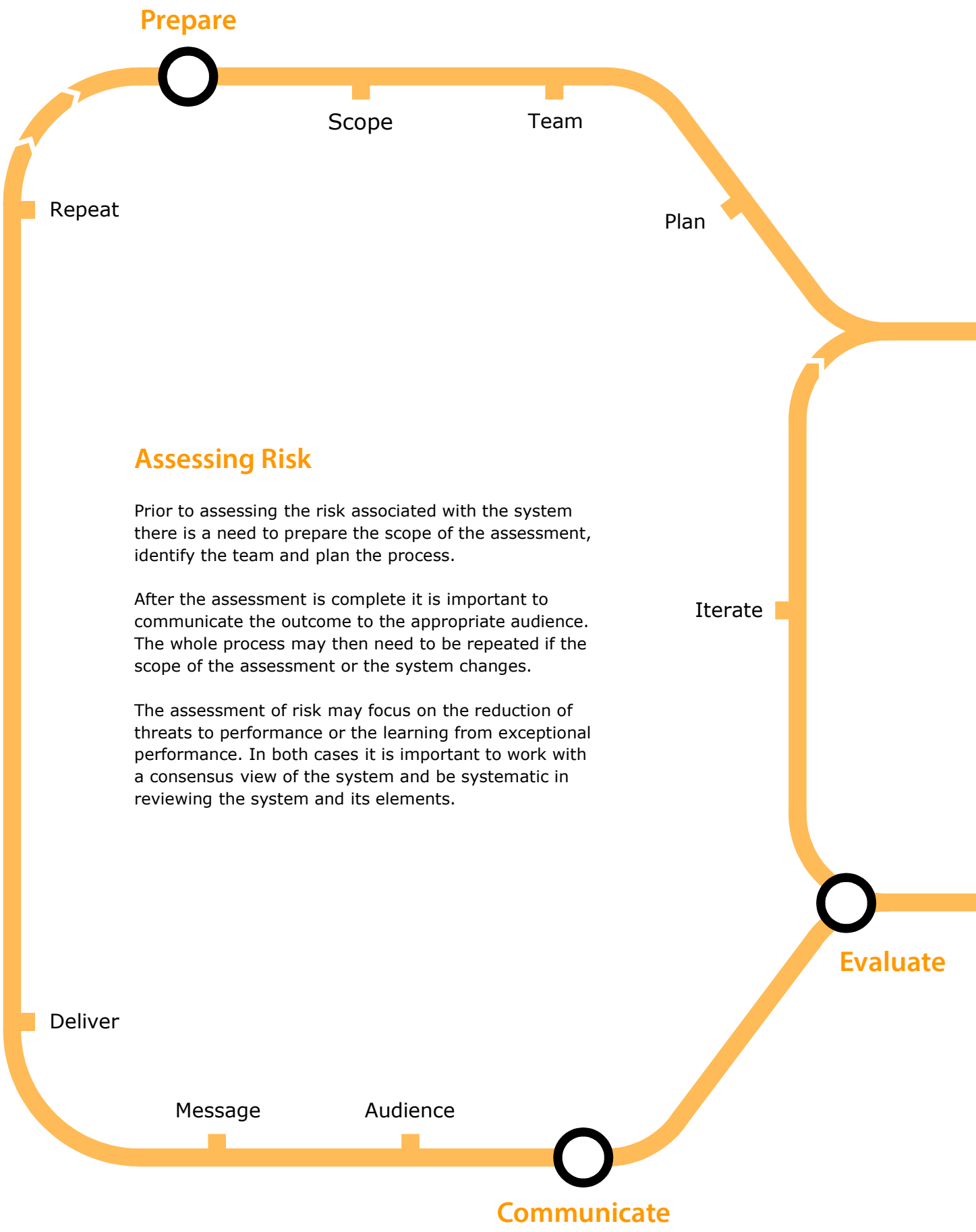
Improve

How can we make it better?

The **improve** phase asks the question 'How can we make it better?' and leads to range of possible solutions that would help mitigate the threats or exploit the opportunities, which takes account of the stakeholders' appetite of such risk. It is likely to include a variety of activities that enable this implementation, for example:

- Propose actions to manage the risk within the system
- Implement potential actions within the system
- Review the assessment in a timely manner

Process



Assessing Risk

Prior to assessing the risk associated with the system there is a need to prepare the scope of the assessment, identify the team and plan the process.

After the assessment is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the assessment or the system changes.

The assessment of risk may focus on the reduction of threats to performance or the learning from exceptional performance. In both cases it is important to work with a consensus view of the system and be systematic in reviewing the system and its elements.

Managing Risk

Chose a variety of approaches to assess the risk and seek the opportunities within the system and its elements, stakeholders and their relationships, and information and equipment flows. More than one approach may be required to adequately assess the system.

Iteratively cycle between the **Examine**, **Assess / Seek** and **Improve** stages until sufficient insights into the system risk and opportunity for improvement are known.

Further details regarding individual risk management tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

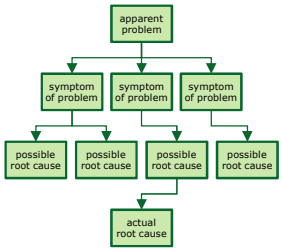
Useful toolkit resources: the **Process** worksheet and cards for each of the tools are included in the Resources part of this toolkit.

Tools

Life Cycle Assessment

A systematic approach to estimating the environmental impact of a system

Root Cause Analysis



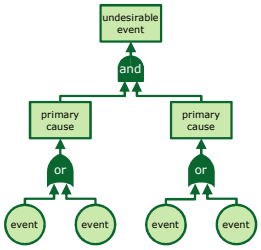
A systematic approach for identifying the root cause of a problem within a system

Failure Mode and Effects Analysis

failure mode	failure effect	failure likelihood	failure impact	risk of failure

A systematic approach for identifying the causes of all possible failures in a system and their consequent risk

Fault Tree Analysis



An approach to identifying desirable or undesirable events and the actions that lead to them

Hazard and Operability Analysis

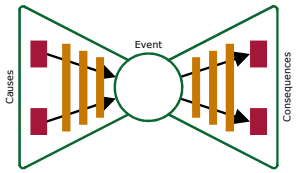
guide word	likely deviation	conse-quence	possible causes	existing protection

A systematic approach for identifying deviations from normal operation and their undesirable consequences

Structured What-If Technique

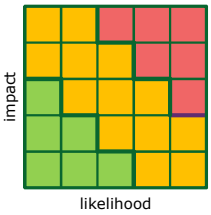
A systematic approach for identifying risks within a system using structured brainstorming and guidewords

Bowtie Method



A systematic approach for visualising links between causes of an event and potential consequences

Risk Matrix



A structured representation of the likelihood and impact of threats and opportunities in the system

Literature

British Standards (2009). *BS ISO 31000:2009 Risk management – principles and guidelines.* British Standards, London, UK.

DH and Design Council (2003). *Design for patient safety: a system-wide, design-led approach to tackling patient safety in the NHS.* Design Council and Department of Health, London, UK.

Hollnagel E, Wears R and Braithwaite J (2015). From Safety-I to Safety-II: A White Paper. *The Resilient Health Care Net:* Published simultaneously by the University of Southern Denmark, University of Florida, USA, and Macquarie University, Australia.

HSE (2014). *Risk assessment – A brief guide to controlling risks in the workplace.* INDG163 (rev4), Health and Safety Executive, London, UK.

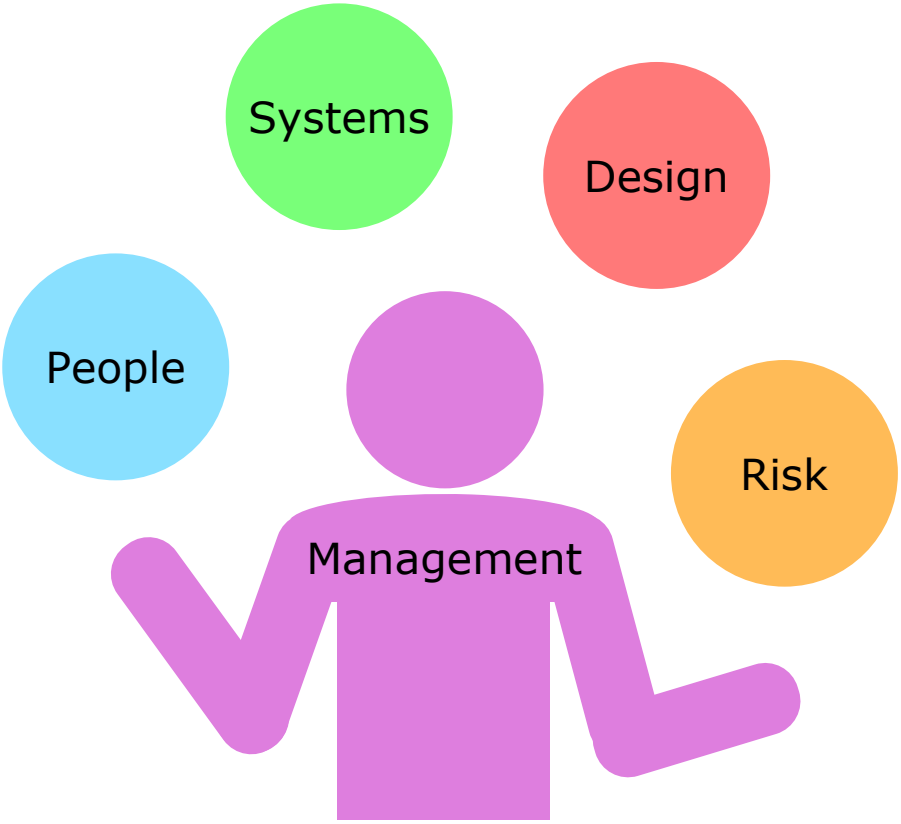
Lewis H, Allan N, Ellinas C and Godfrey P (2014). *Engaging with risk.* CIRIA, London, UK.
NPSA (2007). *Healthcare Risk Assessment Made Easy.* NPSA, London, UK.

Spear SJ (2005). Fixing Healthcare from the Inside, Today. *Harvard Business Review*, R0509D.

Vincent C and Amalberti R (2016). *Safer Healthcare: Strategies for the real world.* Springer International Publishing, Switzerland.

Yu A, Flott K, Chainani N, Fontana G and Darzi A (2016). *Patient safety 2030.* NIHR Imperial Patient Safety Translational Research Centre, London, UK.

Applying these Questions



Summary

The case studies explore retrospectively how the questions from the spiral model of this toolkit's systems approach could be applied to large systems.

Contents

The Esther Model

A multi-organisational collaboration between acute, primary and social care providers was created by Jönköping County Council to develop a model for the improvement of patient-centred care in the community, based on a fictitious patient known as Esther.

Trigger

Why are we doing this?

Esther lived alone and one morning developed breathing difficulties. After contacting her daughter, who did not know what to do, Esther sought medical advice. She saw a total of 36 different people and had to retell her story at every point, while having problems breathing. A doctor finally admitted her to a hospital ward. This case inspired the head of the medical department of Höglandet Hospital in Nässjö to initiate an extensive series of interviews and workshops to identify redundancies and gaps in the medical and community care systems.

Problem

What is the problem?

Elderly patients with complex care needs may receive services from multiple specialists, as well as primary care physicians. In addition, they may visit emergency departments, have frequent hospitalisations and post-hospital rehabilitations, and receive long-term care services at their home or in nursing facilities. The central idea was that care should be guided by the following questions: What does Esther need? What does she want? What is important to her when she is not well? What does she need when she leaves the hospital? Which providers must cooperate to meet Esther's needs?

Identify

Who will use the system?

Elderly persons who have complex care needs that involve a variety of providers, along with carers and a number of health and care professionals.

The Esther Model

Locate

Where is the system?

The Höglandet (Highland) region (population: 110,000) in Jönköping County, in the south of Sweden, where the county has 34 primary care centres and three acute hospitals, with a total health workforce of 9,500, serving a local population of 350,000 across 11 municipalities.

Situate

What affects the system?

Care coordination in Sweden is complicated by a legal structure that gives the country's 21 counties responsibility for funding and providing hospital and physician services while the 290 municipalities are responsible for funding and providing community care. Home health care (nursing services for sick patients) and home care (assistance with activities of daily living) are also provided by different professionals.

Team

Who should be involved?

Patients and carers, and people involved in the supply, management and control of care for elderly people, such as physicians, nurses, social workers, other providers representing the Höglandet Hospital and physician practices in each of the six municipalities.

The Esther Model

Understand

Who are the stakeholders?

Stakeholders are those that have an interest in the successful performance of the system and can be described by their role title, need(s) and purpose:

- **As a patient I need** care in or close to my home **so that** I can stay at home, **I need** to experience care from multiple providers as if it were from the same provider **so that** they all know my medical history, **I need** to have care uniformly available throughout the region **so that** I feel free to travel, and **I need** to know who to turn to when problems arise **so that** I feel safe.
- **As a carer I need** to understand Esther's needs **so that** I can help care for her, and **I need** to know who to call if Esther needs help **so that** I can be sure of talking to someone who knows her.
- **As a neighbour I need** to have a contact number for emergencies **so that** I can quickly summon medical assistance.
- **As a primary care physician I need** to provide the best care possible for Esther in the community **so that** her medical needs are met locally as far as is possible, **I need** access to Esther's full medical history **so that** I know what treatment may have been provided by the hospital and what level of social care is
- being provided.
- **As a pharmacist I need** access to Esther's medical history **so that** I can check that her medications are safe to be taken together.
- **As a hospital physician I need** access to Esther's medical history **so that** I can prescribe the most appropriate treatment, and **I need** to be sure that appropriate care is available **so that** I can safely discharge Esther from hospital.
- **As a specialist I need** access to Esther's medical history **so that** I can provide appropriate specialist treatment as required.
- **As a nurse I need** access to Esther's medical history **so that** I can care for her, and **I need** to know Esther **so that** I can do what is best for her.
- **As a home healthcare worker I need** access to Esther's medical history **so that** I understand her care needs, and **I need** to know Esther **so that** I can do what is best for her.
- **As a home care worker I need** to have a contact number for emergencies **so that** I can be sure of talking to someone who knows her, and **I need** to know Esther **so that** I can do what is best for her.
- **As a hospital manager I need** to understand Esther's care needs **so that** I can ensure she receives the care she needs and coordinate her discharge from hospital, and **I need** to ensure she remains in hospital only as long as is medically required **so that** I can manage my budget wisely.
- **As a community care manager I need** to understand Esther's care needs **so that** I can coordinate her care, and **I need** to be consulted if she is to be discharged from hospital **so that** her immediate care needs can be met.
- **As a service provider I need** to ensure that I meet Esther's care needs **so that** I can do what is best for her, and **I need** to know how well I am meeting her needs **so that** I can continuously improve the care I am able to provide.
- **As a funder I need** to be confident that the money I provide for the care of elderly persons is spent wisely **so that** the benefit of good care is provided for all.
- **As an administrator I need** to ensure good communication between care providers **so that** they understand Esther's medical and care needs and provide coordinated care for her.

The Esther Model

Seek

What do we do well?

There has always been the desire in health and care systems to deliver the best possible care at a local level. Improvement is a necessary and accepted part of the job. However, the motivation and ability to take a wider view has often been lacking.

Success

What does 'good' look like?

Success will be measured by Esther getting care in or close to home, experiencing care from multiple providers as if it were from the same provider, having care uniformly available throughout the region and knowing who to turn to when problems arise.

Organise

What are the elements?

The elements of the system can be considered to be Esther and her family and neighbours, the people who provide all aspects of medical and home care to her, the geographical and transport systems around her home and points of care, the organisations that facilitate her care, and the bodies that fund her care.

Explore

What are the needs?

The analysis of interviews with over 60 patients and providers throughout the system identified six key needs for action:

- The development of a flexible organisation with patient value in focus.
- The design of more efficient and improved prescription and medication routines.
- The creation of approaches to documentation and communication of information that can be adapted to the next link of the care chain.
- The provision of efficient IT-support through the whole care chain.
- The provision of a diagnosis system for community care.
- The development of a virtual competence centre for better transfer and improvement of competence through the care chain.

The Esther Model

Create

How can the needs be met?

Many of the problems experienced by Esther involved more than one organisation. It was important to bring together people from different levels in these organisations to develop and deliver solutions to support the needs identified. These included:

- A steering committee of the community care chiefs from municipalities, hospitals and primary care centres to address challenges across organisations.
- Four Esther cafés in municipalities each year, which were cross-organisational, multi-professional meetings for sharing and learning from the experiences of specific patients who were hospitalised in the past year and have continued on to home care or other services.
- Inter-organisational training workshops on palliative care, nutrition and fall prevention, among other topics.
- An annual strategy day for nurses and other staff, physicians, managers, as well as Esthers themselves to come together to team build and generate priorities and ideas for addressing problems in care.

In 2006 coaches were introduced to the model to promote the Esther Network vision and values and to support ongoing improvement. The aim was to develop internal coaches to facilitate improvement across organisational boundaries, providing: customer focus, modelled by involvement of senior citizens in the training programme; a shared set of values; networking skills with a solution focused approach; and systems thinking.

Evaluate

How well are the needs met?

The Esther model calls for continuous and coordinated improvement with a focus on providing what is best for Esther. The evidence points to a cultural shift in the way leaders and workers in the Jönköping County health and care systems now provide for Esther, facilitated by the solutions introduced in response to her needs — "the focus is on her now." It is also evident that the changes have not only been sustained and further developed, but also have provided the inspiration for change in other health and care systems around the world.

The Esther Model

Assess

What could go wrong?

Proactive risk assessment was not employed within this programme. However, the impact of the changes introduced were continuously monitored.

Integrate

How does the system perform?

This innovation programme was not designed as a research project and involved many organisational and process changes that were introduced in different components of the model at different times. Therefore, it is important to be cautious in assessing the impact of the Esther model.11 Positive changes are noted, but it is difficult to attribute them to the model in the absence of comparative information. With this in mind, programme leaders cite the following outcomes:

- Admissions to the medical department of Höglandet Hospital declined from 9,300 in 1998 to 6,500 in 2013.
- Hospital readmissions within 30 days for patients age 65 and older dropped from 17.4% in 2012 to 15.9% in 2014.
- Hospital lengths of stay decreased between 2009 and 2014 for surgery (from 3.6 to 3.0 days) and rehabilitation (from 19.2 to 9.2 days).
- Surveys conducted in Jönköping in 2008 and 2011 showed that Esthers felt safe and were appreciative of the personal contacts.

Plan

What should we do next?

"Taking a system approach to meeting the needs of the frail elderly is unusual, difficult, and necessary." The Esther model depends on "the power of patients' stories", which were elicited and collected as part of the model to show how patients' lives are affected by their health challenges and their experiences in getting care. The model creates mechanisms, including an annual retreat and development of action plans for each forthcoming year, to help members of different professions to continue to think together to solve problems and help to motivate the coaches. "The secret of Esther is the change in state of mind — stop thinking what is best for my organisation, but instead think what is best for Esther."

Methotrexate

Local and national stakeholders, led by the National Patient Safety Agency, were engaged in making the design of methotrexate tablets, their prescription, delivery and monitoring safer for patients using it for the treatment of rheumatoid arthritis.

Trigger

Why are we doing this?

In 2000, a Cambridgeshire patient died as a direct result of failures in their care and treatment. The inquiry into their death highlighted the need to review the use of oral methotrexate for the treatment of rheumatoid arthritis in the UK. In this particular case, the patient had been taking a weekly dose of methotrexate for rheumatoid arthritis. The strength of methotrexate had been altered in error by her GP to a daily dose of 10 mg from the previous weekly dose of 17.5 mg. This was dispensed by a community pharmacy. The patient inadvertently overdosed on methotrexate and their immune system became severely compromised. The patient was later admitted to hospital with symptoms of a severe sore throat, where they continued to receive treatment at this high daily dose until the mistake was identified on the fourth day following admission.

Problem

What is the problem?

Of the 13,000 medicines licensed for use in the UK at that time, oral methotrexate was one of only six that should have been taken weekly. Previously, 25 deaths and 26 cases of serious harm had been attributed to the incorrect use of methotrexate. More than half of the 167 adverse events associated with patients taking methotrexate between 1993 and 2002 were the result of the drug being prescribed on a daily basis. Some cases were due to errors occurring during the transfer of information from hospitals to GPs, others were due to problems with information technology systems that failed to give clear information on the frequency of dosing.

Identify

Who will use the system?

People who are actively using the system are those within the Shared Care Arrangement (see below), such as patients with rheumatoid arthritis, their carers, GPs, pharmacists, phlebotomists and hospital doctors.

Locate

Where is the system?

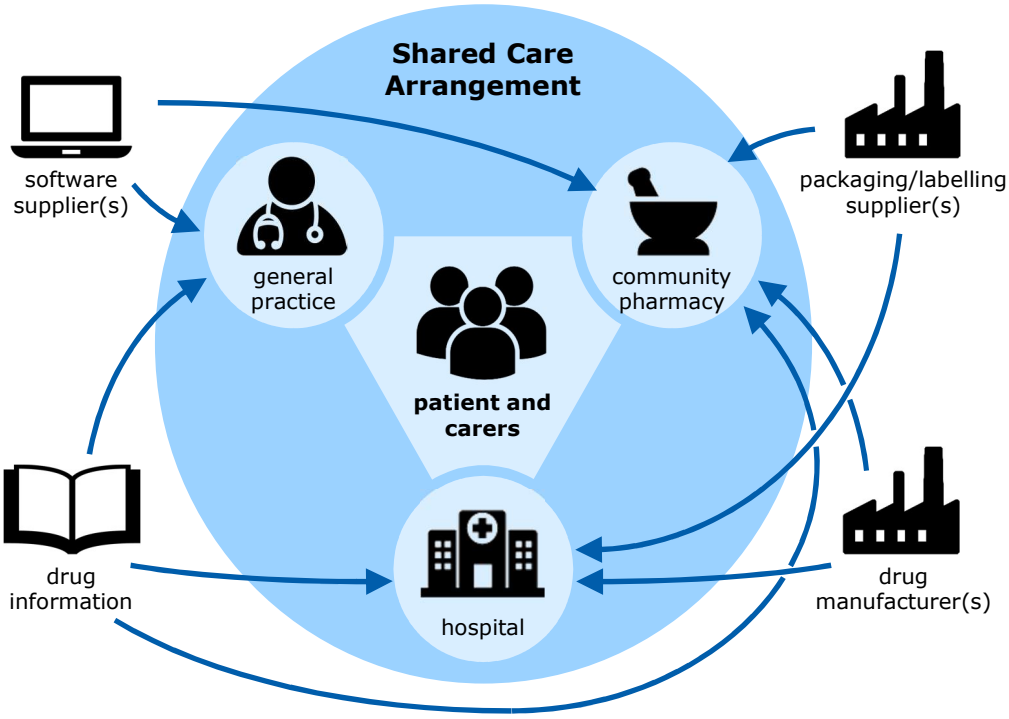
The system is in the UK and spans from the home to general practice to the community pharmacy to the hospital, working under a shared care arrangement (see below).

Methotrexate

Situate

What affects the system?

There are three suppliers of methotrexate for the UK market. They provide 2.5 mg and 10 mg tablets that are similar in colour and size in 100 tablet bottles and 2.5 mg tablets in blister packs of 28 tablets.



Team

Who should be involved?

People should be involved in the improvement programme if they are involved in the supply, management and control of methotrexate in the UK, such as:

- patients and carers
- community pharmacies
- GPs and hospital doctors
- drug manufacturers
- drug prescription and dispensing software vendors
- information providers and packaging designers.

Methotrexate

Understand

Who are the stakeholders?

Stakeholders are those that have an interest in the successful performance of the system and can be described by their role title, need(s) and purpose:

- **As a patient I need** sufficient methotrexate **so that** I have relief from the pain resulting from my rheumatoid arthritis, **I need** methotrexate in an easy-to-open pack **so that** I am able to open the pack and easily retrieve the correct dose and **I need** to be confident that I am taking the correct dose of methotrexate **so that** I do not suffer adverse effects from the drug.
- **As a general practitioner I need** to ensure that the patient knows how to administer methotrexate **so that** there is no chance of the patient taking the wrong dose. **I need** to be sure that I prescribe the correct dose of methotrexate **so that** there is no chance of the patient taking the wrong dose, and **I need** to ensure that the patient's bloods are monitored **so that** the dose can be controlled.
- **As a hospital doctor I need** to understand the particular challenges of oral methotrexate use **so that** I am able to recognise the needs and potential problems experienced by these patients.
- **As an arthritis specialist I need** to identify patients who might benefit from the use of oral methotrexate **so that** their quality of life can be improved, and **I need** to determine the most appropriate dose of oral methotrexate for the patient **so that** their condition may be improved.
- **As a drug manufacturer I need** to supply oral methotrexate in a form **so that** pharmacies can adjust the quality dispensed to meet individual patient needs, and **I need** to sell sufficient quantity of oral methotrexate **so that** the product line is commercially viable.
- **As a pharmacist I need** to dispense methotrexate in a timely way **so that** the patient always has the medication they need, and **I need** to ensure that the patient understands the particular restrictions on the use of oral methotrexate **so that** they are kept safe.
- **As a carer I need** to know that the patient understands the importance of taking the correct dose of methotrexate **so that** they remain safe, and **I need** to be sure that methotrexate is not confused with other medications **so that** they remain safe.
- **As a phlebotomist I need** to collect blood samples from the patient **so that** methotrexate toxicity tests can be carried out in the hospital, and **I need** to ensure that any change to the methotrexate dose is communicated to the patient and GP **so that** they are both informed of the new dose.
- **As a pathologist I need** good blood samples **so that** I can test methotrexate levels in the patient's blood.
- **As a software supplier I need** to deliver competitive prescribing and dispensing systems **so that** GPs/pharmacists use my software, and **I need** to ensure that my products enhance GP/pharmacist practices **so that** errors are reduced.
- **As an information supplier I need** to ensure that information is trustworthy and accessible **so that** GPs/pharmacists use my services, and **I need** to ensure that my services enhance GP/pharmacist practices **so that** errors are reduced.
- **As a packaging/labelling supplier I need** to provide clear identification **so that** the pharmacist and patient can unambiguously select the correct medication.
- **As a practice receptionist I need** to ensure that repeat prescription forms are authorised **so that** patients receive their prescriptions in a timely manner.
- **As a practice manager I need** to ensure that everyone is aware of our policies and practice relating to methotrexate **so that** patients receive safe care.

Seek

What do we do well?

The shared care arrangement has been successful in treating numerous patients in the UK over many years, alleviating the pain associated with arthritis.

Methotrexate

Success

What does 'good' look like?

Success will be measured by a significant reduction of deaths and serious injury to patients being treated with methotrexate for rheumatoid arthritis while maintaining the benefits of disease and symptom control.

Organise

What are the elements?

The management of patients taking methotrexate is organised using a Shared Care Arrangement, sharing responsibility for safe care between the general practice, the community pharmacy and the hospital. This forms the core of the system. In addition, computer software enabling the prescribing and dispensing of methotrexate is used, drug information leaflets and record books are provided, and the drug and packaging are required (see above).

Explore

What are the needs?

The needs for redesign of the system are dominated by the needs of the patient, where the priority is for an easy-to-follow medication management process, easy-to-understand information about methotrexate, easy-to-identify medication and easy-to-open packs. Other needs, derived from the stakeholders list, should also be considered in the context of meeting the fundamental patient needs.

Create

How can the needs be met?

In response to the patient needs and risk assessment, a number of potential solutions were identified, each of which would prevent some opportunity for harm and collectively would prevent or reduce all harm based upon the causal and contributory data available at the time:

1. Better information for the patient prior to treatment and use of patient-held records to include monitoring schedules and results.
2. Clear branding of methotrexate as a weekly medication with clear instructions to take methotrexate on Mondays.
3. Improved warnings and flags for GP prescribing and pharmacy dispensing software systems which were not easily over-ridden.
4. Reshaped tablets from manufacturers to ensure that 2.5 mg round tablets are easily distinguishable from new 10 mg torpedo shaped tablets.
5. Repackaged tablets using novel designs and in reduced quantities so that the patient receives the original manufacturers pack.

Methotrexate

Evaluate

How well are the needs met?

A new information leaflet for patients, emphasising the weekly dose for methotrexate, was drafted and trialled. This led to the provision of a methotrexate treatment guide incorporating a pre-treatment leaflet, designed to provide patients with guidance on low dose methotrexate, and a blood monitoring and dosage record booklet.

The changes proposed for the shape of the methotrexate tablets were delivered, but this did not address potential confusion with other medications and, in particular, folic acid which is often prescribed along with methotrexate.

Software vendors provided enhancements to their existing GP prescribing software to ensure methotrexate was clearly labelled as High-Alert, Alert or Toxic in the drug list, to generate an additional alert message when selecting methotrexate highlighting the need for weekly doses and to provide dosing options that clearly articulated the number of tablets to be taken.

Novel packaging designs were not pursued at this stage. However, manufacturers began to provide tablets in 16 and 24 packs with improved design (for patients with reduced manual dexterity), labelling and safety information. The use of existing pharmacy labels continued.

Assess

What could go wrong?

A review of the risks associated with the original oral methotrexate system was undertaken prior to determining the design interventions described above. This identified the following high-risk scenarios:

i. Failure to identify changed prescription request arising from blood test results.
ii. GP prescribes methotrexate "as directed".
iii. Patient receives wrong dose due to confusion between different strengths of methotrexate tablets.
iv. Patient receives wrong dose due to confusion between folic acid and methotrexate tablets.
v. Patient experiences difficulties reading print on blister pack.
vi. Incorrect prescription of methotrexate is dispensed to the patient because of poor design of prescribing/dispensing software.
vii. Pharmacy picking error results in wrong medications being dispensed.
viii. Pharmacist only writes total dose of methotrexate, not number of tablets.
ix. Poor hospital drug chart review by hospital pharmacy.
x. Poor education of healthcare professionals regarding use of methotrexate.

Many of these issues were addressed by the design changes proposed and other patient safety initiatives. However, a number remained, including the potential for patients to be confused by the two strengths of methotrexate tablets and this led directly to the policy in many regions to prescribe only 2.5 mg tablets. There was also a danger that patients might be confused by the variation in dose that was the direct result of the review of regular blood tests designed to determine the optimal dose for each individual. It was important that changes in dose were communicated clearly to the patient and others in the shared care arrangement to ensure that all patient records were up to date.

Methotrexate

Integrate

How does the system perform?

Limited data was collected to enable direct comparison with previous error rates and subsequent patient harm resulting from use of oral methotrexate. Communications from the NPSA suggested that early compliance with new guidance remained poor, likely contributing to ongoing errors in the use of methotrexate, resulting in patient harm.

Eighteen months after the shape of the 10 mg methotrexate tablet was changed the Medical and Healthcare Products Regulatory Agency (MHRA) issued a Class 3 Medicines Recall. Original round 10 mg tablets that had remained in circulation alongside the new torpedo shaped 10 mg tablets were recalled as their continued presence had given rise to confusion where patients had been told all round tablets were 2.5 mg.

Despite all the best efforts of the improvement team, methotrexate remains a potentially harmful drug that is ultimately administered by the patient. Deaths and serious harm continued at a lower level and in 2011 a patient, prescribed an increasing dose of methotrexate in order to identify the required level of medication, continued to increase the weekly dose beyond the mandated maximum and died. This was not an error that had been predicted and shows the importance of shared care arrangement team taking full responsibility for all aspects of the prescribing, dispensing and monitoring cycle when working with patients receiving oral methotrexate.

Plan

What should we do next?

The use of oral methotrexate as a treatment for rheumatoid arthritis relies on a number of systems working with the patient to ensure their safety. Further improvements in the use of this drug will need to follow a systems approach to ensure that key stakeholders work together to identify and implement changes that would minimise future loss of life.

Improvement Process

Introduction

Page 3-1 onwards

Describes an iterative model of the health and care improvement process.

Understand the Context

Page 3-7 onwards

The context describes the circumstances or setting that surround a system.

Define the Problem

Page 3-19 onwards

The problem describes the detail of a particular challenge within a system.

Develop the Solution

Page 3-29 onwards

The solution describes a way of solving a particular problem within a system.

Collect the Evidence

Page 3-37 onwards

The evidence describes the information in support of solution(s) within a system.

Make the Case

Page 3-47 onwards

The case describes the set of facts or arguments in support of improving a system.

Manage the Plan

Page 3-55 onwards

The plan describes a detailed proposal for enabling change to a system.

Agree the Scope

Page 3-63 onwards

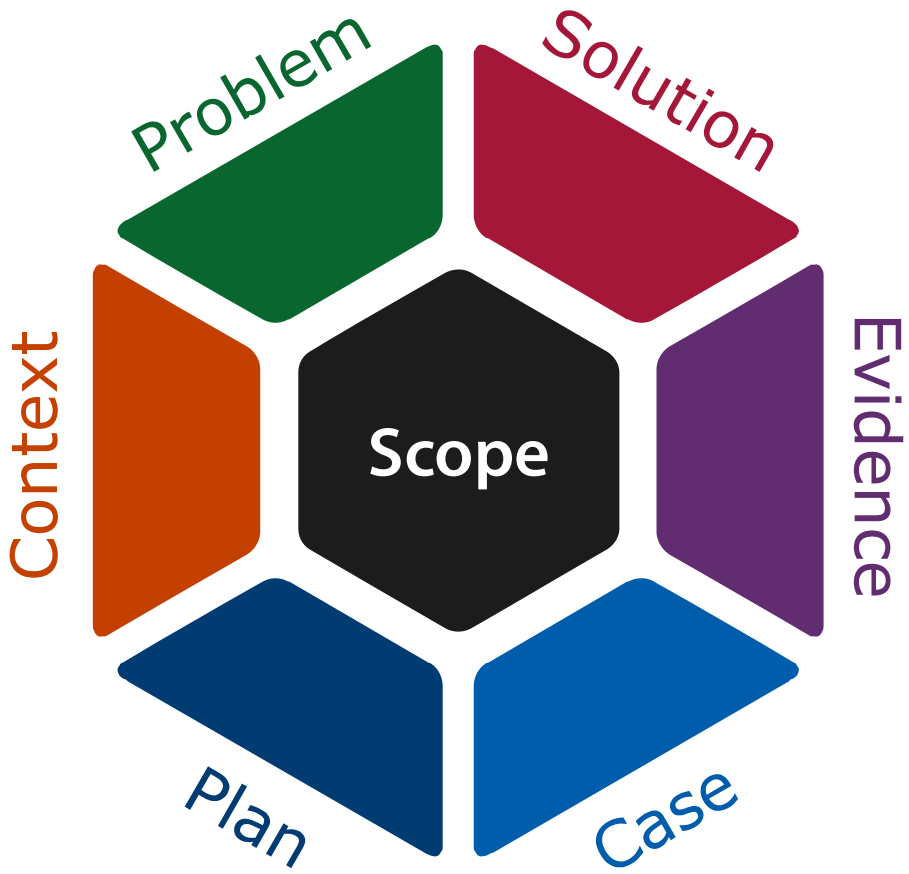
The scope describes the extent of the ambition for the improvement process.

Applying this model

Page 3-67 onwards

These case studies explore how this model could be applied to large systems.

Introduction



Summary

This introduction describes an iterative model that forms the basis of a systems approach to health and care design and continuous improvement.

Introduction

The engineered world is full of systems. From the simple water heater to the fully integrated international airport, from ancient irrigation systems to modern communication networks, all systems share one key feature: their elements together produce results not obtainable by the same elements alone. These elements, or parts, can include people, processes, information, organisations and services, as well as software, hardware and other systems.

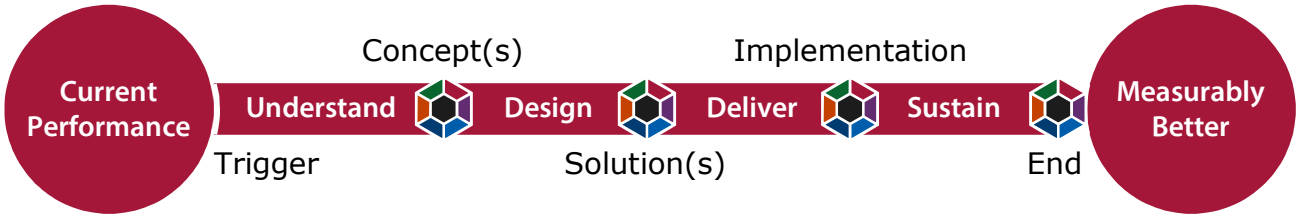
A system (or system of systems) is a set of elements: people, processes, information, organisations and services, as well as software, hardware and other systems that, when combined, have qualities that are not present in any of the elements themselves. A system is delineated by its spatial and temporal boundaries, surrounded and influenced by its environment, described by its structure and purpose, and expressed in its functioning. In other words, the whole is very likely to be greater than the sum of the parts. The layout of the system, defining all the elements and their interconnections, needs to be carefully considered to ensure that each element on its own and in combination with others performs as required. In response to this challenge and the ever increasing complexity of modern systems, a new discipline of systems engineering has evolved as an interdisciplinary approach to enable the realisation of successful systems.

"Systems that work do not just happen — they have to be planned, designed and built"

Engineers routinely use a systems approach to address challenging problems in complex projects. This allows them to work through the implications of each change or decision they make for the project as a whole. They consider the layout of the system, defining all the elements and interconnections, to ensure that the whole system performs as required. One example is the successful delivery of the London 2012 Olympic and Paralympic Games. Physical infrastructure and practical organisation were brought together, with innovative physical engineering, modelling and simulation of people flows, early testing of venues, and extensive risk management. A systems approach, combined with tried and tested engineering methods and tools, delivered real success on a massive scale.

Introduction

As already seen in the Improving Improvement section of this toolkit, the heart of this toolkit integrates the key questions from the Engineering Better Care[1] report together with an **Improvement Model** that contains seven **activity strands** and a stage-based view of the improvement process.



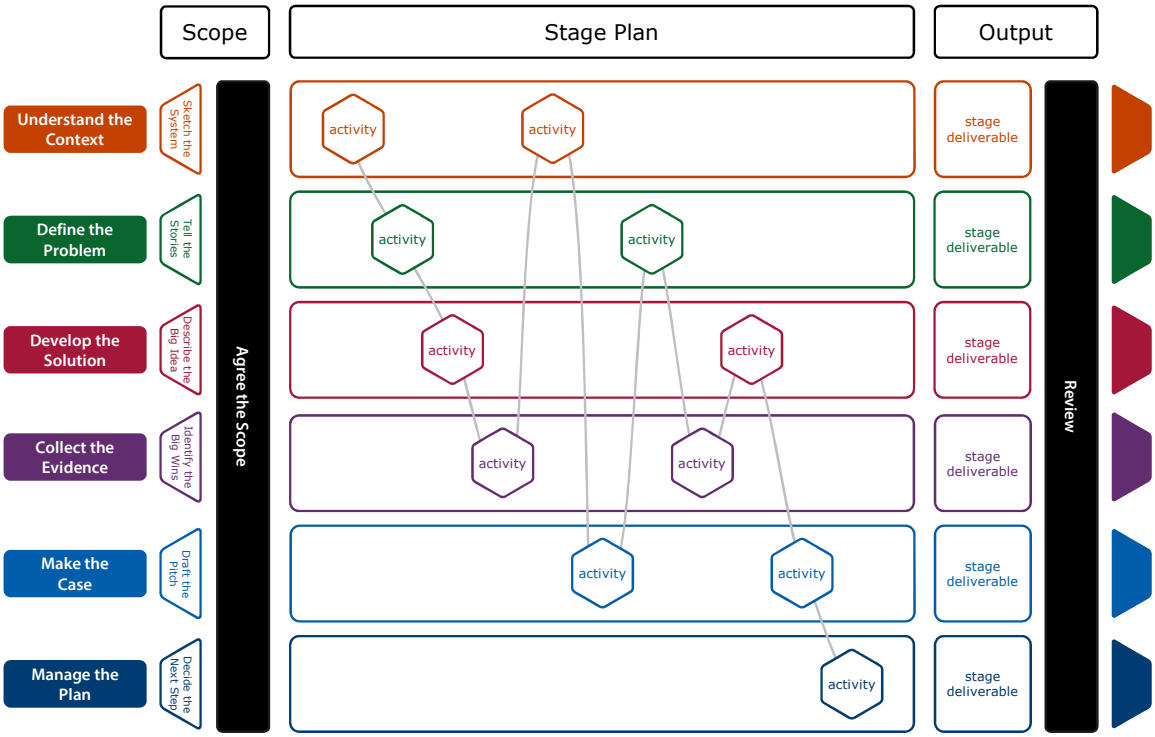
As described previously in the Engineering Better Care section, the activity strands that focus on particular aspects of a successful improvement process include:

- **Understand the Context** — describes the circumstances or setting that surround a system and all the factors that could influence the system and its improvement.
- **Define the Problem** — describes the detail of a particular challenge within a system and all the requirements for change necessary to improve the system.
- **Develop the Solution** — describes a way of solving a particular problem within a system and all the elements of change necessary to improve the system.
- **Collect the Evidence** — describes the information and all the measures used to evidence the validity of a particular solution(s) to a problem within a system.
- **Make the Case** — describes the set of facts or arguments in support of improving a system and delivering a particular solution(s) to a problem within the system.
- **Manage the Plan** — describes a detailed proposal for enabling change to a system and delivering a particular solution(s) to a problem within the system.
- **Agree the Scope** — describes the context of the improvement envisaged in terms of the extent of the ambition for improvement and the boundary of the system of interest.

1. *Engineering Better Care, a systems approach to health and care design and continuous improvement*. Royal Academy of Engineering, London, UK, 2017.

Introduction

These **strands** will be present throughout the improvement process, but the emphasis given to each one should vary. At different stages of the improvement process there will be different targets for each of the strands, with early focus more likely on the **context** and **problem** and later emphasis on the **solution** and **evidence**. The strands will be delivered through the selection of specific, individual **activities** supported, where appropriate, by the use of standard **tools**.



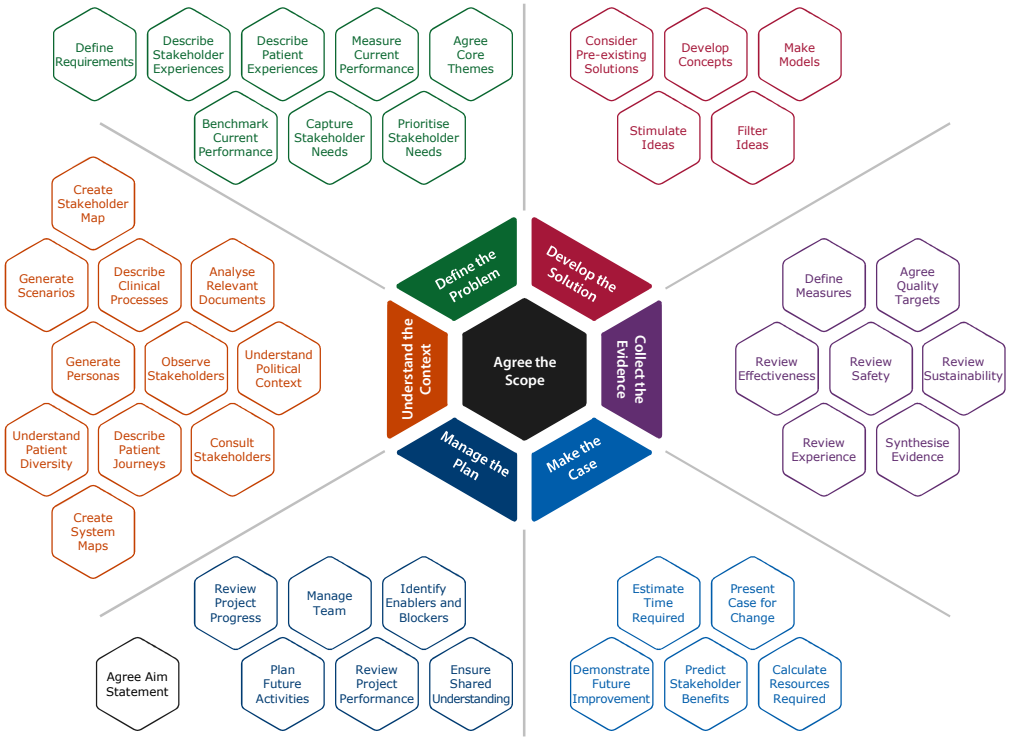
An initial set of activities and tools are included in this toolkit, along with resources to assist with the overall planning of the improvement process and the planning and execution of individual activities. They are divided into two types: **Preliminary Activities**, to assist with the planning of the improvement stage; and **Stage Activities**, to enable the team to bridge the gap between what is learned from the preliminary activities and what is required to achieve the next stage-gate targets.

The **Preliminary Activities** are intended to be flexible and tailored to the planning needs of each stage of the improvement process. Similarly, the **Stage Activities** are not designed to be rigid, rather they are intended to inspire enquiry across all stages of the improvement process in order to understand the context of the improvement challenge and the gap between the current performance of the system and its desired performance.

Introduction

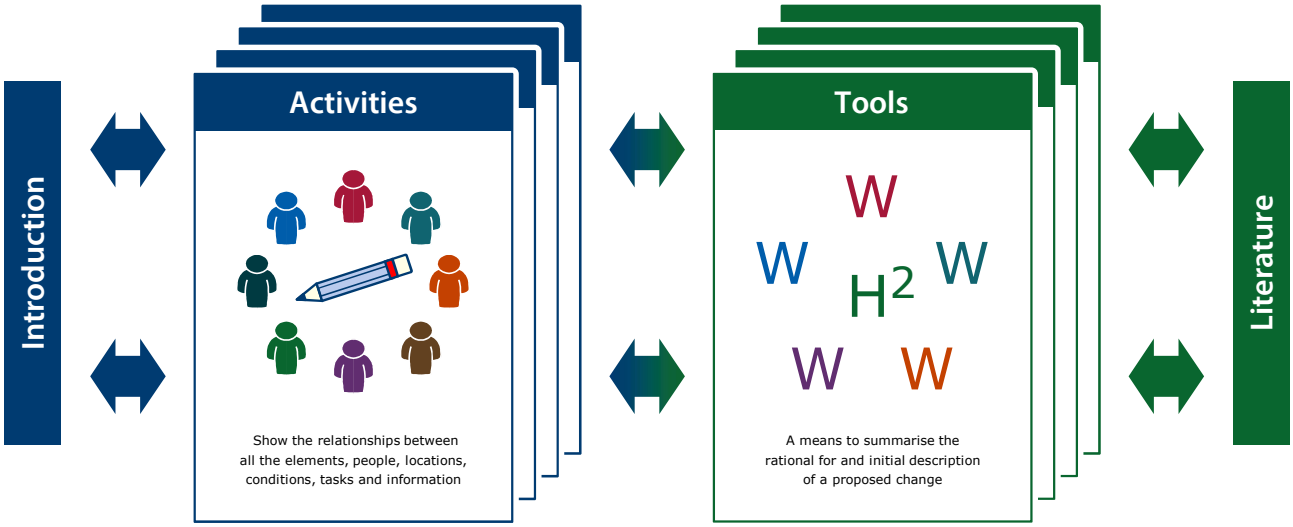
A set of **Preliminary Activities** for the Understand stage of the improvement programme were proposed in the [Improving Improvement]() section of this toolkit.

Similarly, a set of **Stage Activities** for the Understand stage of the improvement programme were also proposed in the [Improving Improvement]() section of this toolkit.



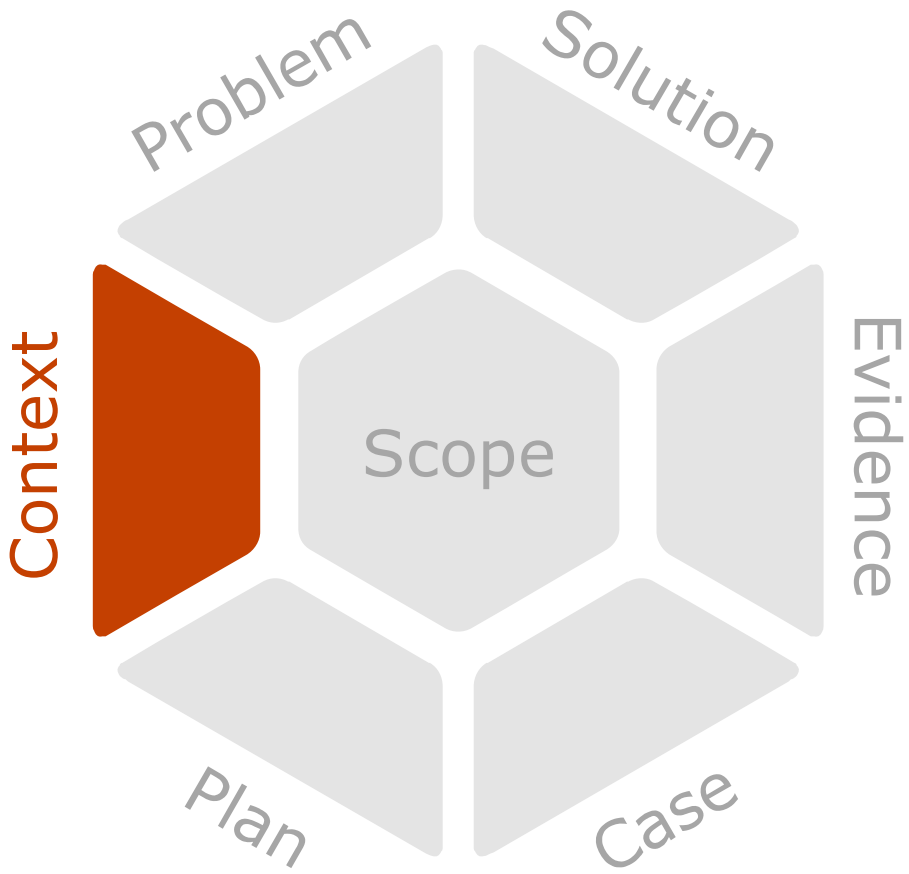
Introduction

The following sections describe the contents of this toolkit relating to the **context**, **problem**, **solution**, **evidence**, **case**, **plan** and **scope** strands associated with improvement process. In each case, a brief introduction to the strand is provided, along with details of all the activities related to that strand and tools that may be used to support those activities. An introduction to the literature related to each strand is also provided.



Reference is made throughout to the contents of the **Improvement Resources** section of this toolkit and to the cards, posters and worksheets included in the toolkit. The methotrexate and Esther case studies described in the **Improving Improvement** section of this toolkit are also reintroduced and extended to provide insight as to how the stands might have been addressed in these studies.

Understand the Context



Summary

The context describes the circumstances or setting that surround a system and all the factors that could influence the system and its improvement.

Contents

Introduction

The need to **Understand the Context** is the first of the seven strands in the improvement model. It underlines the importance of understanding the context of the system to be improved, as a precursor to defining the problem, developing the solution and collecting the evidence. As a result, it is expected that such understanding will be developed in the early stages of the improvement process and revised, as appropriate, as the process develops.

Purpose

Understanding the context has particular relevance to systems: reflecting the position of the system of interest among other related, adjacent systems; capturing the intended purpose of the system; describing the people and things that make up the system; and analysing the current performance of the system.

Activities

The process of understanding the context may include a wide range of activities including, but not limited to: Understand Political Context, Analyse Relevant Documents, Observe Stakeholders, Consult Stakeholders, Create Stakeholder Map, Describe Clinical Processes, Describe Patient Journeys, Create System Maps, Create Stakeholder Map, Understand Patient Diversity, Generate Personas and Generate Scenarios.

Tools

The practice of understanding the context may draw on a wide range of tools including, but not limited to: Literature Review, Soft Systems Method, Causal Loop Diagram, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Flow Chart, Swimlane Diagram, Spaghetti Diagram, Value Stream Mapping, Dependency Structure Matrix, One-to-one Interviews, Facilitated Discussion, Delphi Study, Participant Observation, Observational Study, Designing Personas, Designing Scenarios, Public Involvement and Storyboarding.

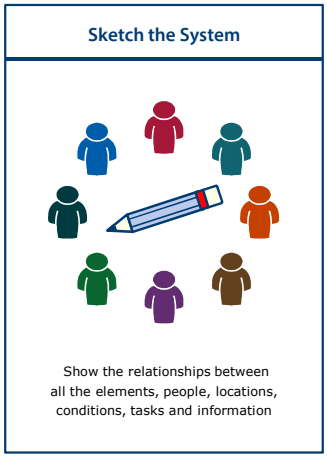
Getting Started

Understanding the **context** is critical to the successful delivery of an improvement project. It is particularly important to understand the context at the beginning of the improvement process and to update the description as necessary throughout the process.

The Understand, Design, Deliver and Sustain stages of an improvement process were previously described within the Introduction section, where each stage will likely comprise a **preliminary activity**, followed by a number of **stage activities**.

For the **Understand the Context** strand of the Understand phase, the **preliminary activity** is entitled **Sketch the System**. For the **Design**, **Delivery** and **Sustain** stages, the context should be reviewed and updated as necessary to support the ongoing improvement process.

Sketch the System



This preliminary activity encourages people to show the relationships between all the elements, people, locations, conditions, tasks and information and deliver a sketch or rich picture describing what is known about the system and its context.

Tools: Soft Systems Method, Entity Relationship Diagram

Worksheets: Improvement Questions, Improvement Stakeholders, Improvement Stands Canvas, Improvement Plan

Top tips:
- Use shapes to describe system elements and people
- Use labelled arrows to describe the relationships between them
- Use multiple diagrams to show different perspectives

Following on from this preliminary activity, the remaining **stage activities** are: Understand Political Context, Analyse Relevant Documents, Observe Stakeholders, Consult Stakeholders, Describe Clinical Processes, Create System Maps, Create Stakeholder Map, Understand Patient Diversity, Generate Personas and Generate Scenarios. Each of these are now described in turn, together with the tools that may be used to support them.

Activities

Understand Political Context

The location of the system in its wider geographical, political, management and cultural context.

Purpose: to understand the management, policy and political landscape within which the system exists

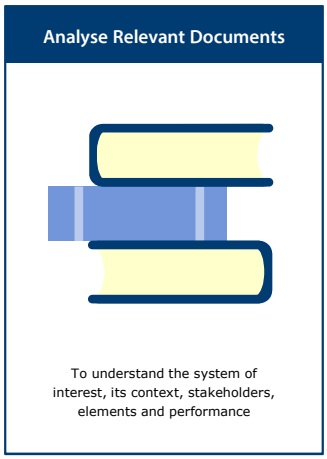
Inputs: Analyse Relevant Documents, Create System Maps, Create Stakeholder Map, Describe Clinical Processes, Describe Patient Journeys

Tools: Entity Relationship Diagram

Outputs: a comprehensive description of the wider geographical, political, management and cultural context of the system

Top tips:
- Describe the geographical and political context of the system
- Describe the management and leadership context of the system
- Understand local practice and policy on improvement and innovation

Analyse Relevant Documents



The analysis of documents relating to the system of interest, to reveal the current extent, behaviour and performance of the system

Purpose: to understand the system of interest, its context, stakeholders, elements and performance

Inputs: Understand System Context, Create System Maps, Create Stakeholder Map, Describe Clinical Processes, Describe Patient Journeys

Tools: Literature Review

Outputs: a compendium of relevant documents and commentary on their content and likely influence on the improvement

Top tips:
- Collect documents relevant to the system of interest
- Identify other literature of relevance to the system
- Analyse the documents and literature

Activities

Observe Stakeholders

The observation of individual stakeholders, i.e. service providers and users, to better understand their experiences of care

Purpose: to observe stakeholders within the system and document their actual behaviour

Inputs: Create Stakeholder Map, Describe Clinical Processes, Describe Patient Journeys, Consult Stakeholders

Tools: Participant Observation, Observational Study, Spaghetti Diagram

Outputs: a description of the actual behaviour and journeys undertaken by individual stakeholders

Top tips:
- Use a variety of observation and ethnographic tools
- Select a representative sample of stakeholders
- Observe links with other stakeholders

Consult Stakeholders

The consultation of individual stakeholders, i.e. service providers or users, to better understand their needs and experiences of care

Purpose: to consult stakeholders within the system and understand their expected behaviour

Inputs: Create Stakeholder Map, Describe Clinical Processes, Describe Patient Journeys, Observe Stakeholders

Tools: One-to-one Interviews, Facilitated Discussion, Delphi Study

Outputs: a description of the expected behaviour and journeys undertaken by individual stakeholders

Top tips:
- Use a variety of interview, discussion and survey tools
- Select a representative sample of stakeholders
- Consult on links with other stakeholders

Activities

Describe Clinical Processes

The mapping of the clinical processes that make up and support the patient journey through the system of interest

Purpose: to describe the clinical processes, key decisions and expected outcomes associated with the system

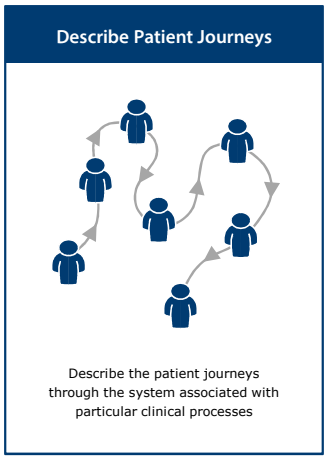
Inputs: Understand System Context, Analyse Relevant Documents, Create System Maps, Create Stakeholder Map, Describe Patient Journeys, Observe Stakeholders, Consult Stakeholders, Describe Patient Experiences, Describe Stakeholder Experiences

Tools: Literature Review, Rich Picture, Soft Systems Method, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, **Flow Chart**, Swimlane Diagram, Spaghetti Diagram, Storyboarding

Outputs: a description of clinical processes, highlighting the key stages and any particular challenges that might be faced

Top tips:
- Convene a representative group of service stakeholders
- Think broadly to identify where the stakeholder journeys begin
- Consider all stages of the subsequent stakeholder journeys

Describe Patient Journeys



The mapping of the patient journeys associated with particular clinical processes within the system of interest

Purpose: to describe the patient journeys through the system associated with particular clinical processes

Inputs: Understand System Context, Analyse Relevant Documents, Create System Maps, Create Stakeholder Map, Describe Clinical Processes, Observe Stakeholders, Consult Stakeholders, Describe Patient Experiences, Describe Stakeholder Experiences

Tools: Soft Systems Method, Entity Relationship Diagram, State Transition Diagram, Flow Chart, Swimlane Diagram, Spaghetti Diagram, Life Café, Public Involvement, **Storyboarding**

Outputs: a description of patient journeys, highlighting the key stages and any particular challenges that might be faced

Top tips:
- Convene a representative group of patients or their representatives
- Think broadly to identify where the patient journey begins
- Consider all stages of the subsequent patient journey

Activities

Create System Maps

The mapping of the system of interest, to identify key elements and their interfaces to each other and neighbouring systems

Purpose: to create a common view of the system, its elements, architecture and interfaces to other systems

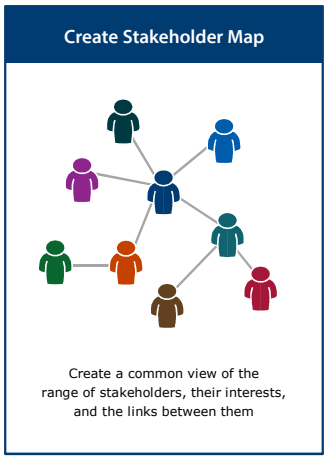
Inputs: Understand System Context, Analyse Relevant Documents, Create Stakeholder Map, Describe Clinical Processes, Describe Patient Journeys, Describe Patient Experiences, Describe Stakeholder Experiences

Tools: Literature Review, **Rich Picture**, Soft Systems Method, Causal Loop Diagram, Influence Diagram, Entity Relationship Diagram, Data Flow Diagram, State Transition Diagram, Flow Chart, Swimlane Diagram, Dependency Structure Matrix

Outputs: a set of maps of the system, its elements and their interfaces to each other and other systems

Top tips:
- Include anything that can impact on the desired outcomes
- Link to stakeholder map, clinical pathway and patient journeys
- Reflect on what is noteworthy about the location of the system

Create Stakeholder Map



The mapping of the links between stakeholders, i.e. service providers or users, who have a direct or indirect interest in the system to be improved

Purpose: to create a common view of the range of stakeholders, their interests, and the links between them

Inputs: Understand System Context, Analyse Relevant Documents, Create System Maps, Describe Clinical Processes, Describe Patient Journeys, Describe Patient Experiences, Describe Stakeholder Experiences

Tools: Literature Review, Rich Picture, Soft Systems Method, Causal Loop Diagram, Influence Diagram, Entity Relationship Diagram, Swimlane Diagram, Dependency Structure Matrix

Worksheets: Improvement Stakeholders

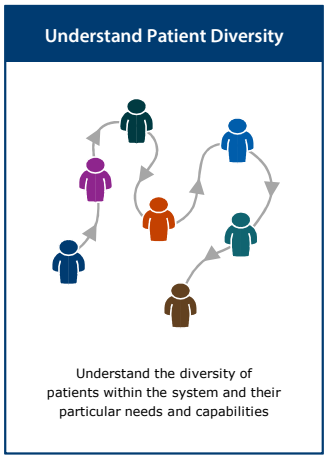
Cards: Service Users, Service Stakeholders

Outputs: a map of the system stakeholders, their interests and the links between them

Top tips:
- List stakeholders starting with those at the heart of the system
- Describe the likely interests of the stakeholders in the system
- Identify links through formal and informal networks and pathways

Activities

Understand Patient Diversity



The acknowledgement of the diversity of patients and their corresponding journeys and experiences of care

Purpose: to understand the diversity of patients within the system and their particular needs and capabilities

Inputs: Create System Maps, Describe Clinical Processes, Describe Patient Journeys, Observe Stakeholders, Consult Stakeholders, Describe Patient Experiences, Describe Stakeholder Experiences

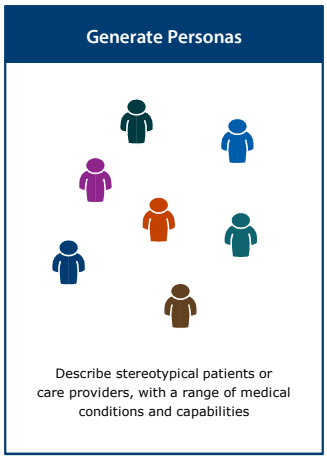
Tools: One-to-One Interviews, Facilitated Discussion, Participant Observation, Observational Study

Cards: Service Users

Outputs: a description of the diversity of patients and their experiences of care

Top tips:
- Consider the range of patients navigating the user journey
- Expect to see diversity in sensory, cognitive and motion capability
- Expect to see diversity in gender, culture and socioeconomic status

Generate Personas



The drafting of short, narrative descriptions of people, as providers or recipients of care, to inspire and test ideas for improvement

Purpose: to describe stereotypical patients or care providers, with a range of medical conditions and capabilities

Inputs: Create System Maps, Create Stakeholder Map, Understand Patient Diversity, Describe Patient Journeys, Generate Scenarios, Describe Stakeholder Experiences, Describe Patient Experiences

Tools: Designing Personas

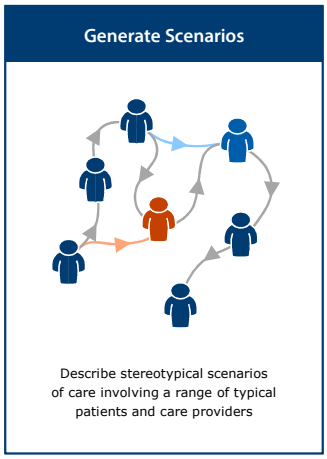
Cards: Service Users, Service Stakeholders

Outputs: a set of personas that are representative of the range or possible users of the system

Top tips:
- Ensure personas emphasise notable user characteristics
- Generate a set of personas to caricature the diversity of users
- Use personas as a means to test ideas for improvement

Activities

Generate Scenarios



The drafting of short, narrative descriptions of a range of scenarios of care to inspire and test ideas for improvement

Purpose: to describe stereotypical scenarios of care involving a range of typical patients and care providers

Inputs: Create System Maps, Create Stakeholder Map, Describe Clinical Processes, Describe Patient Journeys, Understand Patient Diversity, Generate Personas, Describe Stakeholder Experiences, Describe Patient Experiences

Tools: Designing Scenarios

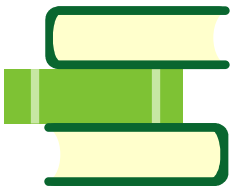
Cards: Service Users, Service Stakeholders

Outputs: a set of scenarios that are representative of the range of possible journeys through the system

Top tips:
- Ensure scenarios emphasise notable pathway characteristics
- Generate a set of scenarios to caricature the diversity of care
- Use scenarios as a means to test ideas for improvement

Tools

Literature Review

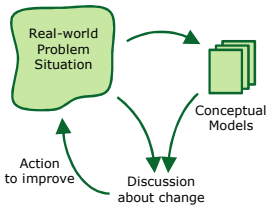


A systematic review of the literature describing the system being improved and its behaviour

Rich Picture

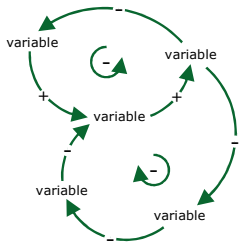
A means to understand a system using diagrams to create a preliminary mental model

Soft Systems Method



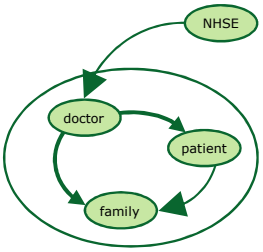
A means to foster learning and appreciation of the problem situation within a complex system

Causal Loop Diagram



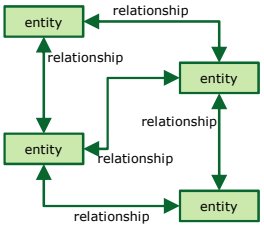
A means to capture the variables of interest in a complex system and understand their effect on outcomes

Influence Diagram



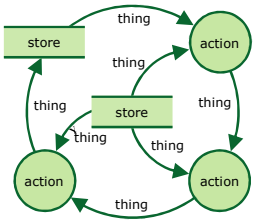
A means to map the main components or issues for a situation or system and the influences that exist between them

Entity Relationship Diagram



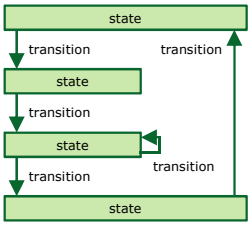
A means to identify and map the entities in a complex system and the relationships between them

Data Flow Diagram



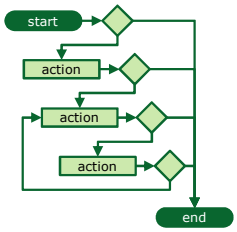
A means to identify and map the functions in a complex system and the things flowing between them

State Transition Diagram



A means to identify and map the states in a complex system and the transitions between them

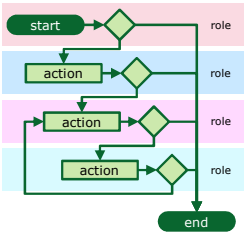
Flow Chart



A means to map key activities and decisions in a system and understand their impact on performance

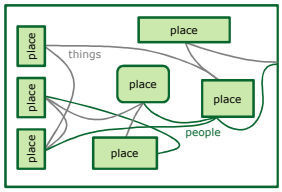
Tools

Swimlane Diagram



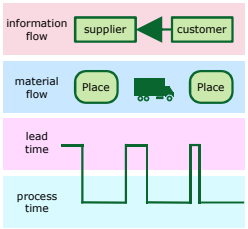
A means to map key activities and decisions in a system and understand their impact on performance

Spaghetti Diagram



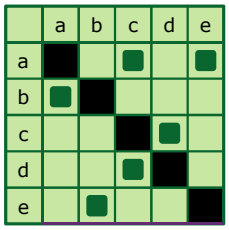
A tool to establish the optimum layout for a department based on observations of movement

Value Stream Mapping



A tool to help understand and improve the material and information flow within organisations

Dependency Structure Matrix



A structured representation of the dependencies between individual elements of a system

One-to-one Interviews

A means to elicit information about a particular topic or area of interest in a one-to-one conversation

Facilitated Discussion

A means to elicit perceptions about a particular topic or area of interest in a non-threatening environment

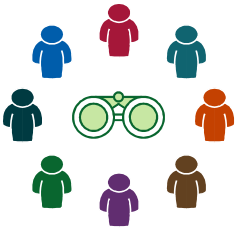
Delphi Study

An iterative approach to develop a consensus view regarding the current performance of the system

Participant Observation

A means to understand how things are really done in a particular situation or area of interest

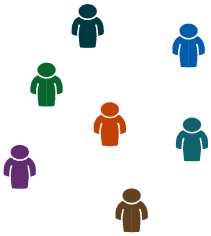
Observational Study



A means to observe how things are done in a particular situation or area of interest

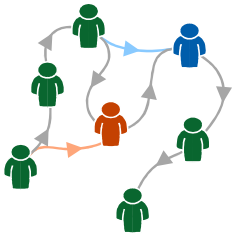
Tools

Designing Personas



A means to create representations of stereotypical users and their conditions, capabilities or responsibilities

Designing Scenarios

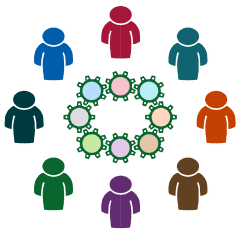


A means to create the stories of stereotypical users reflecting their conditions, capabilities or responsibilities

Life Café

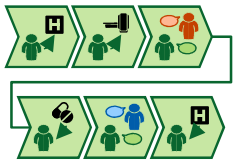
A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

Public Involvement



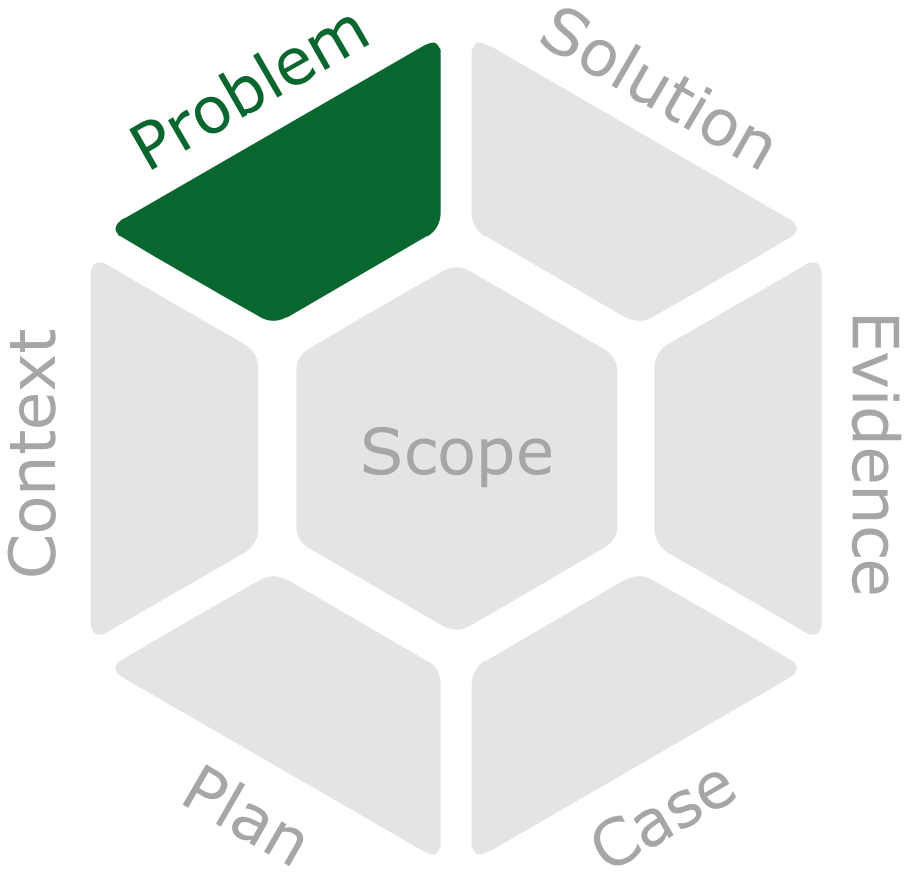
A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

Storyboarding



A means to clearly articulate a view of a better system based on an understanding of the current system

Define the Problem



Summary

The problem describes the detail of a particular challenge within a system and all the requirements for change necessary to improve the system.

Contents

Introduction

The need to **Define the Problem** is the second of the seven strands in the improvement model. It underlines the importance of defining the problem within the system to be improved, following understanding the system and as a precursor to developing the solution and collecting the evidence. As a result, it is expected that such a definition will be developed in the early stages of the improvement process and revised, as appropriate, as the process develops.

Purpose

Defining the problem has particular importance to systems improvement: describing and benchmarking the current performance of the system of interest; understanding and prioritising the needs of stakeholders and users of the system; and defining and agreeing the key requirements for improvement.

Activities

The process of defining the problem may include a wide range of activities including, but not limited to: Describe Stakeholder Experiences, Describe Patient Experiences, Measure Current Performance, Benchmark Current Performance, Capture Stakeholder Needs, Prioritise Stakeholder Needs, Agree Core Themes and Define Requirements.

Tools

The practice of defining the problem may draw on a wide range of tools including, but not limited to: Value Stream Mapping, Dependency Structure Matrix, One-to-one Interviews, Facilitated Discussion, Delphi Study, Participant Observation, Observational Study, Designing Personas, Public Involvement, MoSCoW, Data Analysis, Storyboarding and Fishbone Diagram.

Getting Started

Defining the **problem** is vital for the successful delivery of an improvement project. It is particularly important to define the problem at the beginning of the improvement process and to update the description as necessary throughout the process.

The Understand, Design, Deliver and Sustain stages of an improvement process were previously described within the Introduction section, where each stage will likely comprise a **preliminary activity**, followed by a number of **stage activities**.

For the **Define the Problem** strand of the Understand phase, the **preliminary activity** is entitled **Tell the Stories**. For the Design, Delivery and Sustain stages, the problem should be reviewed and updated as necessary to support the ongoing improvement process.

Tell the Stories

This preliminary activity encourages people to communicate stories of patient and stakeholder experiences that bring life to the improvement challenges and deliver a description of what is known about the current challenges within the system.

Worksheets: Improvement Questions, Improvement Stakeholders, Improvement Stands Canvas, Improvement Plan

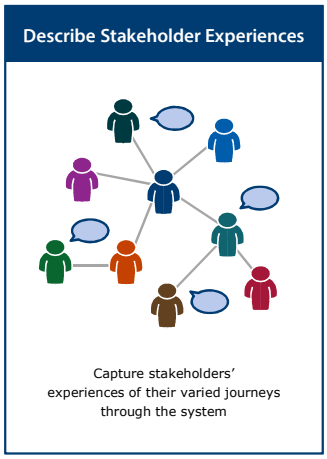
Cards: Service Users, Service Stakeholders

Top tips:
- Bring stories to life with images and videos of interviews
- Use the stories to identify key elements of the system
- Showcase areas of the system that might be improved

Following on from this preliminary activity, the remaining **stage activities** are: Describe Stakeholder Experiences, Describe Patient Experiences, Measure Current Performance, Benchmark Current Performance, Capture Stakeholder Needs, Prioritise Stakeholder Needs, Agree Core Themes and Define Requirements. Each of these are now described in turn, together with the tools that may be used to support them.

Activities

Describe Stakeholder Experiences



The description of stakeholder journeys, using observation and consultation approaches, to understand their experiences

Purpose: to capture stakeholder experiences of their varied and multiple journeys through the system

Inputs: Create System Maps, Create Stakeholder Map, Describe Clinical Process, Describe Patient Experiences

Tools: One-to-One Interviews, Facilitated Discussion, Delphi Study, Life Café, Public Involvement, Storyboarding

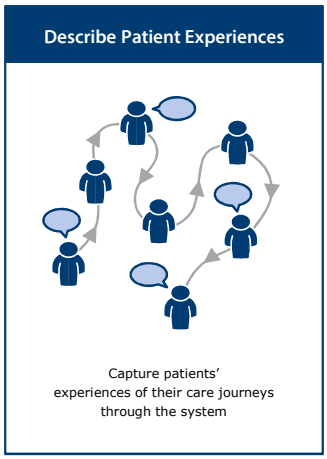
Worksheets: Improvement Design Wall

Cards: Service Stakeholders

Outputs: a description of stakeholder experiences, highlighting the key stages and particular challenges that might be faced

Top tips:
- Convene a representative group of service stakeholders
- Collect stakeholder stories identifying the elements of care
- Discuss different experiences of the service and patients

Describe Patient Experiences



The description of patient journeys, using observation and consultation approaches, to understand their experiences

Purpose: to capture patients' experiences of their care journeys through the system

Inputs: Create System Maps, Create Stakeholder Map, Describe Clinical Process, Describe Stakeholder Experiences

Tools: One-to-One Interviews, Facilitated Discussion, Life Café, Public Involvement, Storyboarding

Worksheets: Improvement Design Wall

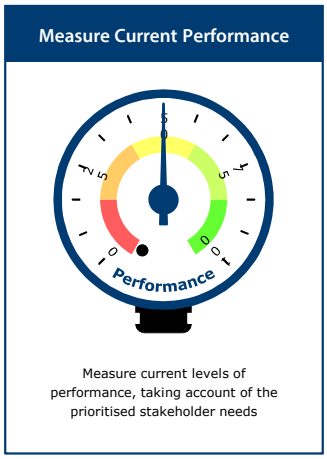
Cards: Service Users

Outputs: a description of patient experiences, highlighting the key stages and any particular challenges that might be faced

Top tips:
- Convene a representative group of patients or their representatives
- Collect patient stories identifying the elements of care
- Discuss different experiences of the process and associated care

Activities

Measure Current Performance



The collection and analysis of recent measured performance data and targets, including both quantitative and qualitative data

Purpose: to measure current levels of performance, taking account of the prioritised stakeholder needs

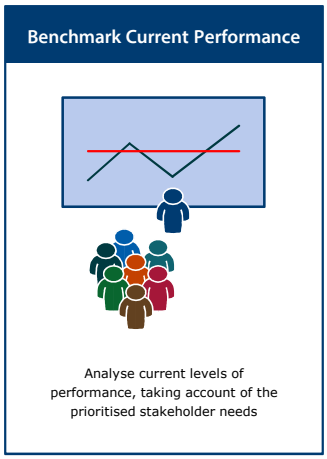
Inputs: Analyse Relevant Documents, Create System Maps, Describe Clinical Processes, Describe Patient Experiences, Describe Stakeholder Experiences, Benchmark Current Performance

Tools: Observational Study, Data Analysis

Outputs: measured qualitative and quantitative performance data relating to the system of interest and its stakeholders

Top tips:
- Monitor the current performance of the whole system
- Estimate the levels of performance from qualitative measures
- Derive the levels of performance from quantitative measures

Benchmark Current Performance



The collection and analysis of recent performance data and targets, benchmarked where appropriate to similar systems

Purpose: to analyse current levels of performance, taking account of the prioritised stakeholder needs

Inputs: Analyse Relevant Documents, Create System Maps, Describe Clinical Processes, Describe Patient Experiences, Describe Stakeholder Experiences, Measure Current Performance

Tools: Facilitated Discussion, Observational Study, Data Analysis

Outputs: performance data relating to the system of interest and its stakeholders, and benchmarking to similar systems

Top tips:
- Convene a representative group of stakeholders together
- Present recent information and benchmark the elements of care
- Discuss different perspectives on the current performance

Activities

Capture Stakeholder Needs

The capture of stakeholder needs relating to the purpose of the system, detailing the rationale for each individual need

Purpose: to identify the full range of possible stakeholder needs relevant to the system

Inputs: Create System Maps, Create Stakeholder Map, Describe Clinical Processes, Observe Stakeholders, Consult Stakeholders, Understand Patient Diversity, Prioritise Stakeholder Needs

Tools: One-to-one Interviews, Facilitated Discussion, Delphi Study, Participant Observation, Observational Study, Designing Personas, Designing Scenarios, MoSCoW, Data Analysis, Storyboarding

Cards: Service Stakeholders

Outputs: a full list of stakeholders' needs, including the rationale for each need

Top tips:
- Capture and explore as many of the needs as possible
- Describe the needs without suggesting possible solutions
- Use a system map to assist identification of system needs

Prioritise Stakeholder Needs

The prioritisation of stakeholder needs relating to the purpose of the system, detailing the rationale for each priority

Purpose: to understand the relative priority of stakeholder needs relevant to the system

Inputs: Create System Maps, Create Stakeholder Map, Describe Clinical Processes, Observe Stakeholders, Consult Stakeholders, Understand Patient Diversity, Capture Stakeholder Needs

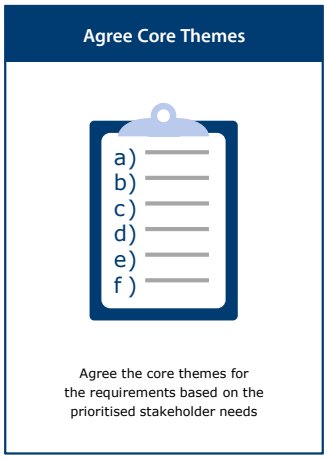
Tools: Value Stream Mapping, Dependency Structure Matrix, One-to-one Interviews, Facilitated Discussion, Delphi Study, Designing Personas, Designing Scenarios, MoSCoW

Outputs: a prioritized list of stakeholders' needs, including the rationale for each need

Top tips:
- Prioritise the stakeholders needs resolving any conflicts
- Focus on outcomes and their values to the stakeholders
- Develop requirements with the prioritised list in mind

Activities

Agree Core Themes



The identification and articulation of the core themes for the requirements for improvement, describing what the revised system must do

Purpose: to agree the core themes for the requirements based on the prioritised stakeholder needs

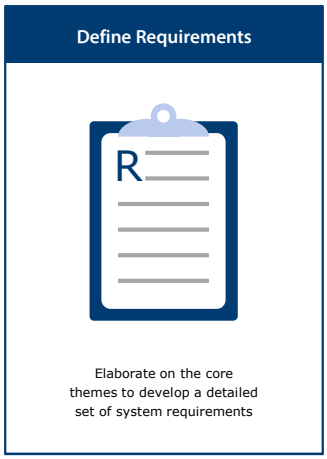
Inputs: Understand System Context, Create System Maps, Create Stakeholder Map, Generate Personas, Generate Scenarios, Prioritise Stakeholders Needs, Benchmark Current Performance, Measure Current Performance, Define Requirements, Develop Concepts, Make Models, Synthesise Evidence, Agree Aim Statement

Tools: Value Stream Mapping, Dependency Structure Matrix, Delphi Study, Life Café, Public Involvement, MoSCoW, Fishbone Diagram

Outputs: a short list of specific, measurable, acceptable, realistic themes to act as a the focus for the improved system

Top tips:
- Be specific, measurable, acceptable, realistic and time-bound
- Capture the essence of what the system must do
- Link the core themes to appropriate stakeholders

Define Requirements



The definition of requirements for improvement, describing what the revised system should be able to do and how this will be measured

Purpose: to elaborate on the core themes to develop a detailed set of system requirements

Inputs: Understand System Context, Create System Maps, Create Stakeholder Map, Generate Personas, Generate Scenarios, Prioritise Stakeholders Needs, Benchmark Current Performance, Measure Current Performance, Agree Core Themes, Develop Concepts, Make Models, Synthesise Evidence, Agree Aim Statement

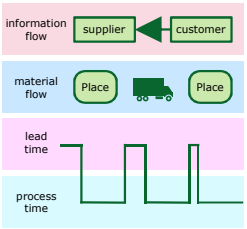
Tools: Value Stream Mapping, Delphi Study, Life Café, Public Involvement, MoSCoW, Fishbone Diagram

Outputs: a prioritised list of specific, measurable, acceptable, realistic and time-bound requirements for the improved system

Top tips:
- Be specific, measurable, acceptable, realistic and time-bound
- Distinguish between demands and wishes
- Link all requirements to appropriate themes

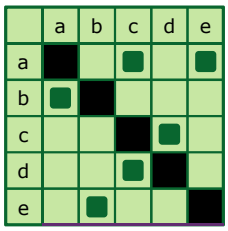
Tools

Value Stream Mapping



A tool to help understand and improve the material and information flow within organisations

Dependency Structure Matrix



A structured representation of the dependencies between individual elements of a system

One-to-one Interviews

A means to elicit information about a particular topic or area of interest in a one-to-one conversation

Facilitated Discussion

A means to elicit perceptions about a particular topic or area of interest in a non-threatening environment

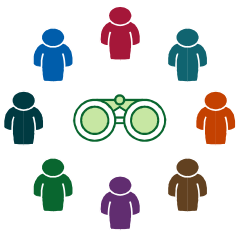
Delphi Study

An iterative approach to develop a consensus view regarding the current performance of the system

Participant Observation

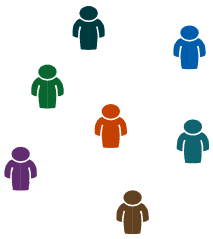
A means to understand how things are really done in a particular situation or area of interest

Observational Study



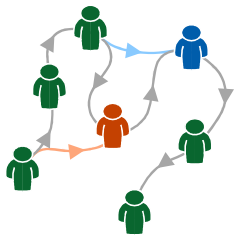
A means to observe how things are done in a particular situation or area of interest

Designing Personas



A means to create representations of stereotypical users and their conditions, capabilities or responsibilities

Designing Scenarios



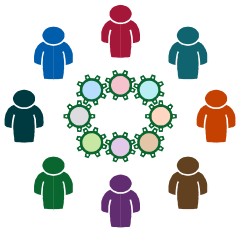
A means to create the stories of stereotypical users reflecting their conditions, capabilities or responsibilities

Tools

Life Café

A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

Public Involvement

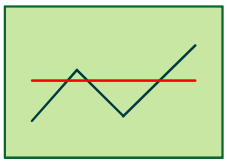


A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

MoSCoW

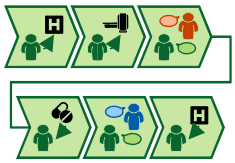
A means to capture a prioritised list of must, should, could and won't have requirements for improvement

Data Analysis



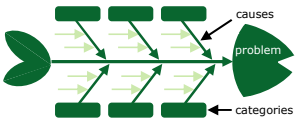
A means to analyse available data to understand the current levels of performance of the system

Storyboarding



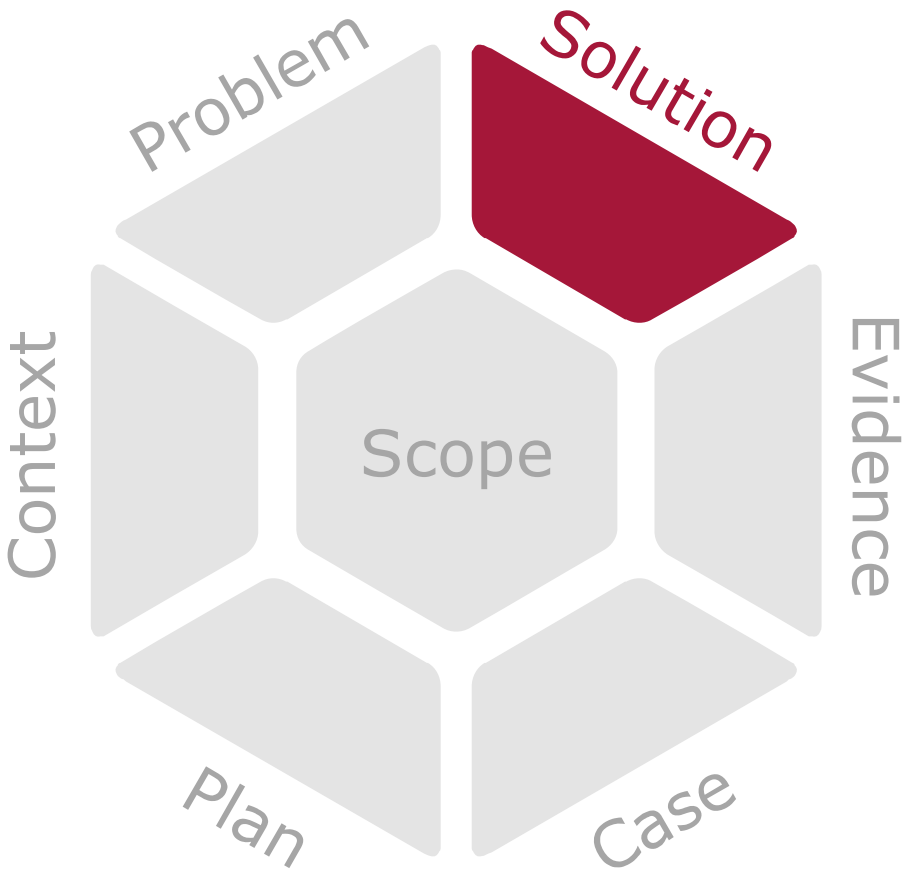
A means to clearly articulate a view of a better system based on an understanding of the current system

Fishbone Diagram



A method to think through the causes of a problem before starting to identify its root causes

Develop the Solution



Summary

The solution describes a way of solving a particular problem within a system and all the elements of change necessary to improve the system.

Contents

Introduction

The need to **Develop the Solution** is the third of the seven strands in the improvement model. It underlines the importance of developing the solution for the system to be improved, following understanding the system and defining the problem, and as a precursor to collecting the evidence. As a result, it is expected that such a solution will be developed in the intermediate stages of the improvement process and revised, as appropriate, as the process develops.

Purpose

Developing the solution has direct importance to systems improvement: considering pre-existing solutions; identifying, filtering and developing solution concepts; and making models to evaluate potential ideas for improvement.

Activities

The process of developing the solution may include a wide range of activities including, but not limited to: Consider Pre-existing Solutions, Stimulate Ideas, Filter Ideas, Develop Concepts and Make Models.

Tools

The practice of developing the solution may draw on a wide range of tools including, but not limited to: Storyboarding, Brainstorming, Disney, Six Thinking Hats and Morphological Chart.

Getting Started

Developing the **solution** is essential for the successful delivery of an improvement project. It is particularly important to develop the solution in the middle of the improvement process and to update the description as necessary during the remainder of the process.

The Understand, Design, Deliver and Sustain stages of an improvement process were previously described within the Introduction section, where each stage will likely comprise a **preliminary activity**, followed by a number of **stage activities**.

For the **Develop the Solution** strand of the Understand phase, the **preliminary activity** is entitled **Describe the Big Idea**. For the Design, Delivery and Sustain stages, the concepts/solutions should be reviewed and updated as necessary to support the ongoing improvement process.

Describe the Big Idea

This preliminary activity encourages people to think creatively and describe how the system could be improved and deliver a description of what is proposed as a possible solution concept(s) for improving the system.

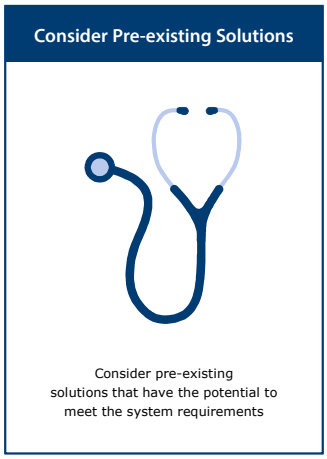
Worksheets: Improvement Questions, Improvement Stakeholders, Improvement Strands Canvas, Improvement Plan

Top tips:
- Establish a creative culture for generating ideas
- Identify ideas that are most likely to result in improvement
- Use sketches or models to bring the idea(s) to life

Following on from this preliminary activity, the remaining **stage activities** are: Consider Pre-existing Solutions, Simulate Ideas, Filter Ideas, Develop Concepts and Make Models. Each of these are now described in turn, together with the tools that may be used to support them.

Activities

Consider Pre-existing Solutions



The identification, review and presentation of existing solutions with the potential to satisfy the demands of the requirements

Purpose: to consider pre-existing solutions that have the potential to meet the system requirements

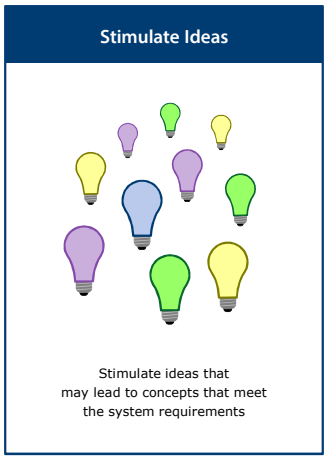
Inputs: Define Requirements, Stimulate Ideas

Tools: Morphological Chart

Outputs: a list of pre-existing solutions with potential to satisfy the demands of the requirements

Top tips:
- Allow plenty of time for solution identification and review
- Ensure pre-existing solutions meet the demands in the requirements
- Avoid fixation to encourage a broader search

Stimulate Ideas



The generation of ideas to inspire the creation of new ideas that are likely to satisfy the demands of the requirements

Purpose: to stimulate ideas that may lead to new concepts that meet the system requirements

Inputs: Define Requirements, Consider Pre-existing Solutions, Develop Concepts, Make Models

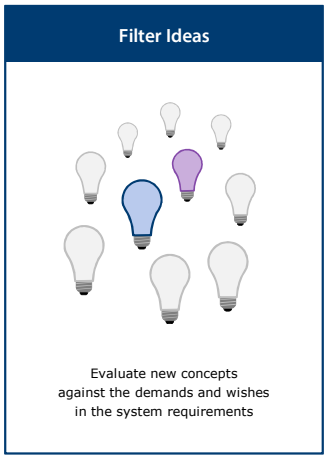
Tools: Storyboarding, Brainstorming, Disney, Six Thinking Hats

Outputs: a wide range of ideas with the potential to lead to new concepts that may satisfy the demands of the requirements

Top tips:
- Adopt a variety of methods to encourage the generation of ideas
- Consider the use of tools that avoid fixation and encourage creativity
- Include all ideas generated at this stage, filter later

Activities

Filter Ideas



The filtering of ideas to ensue the development of new concepts with the potential to satisfy the demands of the requirements

Purpose: to evaluate new ideas against the demands and wishes in the system requirements

Inputs: Consider Pre-existing Solutions, Stimulate Ideas, Develop Concepts, Make Models

Tools: Morphological Chart

Outputs: a range of ideas with the potential to lead to new concepts that satisfy the demands of the requirements

Top tips:
- Ensure ideas meet the demands in the requirements
- Filter ideas against the wishes in the requirements
- Note requirements that relate to different stakeholders

Develop Concepts

The development of new concepts with the potential to satisfy the demands and meet the wishes of the system requirements

Purpose: to develop new concepts that have the potential to meet the system requirements

Inputs: Define Requirements, Consider Pre-existing Solutions, Stimulate Ideas, Make Models, Define Measures, Review Experience, Review Safety, Review Effectiveness

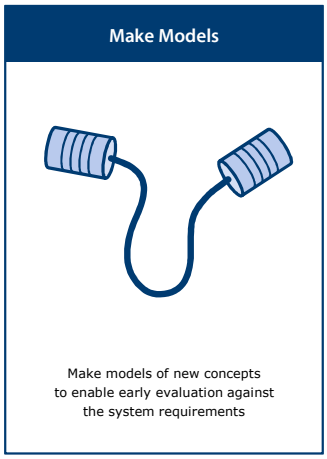
Tools: Brainstorming, Disney, Six Thinking Hats, Morphological Chart

Outputs: a number of new concepts that are likely to satisfy the demands and meet the wishes of the requirements

Top tips:
- Allow plenty of time for concept development
- Combine elements of different ideas to develop new concepts
- Avoid fixation to encourage greater creativity

Activities

Make Models



The early evaluation of new concepts to see if they satisfy the demands and meet the wishes of the requirements

Purpose: to make models of new concepts to enable early evaluation against the system requirements

Inputs: Consider Pre-existing Solutions, Filter Ideas, Develop Concepts

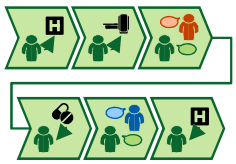
Tools: tbd

Outputs: a number of models and evidence of their behaviour against the demands and wishes of the requirements

Top tips:
- Produce a physical or virtual demonstration of the concept
- Consider different models for different purposes
- Consider quick tests with rough models to resolve critical issues

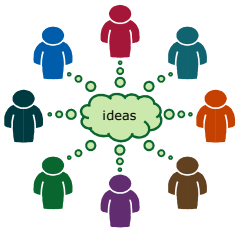
Tools

Storyboarding



A means to clearly articulate a view of a better system based on an understanding of the current system

Brainstorming



A means to encourage the generation of ideas and concepts to facilitate system improvement

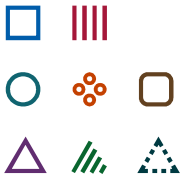
Disney

A means to encourage the dreamer, the realist and the critic to develop ideas for system improvement

Six Thinking Hats

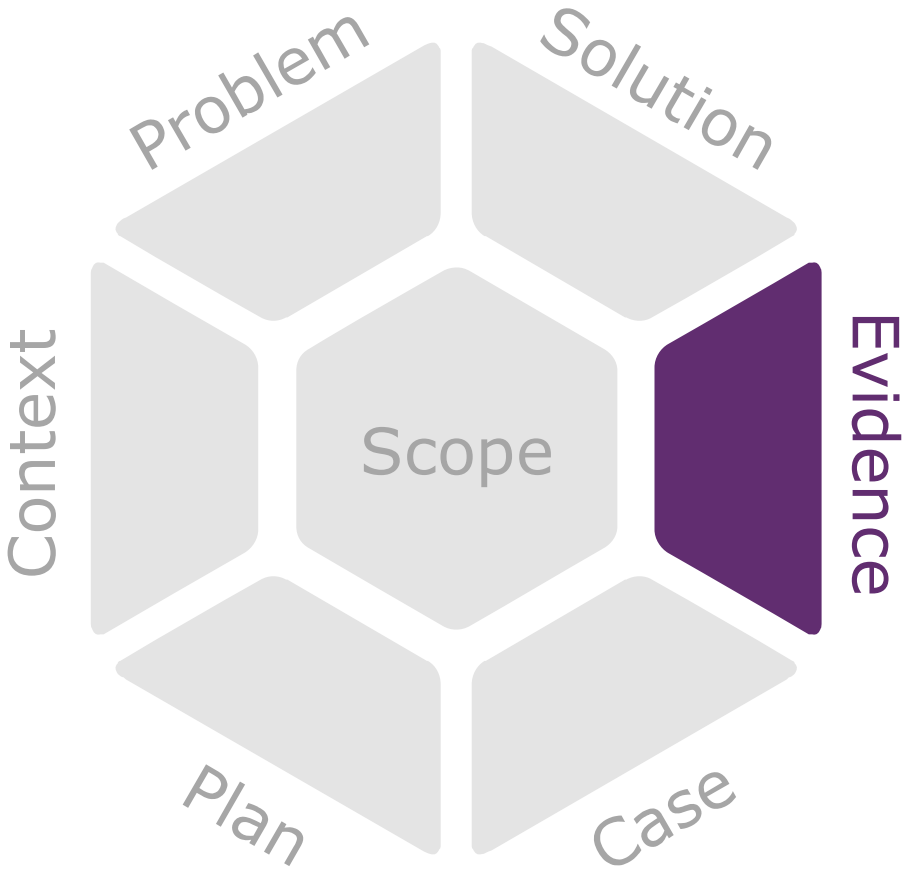
A means to encourage different ways of thinking to reach innovative concepts for system improvement

Morphological Chart



A means to help organise the presentation of ideas and concepts to facilitate system improvement

Collect the Evidence



Summary

The evidence describes the information in support of solution(s) within a system and the means used to measure the performance of the system.

Contents

Introduction

The need to **Collect the Evidence** is the fourth of the seven strands in the improvement model. It underlines the importance of collecting the evidence that the system has been improved, following understanding the system, defining the problem and developing the solution. As a result, it is expected that such a definition will be developed in the intermediate stages of the improvement process and revised, as appropriate, as the process develops.

Purpose

Collecting the evidence has particular importance to systems improvement: defining the measures required to evaluate the performance of the system of interest; undertaking a range of evaluation activities to evaluate effectiveness, patient safety and patient experience; and synthesising the information to evidence the extent of the improvement to the system.

Activities

The process of collecting the evidence may include a wide range of activities including, but not limited to: Define Measures, Agree Quality Targets, Review Effectiveness, Review Safety, Review Experience, Review Sustainability and Synthesise Evidence.

Tools

The practice of collecting the evidence may draw on a wide range of tools including, but not limited to: Exclusion Audit, User Trials, Expert Review, Life Cycle Assessment, Root Cause Analysis, Failure Mode and Effects Analysis, Fault Tree Analysis, Structured What-if Technique and Risk Matrix.

Getting Started

Collecting the **evidence** is key to the successful evaluation of an improvement project. It is particularly important to collect the evidence starting early in the improvement process and to update the description as necessary during the remainder of the process.

The Understand, Design, Deliver and Sustain stages of an improvement process were previously described within the Introduction section, where each stage will likely comprise a **preliminary activity**, followed by a number of **stage activities**.

For the **Collect the Evidence** strand of the Understand phase, the **preliminary activity** is entitled **Identify the Big Wins.** For the Design, Delivery and Sustain stages, the evidence should be further developed into a full account of the effectiveness (or otherwise) of the implemented solution(s).

Identify the Big Wins

This preliminary activity encourages people to identify the big wins and justify the resources required to make the system changes proposed and deliver a description of the most likely outcome(s) from delivering the proposed solution(s) for improving the system.

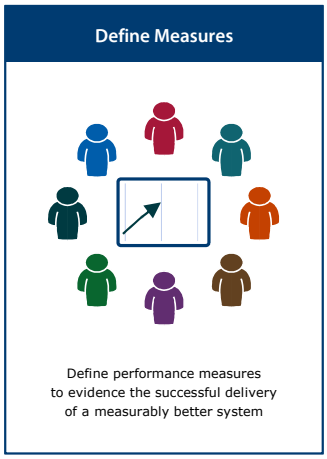
Worksheets: Improvement Questions, Improvement Stakeholders, Improvement Strands Canvas, Improvement Plan

Top tips:
- Quantify how many patients could benefit from the changes
- Identify the potential benefits, costs and risks for the stakeholders
- Consider the alignment of risks and benefits for each stakeholder

Following on from this preliminary activity, the remaining **stage activities** are: Define Measures, Agree Quality Targets, Review Effectiveness, Review Safety, Review Experiences and Synthesise Evidence. Each of these are now described in turn, together with the tools that may be used to support them.

Activities

Define Measures



The translation of the core themes for improvement into the definition of appropriate and robust measures of success

Purpose: to define performance measures to evidence the successful delivery of a measurably better system

Inputs: Define Requirements, Agree Quality Targets, Review Effectiveness, Review Safety, Review Experience, Review Sustainability

Tools: tbd

Outputs: a clear definition of the performance measures required to evidence success

Top tips:
- Establish a clear rationale for the criteria for success
- Identify performance measures necessary to demonstrate success
- Align evaluation activities to the measures and criteria

Agree Quality Targets

The translation of the core themes for improvement into the definition of appropriate and robust quality targets to ensure success

Purpose: to define service quality targets to ensure the successful delivery of a measurably better system

Inputs: Define Requirements, Define Measures, Review Effectiveness, Review Safety, Review Experience, Review Sustainability

Tools: tbd

Outputs: a clear definition of the quality targets required to ensure success

Top tips:
- Define appropriate targets for clinical and cost effectiveness
- Define appropriate targets for patient safety
- Define appropriate targets for patient experience

Activities

Review Effectiveness

The systematic review of new concepts, identifying their strengths and weaknesses in meeting the prioritised stakeholder needs

Purpose: to identify clinical and cost effectiveness risks in the adoption of new concepts by their intended users

Inputs: Define Requirements, Filter Ideas, Develop Concepts, Make Models, Define Measures, Agree Quality Targets, Review Safety, Review Experience, Review Sustainability

Tools: Exclusion Audit, Expert Review, User Trials

Outputs: a list of the strengths and weaknesses of the new concepts in meeting the stakeholder needs

Top tips:
- Ensure concepts meet the demands in the requirements
- Check if concepts meet the wishes in the requirements
- Note requirements that relate to different stakeholders

Review Safety

The systematic review of the safety of the system, identifying hazards and the subsequent risks they pose to users

Purpose: to identify safety concerns in the adoption of new concepts by their intended users

Inputs: Define Requirements, Filter Ideas, Develop Concepts, Make Models, Define Measures, Agree Quality Targets, Review Effectiveness, Review Experience, Review Sustainability

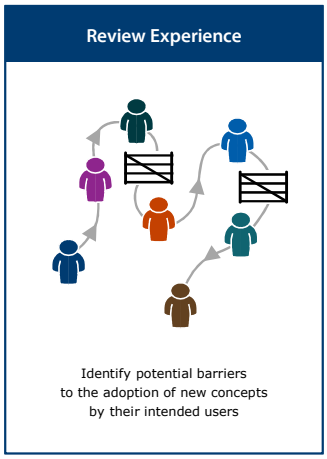
Tools: Root Cause Analysis, Failure Mode and Effects Analysis, Fault Tree Analysis, Hazard and Operability Analysis, Structured What-if Technique, Bowtie Method, Risk Matrix

Outputs: a list of the hazards present within the proposed system and the safety risk they pose to users

Top tips:
- List the hazards presented to users along the care journey
- Estimate the likelihood of harm posed by these hazards
- Identify the likely extent of harm posed by these hazards

Activities

Review Experience



The systematic review of the demands made by the system on patients and other stakeholders, and their corresponding capability to respond

Purpose: to identify potential barriers to the adoption of new concepts by their intended users

Inputs: Define Requirements, Filter Ideas, Develop Concepts, Make Models, Define Measures, Agree Quality Targets, Review Effectiveness, Review Safety, Review Sustainability

Tools: Exclusion Audit, Expert Review, User Trials

Worksheets: Improvement Design Wall

Outputs: a list of accessibility issues with the proposed system and the challenge they pose to users

Top tips:
- Understand the demands made of users along the care journey
- Estimate the users' capability to respond to these demands
- Identify where specific demands exceed users' capabilities

Review Sustainability

The systematic review of the sustainability of the system, identifying issues and the subsequent impacts to users and the environment

Purpose: to identify sustainability concerns in the adoption of new concepts by their intended users

Inputs: Define Requirements, Filter Ideas, Develop Concepts, Make Models, Define Measures, Agree Quality Targets, Review Effectiveness, Review Safety, Review Experience

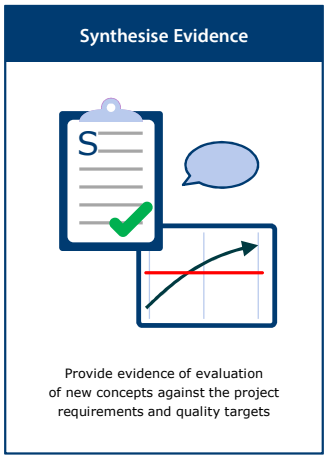
Tools: Life Cycle Assessment

Outputs: a list of sustainability issues with the proposed system and the impacts to users and the environment

Top tips:
- List the sustainability issues that arise along the care journey
- Estimate the likelihood of adverse impacts posed by these issues
- Identify the likely extent of adverse impacts posed by these issues

Activities

Synthesise Evidence



The drawing together and summary of a body of evidence that describes the evaluation and selection of concepts for improvement

Purpose: to provide evidence of evaluation of new concepts against the system requirements

Inputs: Define Requirements, Consider Pre-existing Solutions, Stimulate Ideas, Filter Ideas, Develop Concepts, Make Models, Define Measures, Agree Quality Targets, Review Experience, Review Safety, Review Effectiveness, Review Sustainability

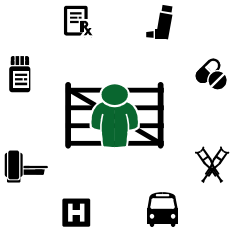
Tools: tbd

Outputs: a clear summary of evidence relating to the evaluation of the new concepts

Top tips:
- Draw together, summarise and communicate all of the evidence
- Do this in a systematic way to support the review criteria
- Use the evidence to support the choice of solution concept

Tools

Exclusion Audit



A systematic approach to estimating potential levels of exclusion when using a system

User Trials

An experimental approach to identifying potential causes of difficulty when using a system

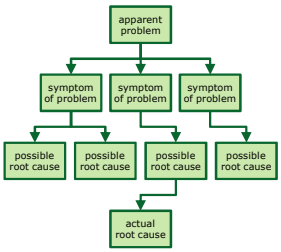
Expert Review

A systematic approach to identifying potential causes of difficulty when using a system

Life Cycle Assessment

A systematic approach to estimating the environmental impact of a system

Root Cause Analysis



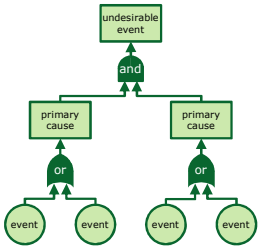
A systematic approach for identifying the root cause of a problem within a system

Failure Modes and Effects Analysis

failure mode	failure effect	failure likelihood	failure impact	risk of failure

A systematic approach for identifying the causes of all possible failures in a system and their consequent risk

Fault Tree Analysis



An approach to identifying desirable or undesirable events and the actions that lead to them

Hazard and Operability Analysis

guide word	likely deviation	conse-quence	possible causes	existing protection

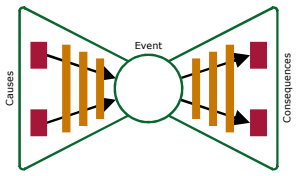
A systematic approach for identifying deviations from normal operation and their undesirable consequences

Structured What-If Technique

A systematic approach for identifying risks within a system using structured brainstorming and guidewords

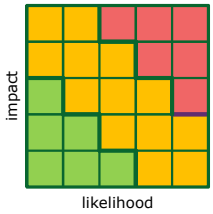
Tools

Bowtie Method



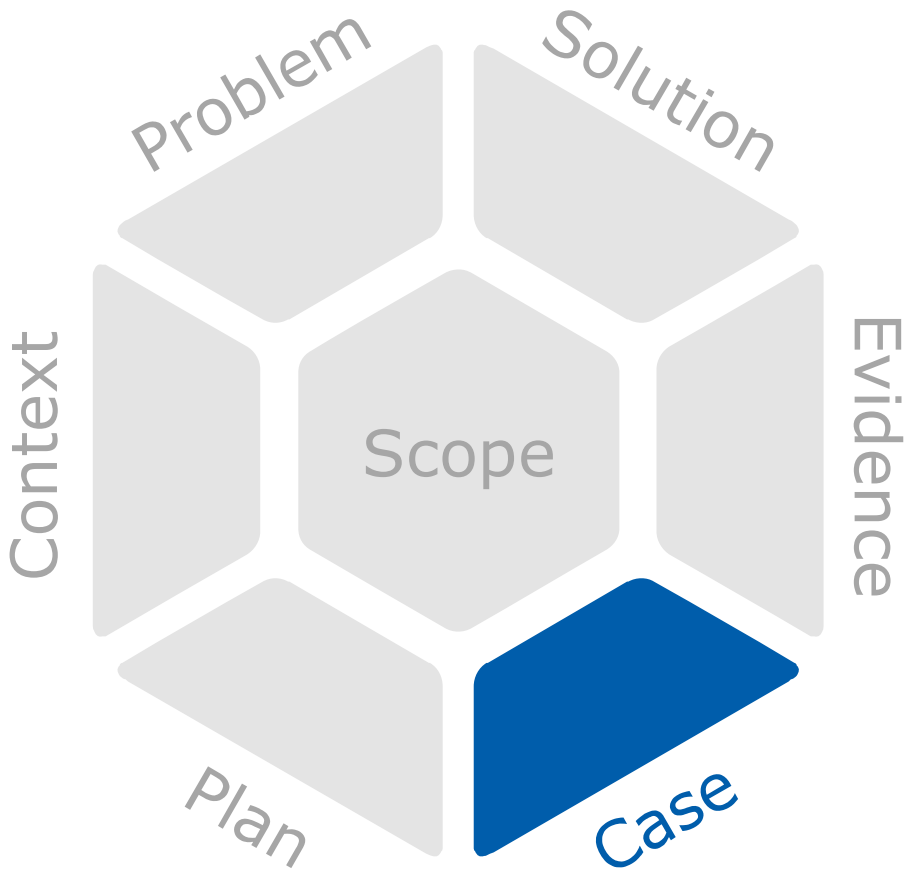
A systematic approach for visualising links between causes of an event and potential consequences

Risk Matrix



A structured representation of the likelihood and impact of threats and opportunities in the system

Make the Case



Summary

The case describes the set of facts or arguments in support of improving a system and delivering a particular solution(s) to a problem within the system.

Contents

Introduction

The need to **Make the Case** is the fifth of the seven strands in the improvement model. It underlines the importance of making the case for change for the system to be improved, following understanding the system, defining the problem, developing the solution and collecting the evidence. As a result, it is expected that such a case will be developed in the early stages of the improvement process and revised, as appropriate, as the process develops.

Purpose

Making the Case is critical to systems improvement: predicting the benefits to stakeholders of the proposed change; estimating the resources required and cost associated with the proposed change; and making a credible and ultimately successful care for changing and improving the system.

Activities

The process of making the case may include a wide range of activities including, but not limited to: Demonstrate Future Improvement, Predict Stakeholder Benefits, Calculate Resources Required, Estimate Time Required and Present Case for Change.

Tools

The practice of making the case may draw on a wide range of tools including, but not limited to: PEST(LE) Analysis, SWOT Analysis, Stakeholder Analysis, The Five Ws and two Hs and Wardley Map.

Getting Started

Making the **case** is critical to the successful delivery of an improvement project. It is particularly important to make the care at the beginning of the improvement process and to refine the description as necessary during the remainder of the process.

The Understand, Design, Deliver and Sustain stages of an improvement process were previously described within the Introduction section, where each stage will likely comprise a **preliminary activity**, followed by a number of **stage activities**.

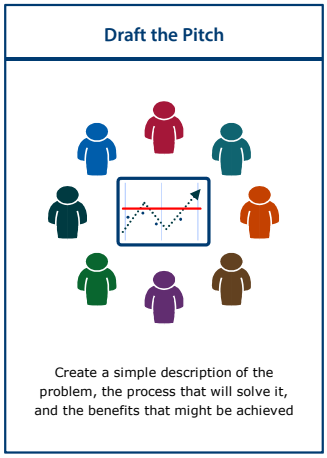
For the **Make the Case** strand of the Understand phase, the **preliminary activity** is entitled **Draft the Pitch.** For the Design, Delivery and Sustain stages, the initial case should be further developed into a full case for the benefits to be delivered by the proposed solution(s).

Draft the Pitch

This preliminary activity encourages people to create a simple description of the problem, the process that will solve it, and the benefits that might be achieved and compile the most compelling case to deliver the proposed solution(s) for improving the system.

Worksheets: Improvement Questions, Improvement Stakeholders, Improvement Strands Canvas, Improvement Plan

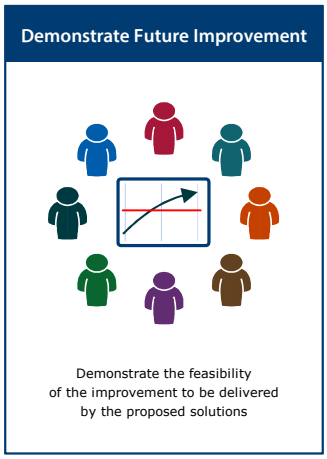
Top tips:
- Describe and quantify the scale of the challenge
- Outline the plan for improving the system
- Quantify the likely benefits for patients and stakeholders



Following on from this preliminary activity, the remaining **stage activities** are: Demonstrate Future Improvement, Predict Stakeholder Benefits, Calculate Resources Required, Estimate Time Required and Present Case For Change. Each of these are now described in turn, together with the tools that may be used to support them.

Activities

Demonstrate Future Improvement



The demonstration of most likely behaviour and corresponding improvement to be delivered by the modified system

Purpose: to demonstrate the feasibility of improvement to be delivered by the proposed solutions

Inputs: Define Requirements, Synthesise Evidence, Predict Stakeholder Benefits, Calculate Resources Required, Estimate Time Required

Tools: tbd

Outputs: a demonstration of the future improvement of the modified system

Top tips:
- Describe the likely future behaviour of the system
- Estimate the level of future behaviour of the system
- Compare the predicted performance against the desired performance

Predict Stakeholder Benefits

The prediction of most likely behaviour and corresponding benefits to be delivered by the modified system

Purpose: to predict the stakeholder benefits expected by delivering the proposed improvement

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Demonstrate Future Improvement, Calculate Resources Required, Estimate Time Required

Tools: tbd

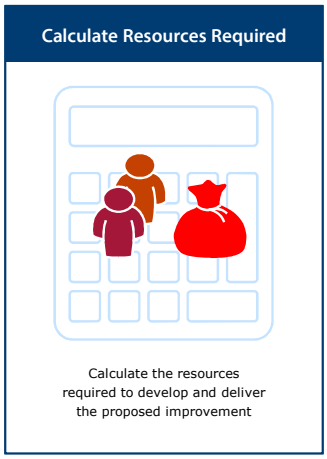
Cards: Service Stakeholders

Outputs: a prediction of the stakeholder benefits of the modified system

Top tips:
- Estimate the value of meeting the individual stakeholder needs
- Estimate the value of meeting the system requirements
- Predict the benefit of delivering improvement

Activities

Calculate Resources Required



The calculation of the resources most likely to be required to develop and deliver the modified system

Purpose: to calculate the resources required to develop and deliver the proposed improvement

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Demonstrate Future Improvement, Predict Stakeholder Benefits, Estimate Time Required

Tools: tbd

Outputs: a calculation of the resources required to deliver the modified system

Top tips:
- Estimate the effort required to meet the system requirements
- Estimate the cost required to meet the system requirements
- Calculate the resources required to deliver improvement

Estimate Time Required

The estimation of the time most likely to be required to develop and deliver the modified system

Purpose: to estimate the time required to develop and deliver the proposed improvement

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Demonstrate Future Improvement, Predict Stakeholder Benefits, Calculate Resources Required

Tools: tbd

Outputs: a calculation of the time required to deliver the modified system

Top tips:
- Estimate the effort required to meet the system requirements
- Estimate the time required to meet the system requirements
- Calculate the time required to deliver improvement

Activities

Present Case for Change

The drafting of a case for change, reflecting the system requirements, predicted system performance and likely benefits

Purpose: to present a comprehensive case for change, balancing stakeholder benefits against costs of delivery

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Demonstrate Future Improvement, Predict Stakeholder Benefits, Calculate Resources Required, Estimate Time Required, Agree Aim Statement

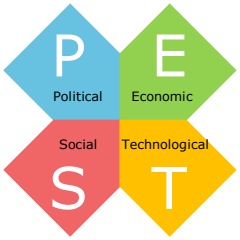
Tools: PEST(LE) Analysis, SWOT Analysis, Stakeholder Analysis, The Five Ws and Two Hs, Wardley Diagram

Outputs: a comprehensive case for change and delivery of the modified system

Top tips:
- Describe the routes to and priorities for enabling improvement
- Identify the support required to deliver demonstrable improvement
- Build a compelling case for the benefits and timeliness of the work

Tools

PEST(LE) Analysis

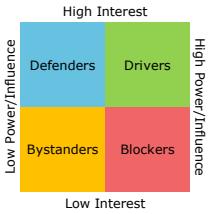


A broad approach to identify the external factors most likely to impact a proposed change

SWOT Analysis

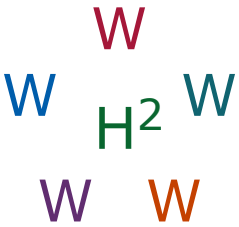
A means to identify the strengths, weaknesses, opportunities and threats associated with a change

Stakeholder Analysis



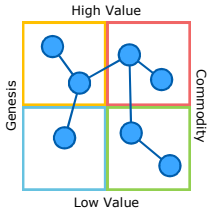
An analysis of the potential for stakeholders to drive or block the outcome of a proposed change

The Five Ws and Two Hs



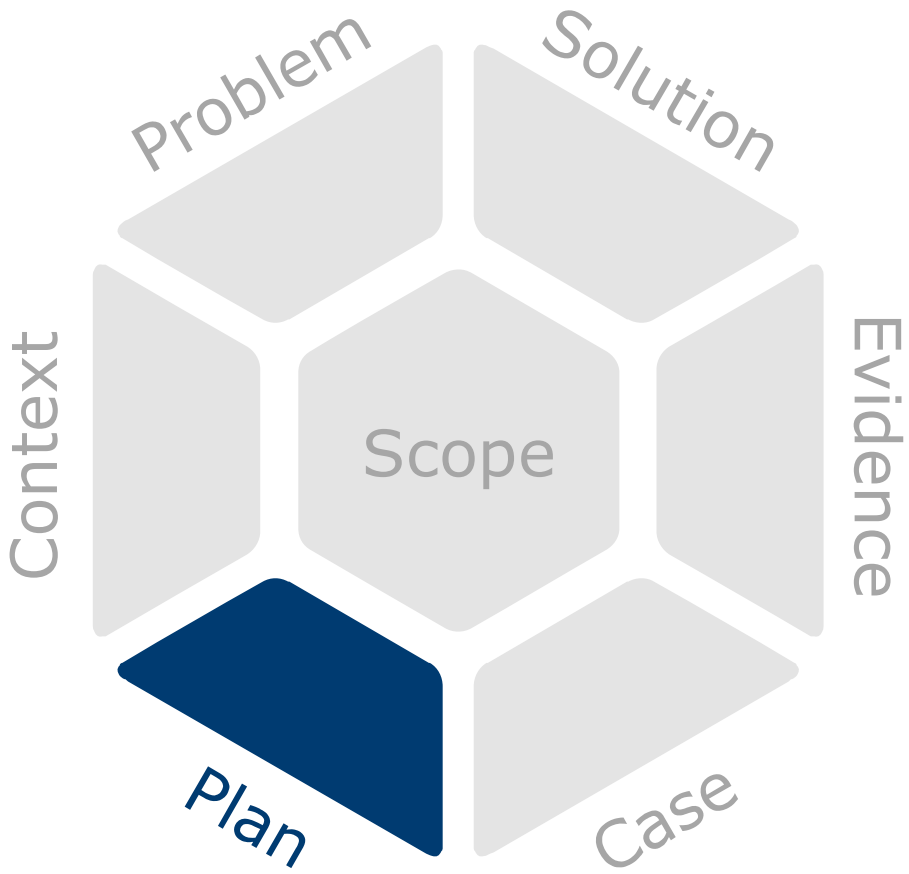
A means to summarise the rational for and initial description of a proposed change

Wardley Map



A linked map of stakeholder values set against the maturity of the elements that create them

Manage the Plan



Summary

The plan describes a detailed proposal for enabling change to a system and delivering a particular solution(s) to a problem within the system.

Contents

Introduction

The need to **Manage the Plan** is the sixth of the seven strands in the improvement model. It underlines the importance of managing the plan for improving the system, following understanding the system, defining the problem, developing the solution and collecting the evidence. As a result, it is expected that such a plan will be developed in the early stages of the improvement process and revised, as appropriate, as the process develops.

Purpose

Managing the plan has practical importance to systems improvement: identifying the right team to deliver change; planning and scheduling appropriate activities for delivering change; and assessing the risk associated with delivering the programme of change.

Activities

The process of managing the plan may include a wide range of activities including, but not limited to: Identify Enablers and Blockers, Manage Team, Ensure Shared Understanding, Review Project Performance, Review Project Progress and Plan Future Activities.

Tools

The practice of managing the plan may draw on a wide range of tools including, but not limited to: Failure Mode and Effects Analysis, Fault Tree Analysis, Structured What-if Technique, Risk Matrix, PEST(LE) Analysis, SWOT Analysis, Stakeholder Analysis, The Five Ws and Two Hs, Driver Diagram, Gantt Chart, Activity Dependency Diagram and LoMo.

Getting Started

Managing the **plan** is key to the successful evaluation of an improvement project. It is particularly important to communicate the plan from the beginning of the improvement process and to update the description as necessary during the remainder of the process.

The Understand, Design, Deliver and Sustain stages of an improvement process were previously described within the Introduction section, where each stage will likely comprise a **preliminary activity**, followed by a number of **stage activities**.

For the **Manage the Plan** strand of the Understand phase, the **preliminary activity** is entitled **Describe the Next Step.** For the Design, Delivery and Sustain stages, the initial plan should be further developed into a full programme to design, deliver and sustain the benefits to be provided by the proposed solution(s).

Decide the Next Step

This preliminary activity encourages people to choose the activities most likely to improve the system and enable progress to the next stage gate and deliver the most effective plan to deliver the proposed solution(s) for improving the system.

Worksheets: Improvement Questions, Improvement Stakeholders, Improvement Strands Canvas, Improvement Plan

Top tips:
- Assess the quality and confidence levels of existing outputs
- Identify the outputs required to pass the next stage gate
- Decide the activities required to reach the next stage gate

Following on from this preliminary activity, the remaining **stage activities** are: Identify Enablers And Blockers, Manage Team, Ensure Shared Understanding, Review Project Performance, Review Project Progress and Plan Future Activities. Each of these are now described in turn, together with the tools that may be used to support them.

Activities

Identify Enablers and Blockers

The identification of stakeholders who have the potential to enhance or disrupt the delivery of an improved system

Purpose: to identify stakeholders who are able to facilitate or block delivery of an improved system

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Present Case for Change, Manage Team, Review Project Performance, Review Progress, Plan Future Activities, Agree Aim Statement

Tools: SWOT Analysis, Stakeholder Analysis, Gantt Chart, Activity Dependency Diagram

Cards: Service Stakeholders, Service Improvers

Outputs: a list of the enablers and blockers likely to influence the delivery of an improved system

Top tips:
- Identify stakeholders who are most likely to influence a change
- Build on the enthusiasm of actively supportive stakeholders
- Develop strategies to disarm potentially disruptive stakeholders

Manage Team

The assembly and empowerment of a team who have the potential to develop and deliver the modified system

Purpose: to manage a team who are enabled and willing to embark on the programme of improvement

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Present Case for Change, Identify Enablers and Blockers, Ensure Shared Understanding, Review Project Performance, Review Progress, Plan Future Activities, Agree Aim Statement

Tools: SWOT Analysis, Stakeholder Analysis, Gantt Chart, Activity Dependency Diagram, Project Canvas, LoMo

Cards: Service Improvers

Outputs: a description of the team most likely to deliver the modified system

Top tips:
- Build a team from stakeholders, influencers and facilitators
- Ensure team members are clear of their roles within the programme
- Agree a framework for team communication and meetings

Activities

Ensure Shared Understanding

The identification and agreement of key improvement terms to bring clarity to the delivery of an improved system

Purpose: to ensure the team share a common understanding of the key improvement terms

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Present Case for Change, Manage Team, Review Project Performance, Review Progress, Plan Future Activities, Agree Aim Statement

Tools: Gantt Chart, Activity Dependency Diagram, Project Canvas

Cards: Improvement Terms

Worksheets: Improvement Terms

Outputs: a collection of key improvement terms and their corresponding definitions

Top tips:
- Identify the key terms to be used in the improvement programme
- Ensure the team have a shared understanding of the key terms
- Use the terms consistently in all communication and meetings

Review Project Performance

The systematic review of the risks evident in the delivery of an improved system and their likely impact on stakeholders

Purpose: to review risks present in the programme required to deliver an improved system

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Present Case for Change, Identify Enablers and Blockers, Manage Team, Ensure Shared Understanding, Review Progress, Plan Future Activities, Agree Aim Statement

Tools: Failure Mode and Effects Analysis, Hazard and Operability Analysis, Fault Tree Analysis, Structured What-if Technique, Risk Matrix, SWOT Analysis, Stakeholder Analysis, Gantt Chart, Activity Dependency Diagram, Project Canvas, LoMo

Outputs: a list of the hazards present in the programme and the risk they pose to its delivery

Top tips:
- Understand the risks present in the improvement programme
- Estimate the likelihood of disruption posed by these risks
- Identify the likely extent of disruption posed by these risks

Activities

Review Project Progress

The systematic review of progress made in the delivery of an improved system and the likely impact on stakeholders

Purpose: to review progress against the programme required to deliver an improved system

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Present Case for Change, Identify Enablers and Blockers, Manage Team, Ensure Shared Understanding, Review Project Performance, Plan Future Activities, Agree Aim Statement

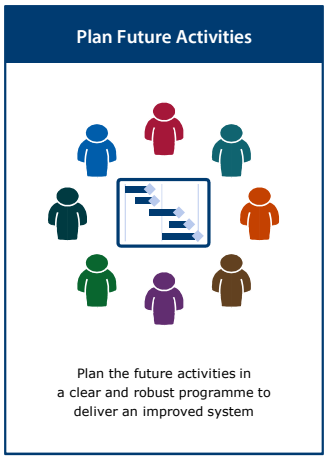
Tools: PEST(LE) Analysis, The Five Ws and Two Hs, Wardley Diagram, Driver Diagram, Gantt Chart, Activity Dependency Diagram, Project Canvas, LoMo

Worksheets: Improvement Strands Canvas

Outputs: a review of the progress made against the planned programme delivery targets

Top tips:
- Understand the progress made in the improvement programme
- Review the progress made against the plan of future activities
- Identify areas where progress is not in line with that planned

Plan Future Activities



The development of a resilient plan for the timely and cost effective delivery of an improved system

Purpose: to plan the next steps in a clear and robust programme to deliver an improved system

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Present Case for Change, Identify Enablers and Blockers, Manage Team, Ensure Shared Understanding, Review Project Performance, Review Progress, Agree Aim Statement

Tools: PEST(LE) Analysis, The Five Ws and Two Hs, Wardley Diagram, Driver Diagram, Gantt Chart, Activity Dependency Diagram, Project Canvas, LoMo

Worksheets: Improvement Strands Canvas, Improvement Activities, Improvement Plan

Outputs: a detailed plan of the next steps required to deliver an improved system

Top tips:
- Establish a clear and effective planning and reporting process
- Define clear targets for each stage of the improvement process
- Deliver regular progress updates to the programme funders

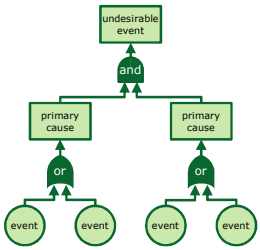
Tools

Failure Modes and Effects Analysis

failure mode	failure effect	failure likelihood	failure impact	risk of failure

A systematic approach for identifying the causes of all possible failures in a system and their consequent risk

Fault Tree Analysis



An approach to identifying desirable or undesirable events and the actions that lead to them

Hazard and Operability Analysis

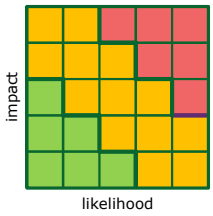
guide word	likely deviation	conse-quence	possible causes	existing protection

A systematic approach for identifying deviations from normal operation and their undesirable consequences

Structured What-If Technique

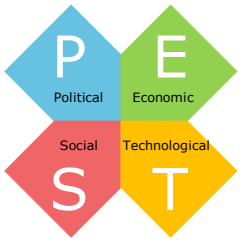
A systematic approach for identifying risks within a system using structured brainstorming and guidewords

Risk Matrix



A structured representation of the likelihood and impact of threats and opportunities in the system

PEST(LE) Analysis

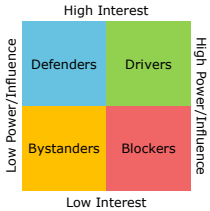


A broad approach to identify the external factors most likely to impact a proposed change

SWOT Analysis

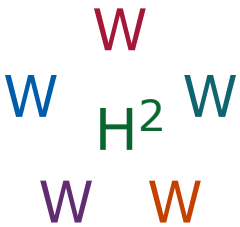
A means to identify the strengths, weaknesses, opportunities and threats associated with a change

Stakeholder Analysis



An analysis of the potential for stakeholders to drive or block the outcome of a proposed change

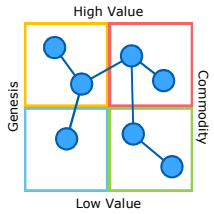
The Five Ws and Two Hs



A means to summarise the rational for and initial description of a proposed change

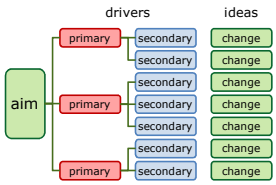
Tools

Wardley Map



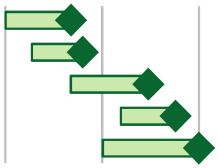
A linked map of stakeholder values set against the maturity of the elements that create them

Driver Diagram



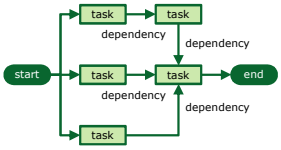
A theory-of-change that can be used to collaboratively plan improvement project activities

Gantt Chart



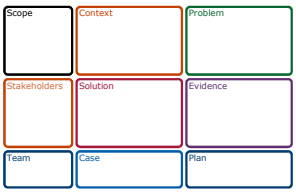
A bar chart to illustrate the schedule required to deliver a programme of improvement

Activity Dependency Diagram



A dependency network to map the activities required to deliver a programme of improvement

Project Canvas



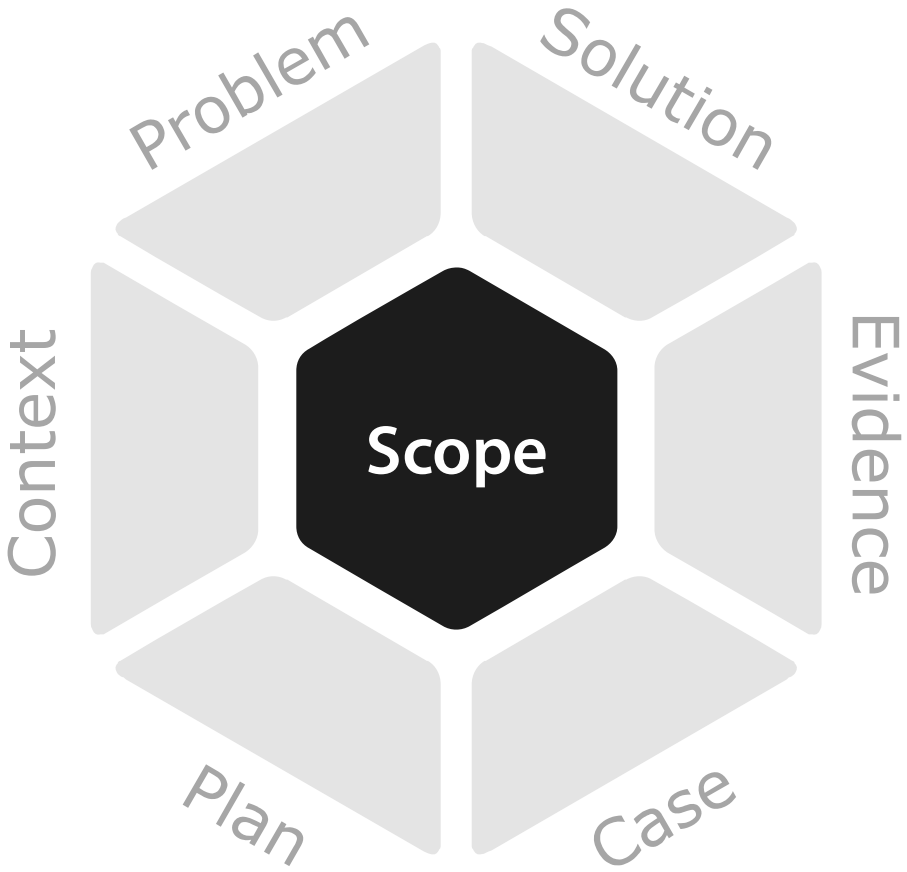
A dynamic summary of a programme of improvement to encourage team consensus

LoMo

LoMo

A fundamental shift in thinking about the meetings required to deliver a programme of improvement

Agree the Scope



Summary

The scope describes the context of the improvement envisaged in terms of the extent of the ambition for improvement and the boundary of the system of interest.

Contents

Introduction

The need to **Agree the Scope** is the last of the seven strands in the improvement model. It underlines the importance of reflecting on all that has been learned from the previous six elements, namely: understanding the system, defining the problem and developing the solution, collecting the evidence, making the case and managing the plan. The result should be an agree statement of the scope of the improvement programme which may be refined, as appropriate, as the process develops.

Purpose

Agreeing the Scope has vital importance to systems improvement: exploring the context of the challenge and possible solutions; establishing a clear case for change and plan for delivery; and developing a clear statement of the intended scope of the improvement to the system.

Activities

The process of collecting the evidence may include a wide range of activities including, but not limited to: Agree Aim Statement.

Tools

The practice of agreeing the scope may draw on a wide range of tools including all those that may be used to address the other six elements of the improvement process, but is likely to be focused on discussions by the improvement team.

Getting Started

Agreeing the **scope** is vital to the successful evaluation of an improvement project. It is particularly important to agree the scope from the beginning of the improvement process and to update the description as necessary during the remainder of the process.

The Understand, Design, Deliver and Sustain stages of an improvement process were previously described within the **Introduction** section, where each stage will likely comprise a **preliminary activity**, followed by a number of **stage activities**.

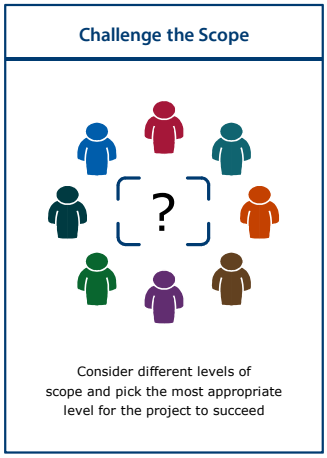
For the **Agree the Scope** strand of the Understand phase, the **preliminary activity** is entitled C**hallenge the Scope.** This encourages the team to discuss the most appropriate programme scope to respond to the proposed solution(s) for improving the system. For the Design, Delivery and Sustain stages, the scope should be revised to ensure the intended benefits remain appropriately focused.

Challenge the Scope

This preliminary activity encourages people to consider different levels of scope and pick the most appropriate level for the project to succeed and discuss the most appropriate programme scope to respond to the proposed solution(s) for improving the system.

Worksheets: Improvement Questions, Improvement Stakeholders, Improvement Stands Canvas, Improvement Plan

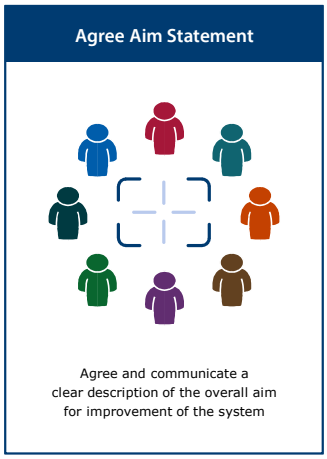
Top tips:
- Expand the scope by asking why does this happen?
- Consider the balance of risk and reward for different levels of scope
- Review the system sketches and identify what is in or out of scope



Following on from this preliminary activity, the remaining **stage activity** is **Agree Aim Statement.** This is now described, together with the tools that may be used to support it.

Activities

Agree Aim Statement



The drafting and communication of an agreed statement of purpose and direction of improvement for the system

Purpose: to agree and communicate a clear description of the overall aim for improvement of the system

Inputs: Define Requirements, Develop Concepts, Synthesise Evidence, Present Case for Change

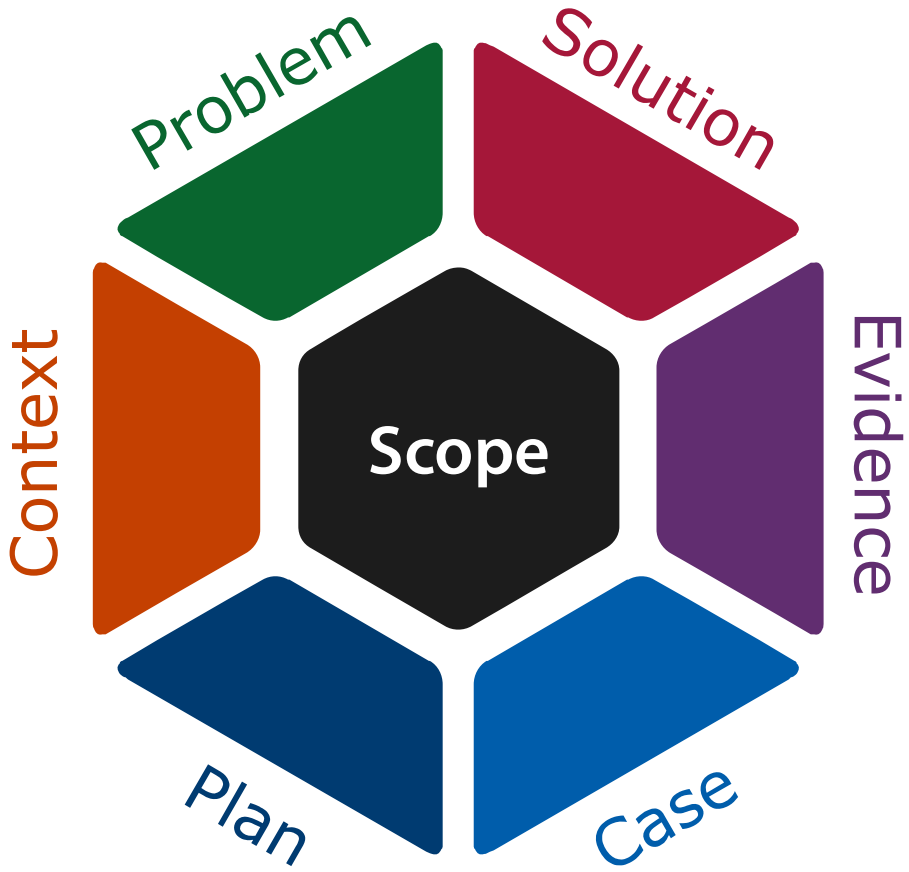
Tools: tbd

Worksheets: Improvement Strands Canvas

Outputs: a succinct statement describing the overall aim for improvement of the system

Top tips:
- Consult likely stakeholders and influencers to define the aim
- Define realistic targets for the overall improvement process
- Establish a clear and effective communication strategy

Applying this Model



Summary

The case studies explore retrospectively how the key activities from the activity model of this toolkit's systems approach could be applied to large systems.

Contents

The Esther Model

A multi-organisational collaboration between acute, primary and social care providers was created by Jönköping County Council to develop a model for the improvement of patient-centred care in the community, based on a fictitious patient known as Esther.

Scope

Trigger

Esther lived alone and one morning developed breathing difficulties. After contacting her daughter, who did not know what to do, Esther sought medical advice. She saw a total of 36 different people and had to retell her story at every point, while having problems breathing. A doctor finally admitted her to a hospital ward. This case inspired the head of the medical department of Höglandet Hospital in Nässjö to initiate an extensive series of interviews and workshops to identify redundancies and gaps in the medical and community care systems.

Agree Aim Statement

Elderly patients with complex care needs may receive services from multiple specialists, as well as primary care physicians. In addition, they may visit emergency departments, have frequent hospitalisations and post-hospital rehabilitations, and receive long-term care services at their home or in nursing facilities. The central idea was that care should be guided by the following questions: What does Esther need? What does she want? What is important to her when she is not well? What does she need when she leaves the hospital? Which providers must cooperate to meet Esther's needs?

The Esther Model

Context

Generate Scenarios

The Höglandet (Highland) region (population: 110,000) in Jönköping County, in the south of Sweden, where the county has 34 primary care centres and three acute hospitals, with a total health workforce of 9,500, serving a local population of 350,000 across 11 municipalities.

Understand Patient Diversity

Elderly persons who have complex care needs that involve a variety of providers, along with carers and a number of health and care professionals.

Understand Political Context

Care coordination in Sweden is complicated by a legal structure that gives the country's 21 counties responsibility for funding and providing hospital and physician services while the 290 municipalities are responsible for funding and providing community care. Home health care (nursing services for sick patients) and home care (assistance with activities of daily living) are also provided by different professionals.

Create System Maps

The elements of the system can be considered to be Esther and her family and neighbours, the people who provide all aspects of medical and home care to her, the geographical and transport systems around her home and points of care, the organisations that facilitate her care, and the bodies that fund her care.

The Esther Model

Context

Create Stakeholder Map

Stakeholders are those that have an interest in the successful performance of the system and can be described by their role title, need(s) and purpose:

- **As a patient I need** care in or close to my home **so that** I can stay at home, **I need** to experience care from multiple providers as if it were from the same provider **so that** they all know my medical history, **I need** to have care uniformly available throughout the region **so that** I feel free to travel, and **I need** to know who to turn to when problems arise **so that** I feel safe.
- **As a carer I need** to understand Esther's needs **so that** I can help care for her, and **I need** to know who to call if Esther needs help **so that** I can be sure of talking to someone who knows her.
- **As a neighbour I need** to have a contact number for emergencies **so that** I can quickly summon medical assistance.
- **As a primary care physician I need** to provide the best care possible for Esther in the community **so that** her medical needs are met locally as far as is possible, **I need** access to Esther's full medical history **so that** I know what treatment may have been provided by the hospital and what level of social care is being provided.
- **As a pharmacist I need** access to Esther's medical history **so that** I can check that her medications are safe to be taken together.
- **As a hospital physician I need** access to Esther's medical history **so that** I can prescribe the most appropriate treatment, and **I need** to be sure that appropriate care is available **so that** I can safely discharge Esther from hospital.
- **As a specialist I need** access to Esther's medical history **so that** I can provide appropriate specialist treatment as required.
- **As a nurse I need** access to Esther's medical history **so that** I can care for her, and **I need** to know Esther **so that** I can do what is best for her.
- **As a home healthcare worker I need** access to Esther's medical history **so that** I understand her care needs, and **I need** to know Esther **so that** I can do what is best for her.
- **As a home care worker I need** to have a contact number for emergencies **so that** I can be sure of talking to someone who knows her, and **I need** to know Esther **so that** I can do what is best for her.
- **As a hospital manager I need** to understand Esther's care needs **so that** I can ensure she receives the care she needs and coordinate her discharge from hospital, and **I need** to ensure she remains in hospital only as long as is medically required **so that** I can manage my budget wisely.
- **As a community care manager I need** to understand Esther's care needs **so that** I can coordinate her care, and **I need** to be consulted if she is to be discharged from hospital **so that** her immediate care needs can be met.
- **As a service provider I need** to ensure that I meet Esther's care needs **so that** I can do what is best for her, and **I need** to know how well I am meeting her needs **so that** I can continuously improve the care I am able to provide.
- **As a funder I need** to be confident that the money I provide for the care of elderly persons is spent wisely **so that** the benefit of good care is provided for all.
- **As an administrator I need** to ensure good communication between care providers **so that** they understand Esther's medical and care needs and provide coordinated care for her.

The Esther Model

Problem

Capture Stakeholder Needs

The analysis of interviews with over 60 patients and providers throughout the system identified six key needs for action:

- The development of a flexible organisation with patient value in focus.
- The design of more efficient and improved prescription and medication routines.
- The creation of approaches to documentation and communication of information that can be adapted to the next link of the care chain.
- The provision of efficient IT-support through the whole care chain.
- The provision of a diagnosis system for community care.
- The development of a virtual competence centre for better transfer and improvement of competence through the care chain.

Prioritise Stakeholder Needs

Success will be measured by Esther getting care in or close to home, experiencing care from multiple providers as if it were from the same provider, having care uniformly available throughout the region and knowing who to turn to when problems arise.

Solution

Develop Concepts

Many of the problems experienced by Esther involved more than one organisation. It was important to bring together people from different levels in these organisations to develop and deliver solutions to support the needs identified. These included:

- A steering committee of the community care chiefs from municipalities, hospitals and primary care centres to address challenges across organisations.
- Four Esther cafés in municipalities each year, which were cross-organisational, multi-professional meetings for sharing and learning from the experiences of specific patients who were hospitalised in the past year and have continued on to home care or other services.
- Inter-organisational training workshops on palliative care, nutrition and fall prevention, among other topics.
- An annual strategy day for nurses and other staff, physicians, managers, as well as Esthers themselves to come together to team build and generate priorities and ideas for addressing problems in care.

In 2006 coaches were introduced to the model to promote the Esther Network vision and values and to support ongoing improvement. The aim was to develop internal coaches to facilitate improvement across organisational boundaries, providing: customer focus, modelled by involvement of senior citizens in the training programme; a shared set of values; networking skills with a solution focused approach; and systems thinking.

The Esther Model

Evidence

Review Effectiveness

The Esther model calls for continuous and coordinated improvement with a focus on providing what is best for Esther. The evidence points to a cultural shift in the way leaders and workers in the Jönköping County health and care systems now provide for Esther, facilitated by the solutions introduced in response to her needs — "the focus is on her now." It is also evident that the changes have not only been sustained and further developed, but also have provided the inspiration for change in other health and care systems around the world.

Review Safety

Proactive risk assessment was not employed within this programme. However, the impact of the changes introduced were continuously monitored.

Review Experience

This innovation programme was not designed as a research project and involved many organisational and process changes that were introduced in different components of the model at different times. Therefore, it is important to be cautious in assessing the impact of the Esther model.11 Positive changes are noted, but it is difficult to attribute them to the model in the absence of comparative information. With this in mind, programme leaders cite the following outcomes:

- Admissions to the medical department of Höglandet Hospital declined from 9,300 in 1998 to 6,500 in 2013.
- Hospital readmissions within 30 days for patients age 65 and older dropped from 17.4% in 2012 to 15.9% in 2014.
- Hospital lengths of stay decreased between 2009 and 2014 for surgery (from 3.6 to 3.0 days) and rehabilitation (from 19.2 to 9.2 days).
- Surveys conducted in Jönköping in 2008 and 2011 showed that Esthers felt safe and were appreciative of the personal contacts.

The Esther Model

Case

Present Case for Change

The benefit to Esther and the value, set against the costs to integrate care, was recognised by all of the acute, primary and social care providers collaborators brought together by Jönköping County Council.

Plan

Manage Team

Patients and carers, and people involved in the supply, management and control of care for elderly people, such as physicians, nurses, social workers, other providers representing the Höglandet Hospital and physician practices in each of the six municipalities.

Review Project Performance

"Taking a system approach to meeting the needs of the frail elderly is unusual, difficult, and necessary." The Esther model depends on "the power of patients' stories", which were elicited and collected as part of the model to show how patients' lives are affected by their health challenges and their experiences in getting care. The model creates mechanisms, including an annual retreat and development of action plans for each forthcoming year, to help members of different professions to continue to think together to solve problems and help to motivate the coaches. "The secret of Esther is the change in state of mind — stop thinking what is best for my organisation, but instead think what is best for Esther."

Methotrexate

Local and national stakeholders, led by the National Patient Safety Agency, were engaged in making the design of methotrexate tablets, their prescription, delivery and monitoring safer for patients using it for the treatment of rheumatoid arthritis.

Scope

Trigger

In 2000, a Cambridgeshire patient died as a direct result of failures in their care and treatment. The inquiry into their death highlighted the need to review the use of oral methotrexate for the treatment of rheumatoid arthritis in the UK. In this particular case, the patient had been taking a weekly dose of methotrexate for rheumatoid arthritis. The strength of methotrexate had been altered in error by her GP to a daily dose of 10 mg from the previous weekly dose of 17.5 mg. This was dispensed by a community pharmacy. The patient inadvertently overdosed on methotrexate and their immune system became severely compromised. The patient was later admitted to hospital with symptoms of a severe sore throat, where they continued to receive treatment at this high daily dose until the mistake was identified on the fourth day following admission.

Agree Aim Statement

Of the 13,000 medicines licensed for use in the UK at that time, oral methotrexate was one of only six that should have been taken weekly. Previously, 25 deaths and 26 cases of serious harm had been attributed to the incorrect use of methotrexate. More than half of the 167 adverse events associated with patients taking methotrexate between 1993 and 2002 were the result of the drug being prescribed on a daily basis. Some cases were due to errors occurring during the transfer of information from hospitals to GPs, others were due to problems with information technology systems that failed to give clear information on the frequency of dosing. The aim is to reduce to zero the number of deaths attributed to the misuse of oral methotrexate.

Methotrexate

Context

Generate Scenarios

The system is in the UK and spans from the home to general practice to the community pharmacy to the hospital, working under a shared care arrangement.

Understand Patient Diversity

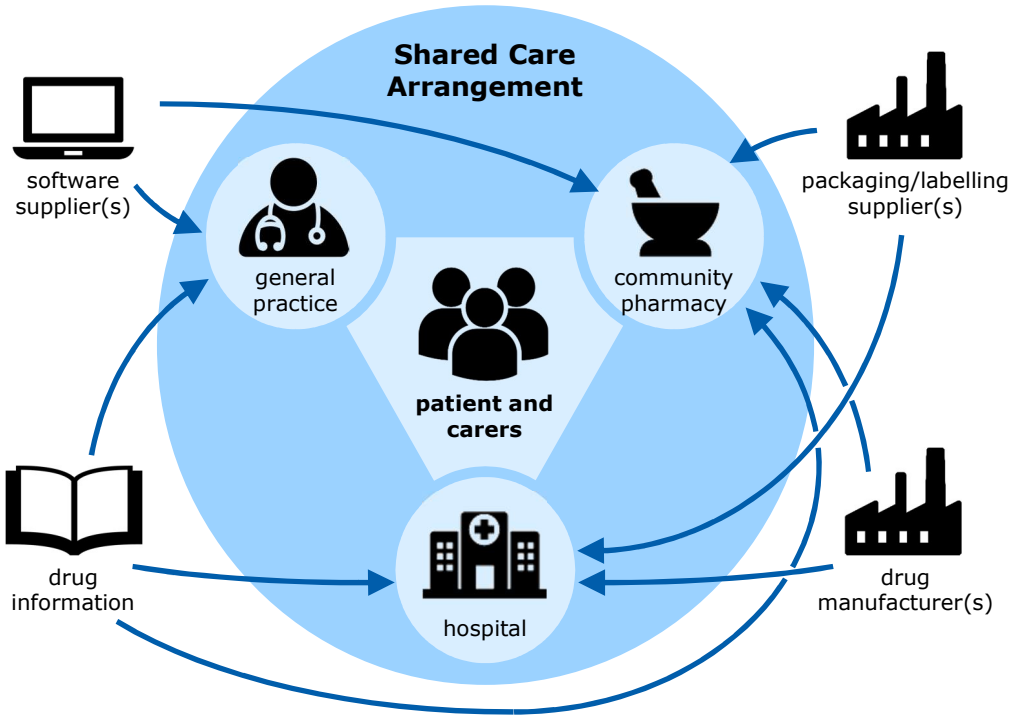
People who are actively using the system are those within the Shared Care Arrangement, such as patients with rheumatoid arthritis, their carers, GPs, pharmacists, phlebotomists and hospital doctors.

Understand Political Context

There are three suppliers of methotrexate for the UK market. They provide 2.5 mg and 10 mg tablets that are similar in colour and size in 100 tablet bottles and 2.5 mg tablets in blister packs of 28 tablets.

Create System Maps

The management of patients taking methotrexate is organised using a Shared Care Arrangement, sharing responsibility for safe care between the general practice, the community pharmacy and the hospital. This forms the core of the system. In addition, computer software enabling the prescribing and dispensing of methotrexate is used, drug information leaflets and record books are provided, and the drug and packaging are required (see below).



Methotrexate

Context

Create Stakeholder Map

Stakeholders are those that have an interest in the successful performance of the system and can be described by their role title, need(s) and purpose:

- **As a patient I need** sufficient methotrexate **so that** I have relief from the pain resulting from my rheumatoid arthritis, **I need** methotrexate in an easy-to-open pack **so that** I am able to open the pack and easily retrieve the correct dose and **I need** to be confident that I am taking the correct dose of methotrexate **so that** I do not suffer adverse effects from the drug.
- **As a general practitioner I need** to ensure that the patient knows how to administer methotrexate **so that** there is no chance of the patient taking the wrong dose. **I need** to be sure that I prescribe the correct dose of methotrexate **so that** there is no chance of the patient taking the wrong dose, and **I need** to ensure that the patient's bloods are monitored **so that** the dose can be controlled.
- **As a hospital doctor I need** to understand the particular challenges of oral methotrexate use **so that** I am able to recognise the needs and potential problems experienced by these patients.
- **As an arthritis specialist I need** to identify patients who might benefit from the use of oral methotrexate **so that** their quality of life can be improved, and **I need** to determine the most appropriate dose of oral methotrexate for the patient **so that** their condition may be improved.
- **As a drug manufacturer I need** to supply oral methotrexate in a form **so that** pharmacies can adjust the quality dispensed to meet individual patient needs, and **I need** to sell sufficient quantity of oral methotrexate **so that** the product line is commercially viable.
- **As a pharmacist I need** to dispense methotrexate in a timely way **so that** the patient always has the medication they need, and **I need** to ensure that the patient understands the particular restrictions on the use of oral methotrexate **so that** they are kept safe.
- **As a carer I need** to know that the patient understands the importance of taking the correct dose of methotrexate **so that** they remain safe, and **I need** to be sure that methotrexate is not confused with other medications **so that** they remain safe.
- **As a phlebotomist I need** to collect blood samples from the patient **so that** methotrexate toxicity tests can be carried out in the hospital, and **I need** to ensure that any change to the methotrexate dose is communicated to the patient and GP **so that** they are both informed of the new dose.
- **As a pathologist I need** good blood samples **so that** I can test methotrexate levels in the patient's blood.
- **As a software supplier I need** to deliver competitive prescribing and dispensing systems **so that** GPs/pharmacists use my software, and **I need** to ensure that my products enhance GP/pharmacist practices **so that** errors are reduced.
- **As an information supplier I need** to ensure that information is trustworthy and accessible **so that** GPs/pharmacists use my services, and **I need** to ensure that my services enhance GP/pharmacist practices **so that** errors are reduced.
- **As a packaging/labelling supplier I need** to provide clear identification **so that** the pharmacist and patient can unambiguously select the correct medication.
- **As a practice receptionist I need** to ensure that repeat prescription forms are authorised **so that** patients receive their prescriptions in a timely manner.
- **As a practice manager I need** to ensure that everyone is aware of our policies and practice relating to methotrexate **so that** patients receive safe care.

Methotrexate

Problem

Capture Stakeholder Needs

The needs for redesign of the system are dominated by the needs of the patient, where the priority is for an easy-to-follow medication management process, easy-to-understand information about methotrexate, easy-to-identify medication and easy-to-open packs. Other needs, derived from the stakeholders list, should also be considered in the context of meeting the fundamental patient needs.

Prioritise Stakeholder Needs

Success will be measured by a significant reduction of deaths and serious injury to patients being treated with methotrexate for rheumatoid arthritis while maintaining the benefits of disease and symptom control.

Solution

Develop Concepts

In response to the patient needs and risk assessment, a number of potential solutions were identified, each of which would prevent some opportunity for harm and collectively would prevent or reduce all harm based upon the causal and contributory data available at the time:

1. Better information for the patient prior to treatment and use of patient-held records to include monitoring schedules and results.
2. Clear branding of methotrexate as a weekly medication with clear instructions to take methotrexate on Mondays.
3. Improved warnings and flags for GP prescribing and pharmacy dispensing software systems which were not easily over-ridden.
4. Reshaped tablets from manufacturers to ensure that 2.5 mg round tablets are easily distinguishable from new 10 mg torpedo shaped tablets.
5. Repackaged tablets using novel designs and in reduced quantities so that the patient receives the original manufacturers pack.

Methotrexate

Evidence

Review Effectiveness

A new information leaflet for patients, emphasising the weekly dose for methotrexate, was drafted and trialled. This led to the provision of a methotrexate treatment guide incorporating a pre-treatment leaflet, designed to provide patients with guidance on low dose methotrexate, and a blood monitoring and dosage record booklet.

The changes proposed for the shape of the methotrexate tablets were delivered, but this did not address potential confusion with other medications and, in particular, folic acid which is often prescribed along with methotrexate.

Software vendors provided enhancements to their existing GP prescribing software to ensure methotrexate was clearly labelled as High-Alert, Alert or Toxic in the drug list, to generate an additional alert message when selecting methotrexate highlighting the need for weekly doses and to provide dosing options that clearly articulated the number of tablets to be taken.

Novel packaging designs were not pursued at this stage. However, manufacturers began to provide tablets in 16 and 24 packs with improved design (for patients with reduced manual dexterity), labelling and safety information. The use of existing pharmacy labels continued.

Review Safety

A review of the risks associated with the original oral methotrexate system was undertaken prior to determining the design interventions described above. This identified the following high-risk scenarios:

i. Failure to identify changed prescription request arising from blood test results.
ii. GP prescribes methotrexate "as directed".
iii. Patient receives wrong dose due to confusion between different strengths of methotrexate tablets.
iv. Patient receives wrong dose due to confusion between folic acid and methotrexate tablets.
v. Patient experiences difficulties reading print on blister pack.
vi. Incorrect prescription of methotrexate is dispensed to the patient because of poor design of prescribing/dispensing software.
vii. Pharmacy picking error results in wrong medications being dispensed.
viii. Pharmacist only writes total dose of methotrexate, not number of tablets.
ix. Poor hospital drug chart review by hospital pharmacy.
x. Poor education of healthcare professionals regarding use of methotrexate.

Many of these issues were addressed by the design changes proposed and other patient safety initiatives. However, a number remained, including the potential for patients to be confused by the two strengths of methotrexate tablets and this led directly to the policy in many regions to prescribe only 2.5 mg tablets. There was also a danger that patients might be confused by the variation in dose that was the direct result of the review of regular blood tests designed to determine the optimal dose for each individual. It was important that changes in dose were communicated clearly to the patient and others in the shared care arrangement to ensure that all patient records were up to date.

Methotrexate

Evidence

Review Experience

Limited data was collected to enable direct comparison with previous error rates and subsequent patient harm resulting from use of oral methotrexate. Communications from the NPSA suggested that early compliance with new guidance remained poor, likely contributing to ongoing errors in the use of methotrexate, resulting in patient harm.

Eighteen months after the shape of the 10 mg methotrexate tablet was changed the Medical and Healthcare Products Regulatory Agency (MHRA) issued a Class 3 Medicines Recall. Original round 10 mg tablets that had remained in circulation alongside the new torpedo shaped 10 mg tablets were recalled as their continued presence had given rise to confusion where patients had been told all round tablets were 2.5 mg.

Despite all the best efforts of the improvement team, methotrexate remains a potentially harmful drug that is ultimately administered by the patient. Deaths and serious harm continued at a lower level and in 2011 a patient, prescribed an increasing dose of methotrexate in order to identify the required level of medication, continued to increase the weekly dose beyond the mandated maximum and died. This was not an error that had been predicted and shows the importance of shared care arrangement team taking full responsibility for all aspects of the prescribing, dispensing and monitoring cycle when working with patients receiving oral methotrexate.

Case

Present Case for Change

The benefit of reducing the incidence of Methotrexate never events, set against the cost of change, was recognised by the local and national stakeholders brought together by the National Patient Safety Agency.

Plan

Manage Team

People should be involved in the improvement programme if they are involved in the supply, management and control of methotrexate in the UK, such as:

- patients and carers
- community pharmacies
- GPs and hospital doctors
- drug manufacturers
- drug prescription and dispensing software vendors
- information providers and packaging designers.

Review Project Performance

The use of oral methotrexate as a treatment for rheumatoid arthritis relies on a number of systems working with the patient to ensure their safety. Further improvements in the use of this drug will need to follow a systems approach to ensure that key stakeholders work together to identify and implement changes that would minimise future loss of life.

Improvement Resources

Introduction

Page 4-1 onwards

Describes the resources in this section.

Service Users

Page 4-3 onwards

A service user is someone who is a direct beneficiary from improvement enabled and enhanced by use of the healthcare design toolkit.

Service Stakeholders

Page 4-11 onwards

A service stakeholder is someone who a direct interest in improvement enabled and enhanced by use of the healthcare design toolkit.

Service Improvers

Page 4-25 onwards

A service improver is someone whose capacity for improvement is enabled and enhanced by use of the healthcare design toolkit.

Improvement Tools

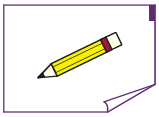
Page 4-33 onwards

A selection of tools are used to enable activities to be executed in a planned order to ensure the efficient and effective execution of a programme of improvement.

Definition of Terms

Page 4-55 onwards

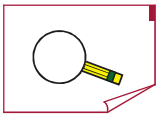
The definition of a term is a statement expressing the essential nature of something that enables a common understanding of key terms within an improvement team.



Improvement Posters

Page 4-71 onwards

Posters assist the improvement team in the visualisation and understanding of programmes, strands and activities within the improvement process.

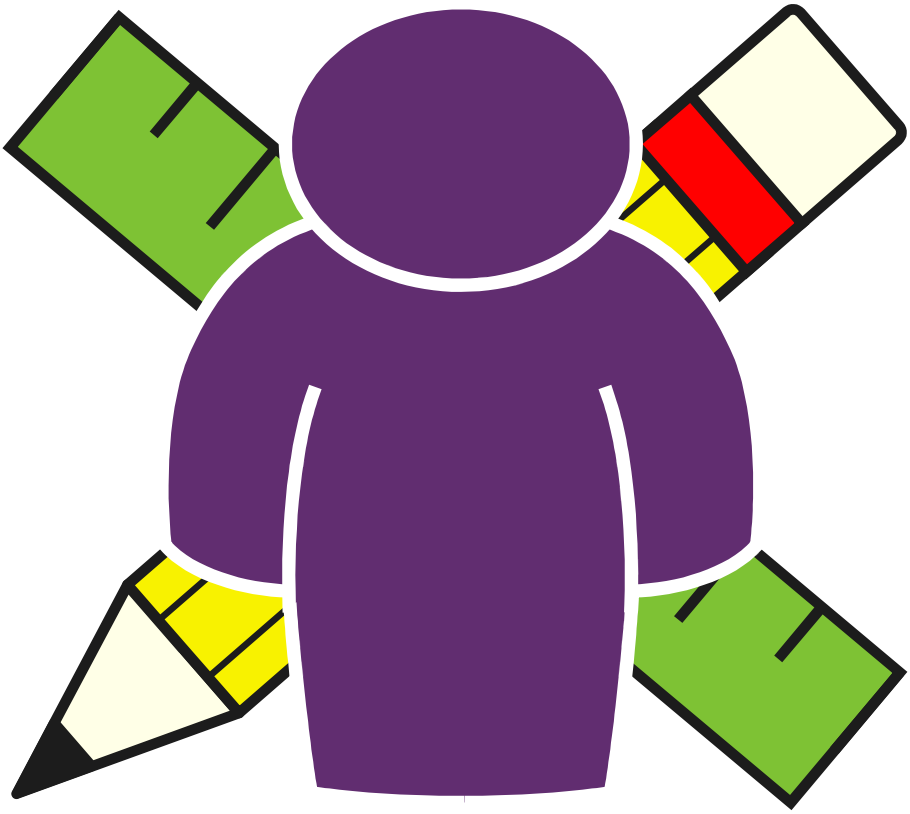


Improvement Worksheets

Page 4-79 onwards

Worksheets assist the improvement team in the planning and execution of programmes, strands and activities within the improvement process.

Introduction

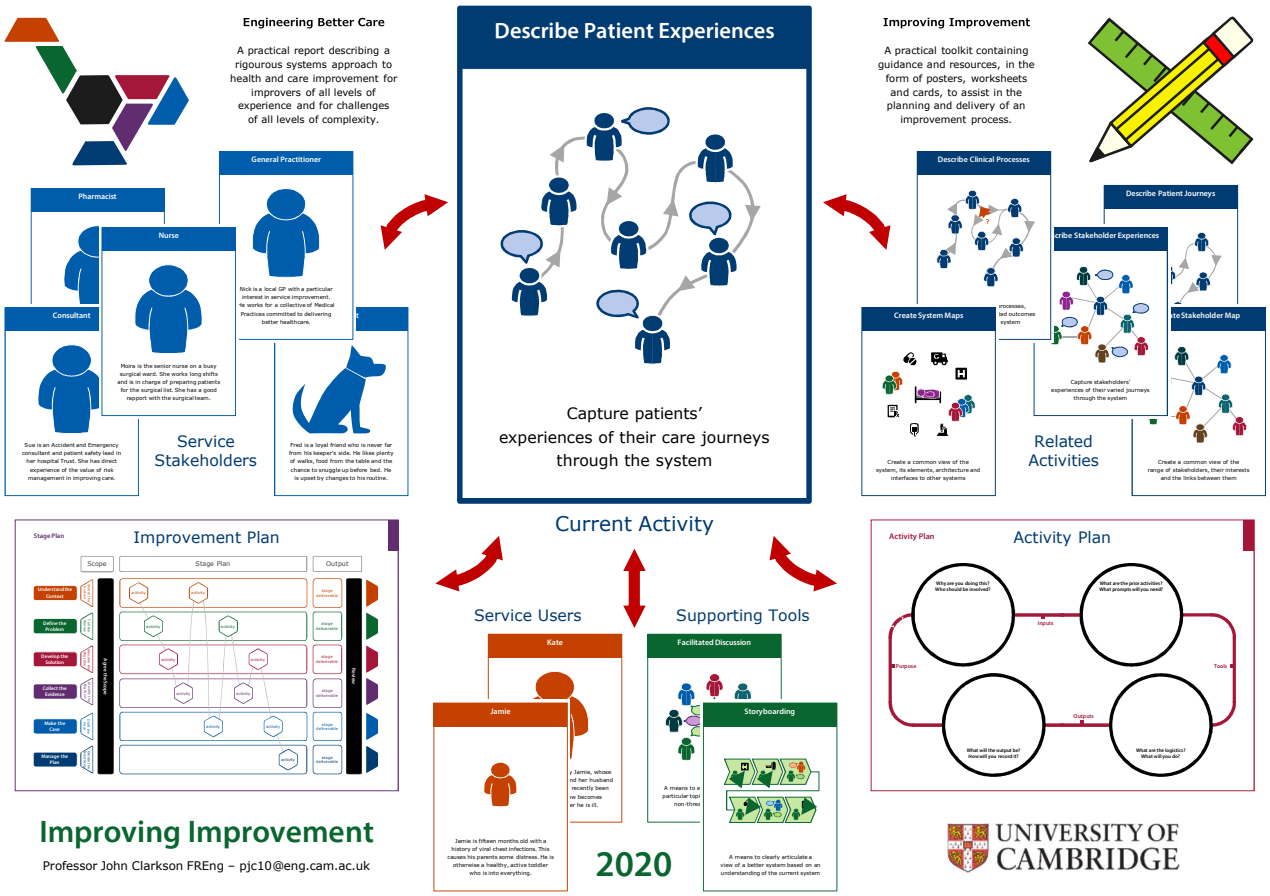


Summary

This introduction describes resources that can be used to assist in the delivery of a systems approach to health and care design and continuous improvement.

Introduction

As has been described earlier, the resources file contains **cards**, **posters**, **worksheets** and workshop materials to assist in the facilitation of improvement programmes.



These provide a starting point to embellish existing improvement approaches or may provide a standalone systems-based framework for improvement, and include:

1. Eight sets of **cards** that describe service users, service stakeholders, service improvers, case studies, improvement questions, improvement activities, improvement tools and improvement terms.
2. A set of **posters** to illustrate the concepts and tools for improvement, including the planning of the improvement process and the use of the worksheets.
3. A set of blank **worksheets**, or working documents, to support the improvement process that are based on the posters and other supporting materials.
4. A selection of pens, post-its and other resources that can be used in support of a wide variety of interactive workshop activities.

Service Users

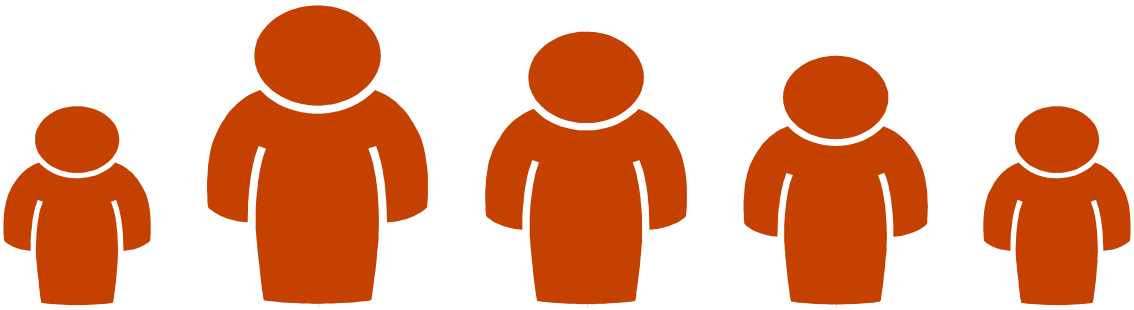
Summary

A service user is someone who is a direct beneficiary of the service that is improved by use of this toolkit.

Contents

Introduction

Descriptions of potential service users are useful in reminding an improvement team who the service is for. Knowledge and understanding of the needs and aspirations of such users, their clinical and care requirements, and their capabilities and limitations in receiving the service, provide crucial insights for those designing and improving care. A useful way to capture and convey descriptions of these users is to use **personas**, or caricatures of people, designed to display certain pertinent attributes.



Personas can be used to represent different groups of people, describing not only typical users, but also a range of non-typical, or rarer, characteristics of individuals. They can also be used to deliberately emphasise certain characteristics or behaviours as a means to ensure that the service is designed to be as inclusive as possible. Personas are fictional characters, but can be inspired by knowledge of real people. They can represent members of the general population or be chosen to be more representative of a particular patient or care population.

This section describes a number of personas, representing people at different stages of the life course. The are typical of personas in that they convey some **personal** information about the individual along with a more **factual** description of their condition or capabilities. They are intended to represent a wide spectrum of the public, with no particular bias towards any clinical condition, and inspire the creation of further, and potentially more bespoke, personas as required.

Useful toolkit resources: Cards for each of these **personas** are included in the **Resources** part of this toolkit. A number of blank cards are included to allow additional personas to be created.

Introduction

Personas represent real people. They help system improvement teams to keep in mind the needs of patients or the public in their work. As a result, it is important that the personas used in any given programme of improvement form a representative set, describing all possible patients or service users.

Personas should be named and annotated with simple demographic data and details of their medical condition. In addition, their goals, challenges and habits should be presented, remembering that patients are also people. Sets of personas should have complementary descriptions, representing the population of service users, and may be related or linked in some way.

Name	Demographics
Personal	
Medical	
As a … I need … so that …	

Personas inspire creative thinking when improvers are trying to conceptualise new services. They also provide assistance in the evaluation of the performance of current or new services. In both cases, improvers, putting themselves in the shoes of personas, can reimagine how a service performs or might perform from the perspective of each persona, arguing the case for particular consideration of their individual capabilities and needs. This ensures that services are improved with a wide range of service users in mind.

The selection or creation of personas is an important step for any improvement team and due thought should be given the role and value of using such personas in the improvement process. There should be clarity and consensus on what constitutes a sufficient set of personas for this task, in order that new personas can be created or existing ones selected and the completed set circulated to the team.

Finally, it is important to note that while personas provide a convenient reminder of the needs of service users, they are no replacement for engagement with real individuals. Hence, the challenge in any improvement programme is to find the appropriate balance between the cost and benefit of learning from literature, data, protocols, personas and real people.

Personas

Jamie

Jamie is fifteen months old with a history of viral chest infections. This causes his parents some distress. He is otherwise a healthy, active toddler who is into everything.

What matters to **Jamie**:

- I need my parents to speak for me and help me when I am sick
- I can fall ill very quickly and can bounce back just as fast
- I need to be cared for by a team with experience of people my size

Jamie

Jamie is fifteen months old with a history of viral chest infections. This causes his parents some distress. He is otherwise a healthy, active toddler who is into everything.

Sam

Sam is a nine-year-old who has a congenital heart condition that requires regular monitoring in hospital. She is very bright, enjoys school and is keen to participate in activities with her friends.

What matters to **Sam**:

- I need lots of reassurance when asked to do something
- I am often in hospital and like it when people recognise me
- I want to be included, but need my parents to make decisions for me

Sam

Sam is a nine-year-old who has a congenital heart condition that requires regular monitoring in hospital. She is very bright, enjoys school and is keen to participate in activities with her friends.

Alfy

Alfy is a young adult with a history of anxiety and depression that is now affecting his studies. He is coping with life away from home, sharing a house with other students in a busy part of town.

What matters to **Alfy**:

- I do not need my parents or sister fussing over me
- I do not know why I feel anxious or sad and would like to feel better
- I like to be part of the gang, but also need some time on my own

Alfy

Alfy is a young adult with a history of anxiety and depression that is now affecting his studies. He is coping with life away from home, sharing a house with other students in a busy part of town.

Personas

Kate

Kate is the mother of baby Jamie, whose bouts of croup cause her and her husband much distress. Jamie has recently been hospitalised and she now becomes very anxious whenever he is ill.

What matters to **Kate**:

- I am scared when Jamie has croup and need to know what to do
- I need to be taken seriously when I know something is wrong
- I am reassured when the doctors understand young people

Kate

Kate is the mother of baby Jamie, whose bouts of croup cause her and her husband much distress. Jamie has recently been hospitalised and she now becomes very anxious whenever he is ill.

Jess

Jess is thirty and was recently diagnosed with breast cancer. She faces a combination of chemotherapy, invasive surgery and radiotherapy. She lives near her mum who helps with the children.

What matters to **Jess**:

- I am scared since my sister died a few years ago from cancer
- I am not sure how to cope with treatment and look after the twins
- I want to know more about my cancer and what I have to change

Jess

Jess is thirty and was recently diagnosed with breast cancer. She faces a combination of chemotherapy, invasive surgery and radiotherapy. She lives near her mum who helps with the children.

Jim

Jim is nearing sixty and finding that not everything is now working as expected. His fitness has been compromised by too many business lunches and little time for his earlier outdoor hobbies.

What matters to **Jim**:

- I would like to lose some weight and I worry about diabetes
- I am finding reading and night driving increasing difficult
- I am always pleased when the hospital calls me in for tests

Jim

Jim is nearing sixty and finding that not everything is now working as expected. His fitness has been compromised by too many business lunches and little time for his earlier outdoor hobbies.

Personas

Peter

Peter is in his seventies and generally in good health. He is the main carer for his wife, Linda, who has dementia. He used to go to watch the football, but now feels uneasy leaving the house.

What matters to **Peter**:

- I find it very difficult when Linda becomes agitated or aggressive
- I often feel lonely in my own home and look forward to seeing visitors
- I do not like being separated from my wife

Peter

Peter is in his seventies and generally in good health. He is the main carer for his wife, Linda, who has dementia. He used to go to watch the football, but now feels uneasy leaving the house.

Rose

Rose is a frail 80-year-old who lives alone. She has diabetes, pulmonary heart disease and kidney problems. She is worried she will end up in a home and so are her family who live far away.

What matters to **Rose**:

- I like living in my own home, but wish more people would visit
- I do not understand why the colour of my tablets keep changing
- I am very frightened that no one will find me when I fall

Rose

Rose is a frail 80-year-old who lives alone. She has diabetes, pulmonary heart disease and kidney problems. She is worried she will end up in a home and so are her family who live far away.

Literature

Adlin T and Pruitt J (2010). *The Essential Persona Lifecycle: Your Guide to Building and Using Personas*. Morgan Kaufmann

Cooper A (2004). *The Inmates Are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity*. 2nd Edition, Sams.

Dam R and Siang T (2019). Personas – A Simple Introduction, Today. *Interaction Design Foundation*, https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them.

Goodwin K, Cooper A (2009). *Designing for the Digital Age: How to Create Human-Centered Products and Services*, Wiley.

LeRouge C, Sneha S and Tolle K (2013). User profiles and personas in the design and development of consumer health technologies. *International Journal of Medical Informatics*, **82**(11):251-268.

Miaskiewicz T and Kozar KA (2011). Personas and user-centered design: How can personas benefit product design processes? *Design Studies,* **32**(5):417-430.

Service Stakeholders

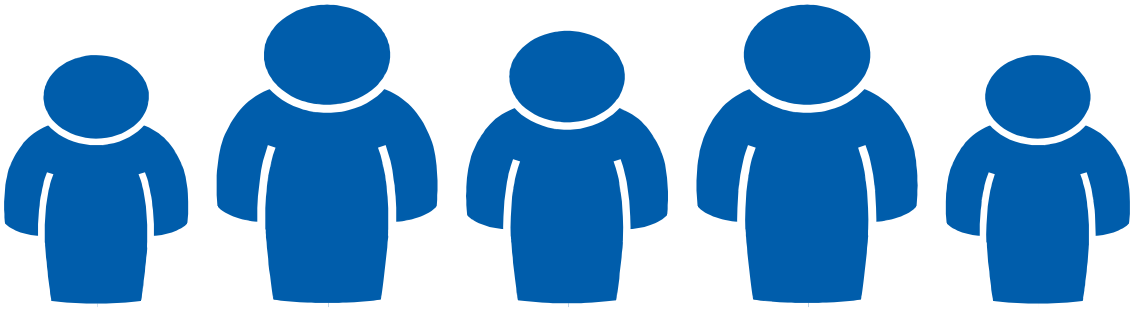
Summary

A service stakeholder is someone who has a direct interest in the service that is improved by use of this toolkit.

Contents

Introduction

Descriptions of potential service stakeholders are useful in reminding an improvement team who is involved in or has an interest in the delivery of a particular service. Knowledge and understanding of the needs and aspirations of such stakeholders, and their capabilities and limitations in delivering the service, provide crucial insights for those designing and improving care. A useful way to capture and convey descriptions of these users is to use **personas**, or caricatures of people, designed to display certain pertinent attributes.



Personas can be used to represent different groups of people, describing not only typical stakeholders, but also a range of non-typical, or rarer, characteristics of individuals. They can also be used to deliberately emphasise certain characteristics or behaviours as a means to ensure that the service is designed to be as inclusive as possible. Personas are fictional characters, but can be inspired by knowledge of real people. They can represent members of the health and care community or be chosen to be more representative of a particular stakeholder population.

This section describes a number of personas, representing stakeholders from different parts of the health and care system. They are typical of personas in that they convey some **personal** information about the individual along with a more **factual** description of their capabilities or limitations. They are intended to represent a wide spectrum of the stakeholder population, with no particular bias towards any clinical pathway, and inspire the creation of further, and potentially more bespoke, personas as required.

Useful toolkit resources: Cards for each of these **personas** are included in the **Resources** part of this toolkit. A number of blank cards are included to allow additional personas to be created.

Introduction

Personas represent real people. They help system improvement teams to keep in mind the needs of patients or the public in their work. As a result, it is important that the personas used in any given programme of improvement form a representative set, describing all possible service stakeholders.

Personas should be named and annotated with simple demographic data and details of their role in the system. In addition, their goals, challenges and habits should be presented, remembering that stakeholders are also people. Sets of personas should have complementary descriptions, representing the population of service stakeholders, and may be related or linked in some way.

Name	Demographics
Personal	
Professional	
As a … I need … so that …	

Personas inspire creative thinking when improvers are trying to conceptualise new services. They also provide assistance in the evaluation of the performance of current or new services. In both cases, improvers, putting themselves in the shoes of personas, can reimagine how a service performs or might perform from the perspective of each persona, arguing the case for particular consideration of their individual capabilities and needs. This ensures that services are improved with a wide range of service users in mind.

The selection or creation of personas is an important step for any improvement team and due thought should be given the role and value of using such personas in the improvement process. There should be clarity and consensus on what constitutes a sufficient set of personas for this task, in order that new personas can be created or existing ones selected and the completed set circulated to the team.

Finally, it is important to note that while personas provide a convenient reminder of the needs of service stakeholders, they are no replacement for engagement with real individuals. Hence, the challenge in any improvement programme is to find the appropriate balance between the cost and benefit of learning from literature, data, protocols, personas and real people.

Personas

Academic

Bill is a consultant urologist and runs the department in his hospital Trust. He is also director of an internationally leading research team with significant charitable and industry funding.

What matters to **Bill**:
- Efficient running of the Urology Department
- Adequate space for the expanding research team
- Time to attend international research meetings

Academic

Bill is a consultant urologist and runs the department in his hospital Trust. He is also director of an internationally leading research team with significant charitable and industry funding.

Administrator

Tracy works on a busy outpatient ward. She is responsible for a wide range of tasks that ensure a smooth flow of patients through the ward, which is staffed by an ever changing team.

What matters to **Tracy**:
- Patients arrive on time for their appointments
- Patient records are delivered on time to the clinical team
- Internal referrals do not disrupt the prearranged list

Administrator

Tracy works on a busy outpatient ward. She is responsible for a wide range of tasks that ensure a smooth flow of patients through the ward, which is staffed by an ever changing team.

Allied Health Professional

Sophie is a physiotherapist in a busy hospital unit specialising in sports injuries. She is interested in the role of novel wearable technologies for delivering and monitoring therapy.

What matters to **Sophie**:
- Timely appointments to facilitate maximum therapeutic benefit
- Access to the latest thinking on therapies and assistive technologies
- Consideration of modern social media to engage with patients

Allied Health Professional

Sophie is a physiotherapist in a busy hospital unit specialising in sports injuries. She is interested in the role of novel wearable technologies for delivering and monitoring therapy.

Personas

Carer

Josie has been the main carer for her bedridden husband for the past five years. Their son rarely visits and she is constantly tired and increasingly worried about her own health.

What matters to **Josie**:

- The ability to continue to care for her husband at home
- Adequate and regular support from community services
- Visits from their son and his family which bring much pleasure

Carer

Josie has been the main carer for her bedridden husband for the past five years. Their son rarely visits and she is constantly tired and increasingly worried about her own health.

Community Worker

Natasha enjoys helping people in their own homes. She is not as fit as she used to be and is frustrated by the increased physical demands and travel delays associated with her job.

What matters to **Natasha**:

- Enough time to provide a minimum level of service to everyone
- Helping heavier patients is leading to recurrent back problems
- Increased traffic makes it difficult to complete the daily list on time

Community Worker

Natasha enjoys helping people in their own homes. She is not as fit as she used to be and is frustrated by the increased physical demands and travel delays associated with her job.

Consultant

Sue is an Accident and Emergency consultant and patient safety lead in her hospital Trust. She has direct experience of the value of risk management in improving care.

What matters to **Sue**:

- Efficient triaging of patients to ensure each receives timely care
- Access to hospital beds for those who most urgently need them
- Clear reporting of all safety-related near misses and accidents

Consultant

Sue is an Accident and Emergency consultant and patient safety lead in her hospital Trust. She has direct experience of the value of risk management in improving care.

Personas

Drug Manufacturer

Sarah works in development and production for an international drug company. She has a particular interest in both preventative and rescue inhalation technologies.

What matters to **Sarah**:

- Drug formulations are fit for their intended medical purpose
- Drug delivery devices are safe and effective for all potential users
- Devices are manufactured to meet sensible cost and quality targets

Drug Manufacturer

Sarah works in development and production for an international drug company. She has a particular interest in both preventative and rescue inhalation technologies.

Equipment Supplier

Michael has supplied imaging technology for over twenty years. His company makes most of its income from products and services sold to fewer than ten NHS Trusts.

What matters to **Michael**:

- Profitable long-term service contracts with larger NHS Trusts
- A good relationship with equipment users and senior clinicians
- Direct influence on the drafting of global equipment standards

Equipment Supplier

Michael has supplied imaging technology for over twenty years. His company makes most of its income from products and services sold to fewer than ten NHS Trusts.

Family Pet

Fred is a loyal friend who is never far from his keeper's side. He likes plenty of walks, food from the table and the chance to snuggle up before bed. He is upset by changes to his routine.

What matters to **Fred**:

- Someone to talk to him and feed him his favourite food
- Regular walks in the park near to his home
- Time to snuggle up at the end of the day with a bone

Family Pet

Fred is a loyal friend who is never far from his keeper's side. He likes plenty of walks, food from the table and the chance to snuggle up before bed. He is upset by changes to his routine.

Personas

Finance Officer

Evgeny is a senior finance officer in a large NHS Trust. Over the years he has accumulated an encyclopedic knowledge of the workings of the trust and of its finances.

What matters to **Evgeny**:

- A clearly articulated and argued financial case for change
- An obvious link to existing or proposed budgets
- A clear understanding of the risks of delay or under-performance

Finance Officer

Evgeny is a senior finance officer in a large NHS Trust. Over the years he has accumulated an encyclopedic knowledge of the workings of the trust and of its finances.

Foundation Doctor

Karl is a foundation doctor about to start a new placement on a critical care unit. He is nervous about his lack of experience working with complex medication regimes and equipment.

What matters to **Karl**:

- Learning new skills quickly from the senior doctors and nurses
- Showing that he has the potential to become a trainee surgeon
- Juggling the needs of a young family with the demands of the job

Foundation Doctor

Karl is a foundation doctor about to start a new placement on a critical care unit. He is nervous about his lack of experience working with complex medication regimes and equipment.

General Practitioner

Nick is a local GP with a particular interest in service improvement. He works for a collective of Medical Practices committed to delivering better healthcare.

What matters to **Nick**:

- Collective ability to deliver outstanding healthcare
- Effective communication with secondary and mental health care
- Skills to facilitate continuous improvement of local practice

General Practitioner

Nick is a local GP with a particular interest in service improvement. He works for a collective of Medical Practices committed to delivering better healthcare.

Personas

Health Minister

Mark is responsible for oversight of all NHS delivery and performance. He holds a portfolio ranging from public health and social care to mental health, primary care and secondary care.

What matters to **Mark**:

- Equity in the delivery of health and well-being services
- Public and patient participation in health and care improvement
- Fair wages for NHS employees and other care providers

Health Minister

Mark is responsible for oversight of all NHS delivery and performance. He holds a portfolio ranging from public health and social care to mental health, primary care and secondary care.

Laboratory Technician

Tatiana is responsible for a range of activities in the pathology laboratory including the automated diagnostics. She particularly enjoys the variety and that every day is different.

What matters to **Tatania**:

- Clinicians provide clear information to guide her investigations
- There is a good balance between routine and emergency cases
- The availability of automated analysis equipment at all times

Laboratory Technician

Tatiana is responsible for a range of activities in the pathology laboratory including the automated diagnostics. She particularly enjoys the variety and that every day is different.

Local Government Officer

Lloyd has worked in local government for all his life. He likes to make a difference, but is increasingly frustrated by the lack of budget to deliver effective community services.

What matters to **Lloyd**:

- Doing things that really matter to the local community
- Sufficient local budget for community and mental health care
- Engagement with the NHS to try to provide continuity of care

Local Government Officer

Lloyd has worked in local government for all his life. He likes to make a difference, but is increasingly frustrated by the lack of budget to deliver effective community services.

Personas

Nurse

Moira is the senior nurse on a busy surgical ward. She works long shifts and is in charge of preparing patients for the surgical list. She has a good rapport with the surgical team.

What matters to **Moira**:

- Ensuring patients and their families are well prepared for surgery
- Working with the same team of nurses on a regular basis
- Feeling valued as part of the surgical team

Nurse

Moira is the senior nurse on a busy surgical ward. She works long shifts and is in charge of preparing patients for the surgical list. She has a good rapport with the surgical team.

Paramedic

Liz is a recently qualified paramedic with aspirations to join the region's air ambulance service. She enjoys the challenge of emergency care, but is frustrated by the lack of resources.

What matters to **Liz**:

- Speed of response to minimise time to the initial intervention
- Timely handover of the patient to Accident and Emergency
- Skills necessary to maximise intervention possibilities

Paramedic

Liz is a recently qualified paramedic with aspirations to join the region's air ambulance service. She enjoys the challenge of emergency care, but is frustrated by the lack of resources.

Patient Representative

David is a patient representative for a mental health Trust. He has been a service user in the past and provides insight into current service provision and the potential for improvement.

What matters to **David**:

- Services are regularly evaluated and improved
- The voice of the patient is heard when discussing services
- Expenses for attendance at events are paid promptly

Patient Representative

David is a patient representative for a mental health Trust. He has been a service user in the past and provides insight into current service provision and the potential for improvement.

Personas

Pharmacist

Naveed runs a small chain of independent community pharmacies. He prides himself on knowing his regular customers and works very hard to provide a good service to them.

What matters to **Naveed**:

- Providing an excellent service to local customers
- Keeping up with ever changing prescription technologies
- Government pricing challenges the profitability of the business

Pharmacist

Naveed runs a small chain of Independent community pharmacies. He prides himself on knowing his regular customers and works very hard to provide a good service to them.

Porter

Andrew has been a porter for nearly forty years in the same hospital. He is well liked by patients and staff, and knows all the best routes, but is not as fast and agile as he used to be.

What matters to **Andrew**:

- The ability to help people in a time of uncertainty or crisis
- That the lifts between the wards and theatres are in service
- Time to chat to people on his travels around the hospital

Porter

Andrew has been a porter for nearly forty years in the same hospital. He is well liked by patients and staff, and knows all the best routes, but is not as fast and agile as he used to be.

Practice Manager

Thomas works for a general practice unit. He is responsible for a wide range of tasks that ensure a smooth flow of patients through the practice, which is staffed by an ever changing team.

What matters to **Thomas**:

- Patients arrive on time for their appointments
- Patient records are delivered on time to the medical team
- External referrals are followed up in a timely manner

Practice Manager

Thomas works for a general practice unit. He is responsible for a wide range of tasks that ensure a smooth flow of patients through the practice, which is staffed by an ever changing team.

Personas

Public Health Worker

Gabriella is a nutritionist with a wide brief to engage with the local community to promote good health through nutrition and monitor the impact of national policies.

What matters to **Gabriella**:

- The ability to engage effectively with vulnerable people
- The support of local community groups and health centres
- Knowledge of the latest best practice in good nutrition

Public Health Worker

Gabriella is a nutritionist with a wide brief to engage with the local community to promote good health through nutrition and monitor the impact of national policies.

Senior Trainee Doctor

Aoife is a senior anaesthetic registrar supporting a number of surgical teams across the hospital. She enjoys the variety of her work and is keen to continuously improve her skills.

What matters to **Aoife**:

- Tracking of patients' progress before and after surgery
- Effective team working in all surgical environments
- Standardised equipment available in all surgical units

Senior Trainee Doctor

Aoife is a senior anaesthetic registrar supporting a number of surgical teams across the hospital. She enjoys the variety of her work and is keen to continuously improve her skills.

Service Commissioner

Sally is a regional commissioner who has seen many changes in procurement practice. She is increasingly frustrated that she is unable to take a more holistic approach to service provision.

What matters to **Sally**:

- Patients' interests are at the heart of all service provision
- Individual providers understand their position in the wider system
- Providers take a broader financial view of service proposals

Service Commissioner

Sally is a regional commissioner who has seen many changes in procurement practice. She is increasingly frustrated that she is unable to take a more holistic approach to service provision.

Personas

Service Funder

Geoff has held senior roles in healthcare management for over thirty years. He has seen national directives and internal initiatives come and go with little apparent impact on care.

What matters to **Geoff**:

- The relative strength of the clinical and financial case for change
- The risks associated with development and delivery
- How the proposed service relates to best practice

Service Funder

Geoff has held senior roles in healthcare management for over thirty years. He has seen national directives and internal initiatives come and go with little apparent impact on care.

Service Manager

Dawn is a nurse by training and service manager for a regional hospital. She has limited experience of change, but has a good working relationship with the wider team.

What matters to **Dawn**:

- How the proposed changes will impact patients and staff
- The resources required to develop and deliver the new service
- How the transition to the new service will be achieved

Service Manager

Dawn is a nurse by training and service manager for a regional hospital. She has limited experience of change, but has a good working relationship with the wider team.

Service Regulator

Richard is a former pharmaceutical executive turned regulator. He has responsibility for the accreditation of medicines and care practices for general and specialist use.

What matters to **Richard**:

- Access to reliable evidence for the efficacy of medicines and practices
- Up-to-date knowledge of national regulatory frameworks
- Some influence on research funding to plug evidence gaps

Service Regulator

Richard is a former pharmaceutical executive turned regulator. He has responsibility for the accreditation of medicines and care practices for general and specialist use.

Personas

Third Sector Worker

Anna is a former community nurse now working for a charity specialising in end-of-life care. She typically supports an individual and their family during their final months of life.

What matters to **Anna**:

- Making a real difference at a time of particular need
- Time to get to know and support the individual and their family
- Timely clinical support from community and specialist doctors

Third Sector Worker

Anna is a former community nurse now working for a charity specialising in end-of-life care. She typically supports an individual and their family during their final months of life.

Literature

Adlin T and Pruitt J (2010). *The Essential Persona Lifecycle: Your Guide to Building and Using Personas*. Morgan Kaufmann

Cooper A (2004). *The Inmates Are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity*. 2nd Edition, Sams.

Dam R and Siang T (2019). Personas – A Simple Introduction, Today. *Interaction Design Foundation*, https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them.

Goodwin K, Cooper A (2009). *Designing for the Digital Age: How to Create Human-Centered Products and Services*, Wiley.

LeRouge C, Sneha S and Tolle K (2013). User profiles and personas in the design and development of consumer health technologies. *International Journal of Medical Informatics*, **82**(11):251-268.

Miaskiewicz T and Kozar KA (2011). Personas and user-centered design: How can personas benefit product design processes? *Design Studies,* **32**(5):417-430.

Service Improvers

Summary

A service improver is someone whose capacity for system improvement is enabled and enhanced by use of this toolkit.

Contents

Introduction

Descriptions of potential toolkit users are useful in reminding improvement managers who will use the toolkit. Knowledge and understanding of the needs and aspirations of such users, and their capabilities and limitations in engineering and healthcare approaches to systems improvement, provide crucial insights for those responsible for improving care. A useful way to capture and convey descriptions of these users is to use **personas**, or caricatures of people, designed to display certain pertinent attributes.

Personas can be used to represent different groups of people, describing not only typical users, but also a range of non-typical, or rarer, characteristics of individuals. They can also be used to deliberately emphasise certain characteristics or behaviours as a means to ensure that the service is designed to be as inclusive as possible. Personas are fictional characters, but can be inspired by knowledge of real people. They can represent members of the general population or be chosen to be more representative of a particular patient or care population.

This section describes a number of personas, representing people at different stages of the life course. They are typical of personas in that they convey some **personal** information about the individual along with a more **factual** description of their condition or capabilities. They are intended to represent a wide spectrum of the public, with no particular bias towards any clinical condition, and inspire the creation of further, and potentially more bespoke, personas as required.

4-28 Clinical Lead
4-28 Commissioner
4-28 Improvement Fellow
4-29 Nurse Clinical Manager
4-29 Project Manager
4-29 Risk Manager
4-30 Service Lead
4-30 Service Manager
4-30 Transformation Lead

Useful toolkit resources: Cards for each of these **personas** are included in the **Resources** part of this toolkit. A number of blank cards are included to allow additional personas to be created.

Introduction

Personas represent real people. They help system improvement teams to keep in mind the needs of patients or the public in their work. As a result, it is important that the personas used in any given programme of improvement form a representative set, describing all possible patients or service users.

Personas should be named and annotated with simple demographic data and details of their medical condition. In addition, their goals, challenges and habits should be presented, remembering that patients are also people. Sets of personas should have complementary descriptions, representing the population of service users, and may be related or linked in some way.

Name	Demographics
Personal	
Medical	
As a … I need … so that …	

Personas inspire creative thinking when improvers are trying to conceptualise new services. They also provide assistance in the evaluation of the performance of current or new services. In both cases, improvers, putting themselves in the shoes of personas, can reimagine how a service performs or might perform from the perspective of each persona, arguing the case for particular consideration of their individual capabilities and needs. This ensures that services are improved with a wide range of service users in mind.

The selection or creation of personas is an important step for any improvement team and due thought should be given the role and value of using such personas in the improvement process. There should be clarity and consensus on what constitutes a sufficient set of personas for this task, in order that new personas can be created or existing ones selected and the completed set circulated to the team.

Finally, it is important to note that while personas provide a convenient reminder of the needs of service users, they are no replacement for engagement with real individuals. Hence, the challenge in any improvement programme is to find the appropriate balance between the cost and benefit of learning from literature, data, protocols, personas and real people.

Personas

Clinical Lead

Amari is a consultant who is looking at making service improvements in a large teaching hospital in Cityville to address the growing demands due to an ageing population.

What matters to **Amari**:
- Clear local clinical benefit with wider potential impact
- Credible evidence base that the process will work
- Time and cost effectiveness to maximise engagement

Clinical Lead

Amari is a consultant who is looking at making service improvements in a large teaching hospital in Cityville to address the growing demands due to an ageing population.

Commissioner

Lucas works for the CCG and is responsible for overseeing existing services as well as commissioning new solutions that can address clinical priorities at appropriate levels of cost.

What matters to **Lucas**:
- A commitment to meet clinical and operational priorities
- A costed and credible clinical case allied to a viable plan for change
- Ideally a short to medium term payback period

Commissioner

Lucas works for the CCG and is responsible for overseeing existing services as well as commissioning new solutions that can address clinical priorities at appropriate levels of cost.

Improvement Fellow

Joseph is a junior doctor working for a newly-formed Major Trauma Service in a large hospital. He is particularly interested in QI and its application to the service he has joined.

What matters to **Joseph**:
- Mix of clinical time and protected time for quality improvement
- Ability to apply the questions from the system approach
- Use of a practical process view of the Systems Approach

Improvement Fellow

Joseph is a junior doctor working for a newly-formed Major Trauma Service in a large hospital. He is particularly interested in QI and its application to the service he has joined.

Personas

Nurse Clinical Manager

Emma is a nurse clinical manager working for a newly-formed Major Trauma Service at a large hospital. She is involved in the day-to-day management of the service.

What matters to **Emma**:

- Effective management of the new trauma service
- Data collection for service monitoring and improvement
- Opportunity to learn about the Systems Approach

Nurse Clinical Manager

Emma is a nurse clinical manager working for a newly-formed Major Trauma Service at a large hospital. She is involved in the day-to-day management of the service.

Project Manager

Jake is a project manager for the CCG in Cityshire. He has worked in healthcare but is not a clinician. He has been tasked with leading a project but has no specific background in this area.

What matters to **Jake**:

- Process leads to a clear plan and set of actionable activities
- Process works within organisational processes and constraints
- Process helps coordinate different inputs from a variety of sources

Project Manager

Jake is a project manager for the CCG in Cityshire. He has worked in healthcare but is not a clinician. He has been tasked with leading a project but has no specific background in this area.

Risk Manager

Zac is a risk manager in a large teaching hospital within Cityshire. He is not a clinician, but has a background in human factors and safety management, having previously worked in industry.

What matters to **Zac**:

- Risks are systematically identified, reviewed and documented
- Mitigation strategies are developed and system changes risk assessed
- A proactive risk mindset is instilled in all stakeholders

Risk Manager

Zac is a risk manager in a large teaching hospital within Cityshire. He is not a clinician, but has a background in human factors and safety management, having previously worked in industry.

Personas

Service Lead

Charles is a consultant and service lead for a newly-formed Major Trauma Service in a large hospital. He helped design this new service based on his experience of the needs of patients.

What matters to **Charles**:

- Continuous development and improvement of the new service
- Engagement with a team who understand QI approaches
- Opportunity to learn more about the Systems Approach

Service Lead

Charles is a consultant and service lead for a newly-formed Major Trauma Service in a large hospital. He helped design this new service based on his experience of the needs of patients.

Service Manager

Zoe manages a busy care service in Cityshire which is coming under increasing pressure. She has been asked to look at increasing capacity through co-ordination with other service providers.

What matters to **Zoe**:

- That any solutions will work at day-to-day operational level
- That the patient experience is maintained or enhanced
- That staff issues and risks are understood and acted upon

Service Manager

Zoe manages a busy care service in Cityshire which is coming under increasing pressure. She has been asked to look at increasing capacity through co-ordination with other service providers.

Transformation Lead

Lucia works for the clinical CCG in Cityshire. She has worked in a variety of service improvement roles in different NHS organisations. She started her career as a nurse before moving into management.

What matters to **Lucia**:

- The clinical need and case for change are made clear
- Strong clinical support with high domain knowledge and experience
- Sufficient budget for a programme of work to address the need

Transformation Lead

Lucia works for the clinical CCG in Cityshire. She has worked in a variety of service improvement roles in different NHS organisations. She started her career as a nurse before moving into management.

Literature

Adlin T and Pruitt J (2010). *The Essential Persona Lifecycle: Your Guide to Building and Using Personas*. Morgan Kaufmann

Cooper A (2004). *The Inmates Are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity*. 2nd Edition, Sams.

Dam R and Siang T (2019). Personas – A Simple Introduction, Today. *Interaction Design Foundation*, https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them.

Goodwin K, Cooper A (2009). *Designing for the Digital Age: How to Create Human-Centered Products and Services*, Wiley.

LeRouge C, Sneha S and Tolle K (2013). User profiles and personas in the design and development of consumer health technologies. *International Journal of Medical Informatics*, **82**(11):251-268.

Miaskiewicz T and Kozar KA (2011). Personas and user-centered design: How can personas benefit product design processes? *Design Studies,* **32**(5):417-430.

Improvement Tools

Summary

A selection of **tools** are used to enable activities to be executed in a planned order to ensure the efficient and effective execution of a programme of improvement.

Contents

Introduction

Tools are an important part of any toolkit, but are only as good as the people that use them and only effective when used to accomplish appropriate activities. **Tools** in the hands of novices may require careful instruction or benefit from some form of training or apprenticeship. **Tools** in the hands of experts may feel like an extension of the master working their trade, used for their intended purpose or adapted for other purposes. Tools are typically designed for a particular activity and optimised for the purpose, however, many may be usefully adopted for related tasks.

The tools in this toolkit are largely off-the-shelf, established and well used. Simple guidance is provided for their use and reference given to resources that describe them in more detail. The intention is not to provide full instructions for their use here, rather to point to their existence and indicate where they might be used. They are catalogued according to their most likely contribution to the key strands of the improvement process, but may be used at any stage. Hence the tools are presented in groups, aligned with the key strands, but are also listed here alphabetically, with reference to the page on which each tool may be found.

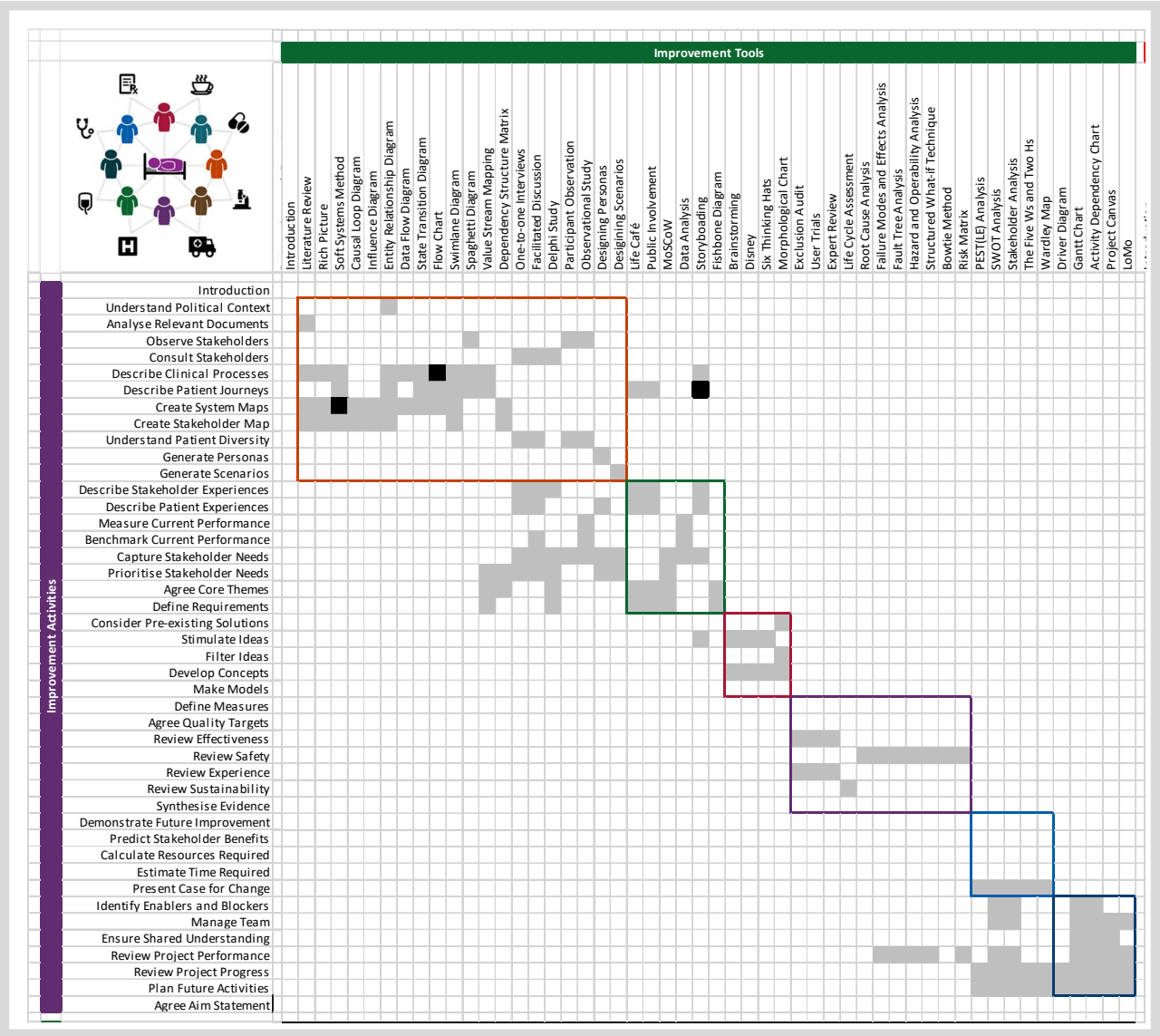
Tools listed alphabetically:

Tools located within each strand:

Useful toolkit resources: Cards for each of these **tools** are included in the **Resources** part of this toolkit. A number of blank cards are included to allow additional tools to be created.

Introduction

Tools may be mapped to **activities** to assist in their selection. More than one tool may be used for any particular purpose and this is often encouraged. The mapping provides clear indication as to how **tools** might be used to support **activities**, but is not expected to exhaustively show where tools have actually been used in practice.



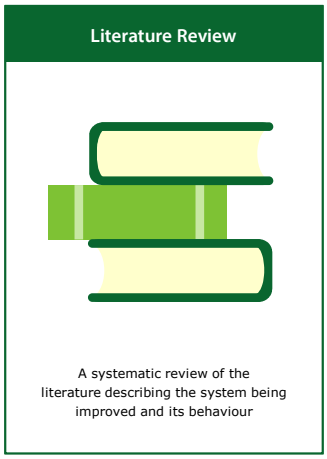
Context

Literature Review

A systematic review of the literature describing the system being improved and its behaviour.

Top tips:
- Define relevant search terms and likely sources of literature
- Filter the literature retrieved to maximise its utility
- Search the grey literature for additional practical insights

https://www2.open.ac.uk/students/skillsforstudy/conducting-a-literature-review.php

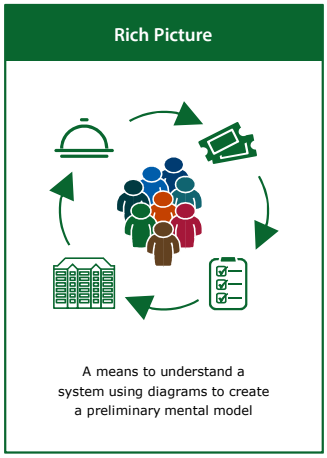


Rich Picture

A means to understand a system using diagrams to create a preliminary mental model

Top tips:
- Draw the time-invariant structures within the system
- Capture the activities and processes within the systems
- Identify the ways in which the structure and processes interact

https://www.open.edu/openlearn/science-maths-technology/engineering-technology/rich-pictures

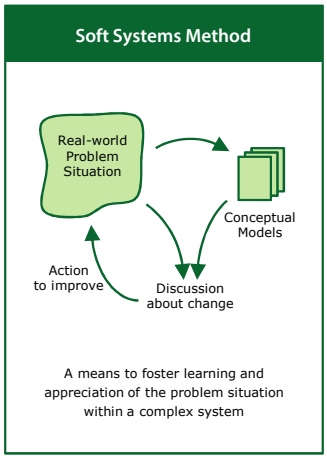


Soft Systems Method

A means to foster learning and appreciation of the problem situation within a complex system

Top tips:
- Look at the real-world situation rather than the problem
- Develop conceptual models to aid understanding of the system
- Define actions to improve that are shared by stakeholders

https://www.wiley.com/en-gb/Soft+Systems+Methodology+in+Action-p-9780471986058



Context

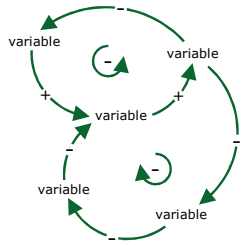
Causal Loop Diagram

A means to capture the variables of interest in a complex system and understand their effect on outcomes

Top tips:
- Identify the variables of interest and link them together
- Label and characterise the causal loops within the system
- Use the causal loops to tell the story of the system

https://thesystemsthinker.com/fine-tuning-your-causal-loop-diagrams-part-i/

Causal Loop Diagram



A means to capture the variables of interest in a complex system and understand their effect on outcomes

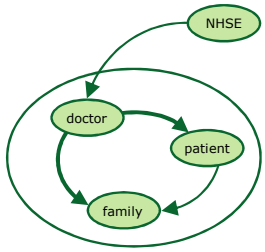
Influence Diagram

A means to map the components or issues for a situation or system and the influences that exist between them

Top tips:
- Identify the components and the influences between them
- Use different line thicknesses to indicate the levels of influence
- Explore the interrelationships and their effects on the system

https://www.open.edu/openlearn/science-maths-technology/computing-ict/managing-complexity-systems-approach-introduction/content-section-9.4

Influence Diagram



A means to map the components or issues for a situation or system and the influences that exist between them

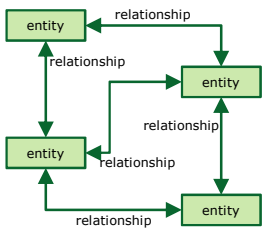
Entity Relationship Diagram

A means to identify and map the entities in a complex system and the relationships between them

Top tips:
- Look at the real-world situation rather than the problem
- Identify the entities and the nature of the relationships between them
- Use the relational loops to tell the story of the system

https://www.open.edu/openlearn/science-maths-technology/computing-ict/models-and-modelling/content-section-8.1

Entity Relationship Diagram



A means to identify and map the entities in a complex system and the relationships between them

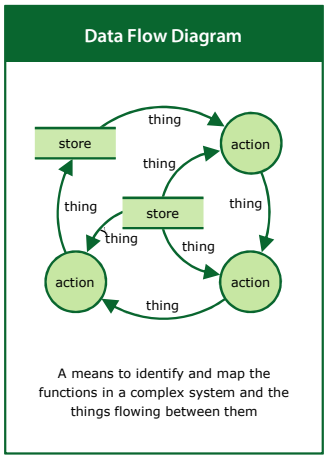
Context

Data Flow Diagram

A means to identify and map the functions in a complex system and the things flowing between them

Top tips:
- Look at the real-world situation rather than the problem
- Identify the functions and the data/things flowing between them
- Use the function/data loops to tell the story of the system

https://www.open.edu/openlearn/science-maths-technology/computing-ict/models-and-modelling/content-section-4.1

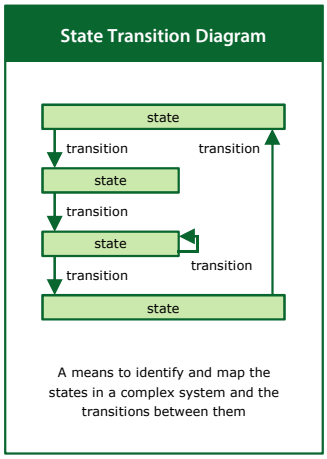


State Transition Diagram

A means to identify and map the states in a complex system and the transitions between them

Top tips:
- Look at the real-world situation rather than the problem
- Identify the states and nature of the transitions between them
- Use the transition loops to tell the story of the system

https://www.open.edu/openlearn/science-maths-technology/computing-ict/models-and-modelling/content-section-9.1

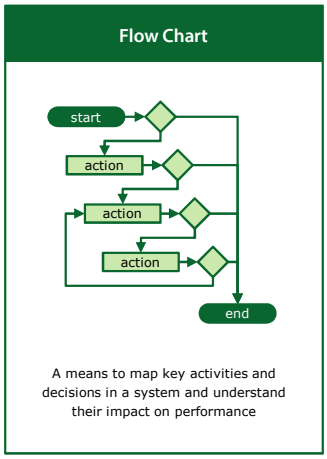


Flow Chart

A means to map the key activities and decisions in a system and understand their impact on performance

Top tips:
- Identify key activities in the system and the decisions that link them
- Look for unexpected feedback loops that may effect performance
- Identify the resources required to deliver the activities and decisions

https://www.open.edu/openlearn/science-maths-technology/computing-ict/models-and-modelling/content-section-7.1



Context

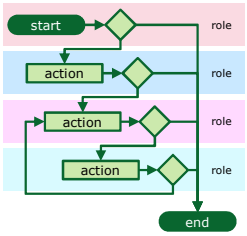
Swimlane Diagram

A means to map the key activities and decisions in a system and understand their impact on performance

Top tips:
- Identify key activities in the system and the decisions that link them
- Identify the resources required to deliver the activities and decisions
- Look for unexpected feedback loops that may effect performance

https://www.open.edu/openlearn/science-maths-technology/computing-ict/models-and-modelling/content-section-7.1

Swimlane Diagram



A means to map key activities and decisions in a system and understand their impact on performance

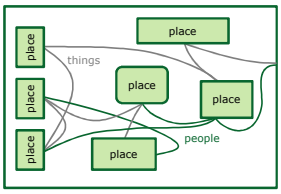
Spaghetti Diagram

A tool to establish the optimum layout for a department based on observations of movement

Top tips:
- Obtain a detailed floor plan of the department of interest
- Capture the movements of people or products within the department
- Analyse the lines of flow to identify unnecessary movement

https://www.england.nhs.uk/wp-content/uploads/2021/03/qsir-spaghetti-diagram.pdf

Spaghetti Diagram



A tool to establish the optimum layout for a department based on observations of movement

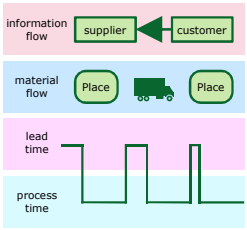
Value Stream Mapping

A tool to help understand and improve the material and information flow within organisations

Top tips:
- Present the whole process from end to end
- Use a simple graphical format to map current and future states
- Encourage a team approach to constructively critique activity

https://www.england.nhs.uk/wp-content/uploads/2021/03/qsir-value-stream-mapping.pdf

Value Stream Mapping



A tool to help understand and improve the material and information flow within organisations

Context

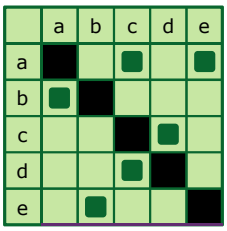
Dependency Structure Matrix

A structured representation of the dependencies between individual elements of a system

Top tips:
- Identify the relevant elements of the system and their dependencies
- Present the rows and columns of the matrix in the same order
- Apply clustering and sequencing algorithms to analyse the system

https://dsmweb.org/home-2/

Dependency Structure Matrix



A structured representation of the dependencies between individual elements of a system

One-to-one Interviews

A means to elicit information about a particular topic or area of interest in a one-to-one conversation

Top tips:
- Select participants with a range of views on the chosen topic
- Prepare some key questions as the basis of the conversation
- Determine the degree of structure required before the interview

https://www.methods.manchester.ac.uk/themes/qualitative-methods/

One-to-one Interviews

A means to elicit information about a particular topic or area of interest in a one-to-one conversation

Facilitated Discussion

A means to elicit perceptions about a particular topic or area of interest in a non-threatening environment

Top tips:
- Select participants with a range of views on the chosen topic
- Encourage all participants to contribute to the discussion
- Use visualisation tools to summarise and communicate the results

https://www.methods.manchester.ac.uk/themes/data-collection/

Facilitated Discussion

A means to elicit perceptions about a particular topic or area of interest in a non-threatening environment

Context

Delphi Study

An iterative approach to develop a consensus view regarding the current performance of the system

Top tips:
- Select experts with a range of views on the chosen topic
- Design the questionnaires to inform and elicit a consensus view
- Ensure a quick turnaround of views between the study cycles

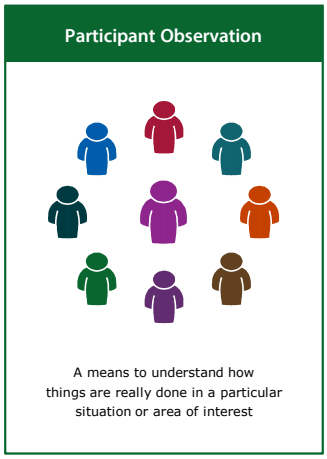
https://www.rand.org/topics/delphi-method.html

Participant Observation

A means to understand how things are really done in a particular situation or area of interest

Top tips:
- Design the study carefully to define its scope and appropriate duration
- Use ethnographic methods early in a programme of change
- Identify key activities, actions and detailed behaviours

https://www.methods.manchester.ac.uk/themes/ethnographic-methods/

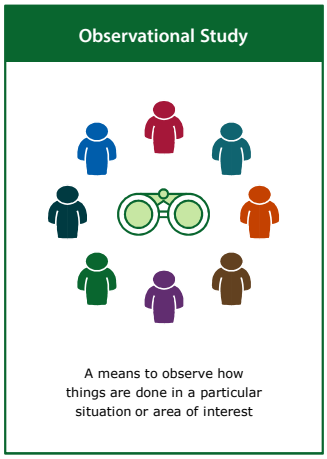


Observational Study

A means to observe how things are done in a particular situation or area of interest

Top tips:
- Design the study carefully to define its scope and appropriate duration
- Use observational methods early in a programme of change
- Identify key activities, actions and detailed behaviours

https://www.methods.manchester.ac.uk/themes/qualitative-methods/



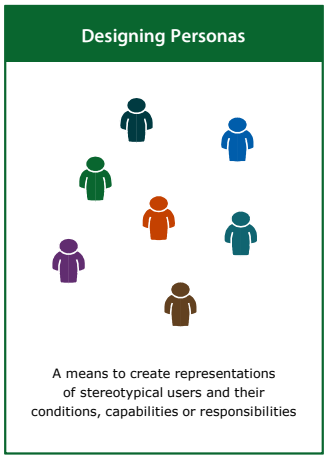
Context

Designing Personas

A means to create representations of stereotypical users and their conditions, capabilities and responsibilities

Top tips:
- Conduct user research to identify key users and their behaviours
- Focus on the expectations, needs and motivations of key users
- Describe realistic people with backgrounds, goals and values

https://www.usabilitybok.org/persona

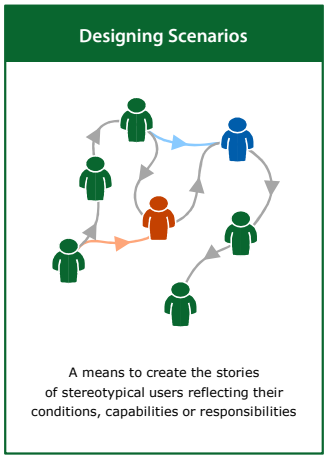


Designing Scenarios

A means to create the stories of stereotypical users reflecting their conditions, capabilities and responsibilities

Top tips:
- Conduct user research to identify key stories and their context
- Focus on the expectations, needs and motivations of key users
- Describe realistic scenarios involving stereotypical users

https://www.usabilitybok.org/scenario-of-use



Problem

Life Café

A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

Top tips:
- Enable community members to express what matters to them
- Generate conversations within a safe and familiar environment
- Tailor the experience for different people, situations or environments

https://www.lifecafe.org.uk/

Life Café

A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

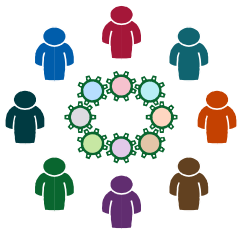
Public Involvement

A means to encourage and ensure patient and public involvement in quality improvement projects

Top tips:
- Identify key patient and public groups to be involved
- Co-design all activities to maximise engagement and value
- Ensure that ethical approval is obtained for all activities

https://www.bma.org.uk/media/1938/bma-patient-and-public-involvement-2015.pdf

Public Involvement



A means to encourage and ensure patient and public involvement in quality improvement projects

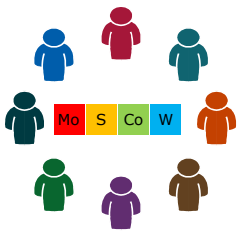
MoSCoW

A means to capture a prioritised list of **must**, **should**, **could** and **won't have** requirements for improvement

Top tips:
- Capture the requirements that must be met
- Identify those requirements that should or could be met
- List those requirements that would be required later

https://www.toolshero.com/project-management/moscow-method/

MoSCoW



A means to capture a prioritised list of **must**, **should**, **could** and **won't have** requirements for improvement

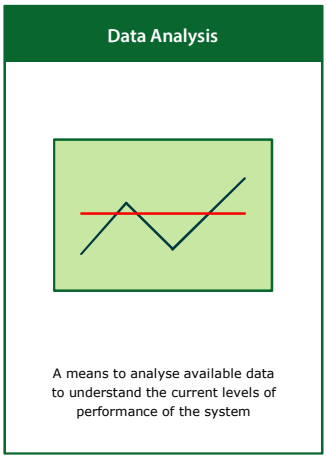
Problem

Data Analysis

A means to analyse available data to understand the current levels of performance of the system

Top tips:
- Collect relevant performance data across the systems of interest
- Select the analytical tools most appropriate to explore the data
- Use visualisation tools to summarise and communicate the results

https://www.methods.manchester.ac.uk/themes/survey-and-statistical-methods/

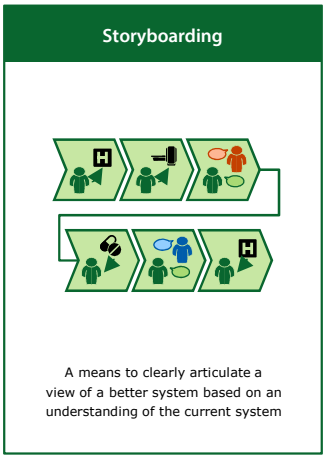


Storyboarding

A means to clearly articulate a view of a better system based on an understanding of the current system

Top tips:
- Identify all the key steps in the end-to-end patient journey
- Make each step small enough to elicit subtle but significant issues
- Look at each step from different stakeholder perspectives

https://www.toolshero.com/problem-solving/storyboarding/

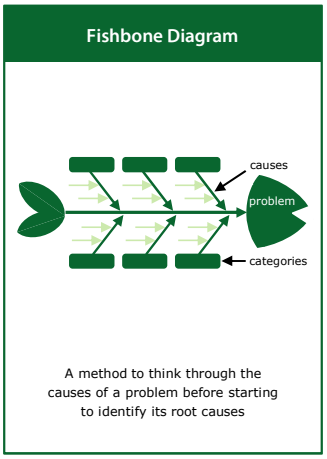


Fishbone Diagram

A method to think through the causes of a problem before starting to identify its root causes

Top tips:
- Define the main problem to be resolved
- Identify the main categories of potential causes
- Allow progressive identification of the most likely causes

https://www.england.nhs.uk/wp-content/uploads/2021/12/qsir-cause-and-effect-fishbone.pdf



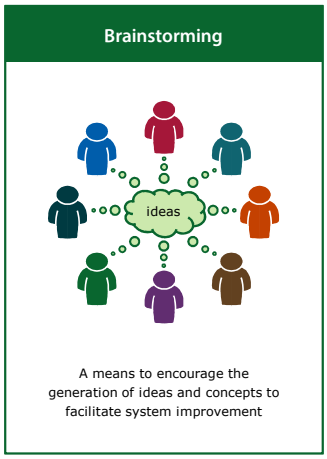
Solution

Brainstorming

A means to encourage the generation of ideas and concepts to facilitate system improvement

Top tips:
- Encourage free thinking in the generation of ideas and concepts
- Focus initially on the quantity of ideas and concepts created
- Filter the ideas and concepts to identify potential winners

https://www.ifm.eng.cam.ac.uk/research/dstools/brainstorming/

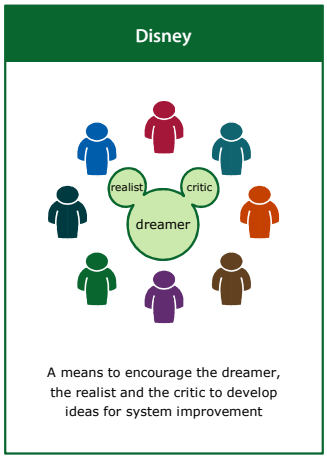


Disney

A means to encourage the dreamer, the realist and the critic to develop ideas for system improvement

Top tips:
- Allow the sharing of dreams without restriction or criticism
- Filter ideas to turn imaginary ideas into a manageable action plan
- Provide constructive critique for the ideas and action plan

https://www.toolshero.com/creativity/walt-disney-method/

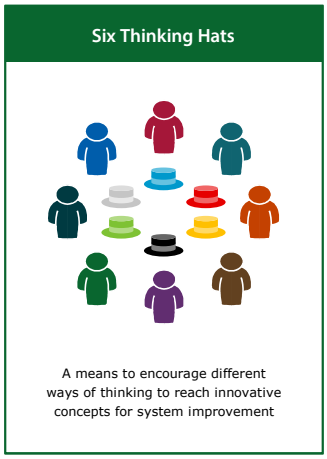


Six Thinking Hats

A means to encourage different ways of thinking to reach innovative concepts for system improvement

Top tips:
- Establish the facts and encourage intuitive thinking
- Allow a structured mix of creative, constructive and cautious thinking
- Facilitate and manage the critical thinking discussions

https://webarchive.nationalarchives.gov.uk/ukgwa/20180501162135mp_/https://improvement.nhs.uk/documents/2167/six-thinking-hats.pdf



Solution

Morphological Chart

A means to help organise the presentation of ideas and concepts to facilitate system improvement

Top tips:
- Encourage free thinking in the generation of ideas and concepts
- Arrange the ideas and concepts in organisational or functional groups
- Create potential solutions as combinations of ideas and concepts

https://www.ifm.eng.cam.ac.uk/research/dmg/tools-and-techniques/morphological-charts/

Evidence

Exclusion Audit

A systematic approach to estimating potential levels of exclusion when using a system

Top tips:
- Identify the location and cause of potential exclusion
- Estimate the likelihood and impact of potential exclusion
- Assess the risk of exclusion and determine its criticality

http://www.inclusivedesigntoolkit.com/GS_evaluate/evaluate.html#exclusion

User Trials

An experimental approach to identifying potential causes of difficulty when using a system

Top tips:
- Observe the location and cause of actual challenges
- Estimate the likelihood and impact of actual challenges
- Assess the risk of challenges and determine their criticality

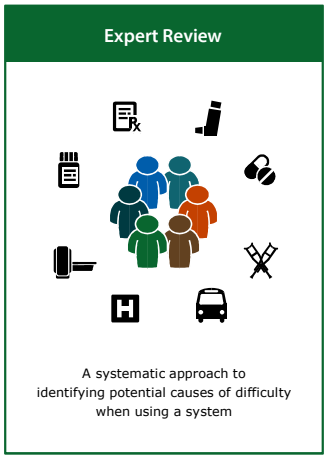
http://www.inclusivedesigntoolkit.com/GS_evaluate/evaluate.html#testuser

Expert Review

A systematic approach to identifying potential causes of difficulty when using a system

Top tips:
- Identify the location and cause of potential challenges
- Estimate the likelihood and impact of potential challenges
- Assess the risk of challenges and determine their criticality

http://www.inclusivedesigntoolkit.com/GS_evaluate/evaluate.html#experts



Evidence

Life Cycle Assessment

A systematic approach to estimating the environmental impact of a system

Top tips:
- Specify the system boundary and baseline for the analysis
- Assess the impact of the system at all stages of its lifecycle
- Develop a strategy for reducing environmental impact

https://www.gov.uk/research-for-development-outputs/a-newcomer-s-guide-to-life-cycle-assessment-baselines-and-boundaries

Life Cycle Assessment

A systematic approach to estimating the environmental impact of a system

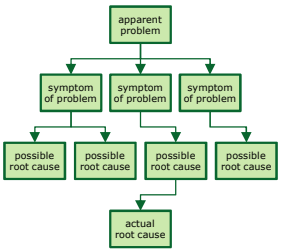
Root Cause Analysis

A systematic approach for identifying the root cause of a problem within a system

Top tips:
- Define the problem and its impact on different stakeholders
- Identify possible causal factors and the real reason for the problem
- Recommend solutions to prevent the problem from happening again

https://webarchive.nationalarchives.gov.uk/ukgwa/20180501161913mp_/https://improvement.nhs.uk/documents/2156/root-cause-analysis-five-whys.pdf

Root Cause Analysis



A systematic approach for identifying the root cause of a problem within a system

Failure Modes and Effects Analysis

A systematic approach for identifying the causes of all possible failures in a system and their consequent risk

Top tips:
- Identify the location and cause of potential failure modes
- Estimate the likelihood and impact of potential failure modes
- Assess the risk of potential failure modes and determine their criticality

https://www.iso.org/standard/72140.html

Failure Modes and Effects Analysis

failure mode	failure effect	failure likelihood	failure impact	risk of failure

A systematic approach for identifying the causes of all possible failures in a system and their consequent risk

Evidence

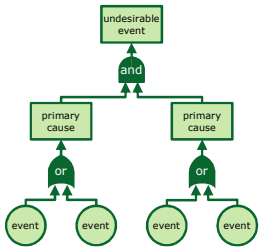
Fault Tree Analysis

An approach to identifying desirable or undesirable events and the combinations of actions that lead to them

Top tips:
- Identify key events representing success or failure
- Map the combinations of actions that may lead to these events
- Estimate the likelihood of the actions and consequent events

https://www.iso.org/standard/72140.html

Fault Tree Analysis



An approach to identifying desirable or undesirable events and the actions that lead to them

Hazard and Operability Analysis

A systematic approach for identifying deviations from normal operation and their undesirable consequences

Top tips:
- Identify and quantify key flows within the system
- Investigate a range of possible deviations from normal operation
- Estimate the impact of deviations on system operation

https://www.iso.org/standard/72140.html

Hazard and Operability Analysis

guide word	likely deviation	conse-quence	possible causes	existing protection

A systematic approach for identifying deviations from normal operation and their undesirable consequences

Structured What-If Technique

A systematic approach for identifying risks within a system using structured brainstorming and guidewords

Top tips:
- Identify and quantify key flows within the system
- Use a suitable list of prompts to initiate discussion of potential risks
- Involve a multidisciplinary team of experts in the review

https://www.iso.org/standard/72140.html

Structured What-If Technique

A systematic approach for identifying risks within a system using structured brainstorming and guidewords

Evidence

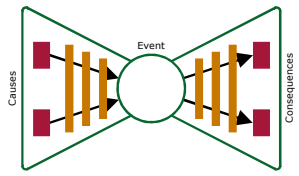
Bowtie Method

A systematic approach for identifying deviations from normal operation and their undesirable consequences

Top tips:
- Identify a key 'top event' associated with the system
- Add causes (threats) to the left and consequences to the right
- Overlay any preventative and mitigation barriers

https://www.gov.uk/government/news/bowtie-a-visual-tool-to-keep-an-overview-of-risk-management-practices

Bowtie Method



A systematic approach for visualising links between causes of an event and potential consequences

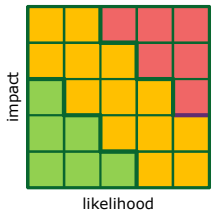
Risk Matrix

A structured representation of the likelihood and impact of threats and opportunities in the system

Top tips:
- Quantify possible threats and opportunities
- Map the likelihood and impact of the threats and opportunities
- Identify unacceptable threats to the system performance

https://www.iso.org/standard/72140.html

Risk Matrix



A structured representation of the likelihood and impact of threats and opportunities in the system

Case

PEST(LE) Analysis

A broad approach to identify the external factors most likely to impact a proposed change

Top tips:
- Consider the external factors associated with a proposed change
- Add environmental and legal factors to conduct a PESTLE
- Use the results of the analysis as input to a SWOT analysis

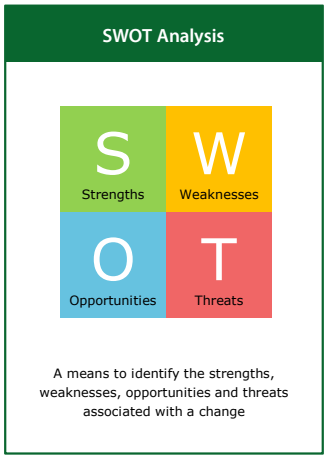
https://www.professionalacademy.com/blogs-and-advice/marketing-theories---pestel-analysis

SWOT Analysis

A means to identify the strengths, weaknesses, opportunities and threats associated with a change

Top tips:
- Consider the external factors involved with a proposed change
- Use the results of a PEST analysis as input to the SWOT analysis
- Set the final change objective following the SWOT analysis

https://www.professionalacademy.com/blogs-and-advice/marketing-theories---swot-analysis

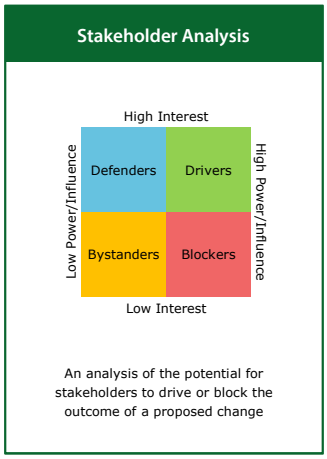


Stakeholder Analysis

An analysis of the potential for stakeholders to drive or block the outcome of a proposed change

Top tips:
- Identify drivers and blockers likely to influence a proposed change
- Develop a strategy to engage with the key influencers
- Ensure good communication with all stakeholders

https://www.professionalacademy.com/blogs/mendelows-matrix-marketing-theories/



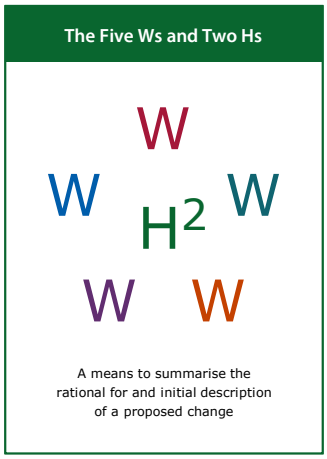
Case

The Five Ws and Two Hs

A means to summarise the rational for and initial description of a proposed change

Top tips:
- Answer the who, what, where, when and why simply and clearly
- Describe how the change will be delivered and how much it will cost
- Use this approach to support other problem solving challenges

https://www.inloox.com/company/blog/articles/back-to-basics-part-3-kick-start-your-projects-with-the-5ws-and-2hs/

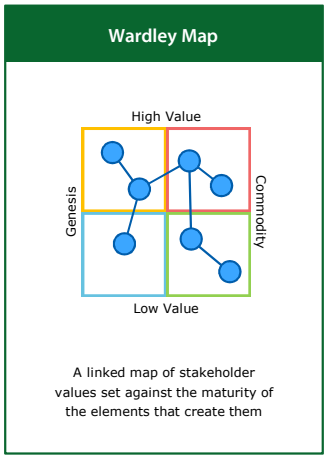


Wardley Map

A linked map of stakeholder values set against the maturity of the elements that create them

Top tips:
- Identify the key components of stakeholder value
- Map value against the maturity of the elements that produce it
- Connect components on the map that are linked in any way

https://blog.gardeviance.org/2015/02/an-introduction-to-wardley-value-chain.html



Plan

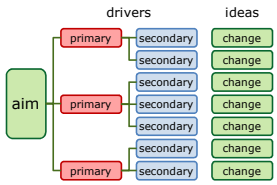
Driver Diagram

A theory-of-change that can be used to collaboratively plan improvement project activities

Top tips:
- Capture a clearly defined and measurable aim
- Identify the drivers which will contribute to the aim
- Formulate the ideas for change designed to meet the aim

https://www.england.nhs.uk/wp-content/uploads/2021/03/qsir-driver-diagrams.pdf

Driver Diagram



A theory-of-change that can be used to collaboratively plan improvement project activities

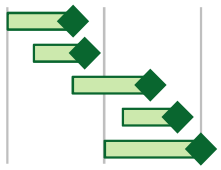
Gantt Chart

A bar chart to illustrate the schedule required to deliver a programme of improvement

Top tips:
- Identify the key activities and deliverables
- Show dependencies if appropriate to illustrate task precedencies
- Cluster the activities by function or in order of start time

https://www.ifm.eng.cam.ac.uk/research/dstools/graphs-gantt-histograms-bar-charts/

Gantt Chart



A bar chart to illustrate the schedule required to deliver a programme of improvement

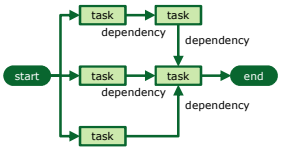
Activity Dependency Diagram

A dependency network to map the activities required to deliver a programme of improvement

Top tips:
- Identify the key activities and deliverables
- Order the activities taking account of their precedencies
- Determine the critical path required to deliver the programme

https://www.ifm.eng.cam.ac.uk/research/dstools/pert/

Activity Dependency Diagram



A dependency network to map the activities required to deliver a programme of improvement

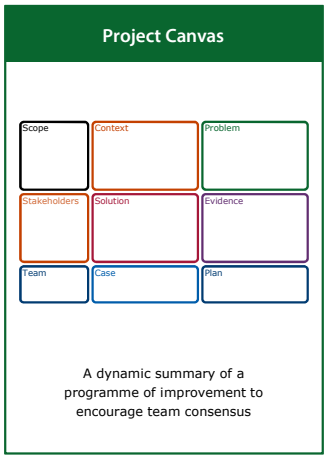
Plan

Project Canvas

A dynamic summary of a programme of improvement to encourage team consensus

Top tips:
- Capture what is known about all elements of the project
- Start with what you know and then fill in the gaps
- Update the canvas as the project progresses

http://www.projectcanvas.dk/project-canvas-manual.pdf

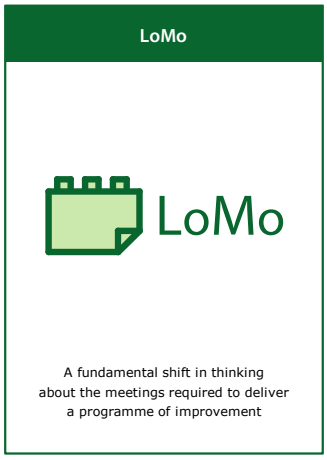


LoMo

A fundamental shift in thinking about the meetings required to deliver a programme of improvement

Top tips:
- Value the way other people see the world
- Empower individuals to take more responsibility
- Make the purpose visible earlier to help people contribute

http://lomomeetings.co.uk/



whatsit

noun

The thing whose name has been forgotten

see also **thingamajig**

Summary

The **definition** of a term is a statement expressing the essential nature of something that enables a common understanding of key terms within an improvement team.

Contents

Introduction

Definitions are important in exploring common understanding within improvement teams. They play a key role in ensuring people understand the same thing about key terms or issues. However, their role is not to standardise or set a common language, rather to enable communication through better understanding or translation.

For example, **design** is a word that often invokes passion and misunderstanding amongst its users. Is it a verb or a noun? Does it refer to the artefact or the process? There is no right or wrong answer here, rather it is important that the originator and recipient of a message hold a common understanding of what is said. This will require knowledge of the background and context of each individual by the other and ideally the ability to translate the meaning of the word simultaneously or, if necessary, to agree a common use. The former model of communication is always preferable as it is likely to be accompanied by a greater empathy between individuals, but the later may be essential to avoid ambiguity.

This section provides definitions for a number of terms relevant to improvement, ordered by their likely use with in the improvement process. They are here for reference and not intended to define a common language. Indeed, alternative and related terms are provided, along with some indication as to how they might be related or used together. Nonetheless, some care has been taken to try to ensure that when these terms are used within the toolkit, it is the meaning defined here that has been adopted. Hence the terms are presented in groups, aligned with the key strands, but are also listed here alphabetically, with reference to the page on which each term may be found.

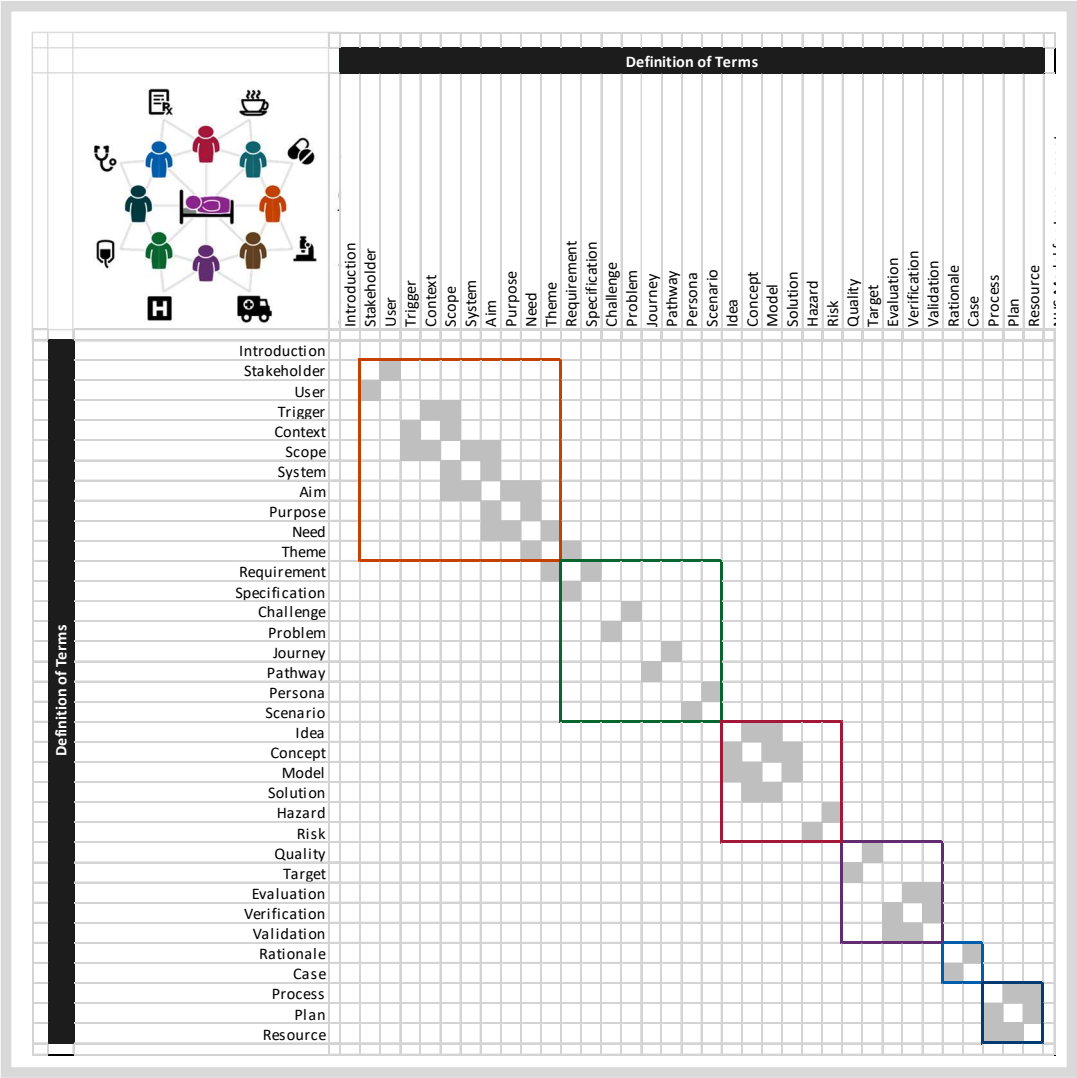
Terms listed alphabetically:

Terms located within each strand:

Useful toolkit resources: Cards for each of these **definitions** are included in the **Resources** part of this toolkit. A number of blank cards are included to allow additional definitions to be created.

Introduction

Definitions may be mapped to **definitions** to assist in understanding their adjacency, distinction and overlap. More than one term may be used for any particular purpose and this is often encouraged when there is good reason for doing so. The mapping provides indication as to how **definitions** might be linked, but is not expected to exhaustively show where these terms are related in practice.



Context

Stakeholder

stakeholder – a person with an interest or concern in something

A stakeholder is a person with an interest in the project because they have something to gain or lose

Use:
- Stakeholders may be service providers or **users**
- Identify as many stakeholders and their needs as possible
- Carefully prioritise the needs of all the stakeholders

see also **user**

Stakeholder

stakeholder
noun

A person with an interest or concern in something

see also **user**

A stakeholder is a person with an interest in the project because they have something to gain or lose

User

user – a person who uses or operates something

The patient is the core user of a system, but other stakeholders are also users in the delivery of services

Use:
- Users are a special category of system **stakeholders**
- Identify as many users and their particular needs as possible
- Carefully balance the needs of the users and other **stakeholders**

see also **stakeholder**

User

user
noun

A person who uses or operates something

see also **stakeholder**

The patient is the core user of a system, but other stakeholders are also users in the delivery of services

Trigger

trigger – the thing that caused someone to do something

The trigger is the reason why there is an improvement programme and defines the initial scope of the programme

Use:
- The trigger describes the event or action that initiated change
- Triggers may be in response to adverse events or near misses
- Triggers may be preemptive to improve a system or avoid error

see also **context** and **scope**

Trigger

trigger
noun

The thing that caused someone to do something

see also **context**, **scope**

The trigger is the reason why there is an improvement programme and defines the initial scope of the programme

Context

Context

context – the circumstances that surround something

The context includes all aspects that affect the problem and the implementation of a solution

Use:
- The context describes all factors that may influence change
- May be used to describe enablers for improvement
- May be used to capture barriers to improvement

see also **trigger** and **scope**

Context

context
noun

The circumstances that surround something

see also **trigger**, **scope**

The context includes all aspects that affect the problem and the implementation of a solution

Scope

scope – the extent of the area that something deals with

The scope is the boundary between aspects considered as part of the problem and others that affect the problem

Use:
- A consensus view of the scope is vitally important
- Should bound the area of interest for subsequent improvement
- Often used in conjunction with **system** and **aim**

see also **trigger**, **context**, **system** and **aim**

Scope

scope
noun

The extent of the area that something deals with

see also **trigger**, **context**, **system**, **aim**

The scope is the boundary between aspects considered as part of the problem and others that affect the problem

System

system – a set of things working together to do something

A system is a set of elements that, when combined, have qualities that are not present in the elements themselves

Use:
- A system may comprise people, rules and other things
- A system may be part of or made up of other systems
- Often used in conjunction with **scope** and **aim**

see also **scope** and **aim**

System

system
noun

A set of things working together to do something

see also **scope**, **aim**

A system is a set of elements that, when combined, have qualities that are not present in the elements themselves

Context

Aim

aim – the intention or ambition or achieving something

The project aim represents a clear statement of intent that helps everyone align with the project objectives

Use:
- A consensus view of the aim is very helpful
- Should provide broad focus for all subsequent development
- Often used in conjunction with **scope** and **purpose**

see also **scope**, **system**, **purpose** and **need**

Aim

aim
noun

The intention or ambition of achieving something

see also **scope**, **system**, **purpose**, **need**

The project aim represents a clear statement of intent that helps everyone align with the project objectives
"

Purpose

purpose – the thing that something is supposed to achieve

The purpose defines the things that the particular health and care system is supposed to deliver and achieve

Use:
- A consensus view of the purpose is important
- Should provide focus for identifying potential improvements
- Often used in conjunction with **aim** and **theme**

see also **aim** and **theme**

Purpose

purpose
noun

The thing that something is supposed to achieve

see also **aim**, **theme**

The purpose defines the things that the particular health and care system is supposed to deliver and achieve

Need

need – a strong feeling that you must have something

A need is an essential condition that a particular stakeholder believes has to be satisfied from their perspective

Use:
- Needs may relate to fundamental issues and specific desires
- All stakeholders in a system are likely to have specific needs
- Often used in conjunction with **aim**, **purpose** and **theme**

see also **aim**, **purpose** and **theme**

Need

need
noun

A strong feeling that you must have something

see also **aim**, **purpose**, **them**

A need is an essential condition that a particular stakeholder believes has to be satisfied from their perspective

Context

Theme

theme – the core idea that is apparent in something

The themes are high-level targets for improvement and capture the essence of the things the improved system must do

Use:
- A consensus view of the theme(s) is particularly important
- Should provide particular focus for all subsequent development
- Often used in conjunction with **need** and **requirement**

see also **need** and **requirement**

Theme

theme
noun

The core idea that is apparent in something

see also **need**, **requirement**

The themes are high-level targets for improvement and capture the essence of the things the improved system must do

Problem

Requirement

requirement – a description of something you must have

A condition that has to be satisfied for the improvement to be successful, derived from an agreed set of themes

Use:
- Requirements relate to a balanced set of stakeholders' **needs**
- Requirements should be reflected in subsequent **evaluation**
- Often used in conjunction with **need** and **specification**

see also **theme** and **specification**

Requirement

requirement
noun

A description of something you must have

see also **theme**, **specification**

A condition that has to be satisfied for the improvement to be successful, derived from an agreed set of themes

Specification

specification – a detailed description of how something should be

A specification is a structured set of requirements providing a holistic view of the need for improvement

Use:
- A specification describes an agreed collection of **requirements**
- The specification should be reflected in subsequent **verification**
- Often used in conjunction with **need** and **requirement**

see also **requirement**

Specification

specification
noun

A detailed description of how something should be

see also **requirement**

A specification is a structured set of requirements providing a holistic view of the need for improvement

Challenge

challenge – a difficult or demanding task or situation

The challenge represents what is known or perceived to be wrong with the current system

Use:
- A consensus view of the challenge is particularly important
- Often used synonymously with the description of a **problem**
- Focus on a challenge may encourage a more enthusiastic response

see also **problem**

Challenge

challenge
noun

A difficult or demanding task or situation

see also **problem**

The challenge represents what is known or perceived to be wrong with the current system

Problem

Problem

problem – a detailed description of a particular challenge

The problem statement represents the consensus view on the challenge that is going to be solved

Use:
- A consensus view of the problem is particularly important
- Often used synonymously with the description of a **challenge**
- Focus on a problem may encourage a more muted response

see also **challenge**

Problem

problem
noun

A detailed description of a particular challenge

see also **challenge**

The problem statement represents the consensus view on the challenge that is going to be solved

Journey

journey – an act of travelling from one place to another

A patient journey captures the things that happen to an individual as they interact with health and care services

Use:
- A description from the point of view of the person making the journey
- The journey may be described for a typical person or an individual
- Multiple journeys may be used to describe a single intervention

see also **pathway**

Journey

journey
noun

An act of travelling from one place to another

see also **pathway**

A patient journey captures the things that happen to an individual as they interact with health and care services

Pathway

pathway – a course of action to achieve a specified result

The clinical pathway is a description of the things that are expected to happen in provision of a health or care service

Use:
- A description from the point of view of the person defining the pathway
- The pathway may be defined for a typical person or an individual
- Multiple pathways may be used to describe a single intervention

see also **journey**

Pathway

pathway
noun

A course of action to achieve a specified result

see also **journey**

The clinical pathway is a description of the things that are expected to happen in provision of a health or care service

Problem

Persona

persona – a caricature designed to display certain attributes

A persona is a description of a person with a blend of real attributes, to assist the design of an improved system

Use:
- Personas represent notable attributes of system stakeholders
- Personas typically describe caricatures of system users
- Personas are often used in conjunction with **scenarios**

see also **scenario**

Persona

persona
noun

A caricature designed to display certain attributes

see also **scenario**

A persona is a description of a person with a blend of real attributes, to assist the design of an improved system

Scenario

scenario – a typical sequence or development of events

A scenario describes an instance of a particular system as a starting point for discussing targets for improvement

Use:
- Scenarios represent notable sequences of events
- Scenarios typically describe journeys of system users
- Scenarios are often used in conjunction with **personas**

see also **persona**

Scenario

scenario
noun

A typical sequence or development of events

see also **persona**

A scenario describes an instance of a particular system as a starting point for discussing targets for improvement

Solution

Idea

idea – a suggestion or plan for doing something

A suggestion for how an aspect of the system could be improved which has not yet been worked into a viable concept

Use:
- A suggestion or plan that may form part of a concept
- A good idea is likely to be realisable and meet the requirements
- Often used in conjunction with the description of a **concept**

see also **concept** and **model**

Idea

idea
noun

A suggestion or plan for doing something

see also **concept**, **model**

A suggestion for how an aspect of the system could be improved which has not yet been worked into a viable concept

Concept

concept – an idea that is connected with something

A concept is a description of something that does not yet exist, but has the potential to improve the service

Use:
- An idea or combination of ideas that may solve a problem
- A viable concept is very likely to meet the requirements
- Often used in conjunction with the description of an **idea** or **solution**

see also **idea**, **model** and **solution**

Concept

concept
noun

An idea that is connected with something

see also **idea**, **model**, **solution**

A concept is a description of something that does not yet exist, but has the potential to improve the service

Model

model – a simplified representation of something

A model is a simplified physical or virtual embodiment of a concept which communicates particular aspects of it

Use:
- A simple model is often adequate early in the programme
- Models may used to describe form and/of function
- Multiple models may be better than a single integrated model

see also **idea**, **concept** and **solution**

Model

model
noun

A simplified representation of something

see also **idea**, **concept**, **solution**

A model is a simplified physical or virtual embodiment of a concept which communicates particular aspects of it

Solution

Solution

solution – a way of solving a particular problem

A solution is chosen from one of the many concepts considered when exploring ways to solve the problem

Use:
- A combination of elements which together solve a problem
- A viable solution demonstrably meets the requirements
- Often used in conjunction with the description of a **concept**

see also **concept** and **model**

Solution

solution
noun

A way of solving a particular problem

see also **concept**, **model**

A solution is chosen from one of the many concepts considered when exploring ways to solve the problem

Hazard

hazard – the possibility of harm or an adverse outcome

A hazard is something that leads to the possibility of harm or events that result in an adverse outcome

Use:
- Hazards represent possible threats present within a system
- Barriers may be used to limit potential exposure to hazards
- Often used in conjunction with the description of an **risk**

see also **risk**

Hazard

hazard
noun

The possibility of harm or an adverse outcome

see also **risk**

A hazard is something that leads to the possibility of harm or events that result in an adverse outcome

Risk

risk – the probability of harm or an adverse outcome

A risk is exposure to hazards and the probability of harm or events that result in an adverse outcome

Use:
- Risks represent probable threats present within a system
- Barriers may be used to limit the potential consequence of risks
- Often used in conjunction with the description of a **hazard**

see also **hazard**

Risk

risk
noun

The probability of harm or an adverse outcome

see also **hazard**

A risk is exposure to hazards and the probability of harm or events that result in an adverse outcome

Evidence

Quality

quality – the degree of excellence possessed by a thing

The quality targets are specific objectives for clinical and cost effectiveness, patient safety and patient experience

Use:
- Quality is not solely a focus on clinical and cost effectiveness
- Quality should be identifiable, measurable and targeted
- Quality should be continuously monitored

see also **target**

Quality

quality
noun

The degree of excellence possessed by a thing

see also **target**

The quality targets are specific objectives for clinical and cost effectiveness, patient safety and patient experience

Target

target – the identity of something to be aimed at

A target is an objective for a given phase of the improvement process related to service or programme performance

Use:
- Targets should be realistically attainable and measurable
- Targets should reflect desirable levels of quality
- Targets may vary through the improvement process

see also **quality**

Target

target
noun

The identity of something to be aimed at

see also **quality**

A target is an objective for a given phase of the improvement process related to service or programme performance

Evaluation

evaluation – showing a solution satisfies its requirements

The evaluation of the elements of a system tests whether they are likely to achieve their intended performance

Use:
- Evaluation checks performance against individual requirements
- Approaches to evaluation should reflect the requirements
- Often used in conjunction with **verification** and **validation**

see also **verification** and **validation**

Evaluation

evaluation
noun

Showing a solution satisfies its requirements

see also **verification**, **validation**

The evaluation of the elements of a system tests whether they are likely to achieve their intended performance

Evidence

Verification

verification – showing a solution meets its requirements

The verification of a system tests whether it achieves its intended performance under specified conditions

Use:
- Verification checks performance against the requirements
- Approaches to verification should reflect the requirements
- Often used in conjunction with **evaluation** and **validation**

see also **evaluation** and **validation**

Verification

verification
noun

Showing a solution meets its requirements

see also **evaluation**, **validation**

The verification of a system tests whether it achieves its intended performance under specified conditions

Validation

validation – showing a solution is fit for its intended purpose

The validation of a system checks whether it works with real users and other stakeholders in real contexts

Use:
- Validation begins with checking requirements against the needs
- Approaches to validation should reflect prioritised needs
- Often used in conjunction with **evaluation** and **verification**

see also **evaluation** and **verification**

Validation

validation
noun

Showing a solution is fit for its intended purpose

see also **evaluation**, **verification**

The validation of a system checks whether it works with real users and other stakeholders in real contexts

Case

Rationale

rationale – the reasons or a logical basis for something

The rational for an improvement concept reasons why it has the form and function that it has

Use:
- Rationale relates to the reasoning behind key decisions
- Typically expressed with relation to the change facilitator
- Often used in conjunction with definition of the **case**

see also **case**

Rationale

rationale
noun

The reasons or a logical basis for something

see also **case**

The rational for an improvement concept reasons why it has the form and function that it has

Case

case – a set of arguments to support doing something

The case for improving a system balances the benefits against the costs of delivering the improvement

Use:
- A clear case is essential to gather the necessary support for a **plan**
- The case should clearly define expected outcomes and costs
- The case should be sufficient, accurate and realistic

see also **rationale**

Case

case
noun

A set of arguments to support doing something

see also **rationale**

The case for improving a system balances the benefits against the costs of delivering the improvement

Plan

Process

process – a series of actions to achieve something

An improvement process comprises activities which are chosen in response to targets to design an improved system

Use:
- A consensus view of the process is particularly important
- The process should clearly define expected actions and outcomes
- The process outcomes should be achievable using available **resource**

see also **plan** and **resource**

Process

process
noun

A series of actions to achieve something

see also **plan**, **resource**

An improvement process comprises activities which are chosen in response to targets to design an improved system

Plan

plan – a detailed proposal for doing something

An improvement plan provides a description of the activities and resources required to deliver an improvement

Use:
- A consensus view of the plan is particularly important
- The plan should clearly define expected actions and timing
- The plan should be achievable using available **resource**

see also **process** and **resource**

Plan

plan
noun

A detailed proposal for doing something

see also **process**, **resource**

An improvement plan provides a description of the activities and resources required to deliver an improvement

Resource

resource – the thing that enables something to happen

The resource required to deliver improvement is likely to include people, things, tools and funding

Use:
- Resource relates to the people and things that enable change
- Typically expressed within the **context** of the change
- Often used in conjunction with definition of the **plan**

see also **process** and **plan**

Resource

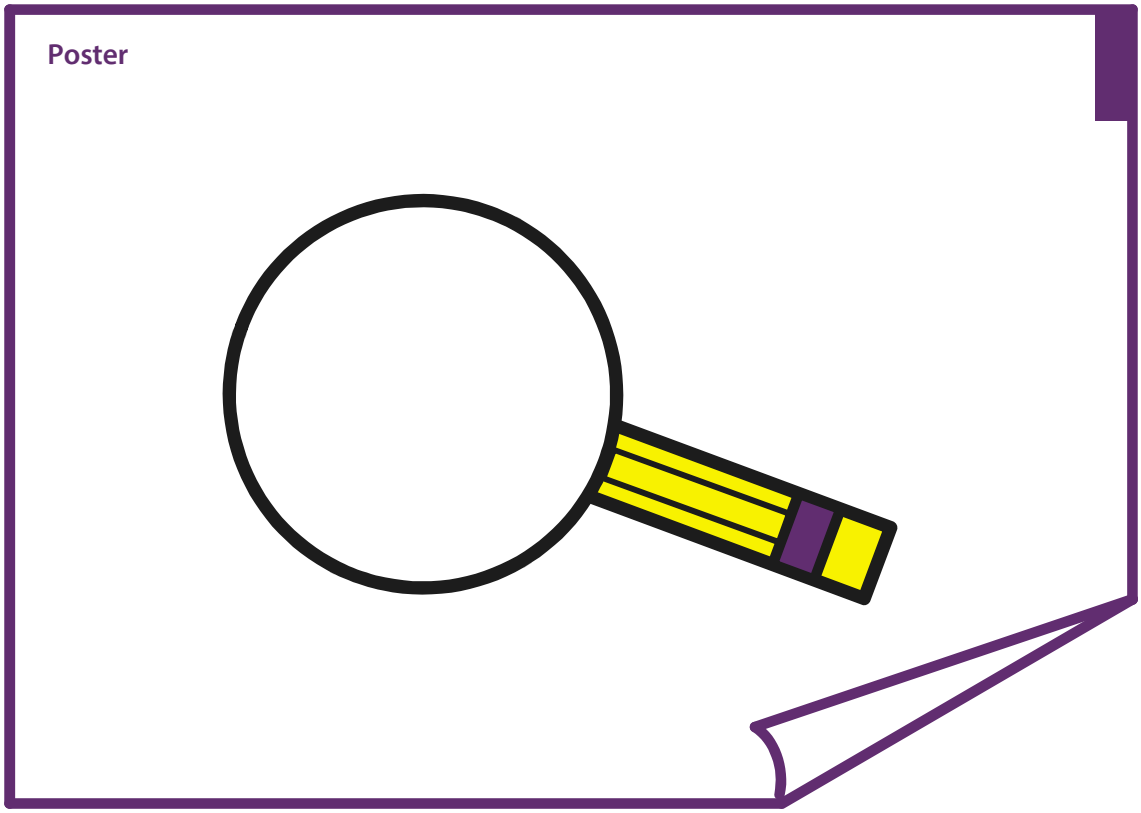
resource
noun

The thing that enables something to happen

see also **process**, **plan**

The resource required to deliver improvement is likely to include people, things, tools and funding

Improvement Posters



Summary

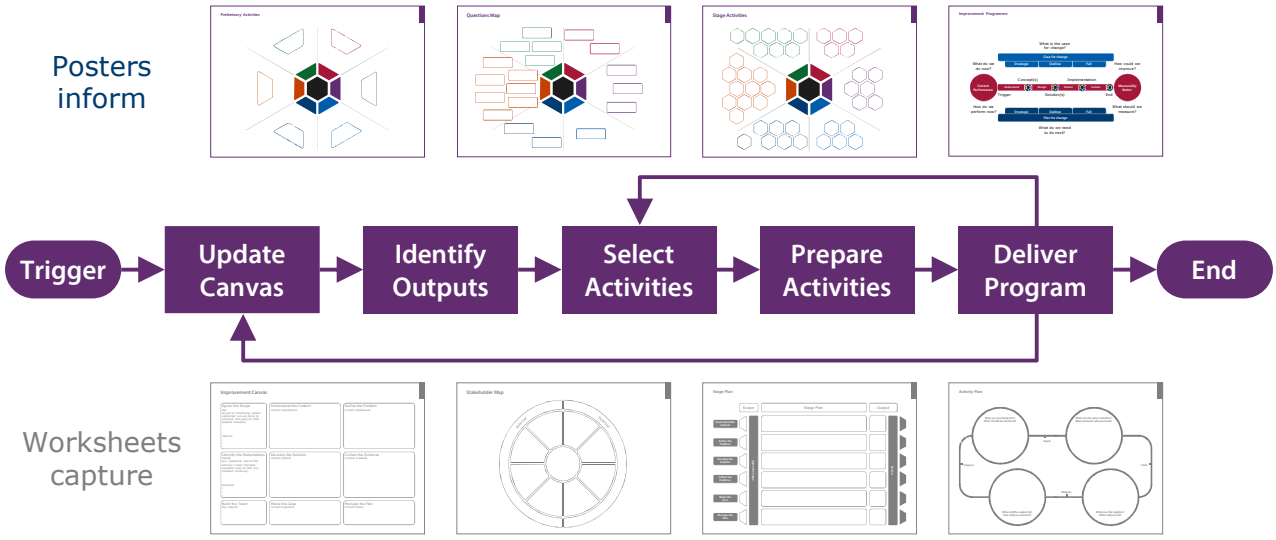
Posters assist the improvement team in the visualisation and understanding of programmes, strands and activities within the improvement process.

Contents

Introduction

The improvement process, informed by the **posters**, may be summarised as:

- Fill in the **Improvement Canvas** with known information
- Identify possible **knowledge** gaps and **outputs** to be created
- Select the **activities** or **questions** to be addressed
- Prepare the **activities** and associated **tools** for use
- Plan the improvement **programme** and **iterate** as appropriate



This process may be summarised as a fundamentally linear, yet iterative process, designed to deliver improvement. It may comprise, interchangeably, elements from both the question and activity driven processes. The **posters** have been chosen to compliment the **worksheets** and **cards** included in this toolkit. They are listed here alphabetically, with reference to the page on which each poster may be found.

The **posters** may be displayed and annotated in electronic form or may be printed at a range of scales, from A3 for desk work through to A1 for class use.

Useful toolkit resources: These **posters** are included in the **Resources** part of this toolkit. They can also be downloaded from www.iitoolkit.com/resources/posters.html

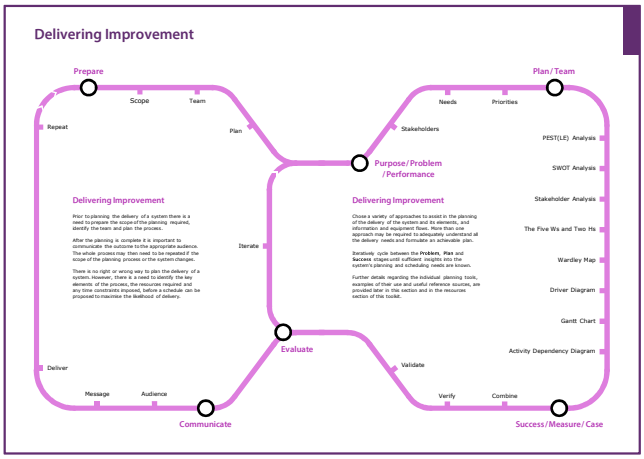
Posters

Delivering Improvement

A summary of the management perspective

Use:

- To remind the team of key elements of a management perspective on improvement
- To highlight the possibility of using tools to deliver a management perspective
- To accentuate the iterative nature of an improvement process

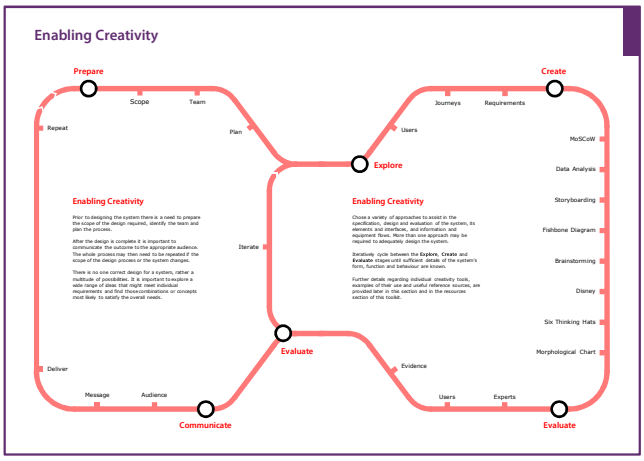


Enabling Creativity

A summary of the design perspective

Use:

- To remind the team of key elements of a design perspective on improvement
- To highlight the possibility of using tools to deliver a design perspective
- To accentuate the iterative nature of an improvement process



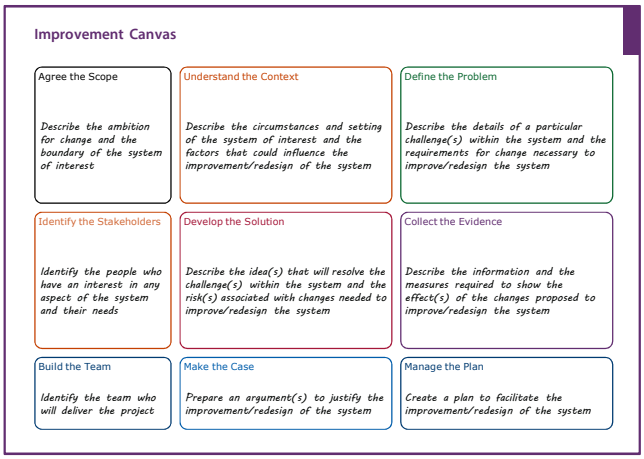
Improvement Canvas

A summary of the status of the programme

Use:

- To remind the team of the factors that determine the status of the programme
- To accentuate the need to maintain an up to date picture of the status
- To highlight the interchangeability of questions and information

see also **Improvement Canvas** worksheet



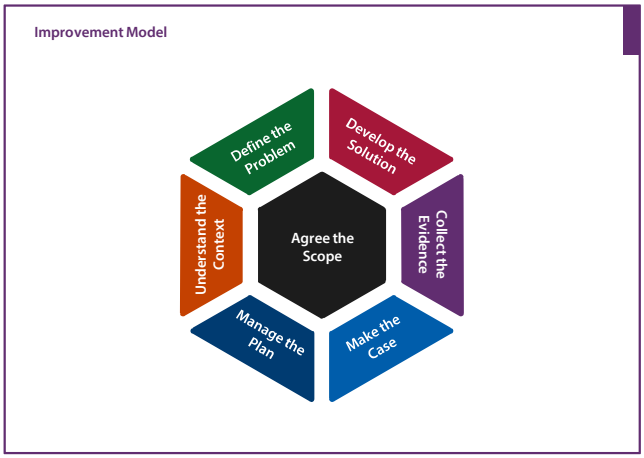
Posters

Improvement Model

A summary of the improvement model

Use:

- To remind the team of the activities strands described in **Improving Improvement**
- To highlight the natural order of the strands within the improvement model
- To accentuate the iterative nature of the improvement process

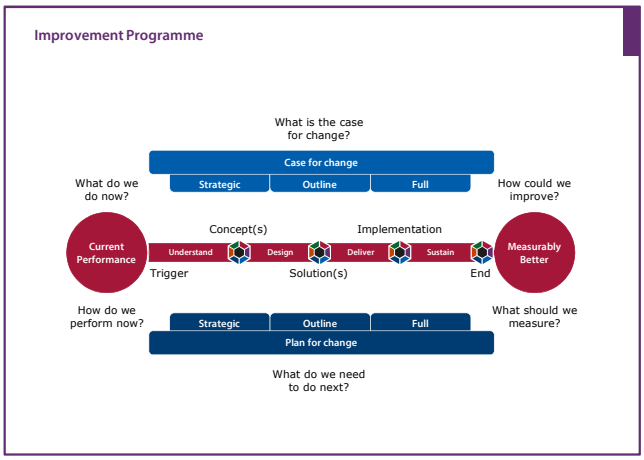


Improvement Programme

A summary of the improvement programme

Use:

- To remind the team of the typical stages of the improvement process
- To accentuate the need to define and maintain a dynamic case for change
- To highlight the importance of continuous planning for change

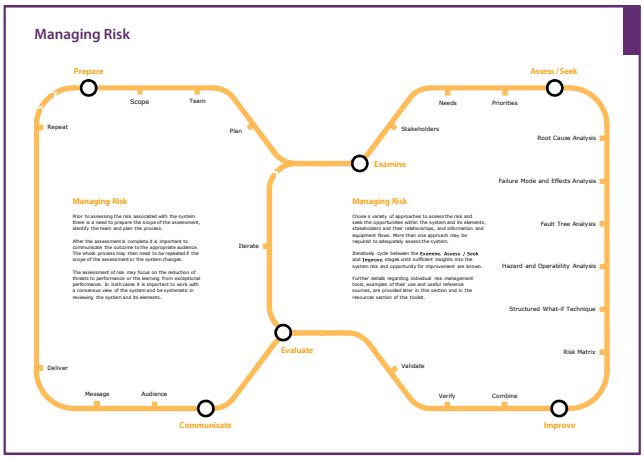


Managing Risk

A summary of the risk perspective

Use:

- To remind the team of key elements of a risk perspective on improvement
- To highlight the possibility of using tools to deliver a risk perspective
- To accentuate the iterative nature of an improvement process

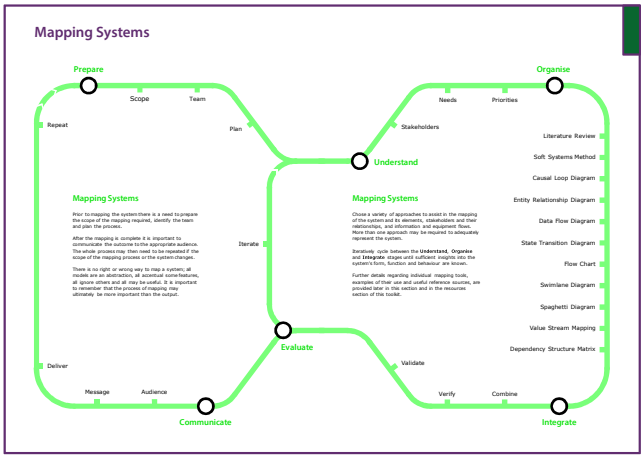


Posters

Mapping Systems

A summary of the systems perspective

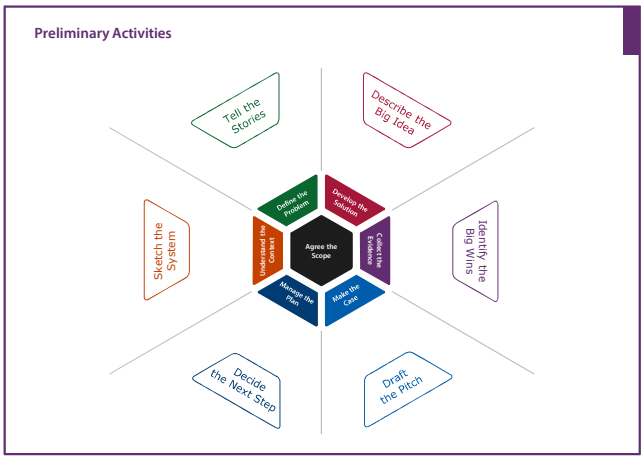
Use:
- To remind the team of key elements of a systems perspective on improvement
- To highlight the possibility of using tools to deliver a systems perspective
- To accentuate the iterative nature of an improvement process



Preliminary Activities

A summary of the preliminary activities

Use:
- To remind the team of the preliminary activities described in this toolkit
- To highlight the natural order of the strands within the improvement model
- To accentuate the iterative nature of the improvement process

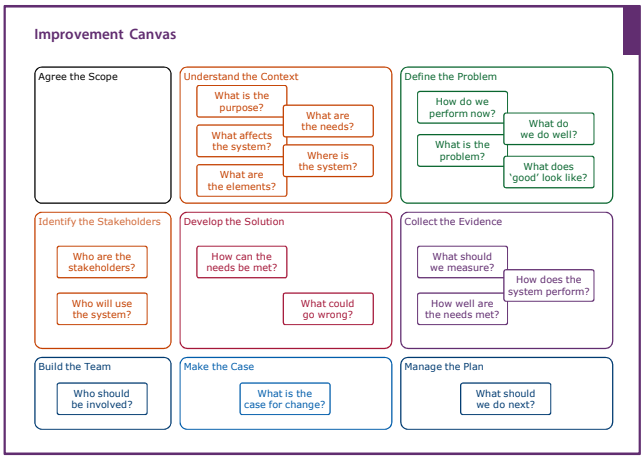


Questions Canvas

A summary of the improvement questions

Use:
- To remind the team of the questions that determine the status of the programme
- To highlight the natural position of the questions within the improvement canvas
- To highlight the interchangeability of questions and information

see also **Improvement Canvas** worksheet

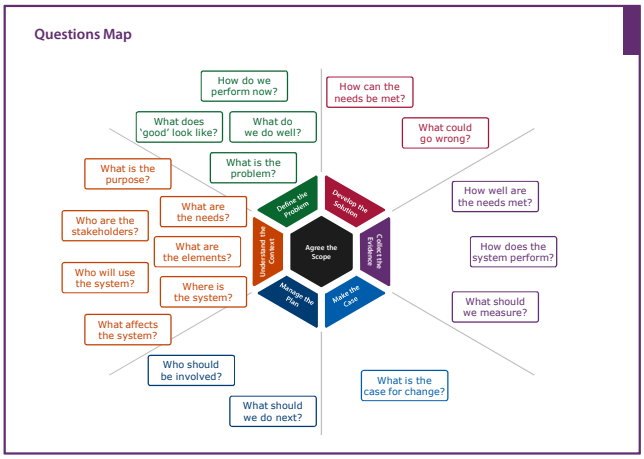


Posters

Questions Map

A summary of the improvement questions

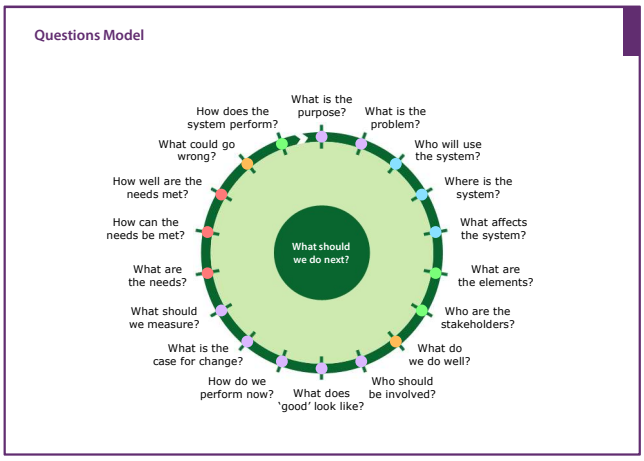
Use:
- To remind the team of the questions described in this toolkit
- To highlight the natural order of the questions within the improvement model
- To accentuate the iterative nature of the improvement process



Questions Model

A summary of the improvement questions

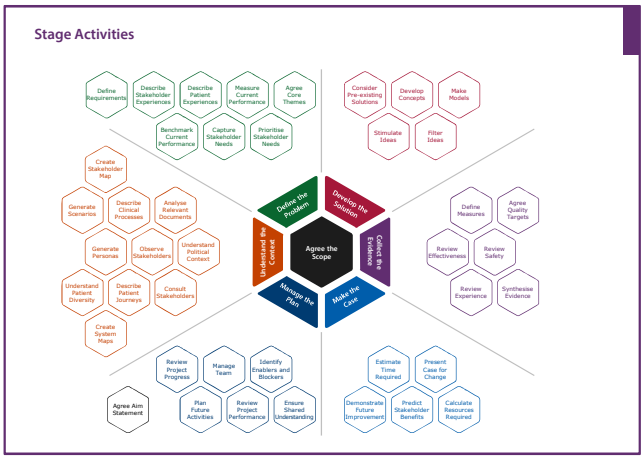
Use:
- To remind the team of the questions described in **Engineering Better Care**
- To highlight the natural order of the questions within the improvement process
- To accentuate the iterative nature of the improvement process



Stage Activities

A summary of the improvement activities

Use:
- To remind the team of the typical activities available to the improvement process
- To accentuate the need for different activities for different programme strands
- To encourage a creative and holistic approach to improvement



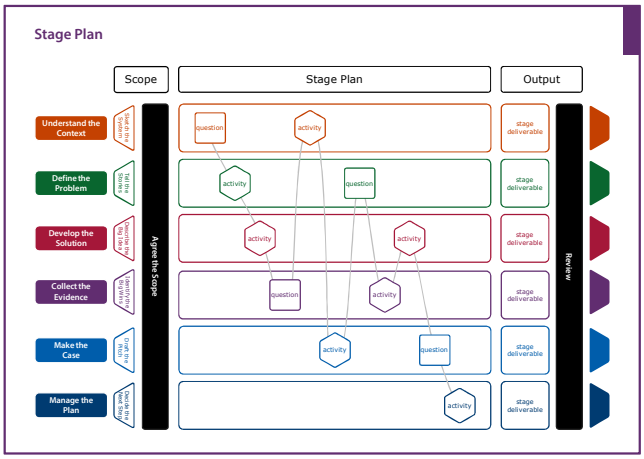
Posters

Stage Plan

A summary of the stage plan

Use:
- To remind the team of the main strands of an improvement plan
- To highlight the imperative to define an improvement plan based on clear outputs
- To accentuate the dynamic nature of the improvement process

see also **Improvement Plan** worksheet

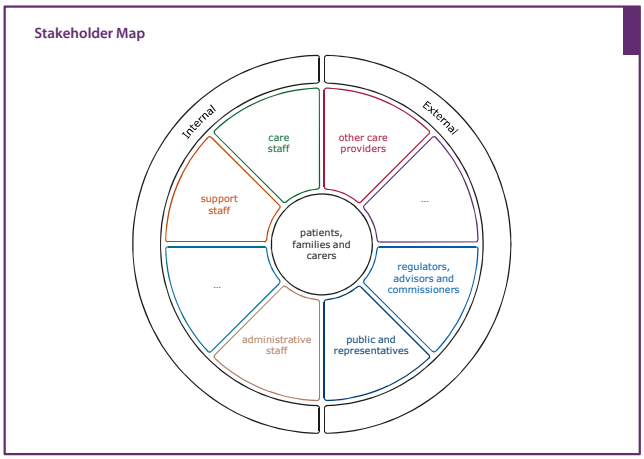


Stakeholder Map

A summary of the system stakeholders

Use:
- To remind the team of the stakeholders related to the improvement process
- To highlight the range and diversity of potential stakeholders
- To accentuate the importance of understanding stakeholders needs

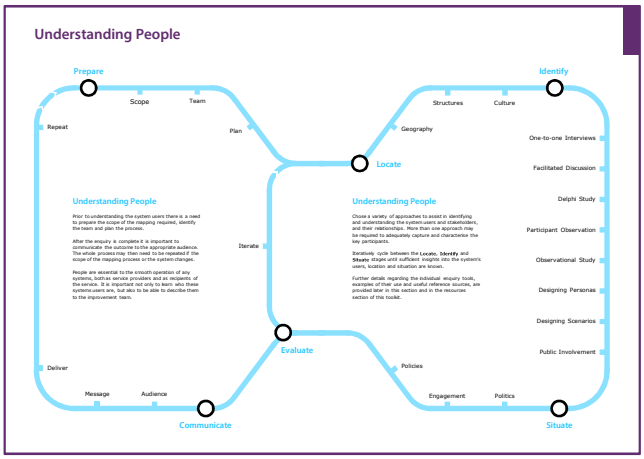
see also **Stakeholder Map** worksheet



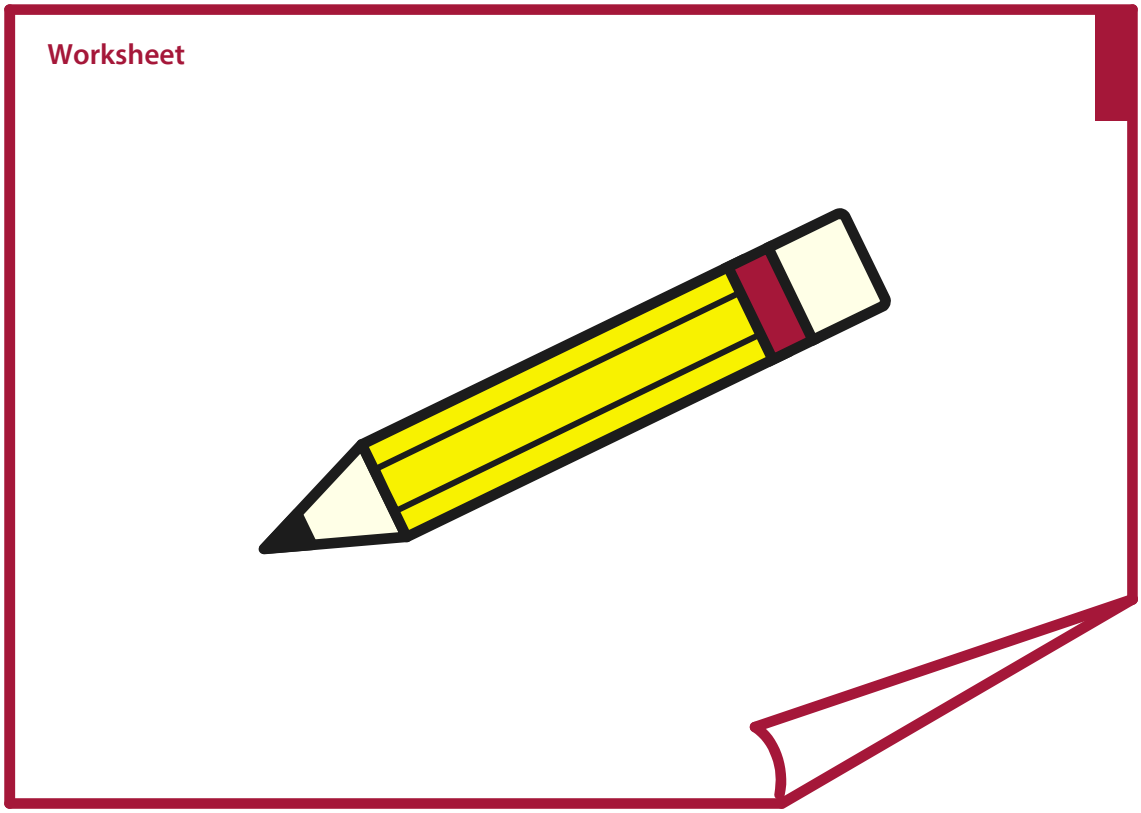
Understanding People

A summary of the people perspective

Use:
- To remind the team of key elements of a people perspective on improvement
- To highlight the possibility of using tools to deliver a people perspective
- To accentuate the iterative nature of an improvement process



Improvement Worksheets



Summary

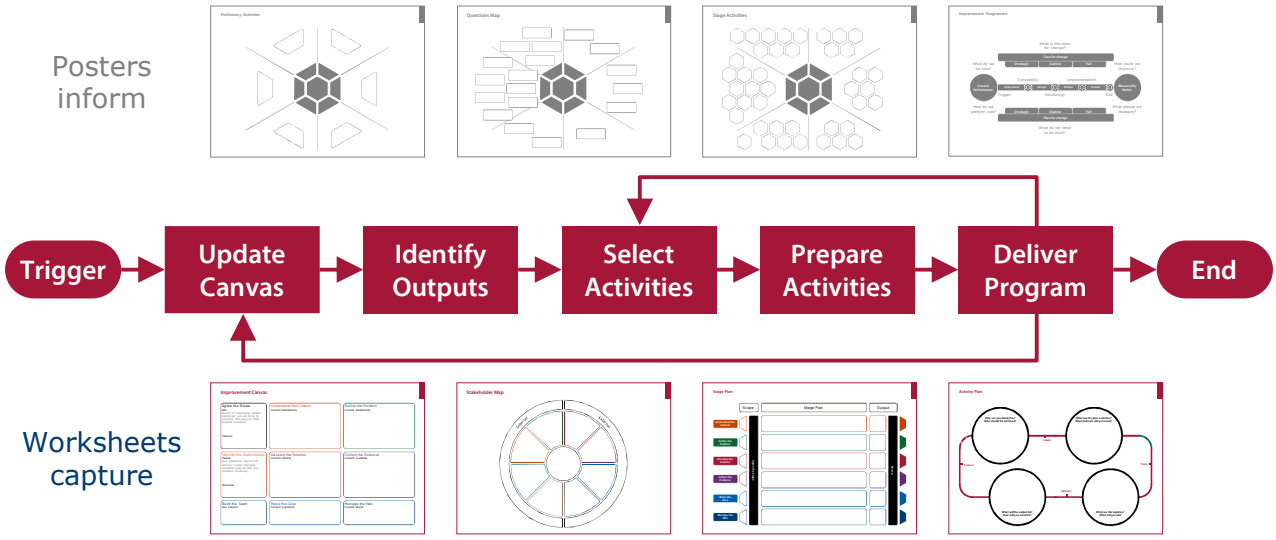
Worksheets assist the improvement team in the planning and execution of programmes, strands and activities within the improvement process.

Contents

Introduction

The improvement process, captured by the **worksheets**, may be summarised as:

- Fill in the **Improvement Canvas** with known information
- Identify possible **knowledge** gaps and **outputs** to be created
- Select the **activities** or **questions** to be addressed
- Prepare the **activities** and associated **tools** for use
- Plan the improvement **programme** and **iterate** as appropriate



This process may be summarised as a fundamentally linear, yet iterative process, designed to deliver improvement. It may comprise, interchangeably, elements from both the question and activity driven processes. The **worksheets** have been chosen to compliment the **posters** and **cards** included in this toolkit. They are listed here alphabetically, with reference to the page on which each worksheet may be found.

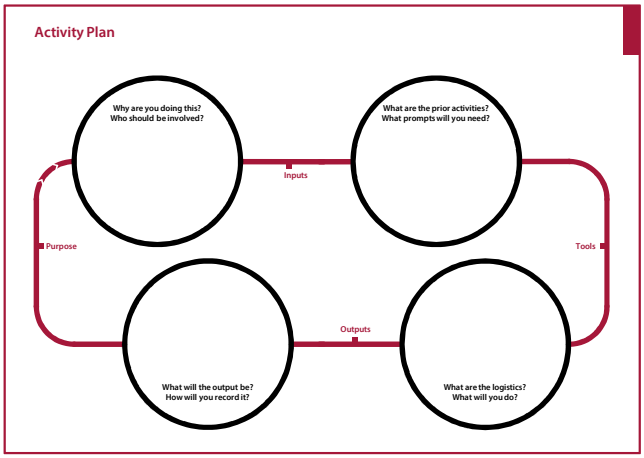
The **worksheets** may be displayed and annotated in electronic form or may be printed at a range of scales, from A3 for desk work through to A1 for class use.

Worksheets

Activity Plan

A summary of an activity plan

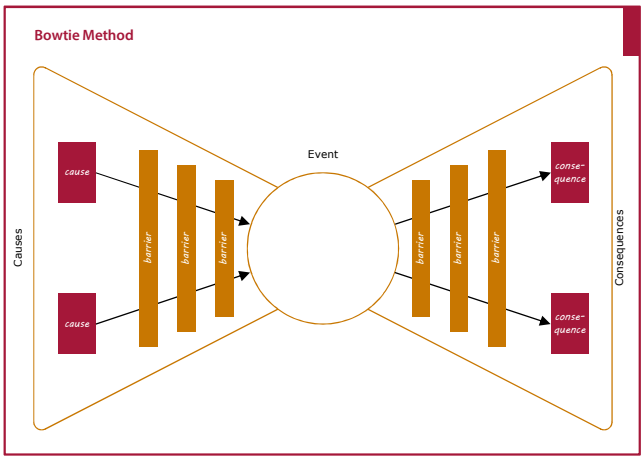
Use:
- To remind the team of the elements required to prepare an improvement activity
- To highlight the value of preparing for and analysing after the execution of an activity
- To accentuate the iterative nature of each activity in the improvement process



Bowtie Method

A summary of system risks and barriers

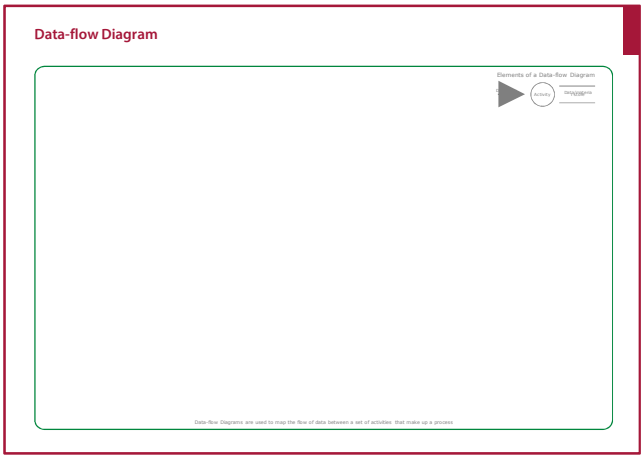
Use:
- To visualise the links between causes of an event and potential consequences
- To identify the barriers between the causes and potential consequences
- To understand the impact of possible degradation of the barriers over time



Data-flow Diagram

A summary of data-flows within the system

Use:
- To identify key activities and data stores within the system
- To visualise the data flows between all elements of the system
- To understand the data-driven behaviour of the system



Worksheets

Design Ideas

A summary of design ideas

Use:
- To capture design ideas that might inspire or lead directly to system improvement
- To encourage the capture of incremental or local ideas for improvement
- To prompt the development of radical or more global ideas for improvement

Design Ideas

Incremental Ideas for System-wide Change	Radical Ideas for System-wide Change
Incremental Ideas for Small-scale Change	Radical Ideas for Small-scale Change

Design Measurement

A summary of measurement needs

Use:
- To remind the team of the stakeholders related to the improvement process
- To highlight the range and diversity of prioritised stakeholder needs
- To articulate how the achievement of prioritised needs might be measured

Design Measurement

As a ...	... I need / require ...	... which could be measured by ...

Design Requirements

A summary of design requirements

Use:
- To translate key stakeholders needs into realisable system requirements
- To agree the core themes that capture the essence of the proposed system
- To accentuate the importance of developing smart requirements

Design Requirements

Keyword	Requirement	Demand/Wish	Weighting

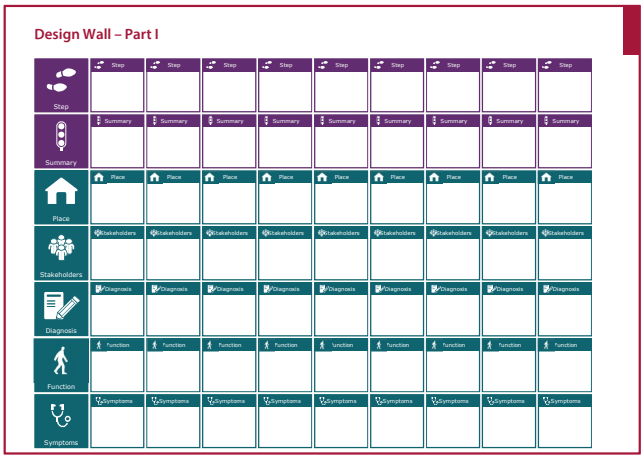
Worksheets

Design Wall

A summary of the patient journey

Use:
- To remind the team of the key steps that make up the patient journey
- To highlight the patient condition and decisions to be made along the journey
- To describe the information and resources required to support the journey

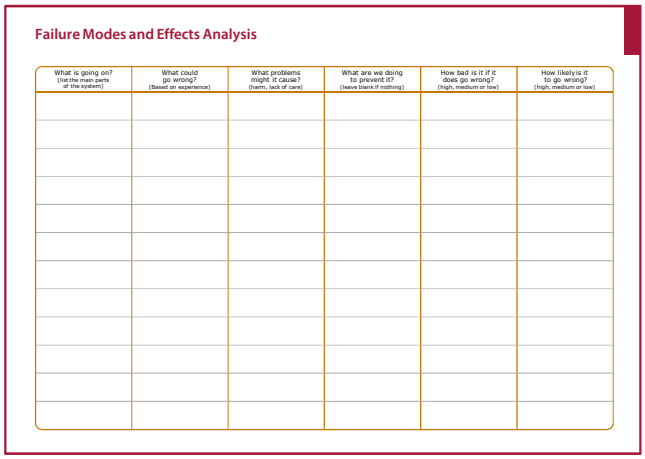
note the **Design Wall** comprises two parts



Failure Modes and Effects Analysis

A summary of the system risk assessment

Use:
- To provide a systematic framework for the assessment of system risks
- To prompt the identification and preliminary evaluation of hazards and risks
- To highlight the value of a clear system description as a prerequisite for assessment

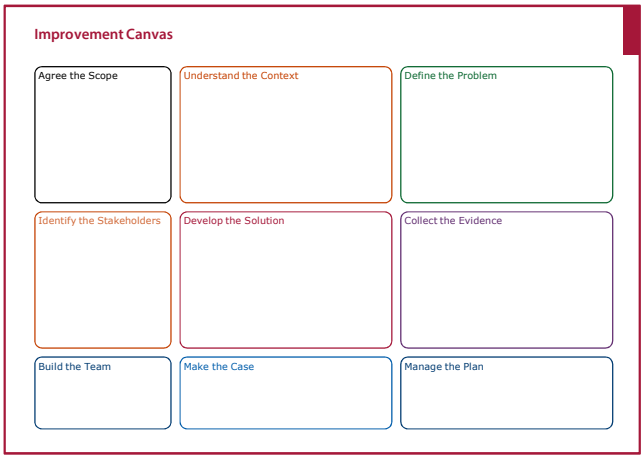


Improvement Canvas

A summary of the status of the programme

Use:
- To remind the team of the factors that determine the status of the programme
- To accentuate the need to maintain an up to date picture of the status
- To highlight the interchangeability of questions and information

see also **Improvement Canvas** poster

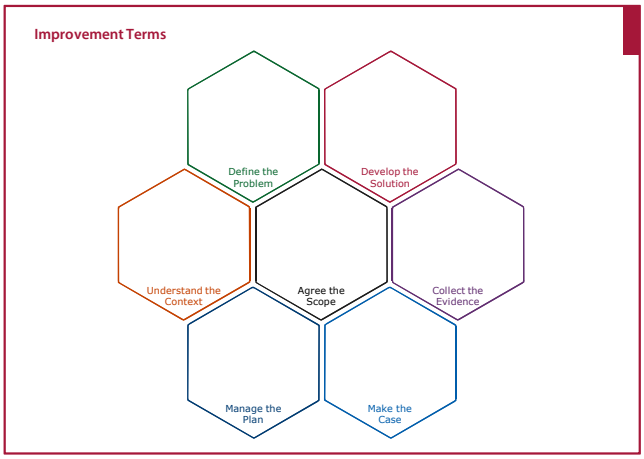


Worksheets

Improvement Terms

A summary of key improvement terms

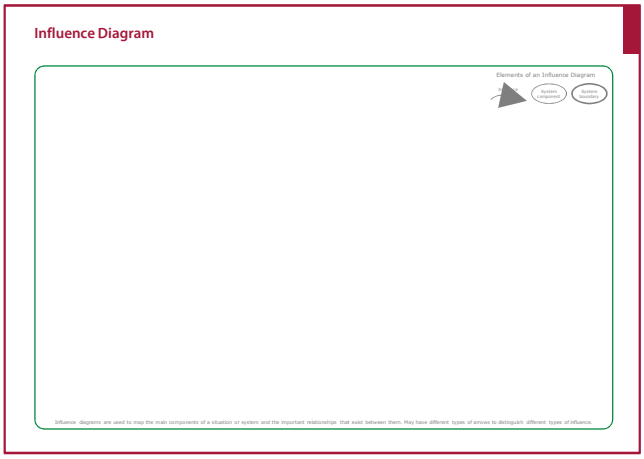
Use:
- To remind the team of the terminology related to the improvement process
- To highlight any differences or ambiguity in the use of key improvement terms
- To accentuate the importance of understanding key improvement terms



Influence Diagram

A summary of influences within the system

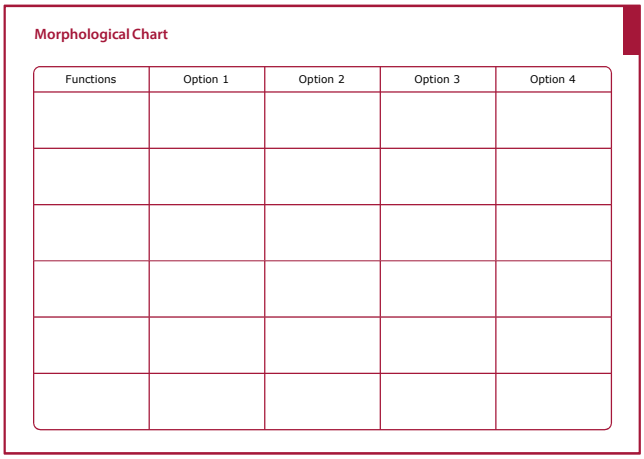
Use:
- To identify key components and/or issues present within the system
- To visualise the nature of influences between the elements of the system
- To understand the inherent and emergent behaviour of the system



Metamorphic Chart

A summary of the improvement concepts

Use:
- To capture a variety of ideas with potential to fulfil key functional requirements
- To identify combinations of ideas that will satisfy the overall system requirements
- To accentuate the importance of identifying alternative system architectures



4-84

Worksheets

Rich Picture

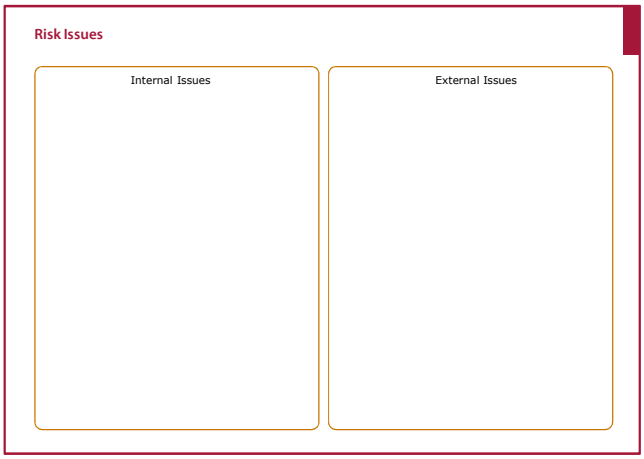
A summary picture of the system

Use:
- To capture images that represent multiple perspectives of the system
- To visualise connections between the collected images of the system
- To understand the inherent and emergent behaviour of the system

Risk Issues

A summary of system risks

Use:
- To capture risk issues that might inspire or lead directly to system improvement
- To facilitate the identification of internal or local hazards and risks
- To prompt the identification of external or more global hazards and risks

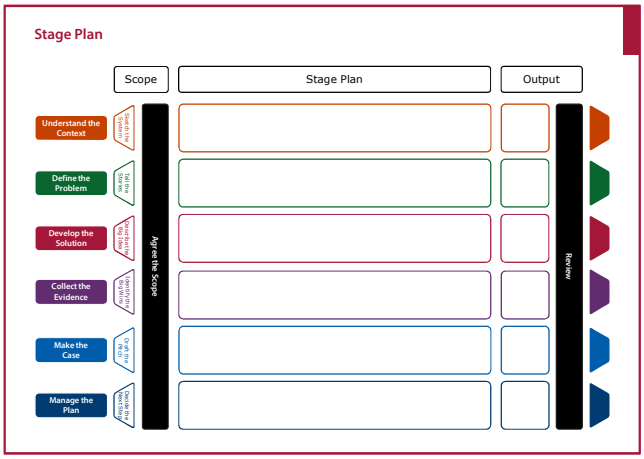


Stage Plan

A summary of the improvement plan

Use:
- To remind the team of the main strands of an improvement plan
- To highlight the imperative to define an improvement plan based on clear outputs
- To accentuate the dynamic nature of the improvement process

see also **Stage Plan** poster

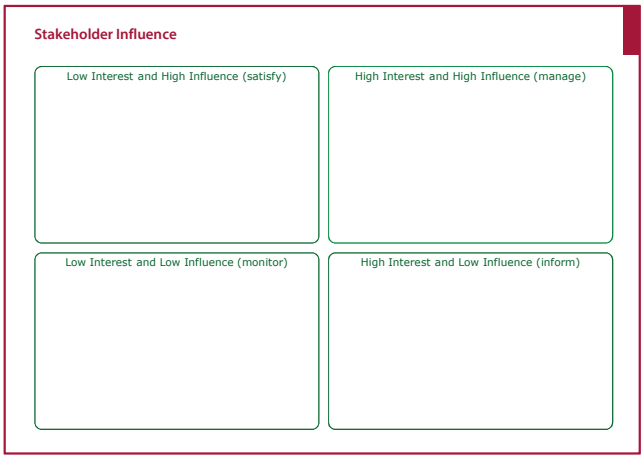


Worksheets

Stakeholder Influence

A summary of stakeholder influences

Use:
- To remind the team of the stakeholders related to the improvement process
- To highlight stakeholders with the interest and power to make things happen
- To accentuate the importance of understanding stakeholders priorities



Stakeholder List

A summary of the system stakeholders

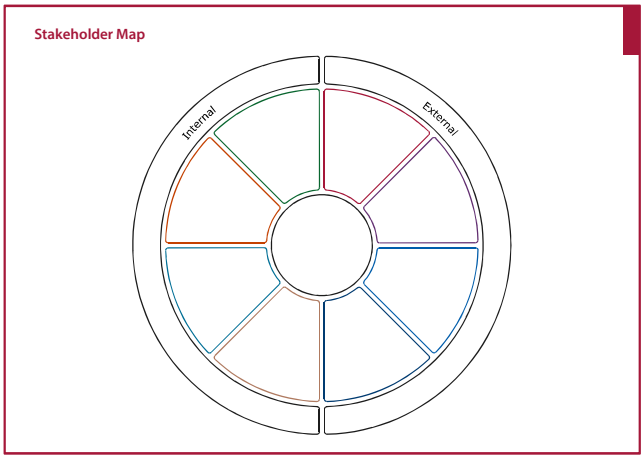
Use:
- To remind the team of the stakeholders related to the improvement process
- To highlight the range and diversity of potential stakeholders
- To accentuate the importance of understanding stakeholders needs

Stakeholder Map

A summary of the system stakeholders

Use:
- To remind the team of the stakeholders related to the improvement process
- To highlight the range and diversity of potential stakeholders
- To accentuate the importance of understanding stakeholders needs

see also **Stakeholder Map** poster



Worksheets

Stakeholder Needs

A summary of stakeholders needs

Use:
- To remind the team of the stakeholders related to the improvement process
- To capture the particular needs of the individual stakeholders
- To highlight the range and diversity of stakeholder needs

Stakeholder Needs

As a ...	... I need ...	... so that ...

Structured What If Technique

A summary of key system risks

Use:
- To provide a systematic framework for the investigation of possible system behaviours
- To prompt the identification and preliminary evaluation of impacts, controls and risks
- To highlight the value of a clear system description as a prerequisite for assessment

Structured What If Technique

Target	What if?	Impact	Controls	Risk (high, medium or low)

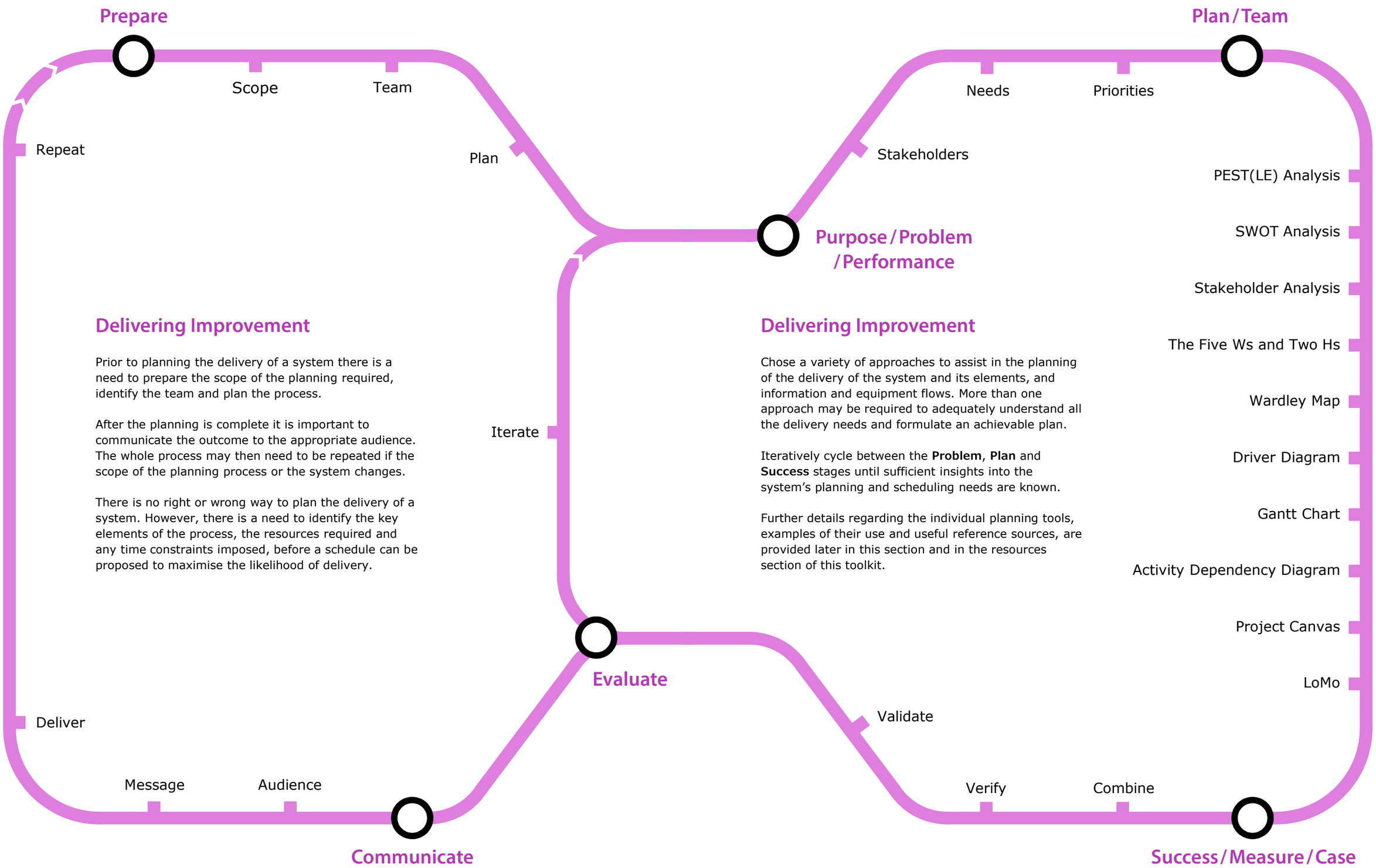
Improving Improvement

Professor John Clarkson FREng
January 2022

Posters

The following pages provide A3 copies of all the **posters** referenced in this toolkit. These may also be found online at: http://www-edc.eng.cam.ac.uk/downloads/improvement.pdf

Delivering Improvement



Delivering Improvement

Prior to planning the delivery of a system there is a need to prepare the scope of the planning required, identify the team and plan the process.

After the planning is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the planning process or the system changes.

There is no right or wrong way to plan the delivery of a system. However, there is a need to identify the key elements of the process, the resources required and any time constraints imposed, before a schedule can be proposed to maximise the likelihood of delivery.

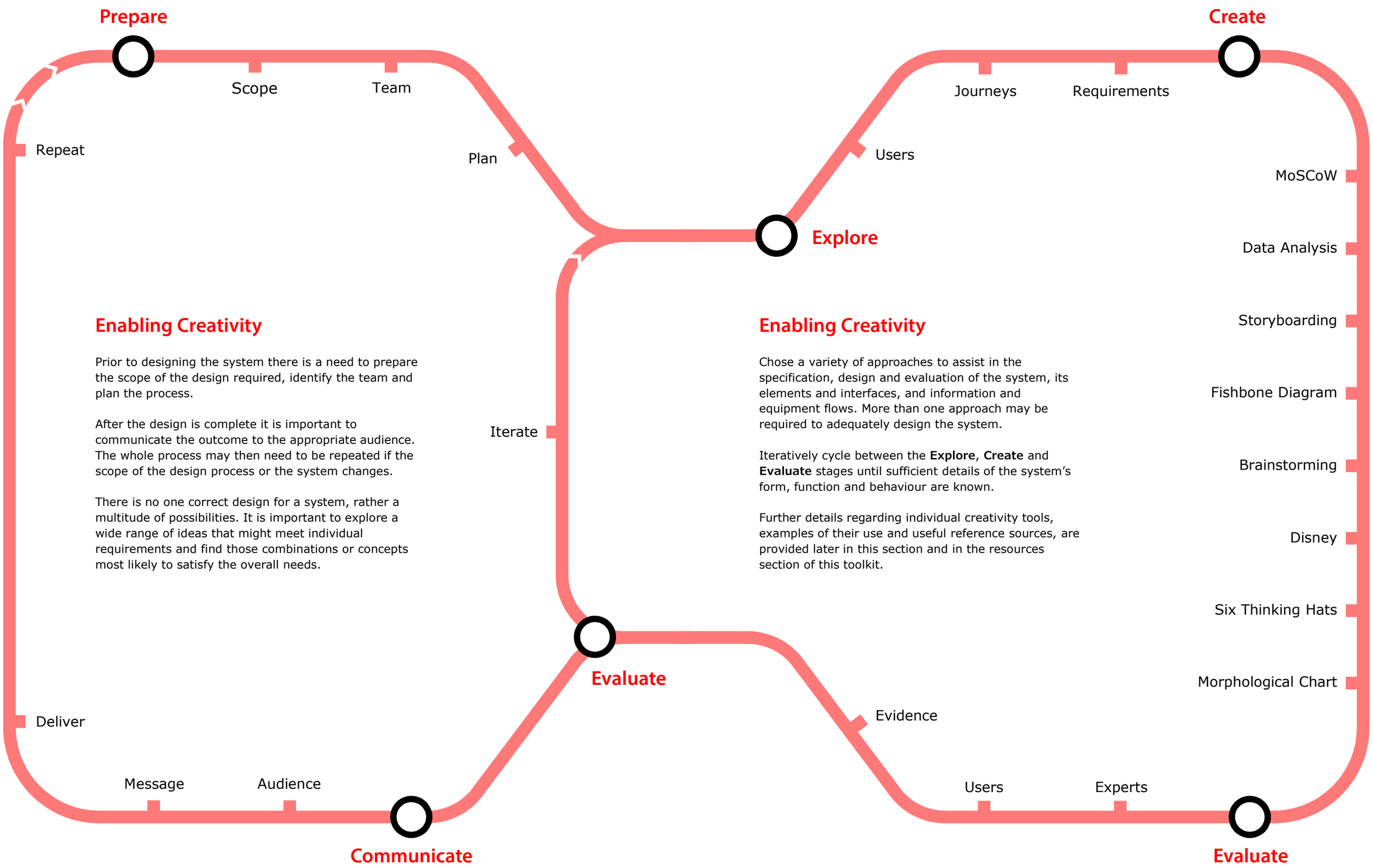
Delivering Improvement

Chose a variety of approaches to assist in the planning of the delivery of the system and its elements, and information and equipment flows. More than one approach may be required to adequately understand all the delivery needs and formulate an achievable plan.

Iteratively cycle between the **Problem**, **Plan** and **Success** stages until sufficient insights into the system's planning and scheduling needs are known.

Further details regarding the individual planning tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

Enabling Creativity



Enabling Creativity

Prior to designing the system there is a need to prepare the scope of the design required, identify the team and plan the process.

After the design is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the design process or the system changes.

There is no one correct design for a system, rather a multitude of possibilities. It is important to explore a wide range of ideas that might meet individual requirements and find those combinations or concepts most likely to satisfy the overall needs.

Enabling Creativity

Chose a variety of approaches to assist in the specification, design and evaluation of the system, its elements and interfaces, and information and equipment flows. More than one approach may be required to adequately design the system.

Iteratively cycle between the **Explore**, **Create** and **Evaluate** stages until sufficient details of the system's form, function and behaviour are known.

Further details regarding individual creativity tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

Improvement Canvas

Agree the Scope

Describe the ambition for change and the boundary of the system of interest

Understand the Context

Describe the circumstances and setting of the system of interest and the factors that could influence the improvement/redesign of the system

Define the Problem

Describe the details of a particular challenge(s) within the system and the requirements for change necessary to improve/redesign the system

Identify the Stakeholders

Identify the people who have an interest in any aspect of the system and their needs

Develop the Solution

Describe the idea(s) that will resolve the challenge(s) within the system and the risk(s) associated with changes needed to improve/redesign the system

Collect the Evidence

Describe the information and the measures required to show the effect(s) of the changes proposed to improve/redesign the system

Build the Team

Identify the team who will deliver the project

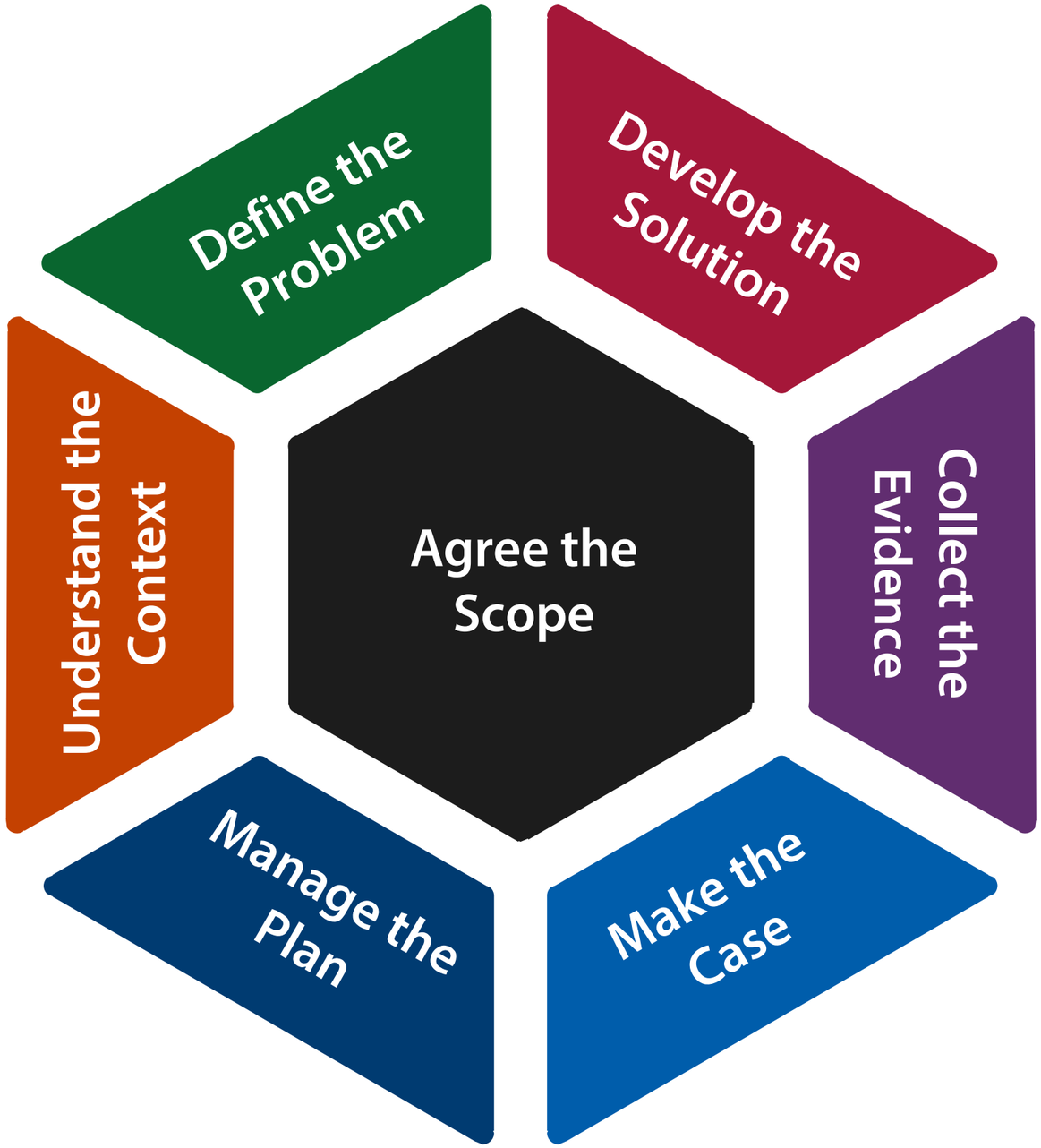
Make the Case

Prepare an argument(s) to justify the improvement/redesign of the system

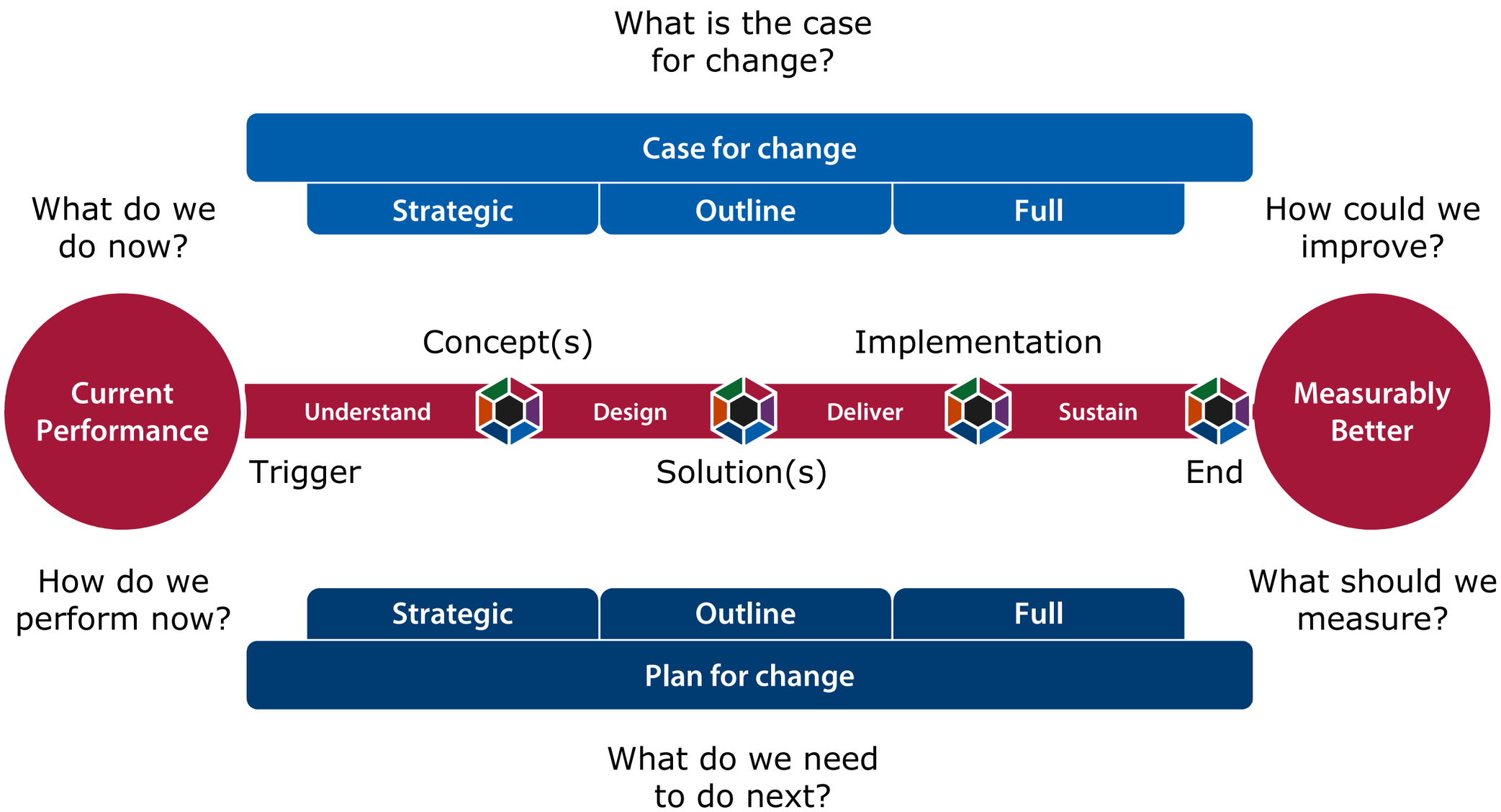
Manage the Plan

Create a plan to facilitate the improvement/redesign of the system

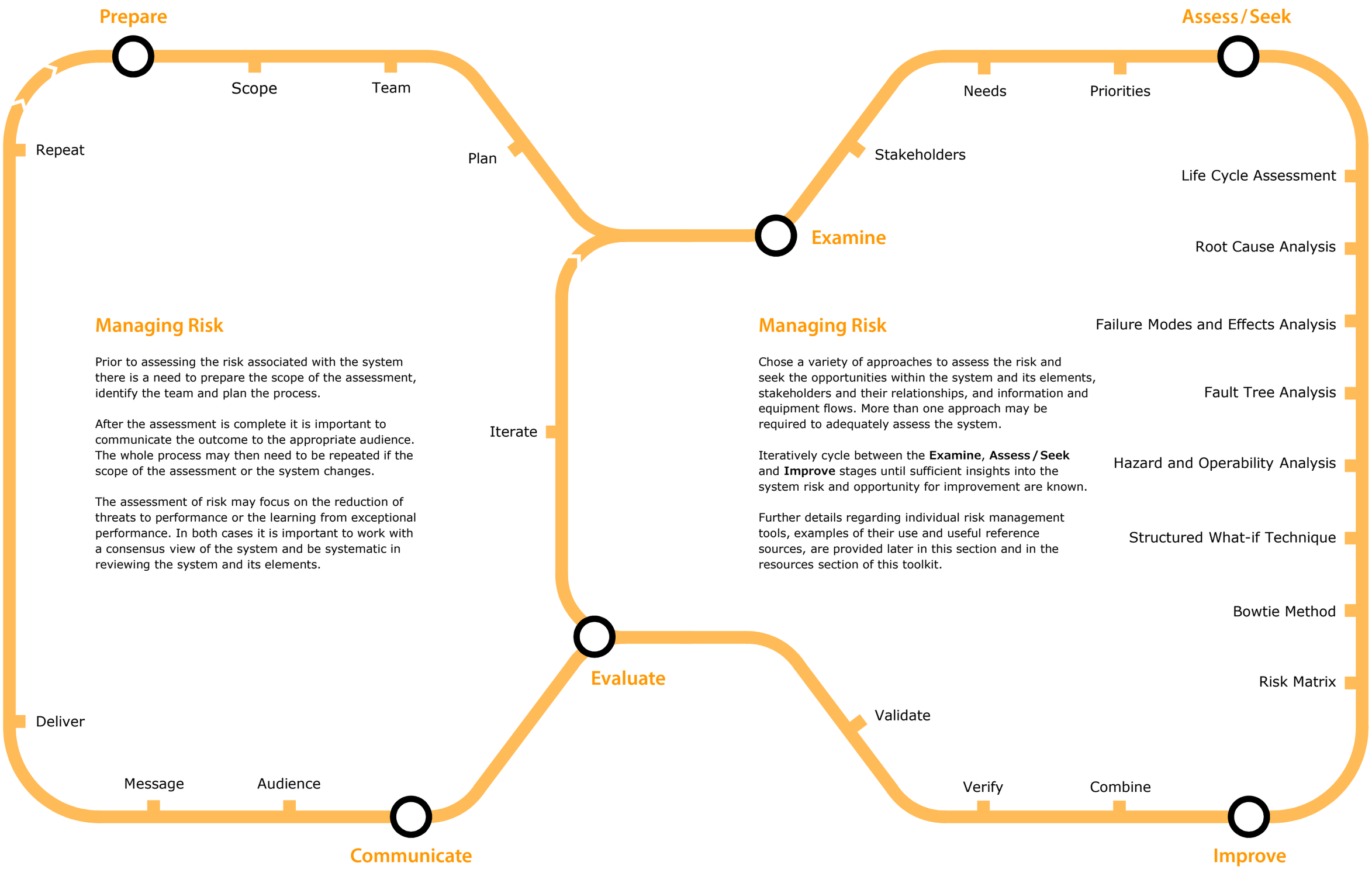
Improvement Model



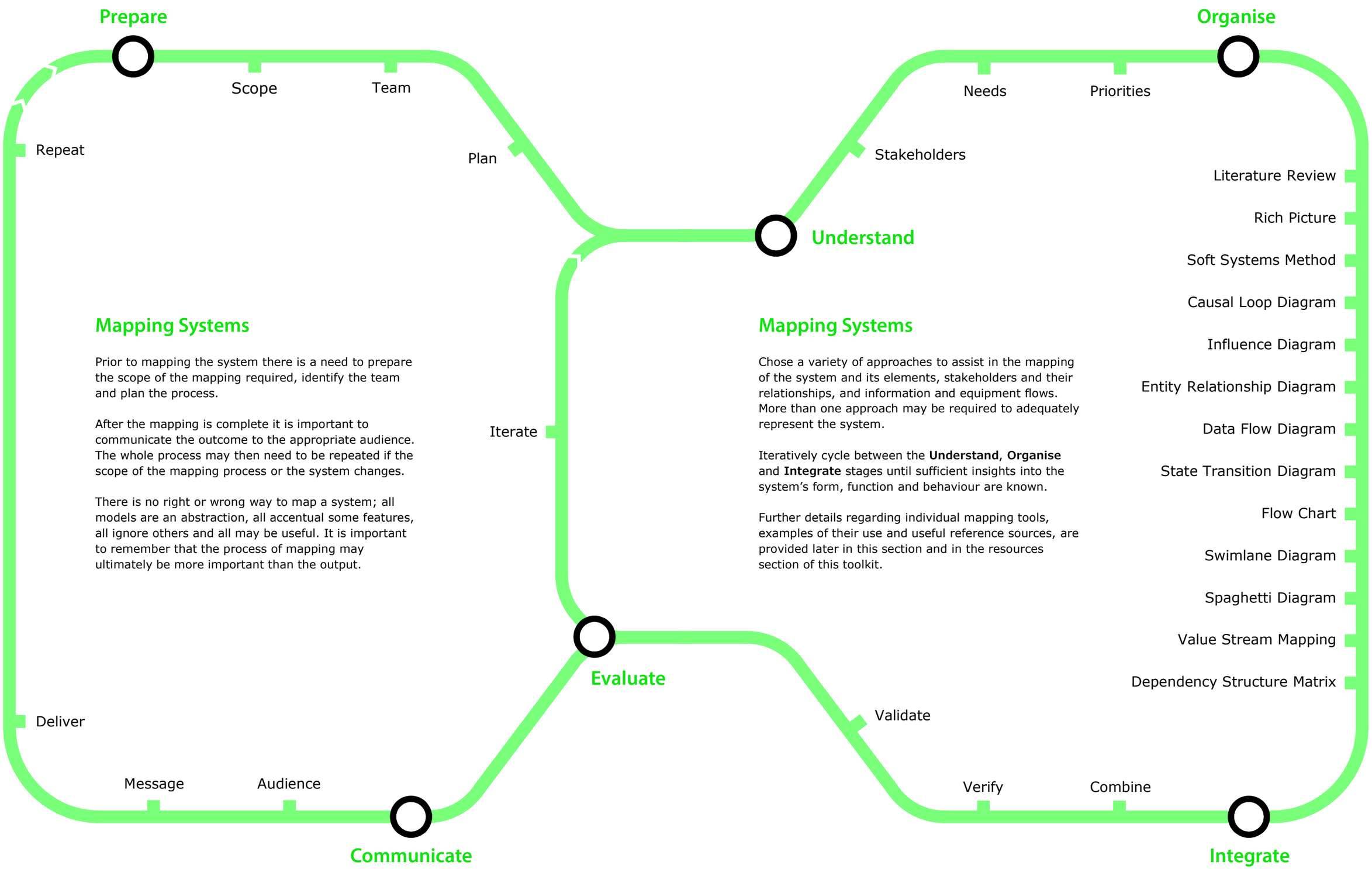
Improvement Programme



Managing Risk



Mapping Systems



Mapping Systems

Prior to mapping the system there is a need to prepare the scope of the mapping required, identify the team and plan the process.

After the mapping is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the mapping process or the system changes.

There is no right or wrong way to map a system; all models are an abstraction, all accentual some features, all ignore others and all may be useful. It is important to remember that the process of mapping may ultimately be more important than the output.

Mapping Systems

Chose a variety of approaches to assist in the mapping of the system and its elements, stakeholders and their relationships, and information and equipment flows. More than one approach may be required to adequately represent the system.

Iteratively cycle between the **Understand**, **Organise** and **Integrate** stages until sufficient insights into the system's form, function and behaviour are known.

Further details regarding individual mapping tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

Preliminary Activities

Questions Canvas

Agree the Scope

Understand the Context

- What is the purpose?
- What are the needs?
- What affects the system?
- Where is the system?
- What are the elements?

Define the Problem

- How do we perform now?
- What do we do well?
- What is the problem?
- What does 'good' look like?

Identify the Stakeholders

- Who are the stakeholders?
- Who will use the system?

Develop the Solution

- How can the needs be met?
- What could go wrong?

Collect the Evidence

- What should we measure?
- How does the system perform?
- How well are the needs met?

Build the Team

- Who should be involved?

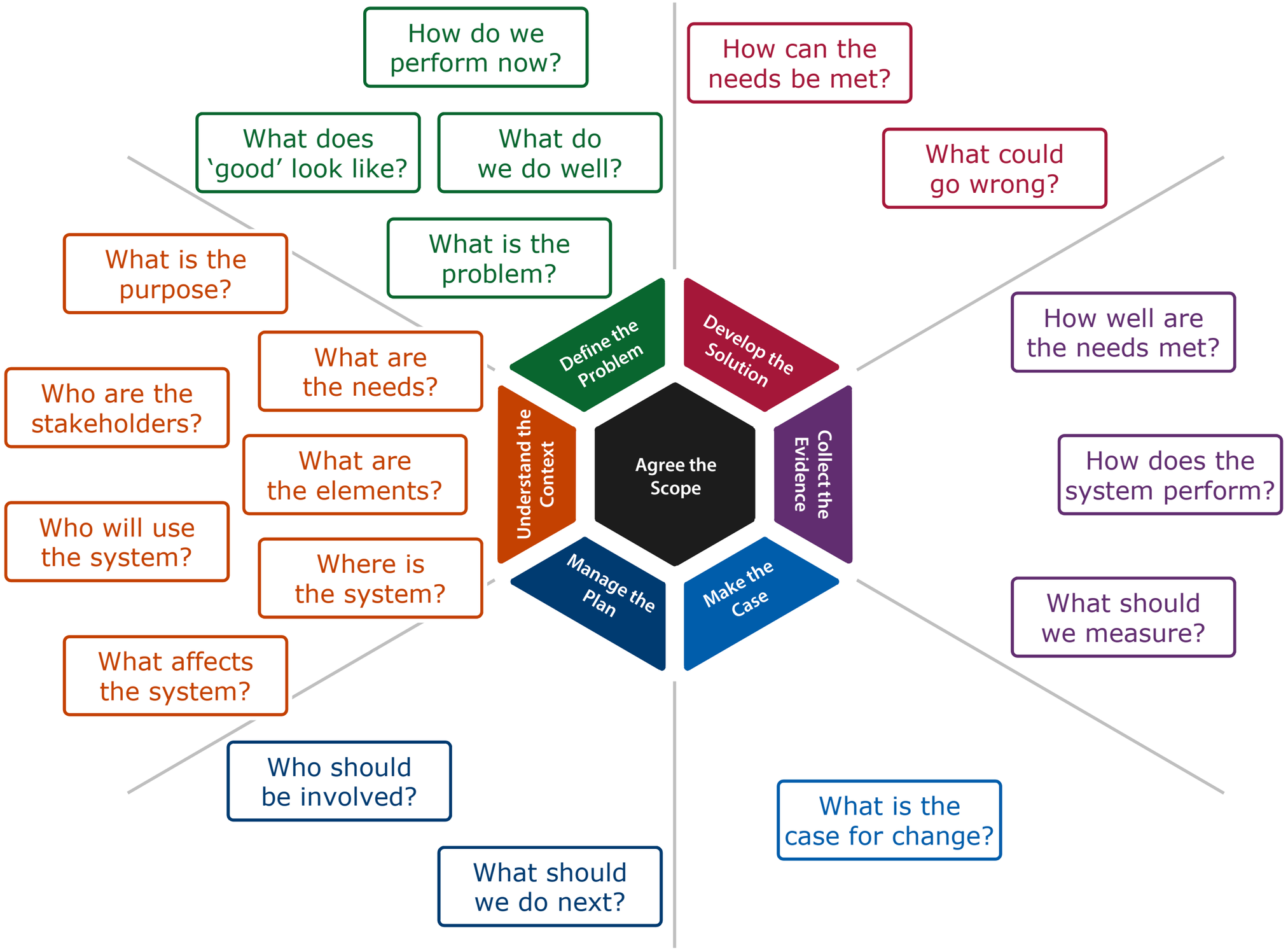
Make the Case

- What is the case for change?

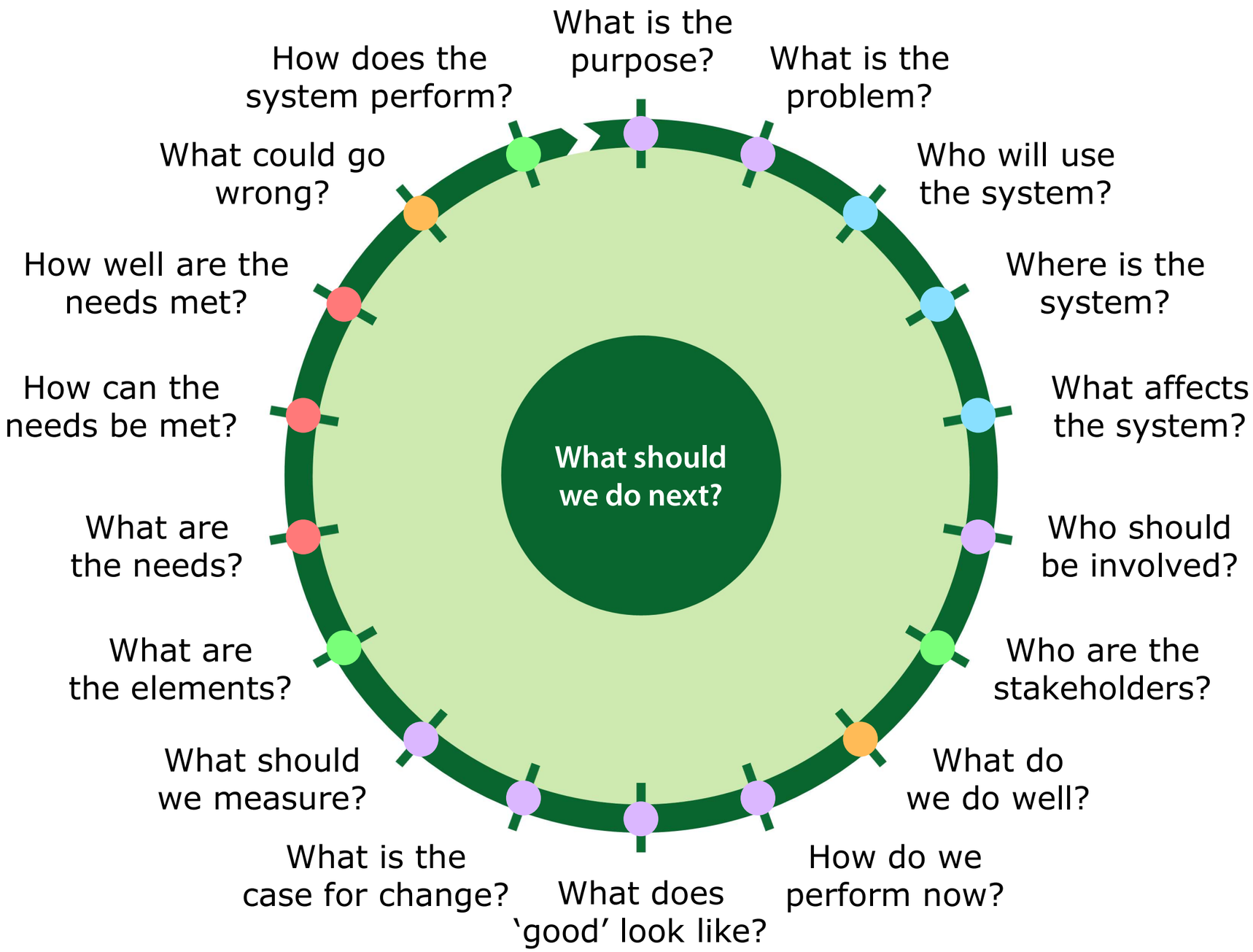
Manage the Plan

- What should we do next?

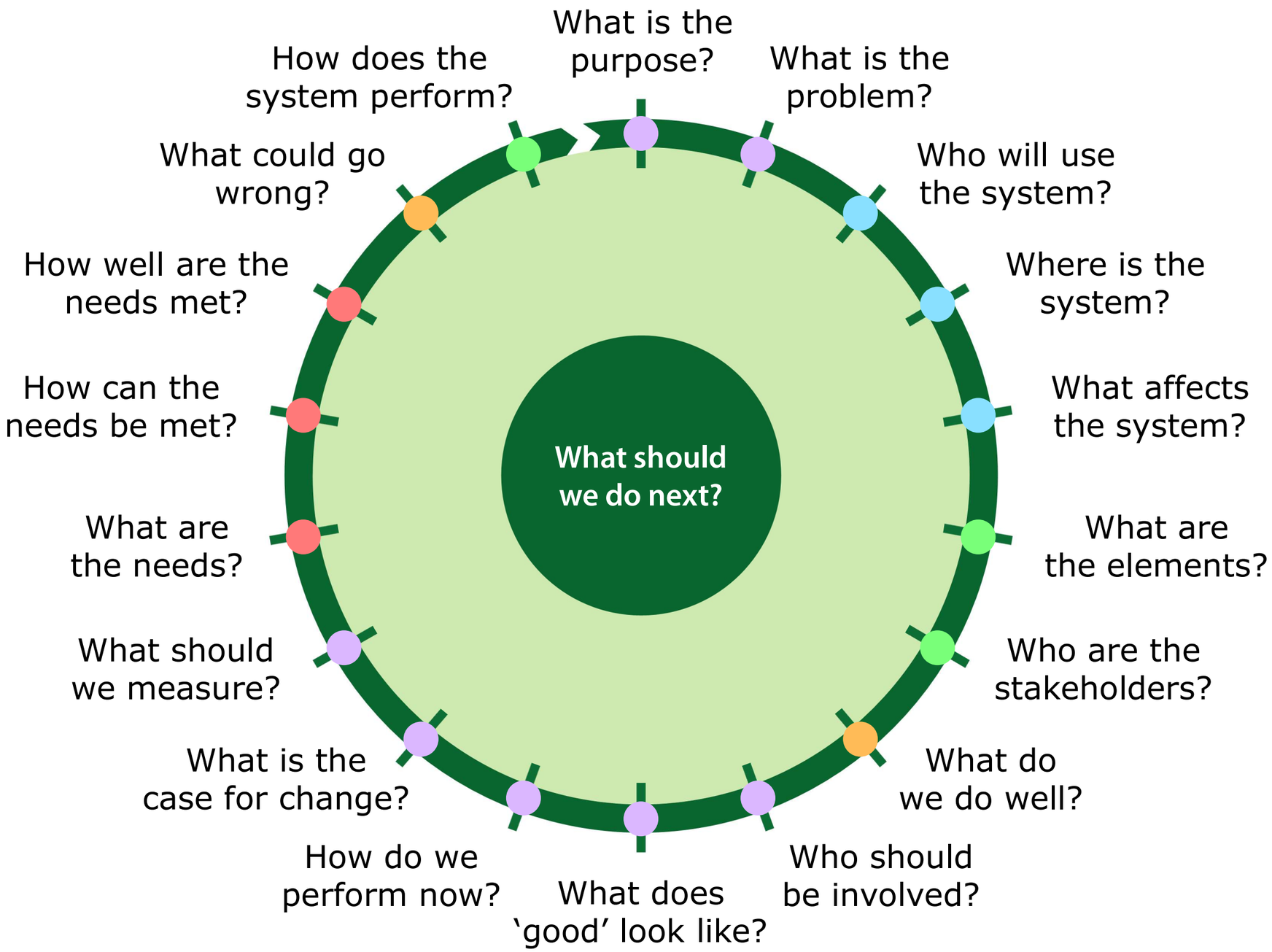
Questions Map



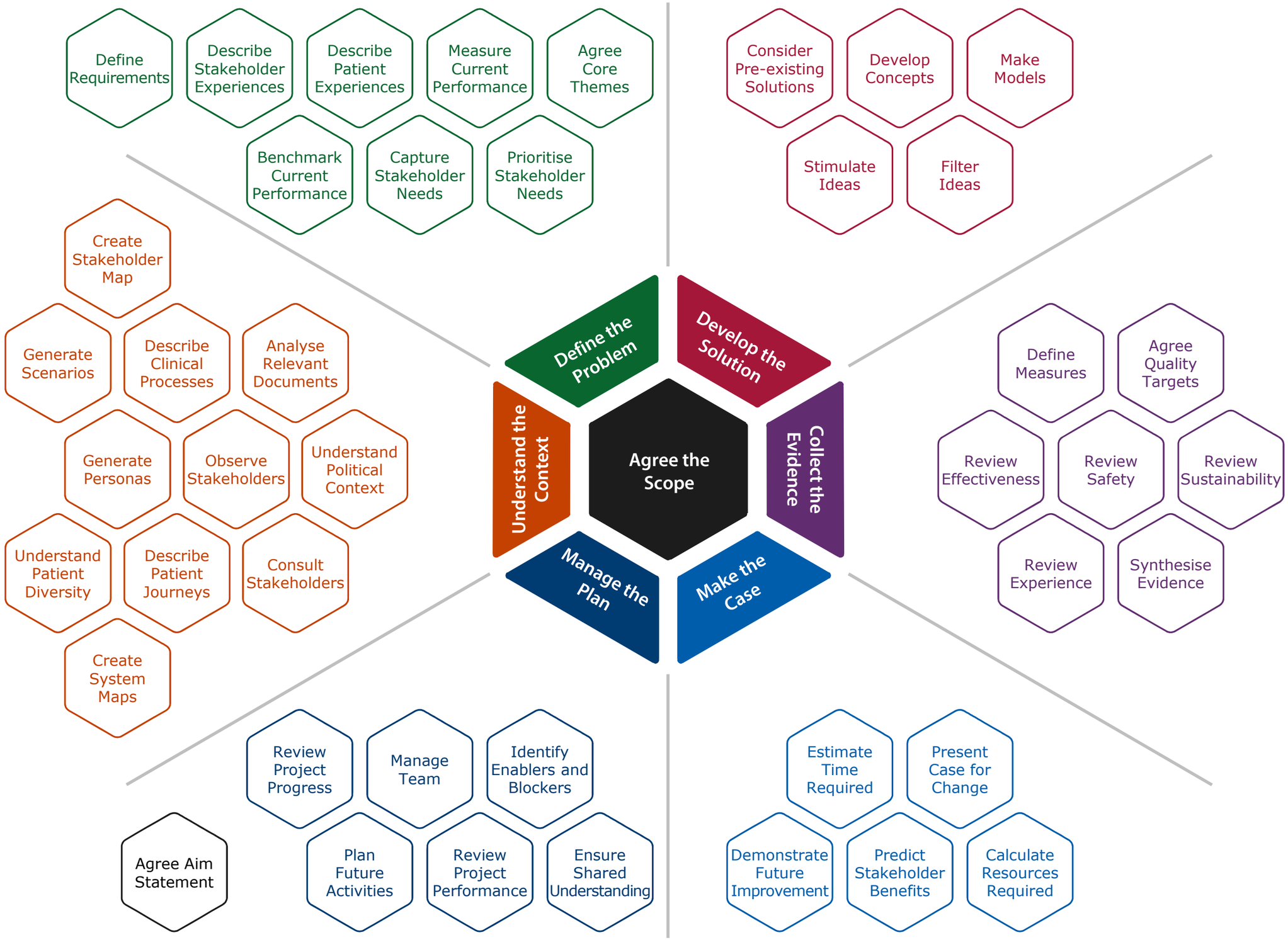
Questions Model



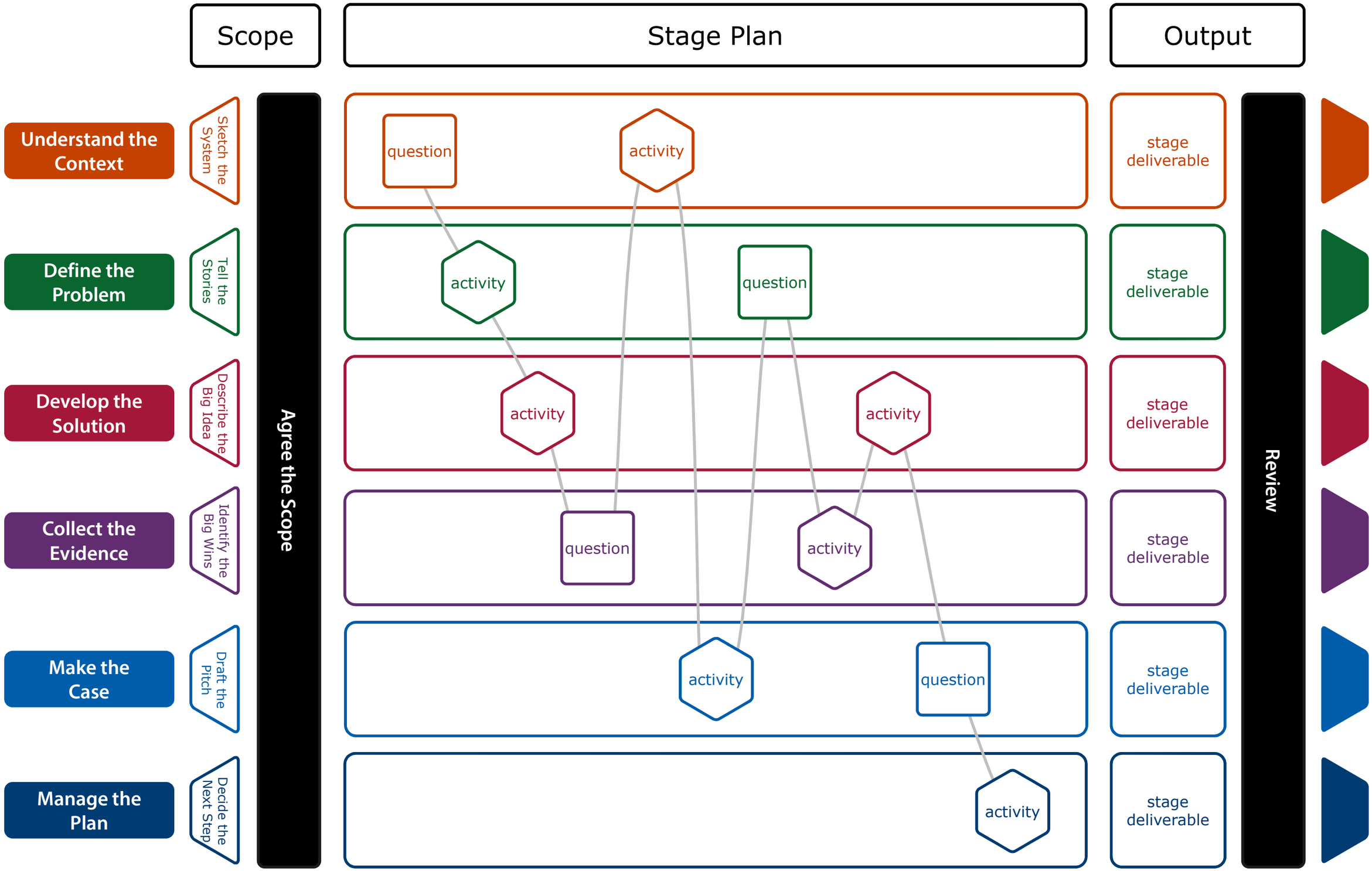
Questions Model



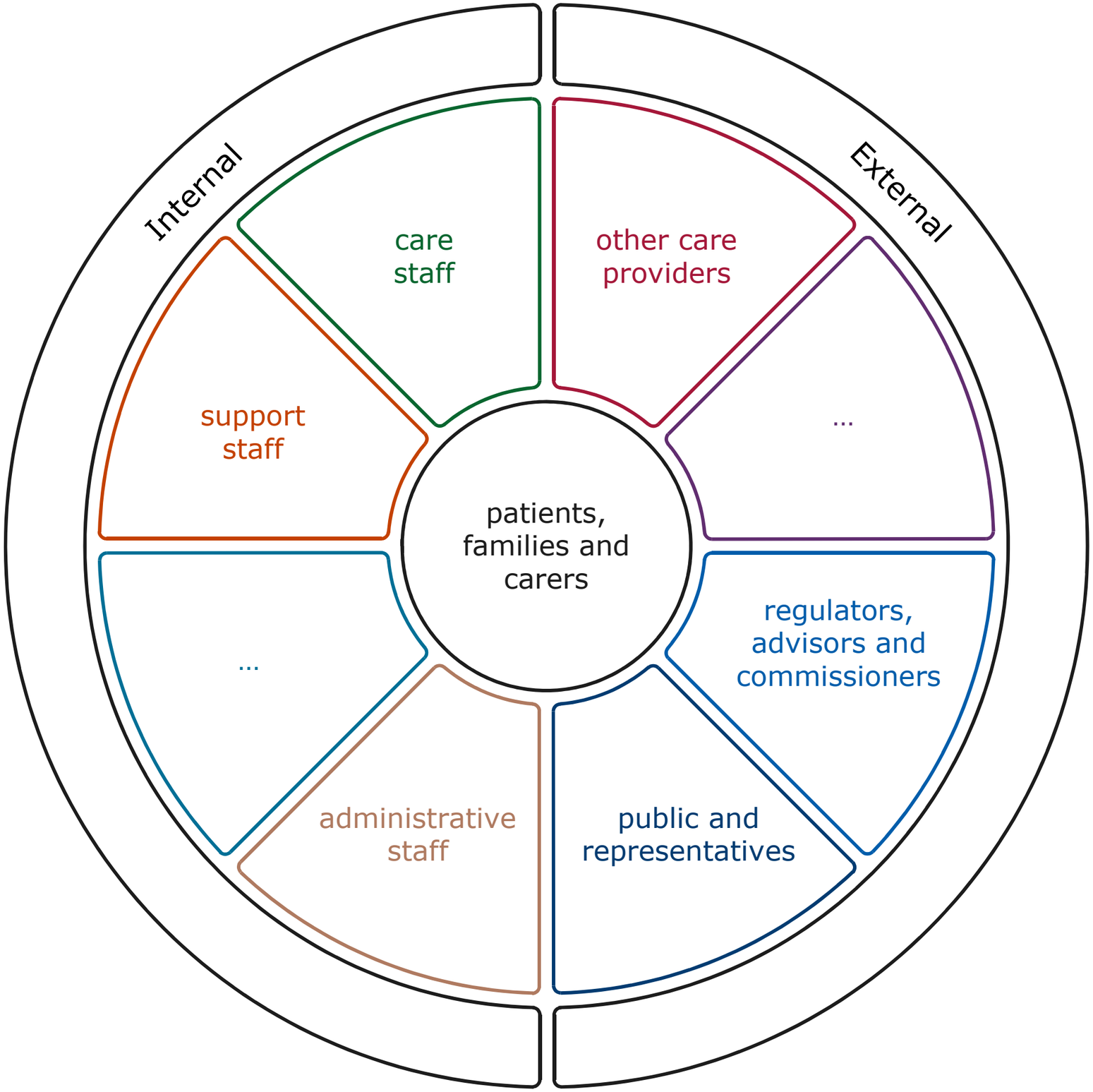
Stage Activities



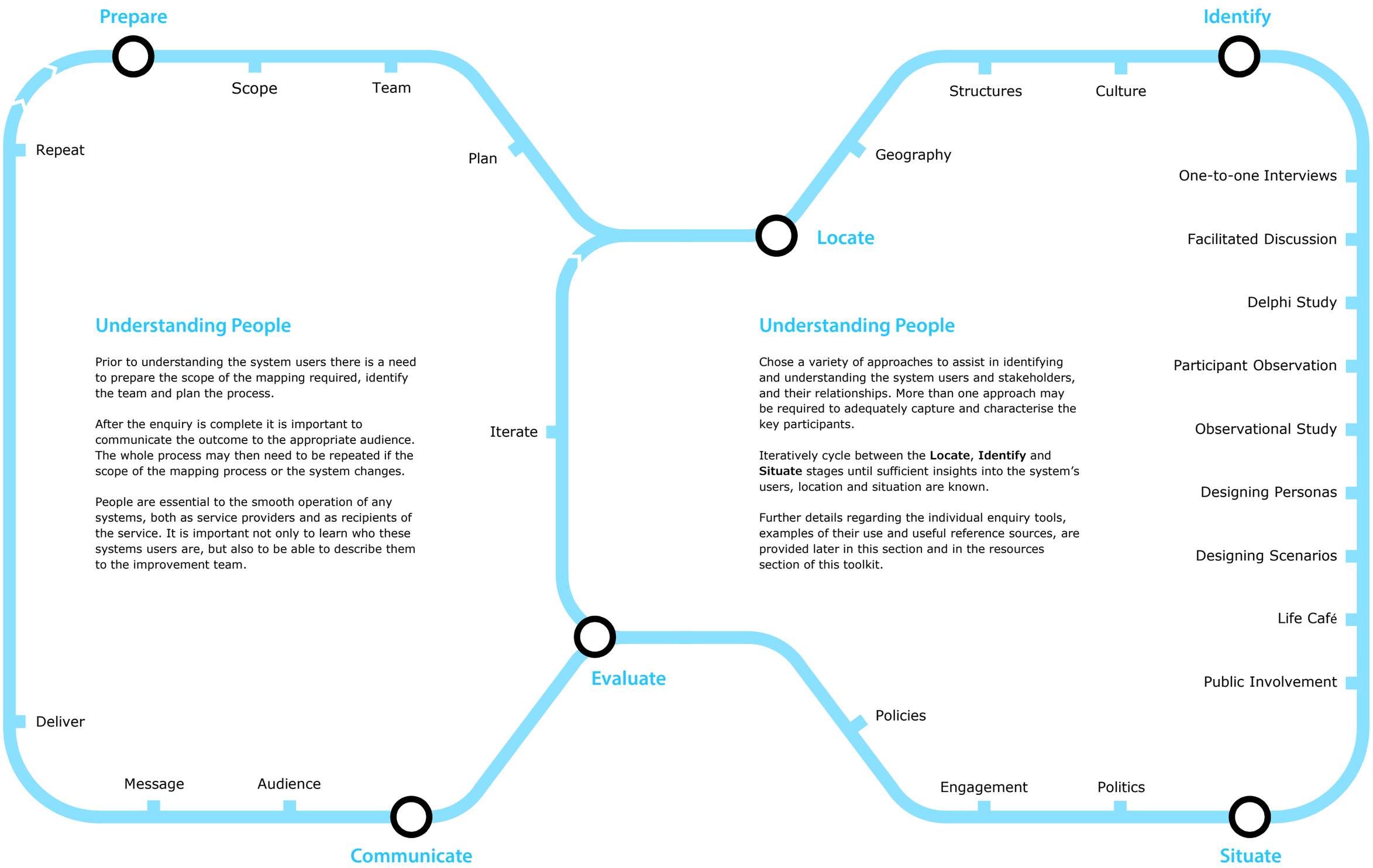
Stage Plan


Scope
Stage Plan
Output
Understand the Context
Define the Problem
Develop the Solution
Collect the Evidence
Make the Case
Manage the Plan
Sketch the System
Tell the Stories
Describe the Big Idea
Identify the Big Wins
Draft the Pitch
Decide the Next Step
Agree the Scope
question
activity
stage deliverable
Review

Stakeholder Map



Understanding People



Understanding People

Prior to understanding the system users there is a need to prepare the scope of the mapping required, identify the team and plan the process.

After the enquiry is complete it is important to communicate the outcome to the appropriate audience. The whole process may then need to be repeated if the scope of the mapping process or the system changes.

People are essential to the smooth operation of any systems, both as service providers and as recipients of the service. It is important not only to learn who these systems users are, but also to be able to describe them to the improvement team.

Understanding People

Chose a variety of approaches to assist in identifying and understanding the system users and stakeholders, and their relationships. More than one approach may be required to adequately capture and characterise the key participants.

Iteratively cycle between the **Locate**, **Identify** and **Situate** stages until sufficient insights into the system's users, location and situation are known.

Further details regarding the individual enquiry tools, examples of their use and useful reference sources, are provided later in this section and in the resources section of this toolkit.

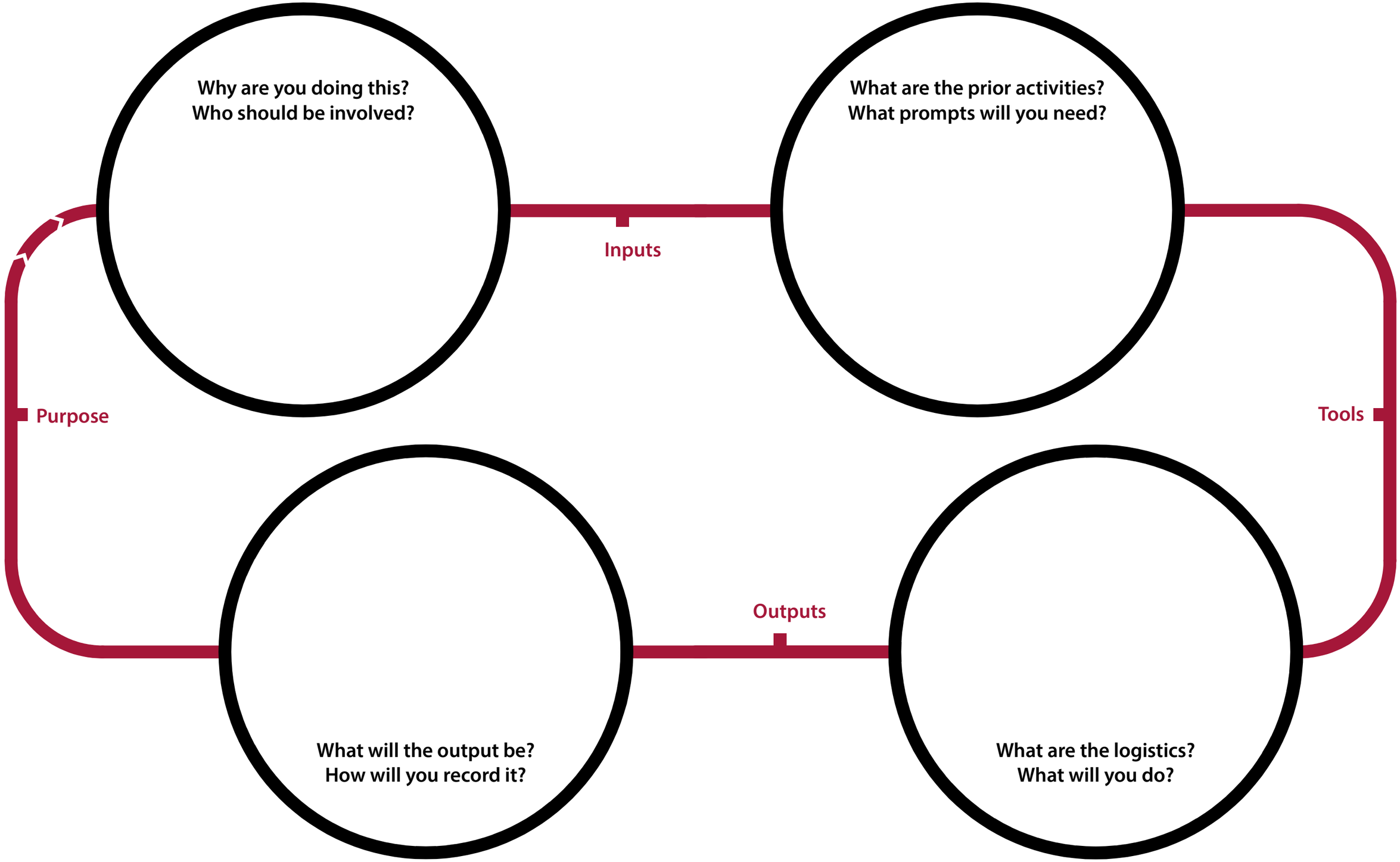
Improving Improvement

Professor John Clarkson FREng
January 2022

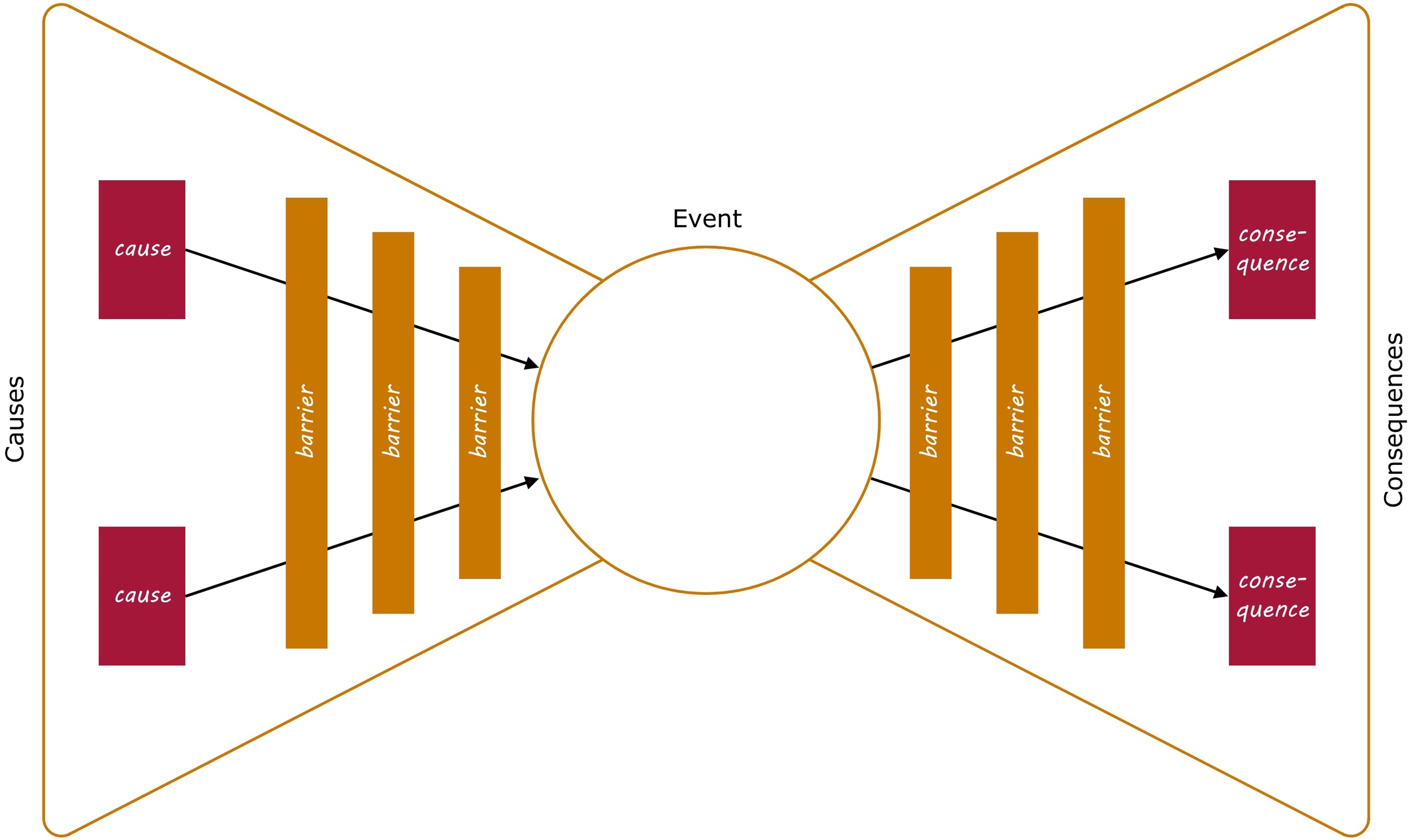
Worksheets

The following pages provide A3 copies of all the **worksheets** referenced in this toolkit. These may also be found online at: http://www-edc.eng.cam.ac.uk/downloads/improvement.pdf

Activity Plan



Bowtie Method



Data-flow Diagram

Elements of a Data-flow Diagram

Data-flow Diagrams are used to map the flow of data between a set of activities that make up a process

Design Ideas

Incremental Ideas for System-wide Change	Radical Ideas for System-wide Change

Incremental Ideas for Small-scale Change	Radical Ideas for Small-scale Change

Design Measurement

As a …	… I need / require …	… which could be measured by …

Design Requirements

Keyword	Requirement	Demand/Wish	Weighting

Design Wall – Part I

Step	Step	Step	Step	Step	Step	Step	Step	Step	Step
Summary	Summary	Summary	Summary	Summary	Summary	Summary	Summary	Summary	Summary
Place	Place	Place	Place	Place	Place	Place	Place	Place	Place
Stakeholders	Stakeholders	Stakeholders	Stakeholders	Stakeholders	Stakeholders	Stakeholders	Stakeholders	Stakeholders	Stakeholders
Diagnosis	Diagnosis	Diagnosis	Diagnosis	Diagnosis	Diagnosis	Diagnosis	Diagnosis	Diagnosis	Diagnosis
Function	Function	Function	Function	Function	Function	Function	Function	Function	Function
Symptoms	Symptoms	Symptoms	Symptoms	Symptoms	Symptoms	Symptoms	Symptoms	Symptoms	Symptoms

Design Wall – Part II

Changes	Changes	Changes	Changes	Changes	Changes	Changes	Changes	Changes	Changes
Prognosis	Prognosis	Prognosis	Prognosis	Prognosis	Prognosis	Prognosis	Prognosis	Prognosis	Prognosis
Wishes	Wishes What: Why:	Wishes What: Why:	Wishes What: Why:	Wishes What: Why:	Wishes What: Why:	Wishes What: Why:	Wishes What: Why:	Wishes What: Why:	Wishes What: Why:
Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan
Information	Information	Information	Information	Information	Information	Information	Information	Information	Information
Resources	Resources	Resources	Resources	Resources	Resources	Resources	Resources	Resources	Resources
Social	Social	Social	Social	Social	Social	Social	Social	Social	Social

Failure Modes and Effects Analysis

What is going on? (list the main parts of the system)	What could go wrong? (Based on experience)	What problems might it cause? (harm, lack of care)	What are we doing to prevent it? (leave blank if nothing)	How bad is it if it does go wrong? (high, medium or low)	How likely is it to go wrong? (high, medium or low)

Improvement Canvas

Agree the Scope

Understand the Context

Define the Problem

Identify the Stakeholders

Develop the Solution

Collect the Evidence

Build the Team

Make the Case

Manage the Plan

Improvement Terms

Influence Diagram

Elements of an Influence Diagram

Influence diagrams are used to map the main components of a situation or system and the important relationships that exist between them. May have different types of arrows to distinguish different types of influence.

Morphological Chart

Functions	Option 1	Option 2	Option 3	Option 4

Rich Picture

Elements of a Rich Picture

Symbols Signs Sketches Icons Keywords Title

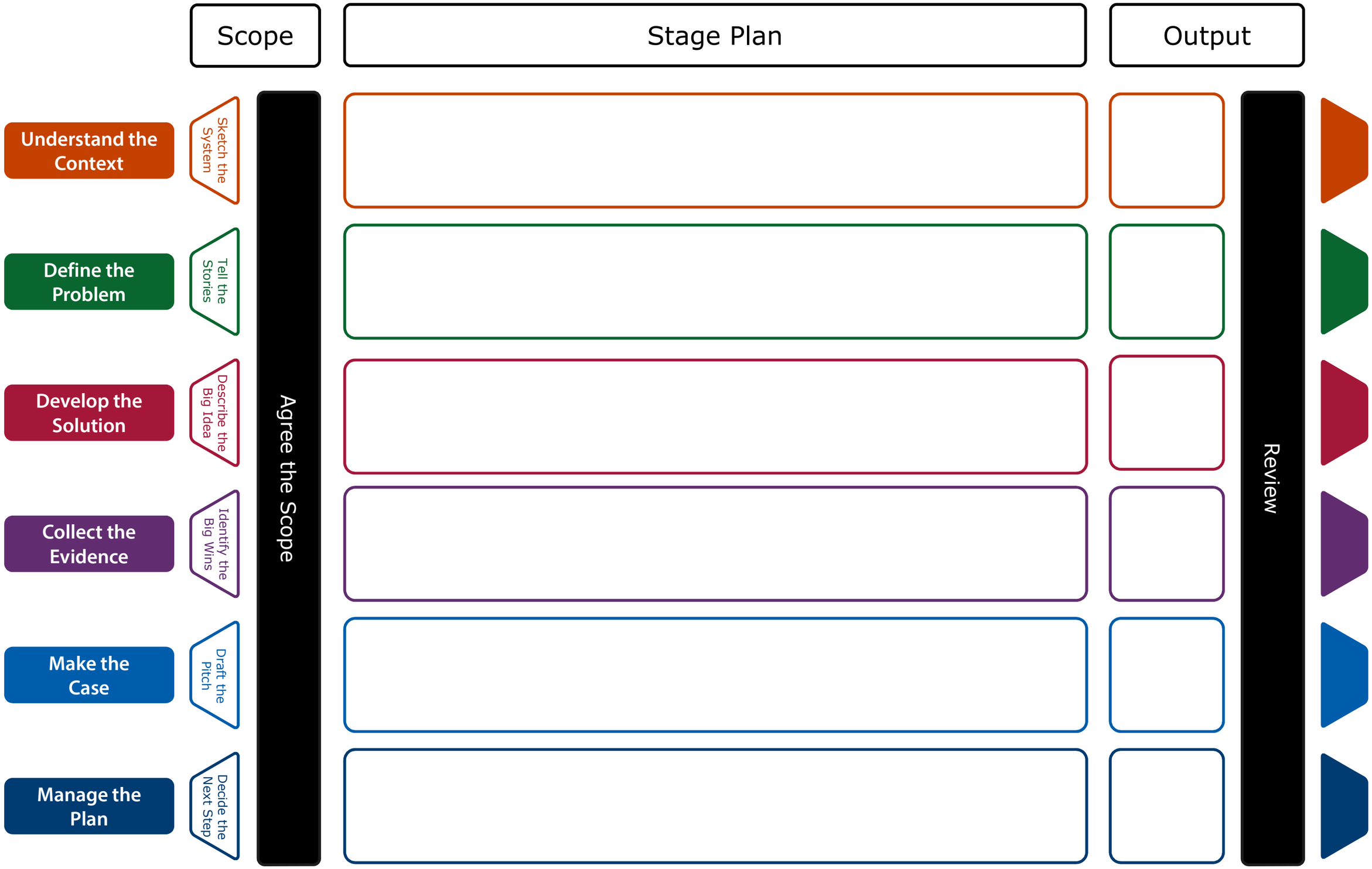
CANCER ?

Rich Pictures are used to depict complicated situations in order to understand a problem by uncovering hidden beliefs, expectations and motivations.

Risk Issues

Internal Issues	External Issues

Stage Plan


Scope
Stage Plan
Output
Understand the Context
Sketch the System
Define the Problem
Tell the Stories
Develop the Solution
Describe the Big Idea
Collect the Evidence
Identify the Big Wins
Make the Case
Draft the Pitch
Manage the Plan
Decide the Next Step
Agree the Scope
Review

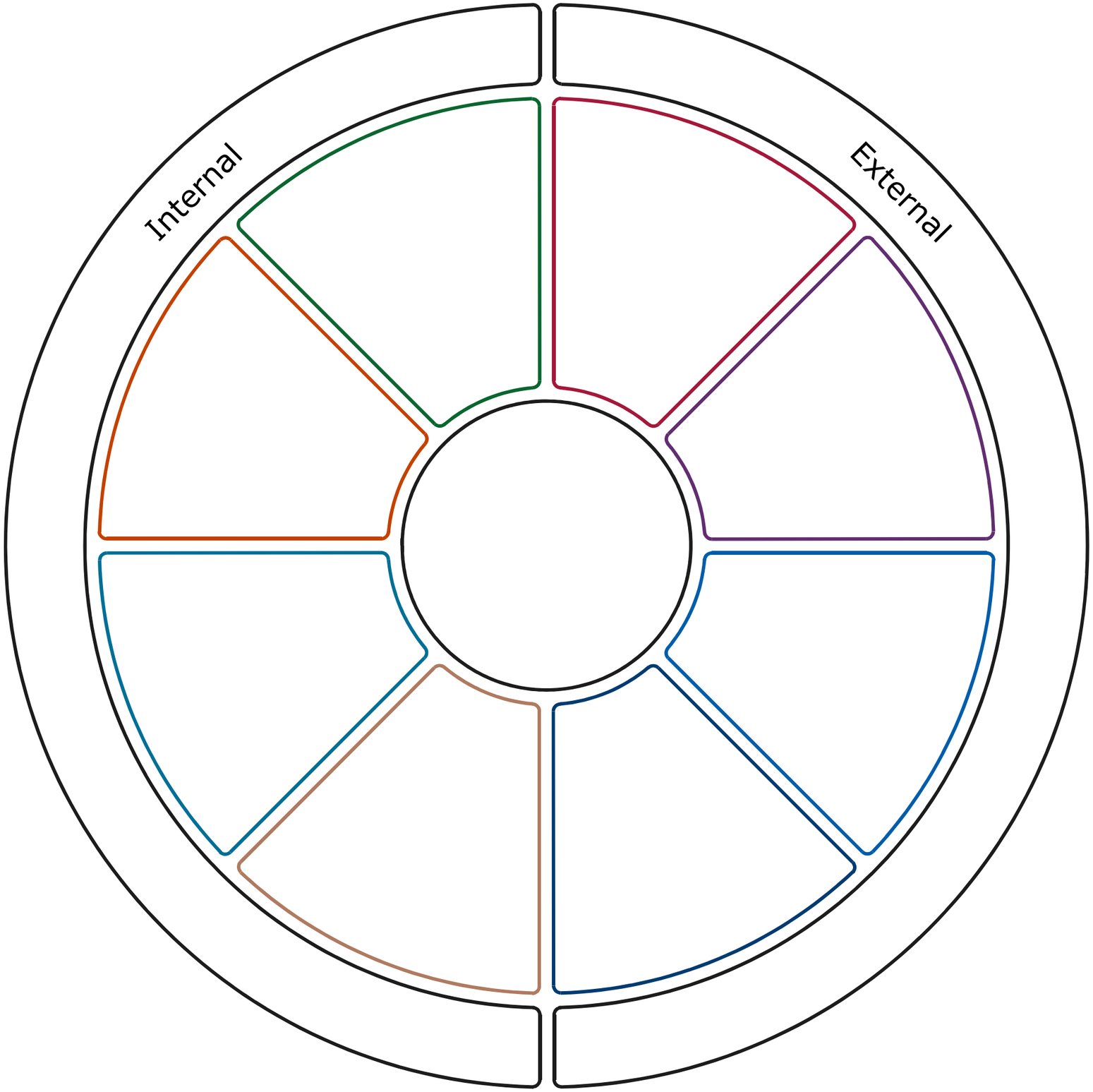
Stakeholder Influence

Low Interest and High Influence (satisfy)	High Interest and High Influence (manage)
Low Interest and Low Influence (monitor)	High Interest and Low Influence (inform)

Stakeholder List

Internal Stakeholders	External Stakeholders

Stakeholder Map



Stakeholder Needs

As a …	… I need …	… so that …

Structured What If Technique

Target	What if?	Impact	Controls	Risk (high, medium or low)

Improving Improvement

Professor John Clarkson FREng
January 2022

Cards

The following pages provide copies of all the **cards** referenced in this toolkit. These may also be found online at: http://www-edc.eng.cam.ac.uk/downloads/improvement.pdf

Service Users

People

Service Users

Problem

Jamie

Jamie is fifteen months old with a history of viral chest infections. This causes his parents some distress. He is otherwise a healthy, active toddler who is into everything.

Sam

Sam is a nine-year-old who has a congenital heart condition that requires regular monitoring in hospital. She is very bright, enjoys school and is keen to participate in activities with her friends.

Alfy

Alfy is a young adult with a history of anxiety and depression that is now affecting his studies. He is coping with life away from home, sharing a house with other students in a busy part of town.

Kate

Kate is the mother of baby Jamie, whose bouts of croup cause her and her husband much distress. Jamie has recently been hospitalised and she now becomes very anxious whenever he is ill.

Jess

Jess is thirty and was recently diagnosed with breast cancer. She faces a combination of chemotherapy, invasive surgery and radiotherapy. She lives near her mum who helps with the children.

Jim

Jim is nearing sixty and finding that not everything is now working as expected. His fitness has been compromised by too many business lunches and little time for his earlier outdoor hobbies.

Peter

Peter is in his seventies and generally in good health. He is the main carer for his wife, Linda, who has dementia. He used to go to watch the football, but now feels uneasy leaving the house.

Rose

Rose is a frail 80-year-old who lives alone. She has diabetes, pulmonary heart disease and kidney problems. She is worried she will end up in a home and so are her family who live far away.

Service Stakeholders

People

Service Stakeholders

Problem

Academic

Bill is a consultant urologist and runs the department in his hospital Trust. He is also director of an internationally leading research team with significant charitable and industry funding.

Administrator

Tracy works on a busy outpatient ward. She is responsible for a wide range of tasks that ensure a smooth flow of patients through the ward, which is staffed by an ever changing team.

Allied Health Professional

Sophie is a physiotherapist in a busy hospital unit specialising in sports injuries. She is interested in the role of novel wearable technologies for delivering and monitoring therapy.

Carer

Josie has been the main carer for her bedridden husband for the past five years. Their son rarely visits and she is constantly tired and increasingly worried about her own health.

Community Worker

Natasha enjoys helping people in their own homes. She is not as fit as she used to be and is frustrated by the increased physical demands and travel delays associated with her job.

Consultant

Sue is an Accident and Emergency consultant and patient safety lead in her hospital Trust. She has direct experience of the value of risk management in improving care.

Drug Manufacturer

Sarah works in development and production for an international drug company. She has a particular interest in both preventative and rescue inhalation technologies.

Equipment Supplier

Michael has supplied imaging technology for over twenty years. His company makes most of its income from products and services sold to fewer than ten NHS Trusts.

Family Pet

Fred is a loyal friend who is never far from his keeper's side. He likes plenty of walks, food from the table and the chance to snuggle up before bed. He is upset by changes to his routine.

Finance Officer

Evgeny is a senior finance officer in a large NHS Trust. Over the years he has accumulated an encyclopedic knowledge of the workings of the trust and of its finances.

Foundation Doctor

Karl is a foundation doctor about to start a new placement on a critical care unit. He is nervous about his lack of experience working with complex medication regimes and equipment.

General Practitioner

Nick is a local GP with a particular interest in service improvement. He works for a collective of Medical Practices committed to delivering better healthcare.

Health Minister

Mark is responsible for oversight of all NHS delivery and performance. He holds a portfolio ranging from public health and social care to mental health, primary care and secondary care.

Laboratory Technician

Tatiana is responsible for a range of activities in the pathology laboratory including the automated diagnostics. She particularly enjoys the variety and that every day is different.

Local Government Officer

Lloyd has worked in local government for all his life. He likes to make a difference, but is increasingly frustrated by the lack of budget to deliver effective community services.

Nurse

Moira is the senior nurse on a busy surgical ward. She works long shifts and is in charge of preparing patients for the surgical list. She has a good rapport with the surgical team.

Paramedic

Liz is a recently qualified paramedic with aspirations to join the region's air ambulance service. She enjoys the challenge of emergency care, but is frustrated by the lack of resources.

Patient Representative

David is a patient representative for a mental health Trust. He has been a service user in the past and provides insight into current service provision and the potential for improvement.

Pharmacist

Naveed runs a small chain of Independent community pharmacies. He prides himself on knowing his regular customers and works very hard to provide a good service to them.

Porter

Andrew has been a porter for nearly forty years in the same hospital. He is well liked by patients and staff, and knows all the best routes, but is not as fast and agile as he used to be.

Service Stakeholders

People

Service Stakeholders

Problem

Practice Manager

Thomas works for a general practice unit. He is responsible for a wide range of tasks that ensure a smooth flow of patients through the practice, which is staffed by an ever changing team.

Public Health Worker

Gabriella is a nutritionist with a wide brief to engage with the local community to promote good health through nutrition and monitor the impact of national policies.

Senior Trainee Doctor

Aoife is a senior anaesthetic registrar supporting a number of surgical teams across the hospital. She enjoys the variety of her work and is keen to continuously improve her skills.

Service Commissioner

Sally is a regional commissioner who has seen many changes in procurement practice. She is increasingly frustrated that she is unable to take a more holistic approach to service provision.

Service Funder

Geoff has held senior roles in healthcare management for over thirty years. He has seen national directives and internal initiatives come and go with little apparent impact on care.

Service Manager

Dawn is a nurse by training and service manager for a regional hospital. She has limited experience of change, but has a good working relationship with the wider team.

Service Regulator

Richard is a former pharmaceutical executive turned regulator. He has responsibility for the accreditation of medicines and care practices for general and specialist use.

Third Sector Worker

Anna is a former community nurse now working for a charity specialising in end-of-life care. She typically supports an individual and their family during their final months of life.

Service Improvers

Manage

Service Improvers

Plan

Clinical Lead

Amari is a consultant who is looking at making service improvements in a large teaching hospital in Cityville to address the growing demands due to an ageing population.

Commissioner

Lucas works for the CCG and is responsible for overseeing existing services as well as commissioning new solutions that can address clinical priorities at appropriate levels of cost.

Improvement Fellow

Joseph is a junior doctor working for a newly-formed Major Trauma Service in a large hospital. He is particularly interested in QI and its application to the service he has joined.

Nurse Clinical Manager

Emma is a nurse clinical manager working for a newly-formed Major Trauma Service at a large hospital. She is involved in the day-to-day management of the service.

Project Manager

Jake is a project manager for the CCG in Cityshire. He has worked in healthcare but is not a clinician. He has been tasked with leading a project but has no specific background in this area.

Risk Manager

Zac is a risk manager in a large teaching hospital within Cityshire. He is not a clinician, but has a background in human factors and safety management, having previously worked in industry.

Service Lead

Charles is a consultant and service lead for a newly-formed Major Trauma Service in a large hospital. He helped design this new service based on his experience of the needs of patients.

Service Manager

Zoe manages a busy care service in Cityshire which is coming under increasing pressure. She has been asked to look at increasing capacity through co-ordination with other service providers.

Transformation Lead

Lucia works for the clinical CCG in Cityshire. She has worked in a variety of service improvement roles in different NHS organisations. She started her career as a nurse before moving into management.

Case Studies

Manage

Case Studies

Case

Esther

Esther inspired her local medical department to initiate a series of interviews and workshops to identify redundancies and gaps in medical and community care systems

Methotrexate

When a patient died as a direct result of failures in their own care an inquiry highlighted the need to review the use of oral methotrexate for the treatment of rheumatoid arthritis

Community Care

Understanding people's ability to respond to the challenges in accessing community care can lead to improvements that influence clinical outcomes

Day Surgery

Perioperative care during day surgery is known to influence patient outcomes and understanding those factors that most effect the patient is of critical importance

Global Health

Observing patterns of treatment in an emergency department led to the development of tools to identify and evaluate more robust patient flow management paradigms

Palliative Care

New approaches to palliative care are required in response to people's changing needs and expectations within an increasingly resource constrained health service

Patient Flow

Observing patterns of treatment in an emergency department led to the development of tools to identify and evaluate more robust patient flow management paradigms

Public Health

Obesity among children is a significant challenge, requiring families, schools, food, community and healthcare services to work together to resolve the crisis

Improvement Questions

Manage

Improvement Questions

Plan

Trigger

Why are we doing this?
Leads to a documented rationale for improving an existing system or developing a new one

Purpose

What is the purpose?
Leads to a detailed description of the purpose of the current system within its wider context

Current

What do we do now?
Leads to a detailed description of the current system architecture and its observable behaviour

Performance

How do we perform now?
Leads to the qualitative and quantitative evaluation of the performance of the current system

Problem

What is the problem?
Leads to a clearly articulated view of a better system based on an understanding of the current system

Success

What does 'good' look like?
Leads to a common and clearly articulated understanding of success and how it might be recognised

Better

How could we improve?
Leads to a preliminary description of a better system architecture and its intended behaviour

Measure

What should we measure?
Leads to the identification of possible performance indicators for the improved system

Team

Who should be involved?
Leads to a common and clearly articulated understanding of who should deliver the improved system

Case

What is the case for change?
Leads to the definition of a case for change from the current system to one that is measurably better

Plan

What should we do next?
Leads to the ongoing development and execution of a plan of action to deliver the system in a timely manner

Identify

Who will use the system?
Leads to an understanding of the diversity of people involved and their needs and capabilities

Locate

Where is the system?
Leads to an understanding of the physical, organisational and cultural context of the system

Situate

What affects the system?
Leads to an understanding of the political and policy landscape within which the system is situated

Understand

Who are the stakeholders?
Leads to a common view of the stakeholders and their individual interests, needs and perspectives

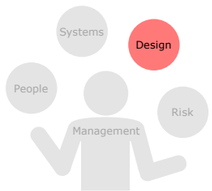
Organise

What are the elements?
Leads to an agreed system boundary, architecture and details of the interfaces between all the system elements

Integrate

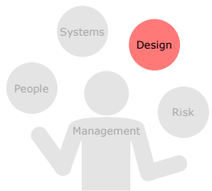
How does the system perform?
Leads to an integrated, operational system that is proven to meet the stakeholder requirements

Explore



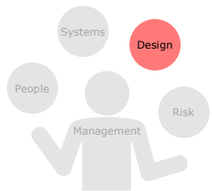
What are the needs?
Leads to a common understanding of the needs for a system, taking account of the full range of stakeholders

Create



How can the needs be met?
Leads to a range of possible solutions that would help meet the needs of the stakeholders

Evaluate



How well are the needs met?
Leads to an evaluation of possible concepts that could meet the needs identified by the stakeholders

Improvement Questions

Manage

Improvement Questions

Plan

Examine

What is going on?
Leads to an understanding of the system architecture and details of the interfaces between the elements

Assess

What could go wrong?
Leads to a systematic assessment of the likelihood and potential impact of threats to the system

Seek

What do we do well?
Leads to a systematic assessment of the presence and potential impact of opportunities within the system

Improve

How can we make it better?
Leads to a range of possible solutions that would help mitigate the threats or exploit the opportunities

Improvement Activities

Manage

Improvement Activities

Plan

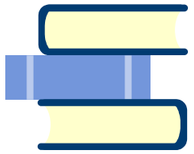
Sketch the System

Show the relationships between all the elements, people, locations, conditions, tasks and information

Understand Political Context

Understand the management, policy and political landscape within which the system exists

Analyse Relevant Documents



To understand the system of interest, its context, stakeholders, elements and performance

Observe Stakeholders

Observe stakeholders within the system and document their actual behaviour

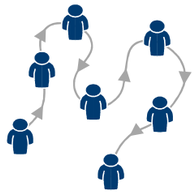
Consult Stakeholders

Consult stakeholders within the system and understand their expected behaviour

Describe Clinical Processes

Describe the clinical processes, key decisions and expected outcomes associated with the system

Describe Patient Journeys

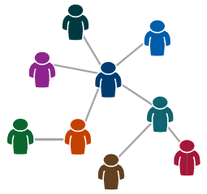


Describe the patient journeys through the system associated with particular clinical processes

Create System Maps

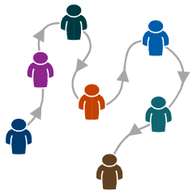
Create a common view of the system, its elements, architecture and interfaces to other systems

Create Stakeholder Map



Create a common view of the range of stakeholders, their interests, and the links between them

Understand Patient Diversity

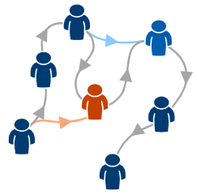


Understand the diversity of patients within the system and their particular needs and capabilities

Generate Personas

Describe stereotypical patients or care providers, with a range of medical conditions and capabilities

Generate Scenarios



Describe stereotypical scenarios of care involving a range of typical patients and care providers

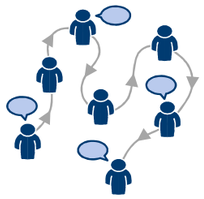
Tell the Stories

Communicate stories of patient and stakeholder experiences that bring life to the improvement challenges

Describe Stakeholder Experiences

Capture stakeholders' experiences of their varied journeys through the system

Describe Patient Experiences



Capture patients' experiences of their care journeys through the system

Measure Current Performance

Measure current levels of performance, taking account of the prioritised stakeholder needs

Benchmark Current Performance

Analyse current levels of performance, taking account of the prioritised stakeholder needs

Capture Stakeholder Needs

As a *stakeholder* **I need ...**
... so that ...

As a *stakeholder* **I need ...**
... so that ...

As a *stakeholder* **I need ...**
... so that ...

Identify the full range of possible stakeholder needs relevant to the system

Prioritise Stakeholder Needs

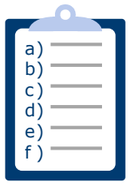
1 **As a** *stakeholder* **I need ...**
... so that ...

2 **As a** *stakeholder* **I need ...**
... so that ...

3 **As a** *stakeholder* **I need ...**
... so that ...

Understand the relative priority of stakeholder needs relevant to the system

Agree Core Themes



Agree the core themes for the requirements based on the prioritised stakeholder needs

Improvement Activities

Manage

Improvement Activities

Plan

Define Requirements

Elaborate on the core themes to develop a detailed set of system requirements

Describe the Big Idea

Encourage people to think creatively and describe how the system could be improved

Consider Pre-existing Solutions

Consider pre-existing solutions that have the potential to meet the system requirements

Stimulate Ideas

Stimulate ideas that may lead to concepts that meet the system requirements

Filter Ideas

Evaluate new concepts against the demands and wishes in the system requirements

Develop Concepts

Develop new concepts that have the potential to meet the system requirements

Make Models

Make models of new concepts to enable early evaluation against the system requirements

Identify the Big Wins

Identify the big wins and justify the resources required to make the system changes proposed

Define Measures

Define performance measures to evidence the successful delivery of a measurably better system

Agree Quality Targets

Define service quality targets to ensure the successful delivery of a measurably better system

Review Effectiveness

Identify clinical and cost effectiveness risks in the adoption of new concepts by their intended users

Review Safety

Identify safety concerns in the adoption of new concepts by their intended users

Review Experience

Identify potential barriers to the adoption of new concepts by their intended users

Review Sustainability

Identify sustainability concerns in the adoption of new concepts by their intended users

Synthesise Evidence

Provide evidence of evaluation of new concepts against the project requirements and quality targets

Draft the Pitch

Create a simple description of the problem, the process that will solve it, and the benefits that might be achieved

Demonstrate Future Improvement

Demonstrate the feasibility of the improvement to be delivered by the proposed solutions

Predict Stakeholder Benefits

Predict the stakeholder benefits expected by delivering the proposed improvement

Calculate Resources Required

Calculate the resources required to develop and deliver the proposed improvement

Estimate Time Required

Estimate the time required to develop and deliver the proposed improvement

Improvement Activities

Manage

Improvement Activities

Plan

Present Case for Change

Present a comprehensive case for change, balancing stakeholder benefits against costs of delivery

Decide the Next Step

Choose the activities most likely to improve the system and enable progress to the next stage gate

Identify Enablers and Blockers

Identify stakeholders who are able to facilitate or block delivery of an improved system

Manage Team

Manage a team who are enabled and willing to embark on the programme of improvement

Ensure Shared Understanding

Ensure the team share a common understanding of key improvement terms

Review Project Performance

Review risks present in the programme required to deliver an improved system

Review Project Progress

Review progress against the programme required to deliver an improved system

Plan Future Activities

Plan the future activities in a clear and robust programme to deliver an improved system

Challenge the Scope

Consider different levels of scope and pick the most appropriate level for the project to succeed

Agree Aim Statement

Agree and communicate a clear description of the overall aim for improvement of the system

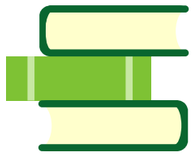
Improvement Tools

Manage

Improvement Tools

Plan

Literature Review

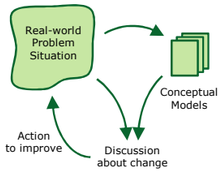


A systematic review of the literature describing the system being improved and its behaviour

Rich Picture

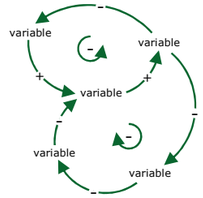
A means to understand a system using diagrams to create a preliminary mental model

Soft Systems Method



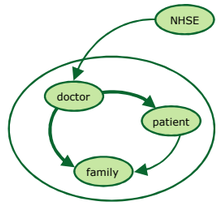
A means to foster learning and appreciation of the problem situation within a complex system

Causal Loop Diagram



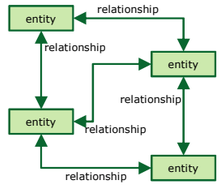
A means to capture the variables of interest in a complex system and understand their effect on outcomes

Influence Diagram



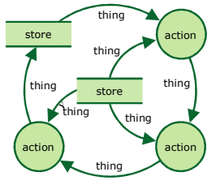
A means to map the components or issues for a situation or system and the influences that exist between them

Entity Relationship Diagram



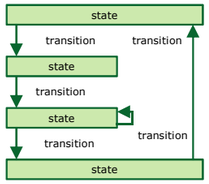
A means to identify and map the entities in a complex system and the relationships between them

Data Flow Diagram



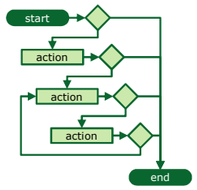
A means to identify and map the functions in a complex system and the things flowing between them

State Transition Diagram



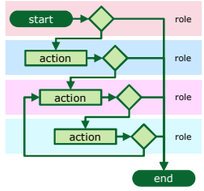
A means to identify and map the states in a complex system and the transitions between them

Flow Chart



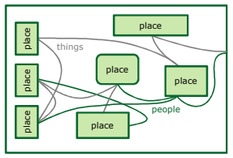
A means to map key activities and decisions in a system and understand their impact on performance

Swimlane Diagram



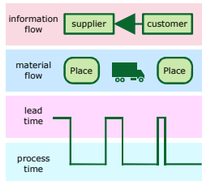
A means to map key activities and decisions in a system and understand their impact on performance

Spaghetti Diagram



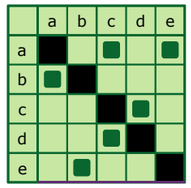
A tool to establish the optimum layout for a department based on observations of movement

Value Stream Mapping



A tool to help understand and improve the material and information flow within organisations

Dependency Structure Matrix



A structured representation of the dependencies between individual elements of a system

One-to-one Interviews

A means to elicit information about a particular topic or area of interest in a one-to-one conversation

Facilitated Discussion

A means to elicit perceptions about a particular topic or area of interest in a non-threatening environment

Delphi Study

An iterative approach to develop a consensus view regarding the current performance of the system

Participant Observation

A means to understand how things are really done in a particular situation or area of interest

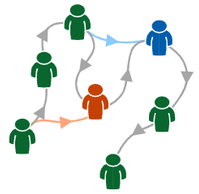
Observational Study

A means to observe how things are done in a particular situation or area of interest

Designing Personas

A means to create representations of stereotypical users and their conditions, capabilities or responsibilities

Designing Scenarios



A means to create the stories of stereotypical users reflecting their conditions, capabilities or responsibilities

Improvement Tools

Manage

Improvement Tools

Plan

Life Café

A means to elicit an understanding of the needs for a system, taking account of the full range of stakeholders

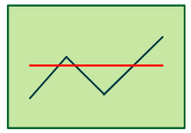
Public Involvement

A means to encourage and ensure patient and public involvement in quality improvement projects

MoSCoW

A means to capture a prioritised list of must, should, could and won't have requirements for improvement

Data Analysis

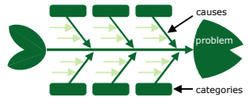


A means to analyse available data to understand the current levels of performance of the system

Storyboarding

A means to clearly articulate a view of a better system based on an understanding of the current system

Fishbone Diagram



A method to think through the causes of a problem before starting to identify its root causes

Brainstorming

A means to encourage the generation of ideas and concepts to facilitate system improvement

Disney

A means to encourage the dreamer, the realist and the critic to develop ideas for system improvement

Six Thinking Hats

A means to encourage different ways of thinking to reach innovative concepts for system improvement

Morphological Chart

A means to help organise the presentation of ideas and concepts to facilitate system improvement

Exclusion Audit

A systematic approach to estimating potential levels of exclusion when using a system

User Trials

An experimental approach to identifying potential causes of difficulty when using a system

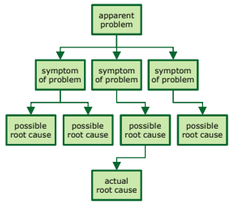
Expert Review

A systematic approach to identifying potential causes of difficulty when using a system

Life Cycle Assessment

A systematic approach to estimating the environmental impact of a system

Root Cause Analysis



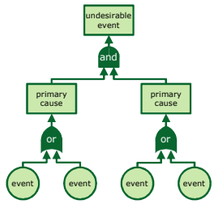
A systematic approach for identifying the root cause of a problem within a system

Failure Mode and Effects Analysis

failure mode	failure effect	failure likelihood	failure impact	risk of failure

A systematic approach for identifying the causes of all possible failures in a system and their consequent risk

Fault Tree Analysis



An approach to identifying desirable or undesirable events and the actions that lead to them

Hazard and Operability Analysis

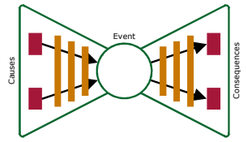
guide word	likely deviation	conse-quence	possible causes	existing protection

A systematic approach for identifying deviations from normal operation and their undesirable consequences

Structured What-If Technique

A systematic approach for identifying risks within a system using structured brainstorming and guidewords

Bowtie Method



A systematic approach for visualising links between causes of an event and potential consequences

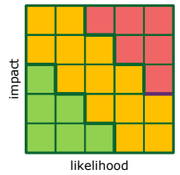
Improvement Tools

Manage

Improvement Tools

Plan

Risk Matrix



A structured representation of the likelihood and impact of threats and opportunities in the system

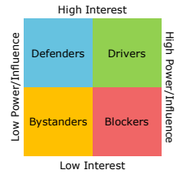
PEST(LE) Analysis

A broad approach to identify the external factors most likely to impact a proposed change

SWOT Analysis

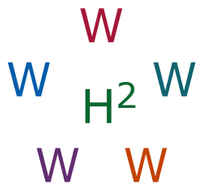
A means to identify the strengths, weaknesses, opportunities and threats associated with a change

Stakeholder Analysis



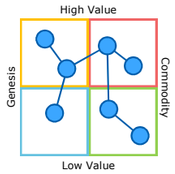
An analysis of the potential for stakeholders to drive or block the outcome of a proposed change

The Five Ws and Two Hs



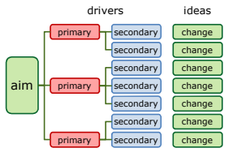
A means to summarise the rational for and initial description of a proposed change

Wardley Map



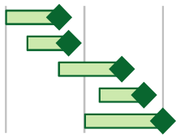
A linked map of stakeholder values set against the maturity of the elements that create them

Driver Diagram



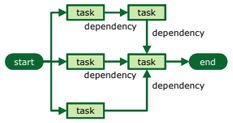
A theory-of-change that can be used to collaboratively plan improvement project activities

Gantt Chart



A bar chart to illustrate the schedule required to deliver a programme of improvement

Activity Dependency Diagram



A dependency network to map the activities required to deliver a programme of improvement

Project Canvas

A dynamic summary of a programme of improvement to encourage team consensus

LoMo

LoMo

A fundamental shift in thinking about the meetings required to deliver a programme of improvement

Improvement Terms

Manage

Improvement Terms

Plan

Stakeholder

stakeholder
noun
A person with an interest or concern in something

see also **user**

A stakeholder is a person with an interest in the project because they have something to gain or lose

User

user
noun
A person who uses or operates something

see also **stakeholder**

The patient is the core user of a system, but other stakeholders are also users in the delivery of services

Trigger

trigger
noun
The thing that caused someone to do something

see also **context**, **scope**

The trigger is the reason why there is an improvement programme and defines the initial scope of the programme

Context

context
noun
The circumstances that surround something

see also **trigger**, **scope**

The context includes all aspects that affect the problem and the implementation of a solution

Scope

scope
noun
The extent of the area that something deals with

see also **trigger**, **context**, **system**, **aim**

The scope is the boundary between aspects considered as part of the problem and others that affect the problem

System

system
noun
A set of things working together to do something

see also **scope**, **aim**

A system is a set of elements that, when combined, have qualities that are not present in the elements themselves

Aim

aim
noun
The intention or ambition of achieving something

see also **scope**, **system**, **purpose**, **need**

The project aim represents a clear statement of intent that helps everyone align with the project objectives
"

Purpose

purpose
noun
The thing that something is supposed to achieve

see also **aim**, **theme**

The purpose defines the things that the particular health and care system is supposed to deliver and achieve

Need

need
noun
A strong feeling that you must have something

see also **aim**, **purpose**, **them**

A need is an essential condition that a particular stakeholder believes has to be satisfied from their perspective

Theme

theme
noun
The core idea that is apparent in something

see also **need**, **requirement**

The themes are high-level targets for improvement and capture the essence of the things the improved system must do

Requirement

requirement
noun
A description of something you must have

see also **theme**, **specification**

A condition that has to be satisfied for the improvement to be successful, derived from an agreed set of themes

Specification

specification
noun
A detailed description of how something should be

see also **requirement**

A specification is a structured set of requirements providing a holistic view of the need for improvement

Challenge

challenge
noun
A difficult or demanding task or situation

see also **problem**

The challenge represents what is known or perceived to be wrong with the current system

Problem

problem
noun
A detailed description of a particular challenge

see also **challenge**

The problem statement represents the consensus view on the challenge that is going to be solved

Journey

journey
noun
An act of travelling from one place to another

see also **pathway**

A patient journey captures the things that happen to an individual as they interact with health and care services

Pathway

pathway
noun
A course of action to achieve a specified result

see also **journey**

The clinical pathway is a description of the things that are expected to happen in provision of a health or care service

Persona

persona
noun
A caricature designed to display certain attributes

see also **scenario**

A persona is a description of a person with a blend of real attributes, to assist the design of an improved system

Scenario

scenario
noun
A typical sequence or development of events

see also **persona**

A scenario describes an instance of a particular system as a starting point for discussing targets for improvement

Idea

idea
noun
A suggestion or plan for doing something

see also **concept**, **model**

A suggestion for how an aspect of the system could be improved which has not yet been worked into a viable concept

Concept

concept
noun
An idea that is connected with something

see also **idea**, **model**, **solution**

A concept is a description of something that does not yet exist, but has the potential to improve the service

Improvement Terms

Manage

Improvement Terms

Plan

Model

model
noun
A simplified representation of something

see also **idea**, **concept**, **solution**

A model is a simplified physical or virtual embodiment of a concept which communicates particular aspects of it

Solution

solution
noun
A way of solving a particular problem

see also **concept**, **model**

A solution is chosen from one of the many concepts considered when exploring ways to solve the problem

Hazard

hazard
noun
The possibility of harm or an adverse outcome

see also **risk**

A hazard is something that leads to the possibility of harm or events that result in an adverse outcome

Risk

risk
noun
The probability of harm or an adverse outcome

see also **hazard**

A risk is exposure to hazards and the probability of harm or events that result in an adverse outcome

Quality

quality
noun
The degree of excellence possessed by a thing

see also **target**

The quality targets are specific objectives for clinical and cost effectiveness, patient safety and patient experience

Target

target
noun
The identity of something to be aimed at

see also **quality**

A target is an objective for a given phase of the improvement process related to service or programme performance

Evaluation

evaluation
noun
Showing a solution satisfies its requirements

see also **verification**, **validation**

The evaluation of the elements of a system tests whether they are likely to achieve their intended performance

Verification

verification
noun
Showing a solution meets its requirements

see also **evaluation**, **validation**

The verification of a system tests whether it achieves its intended performance under specified conditions

Validation

validation
noun
Showing a solution is fit for its intended purpose

see also **evaluation**, **verification**

The validation of a system checks whether it works with real users and other stakeholders in real contexts

Rationale

rationale
noun
The reasons or a logical basis for something

see also **case**

The rational for an improvement concept reasons why it has the form and function that it has

Case

case
noun
A set of arguments to support doing something

see also **rationale**

The case for improving a system balances the benefits against the costs of delivering the improvement

Process

process
noun
A series of actions to achieve something

see also **plan**, **resource**

An improvement process comprises activities which are chosen in response to targets to design an improved system

Plan

plan
noun
A detailed proposal for doing something

see also **process**, **resource**

An improvement plan provides a description of the activities and resources required to deliver an improvement

Resource

resource
noun
The thing that enables something to happen

see also **process**, **plan**

The resource required to deliver improvement is likely to include people, things, tools and funding

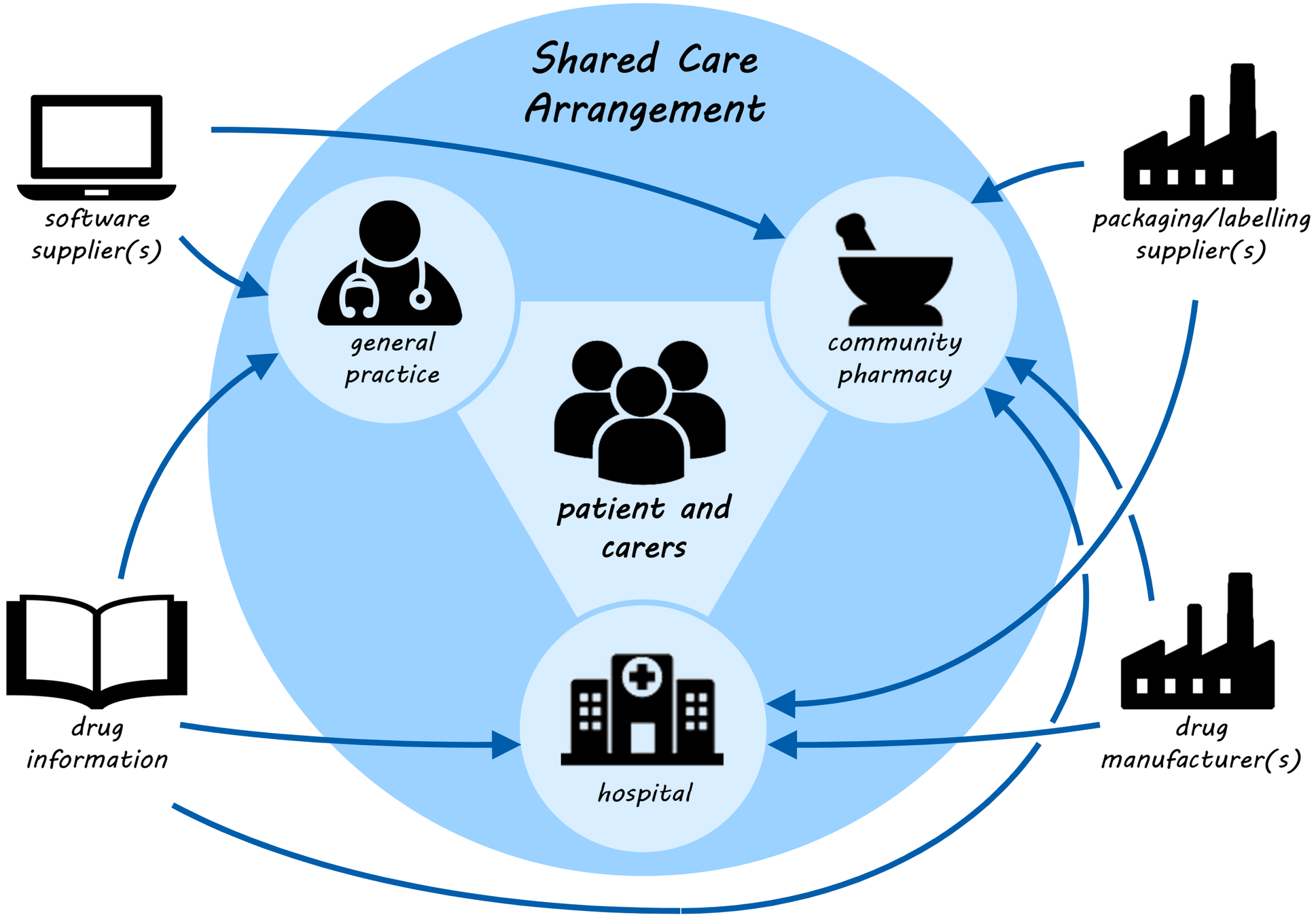
Improving Improvement

Professor John Clarkson FREng
January 2022

Using the Worksheets

The following pages provide show how the **worksheets** might be used in practice.

Local and national stakeholders, led by the National Patient Safety Agency, were engaged in making the design of methotrexate tablets, their prescription, delivery and monitoring safer for patients using it for the treatment of rheumatoid arthritis



Improvement Canvas

Methotrexate

Agree the Scope

To reduce to zero the number of deaths attributed to the misuse of oral methotrexate; focusing on packaging, education and tablet design

Understand the Context

Of the 13,000 medicines licensed for use in the UK at that time, oral methotrexate was one of only six that should have been taken weekly; where previously, 25 deaths and 26 cases of serious harm had been attributed to the incorrect use of methotrexate

Define the Problem

The needs are dominated by the needs of the patient, where the priority is for an easy-to-follow medication management process, easy-to-understand information about methotrexate, easy-to-identify medication and easy-to-open packs

Identify the Stakeholders

See accompanying Stakeholder Map and Stakeholder Influence diagram; with scenarios drawn from home use and hospital admissions

Develop the Solution

Some ideas for rebranding information about methotrexate, differentiating between tablet doses and providing warnings in prescribing software

Collect the Evidence

Multiple risks with current system include wrong prescribing, wrong administration, poor monitoring and lack of awareness of the dangers of methotrexate

Build the Team

Patients, doctors, drug and software suppliers and pharmacists

Make the Case

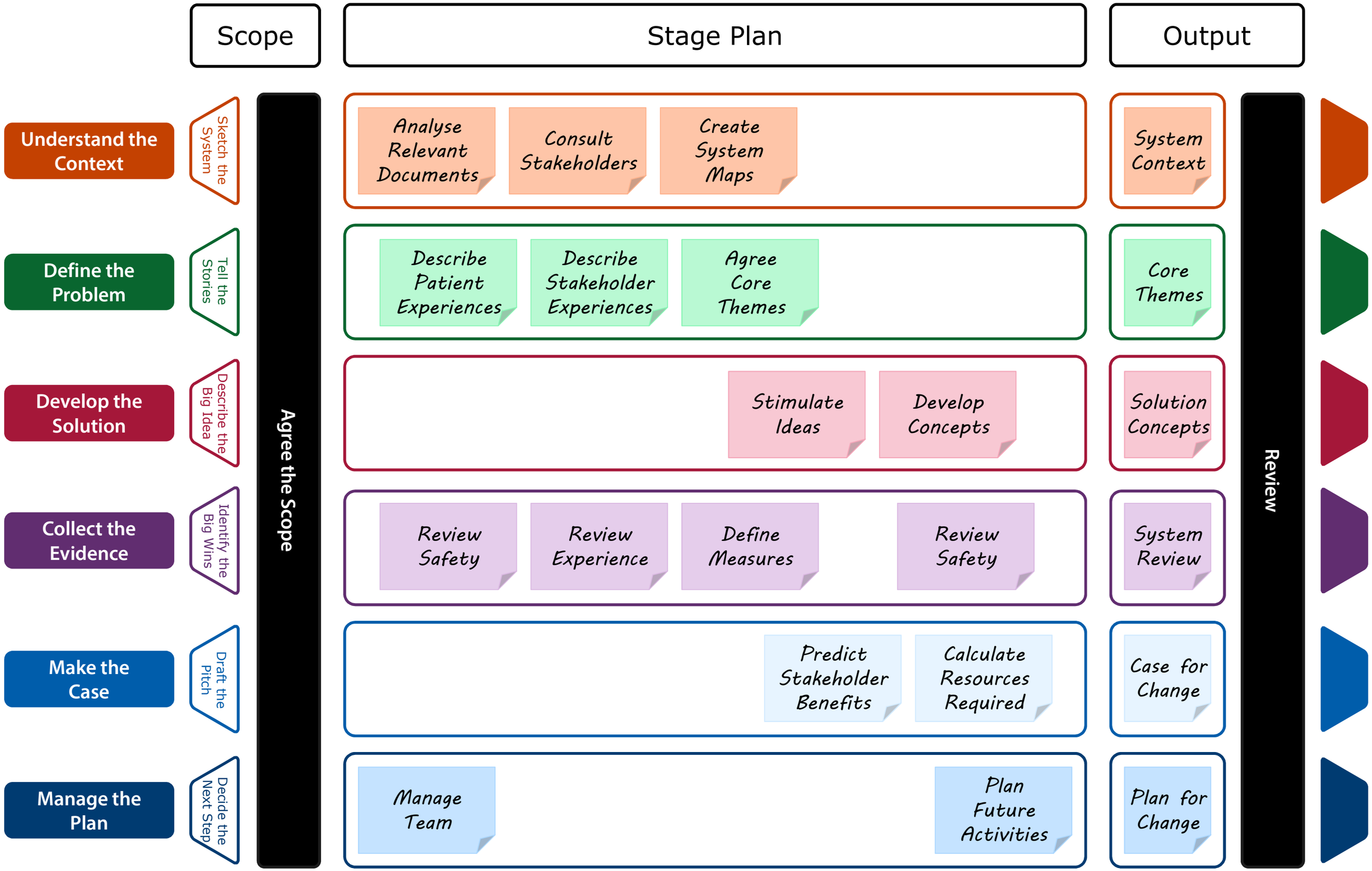
The benefit of reducing the incidence of never events, set against the cost of change

Manage the Plan

See accompanying Stage Plan

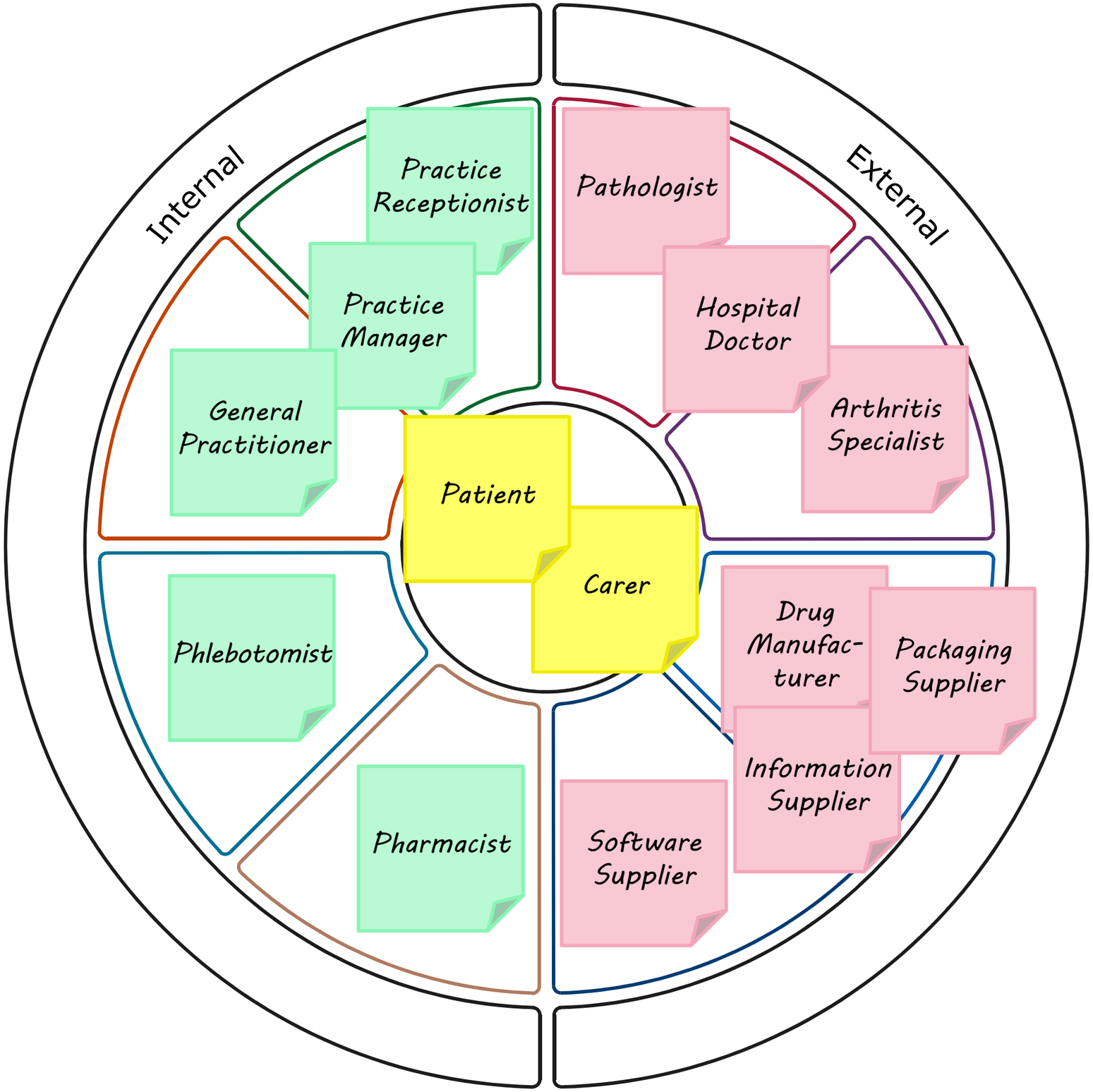
Stage Plan

Methotrexate



Stakeholder Map

Methotrexate



Stakeholder Influence

Methotrexate

Incremental Ideas for System-wide Change

- Phlebotomist
- General Practitioner
- Packaging Supplier
- Hospital Doctor

Radical Ideas for System-wide Change

- Software Supplier
- Patient
- Drug Manufac-turer
- Information Supplier

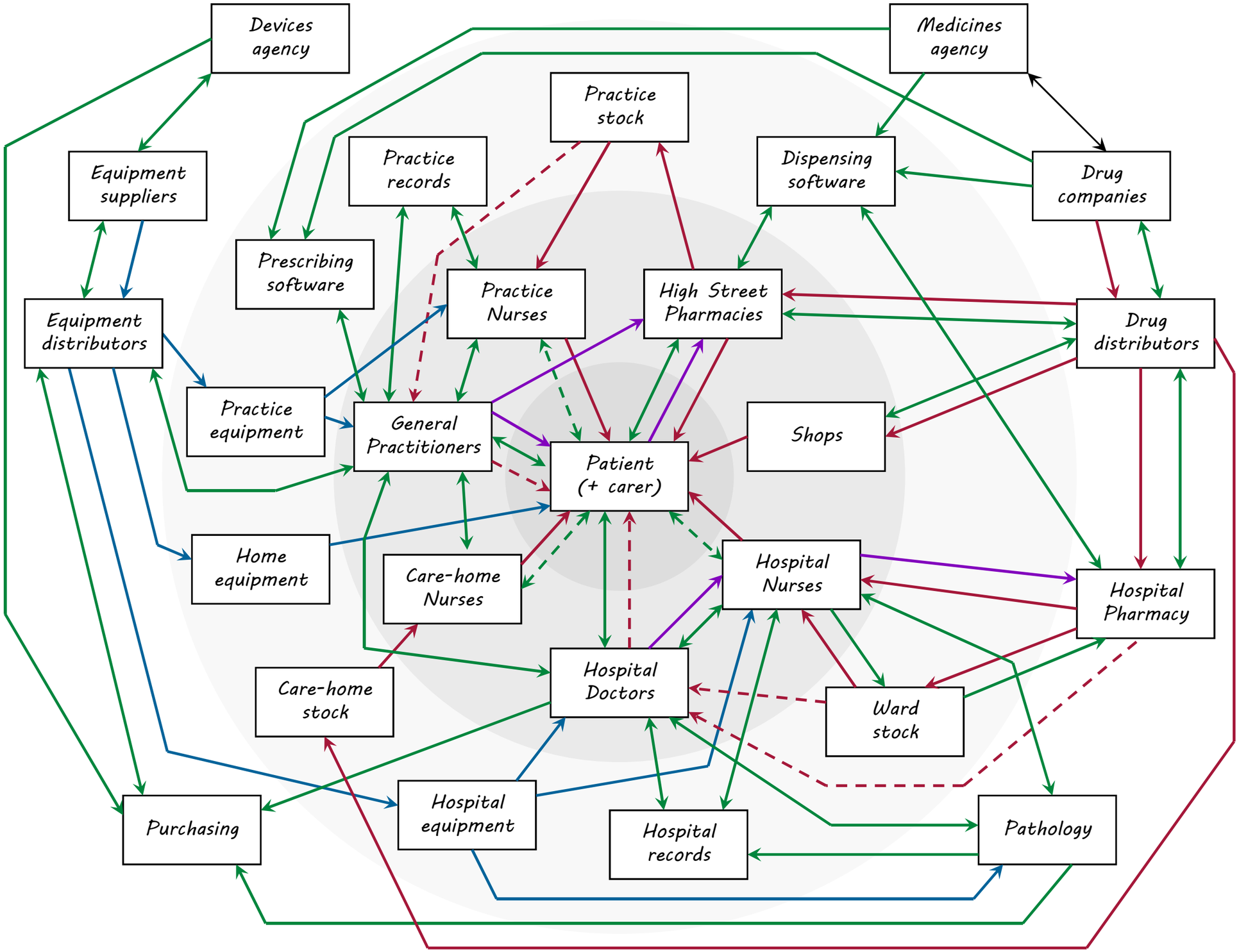
Incremental Ideas for Small-scale Change

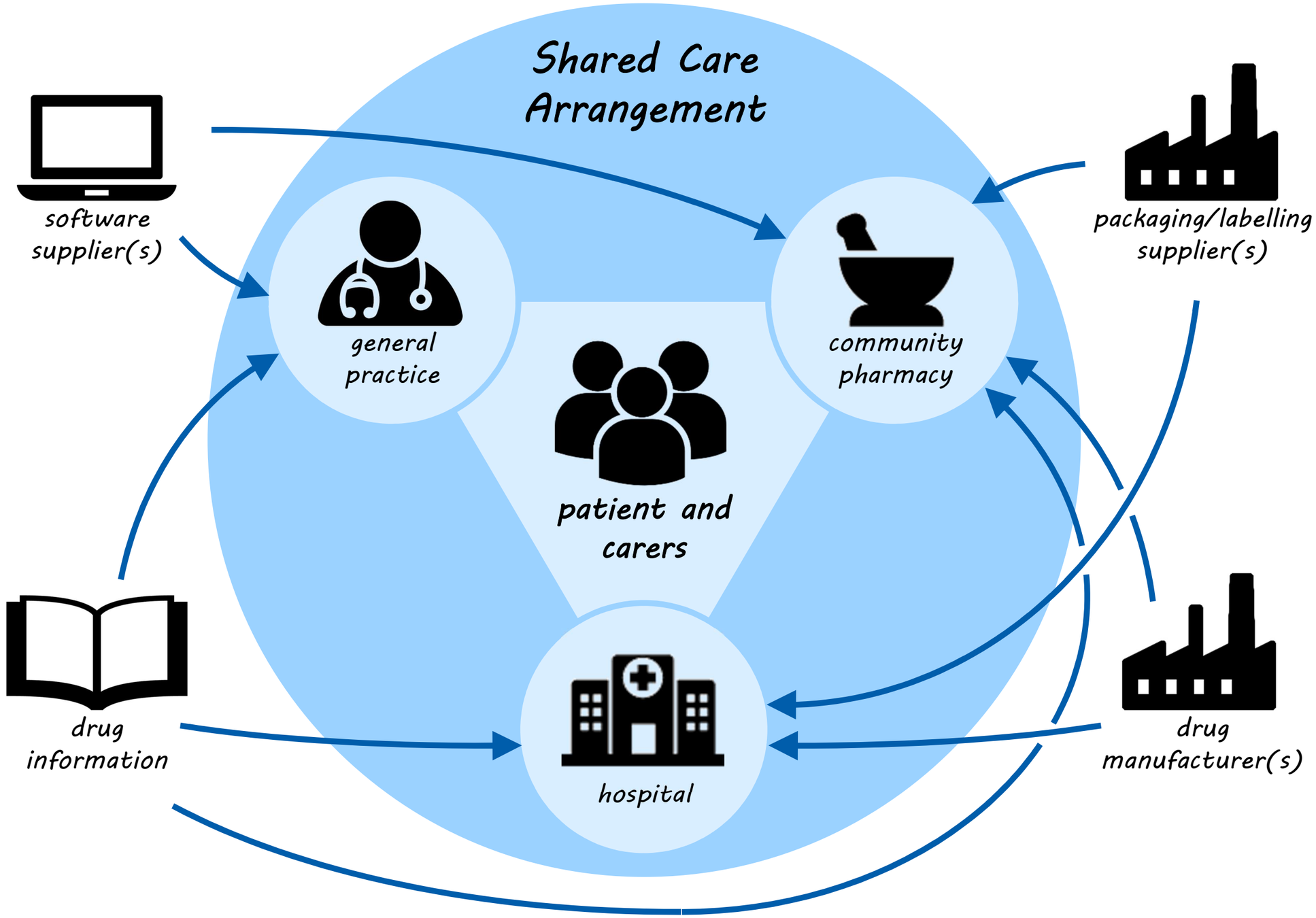
- Pathologist
- Practice Receptionist
- Practice Manager

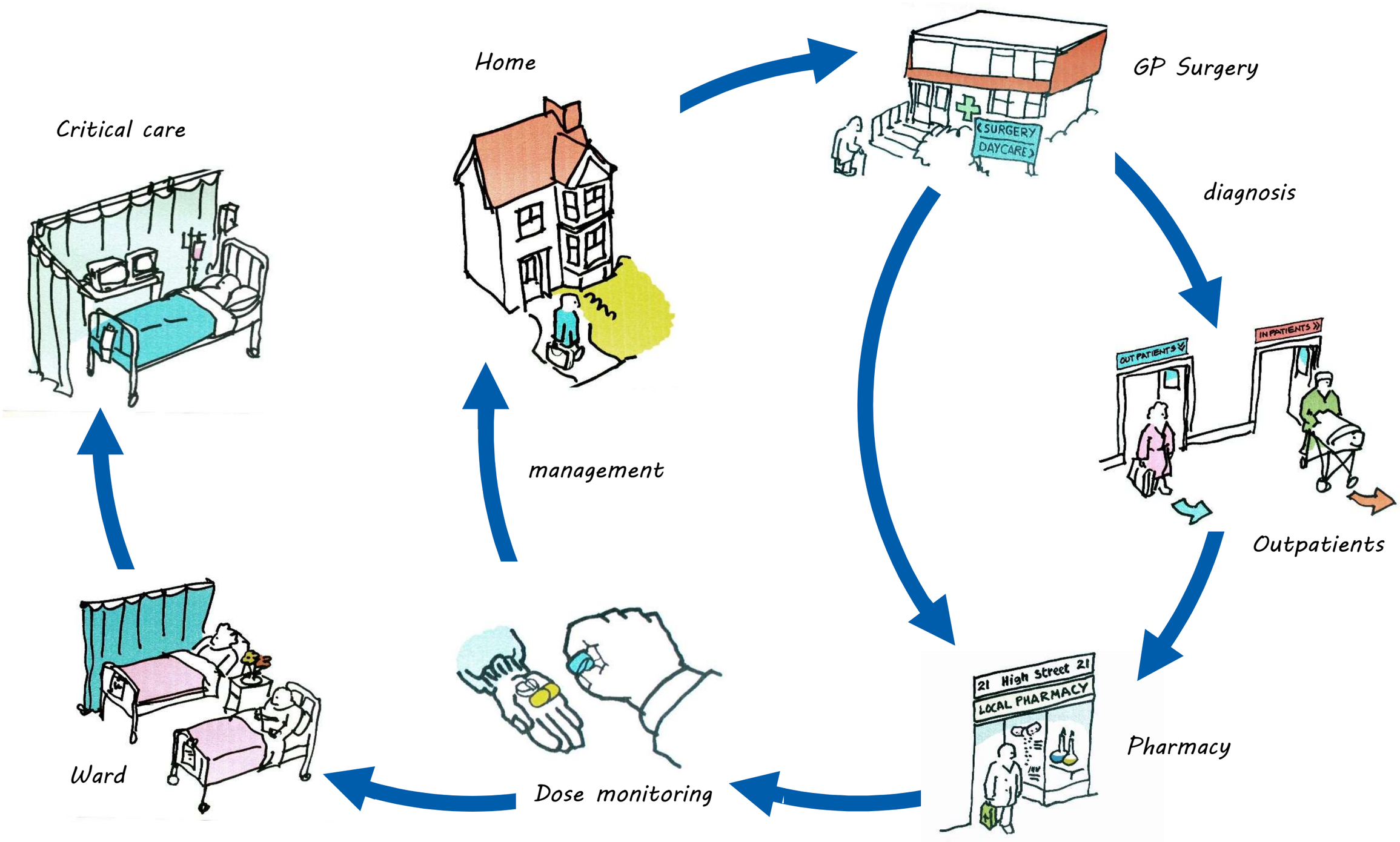
Radical Ideas for Small-scale Change

- Carer
- Pharmacist
- Arthritis Specialist

Methotrexate




Shared Care Arrangement
software supplier(s)
packaging/labelling supplier(s)
general practice
community pharmacy
patient and carers
drug information
drug manufacturer(s)
hospital


Critical care
Home
GP Surgery
SURGERY
DAYCARE
diagnosis
IN PATIENTS
OUT PATIENTS
Outpatients
management
21 High Street 21
LOCAL PHARMACY
Pharmacy
Dose monitoring
Ward

Patient Journey

Methotrexate

TAKING YOUR TABLETS

Always take your tablets exactly as your doctor has told you to. This information will also be on the pharmacist's label. If you are not sure how to take your tablets ask your doctor or pharmacist. Do not take more tablets than your doctor has told you to. It will not make you better any faster and it may harm you.

nts with psoriasis usually take their Methotrexate Sodium Tablets once a week on the same day each week. The will normally be between 10 and 25mg but this dose may be changed by your doctor depending on your condition.

nts with rheumatoid arthritis will also usually take their tablets once a week on the same day each week. The will normally be between 7.5 and 20mg but this may be changed by your doctor.

dose of methotrexate for patients with cancer will vary depending on what kind of cancer the patient has and also e patient's medical condition. Methotrexate may be the only drug given or it may be given with other drugs. Your or or pharmacist will be able to explain exactly which drugs you are being given.

ly patients may need smaller doses of methotrexate.

g your treatment you may have tests, such as blood tests to check that the methotrexate is working properly and our kidneys are getting rid of any drug that is not needed.

doctor may instruct you to take sodium bicarbonate or Diamox* tablets while receiving Methotrexate Sodium ts to help make sure that the active ingredient does not collect in the kidneys.

T TO DO IF YOU FORGET TO TAKE A TABLET

t as soon as you remember if this is within two days. However, if you have missed a dose by more than two please contact your doctor for advice.

T TO DO IF YOU TAKE TOO MANY TABLETS

have taken an overdose of methotrexate or more tablets than the doctor has told you to, you should get medical mmediately either by calling your doctor or by going to the nearest hospital casualty department. Always take pelled medicine container with you, whether there are any Methotrexate Sodium Tablets left or not.

R RECEIVING YOUR TABLETS

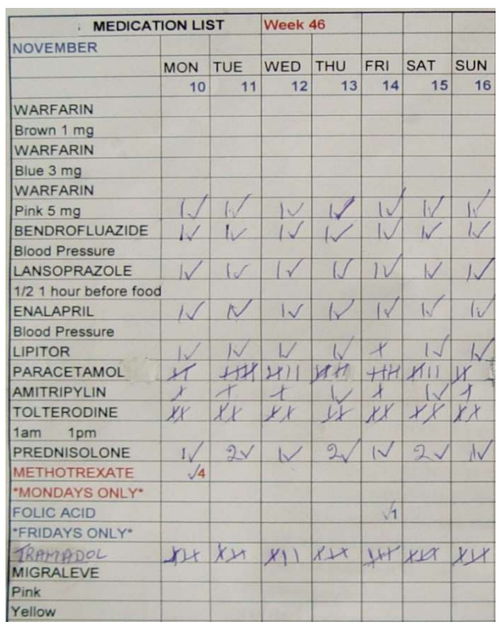
all medicines, as well as helping with your illness, methotrexate may cause some unwanted effects. Most of ects listed below will only be seen in patients who are receiving high doses of methotrexate to treat cancer. re not seen as often and are not as severe at the doses used in the treatment of psoriasis or rheumatoid arthritis. f the effects listed or any other symptoms you may have become troublesome, please contact your doctor or acist.

ost common unwanted effects are nausea, stomach pains and soreness of the mouth and lips.

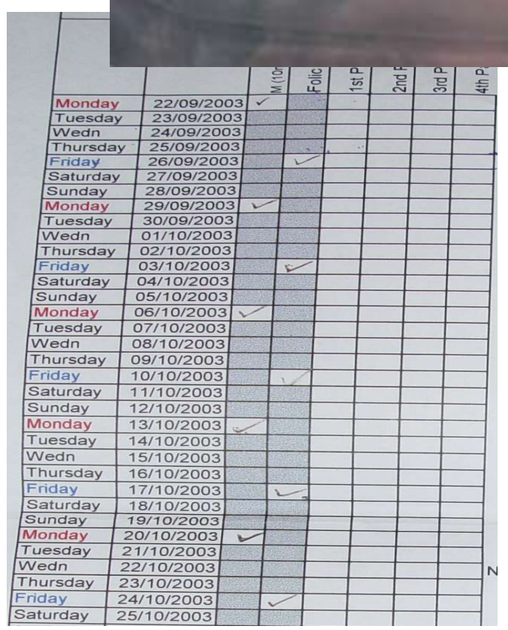
trexate can make you more likely to catch infections. If you think you have an infection, a sore throat, fever, or achiness during treatment you should tell your doctor immediately.

ommonly, methotrexate causes vomiting, diarrhoea, loss of appetite, fever, chills, dizziness, loss of interest in, ility to have sex, eye irritation, tiredness, feeling weak, drowsiness, pain in joints or muscles, mood changes, chiness, reddening and blistering of the skin, increased sensitivity to sunlight, skin ulcers, vaginal ulcers, acne, nflammation of the veins, hair loss, headache or blurred vision.

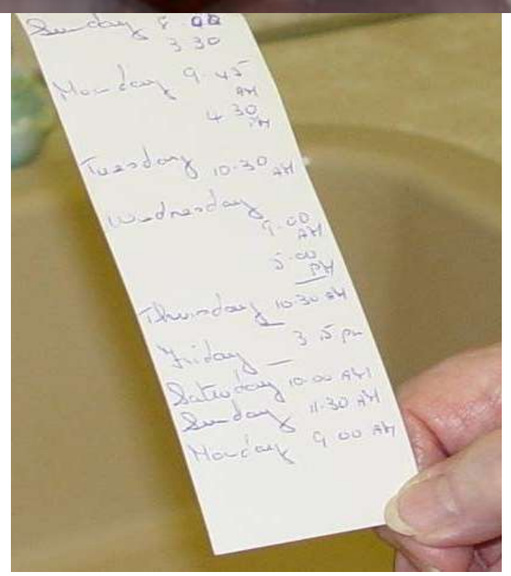
all number of patients methotrexate may cause serious unwanted effects and, on rare occasions, death. You contact your doctor immediately if you notice any of the following:

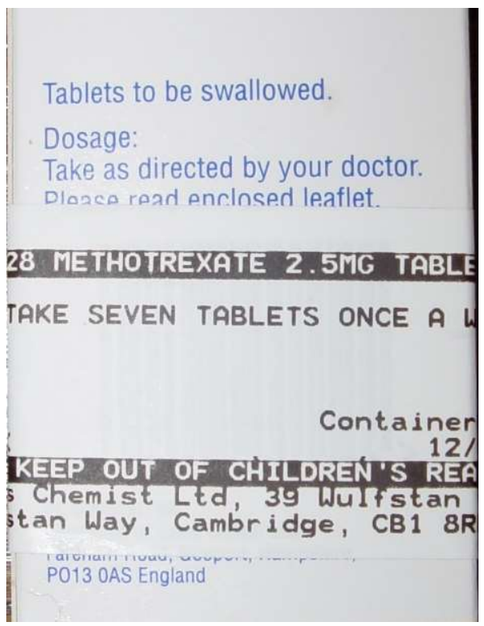


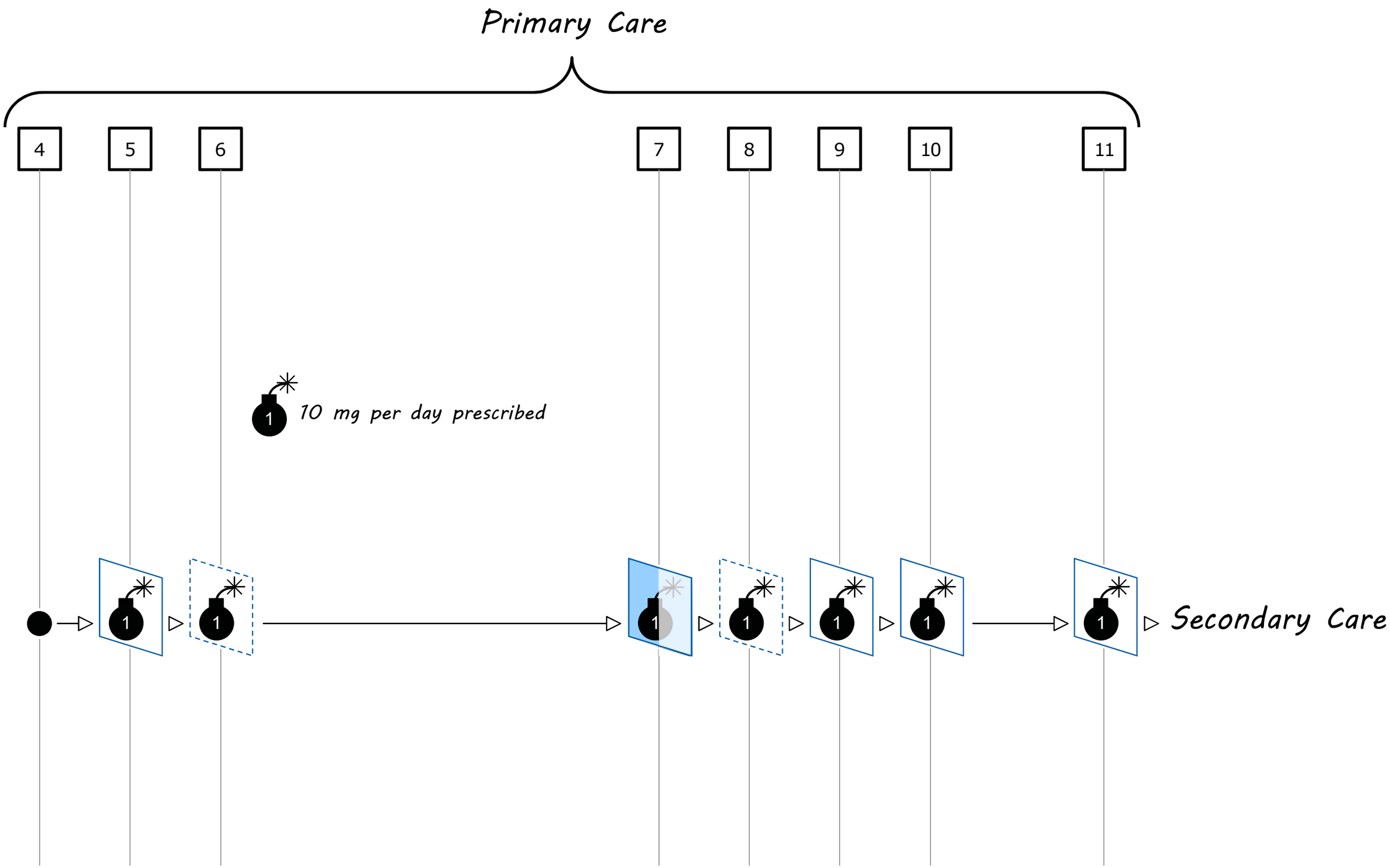
MEDICATION LIST			Week 46				
NOVEMBER							
	MON	TUE	WED	THU	FRI	SAT	SUN
	10	11	12	13	14	15	16
WARFARIN							
Brown 1 mg							
WARFARIN							
Blue 3 mg							
WARFARIN							
Pink 5 mg	1✓	1✓	1✓	1✓	1✓	1✓	1✓
BENDROFLUAZIDE	1✓	1✓	1✓	1✓	1✓	1✓	1✓
Blood Pressure							
LANSOPRAZOLE	1✓	1✓	1✓	1✓	1✓	1✓	1✓
1/2 1 hour before food							
ENALAPRIL	1✓	1✓	1✓	1✓	1✓	1✓	1✓
Blood Pressure							
LIPITOR	1✓	1✓	1✓	1✓	✗	1✓	1✓
PARACETAMOL	✗✗	✗✗✗	✗✗✗	✗✗✗	✗✗✗	✗✗✗	✗✗
AMITRIPYLIN	✗	✗	✗	1✓	✗	1✓	✗
TOLTERODINE	✗✗	✗✗	✗✗	✗✗	✗✗	✗✗	✗✗
1am 1pm							
PREDNISOLONE	1✓	2✓	1✓	2✓	1✓	2✓	1✓
METHOTREXATE	✓4						
MONDAYS ONLY							
FOLIC ACID					✓1		
FRIDAYS ONLY							
TRAMADOL	✗✗✗	✗✗✗	✗✗✗	✗✗✗	✗✗✗	✗✗✗	✗✗✗
MIGRALEVE							
Pink							
Yellow							



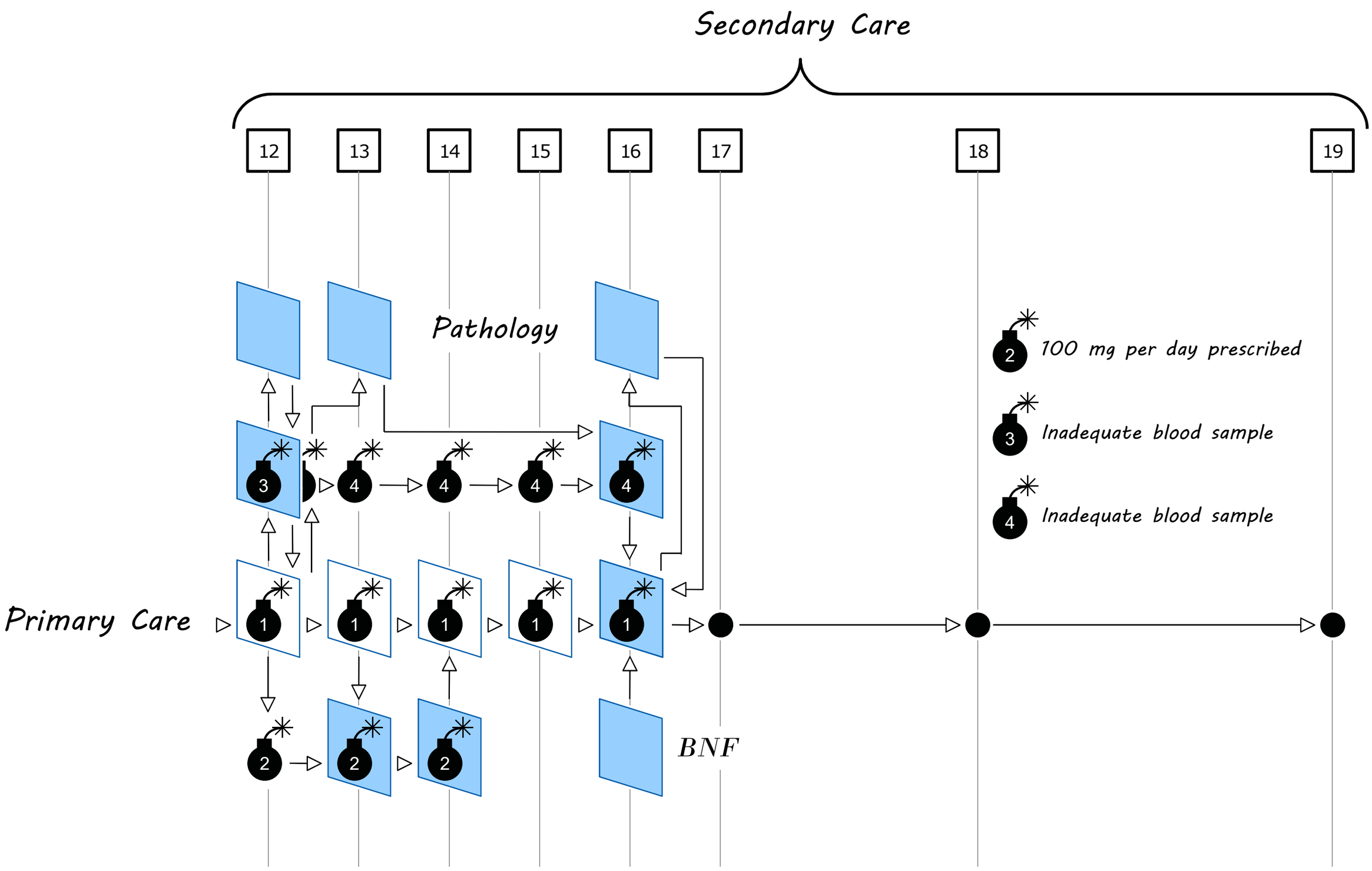
		M 10	Folic	1st P	2nd P	3rd P	4th P
Monday	22/09/2003	✓					
Tuesday	23/09/2003						
Wedn	24/09/2003						
Thursday	25/09/2003						
Friday	26/09/2003		✓				
Saturday	27/09/2003						
Sunday	28/09/2003						
Monday	29/09/2003	✓					
Tuesday	30/09/2003						
Wedn	01/10/2003						
Thursday	02/10/2003						
Friday	03/10/2003		✓				
Saturday	04/10/2003						
Sunday	05/10/2003						
Monday	06/10/2003	✓					
Tuesday	07/10/2003						
Wedn	08/10/2003						
Thursday	09/10/2003						
Friday	10/10/2003		✓				
Saturday	11/10/2003						
Sunday	12/10/2003						
Monday	13/10/2003	✓					
Tuesday	14/10/2003						
Wedn	15/10/2003						
Thursday	16/10/2003						
Friday	17/10/2003		✓				
Saturday	18/10/2003						
Sunday	19/10/2003						
Monday	20/10/2003	✓					
Tuesday	21/10/2003						
Wedn	22/10/2003						
Thursday	23/10/2003						
Friday	24/10/2003		✓				
Saturday	25/10/2003						

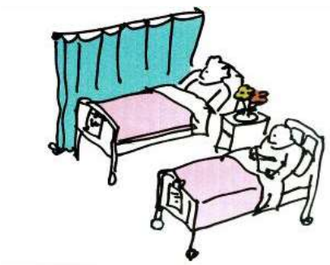





Primary Care
4
5
6
7
8
9
10
11
1
10 mg per day prescribed
1
1
1
1
1
1
1
Secondary Care

Methotrexate



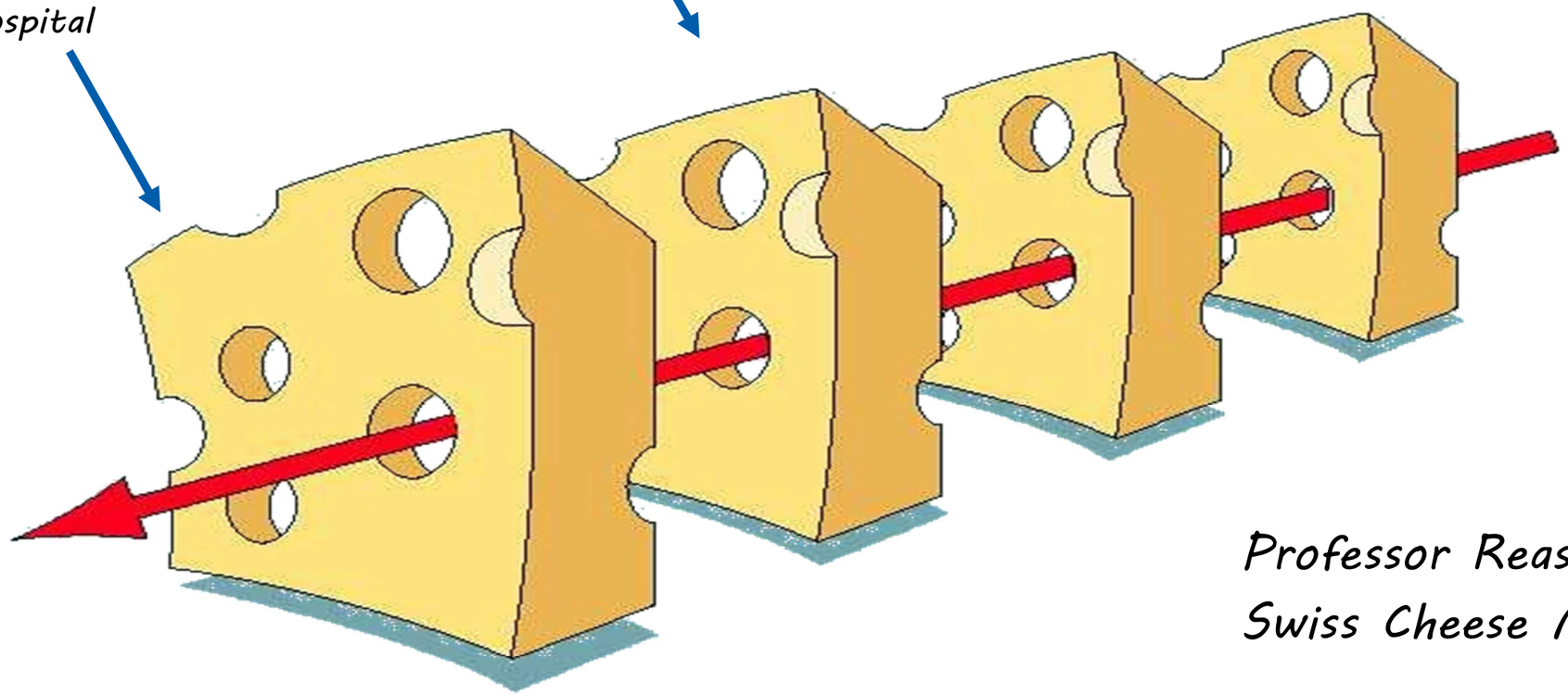


Barriers in the hospital

Barriers at home

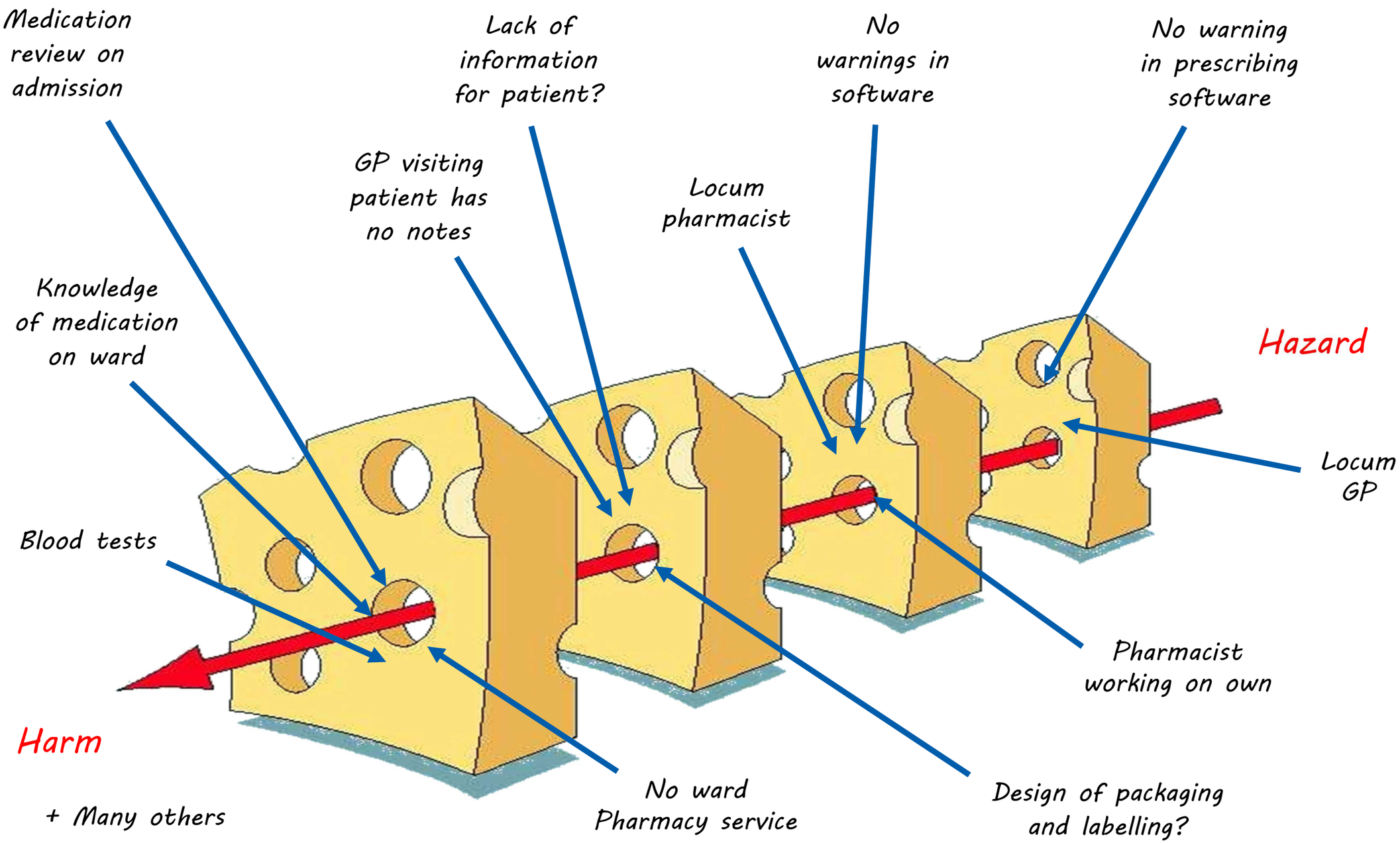
Barriers at the pharmacy

Barriers at the health centre



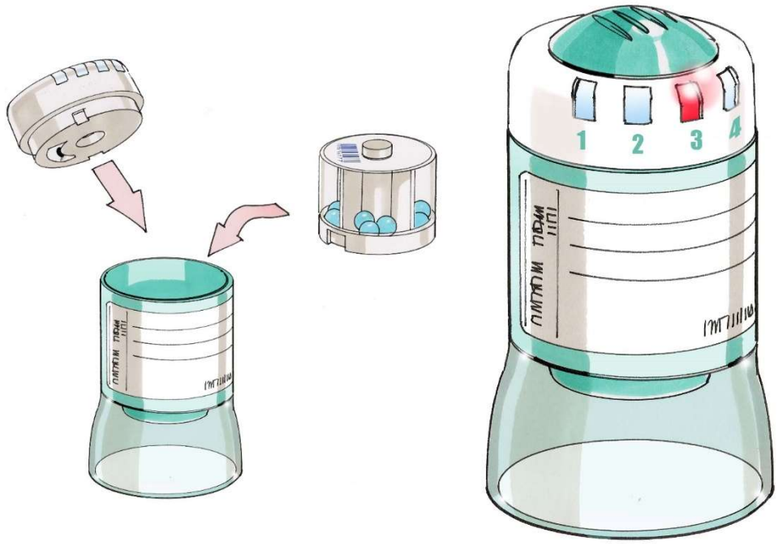
Professor Reason's Swiss Cheese Model

Methotrexate

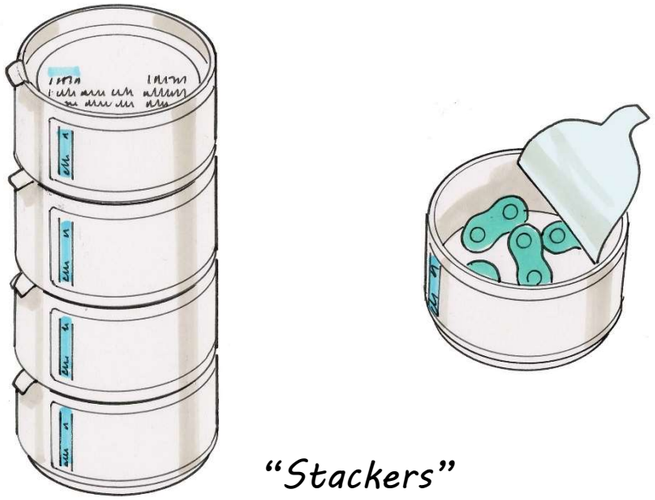


"Silhouette"

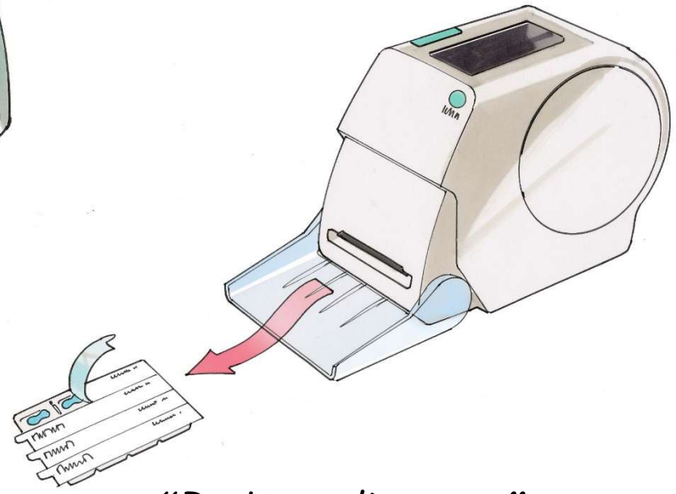
"Wallet"



"Smart pack"



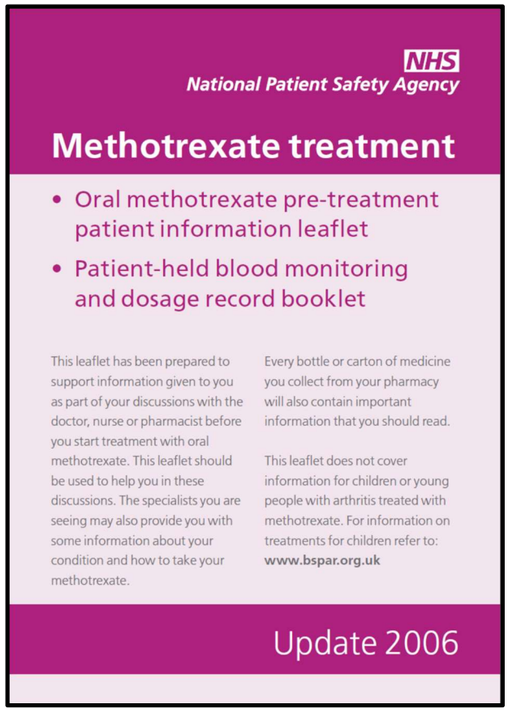
"Stackers"



"Desktop dispenser"

Solution Concepts

Methotrexate



NHS
National Patient Safety Agency

Methotrexate treatment

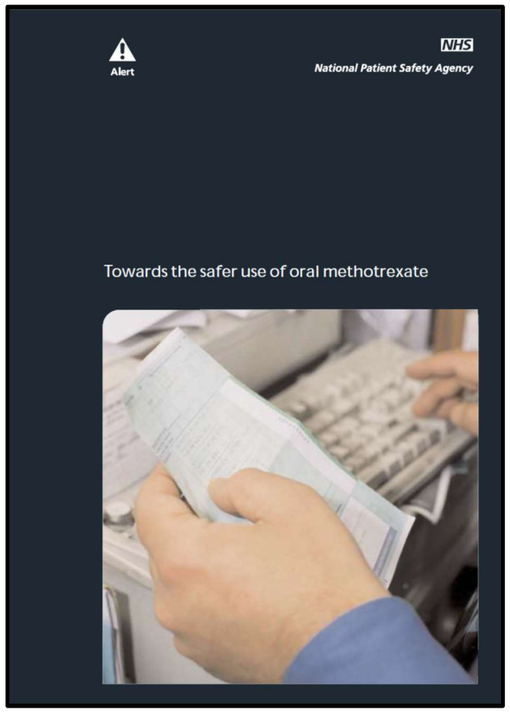
- Oral methotrexate pre-treatment patient information leaflet
- Patient-held blood monitoring and dosage record booklet

This leaflet has been prepared to support information given to you as part of your discussions with the doctor, nurse or pharmacist before you start treatment with oral methotrexate. This leaflet should be used to help you in these discussions. The specialists you are seeing may also provide you with some information about your condition and how to take your methotrexate.

Every bottle or carton of medicine you collect from your pharmacy will also contain important information that you should read.

This leaflet does not cover information for children or young people with arthritis treated with methotrexate. For information on treatments for children refer to: **www.bspar.org.uk**

Update 2006



Alert

NHS
National Patient Safety Agency

Towards the safer use of oral methotrexate

:: This is a NPSA High Risk Process Caution!

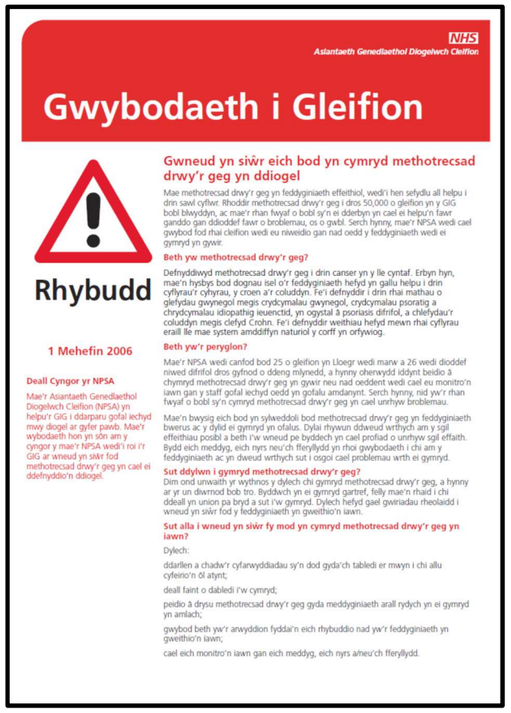
Methotrexate is usually prescribed weekly and requires regular monitoring and blood tests.

Do not proceed | Proceed

NHS
National Patient Safety Agency

IT requirement specification Safety alert

Oral methotrexate 2.5mg and 10mg tablets



NHS
Asiantaeth Genedlaethol Diogelwch Cleifion

Gwybodaeth i Gleifion

Rhybudd

1 Mehefin 2006

Deall Cyngor yr NPSA

Mae'r Asiantaeth Genedlaethol Diogelwch Cleifion (NPSA) yn helpu'r GIG i ddarparu gofal iechyd mwy diogel ar gyfer pawb. Mae'r wybodaeth hon yn sôn am y cyngor y mae'r NPSA wedi'i roi i'r GIG ar wneud yn siŵr fod methotrecsad drwy'r geg yn cael ei ddefnyddio'n ddiogel.

Gwneud yn siŵr eich bod yn cymryd methotrecsad drwy'r geg yn ddiogel

Mae methotrecsad drwy'r geg yn feddyginiaeth effeithiol, wedi'i hen sefydlu all helpu i drin sawl cyflwr. Rhoddir methotrecsad drwy'r geg i dros 50,000 o gleifion yn y GIG bobl blwyddyn, ac mae'r rhan fwyaf o bobl sy'n ei dderbyn yn cael ei helpu'n fawr ganddo gan dlioddef fawr o broblemau, os o gwbl. Serch hynny, mae'r NPSA wedi cael gwybod fod rhai cleifion wedi eu niweidio gan nad oedd y feddyginiaeth wedi ei gymryd yn gywir.

Beth yw methotrecsad drwy'r geg?

Defnyddiwyd methotrecsad drwy'r geg i drin canser yn y lle cyntaf. Erbyn hyn, mae'n hysbys bod dognau isel o'r feddyginiaeth hefyd yn gallu helpu i drin cyflyrau'r cyhyrau, y croen a'r coluddyn. Fe'i defnyddir i drin rhai mathau o glefydau gwynegol megis crydcymalau gwynegol, crydcymalau psoratig a chrydcymalau idiopathig ieuenctid, yn ogystal â psoriasis difrifol, a chlefydau'r coluddyn megis clefyd Crohn. Fe'i defnyddir weithiau hefyd mewn rhai cyflyrau eraill lle mae system amddiffyn naturiol y corff yn orfywiog.

Beth yw'r peryglon?

Mae'r NPSA wedi canfod bod 25 o gleifion yn Lloegr wedi marw a 26 wedi dioddef niwed difrifol dros gyfnod o ddeng mlynedd, a hynny oherwydd iddynt beidio â chymryd methotrecsad drwy'r geg yn gywir neu nad oeddent wedi cael eu monitro'n iawn gan y staff gofal iechyd oedd yn gofalu amdanynt. Serch hynny, nid yw'r rhan fwyaf o bobl sy'n cymryd methotrecsad drwy'r geg yn cael unrhyw broblemau.

Mae'n bwysig eich bod yn sylweddoli bod methotrecsad drwy'r geg yn feddyginiaeth bwerus ac y dylid ei gymryd yn ofalus. Dylai rhywun ddweud wrthych am y sgîl effeithiau posibl a beth i'w wneud pe byddech yn cael profiad o unrhyw sgîl effaith. Bydd eich meddyg, eich nyrs neu'ch fferyllydd yn rhoi gwybodaeth i chi am y feddyginiaeth ac yn dweud wrthych sut i osgoi cael problemau wrth ei gymryd.

Sut ddylwn i gymryd methotrecsad drwy'r geg?

Dim ond unwaith yr wythnos y dylech chi gymryd methotrecsad drwy'r geg, a hynny ar yr un diwrnod bob tro. Byddwch yn ei gymryd gartref, felly mae'n rhaid i chi ddeall yn union pa bryd a sut i'w gymryd. Dylech hefyd gael gwiriadau rheolaidd i wneud yn siŵr fod y feddyginiaeth yn gweithio'n iawn.

Sut alla i wneud yn siŵr fy mod yn cymryd methotrecsad drwy'r geg yn iawn?

Dylech:

ddarllen a chadw'r cyfarwyddiadau sy'n dod gyda'ch tabledi er mwyn i chi allu cyfeirio'n ôl atynt;

deall faint o dabledi i'w cymryd;

peidio â dryslu methotrecsad drwy'r geg gyda meddyginiaeth arall rydych yn ei gymryd yn amlach;

gwybod beth yw'r arwyddion fyddai'n eich rhybuddio nad yw'r feddyginiaeth yn gweithio'n iawn;

cael eich monitro'n iawn gan eich meddyg, eich nyrs a/neu'ch fferyllydd.

NHS
National Patient Safety Agency

Patient safety alert 13

Alert

1 June 2006

Immediate action	☑
Action	☐
Update	☑
Information request	☐

Ref: NPSA/2006/13

Improving compliance with oral methotrexate guidelines

Oral methotrexate is a safe and effective medication if taken at the right dose and with appropriate monitoring. However, as the NPSA's patient safety alert (03) highlighted, very occasionally problems with taking the medication can cause serious harm and even death.

Since July 2004 the NPSA has received 165 reports of patient safety incidents involving oral methotrexate. Of these, 14 happened before the launch of patient safety alert (03) on 29 July 2004 and the remaining 151 happened after this date. Feedback from the Safety Alert Broadcast System (SABS) indicates that 18 per cent (104 out of 569) of NHS organisations in England have still not reported having fully implemented the actions set out in patient safety alert (03).

The NPSA is issuing this subsequent alert to remind all NHS organisations of the actions they need to take to prevent such incidents occurring. Updated information for patients about oral methotrexate is also available and NHS organisations should be aware of the importance of giving this to them.

Action for the NHS

All NHS organisations (including NHS foundation trusts) should take the following steps:

1 Ensure all actions described in the NPSA's previous patient safety alert (03) are completed (see page 4 for details). Carry out local self-assessments to check compliance with patient safety alert (03) and with the three checklists on pages 2,3 and 4.

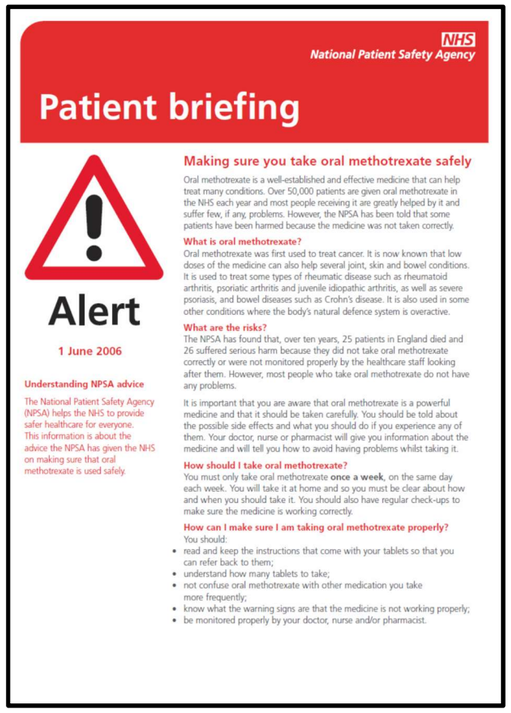
2 Give patients who are taking oral methotrexate the core patient information leaflet and monitoring document. These have been reviewed in collaboration with the British Society for Rheumatology (BSR) and the British Association of Dermatologists (BAD), both of whom support the content and their being issued to patients (see page 4 for details).

For response by:
- NHS acute trusts (including foundation trusts), mental health trusts and primary care organisations in England and Wales

For action by:
- Medical directors in England and Wales

We recommend you also inform:
- Clinical governance leads
- Clinical leads for rheumatology, gastroenterology and dermatology
- Risk managers
- Nursing directors
- Chief pharmacists/pharmaceutical advisors
- Heads of IT
- Communications leads
- Patient advice and liaison service staff in England
- Procurement managers

The NPSA has informed:
- Chief executives of acute trusts, mental health trusts and primary care organisations in England and Wales
- Chief executives/regional directors and clinical governance leads of strategic health authorities (England) and regional offices (Wales)
- Medicines and Healthcare products Regulatory Agency (MHRA)
- The Healthcare Commission
- Healthcare Inspectorate Wales
- NHS Purchasing and Supply Agency
- Welsh Health Supplies
- Royal colleges and societies
- Methotrexate manufacturing or licence holder companies
- Prescribing and dispensing IT system suppliers
- NHS Direct
- Relevant patient organisations and community health councils in Wales
- The Independent Healthcare Forum
- Monitor
- Quality Improvement Scotland and DHSSPS Northern Ireland



NHS
National Patient Safety Agency

Patient briefing

Alert

1 June 2006

Understanding NPSA advice

The National Patient Safety Agency (NPSA) helps the NHS to provide safer healthcare for everyone. This information is about the advice the NPSA has given the NHS on making sure that oral methotrexate is used safely.

Making sure you take oral methotrexate safely

Oral methotrexate is a well-established and effective medicine that can help treat many conditions. Over 50,000 patients are given oral methotrexate in the NHS each year and most people receiving it are greatly helped by it and suffer few, if any, problems. However, the NPSA has been told that some patients have been harmed because the medicine was not taken correctly.

What is oral methotrexate?

Oral methotrexate was first used to treat cancer. It is now known that low doses of the medicine can also help several joint, skin and bowel conditions. It is used to treat some types of rheumatic disease such as rheumatoid arthritis, psoriatic arthritis and juvenile idiopathic arthritis, as well as severe psoriasis, and bowel diseases such as Crohn's disease. It is also used in some other conditions where the body's natural defence system is overactive.

What are the risks?

The NPSA has found that, over ten years, 25 patients in England died and 26 suffered serious harm because they did not take oral methotrexate correctly or were not monitored properly by the healthcare staff looking after them. However, most people who take oral methotrexate do not have any problems.

It is important that you are aware that oral methotrexate is a powerful medicine and that it should be taken carefully. You should be told about the possible side effects and what you should do if you experience any of them. Your doctor, nurse or pharmacist will give you information about the medicine and will tell you how to avoid having problems whilst taking it.

How should I take oral methotrexate?

You must only take oral methotrexate **once a week**, on the same day each week. You will take it at home and so you must be clear about how and when you should take it. You should also have regular check-ups to make sure the medicine is working correctly.

How can I make sure I am taking oral methotrexate properly?

You should:
- read and keep the instructions that come with your tablets so that you can refer back to them;
- understand how many tablets to take;
- not confuse oral methotrexate with other medication you take more frequently;
- know what the warning signs are that the medicine is not working properly;
- be monitored properly by your doctor, nurse and/or pharmacist.

NeverEvents

NPSA Publications