

System Dynamics modelling – a contribution to system integration

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Whole Systems Partnership

The integration challenge

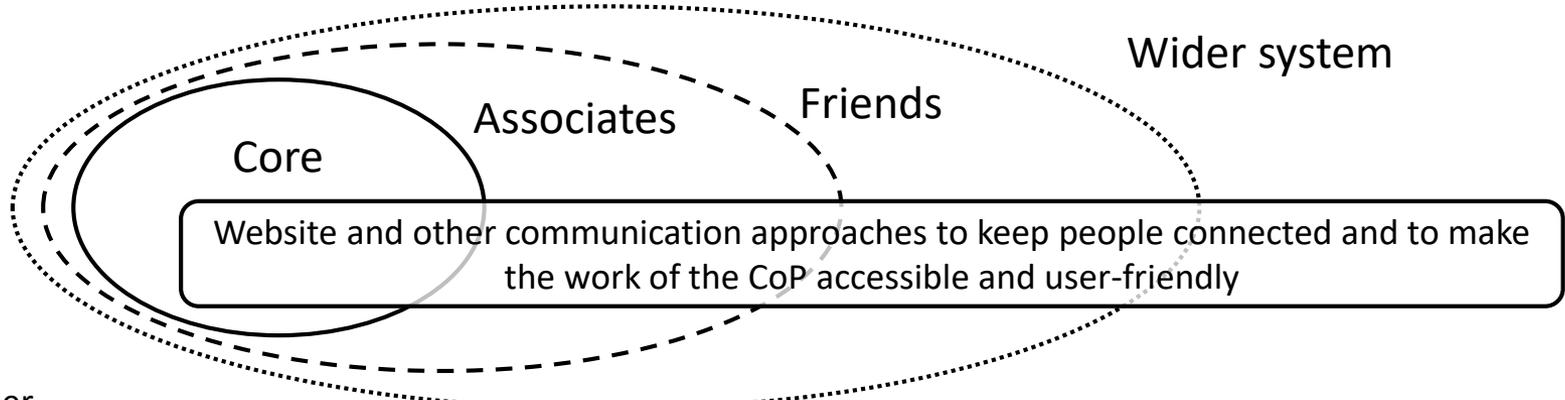
- The distinctives of System Dynamics
- Navigation through the integration challenge
- Workforce planning example

The contribution of SD

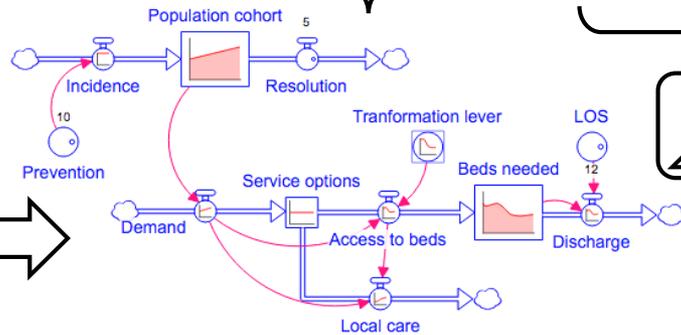
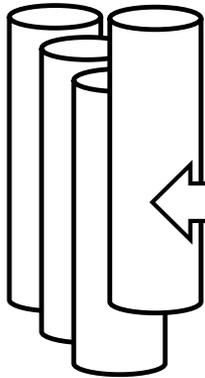
- System Dynamics modelling is the 'tool of choice' when:
 - ✓ The scope of an issue is '*strategic*' rather than operational or tactical;
 - ✓ The importance of variability or tracking individuals within a system is low;
 - ✓ The number of entities is *large*;
 - ✓ When control over the system is exerted through *rates* rather than queues;
 - ✓ When timescales are *relatively long*;
 - ✓ When the purpose is *to inform policy making* and to gain understanding about a system.

Ref: Brailsford et al, *Discrete-Event Simulation and System Dynamics for Management Decision making*, (2014), Wiley

We're building a community of practice.....



The KID and other relevant datasets

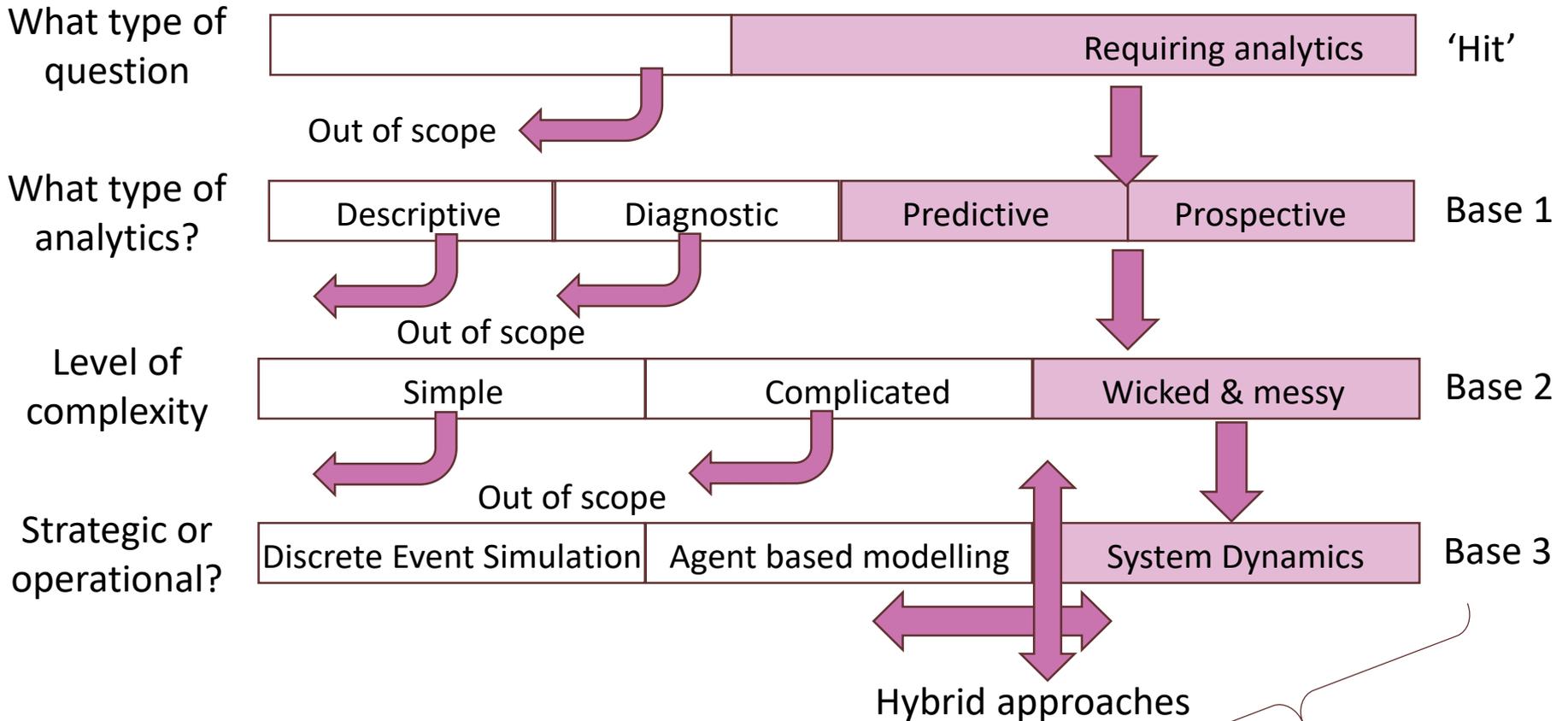


Expertise and coaching in SD modelling

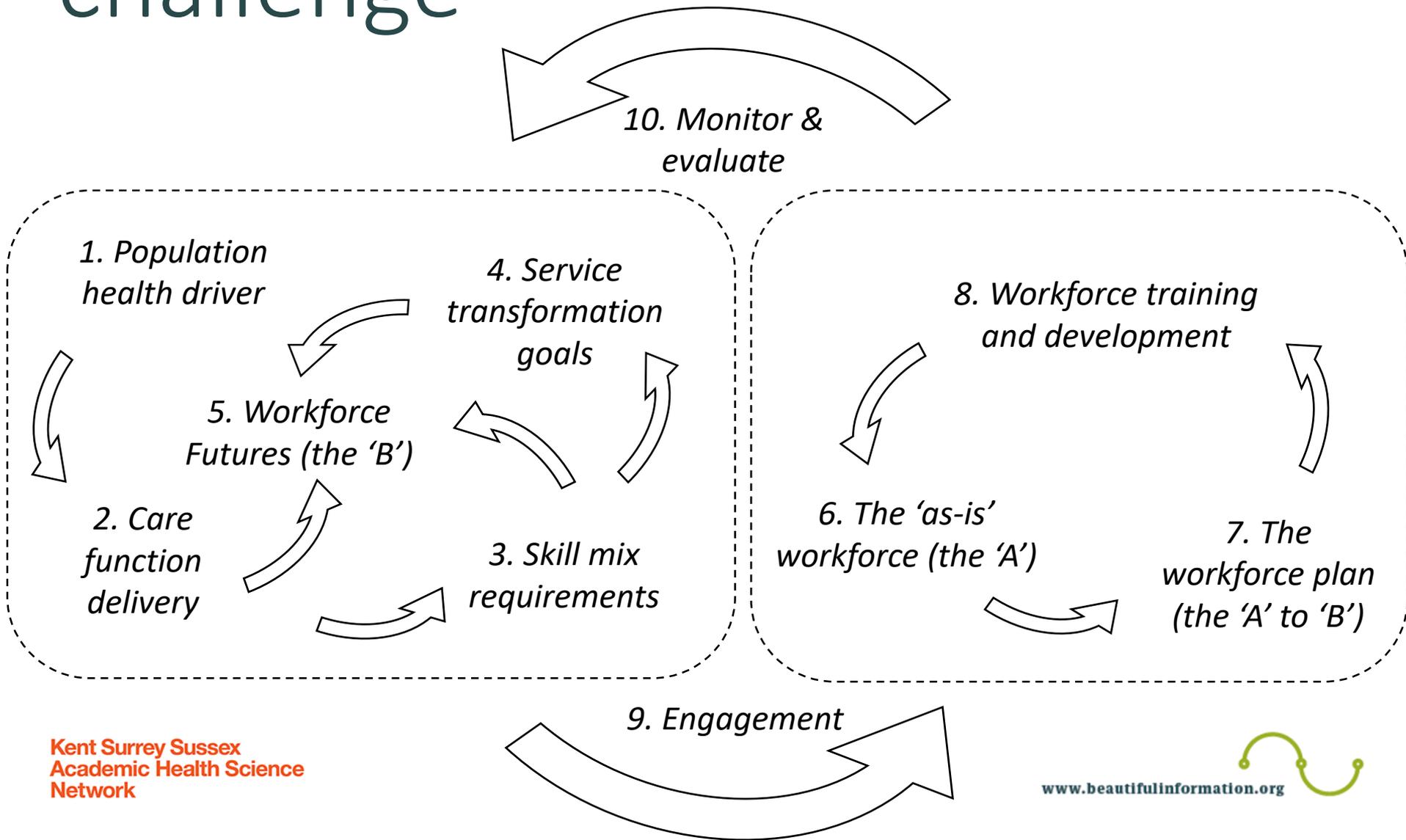
STP/ACS Clinical and Strategic leadership groups

Shared Health and Care Analytics board

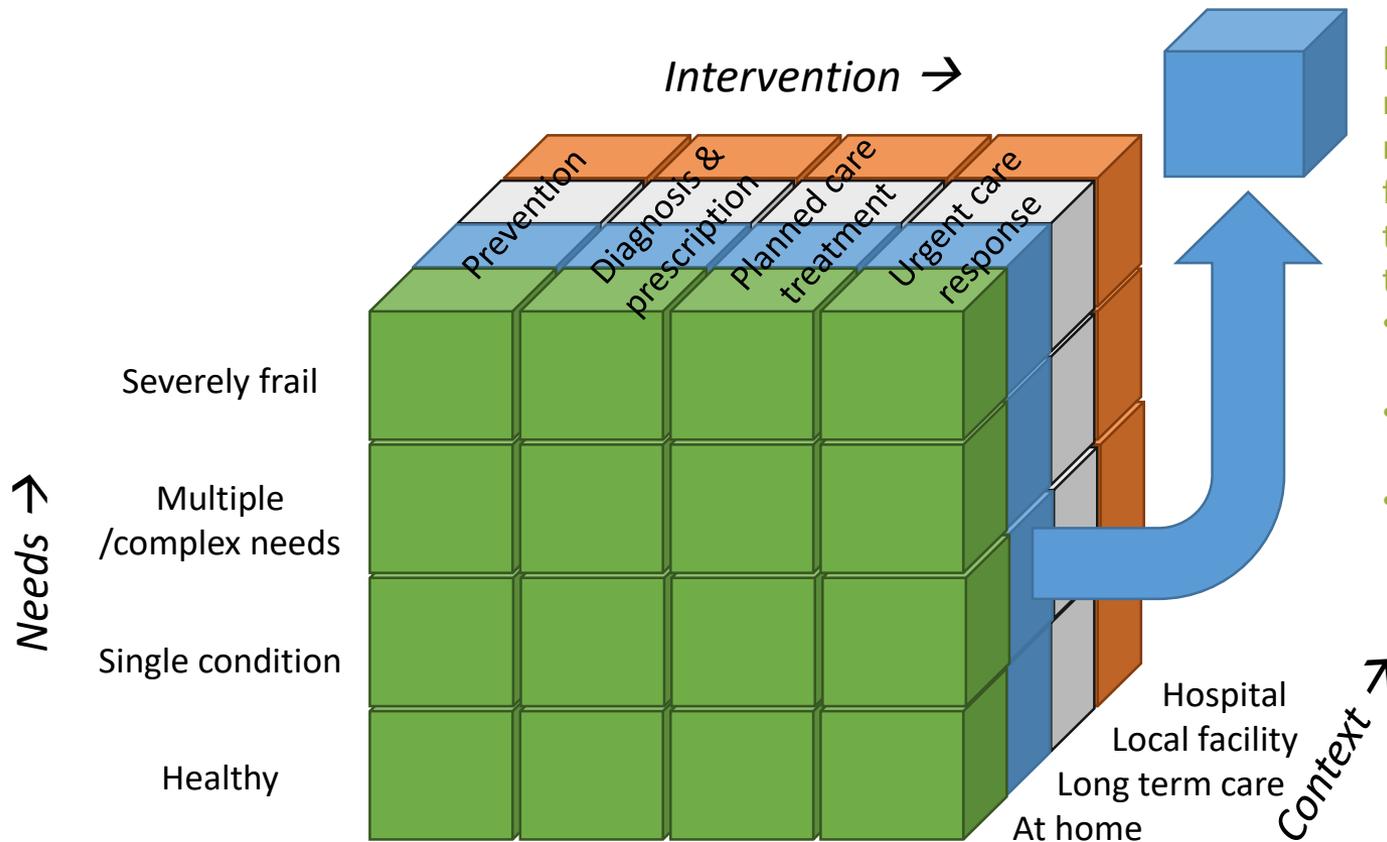
The Critical Appraisal framework – positioning SD modelling



Navigating the integration challenge



The care function cube: *cohorts, care & context*

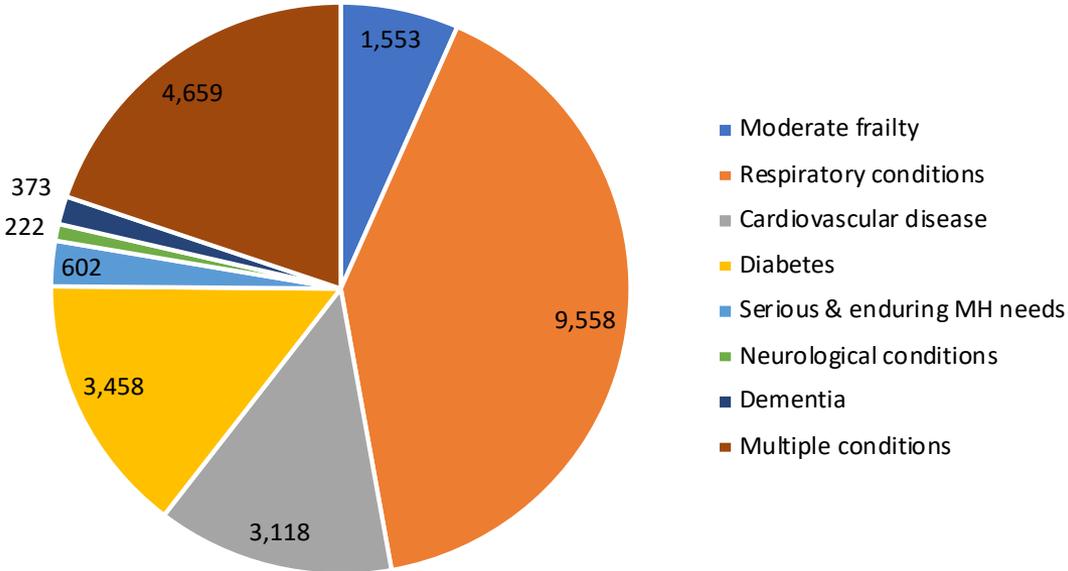


Each segment of the cube requires a workforce that is molded to cohort needs, care functions being delivered and the setting, whilst at the same time:

- Population health needs are changing;
- Services are being re-modeled;
- The settings where care is delivered are evolving.

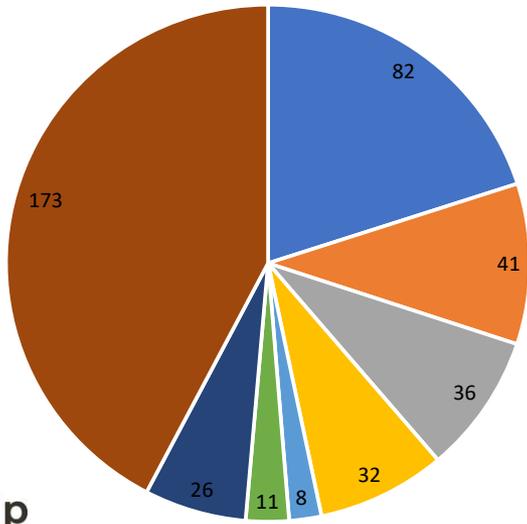
Identifying the true longer-term drivers of cost

Cohorts at risk of progression (2018)

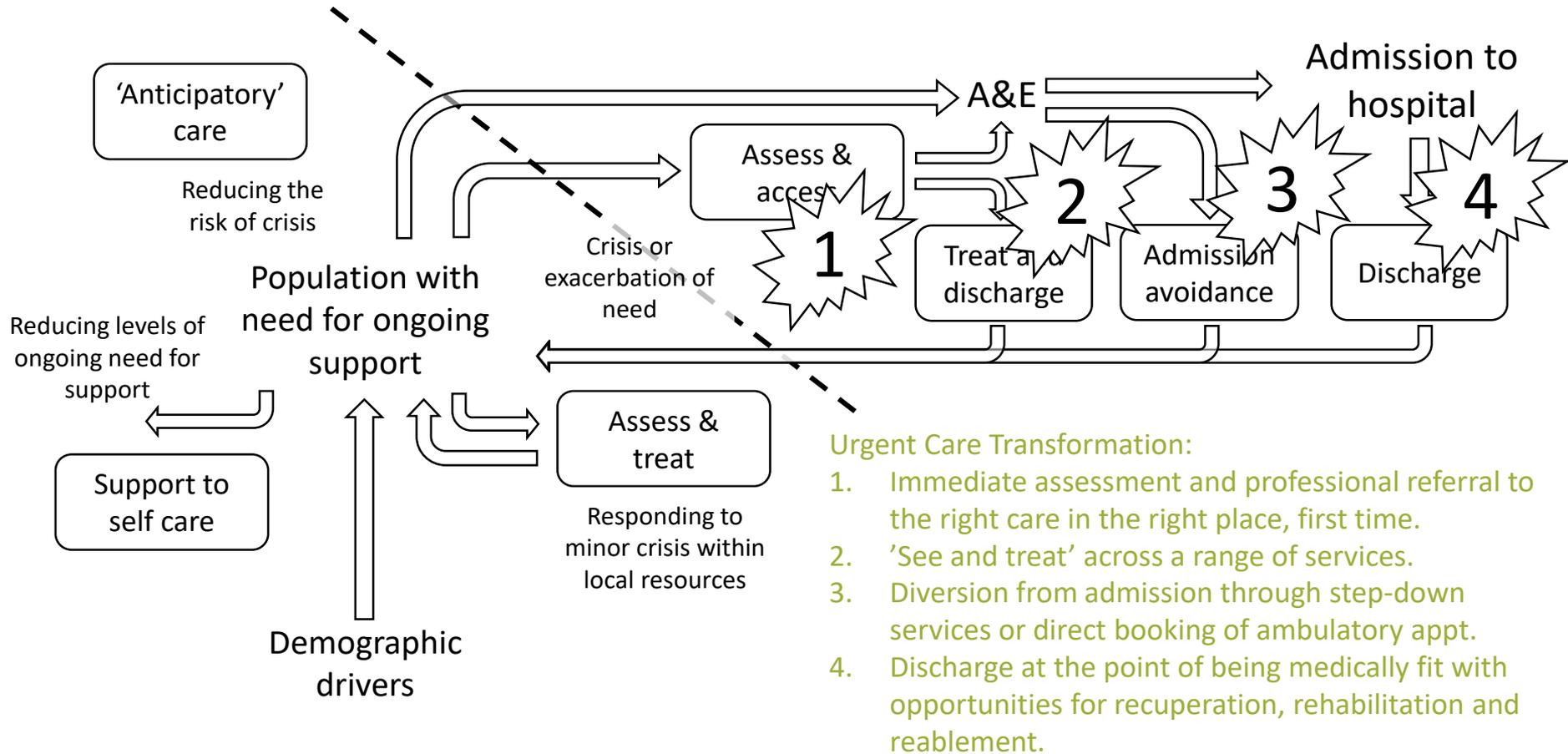


Highest impact will come from focusing on cohorts with high numbers and high rates of progression, e.g. moderate frailty & complex/multiple needs....

Numbers progressing to high & very high frailty pa (2018)

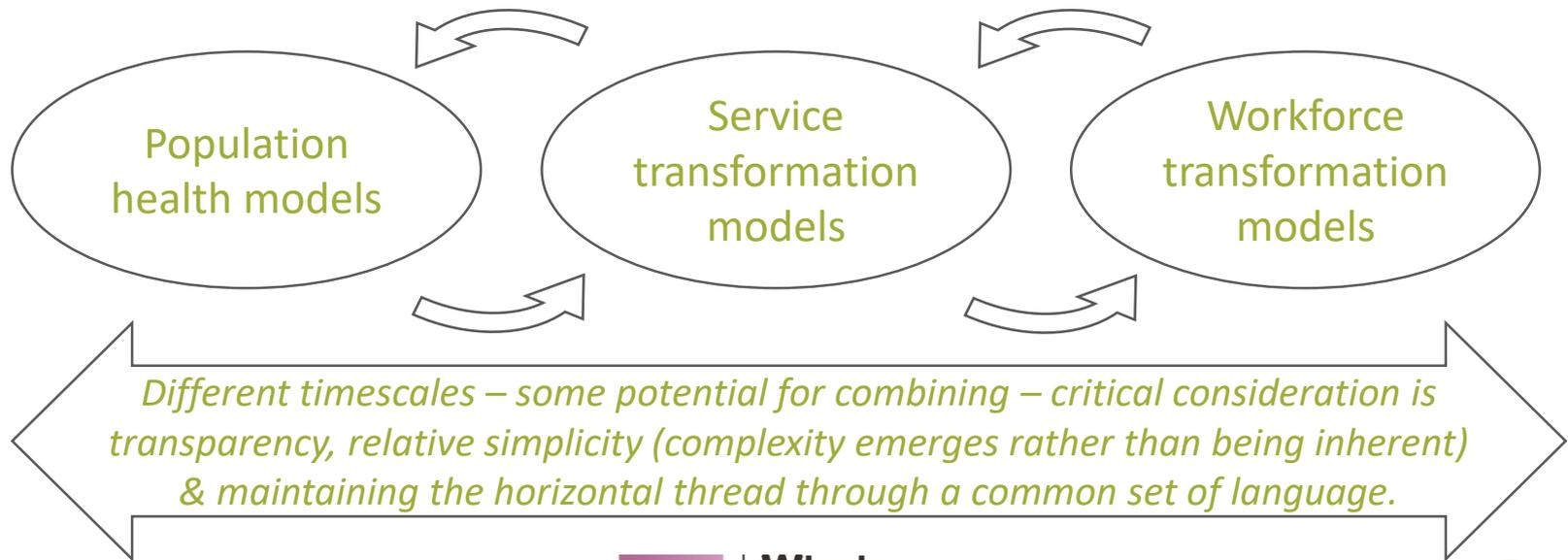


A care function map highlighting transformation



The contribution of SD

- The Kent Cohort model and derivatives, for example the 'progression to frailty' modelling;
- The Local Care service transformation model developed in West Kent, calibrated to other areas;
- The CCG General Practice workforce simulator developing in Lincolnshire, calibrated to other other areas.



Planning for a sustainable workforce in General Practice

What strategies should we employ to achieve the requisite workforce for General Practice in the future and how does that translate into recruitment, retention and workforce development plans?

It answers this question using a whole-practice, skill-level perspective, whilst also retaining the ability to monitor progress toward specific targets for wte GP capacity.



What does the simulator do?

- It uses wte workforce data from NHS Digital (adjusted for missing practices) for September 2017 for a specific CCG;
- It 'shapes' that data into skill levels and 5yr age bands to initialise a system dynamics model;
- It requires a user input that describes the wte requirements at each skill level at a specified date in the future;
- It simulates the required replacement or additional workforce at each skill level and in each year to 2031, including the requirements set in the previous step;
- It enables the end user to explore the impact of different policies on achieving the future wte requirements including, for example, the balance between recruitment and upskilling, the recruitment of GPs from overseas and retention strategies.

Model interface pages

1. Home: set your wte targets by skill level (and the split between GPs v's ANP/ACP) & view high level outputs for wte capacity changes...

General Practice workforce simulator (v5) 2018-07-30

GP wte key figures:

GP wte 2015	112
GP wte 2017	111
GP wte tgr 2020	135
GP wte 2020	130
GP wte 2031	145

WTE and skill level

WTE Autonomous	WTE total workforce	WTE GP recruitment	WTE GP type
2017	227	130	130
2020	130	130	130
2031	145	145	145

Workforce Goal and Year to achieve

2017	Goal	Year
Foundation	227	2022
Core	130	2022
Enhanced	19	2022
Autonomous	171	2020

GP strategies

New GP wte can be secured from 3 sources: GP registrars in local practices, recruiting GPs from overseas and from out of area. The recruitment from out of area is calculated from the difference between the recruitment goal and the sum of GP registrars commencing practice plus overseas recruitment.

Strategy: Overseas recruitment

Strategy: Senior Registrars in local practice

Strategy: Other

2. GP strategies: explore the impact of different ways to achieve the required change in GP wte...

3. Wider workforce: decide on any improvements in the retention of the wider workforce and on preferences toward upskilling...

Wider workforce

Workforce actions

Strategy: Improved retention

Strategy: up-skilling the workforce

Workforce strategies - upskilling

From	To	Value
From Foundation to Core		20
From Core to Enhanced		80
From Enhanced to Autonomous		80

Model output: workforce actions

The model outputs below provide an FTE pa for each skill level that will either need to be upskilled or recruited new to the local system, based on the primary scenario adopted and associated assumptions.

Wider workforce	GP workforce	Workforce actions	Wider primary care workforce WTE
Recruit to Foundation	0	9.2	9.4
Recruit to Core	4.0	5.8	8.5
Recruit to Enhanced	0.3	0.8	1.3
Recruit to Autonomous	0.5	1.3	1.2

4. Annual outputs: view and extract annual wte targets to achieve the model outputs for each skill level and for recruitment v's upskilling...

An example (step 1)

The model allows users two options to calculate a future workforce.
 1. By applying an underlying demographic driver and;
 2. The table below can be used to set a local recruitment goal and year achieved. Switch the 'Use local target' to apply the target and year to attain the target.

Use local target



Total WTE 2017		Workforce Goal and Year to achieve		
	2017		Goal	Year
Foundation	245	Foundation	227	2022
Core	132	Core	136	2022
Enhanced	9	Enhanced	19	2022
Autonomous	149	Autonomous	171	2020

The autonomous target is calculated using the 'Target % autonomus'. The model calculates the change from the Initial % autonomous to the Target % autonomous by the Year to achieve. The Year to achieve is preset to 2020.

Autonomous 2017		Initial % autonomous		Target % autonomous	
	2017		2017		Target
Partner GP	85	Partner GP	57	Partner GP	50
Non partner GP	26	Non Partner GP	18	Non partner	20
ANP	38	ANP	25	ANP	30

This CCG has set a goal for the wte workforce by skill level, as shown in the middle column opposite, with the target year for achieving this set for 2022 except for the Autonomous skill level, where the target is 2020;

From an initial 57/18/25 split for GP partners, salaried and ANP contributions to the Autonomous skill level workforce, the CCG has set a future spilt at 50/20/30.

The model simulates the outputs for GP wte opposite:

GP wte key figures:	
GP wte 2015	112
GP wte 2017	111
GP wte tgt 2020	135
GP wte 2020	122
GP wte 2031	135

Step 2 – GP strategies

The CCG then decides on three strategies to increase the GP workforce:

1. That 5 GPs from overseas will be recruited in three consecutive years from 2018 to 2020.
2. That there will be a gradual increase in the number of Registrars being trained and retained locally, rising gradually from 1 or 2 new Registrars a year initially up to 5 in the medium term.
3. That there will be a 10% improvement in retention.

GP strategies

New GP wte can be secured from 3 sources: GP registrars in local practices, recruiting GPs from overseas and from out of area. The recruitment from out of area is calculated from the difference between the recruitment goal and the sum of GP registrars commencing practice plus overseas recruitment.

Home



Strategy: Overseas recruitment

Use the graphical input below to input the wte GP recruitment planned from overseas. The table input then allows you to indicate the expected length of time in contract, loss during contract period and retention of overseas recruits after their contract is completed.



1

Assumptions for overseas recruitment	
	Value
Length of contract	3
Loss during contract (%)	10
Retained after contract (%)	80

Strategy: Senior Registrars in local practice

Use the graphical input to specify the planned numbers of Snr Registrar starts, and the further tabular inputs to explore further assumptions about assimilation into the local GP workforce.



2

Assumptions for Snr Registrars	
	Value
% CCTs not taking up post	30
Ave gap after training (yrs)	1
% taking up a local post	100
% loss headcount to WTE	8

Strategy: Other

The assumptions used in these tables should reflect permanent net loss in wte (not headcount) each year from the GP workforce and will include people leaving the local system (aged 50 years and over); reduction in wte worked; and the final point at which someone leaves the profession. In addition it is possible to improve retention.

What %wte capacity will be lost permanently pa?	
	Value
Partners aged 50 to 54	0
Partners aged 55 to 59	14
Partners aged 60 to 64	64

What %wte capacity will be lost permanently pa?	
	Value
Non Partner aged 50 to 54	0
Non Partner aged 55 to 59	14
Non Partner aged 60 to 64	64

Average yrs post 65	
	Value
GP Partner	5
Non Partner GPs	5

Average yrs post 65	
	Value
GP Partner	10
Non partner GP	10



3

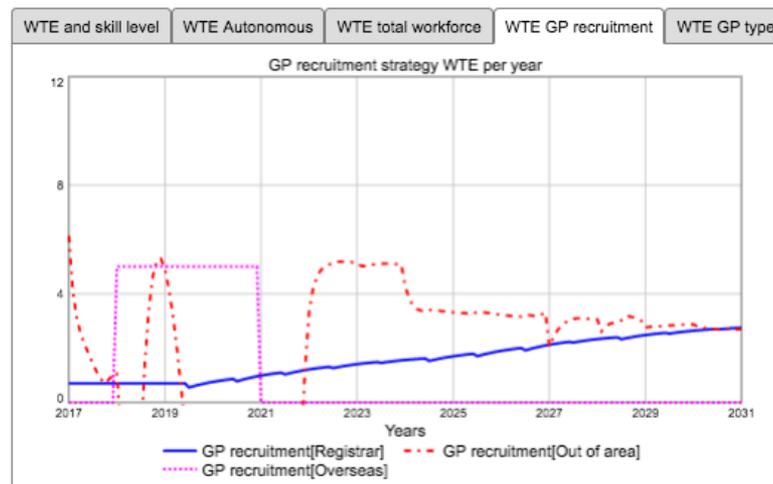
Step 3 – model outputs

What will progress in growing our GP wte look like?

GP wte key figures:

GP wte 2015	112
GP wte 2017	111
GP wte tgt 2020	135
GP wte 2020	128
GP wte 2031	136

Where will new GPs from from (local, out of CCG or international)?



What does our recruitment and workforce development requirements look like each year?

Model output: workforce actions

The model outputs below provide an FTE pa for each skill level that will either need to be upskilled or recruited new to the local system, based on the primary scenario adopted and associated assumptions.

Wider workforce | **GP workforce**

Workforce actions Wider primary care workforce WTE

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Final
Recruit to Foundation	0.0	9.3	9.8	5.9	7.5	9.9	11.3	11.7	11.9	11.9	11.9	12.1	12.2	12.2	11.9
Recruit to Core	0.0	4.4	7.1	9.5	7.2	5.5	5.8	5.9	5.9	6.0	6.1	6.3	6.5	6.6	6.6
Upskill to Core	0.0	1.4	2.3	3.0	2.3	1.7	1.8	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1
Recruit to Enhanced	0.0	0.5	1.3	1.6	1.0	0.6	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6
Upskill to Enhanced	0.0	1.8	5.0	6.4	3.9	2.3	1.7	1.6	1.7	1.8	1.9	2.0	2.2	2.4	2.6
Recruit to Autonomous	0.0	0.9	2.6	2.2	1.1	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.3
Upskill to Autonomous	0.0	1.5	4.5	3.8	1.9	1.4	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.1	2.2

Q&A

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General Practice workforce simulator –
demonstrator version available at:

<https://www.thewholesystem.co.uk/systems-thinking-modelling/hosted-online-models/general-practice-workforce-simulator-demonstrator/>

