BACCH-BACAPH
Improving Services Series

An introduction to systems thinking and the application for health services

Introduction

The NHS Long-Term Plan talks about "health systems" in many different ways. The predominant mention is that of an "Integrated Care System" but the word system is also attached to 'system wide objectives', 'payment systems', 'commissioning systems', 'quality improvement systems' and a multitude of 'clinical systems' such as the Emergency Department system.

A whole system is generally described as "a group of independent, interacting parts that come together to achieve a shared purpose; with each of the parts being further divided into components". Systems thinking is therefore the process of understanding how all the parts interact and influence one another, generally with the intention of improving outcomes.

Comparison to a human body may be helpful; a constant balance is achieved by a process of both positive and negative feedback loops, creating homoeostasis at all times. In the health service it is the interaction between policy, people, structures and processes that create a viable and sustainable organisation. The importance of creating feedback and achieving homeostasis cannot be overstated as an essential element of a whole system approach to improving outcomes.

Systems thinking is often divided into *hard systems* (the quantifiable elements - workforce and finance) and *soft systems* (the more qualitative elements - values and culture) and *improvement systems* where the system is dynamic and evolving. Systems thinking applied to the health service requires all three elements.

Possibly the most important element of systems thinking is to be able to view the system from a number of different external and internal perspectives and then create feedback loops that reinforce best practice. Charles Churchman as long ago as 1968 said "Systems thinking begins when first you see the world through the eyes of another". Expanding on this, Martin Sandbrook described systems thinking as an attitude of open enquiry that challenges (avoiding judgement) one's own and others beliefs and assumptions in order to understand the world, which is the starting point for any change process. Essentially it is a learning process with a

purpose. One of the advantages of systems thinking is that it minimises the likelihood of unintentional outcomes, which often results from mechanistic, linear or silo thinking.

The real advantage of systems thinking is that it enables multiple stakeholders to share their different perspectives in order to reach some consensus of understanding of what currently exists, its strengths and weaknesses and a future direction. Mapping what currently exists together with the existing positive and negative feedback loops within the system, then creates a shared understanding of how the system currently operates.

System hierarchies

It's important to remember that the output is always a changed input and that a system has a purpose, but the primary purpose may be different for different people.

Simple systems. Mowing the lawn is a simple system of grass cutting. One person, one mower and competence to get the job done! But the person, the mower and the competence may all be different depending on the terrain and size of the lawn.

Complicated systems. Building a car is a complicated system. All of the parts must both fit and work together but each part does not have a mind of its own.

Complex (adaptive) systems. Are generally biological systems where, unlike the car, the various parts can interact with each other creating a degree of complexity on top of a complicated system.

All three systems coexist within the health service a simple system would be a single consultation with resolution of the presenting problem. A complicated system is one where multiple appointments are required for assessment and potentially multiple management strategies as for example in a screening programme where there is limited choice. A complex system offers multiple alternatives and the patient is involved with both choice and the coproduction of health outcomes. In a complex system a good outcome may be very different for different patients presenting with the same problem.

Health Systems

A health system is defined by the World Health Organisation as:

"*all organisations, people and actions whose primary intent is to promote, restore or maintain health, whose purpose is to improve health and health equity in ways that are responsive, financially fair and make the best use of available resources*".

Systems thinking recognises the importance of bringing together the perspectives of various stakeholders (figure 1). A user perspective (a system that is easily understood and works for them), a clinician/practitioner/team perspective (a system that makes best use of their training and competencies), a management perspective (a system that makes best use of resources) and a political perspective (a system that is equitable, transparent and accountable), into a practical framework to improve outcomes to children and families.[1, 2]

[1] http://www.scotland.gov.uk/Resource/Doc/355013/0119868.pdf
[2] http://users.actrix.com/bobwill/ssm.pdf

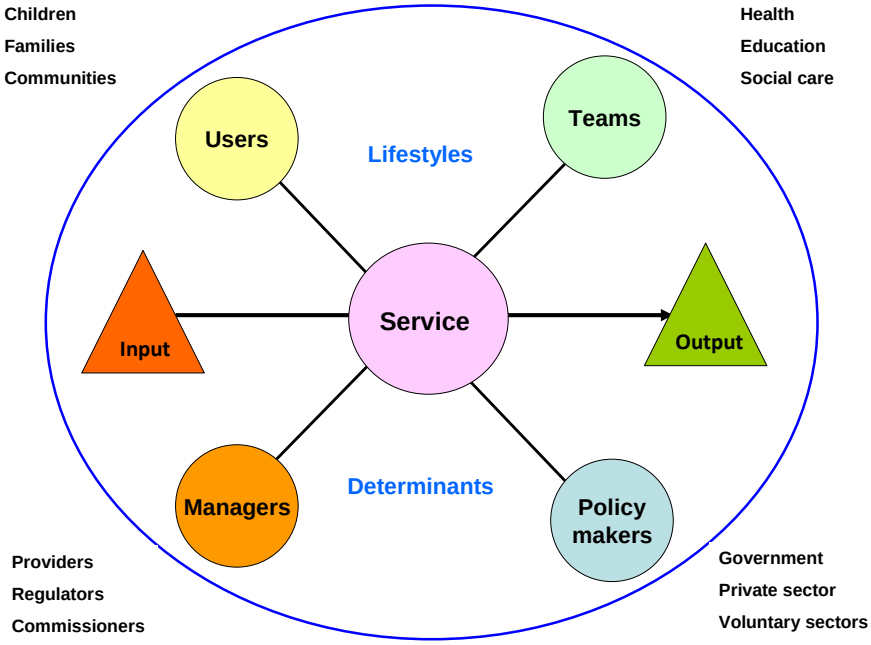

Figure 1: illustrating multiple stakeholder perspectives on service provision, based on a simple systems input-output mode, noting the external influences of lifestyles and determinants.

There is a constant balance between these different perspectives. If one dominates, others will become subordinate, resulting in potential inefficiency, inequity or harm, for example, if there is an excessive focus on targets and cost reduction (potentially a manager's perspective) this may undermine then quality of care (a user's perspective).

Learning and the generation of new knowledge is essential in order to respond to changing circumstances. Health systems have a relatively strong track record of research in clinical sciences, but a relatively weak investment in translational research and research related to health services delivery. The result is that health service structures have remained relatively immune to changing epidemiology, technological advances or service redesign. A culture of learning, based on innovation and evaluation, should therefore become an integral part of service delivery. This local learning then needs to be complemented with mechanisms to spread and adopt successful innovations rapidly throughout the whole system.

Application to health systems/services

As described previously an "output" is always a changed "input". Glucose is changed into energy, carbon dioxide and water in the Krebs cycle, the enzymes involved act as a catalyst or an "agent for change" for the transformation. The health service is also a change agent, in the very simplest of terms, the input being sick patients and the output hopefully being well patients. In whole system's thinking the health system addresses "needs" (defined as the ability to benefit from interventions) to improve health and this improvement can be measured in a number of different ways by outcome measures. If improvements are sustained over time the term "impact" is used rather than outcome.

Added value in the system will be perceived differently by different stakeholders - some will value effectiveness over efficiency, some equity over effectiveness and vice versa. Considering the viewpoints of different stakeholders therefore provides a framework for the evaluation of services. The views of each stakeholder are not mutually exclusive.

	Primary	**Secondary**
Users	Efficacy	Accessibility
Teams	Effectiveness	Acceptability
Managers	Efficiency	Affordability
Policy-makers	Equity	Appropriateness

Systems thinking also recognises that individual care and services do not exist in a vacuum - they sit within a wider political, social and economic environments, which may either help or hinder the achievement better outcomes by influencing either lifestyles or determinants of health. It is therefore vital that, for example, economic, employment and benefit systems, which all contribute to the outcomes of life course pathways, work in synergy with public health, other agencies and the NHS to achieve a greater impact. In the Family Friendly Framework these external factors have been reduced to two terms – lifestyles that individuals have some control over and determinants that are less easily influenced by individuals and more in the control of society decisions.

Whole systems

A whole integrated health system would bring together several different networks and the life course pathway approach together into a comprehensive system which should meet the needs of the whole population (see figure 2). The broad programmes are summarised below and included in figure 2 and approximately map to modules of the English Maternity and Children's National Service Framework[3, 4, 5,. 6] and the Children and Young People's Health Outcome Forum Strategy.[7]

i. Promote the optimal development and determinants/lifestyles of all children - the universal **public health/life course programme.**
ii. Reduce illness and injuries and their consequences - the **urgent, emergency and intensive care programme.**
iii. Reduce long term conditions, disability and consequences of disability - the **long-term conditions programme.**
iv. Reduce social ill health, inequalities and their consequences - **the vulnerable child and family programme.**

[3] http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4090552.pdf
[4] https://www.gov.uk/government/publications/national-service-framework-children-young-people-and-maternity-services
[5] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/199952/National_Service_Framework_for_Children_Young_People_and_Maternity_Services_-_Core_Standards.pdf
[6] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216852/CYP-report.pdf
[7] http://www.dh.gov.uk/health/files/2012/07/CYP-report.pdf

v. Reduce emotional and behavioural disturbance and their consequences - the **child mental health programme.**
vi. Improve maternity care and the outcomes for new-born babies - the **pregnancy and new-born programme.**

These six programmes are based on how services and teams are currently largely configured. It is important to acknowledge that the more treatment orientated programmes should be more actively involved in promotion/protection and prevention of co-morbidities and ill health. Eventually Population Health Management would be included in the roles of networks.

Where multiple networks come together to create a whole system of care for a community the "culture" within that system should be expressed consistently throughout each network. In truly effective systems there should be absolute clarity about:

1. the ***purpose*** of the system, the beneficiaries and the expected outcomes,
2. the operational ***values*** that determine the culture and how the system works,
3. ***leadership*** –based on integrity, accountability, transparency and inclusivity,
4. capacity to adapt and ***learn*** as conditions, circumstances or evidence changes.

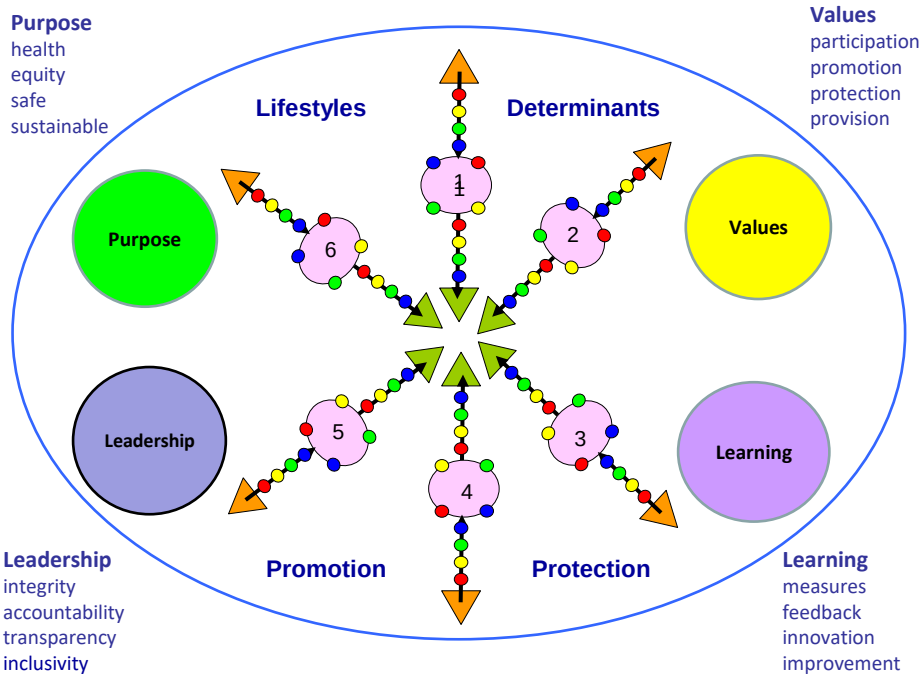

Figure 2: a representation of the Family Friendly Framework of the whole system including six networks and integrating values, purpose, leadership and learning.

The ***purpose*** of the system is best represented by the expected outcomes.[8] High-level outcomes would be improvements in health (in the widest sense), better equity in health, safety (doing no harm) and in outcomes that represent sustainability (best long term use of resources). Specific

[8] http://www.dh.gov.uk/health/files/2012/07/CYP-report.pdf

service related outcomes would then consider effectiveness, efficiency and equity with additional measures of "added value" across the whole network.

Values are important in any system because they guide how the system works and 'hold' the parts together.[9] In systems dynamics they are the "simple rules" which guide how complex systems develop.
Child Friendly Health Care,[10,11] has distilled the United Nations Convention on the Rights of the Child.[12] values *that relate to services* down to following four principles that have practical application at throughout the system:

1. participation of users (in individual decision-making, in service improvement and in policy-setting);
2. protection from harm, (decreasing exposure to hazards)
3. promotion of wellbeing (increasing exposure to assets)
4. provision based on pathways (to ensure all parts are in place and working well together).

Participation at all levels is important because it gives the users of services a voice and influence within the system. This has often been overlooked in the past, but is now gaining increased credibility[13] particularly now there is a greater focus on improving the experience of services for families.[14] Participation should also be viewed as an integral part of service improvement and priority setting at a policy level.

Leadership. Leadership within any system is essential, it may be invested in an individual or team and should operate throughout the whole system, based on integrity, clear lines of accountability, transparency of decision-making with inclusivity - meaning active participation of both users and providers throughout the system.[15] Leadership will be increasingly important in evolving Integrated Health/Care Systems to bring together organisations to share culture and purpose in the future.

Learning. Finally, if a system is to be sustainable, it must be able to innovate, adapt and learn as knowledge, circumstances or evidence changes. The implication is that there should be a relentless drive for continuous quality improvement judged by concepts such as safety, experience and outcomes.[16] This process must be 'internal' and embraced throughout the system, rather than being the result of external inspection or regulation. Logically it would be the primary purpose of networked teams – seeking out and improving the weakest links in

[9] http://www.bacch.org.uk/policy/documents/IntegrationBACCHpositionsummary_final.pdf
[10] https://wcd.coe.int/ViewDoc.jsp?id=1836421&Site=COE
[11] http://www.rcn.org.uk/__data/assets/pdf_file/0003/424677/CM2011113_E_CFH_guidelines_ExM.pdf
[12] http://www2.ohchr.org/english/law/crc.htm
[13] http://www.england.nhs.uk/wp-content/uploads/2013/09/trans-part-hc-guid1.pdf
[14] http://www.rcpch.ac.uk/participation
[15] http://www.leadershipacademy.nhs.uk/discover/leadership-dimensions/
[16] http://www.iom.edu/~/media/Files/Report%20Files/2001/Crossing-the-Quality-Chasm/Quality%20Chasm%202001%20%20report%20brief.pdf

pathways. This will require much better cycles of measurement, feedback, reflection, innovation and evaluation if the system is to incrementally improve over time.[17]

References

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Churchman CW (1968) *The Systems Approach* Dell Publishing, New York

E F Schumacher (1974) *Small is Beautiful, A study of economics as if people mattered.* Abacus edition, Sphere Books, London

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Resources

http://www.systemslearning.org/systems-learning/what-system#sthash.OkJQj71s.dpuf

[17] http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/plan_do_study_act.html

Appendix1: Good practice guidance for improvement/reconfiguration

- Make sure the needs of patients and the quality of patient care are central to your proposal.
- Examine the entire patient pathway, Could the same outcome be achieved in a different way?
- Examine the effects of the proposed reconfiguration on the viability and quality other related services;
- Facilitate early patient and public involvement – to include both current and potential patients.
- Ensure early clinical engagement in any proposed changes.
- Investigate networking opportunities across primary, secondary and tertiary care and across different sectors from ambulance trusts, to mental health and social care organisations.
- Ensure that proposed changes are either evidence-based or based on a wide consensus position.
- Calculate both the short-term and long-term costs; particularly workforce provision.
- Consider alternative ways to provide the service, e.g. using IT solutions, outreach, multidisciplinary teams, assessment units, etc..
- Set measurable standards reflecting process along the pathway that need to occur to achieve high-quality outcomes.
- Consider the wider social implications of service reconfiguration, e.g. transport arrangements, equity of access, etc.
- Consider the requirement for regional planning of some specialist services.
- Consider the role of flexible working in your proposals. This may involve developing new approaches to working and redesigning roles.
- Give early consideration to transport and site access issues.
- Get independent validation of the responses to your consultation. Consultations are there to influence final proposals.

Appendix 2: Sustainable change

To achieve sustainable change, change management theory suggests the following are important:

- The senior team must be aligned and supportive.
- People must “wake up” to the need for change.
- Lead with a vision that provides focus and inspiration on a day-to-day basis.
- Let the vision — not policies and procedures — shape choices and innovation.
- Drill down into the details – the devil is in the detail!
- Increase communication by a factor of 10.
- Make a break with the past – practice abandonment (when safe to do so).
- Use every opportunity to develop more leadership.
- Build momentum by creating early successes.
- Ensure alignment of systems, structures and work processes.
- Innovate, reflect and learn, then share success.