DGHPSim: Performance modelling of general hospitals

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Why smart thinking is needed

squeeze them hard in one place and ….

Many hospitals are like balloons….

… or …

What sort of smart thinking?

- ☐ Important to meet targets (e.g. 18-week RTT)
  - ■ But beware the side effects
- ☐ Important to understand how one decision affects another
  - ■ E.g. Meet 18-week RTT but this could worsen other PIs or degrade service quality
- ☐ Explore the decision space
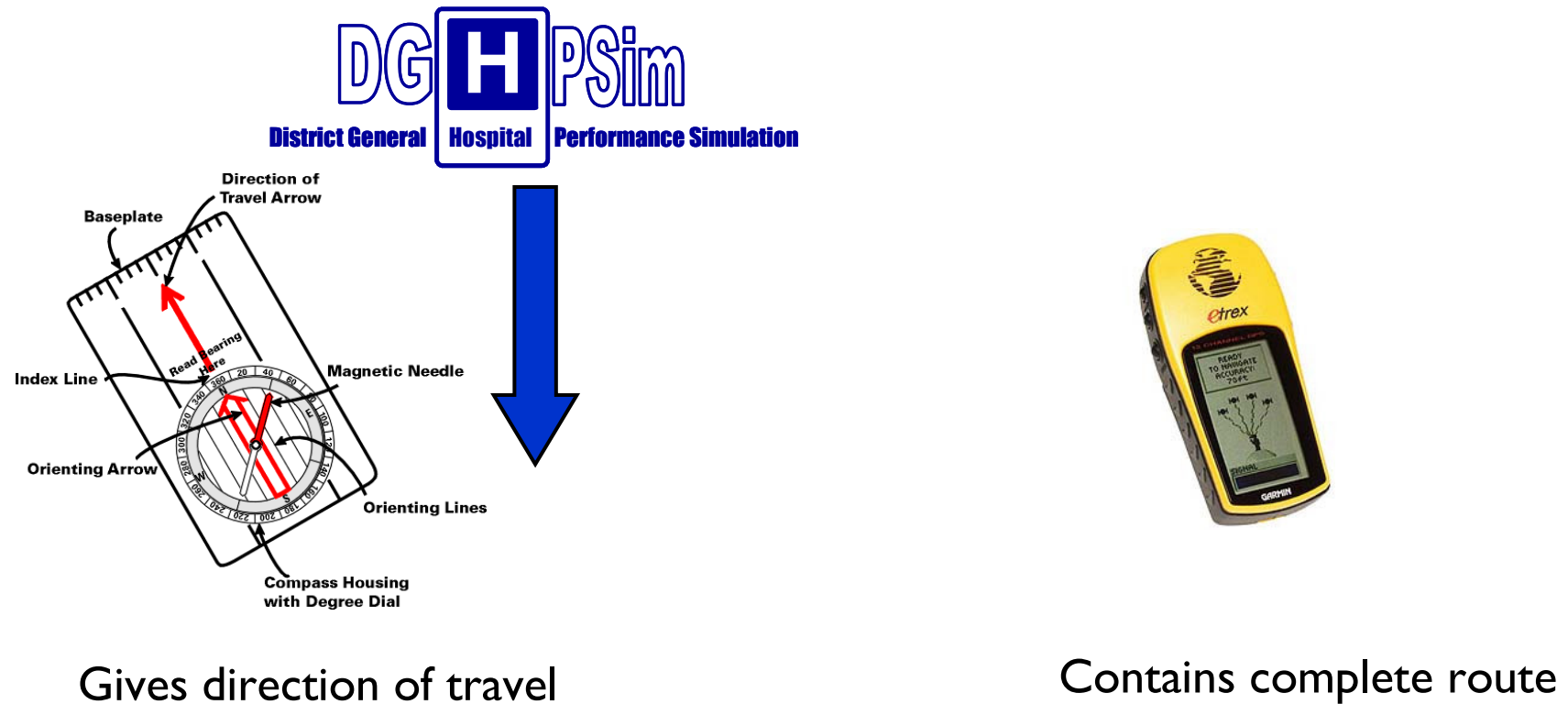- ☐ Need tools that support holistic thinking

DGHPSim Project

www.hospitalsimulation.info

- ☐ EPSRC funded
- ☐ Objectives
  - ◼ To evaluate feasibility of English NHS performance targets and their interactions
  - ◼ To build a whole hospital simulation model with generic features
  - ◼ Change parameter values to fit individual hospitals
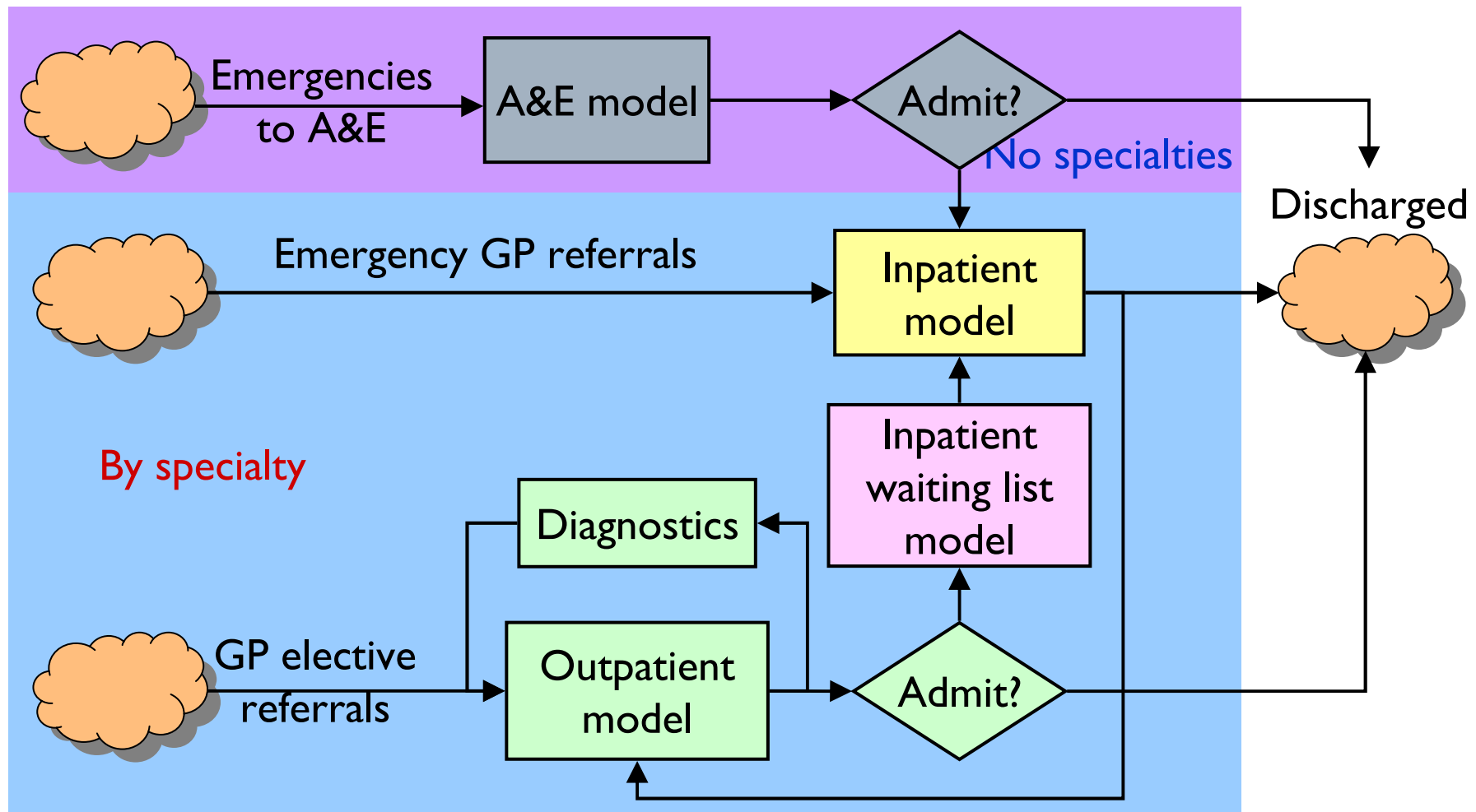- ☐ Approach: model <u>individual</u> patient flows

If you squeeze hard in one place, what happens elsewhere?

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Locating DGHPSim on a model use spectrum

District General Hospital Performance Simulation

Gives direction of travel

Contains complete route

Compass or GPS?

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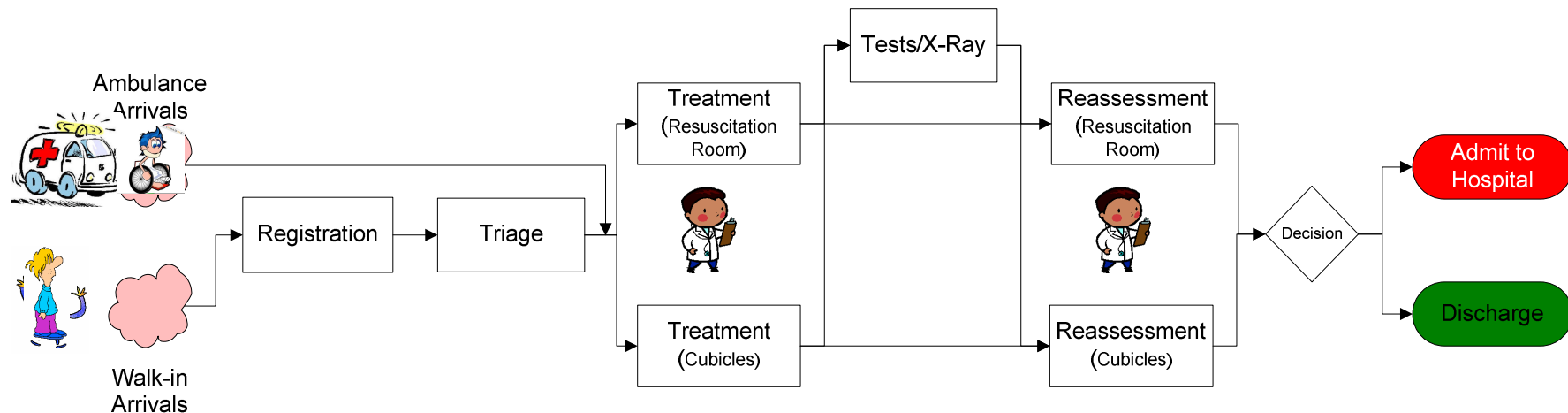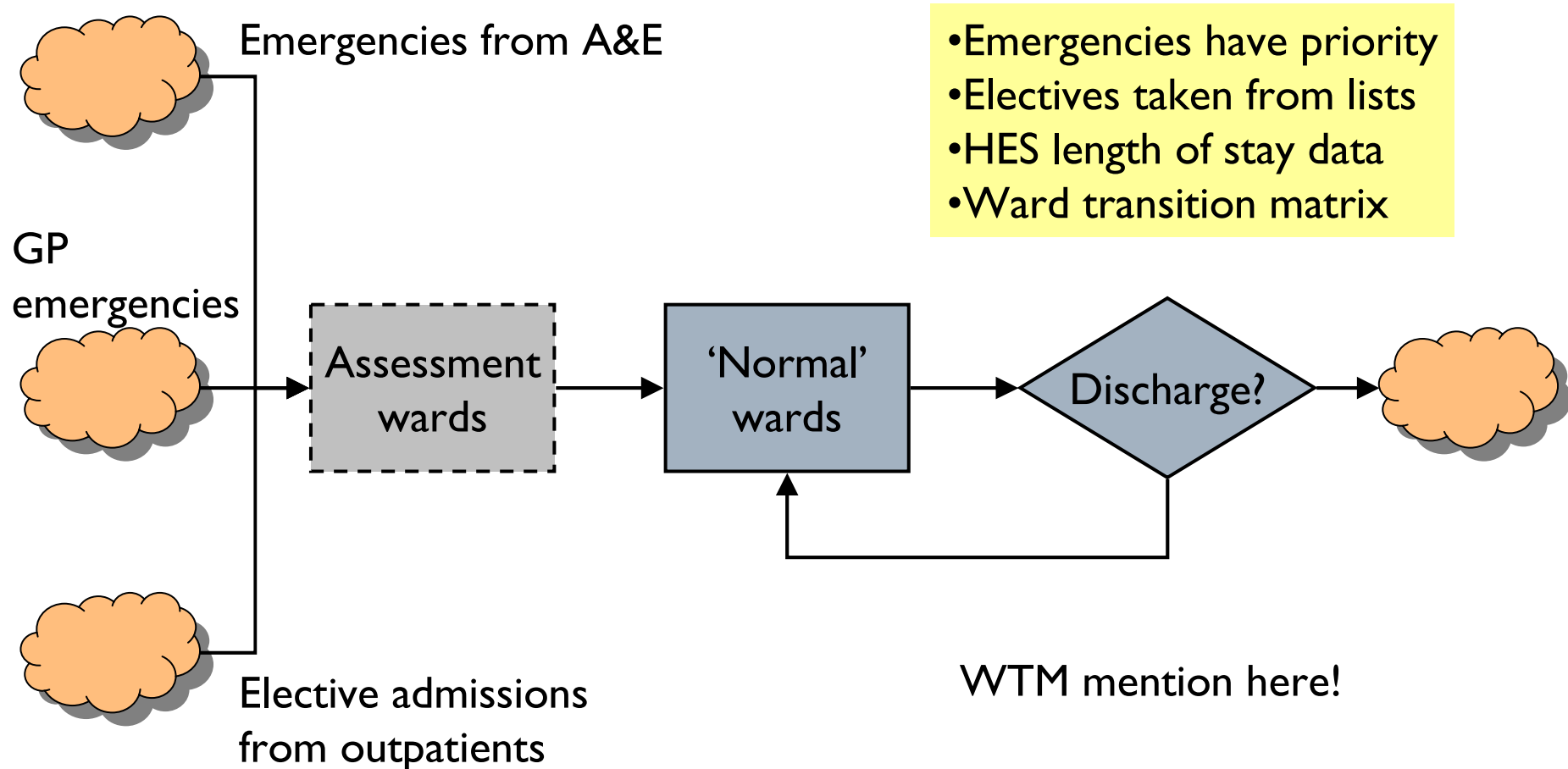
DGHPSim suite: 4 linked models

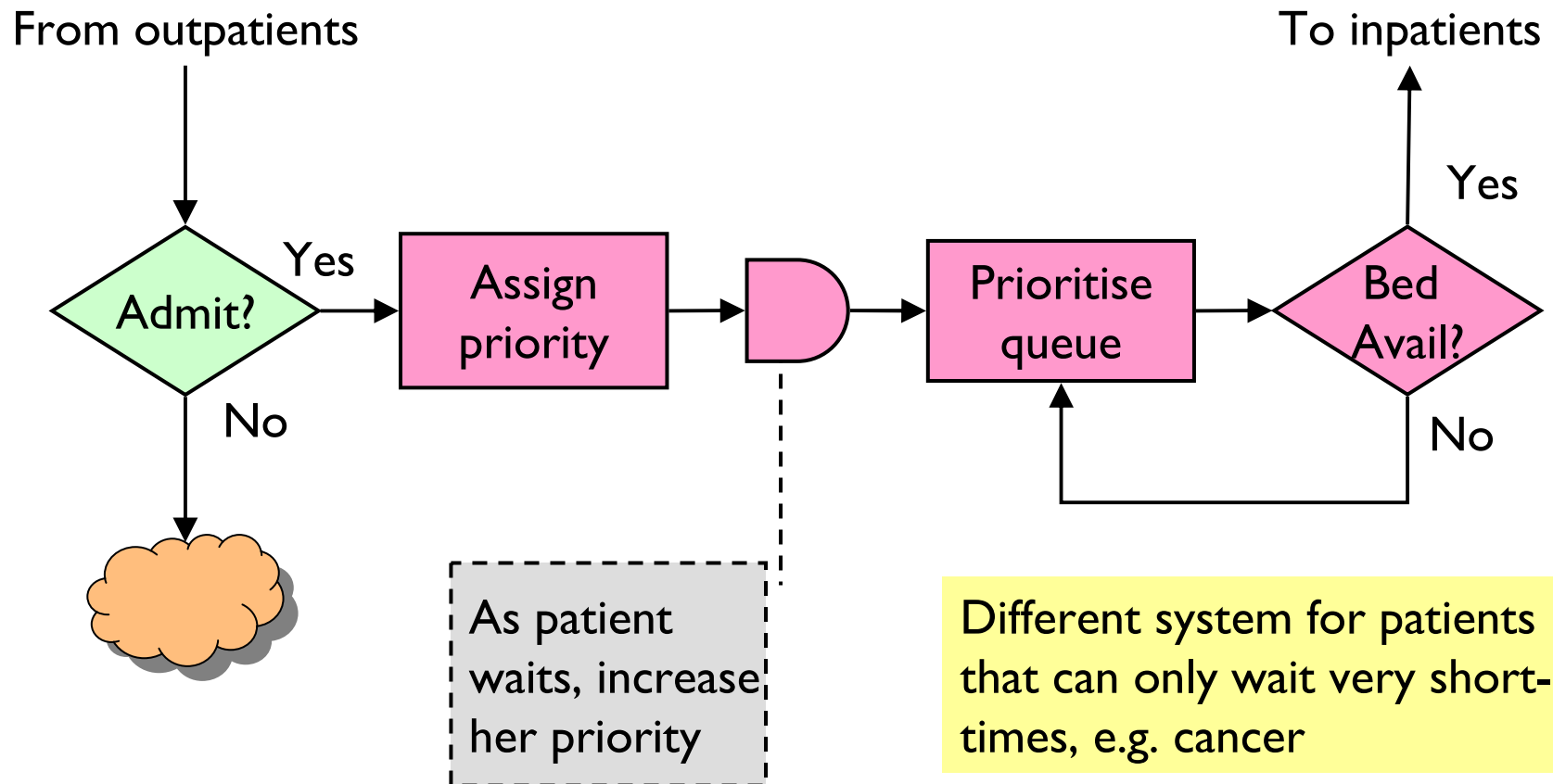# DGHPSim patient flows: e.g. A&E model

Patient flows
- Individual
- Consume resources as they occur (e.g. doctor time)
- Based on statistical models
- Provide much more than just average values

Inpatient Model – schematic

Emergencies from A&E

GP
emergencies

Elective admissions
from outpatients

- •Emergencies have priority
- •Electives taken from lists
- •HES length of stay data
- •Ward transition matrix

Assessment wards

'Normal' wards

Discharge?

WTM mention here!

Elective inpatient waiting list model

Outpatients:18-week RTT

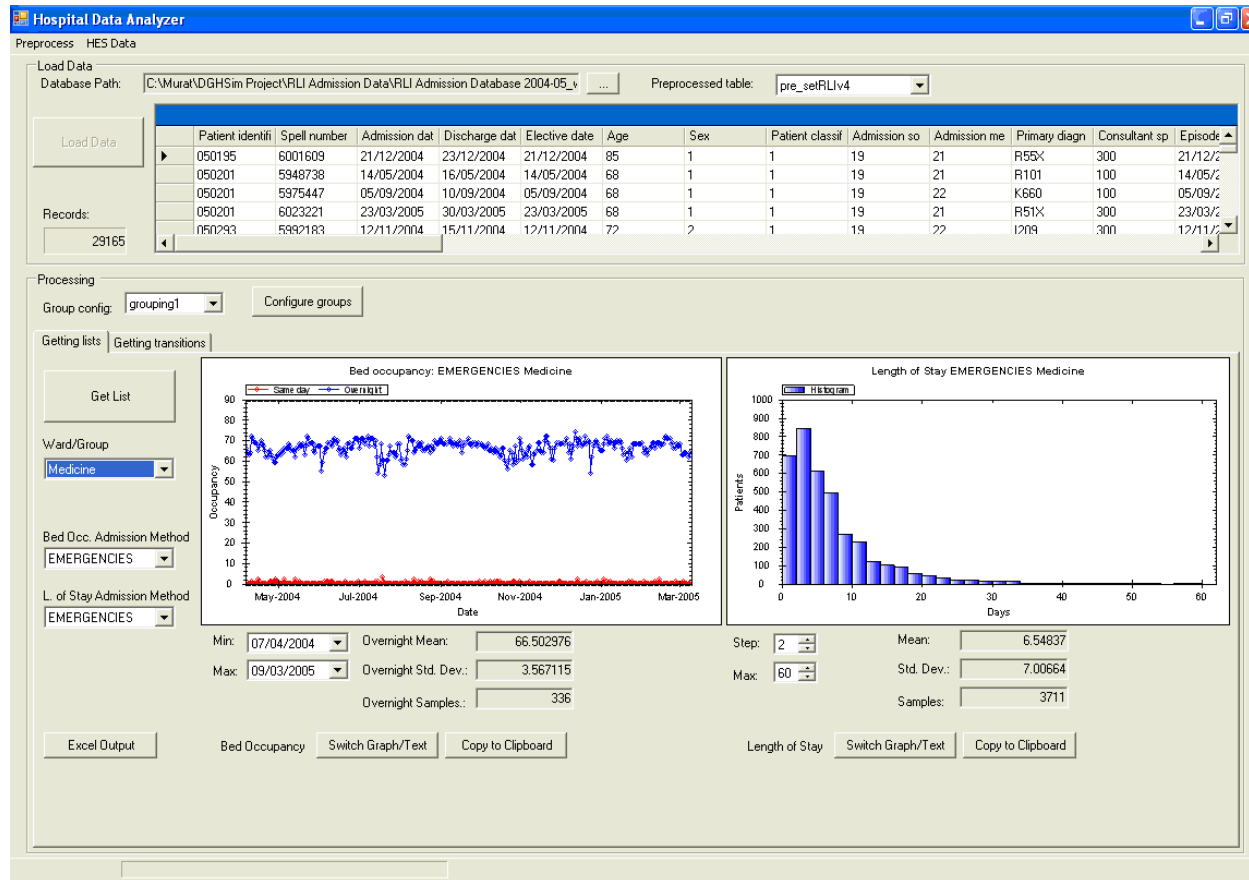|		
1: GP to OP1 Max 4 weeks? **INACTIVE TIME**	**2: OP1 to I/P or exit** Max 4 weeks? **ACTIVE TIME**	**3: Wait to admit** Max 10 weeks? **INACTIVE TIME**
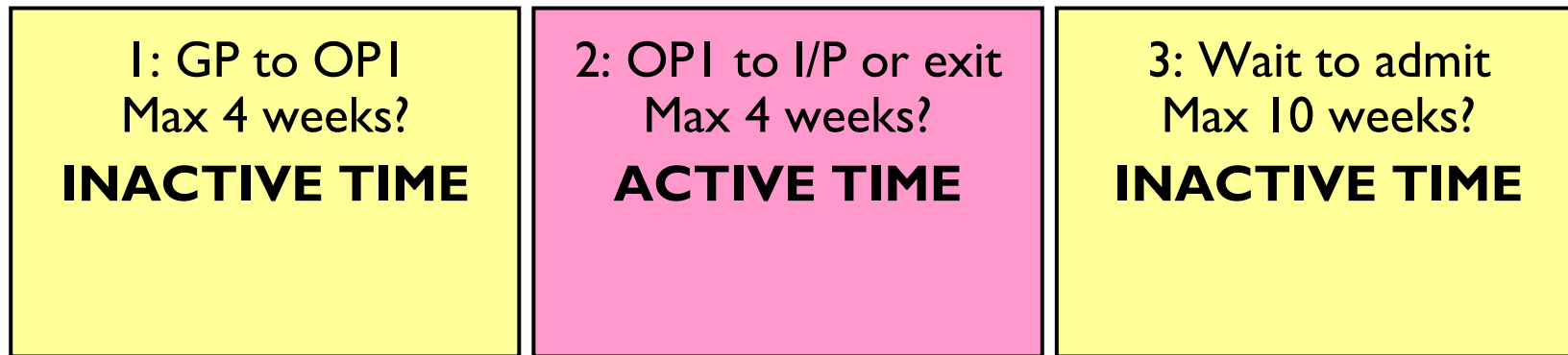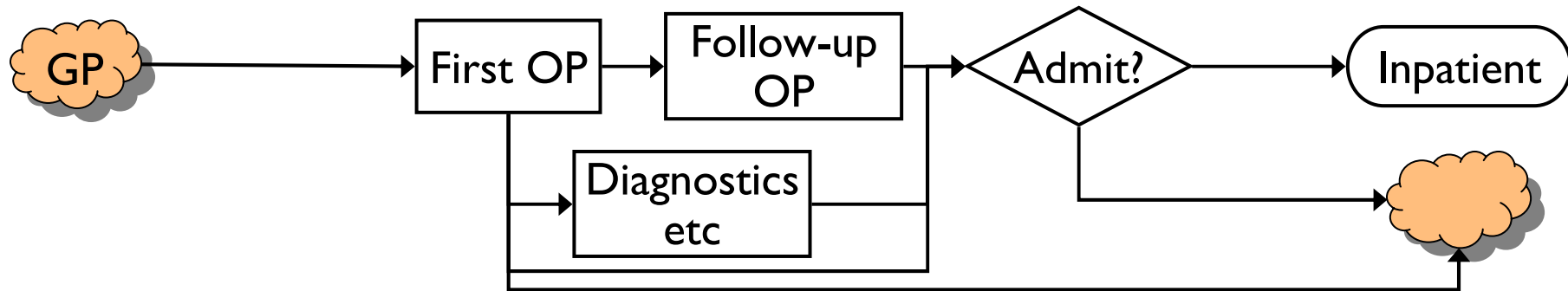
Likely to be relaxed from 100%
Distinguish between admitted & non-admitted?

Hospital Activity Data Analyzer (HADA)

Data Sources

- Hospital's Patient Administration System (PAS)

- National Hospital Episode Statistics (HES)

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Some example DGHPSim experiments

- Examine 3 separate options for change, across all specialties
  - Reduce average LoS by 20%
  - Keep bed total constant, allocate 30% more to electives
    (Total beds: 427, Elective beds: 128 (up from 96))
  - 1100 Extra day-cases (12% increase), hence fewer standard admissions
- Based on old 04/05 data
- Today, focus only on stage 3 elective waits (wait to admit)
  - Model actually copes with all 3 stages
  - Could also look at
    - Emergency/elective interactions
    - Resource swapping (e.g. beds)
    - Combined options for change
    - Individual specialties

Base model: as-was 2004/05
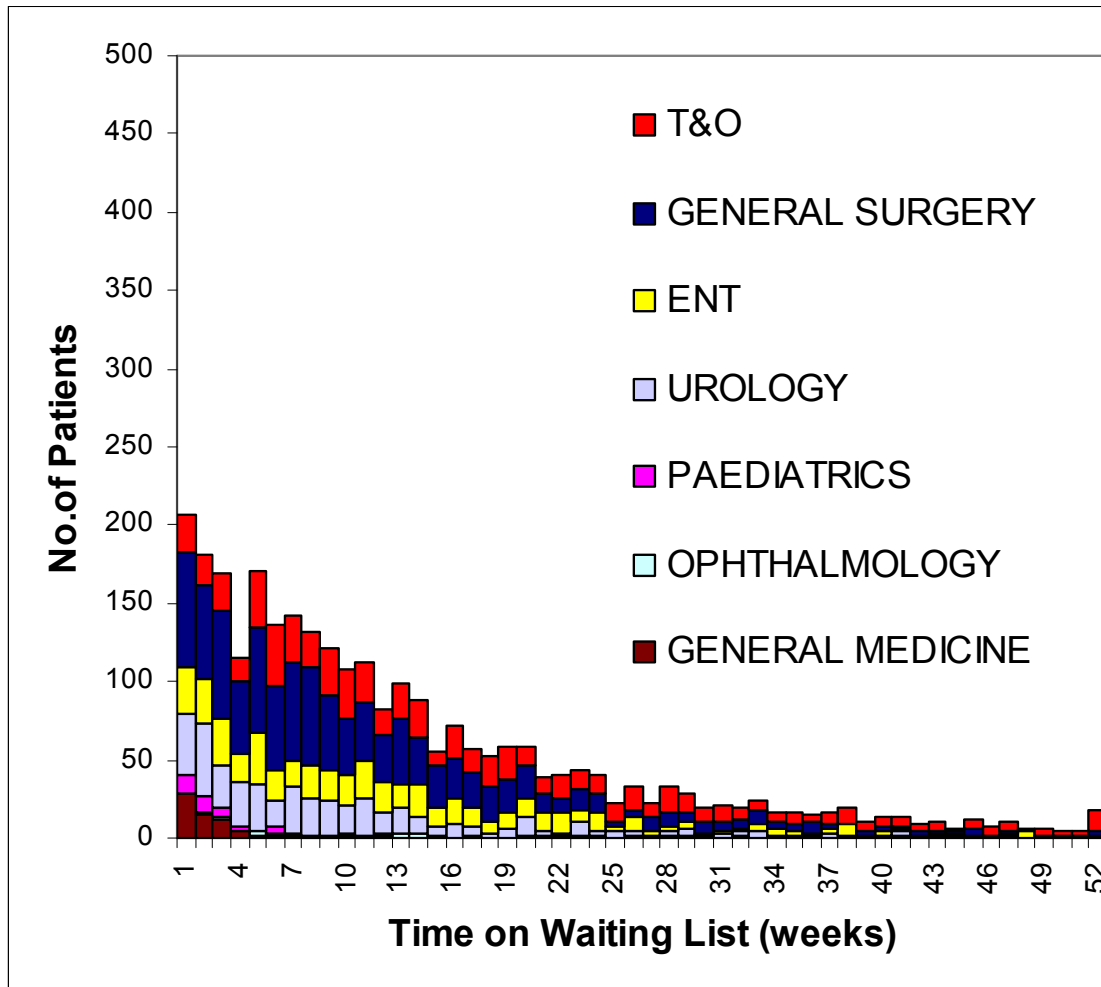
SIMULATION OUTPUT	
%'age of patients waited	
>5 weeks	72.6
>8 weeks	58.4
>10 weeks	46.8
>18 weeks	28.5

	Elect Cancel.	Emerg Outliers
Count	90	469
Total Patients	2880	15713
%'age	3.1	3.0

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Scenario 1: 20% reduced LoS
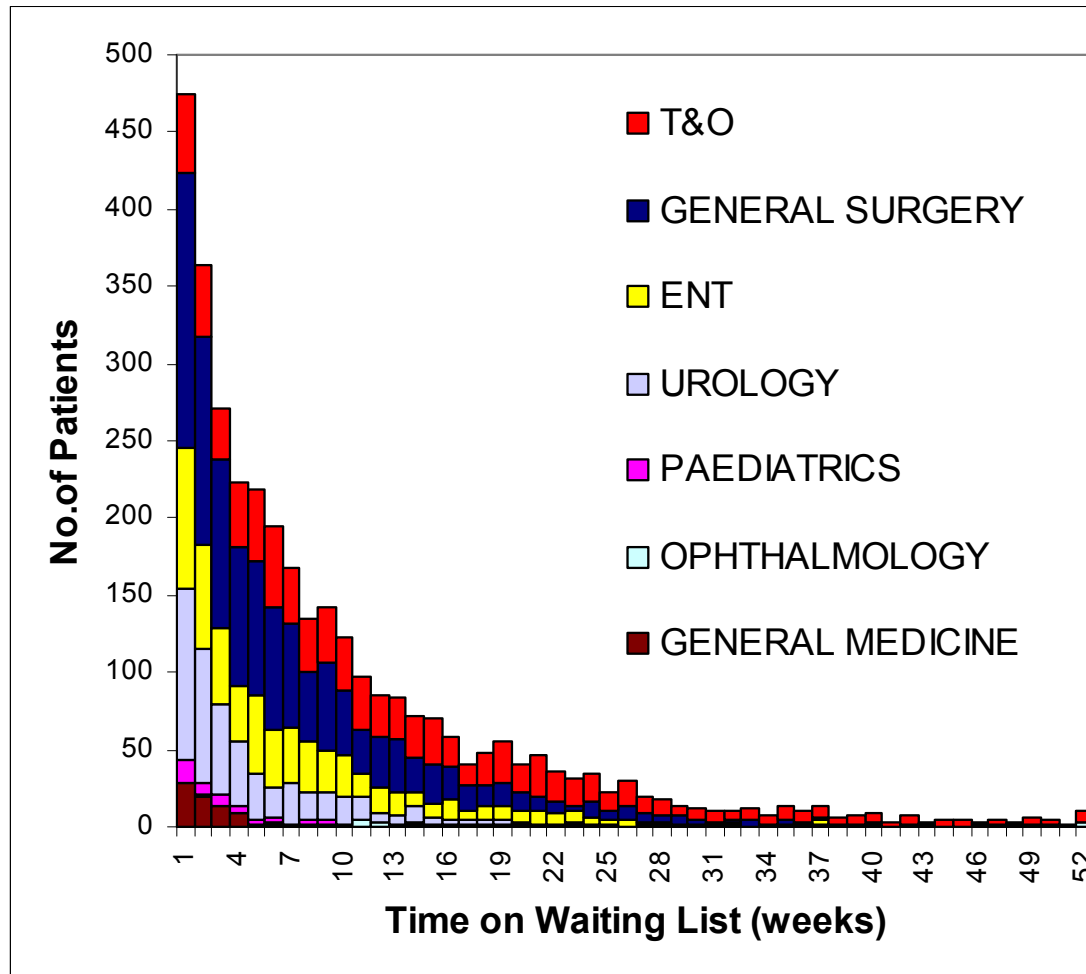
SIMULATION OUTPUT

%'age of patients waited	
>5 weeks	58.7
>8 weeks	43.8
>10 weeks	33.1
>18 weeks	17.6

	Elect Cancel.	Emerg Outliers
Count	73	405
Total Patients	3396	15618
%'age	2.1	2.7

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Scenario 2: Keep bed total constant, allocate 30% more to electives
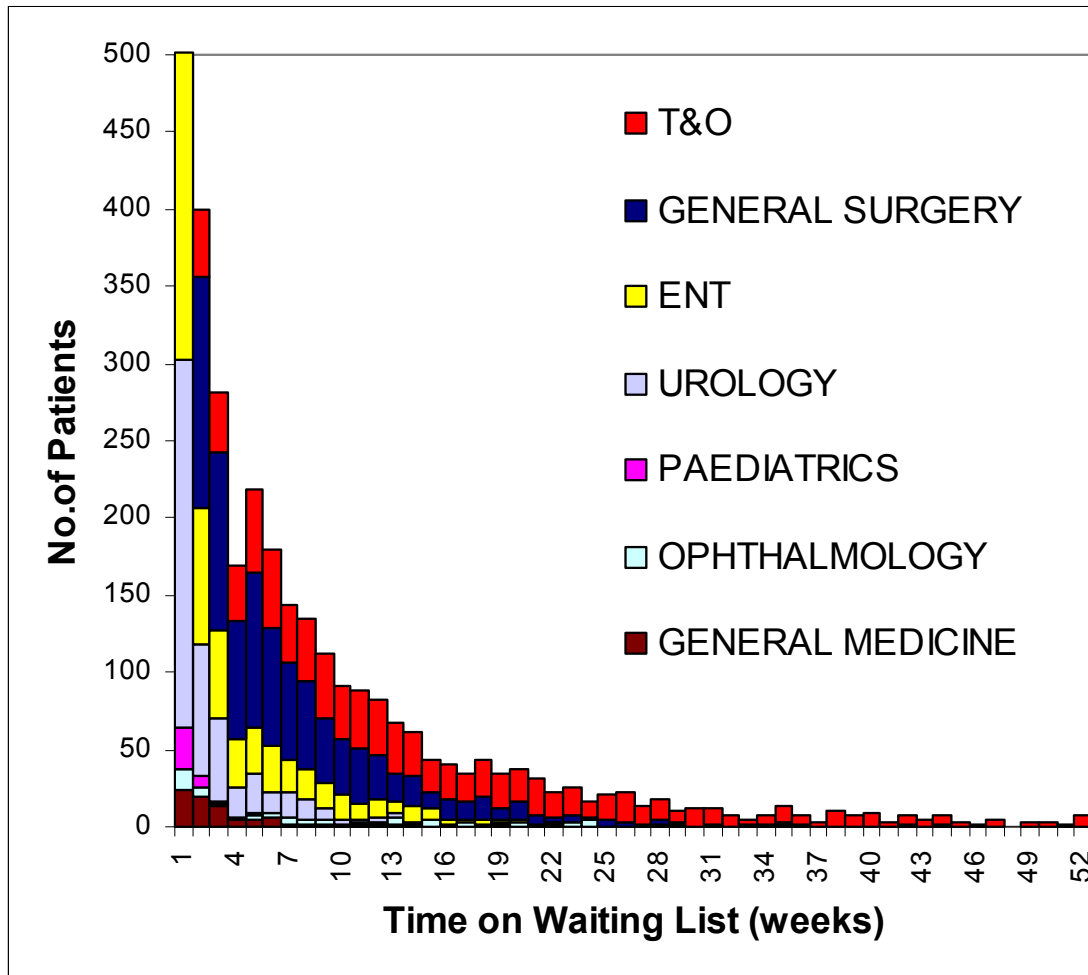
SIMULATION OUTPUT

%'age of patients waited	
>5 weeks	48.1
>8 weeks	34.7
>10 weeks	25.5
>18 weeks	13.4

	Elect Cancel.	Emerg Outliers
Count	114	505
Total Patients	3490	15693
%'age	3.9	4.0

Scenario 3: 12% increase in day-cases (1100 extra)
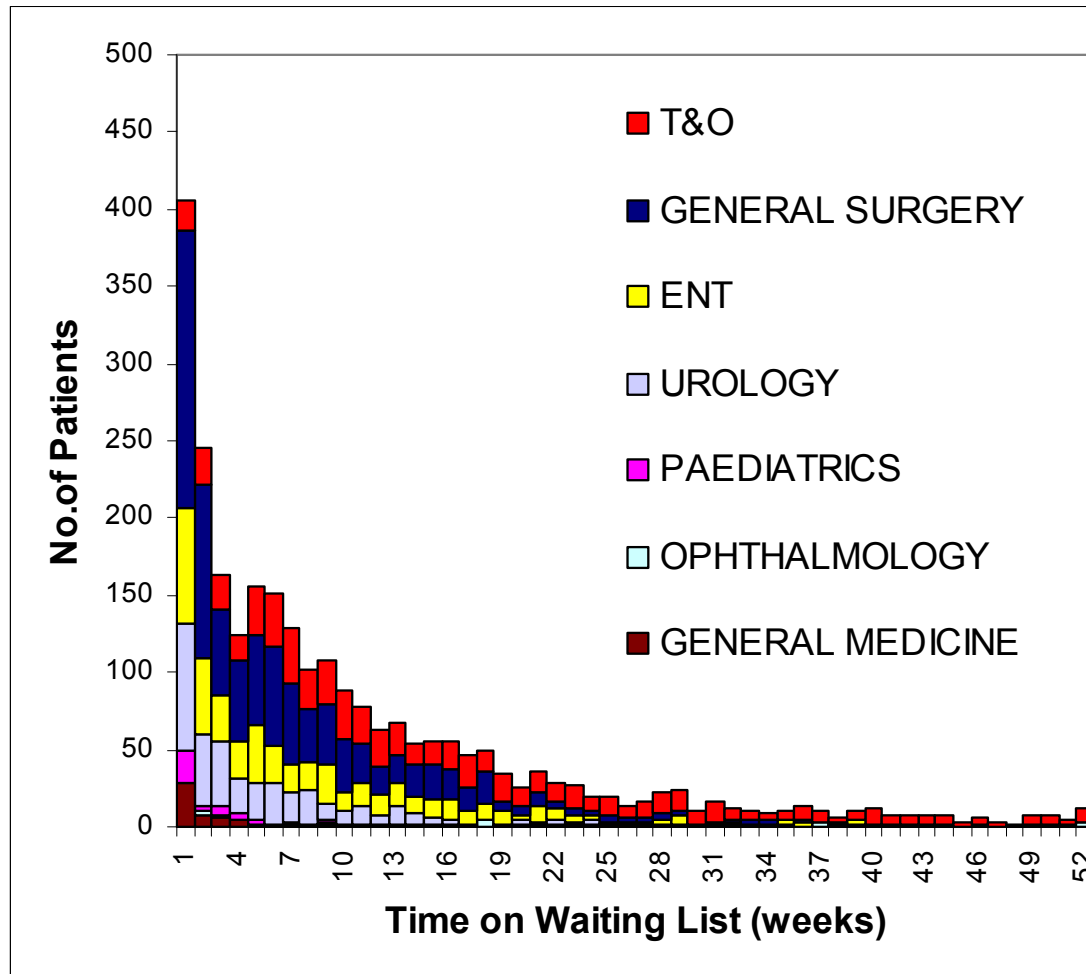
SIMULATION OUTPUT	
%'age of patients waited	
>5 weeks	62.4
>8 weeks	48.2
>10 weeks	37.4
>18 weeks	22.2

	Elect Cancel.	Emerg Outliers
Count	51	469
Total Patients	2654	15711
%'age	2.5	3.2

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Looking across the experiments

	Base	LoS down 20%	30% more elect.beds	12% increase day-cases
% wait > 5 wks	72.6	58.7	48.1	62.4
% wait > 8 wks	58.2	43.8	34.7	48.2
% wait > 10 wks	46.8	33.1	25.5	37.4
% wait > 18 wks	28.5	17.6	13.4	22.2
Elect patients	2880	3396	3490	2654
Elect cancelled	90 (3.1%)	73 (2.1%)	114 (3.9%)	51 (2.5%)
Emerg outliers	469 (3%)	405 (2.7%)	505 (4%)	469 (3.2%)

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Uses for the DGHPSim suite

☐ Resources needed to meet target

- ◾ e.g. 18 week RTT

☐ Waiting times achievable given specific resources

☐ Effect of trading elective admissions against emergencies

☐ Waits for admitted v/s non-admitted patients

☐ Testing proposals for change

- ◾ E.g. from Modernisation Agency/NHS III

☐ Commissioning acute care with changing demands

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