

Modelling for Strategy Support

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Why We Model?

- Understand complex systems, process or cause and effect relationship such as those found in construction, rather than rely on intuition
- The mind can only cope with 5 ± 2 interacting variables
- Identify problems



- Run scenarios
- Reflection on results/outputs

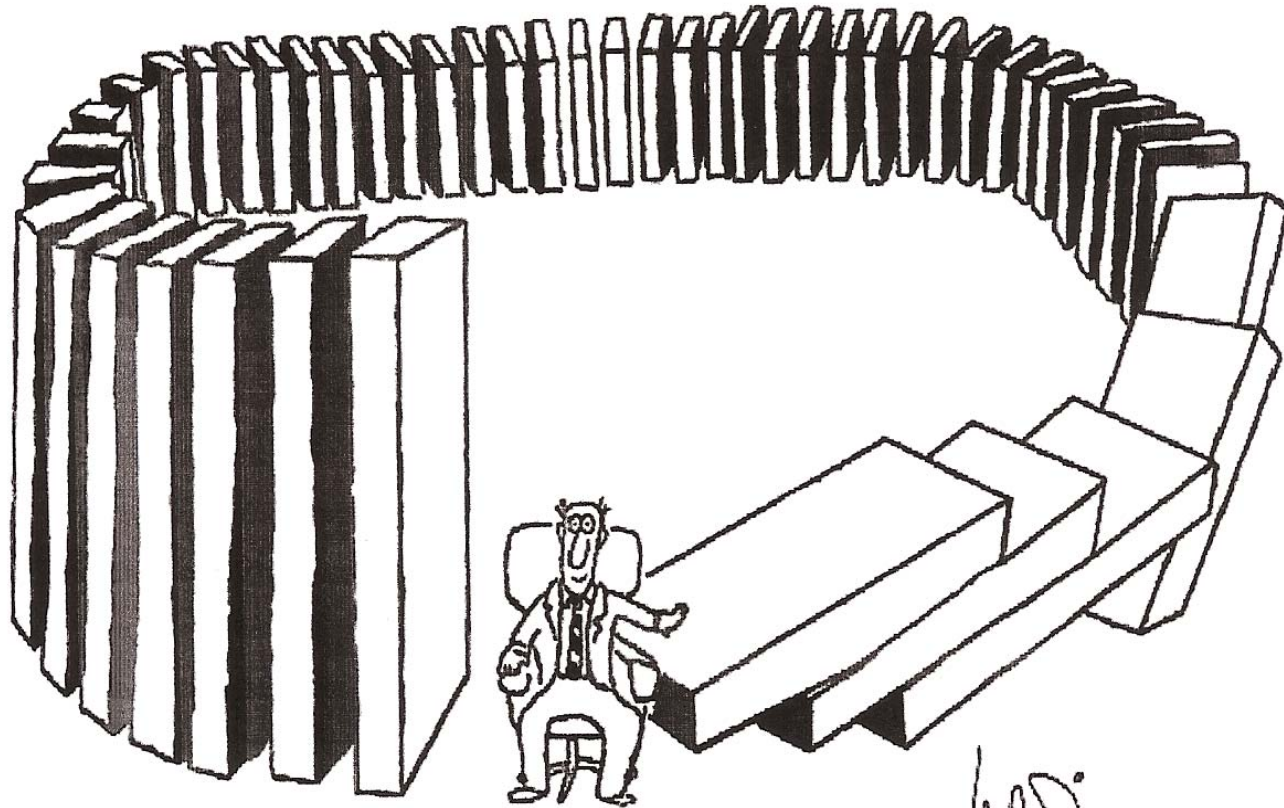


- Help in thinking strategically
- Improve design/policies
- Validate or correct “mental models”

What is System Dynamics?

- Simulation methodology for studying and managing complex feedback systems, such as one finds in business and other social systems
 - Non-linear relationships
 - Feedback
 - Delays
 - Hard and soft variables
- Designed for assisting in policy decisions
- Not a forecasting tool but a tool to aid understanding
- SD used as a research tool
- **The building blocks of SimCity**





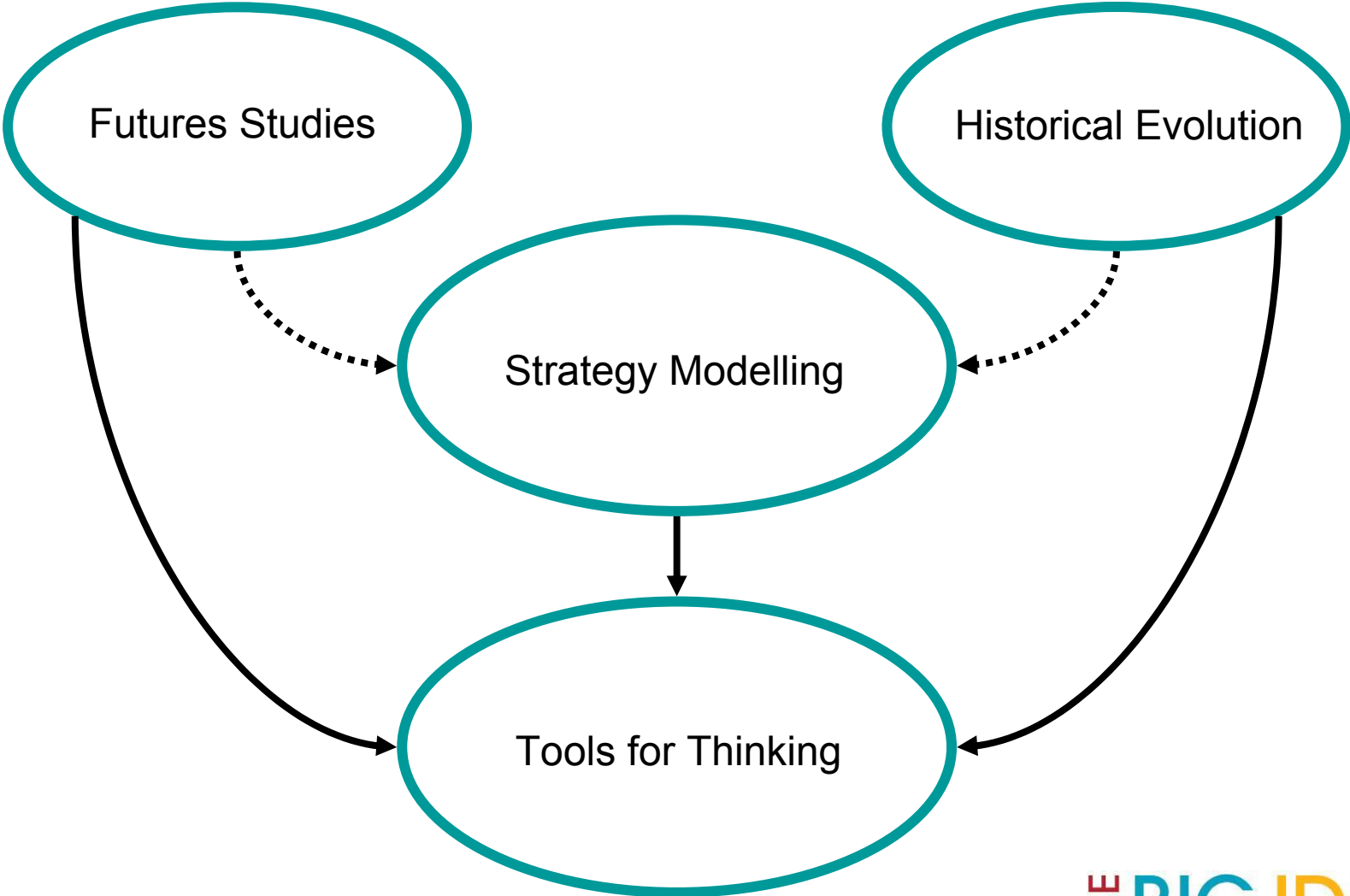
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System Dynamics

successful applications in project based industries

- ➔ London Underground to support a restructuring programme
 - ➔ Boeing to prepare the company to meet changing conditions in its Flight Test Operations by aiding the creation of a value network map
 - ➔ BP to evaluate the most cost-effective way to run down the waning Forties oil field
 - ➔ To manage the diffusion process for energy-efficient buildings
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- ➔ All are characterised by policy/strategy issues at an aggregate level

How We Worked



Workshop: DCD Construction

- **An SME, with one central office and a smaller satellite office**
- **Strengths:**
 - Customer focussed and localised
 - Long-term relationships with clients
 - Strong “team emphasis”
- **How should they compose their order book whilst growing?**
- **Scenarios:**
 - Small number of large contracts, versus
 - Large number of small contracts



Workshop: DCD Construction Discussion Points

Large Contracts

- ➔ How?:
 - ➔ Most likely done through framework membership
- ➔ Why?:
 - ➔ Allows centralised control to be maintained
 - ➔ Concentrate on strengths and markets they have knowledge in
- ➔ However:
 - ➔ Lose localised feel of firm
 - ➔ Large exposure in one market/client maybe risky

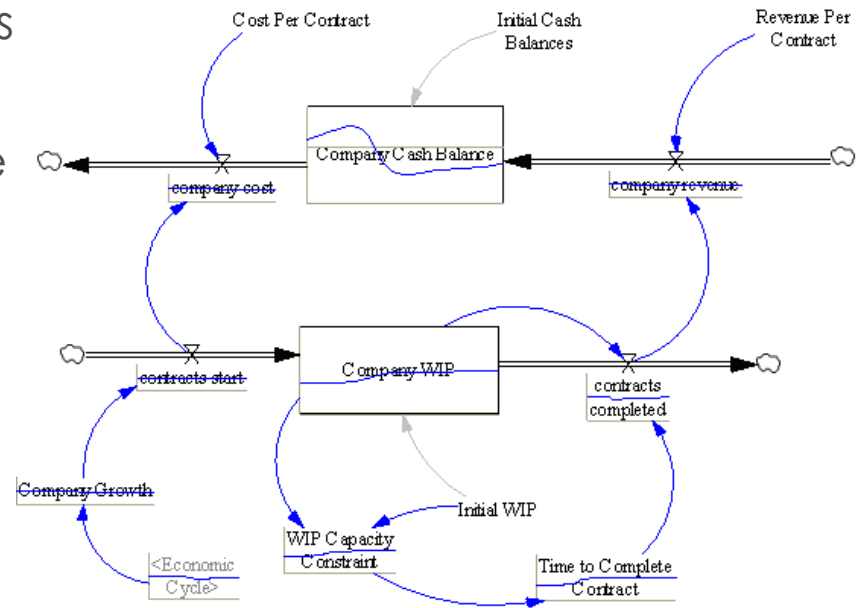
Workshop: DCD Construction Discussion Points

Small/Medium Contracts

- ➔ How?:
 - ➔ More satellite offices in wider geographical area
 - ➔ Or entering new markets
- ➔ Why?:
 - ➔ Keep localised feel
 - ➔ Keep team ethic of the firm
- ➔ However:
 - ➔ New staff required to enter new markets
 - ➔ Loss of centralised control if not careful

Model Output – Managing WIP

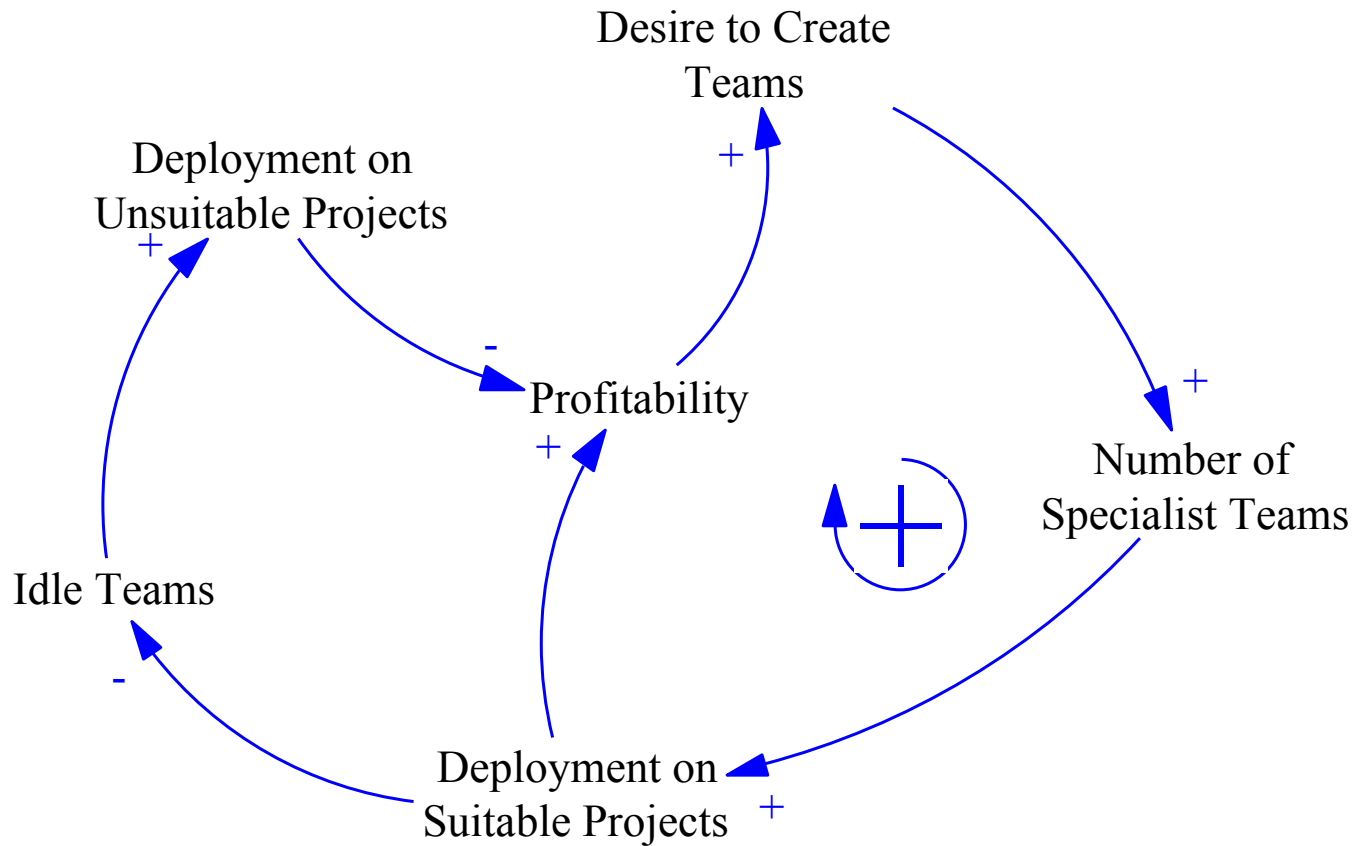
- The Contracts/WIP models shows:
 - Managing work-in-progress is really managing resources – particularly finance
 - Larger projects = larger teams and longer between bids
 - The effect of project delays
 - How health and safety incident rates may change with increased workload



Workshop: Seaside Construction

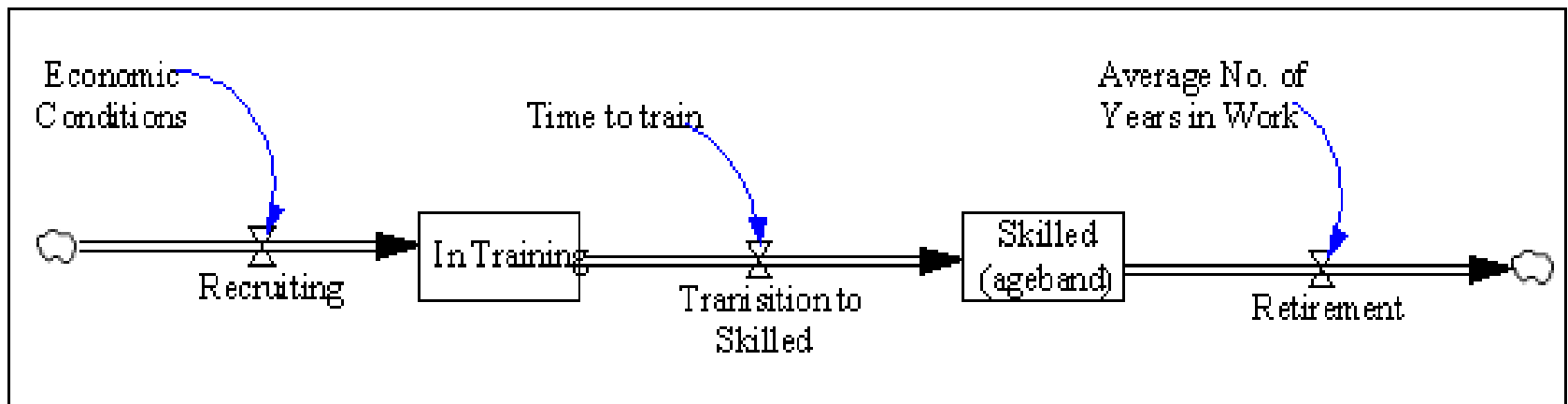
- ➔ **A regional business unit of a national publically contactor**
- ➔ Two workshops to discuss and model a number of issues
 - ➔ Workshop 1 – senior directors and managers
 - ➔ Workshop 2 – young staff
- ➔ Workshop 1: Discussion points
 - ➔ Specialist teams
 - ➔ Lack of construction professionals
- ➔ Workshop 2:
 - ➔ Staff retention
 - ➔ Flexible working hours

Workshop 1: Specialist Teams

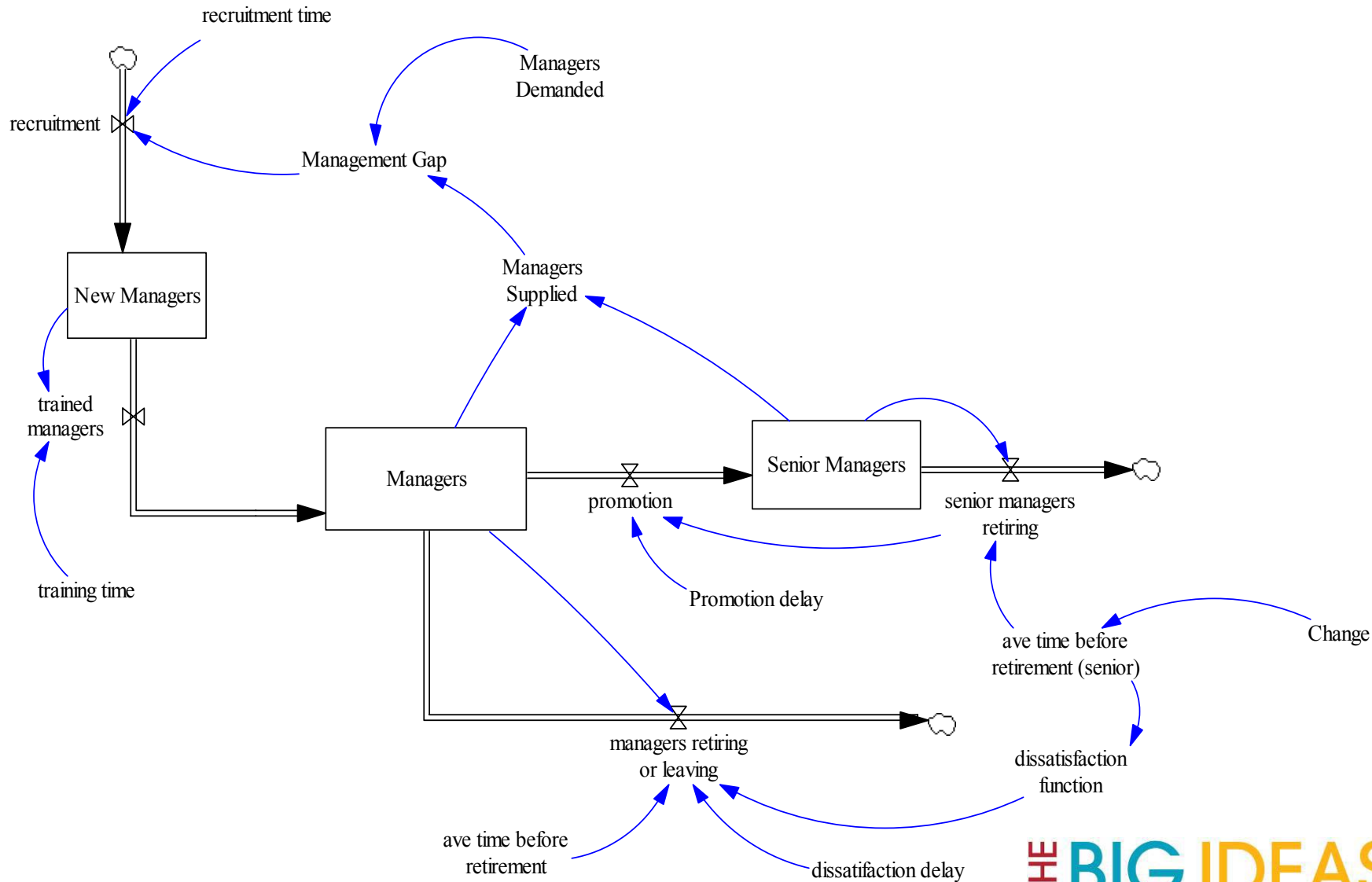


Workshop 1: Construction Professionals

- At the end of the eighties and start of the nineties there was a recession, which had a knock on effect on training. During this period managers and trades were not employed as readily as the period before and after this. The knock-on effect of this is that there is a lack of trained personnel aged 45-50 years old in the construction industry. One problem that this may cause is that either managers need to work in their current role longer, because there is no-one ready to take their place.

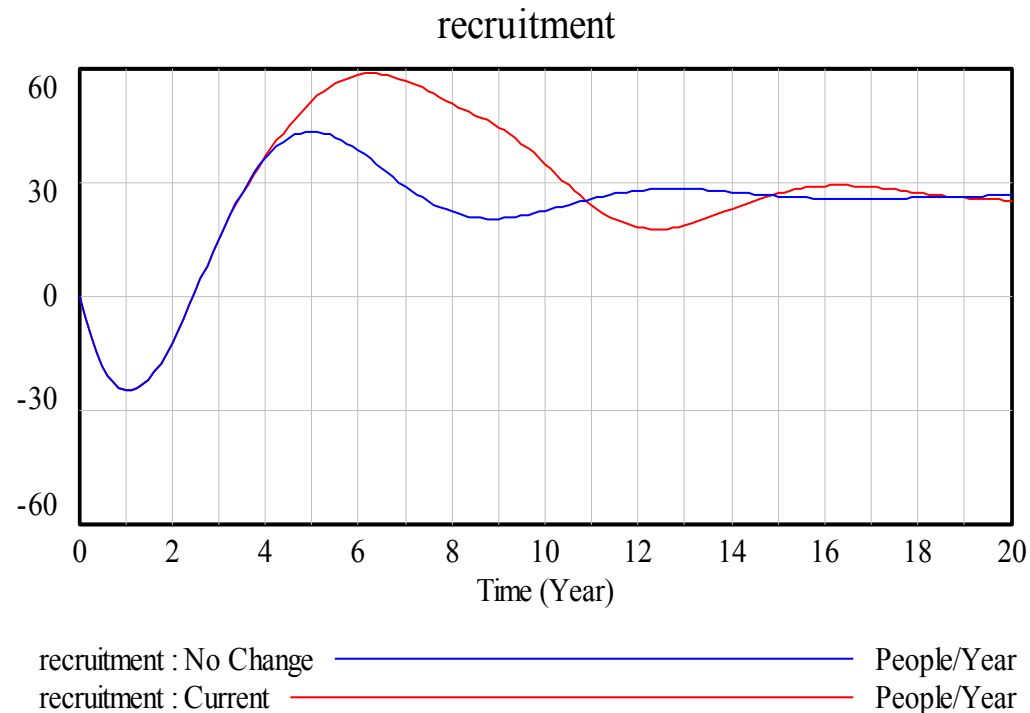


Workshop 1: Construction Professionals



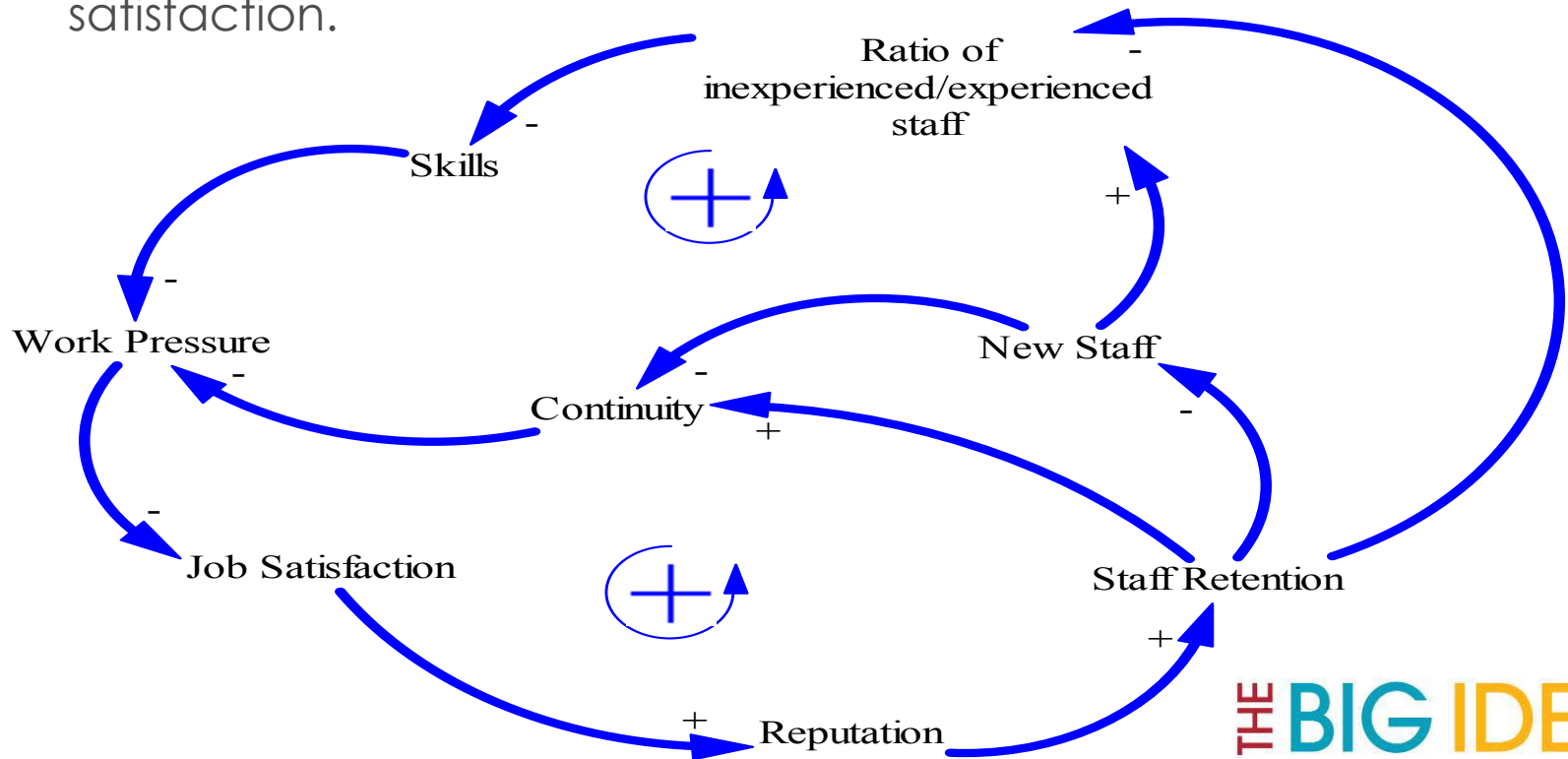
Workshop 1: Construction Professionals

- ➔ The model runs for a period of 20 years.
- ➔ If senior managers decided to stay in their positions longer:
 - ➔ There is increase dissatisfaction from managers “in waiting”.
 - ➔ A higher staff churn, which takes a period of time to correct.
 - ➔ Increased costs associated with recruitment and training.



Workshop 2: Staff Retention

- A discussion on how the company is affected by staff retention issues. The main concern with having low staff retention was the loss of continuity of work and resulting increase in work pressure.
- For the company there is also the training costs to consider.
- The idea of flexible working hours was suggested to improve job satisfaction.



Workshop 2: Flexible Working Hours

- ➔ Job satisfaction was believed to increase as work pressure decreased, which itself was reduced by an increase in work/life satisfaction.
 - ➔ Flexible Working Hours *increases*
 - ➔ Work/Life Satisfaction *increases*
 - ➔ Work Pressure *decreases*
 - ➔ Job Satisfaction *increases*
 - ➔ Staff Retention *increases*

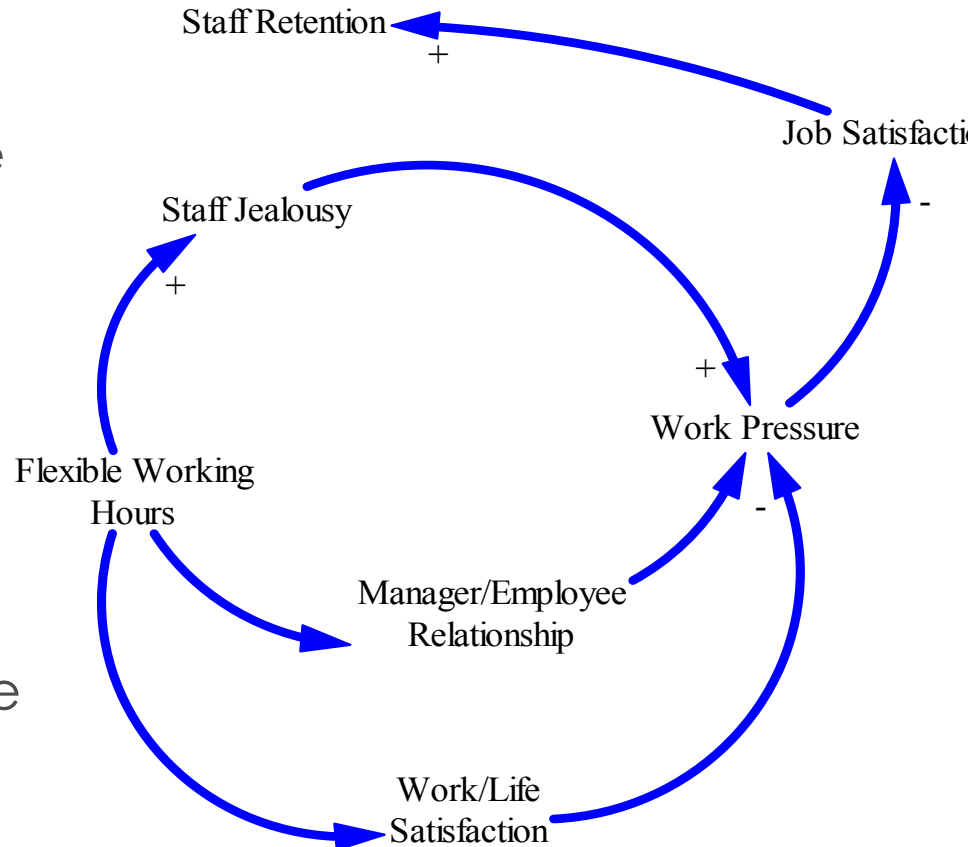
Workshop 2: Flexible Working Hours

- Work/Life Satisfaction may not necessarily improve. For example:

The manager/employee relationships may change for the better or worse, as managers will need to trust employees more.

- **Tension between freedom and control**

- More modelling would be required to examine the possible outputs.



To Recap

System approaches can involve:

- ➔ Mapping/diagramming exercises
- ➔ Creation of formal simulation models
- ➔ Both are participative
- ➔ To produce a step change in learning and understanding

Outputs:

- ➔ Simulations of future scenarios
- ➔ Analysis of performance in local/embedded markets
- ➔ A Tool for Thinking!

Acknowledgements

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