

Engineering better care

a systems approach to health and care design and continuous improvement

Annex 4

Compilation of approaches

This annex describes a number of approaches from the health and care improvement and engineering communities that have the potential to help teams understand *people*, deliver *systems*, facilitate *design* and manage *risk* (Section 2: *Approaches to improvement*). Most excel with one of these perspectives while some attempt to support a more holistic integrated systems approach.

The approaches range from health and care improvement methods, such as the NHS change model, IHI model for improvement, leading large-scale change, human factors in healthcare, lean in healthcare, experience-based co-design and root cause analysis, to design-led safety management tools and human factors methods. Wherever possible references are provided for further information.

Change Model

The NHS Change Model is an organising framework for sustainable change and transformation that delivers potential benefits for patients and the public. It was developed with senior leaders, clinicians, commissioners, providers and improvement activists to support health and care to adopt a shared approach to leading change and transformation.

As a way of thinking, the model is relevant to numerous change programmes and provides an approach that can be tailored to fit individual situations. It is a way of making sense at every level of the 'how and why' of delivering improvement, to consistently make a bigger difference.

The model has eight components that lead to a better understanding of how to create an environment and programme(s) that can make change happen:

- Our shared purpose
- Leadership by all
- Spread and adoption
- Improvement tools
- Project and performance management
- Measurement
- Influencing factors
- Motivate and mobilise

www.england.nhs.uk/ourwork/qual-clin-lead/sustainableimprovement/change-model/

Model for improvement

The model for improvement was developed by 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.

www.ihi.org/resources/Pages/HowtoImprove/default.aspx

futurehospital.rcpjournals.org/content/3/3/191.long

Quality improvement journey - NHS Scotland

The improvement journey is a structured approach that supports individuals and teams to test, implement and spread sustainable improvement across a system. The journey consists of seven stages, from identification of the need through to the successful delivery of change and its spread.

Each stage provides a particular focus:

discover – identifying the problem to fix

explore – further investigating the aim and defining success

design – reviewing all the ideas for improving the system and establishing the priorities for improvement

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refine – identifying what has been learned from evaluating the change

introduce – making the change happen

spread – communicating success

close – capturing lessons learned for the future.

Each stage consists of a series of questions for quality improvers to consider as they carry out an improvement project. These link to suggested tools and resources that will help to further explore and analyse the wider aspects of improvements being made. The journey pays particular attention to cultural aspects of change in the 'introduce' and 'spread' sections, as well as capturing learning for future projects in the 'close' section.

www.qithub.scot.nhs.uk/media/340181/2012-06-15_measurement_improvement_journey_process.pdf

Leading large-scale change

The guide to leading large-scale change (LSC) was developed by managers and clinicians within the NHS and is based on experience and literature around large scale change. The guide includes change management tools such as: key planning questions, driver diagrams, structure / process / pattern thinking, 30/60/90 day cycles, and stakeholder analysis.

LSC is defined as the emergent process of moving a large collection of individuals, groups, and organisations towards a vision of a fundamentally new future state, by means of: high-leverage key themes; a shift in power and a more distributed leadership; massive and active engagement of stakeholders; and mutually-reinforcing changes in multiple systems and processes. This leads to such deep changes in attitudes, beliefs and behaviours that sustainability becomes largely inherent.

Some of the key principles described in LSC may be summarised as:

- moving towards a new vision that is better and fundamentally different from the status quo
- identifying and communicating key themes that people can relate to and will make a big difference
- framing the issues in ways that engage and mobilise the imagination, energy and will of a large number of diverse stakeholders
- continually refreshing the story and attracting new supporters

transforming mind-sets, leading to inherently sustainable change.

www.slideshare.net/NHSIQ/leading-large-scale-change-part-1

www.slideshare.net/NHSIQ/leading-large-scale-change-part-2

Human factors in healthcare

Human factors is the science of understanding human performance within a given system. Translated into a healthcare context, human factors has been defined as enhancing clinical performance through an understanding of the effects of teamwork, tasks, equipment, workspace, culture, organisation on human behaviour and abilities, and application of that knowledge in clinical settings.

Designing healthcare facilities, equipment and the delivery of care around an understanding of human behaviour is vital to reduce the potential for human error. This also helps healthcare staff to act as a barrier against harm. Human factors is a broad discipline that studies the relationship between human behaviour, system design and safety.

Many healthcare organisations have carried out work on implementing human factors and the 'how to' guide aims to:

- broaden understanding among healthcare teams of the potential ways in which human factors methods can be applied to improve patient safety
- share practical experience of applying human factors in healthcare, using case studies from different care settings
- signpost healthcare teams to further information and resources to support them to implement human factors in their own organisations.

chfg.org/best-practice/how-to-guide-to-human-factors-volume-2/

Root cause analysis

Root cause analysis (RCA) is a class of problem solving methods, including fishbone diagrams, Pareto charts and scatter diagrams, aimed at identifying the root causes of a problem or event. It is predicated on the belief that problems are best solved by attempting to address, correct or eliminate root causes, as opposed to merely addressing the immediately obvious symptoms. By identifying measures at the root cause, it is more probable that problem will not occur again.

The principle behind RCA is to take a systems approach to identifying problems that increase the likelihood of errors while avoiding the trap of focusing on mistakes by individuals. Thus RCA identifies both active errors (errors occurring at the point of interface between humans and a complex system) and latent errors (the hidden problems within healthcare systems that contribute to adverse events).

The approach generally begins with the collection of prescribed data and reconstruction of the event through record review and participant interviews. Within healthcare, a multi-disciplinary team would analyse the sequence of events leading to the error, with the goals of identifying how the event occurred (through identification

of active errors) and why it occurred (through systematic identification and analysis of latent errors). RCA is typically used as a reactive method of identifying event causes, revealing problems and solving them, where analysis is done *after* the event has occurred. Its ultimate impact is typically dependent on spending sufficient time, effort and resources on risk control following the analysis.

www.nrls.npsa.nhs.uk/rca/qualitysafetymj.com/content/26/5/417

Systems thinking for health

Systems thinking has its origins in the early 20th century in fields as diverse as engineering, economics and ecology. With the increasing emergence of complexity, these and other non-health disciplines developed systems thinking to understand and appreciate the relationships within any given system, and in designing and evaluating system-level interventions.

Systems Thinking for Health Systems Strengthening offers a practical approach to improving health systems through a systems thinking lens. It works to reveal the underlying characteristics and relationships of systems, which are described as dynamic architectures of interactions and synergies. Such systems typically exhibit non-linear and unpredictable behaviour, are resistant to change, and provide a challenge where seemingly obvious solutions can worsen a problem.

The framework describes 10 practical steps in a two-stage conceptual process that can be adapted to many different situations. Intervention design includes convening stakeholders, brainstorming, predicting performance, and adaptation and redesign. Evaluation design includes identification of indicators, choice of methods, selection of design, planning, budgeting and funding.

www.who.int/alliance-hpsr/resources/9789241563895/en/

Experience-based co-design

Experience-based co-design (EBCD) is an approach that enables staff and patients (or other service users) to co-design services and/or care pathways in partnership. The approach was designed for and within the NHS to develop simple solutions that offer patients a better experience of treatment and care. However, similar user-centric design techniques have been used by leading global companies for many years.

EBCD gathers patient and staff experiences, through interviewing, observations and group discussions, and presents the insights gained in the form of a short edited film. Informed by this, staff and patients collaboratively design and implement activities that will improve the service or the care pathway. Within health and care, the approach has been used in a range of clinical services, including cancer, diabetes, drug and alcohol treatment, emergency services, genetics, inpatient units, intensive care, mental health, orthopaedics, palliative care and surgical units.

The EBCD toolkit outlines an approach to improving patients' experience of services. As well as step-by-step guidance, the toolkit includes videos of people who have taken part in EBCD projects. These help bring to life the successes and range of benefits that can result from implementing this type of improvement project. The toolkit also includes downloadable resources such as template forms, letters and presentations.

www.pointofcarefoundation.org.uk/resource/experience-based-co-design-ebcd-toolkit/

Lean in healthcare

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*, a programme developed by the NHS institute for Innovation and Improvement.

Lean is typically a team process involving many people across an organisation. The Virginia Mason Medical Center in Seattle, Washington has been using lean management 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. It is increasingly used in conjunction with Six Sigma.

productiveseries.com/lean-healthcare.html

www.ncbi.nlm.nih.gov/pmc/articles/PMC4833201/

Risk assessment made easy

A risk assessment seeks to answer four simple, related questions: What can go wrong? How bad? How often? and Is there a need for action?

It is not usually possible to eliminate all risks within a system, but healthcare staff have a duty to protect patients as far as 'reasonably practicable'. In practice, this means that there is an imperative to avoid any unnecessary risk. It is best to focus on the risks that really matter, such as those with the potential to cause harm.

This tool is intended to encourage greater use at practice level, and increased awareness and understanding of risk assessment at all levels. It comprises five simple steps:

- identify the hazards
- decide who might be harmed and how
- evaluate the risks and decide on the precautions
- record the findings and proposed actions
- review the assessment.

It is applicable and easily adapted for use in all care settings. Frontline staff may use this tool to identify hazards and decide whether they are significant and whether appropriate and sufficient controls or contingencies are in place to ensure that the associated risks are properly controlled.

www.nrls.npsa.nhs.uk/resources/?EntryId45=59825

Systems engineering

Systems engineering has its origins in the 1930s and was conceived in response to the growing complexity of engineered products and their associated systems. It is a discipline that concentrates on the design and application of the whole (system) as

distinct from the parts. It involves looking at a problem in its entirety, taking into account all the facets and all the variables and relating the social to the technical aspect.

Systems engineering is an iterative process of top-down synthesis, development, and operation of a real-world system that satisfies, in a near optimal manner, the full range of requirements for the system. It is an interdisciplinary approach that focuses on defining customer needs and required functionality early in the development cycle, documenting requirements, and then proceeding with design synthesis and system validation while considering the complete problem: operations, cost and schedule, performance, training and support, test, manufacturing and disposal.

The INCOSE Systems Engineering Handbook defines the discipline and practice of systems engineering for novice and practising professionals. It provides an authoritative reference to understand the discipline in terms of content and practice.

incoseonline.org.uk/Normal_Files/Publications/SE_Handbook.aspx?CatID=Publications&SubCat=INCOSEPublications

Human-centered design

Human-centered design (HCD) offers problem solvers a chance to design with communities: to deeply understand the people they're looking to serve; to dream up scores of ideas; and to create innovative new solutions rooted in people's actual needs. It encourages the belief that all problems, even the seemingly intractable ones, like poverty, gender equality, and clean water, are solvable. Moreover, it means believing that the people who face those problems every day are the ones who hold the key to their answer.

HCD is defined by its mindsets:

empathy; optimism; iteration; creative confidence; making; embracing ambiguity; and learning from failure. Together, these encourage fearless yet grounded creativity, leading to innovation and solutions never dreamed of when projects are started. HCD has been used to successfully tackle an array of design challenges, from social enterprises to communication campaigns to medical devices.

The field guide to HCD from IDEO presents design as an iterative process comprising three main phases:

- inspiration – understanding people, their hopes and desires
- ideation – generating ideas, testing and refining them
- implementation – taking the idea to market and maximising its impact.

Numerous practical tools are provided to assist each stage.

www.ideo.com/us/post/design-kit

Six sigma

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 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.

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.

It is increasingly used in conjunction with lean thinking.

asq.org/learn-about-quality/six-sigma/tools.html

Inclusive design

Inclusive design (ID) is the design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible without the need for special adaptation or specialised design. It applies to all parts of a user journey, not only to the recipients of care, but also the providers of care and care services.

At the core of ID is a user-focused systems design process and the realisation that every design decision has the potential to include or exclude people. Inclusive design emphasises the contribution that understanding user diversity makes to informing these decisions, and thus to including as many people as possible. In this context, user diversity covers variation in capabilities, needs and aspirations, while care is also taken to address broader issues relating to people, profit and planet.

The ID toolkit provides a step-by-step guide to the use of the *explore, create and evaluate* design cycle, embedded in the context of the *identify and locate* activities that relate to the people engaged with the systems and its location. This process is directly informed by the *purpose* of the system, a deep understanding of stakeholder and user needs and a sense of what *success* looks like.

www.inclusivedesigntoolkit.com/

Risk management

Risk management is the coordinated set of activities used to direct and control an organisation with regard to risk. All activities within an organisation involve some level of risk. Successful organisations manage such risk by identifying it, analysing it, and then evaluating whether the risk should be modified in order to satisfy their risk criteria. Such risk management can be applied to an entire organisation, and its many areas and levels, at any time, as well as to specific functions, projects and activities.

The practice of risk management has been developed over time and within many sectors to meet diverse needs. The adoption of consistent processes within a clear framework ensures that risk is managed effectively, efficiently and coherently across an organisation. Risk management should be both proactive and reactive, and an integral part of an organisation's governance, management, culture and practice.

ISO 31000:2009 and IEC 31010:2009 are international standards for risk management that provide comprehensive principles, guidelines and tools to help organisations manage risk. They are designed to:

- assist proactive assessment
- improve identification of opportunities and threats
- increase the likelihood of meeting risk targets

- improve the engagement of all stakeholders in the management of risk.

www.iso.org/standard/43170.html

www.iso.org/standard/51073.html

System safety assessment

System safety assessment (SSA) is a method designed to help health and care professionals think about 'what could go wrong' in a system, which could be anything from a care pathway to a project plan for a service improvement, to a new ward or even the movement of a service from acute care to the community. SSA is a process for proactively thinking about and addressing potential problems, either so they can be prevented from happening in the first place or so that their consequences can be reduced to an acceptable level.

At the core of SSA is a standard process for managing risks. The principles are likely to be familiar to many people involved in health and care, but the systematic and proactive way in which it is done may be less so. Current healthcare risk assessments typically focus on 'health and safety' risks, such as the risk of slips, trips and falls. Conversely, SSA is flexible and can focus on a wide range of risks, including clinical, project management, financial and organisational risks.

The SSA toolkit provides a step-by-step guide to the use of proactive risk assessment, beginning with the *trigger* and assessing risks through the *examine (organise), assess and improve (create)* stages of the risk management cycle.

www.ssatoolkit.com/toolkit/