# Horizon 2035: The role of System Dynamics and Systems Thinking in developing a future vision of the health, social care and public health workforce in England

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## The Department of Health in England is using System Dynamics to support policy development

- Commissioned by England's Department of Health.
- Considers different workforce futures for health, social care and public health 20 years from now.
- Outcomes aim to inform decision-makers to help ensure the health and care workforce in 2035 can meet the demand challenges facing them.
- Applies a whole-system and skills approach to model diverse workforce groups and to understand the relative scale of competing demand pressures.
- Also applies the CfWI's Robust Workforce Planning framework- based on systems thinking principles and system dynamics simulation, and integrates horizon scanning, scenario generation and workforce modelling.

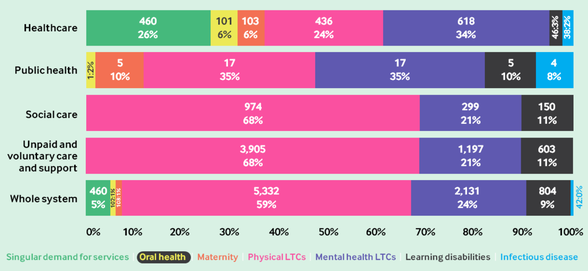
## 5 Inform robust decisions

What are the best options for decision makers?

### Current workforce allocation

| | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Level 6 | Total |
|---|---|---|---|---|---|---|---|
| 1. Prevent | 17.45% | 4.02% | 1.90% | 0.43% | 0.20% | 0.07% | 24.1% |
| 2. Enable | 8.81% | 2.67% | 1.79% | 0.41% | 0.11% | 0.03% | 13.8% |
| 3. Assess | 5.87% | 3.38% | 2.58% | 0.61% | 0.40% | 0.11% | 13.0% |
| 4. Plan | 5.83% | 1.76% | 1.97% | 0.43% | 0.18% | 0.07% | 10.2% |
| 5. Treat | | 0.59% | 0.71% | 0.30% | 0.19% | 0.06% | 1.9% |
| 6. Rehabilitate | 3.02% | 1.31% | 1.08% | 0.37% | 0.08% | 0.03% | 5.9% |
| 7. Relieve | 14.60% | 4.11% | 1.76% | 0.27% | 0.12% | 0.03% | 20.9% |
| 8. Link | 3.19% | 3.20% | 2.60% | 0.87% | 0.33% | 0.08% | 10.3% |
| Total | 58.8% | 21.0% | 14.4% | 3.7% | 1.6% | 0.5% | 100% |

Whole-system workforce by demand source and sector 2013-14 in hours (millions) and %

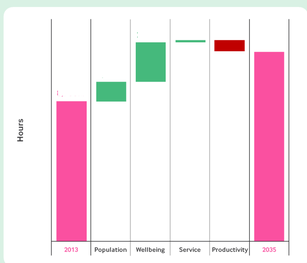



- The model is initialised based upon the current activity of the Horizon 2035 workforce groups.
- This was validated with system stakeholders and provides a rich insight into demands being met by the health and care system

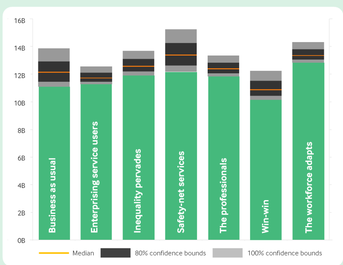
### Sample outputs

- Monte Carlo simulation was used to explore the uncertainty in the model results for each scenario.
- Different policies could be explored and the impact quantified.
- Large datasets were generated, and a Tableau data visualizer was used to share the results with the decision makers. This has enabled the insights to be shared and thus supported the distribution of workforce intelligence

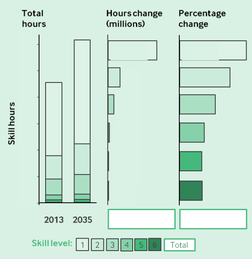
Total skill hours demand 2013 to 2035 under business as usual conditions, median and uncertainty



Components of change waterfall chart, 2013 to 2035: business as usual



Total median skill hours demand in 2035 under business as usual conditions, and in the six scenarios, with spread of uncertainty



Total skill hours demand by skill level, business as usual conditions, change in hours and percentage change, 2013-35 (median projection)

## 2 Understand the system

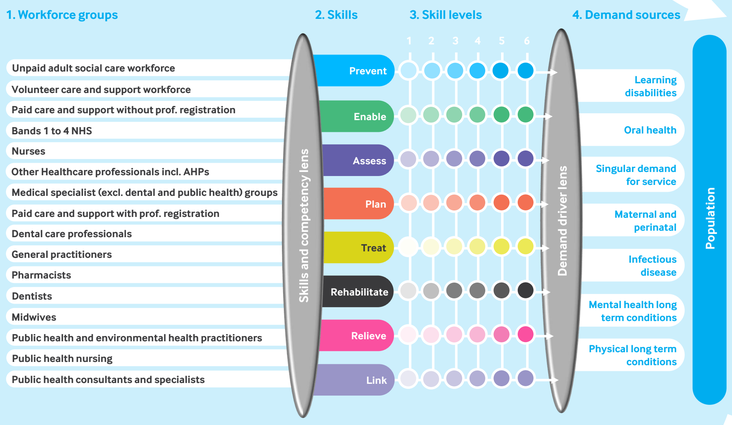
What drives future behaviour?

### Understanding the past and present

- An interactive presentation was developed using Prezi that provided context to the Horizon 2035 research activity.
- The Prezi considered the changes to the English health and care system over the last 20 years.
- This included changes in policy, workforce and population health.

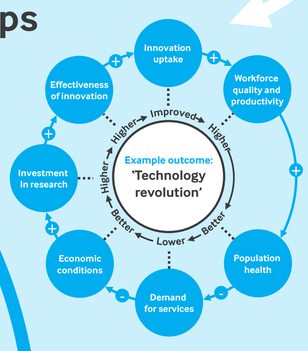
http://prezi.com/qvc2veyqq0ou/horizon-2035-the-context-by-the-cfwi-hs-team/

### Horizon 2035 taxonomy




- The Horizon 2035 taxonomy is a set of definitions that cover the skills delivered within the health and care system.
- The taxonomy contains formal definitions of the workforces delivering wellness skills (16), the types of skills delivered (8), the skill level (6) and the types of demand sources that the skill are delivered to meet (7).
- The taxonomy has been developed with, and validated by, stakeholders from the health and care system
- It offers a framework and language to describe the complex set of skills delivered within the health and care system.

### Cluster workshops

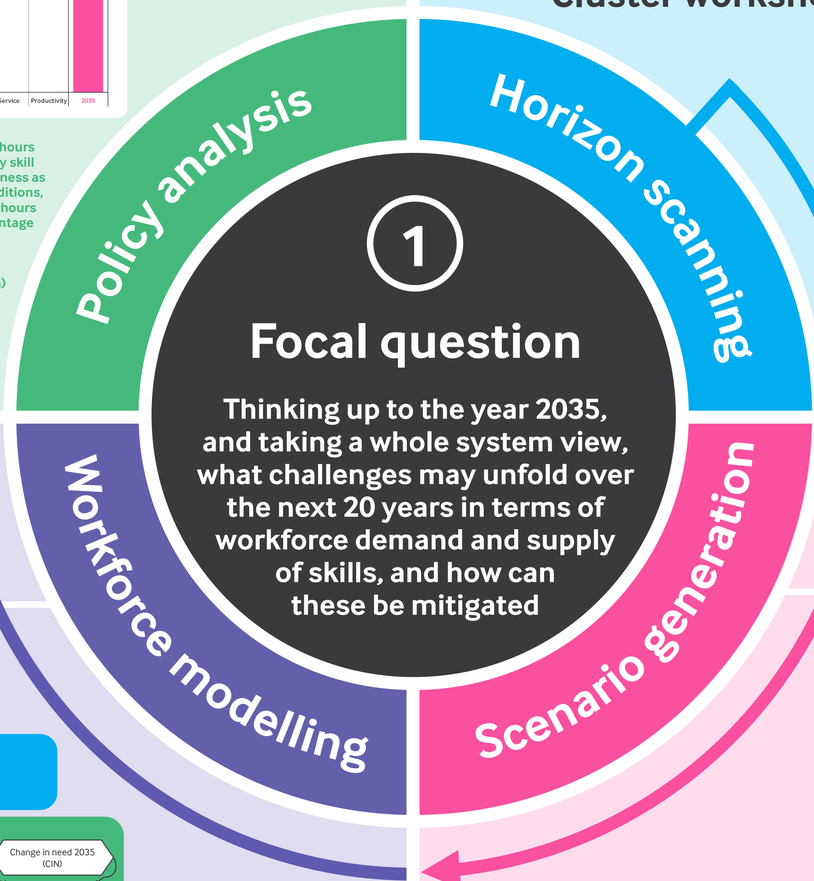



A series of workshops were held with system stakeholders to uncover how it was thought the system may evolve over the next 20 years.

The four workshops covered healthcare, public health, social care and the whole system.

During these workshops causal loops diagrams were developed that linked together the underlying system factors defined during previous horizon scanning activities.

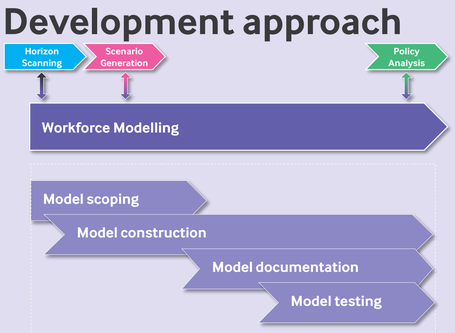
http://www.cfwi.org.uk/publications/horizon-scanning-analysis-of-forces-and-factors




## 4 Simulate the possibilities

How do we quantify the future?

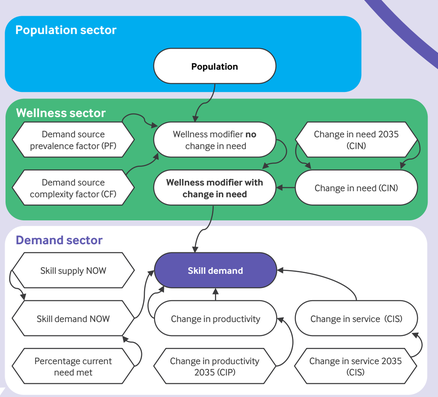
### Development approach




- The SD model has been developed using Vensim based on the CfWI's best practise guide. This mandates appropriate levels of model scoping, documentation and testing.
- All assumptions have been reviewed with sector experts.

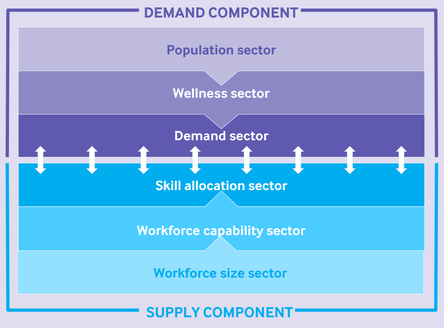
http://www.cfwi.org.uk/publications/developing-robust-system-dynamics-based-workforce-models-a-best-practice-guide

### Demand component




Future demand is calculated based upon population change by age and gender, changes to population health and wellbeing, changes to workforce productivity and changes to service aspirations

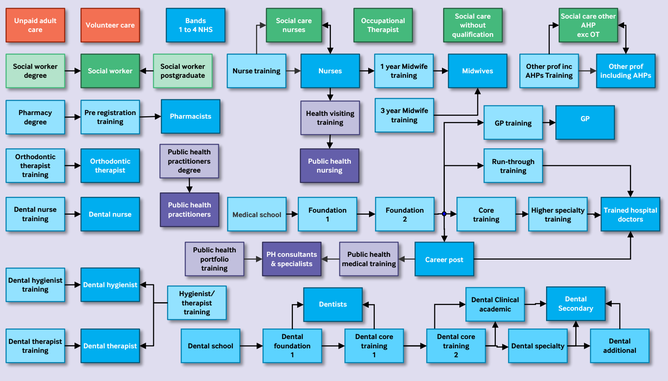
### Sector diagram




The system dynamics model has two components:

1. The demand component projects the future demand for wellness skills
2. The supply component projects future skill supply

### Supply component



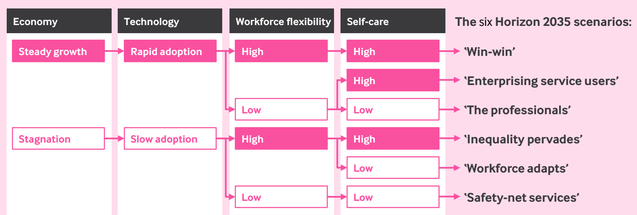
- The supply component simulates the 16 Horizon 2035 workforce groups in terms of 24 distinct workforces and 31 different types of training.
- Each workforce and training stock contains all inflows, delays, and attrition rates.
- The supply component has been benchmarked against CfWI's detailed workforce models.

## 3 Explore the future

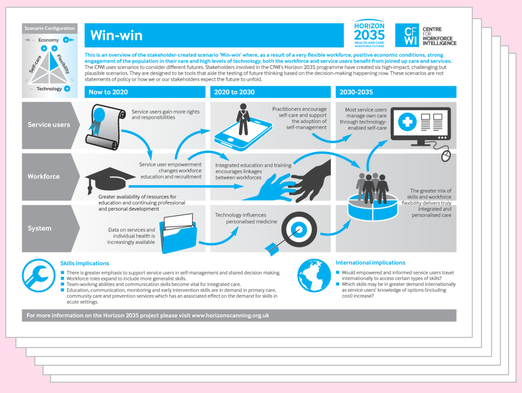
What are the challenging scenarios?

### Scenario development

The scenarios were created in a stakeholder workshop, see: www.youtube.com/watch?v=9FCxFbzNsq4




- The Horizon 2035 scenarios were created by over 50 sector experts and stakeholders from across health, social care and public health in a workshop.
- The scenarios were based on four dimensions chosen by the participants and deemed to be the most significant factors for the future of the health and care system.
- These were the economy, technology, workforce flexibility and self care.

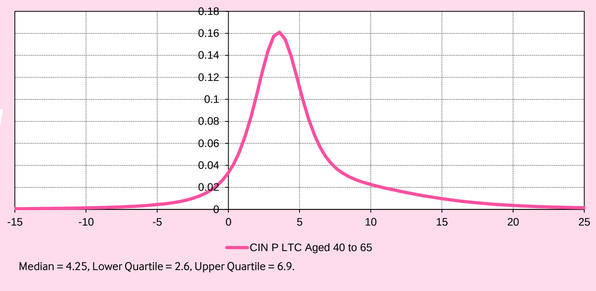



- Six scenarios were constructed using different, plausible directions and combinations of the four dimensions. These scenarios are owned by the stakeholders who attended on the day.
- Common workforce themes emerging from the scenarios include modifying skill mixes to respond to these futures, changing responsibilities around demand, and the changing role of organisations and people across this system and the sectors within.

http://www.horizonscanning.org.uk/our-research/horizon2035/scenarios/

### Elicitation

Change in need due to physical long-term conditions (age over 45 to 65)




Median = 4.25, Lower Quartile = 2.6, Upper Quartile = 6.9.

- Expert elicitation using the SHELF protocol was used to associate values with uncertain variables for each scenarios.
- The elicitation workshops considered:
  1. The percentage change in workforce effort as a result of Physical Long Term Conditions by 2035 above and beyond population growth and ageing.
  2. The percentage change in workforce effort as a result of Long Term Mental Health Conditions, by 2035.
  3. The change in workforce productivity in terms of skill outputs per skill unit time to 2035.