Whole Systems Partnership

To CLD or not, that is the question...

Peter Lacey – Founding Director, Whole Systems Partnership

An exercise

Whole Systems Partnership

Split into two groups and consider the following marketing slogan:

"*Bigger lorries, lower emissions*"
[Courtesy of M&S – seen on the sides of their lorries]

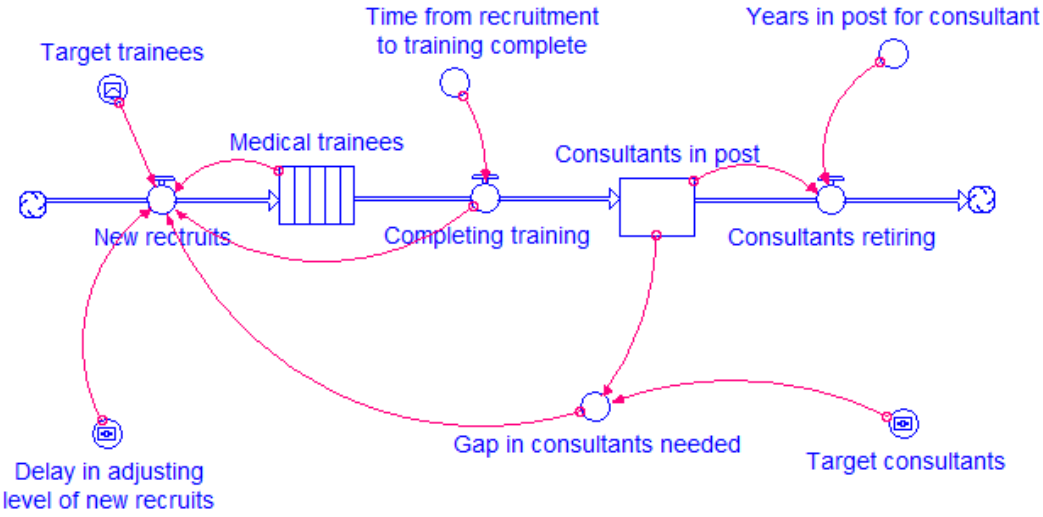
1. In whatever way feels comfortable to your group tell the story that the marketing team at M&S want you to buy into.
2. Consider alternative stories or doubts that you have about the validity of the story.

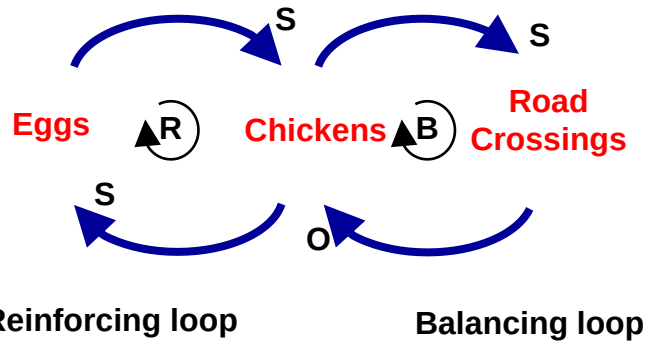
Feedback

Whole Systems Partnership

My assumptions

- That you have a basic understanding of the distinctives of system dynamics modelling – stocks & flows, delays and feedback.
- That you will also have some acquaintance with Causal Loop Diagrams – causality & positive and negative feedback loops.

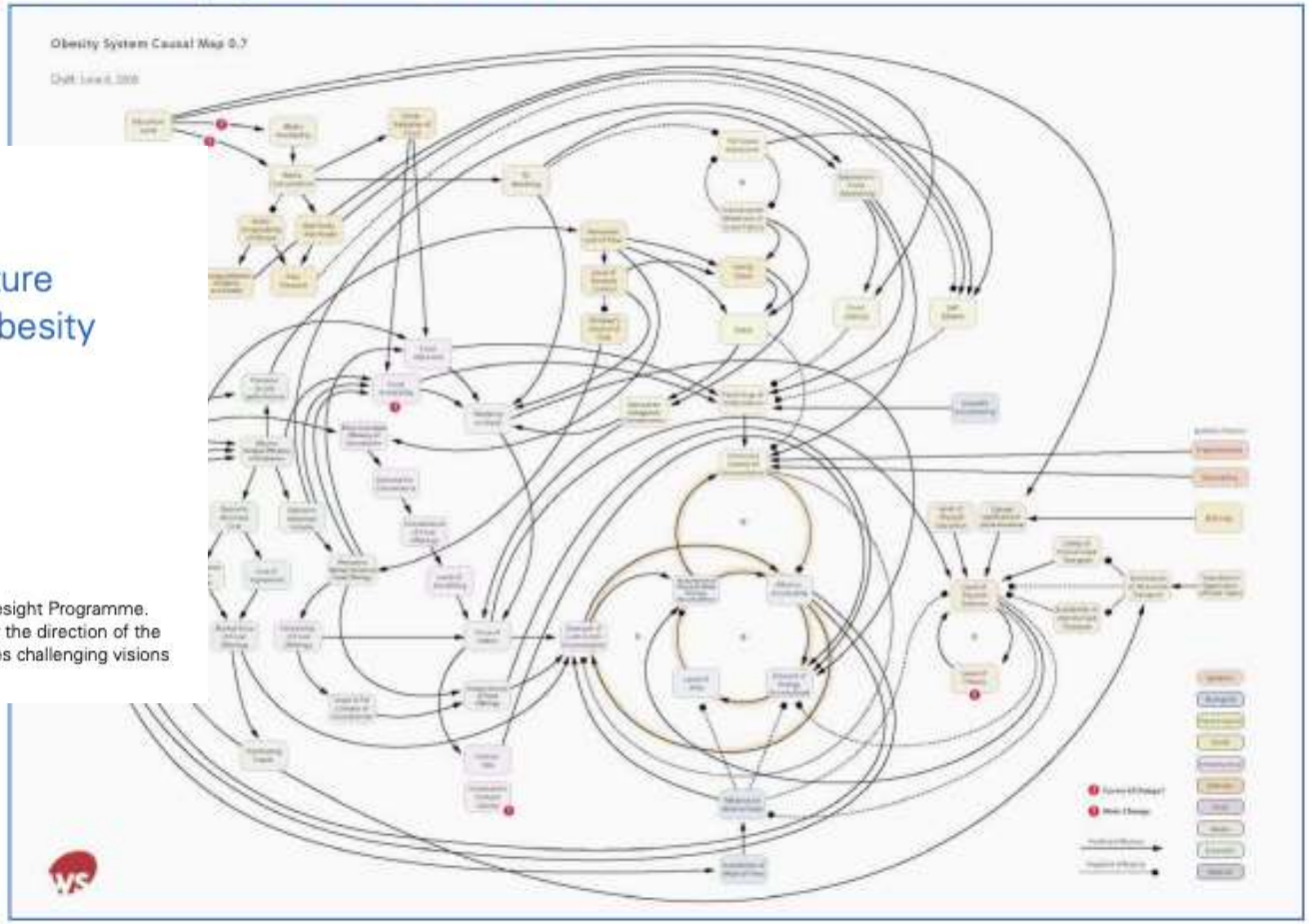




What we're not considering

Whole Systems Partnership

Figure 8: Draft obesity system model (version 0.7)



Foresight

Tackling Obesities: Future Choices – Building the Obesity System Map

Philippe Vandenbroeck, WS
Dr Jo Goossens, WS
Marshall Clemens, WS

This report has been produced by the UK Government's Foresight Programme. Foresight is run by the Government Office for Science under the direction of the Chief Scientific Adviser to HM Government. Foresight creates challenging visions of the future to ensure effective strategies now.

However...

- The process to generate such system maps is intensive, can generate insight and lead to policy recommendations – however...
- They can't give quantitative answers or identify the relative strengths or weaknesses of different feedback loops leaving the hard graft to modelers who would find it difficult to translate the CLD into an SD model – in fact, I've not seen that done!

The use of causal loop diagrams in the world of SD

Whole Systems Partnership

- There is an ongoing debate in the systems thinking and modelling community about when and how to use causal loop diagrams, or not! There are probably three camps…
  - The 'purist' approach would be to ensure CLDs form the basis on which you then proceed to model;
  - The 'pragmatic' approach would be to hold CLDs as an option, perhaps using them to explain system behaviour in a simple non-mathematical way after you've built a model;
  - The 'nay-sayers' for whom CLDs are an unnecessary encumbrance adding little value to the modelling process.
- You 'pays-your-money-and-takes-your-choice', but no introduction to systems thinking should ignore them!

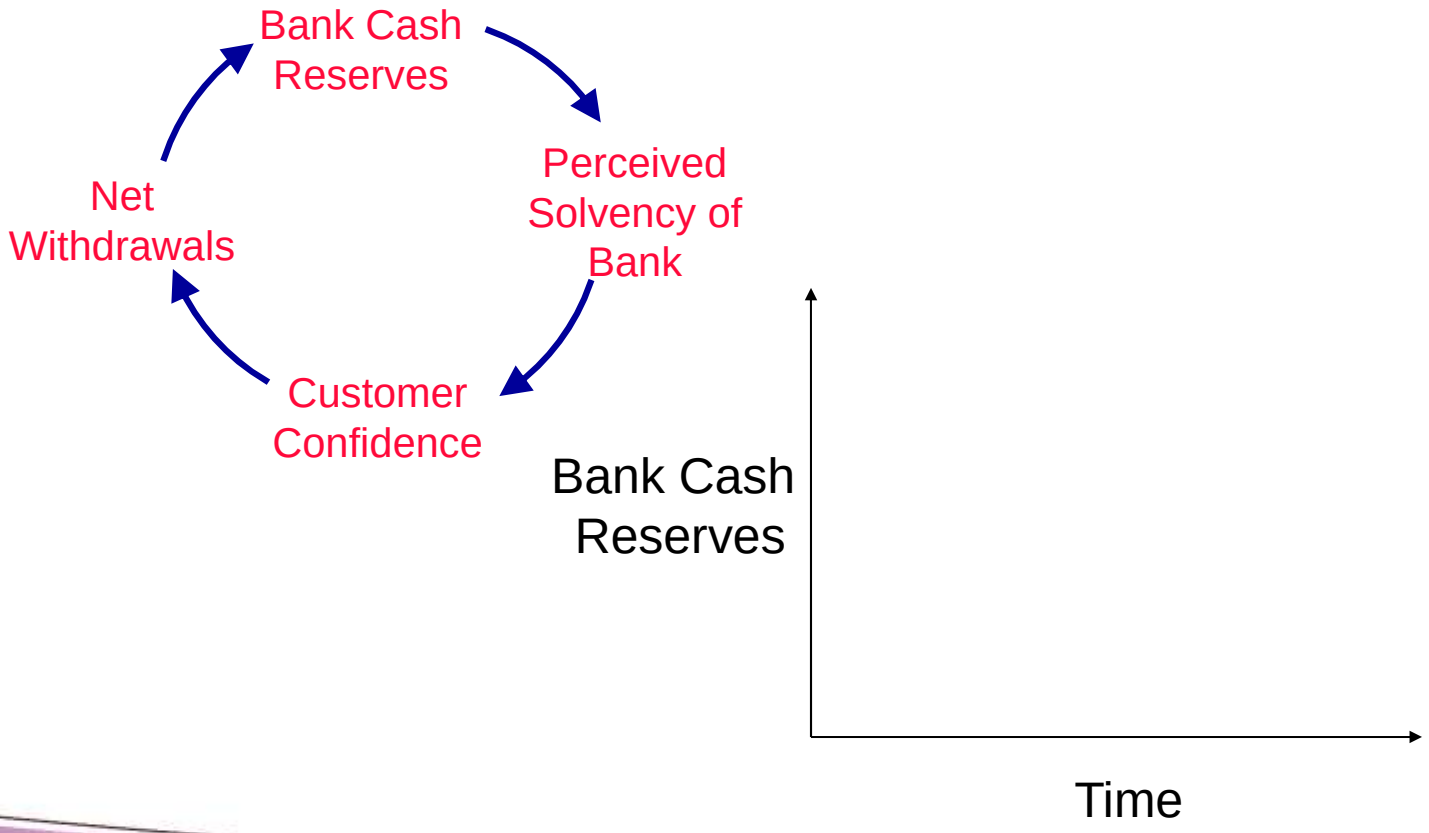
The rationale for CLDs

Whole Systems Partnership

- An understanding of system behaviour (dynamics) is often held in ‘mental models’ – incomplete pictures and thoughts of some causal relationships that lead to a problem we see – often ‘validated’ by biased data;
- Causal loop diagrams allow us to apply system thinking by clarifying and making more complete these mental models and sharing them in a common format;
- CLDs tell the story of the system through identifying variables (nouns) and the interactions between them (verbs);
- Start at a high level to scope the problem (not the data) and then refine as needed when more insight come to light.

Your second task

In your groups tell the story behind the CLD shown below by adding an ‘s’ or an ‘o’ against the causal links, deciding if the loop is reinforcing or balance and add a line to the graph for bank cash reserves over time...



Feedback – what story did you tell?

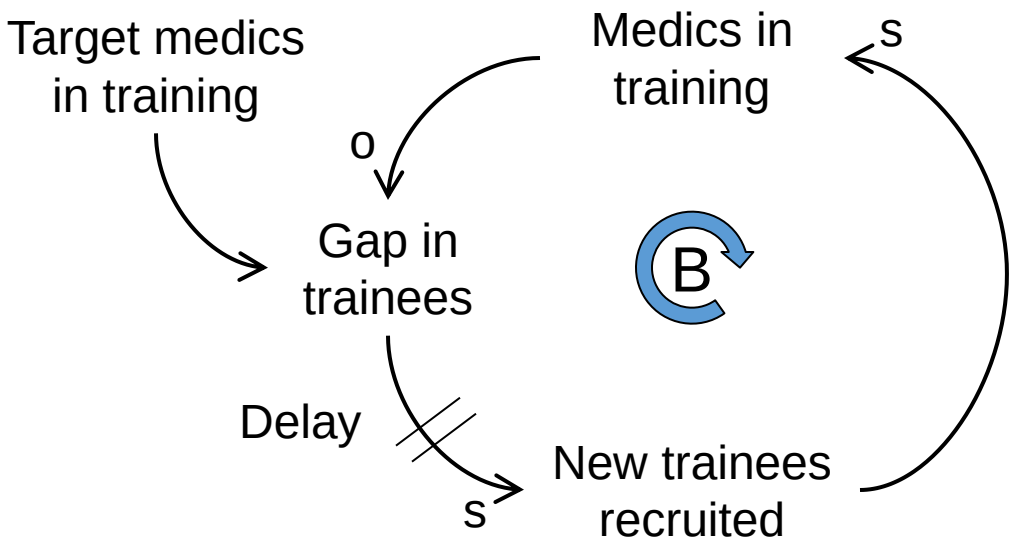
Whole Systems Partnership

An example from our consultancy

Whole Systems Partnership

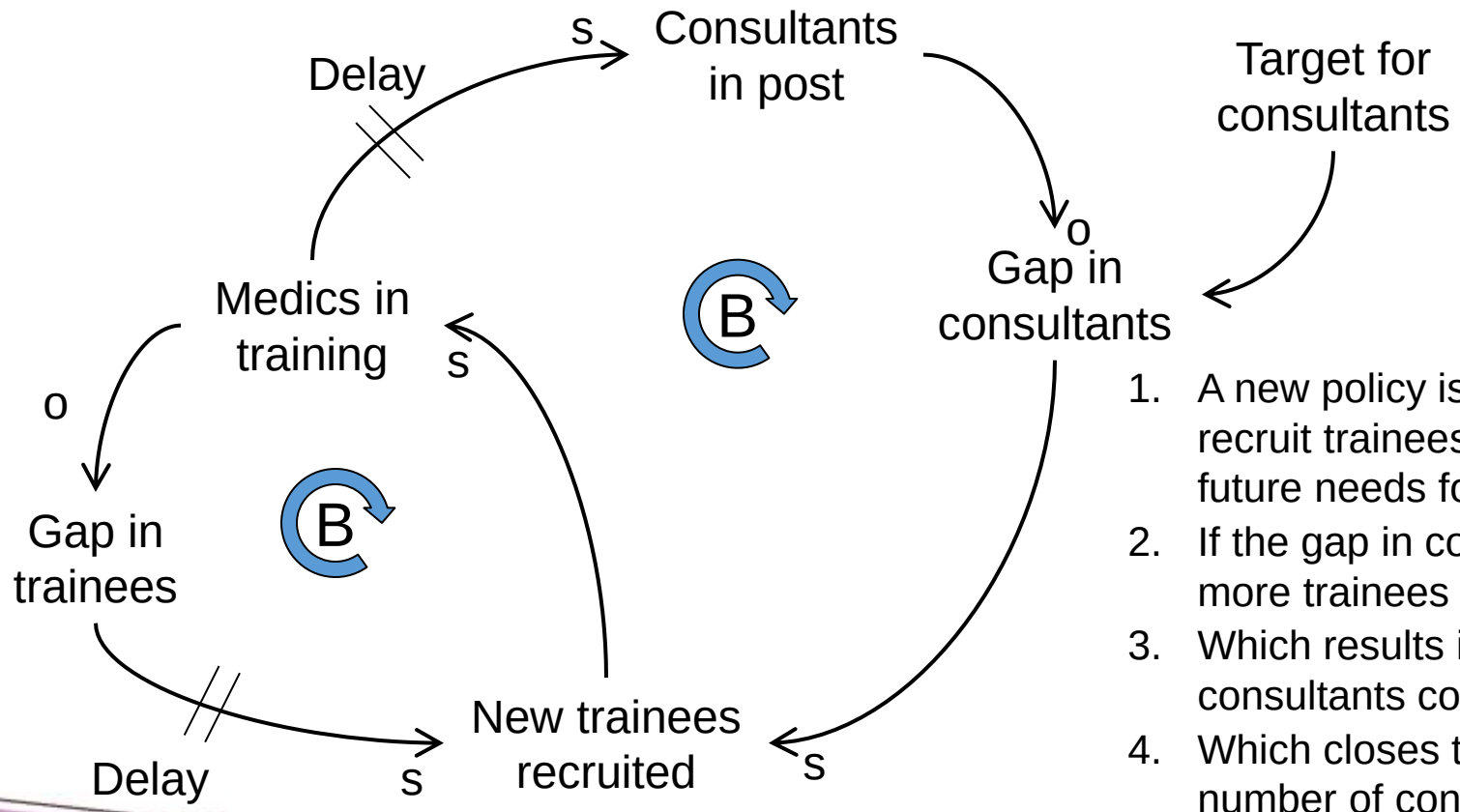
- Training the ‘right number’ of medics.
- What is the ‘issue’ being explored?
  - How do you decide how many training posts you commission today for tomorrow’s workforce requirements?
  - A simple ‘policy’ may reflect a ‘one out, one in’ for training so as to maintain current levels of supply – plus occasional ‘one off’ adjustments to respond to specific identified needs;
  - However, these ‘one-off’ interventions can cause unwanted system behaviour similar to boom and bust, which is of course a system archetype, more of which later...

The system in balance



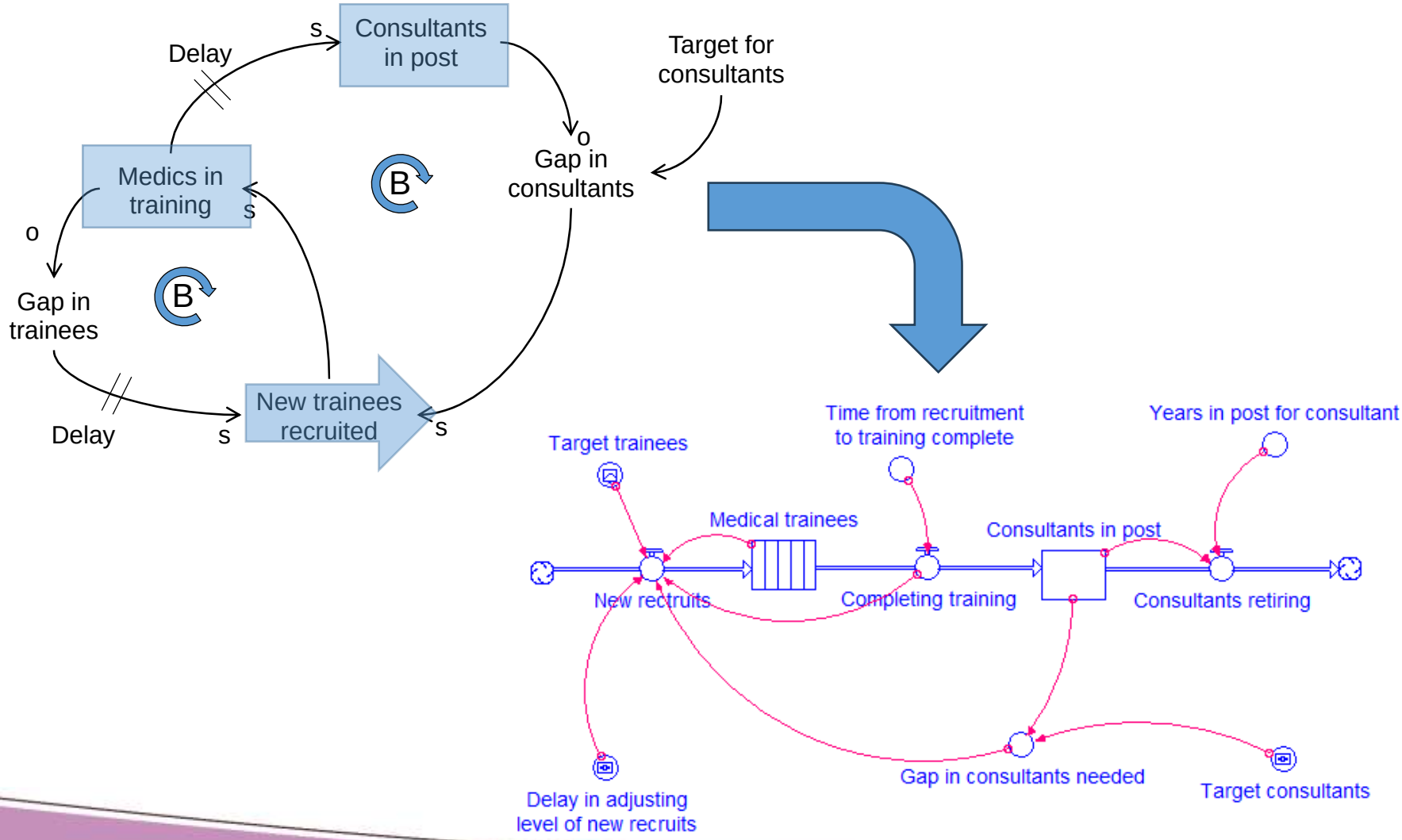
1. As trainees complete their training a gap occurs between actual and required training posts – *trainees go up, gap goes down*
2. New trainees are recruited – *gap goes up, recruits goes up*
3. The number of people in training returns to the required level – *recruits goes up trainees goes up*
4. If the target changes the number in training adjusts accordingly – *a system in balance*

The impact of external target setting



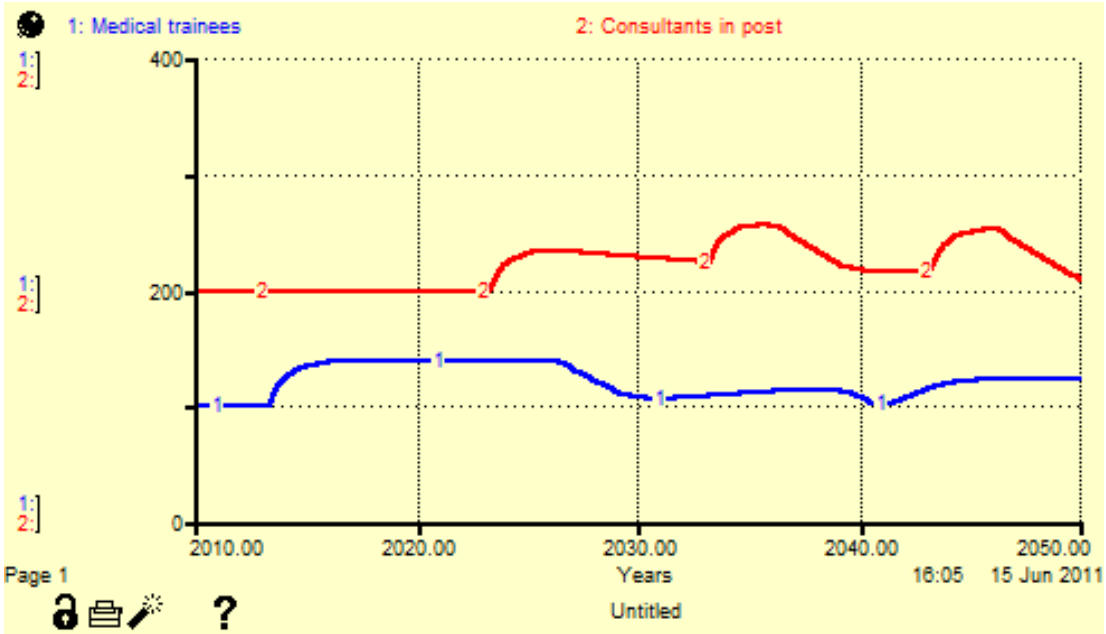
1. A new policy is introduced to recruit trainees on the basis of future needs for consultants
2. If the gap in consultants grows more trainees are recruited
3. Which results in more consultants coming into post
4. Which closes the gap in the number of consultants – after a delay.....

Building the bridge



The impact on system behaviour

The difference in timescales for delays within this simple system cause a more complex set of behaviours as illustrated here…



1. Current equilibrium has 100 trainees and 200 consultants
2. If future need for consultants rises to 240 the number of trainees rises, followed by an increase in consultants
3. However, delays and feedback within the system mean that there continues to be under & overshoot over subsequent time periods

Reflections…?

Whole Systems Partnership

WSP practice in preparing to model using SD

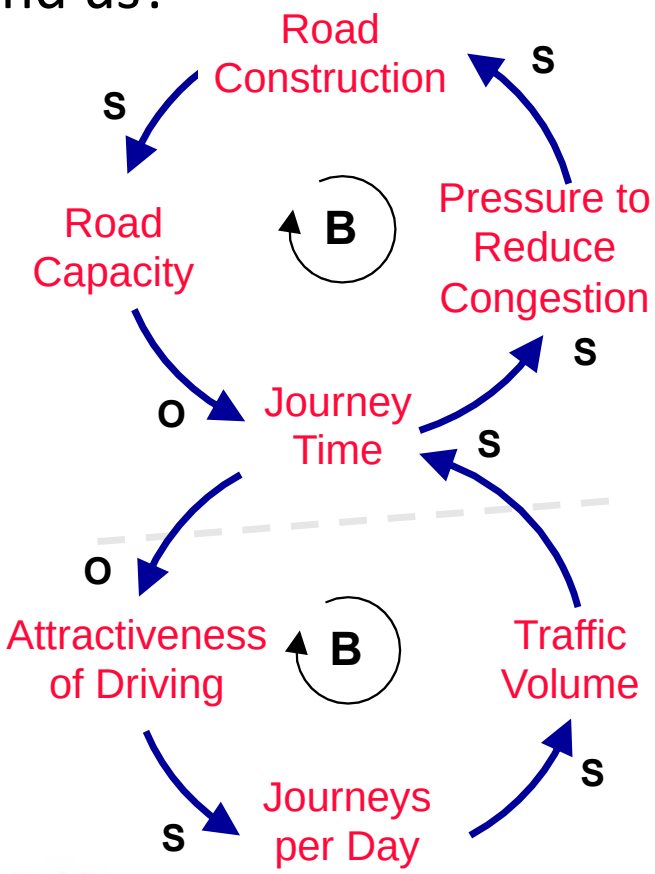
Whole Systems Partnership

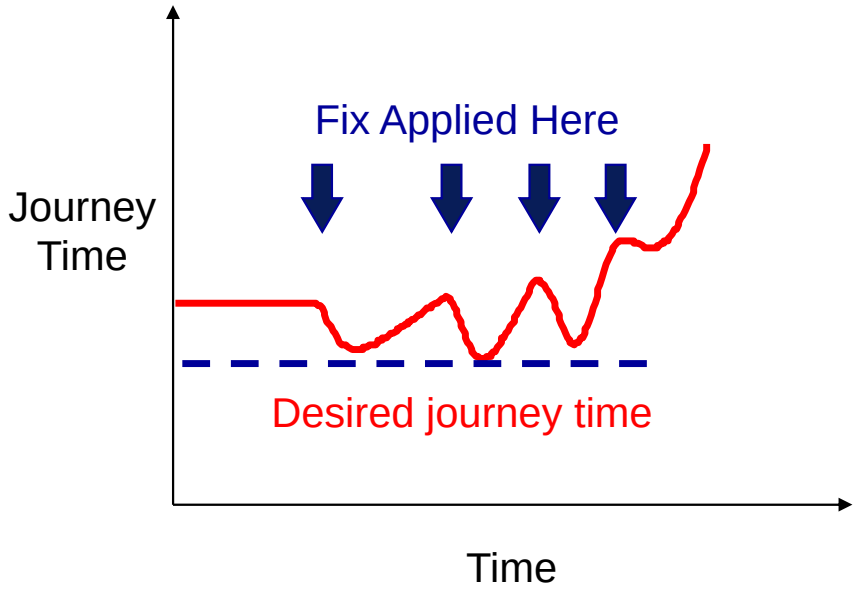
- Developing a clear statement of the issue of concern to the client;
- Extracting people's 'mental models' of the system under investigation – which people typically resort to linear pathway language;
- Discussing behaviour over time for key performance outcomes – what do you experience;
- In all these steps we keep an eye and an ear open to statements or stories that reflect causal loops and often use very simple diagrams including feedback loops to validate what we're hearing;
- In this way we prepare the client to be ready for a CLD explanation of what's happening.

Links to archetypes

Whole Systems Partnership

Fixes that fail – where else do you see this behaviour in the world around us?

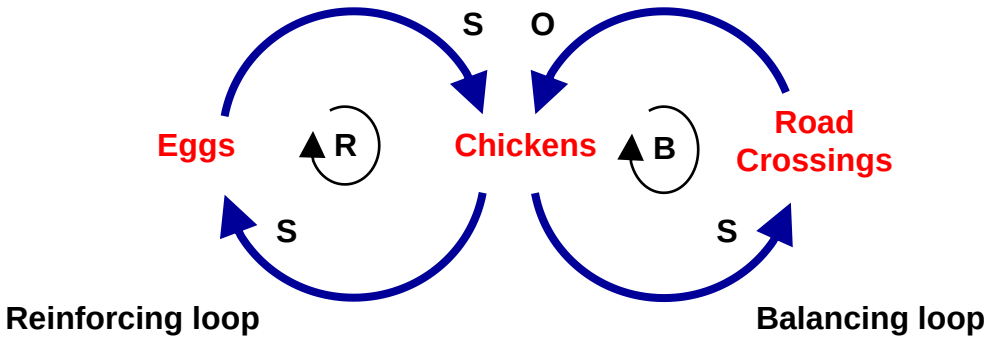




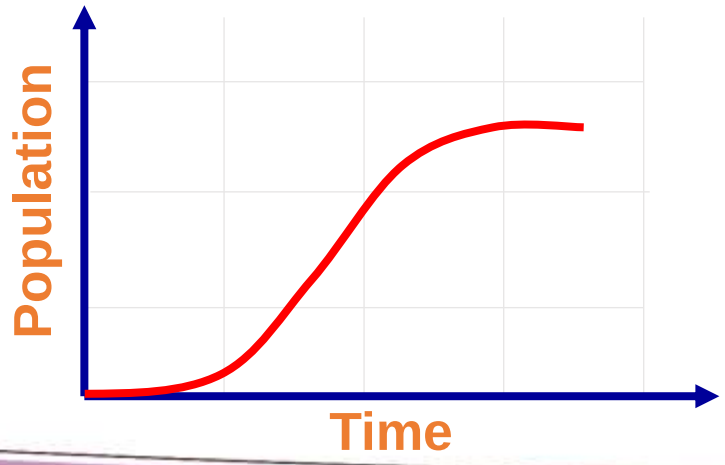
Architypes are useful!

Whole Systems Partnership

- The example from medical training illustrates a fix that fails architype – two balancing loops;
- Other simple architypes are available...



Limits to growth



Good practice in the use of CLDs in developing SD models

Whole Systems Partnership

1. Listen out for language that betrays the welcome presence of ‘loop thinking’ in your clients and amplify them.
2. Have fun with creating the story line to emphasise the importance of clear labeling and logical thinking.
3. Create the link from CLD to SD – stocks and flows, feedback and delays are core to both.
4. Use them as explanatory tools.
5. Keep them simple.
6. Don’t loose sleep when people just don’t get them - linear thinking can be a difficult thing to dislodge!

Your final say...

Whole Systems Partnership

What are CLDs good for?

1. As a route into SD modelling?
2. As a way to sensitize people to the existence of feedback?
3. As a tool for recognising system architypes?
4. As a means to communicate the behaviour of an SD model?
5. As an approach on its own to extract system maps from multiple stakeholders?
6. Other?

7. [Absolutely nothing...]

Quick-fire feedback place the above in rank order.

Go to www.menti.com and enter the code 3866 1775