

System Dynamics Modelling: An Analytics Applied Learning Programme

Incorporating an ICS system dynamics pilot

Commencing September 2022, until March 2023



NHS England and NHS Improvement



Midlands and Lancashire
Commissioning Support Unit

A development programme in modelling systems using **System Dynamics**, incorporating piloting the use of this method in an **ICS** context

Programme Objectives

The objectives of the programme are to:

- develop an understanding of how SD can be applied within health and care
- improve skills in structuring, designing and developing SD models
- develop an SD model which addresses a specific problem prioritised by your organisation
- support your system to develop insight into the problem, and gain an understanding of potential solutions
- create analytical capability within ICSs and local health and care systems to take on SD projects
- develop a community of practice around SD in health and care

Who is it for? *The programme has core training for all participants from individual organisations and ICSs, and enhanced support for up to 3 ICSs participating in the pilot.*

Core training for all

The programme is aimed at any analysts within health and care in the Midlands, who are interested in using system dynamics to map and understand aspects of the health and care system, in order to support decision makers/improve decision-making.

[View Person Specification](#)

Enhanced support for up to 3 ICSs

- ❖ **ICS SD pilot sites:** *The Demand and Capacity programme and The Integrated Urgent Emergency Care (iUEC) Programme, at NHS E/I, are testing strategic demand and capacity modelling for Urgent and Emergency Care Services (UEC) using a System Dynamics approach for NHS ICSs. The Strategy Unit are working alongside them to support a parallel pilot programme in the Midlands region working within the context of the MDSN to build on work already underway. We will be sharing and learning from each other and thus our regional programme also has national impact.*

System Dynamics

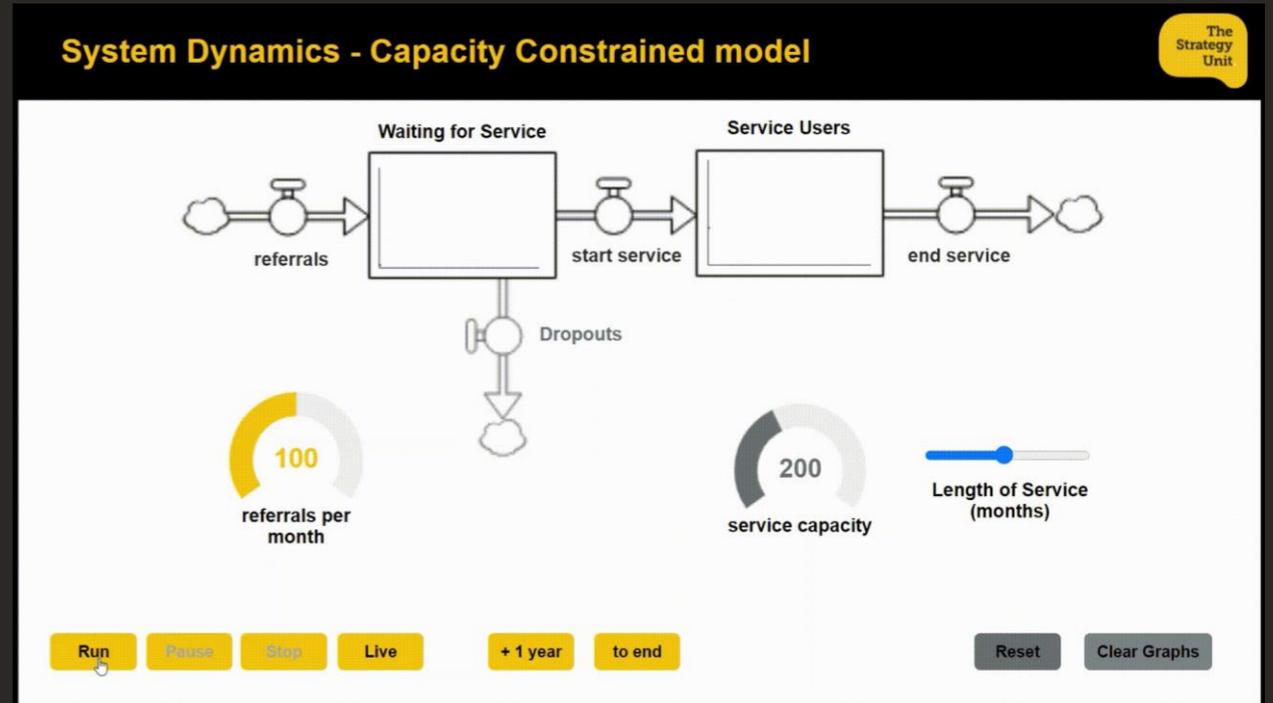
System dynamics is an established technique that models the behaviour of **complex** and **interconnected** systems **over time**.

These consider aggregates of people as continuous flows, capable of exploring **feedback loops** and **interactions** between factors over time. They allow exploration of both intended and unintended consequences.

This approach uses evidence and analysis where available but also allowing for building in assumptions so that both explanatory and soft variables can be included.

Models are built through **participative** group model building, where a mixed group of stakeholders collaborate to explore how the system works, its main constraints and dynamic impacts, current challenges and shortages, future policy and possibilities.

This type of modelling enables organisations to visualise the system and its influences, to explore via an interface different **'what if'** scenarios facilitating conversations and to inform their decisions



A simple illustrative example showing the dynamics of an interface. How adjusting service capacity and length of stay impacts the number of people waiting and those receiving the service.

The models represent the system using:

- Stocks: any entity that accumulates or depletes over time e.g. patients undergoing treatment, people waiting
- Flows: in and out. The rate of change of a stock. The rate people move through the system
- Explanatory and soft factors which influence them.

Why use **System Dynamics** in an **ICS** context?

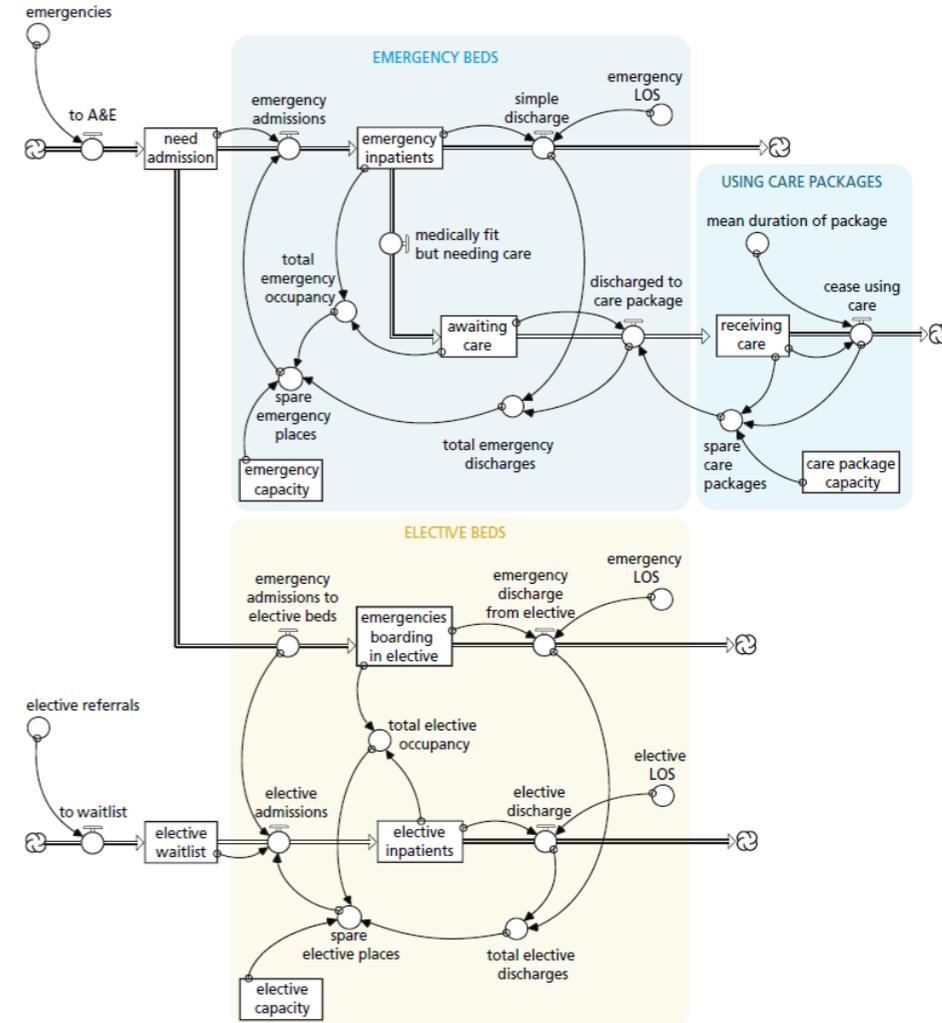


Simulation is a learning tool, it improves the collective understanding of how a particular system 'works' through engagement, learning, feedback and therefore iteration between stakeholders and the model.

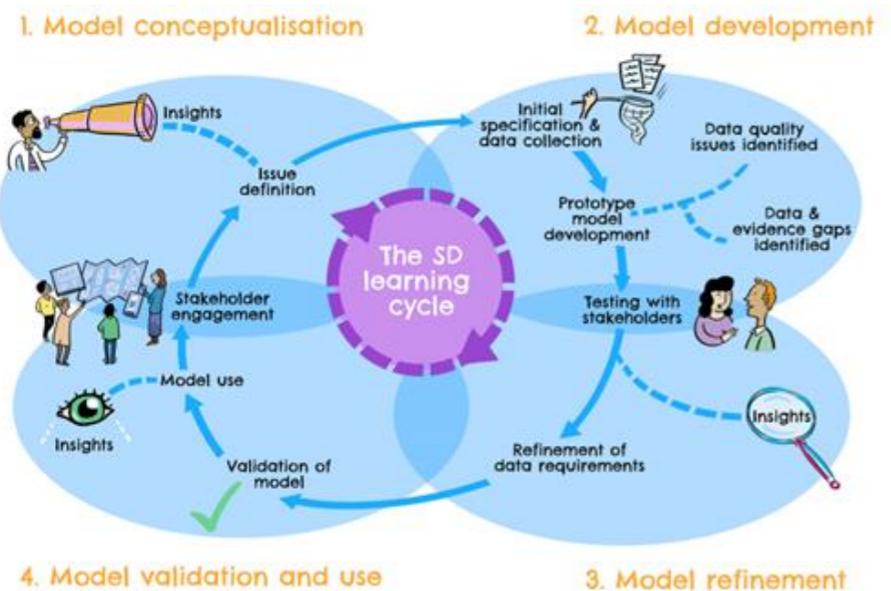
Models provide insight into system behaviour over time under a range of 'what if' scenarios generated by the underlying assumptions.

ICSs are facing the challenges and opportunities of transitioning from service / organisation to **system** level demand and capacity strategic planning.

SD provides the opportunity to take a system view and incorporate population health and needs prediction, to underpin medium and long-term strategic resources (including workforce) planning. It also provides evidence-based decision making for the re-allocation of capacity within a system and new ways of care delivery.



Pictures: Modelling social care complexity: the potential of System Dynamics, 2013



Programme Content

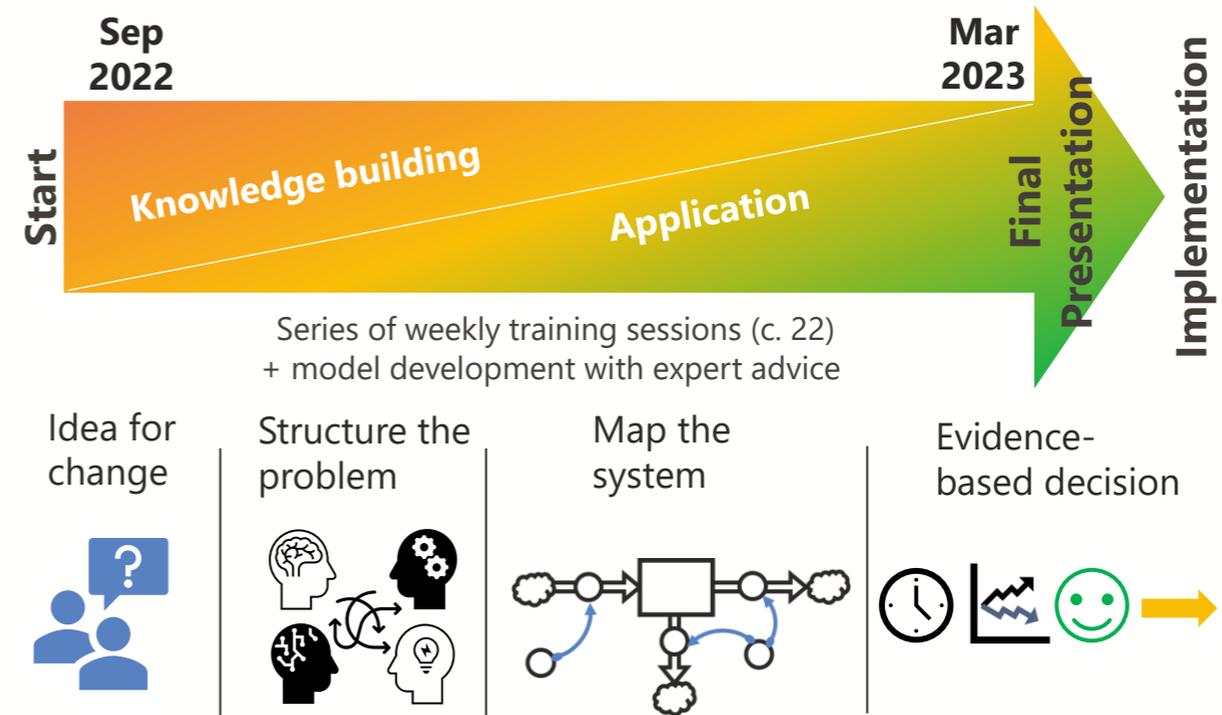
Session Content

The Strategy Unit modellers are working with Douglas McKelvie, a leading systems dynamics modeller and co-author of "The Dynamics of Care"¹ to deliver online sessions, beginning with an introduction to system dynamics, followed by dedicated time with Douglas and simulation modellers Stacey Croft and Sally Thompson from the Strategy Unit to develop SD skills of participants. Supplemented by talks from external speakers.

We will be using a series of case studies in STELLA, state of the art SD software. Learning how to use stocks and flows, auxiliary variables, delay functions, modules and interface development.

Sessions on complementary related topics to aid with project support e.g. problem structuring, project planning and management, facilitating participative model building workshops, model validation and interface design principles.

1. <https://bit.ly/caredynamicsbook>



Potential projects: What sort of projects are we looking for?

Problem domains include, but are not limited to, disease pathways, workforce planning, patient flow, combinations of these, business performance.

Examples might include:

- Understanding how bedded discharge to assess facilities affect patient flow out of ED.
- Exploring the impact of the backlog of hospital referrals on primary care and how GPs might manage the changing requirements of patients still waiting for diagnosis and treatment.
- Understanding workforce supply and demand e.g. in adult social care.
- Exploring how changing home care capacity affects delayed discharges from hospital.
- Simulating how the prevalence of diabetes is likely to change and how will this impact what services are required for diabetes management.

What is expected?

- **Organisations/Systems** are expected to propose projects / ideas prioritised by their organisation/system and nominate participants for the training programme. Organisations and systems must commit to supporting their learners by enabling capacity to participate, providing data and giving them access to clinical, managerial and operational staff who can describe the system.
- **Training participants** will be required to commit to a half-day a week for training and project support sessions (circa. 22 x 0.5 days, Thursday PM Sept '22 – Mar '23), **and** to work in-between sessions to develop their project (estimate 20-30 days), presenting their learnings and project outcomes in March.
- **This will not be a trivial commitment** – exact levels of input for participants and organisations will depend on the project chosen.

[View Person Specification](#)

Enhanced support – ICS pilot sites are also expected to:

- ❖ Address system-led delivery on a range of priorities to tackle demand and capacity challenges.
- ❖ Participate across the system
- ❖ Co-ordinate the workshops
- ❖ Collate local data to include in the process
- ❖ Provide comms support in their ICS
- ❖ Commit to being a case study for NHSE/I

SU & partners will:

For all participants:

- Run weekly sessions that will provide a variety of learning opportunities, model development and project support.
- Provide 6-month training licence for Stella Architect, and software training.
- Offer a series of external speakers from the world of systems modelling.
- Foster a peer support network.

Enhanced support for ICS pilots:

- *Thanks to funding from MLCSU and NHSE/I we are offering additional support for up to 3 ICS pilot sites. We will be working directly with ICSs to support their projects, by helping to facilitate their workshops and collaborating to build the model.*



Questions and how to apply

If you have any questions please feel free to contact:
Stacey.Croft@nhs.net or Sally.Thompson37@nhs.net

To apply for a place for your organisation / ICS to participate in this innovative programme, please ask your Intelligence Function Lead (or equivalent) to complete this [application form](#) (names and emails of IF Leads on the following slide). This asks about your project ideas, project champion and who your nominated participants are.

Applications close end of 15th of August 2022.

ICS Intelligence Function Leads

ICS	IF Lead Name	Email
Birmingham and Solihull	David Scott	david.scott30@nhs.net
Black Country	Lucy Heath	lucy.heath2@nhs.net
Commissioning	Matthew Spilsbury	m.spilsbury@nhs.net
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