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Health economic modelling in bowel cancer

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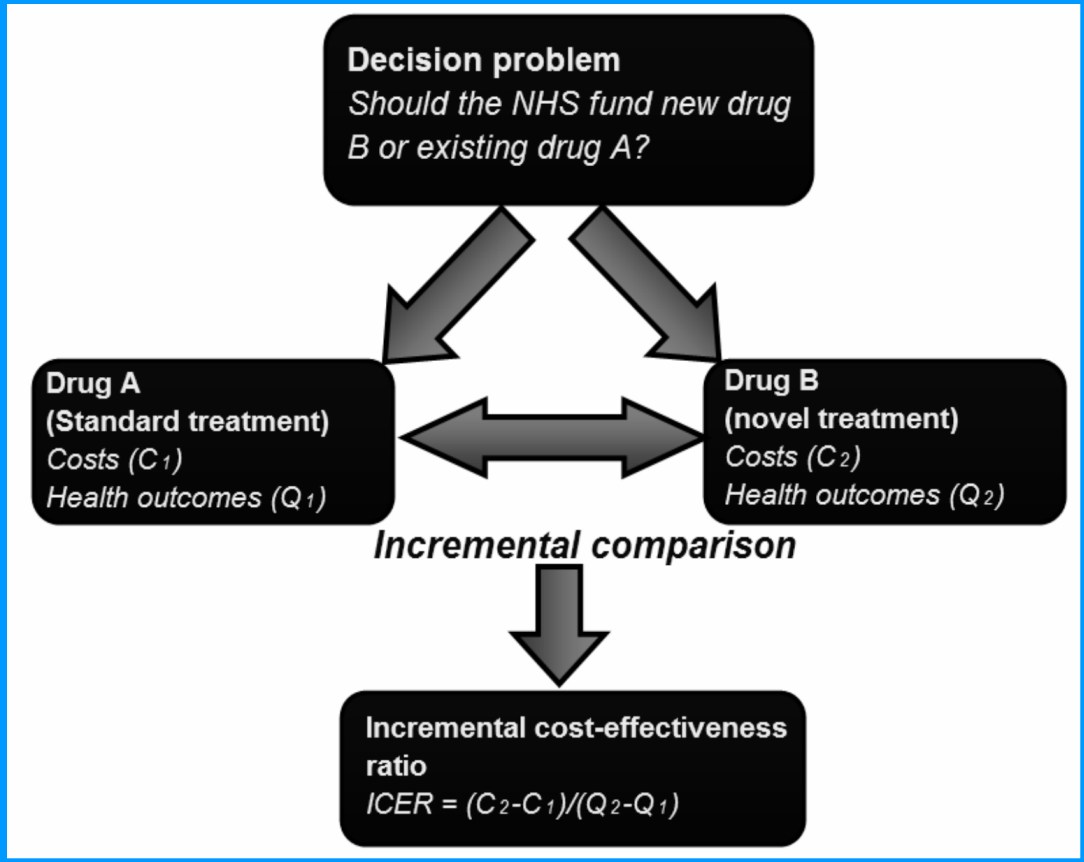
Economic evaluation

"The comparison of alternative options in terms of their costs and consequences."
(Drummond *et al*, 2005).



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Key areas of application

1. Modelling interventions for the early detection / prevention of cancer
2. Modelling interventions for the treatment of diagnosed cancer
3. Modelling whole disease and treatment pathways (Whole Disease Modelling)

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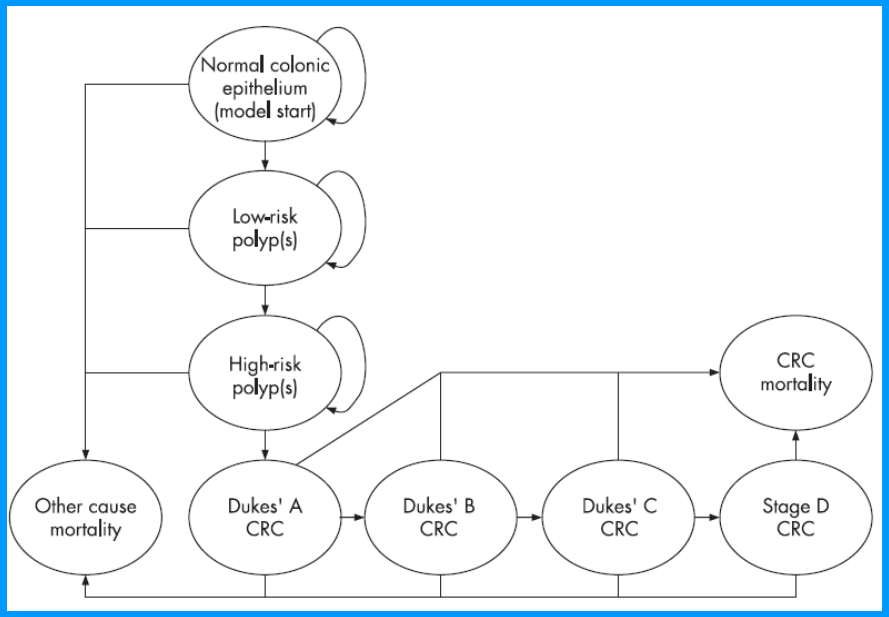
1. Modelling interventions for the early detection / prevention of cancer

- Mostly focussed on screening evaluations but other interventions are possible e.g. chemoprevention, early awareness campaigns
- Methodological development in modelling natural history disease progression
  - Handling competing risks
  - Length / lead-time biases
  - Calibration of unobservable parameters (disease progression, presentation behaviours etc)

An example – screening for CRC



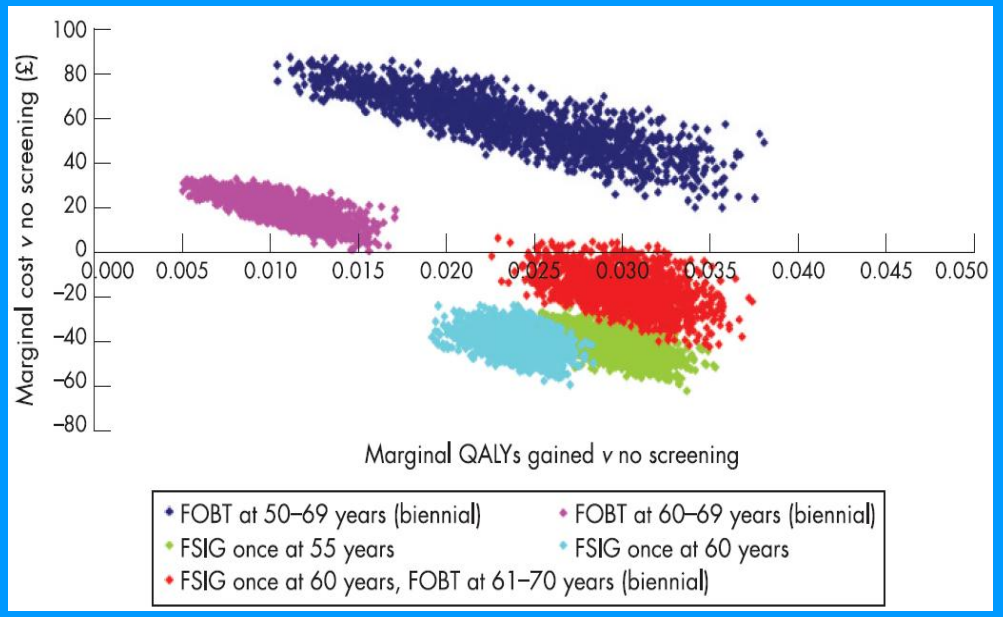


Table 3 Marginal cost-effectiveness and cost-utility estimates for alternative screening options

Screening option	Biennial FOBT at 50–69 years	Biennial FOBT at 60–69 years	FSIG once at 55 years	FSIG once at 60 years	FSIG once at 60 years, biennial FOBT at 61–70 years
Marginal cost	£66.95	£24.53	−£28.77	−£28.51	−£1.92
Marginal LYGs	0.026	0.0126	0.0237	0.0197	0.0271
Marginal QALYs gained	0.0227	0.0104	0.027	0.0221	0.0282
Marginal cost per LYG	£2576.72	£1950.29	Dominates	Dominates	Dominates
Marginal cost per QALY gained	£2949.64	£2364.99	Dominates	Dominates	Dominates

LYG, life year gained; QALY, quality adjusted life year.

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2. Modelling interventions for the treatment of diagnosed cancer

- Curative / palliative treatments for diagnosed cancer
- Numerous appraisals for NICE
- Key issues around methods for handling
  - Extrapolation beyond trial duration
  - Modelling relationships between intermediate and final outcomes
  - Handling treatment crossover
  - Treatment sequences
  - Evidence networks across multiple trials

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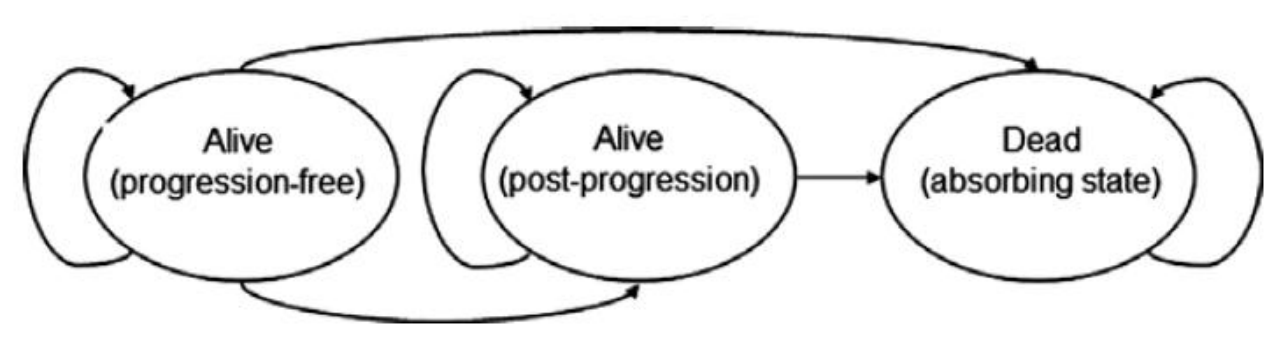
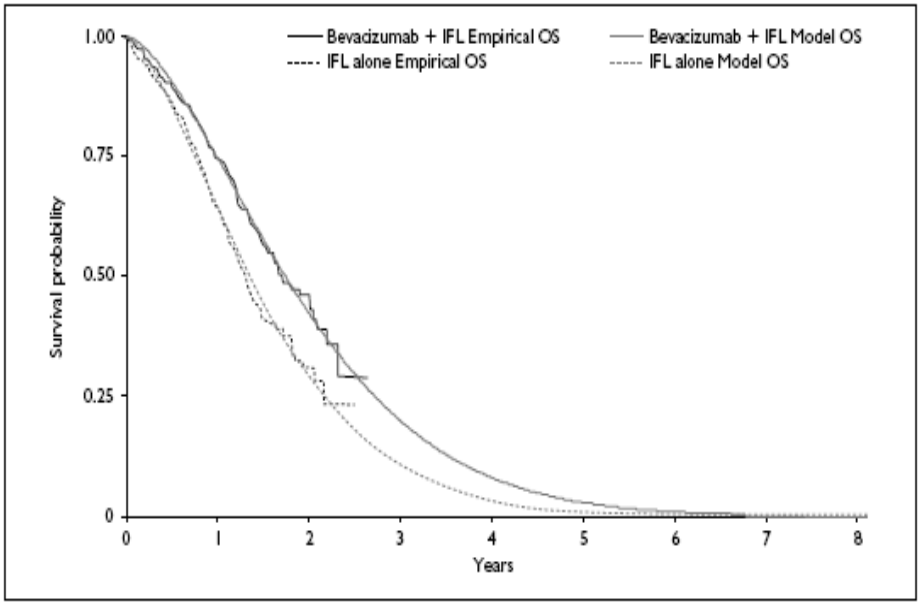
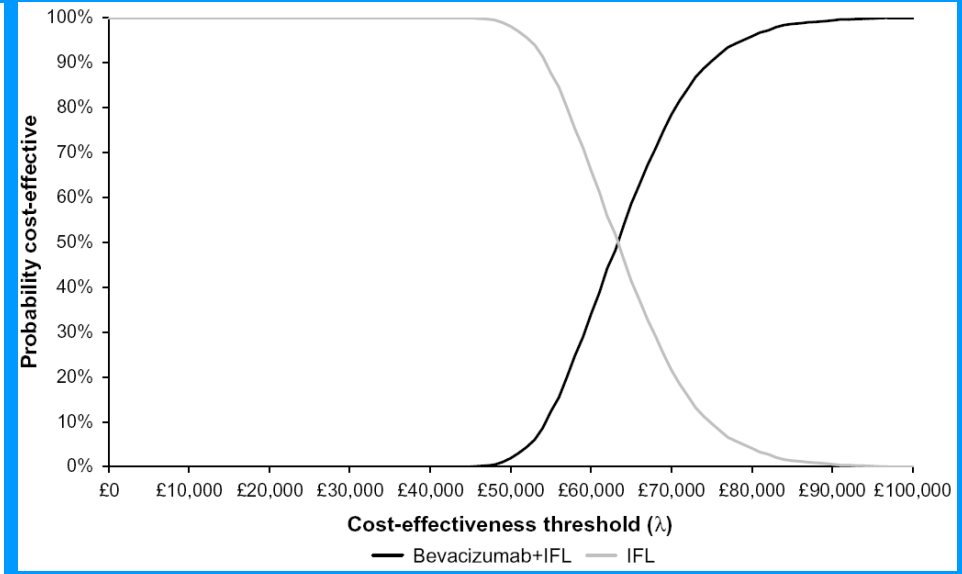
An example – bevacizumab for mCRC







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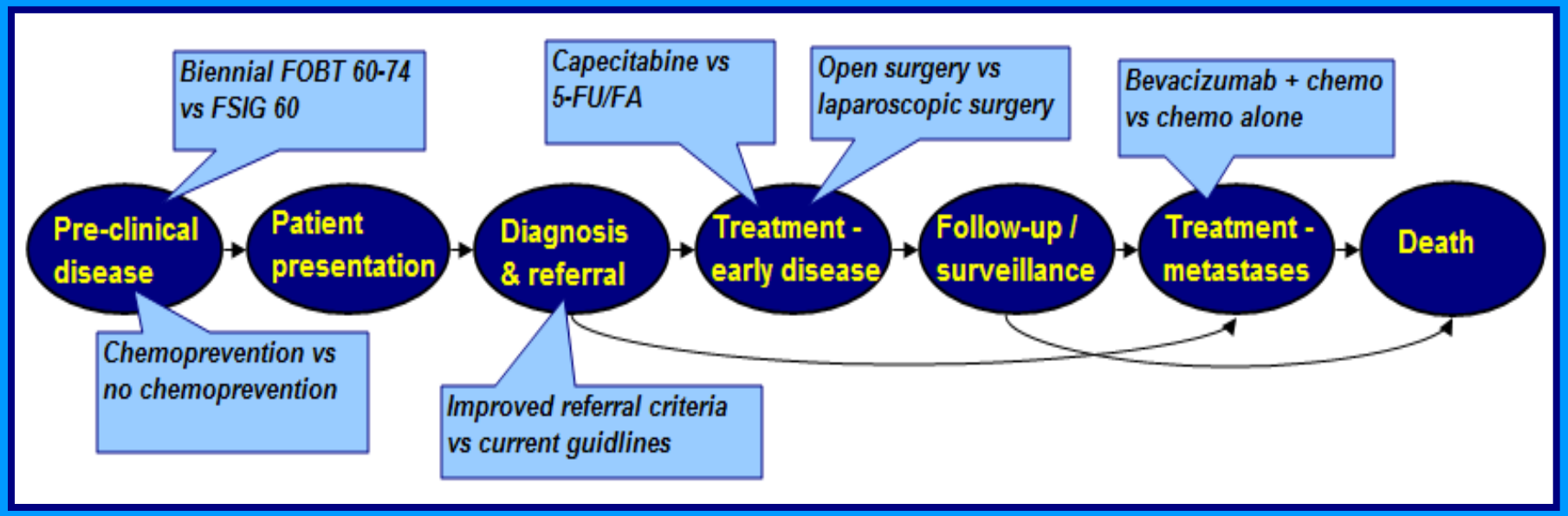
3. Whole Disease Modelling

- Usefulness of models is in part determined by the scope of the decision it is intended to inform.
- Single isolated point versus whole pathway model.
- “Modelling the bigger picture” – development of models which can represent whole disease and treatment pathways



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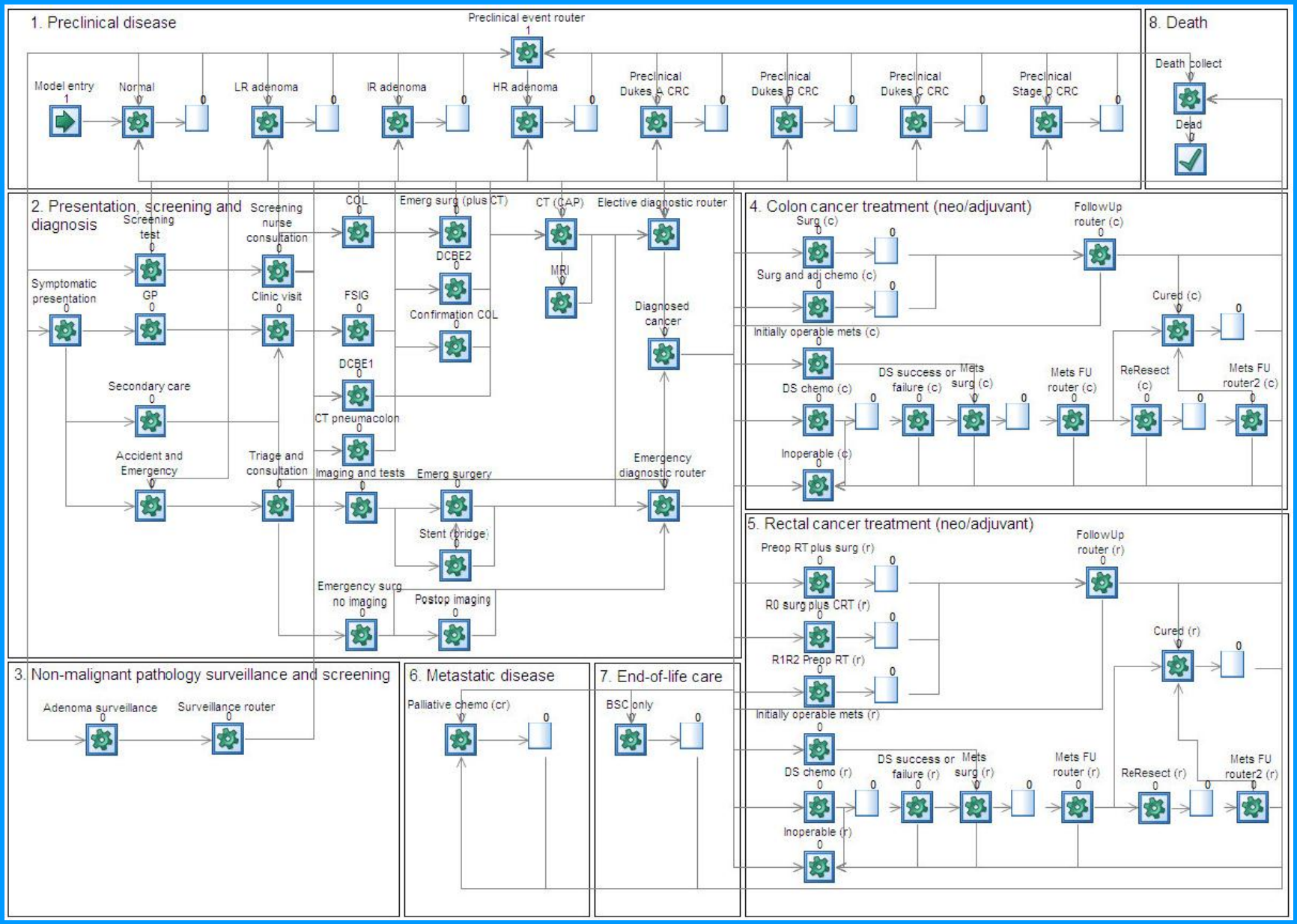
An example – Colorectal Cancer Whole Disease Model



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A lot of effort so why bother?

- Consistent basis for economic evaluation across the pathway
- Structurally capable of evaluating any intervention at any point in the pathway
- Capturing upstream and downstream knock-on impacts
- Shift to potentially more useful economic decision rules
- Methodological challenges
  - Obtaining agreement regarding pathways
  - Handling geographical variability
  - Programming / model run time
  - Calibration of unobservable parameters
- Non-trivial investment of time at outset but payoff may be considerable

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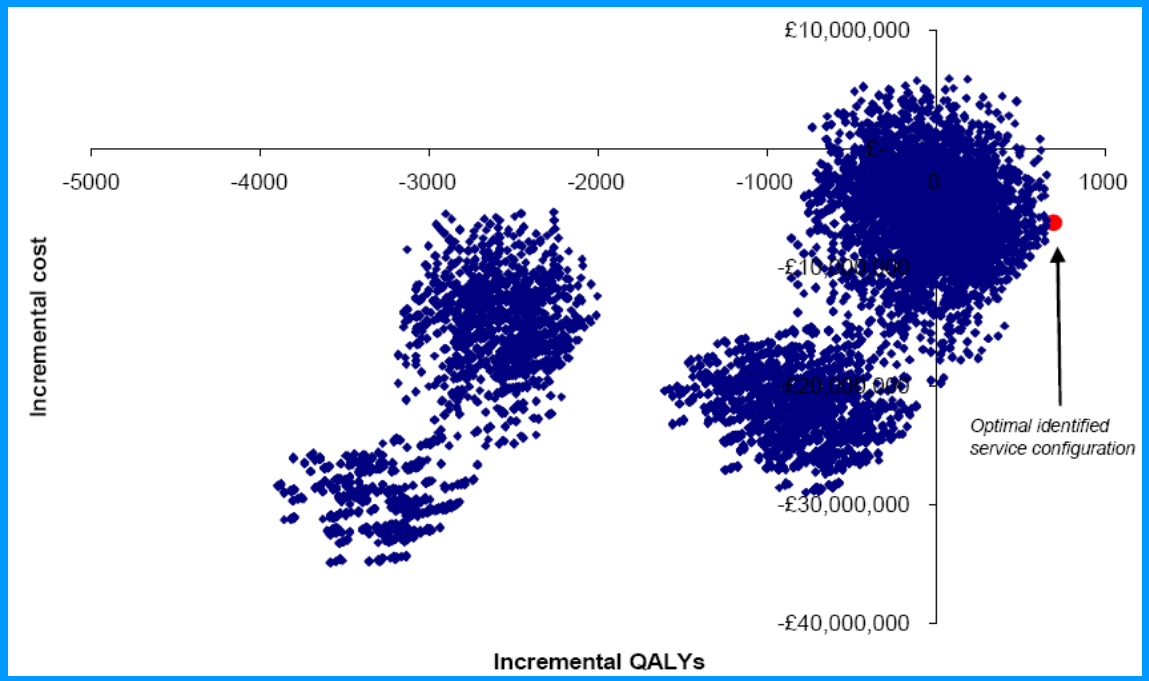
From piecewise CPQ to constrained maximisation



Guideline topic	Decision option within "optimal" identified service configuration
A	CTC
C	TEMS
D1	CT scan
D2	Stenting
E	Pre-operative chemoradiation
F[†]	Simultaneous resection
G	N/a (see Topic E)
H	Adjuvant chemotherapy (baseline level)
I	Adjuvant chemotherapy
J	Palliative chemotherapy
M[†]	CapOx→Cap
N	Intensive follow-up