

District General Hospital Performance Simulation (DGHPSim) Project and the 18 Week Target

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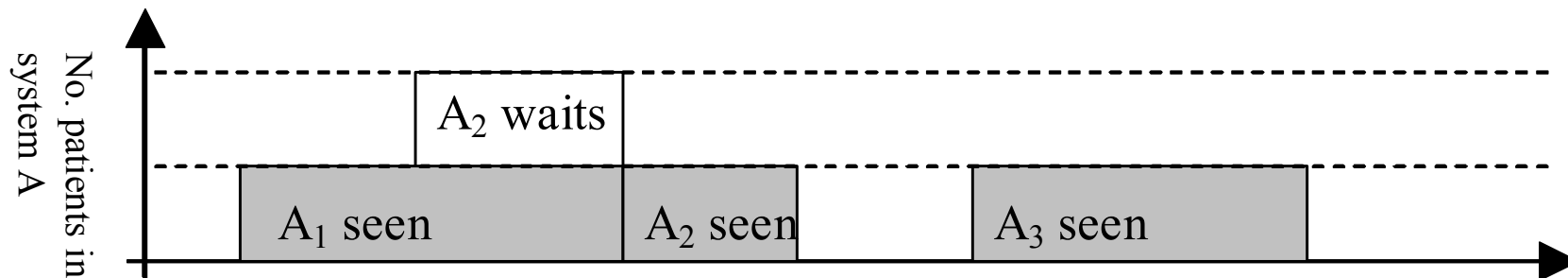
NHS Analytical Fair, 19 Sept. 2007

Introduction

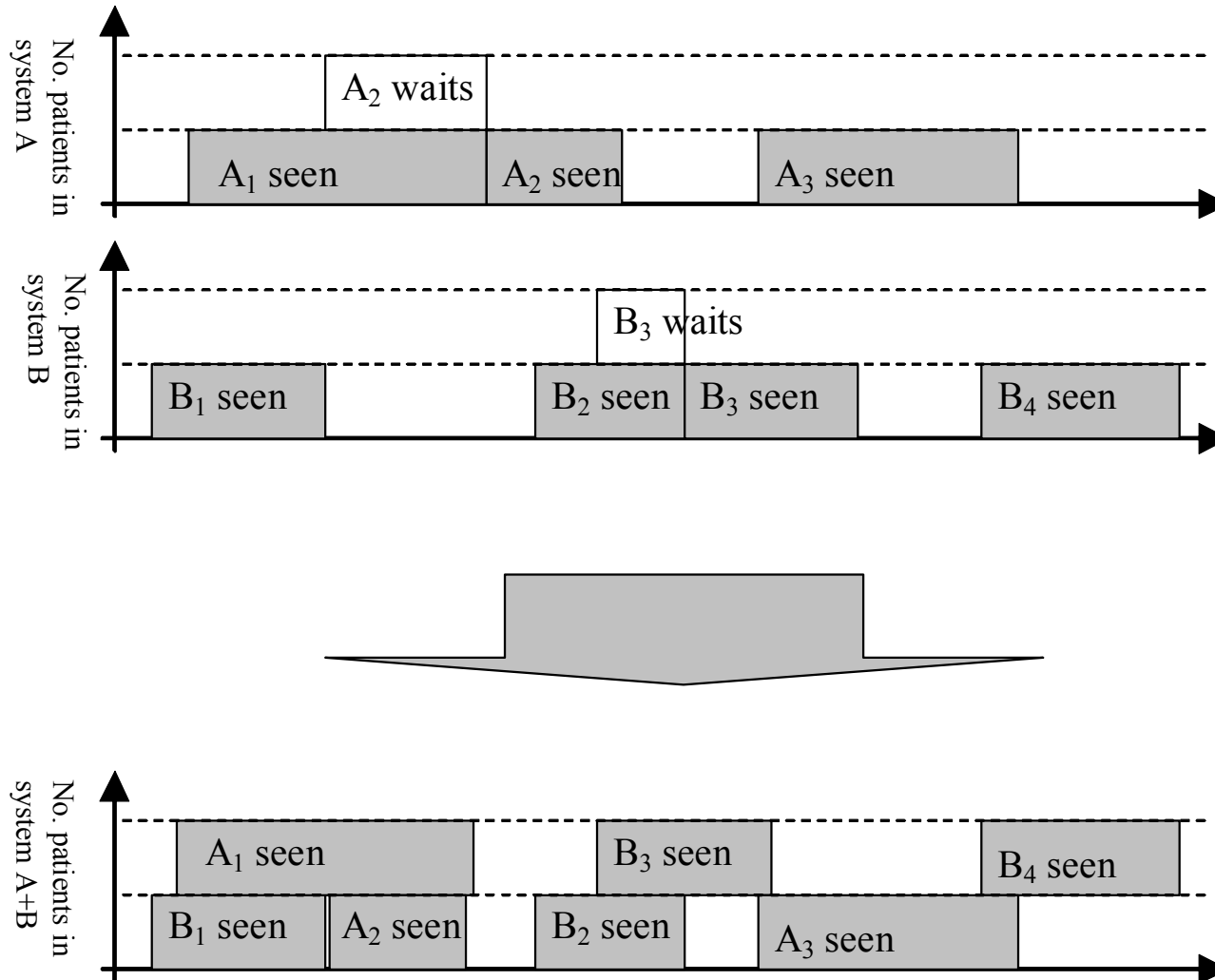
- Three year multi-site EPSRC funded project
 - Lancaster University
 - London School of Economics
 - Centre for Health Economics at University of York
- NHS performance “waiting time” related targets, e.g.
 - 18 Weeks Referral-To-Treatment
 - 4 Hour A&E
- Objectives; to investigate
 - Feasibility of the targets
 - Interactions between them
 - Effects of possible managerial control actions
- To build whole hospital model with generic features and “plausible” level of detail

A Discrete Event Simulation model

- Based on queueing theory
- Models systems dynamically, event by event



Intuitions from stochastic simulation



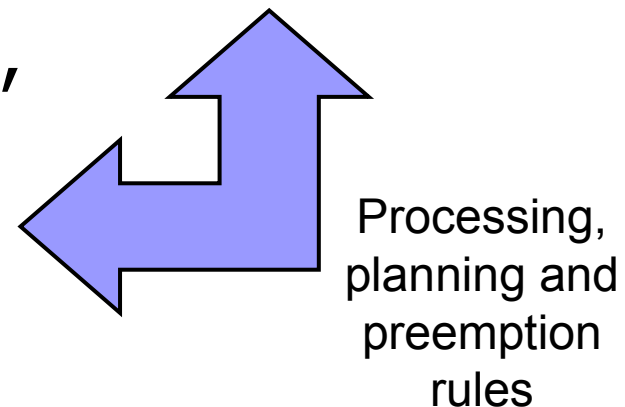
Requirements

■ Demand

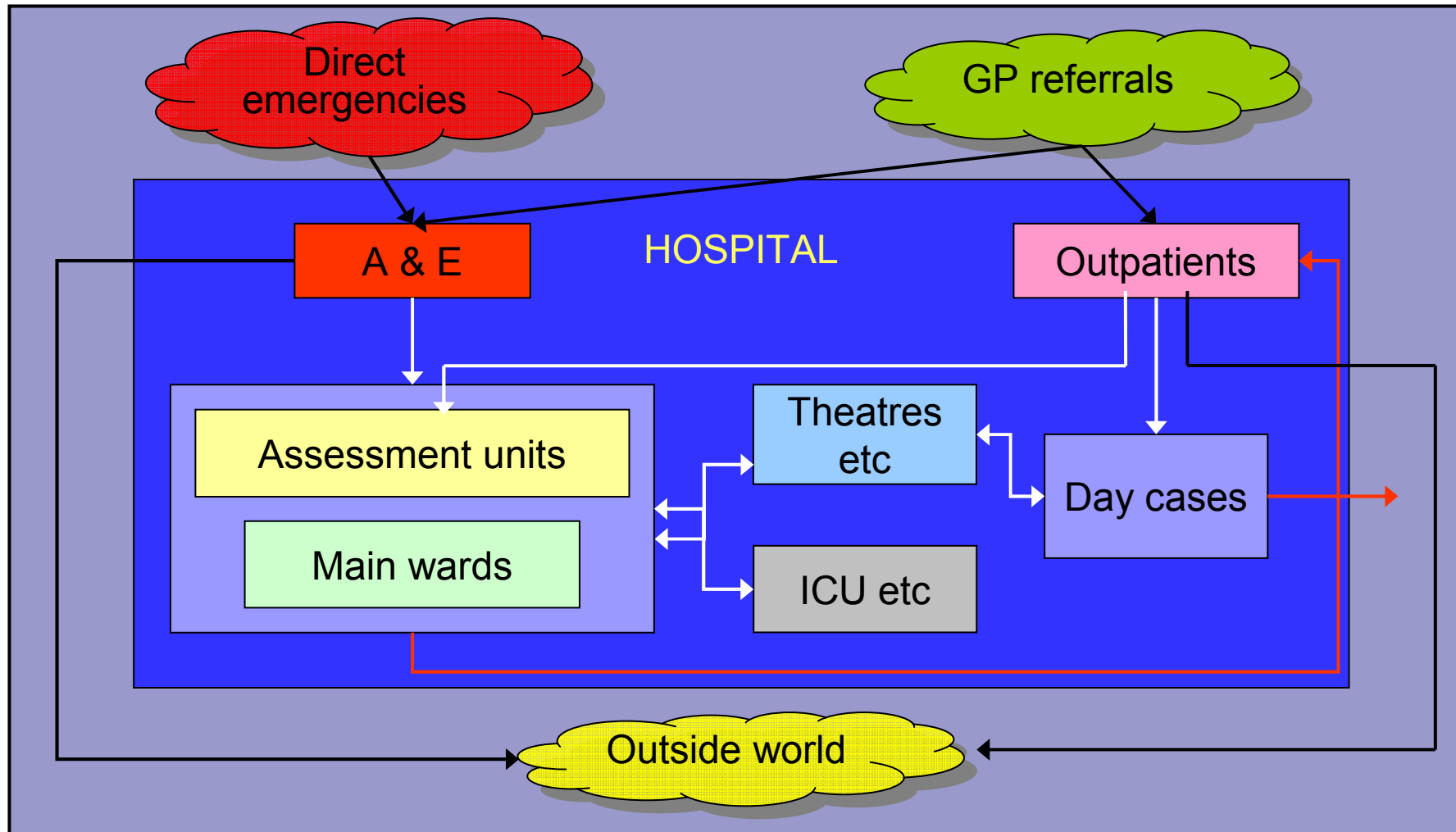
- A&E patients arrival process
- Elective referral process (possibly queue-length dependent)
- Load each patient imposes on system (LoS, operating time)

■ Capacity

- Beds by specialty
- Clinic capacity
- ICU beds
- Theatre time

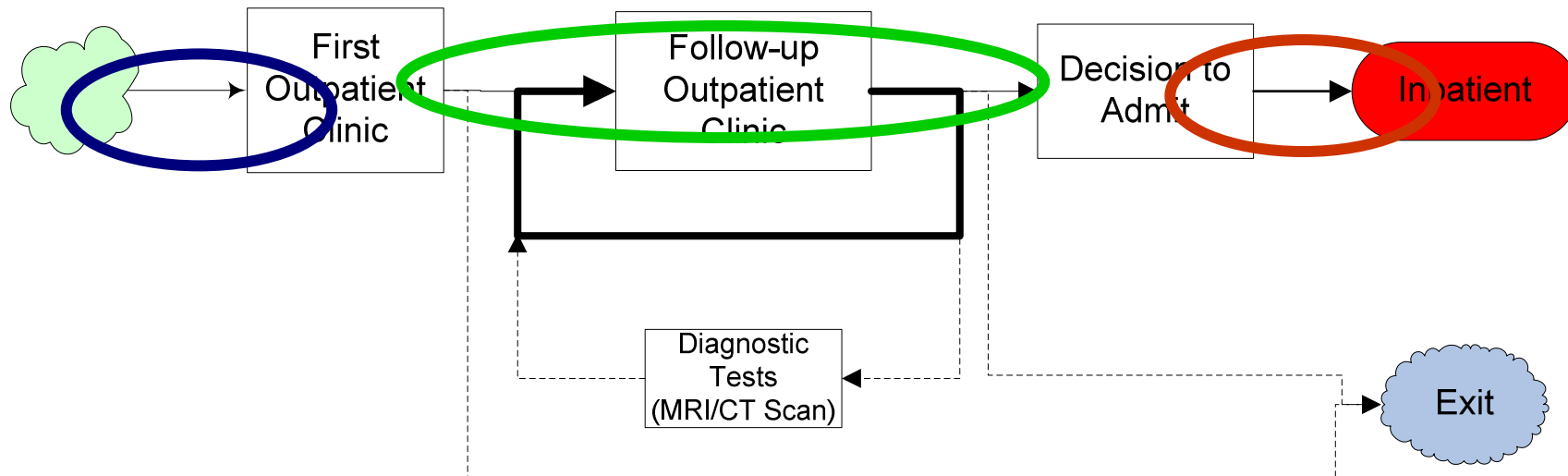


DGHPsim: conceptualisation



Referral-to-treatment (admitted) journey

Referrals
to Specialists



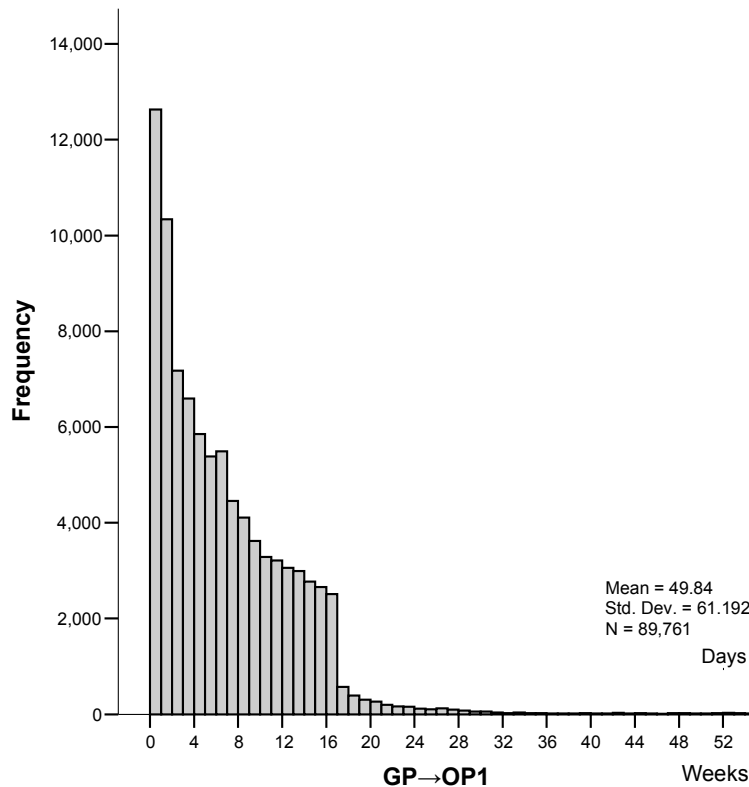
1. Delay between “GP Referral” and “First OP Clinic”

2. Delay between “First OP Clinic” and “Decision to admit”

3. Delay between “Decision to admit” and “Admission”

RTT Admitted Journey-Phase 1

Delay between “GP Referral” and “First OP Clinic”



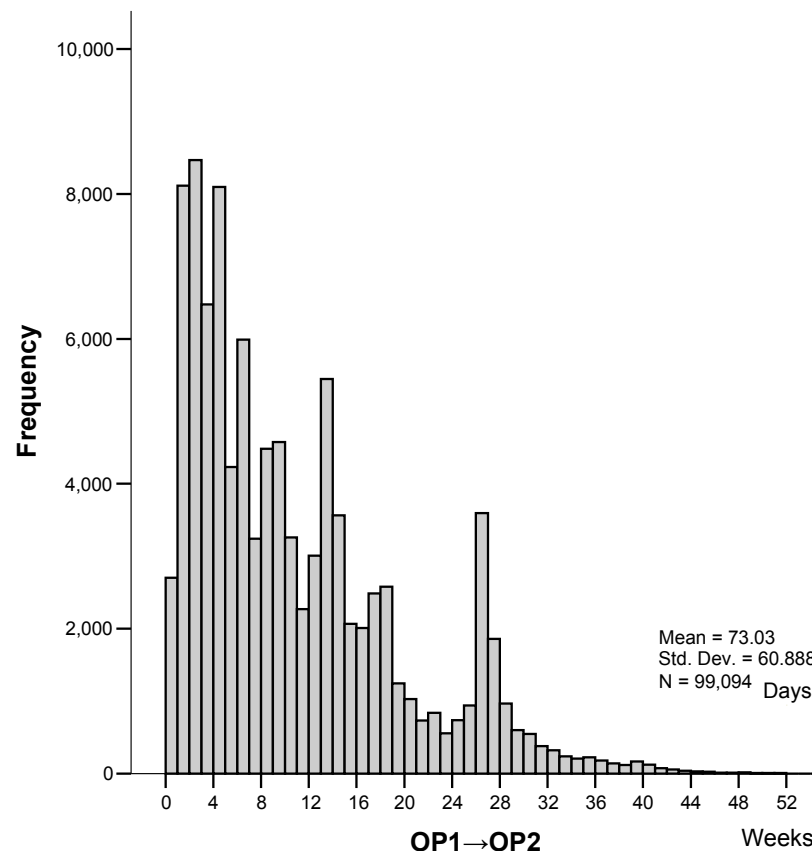
Issues

- Outpatient clinic capacities
- GP referral rates
- Dedicated target (e.g.17 weeks)

2004-2005 Data

RTT Admitted Journey-Phase 2

Delay between “First OP Clinic” and “Decision to admit”



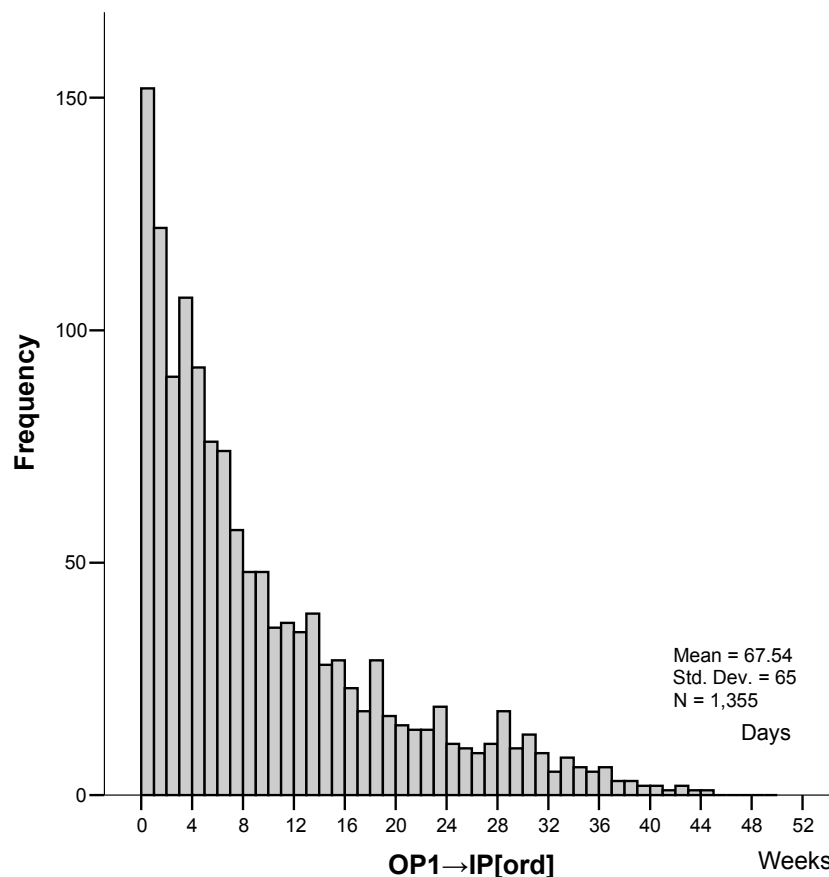
Issues

- Diagnostic test requirements
- Outpatient clinic capacities
- “watchful wait” & patients’ choice
- No dedicated target

2004-2005 Data

RTT Admitted Journey-Phase 3

Delay between “Decision to admit” and “Admission”

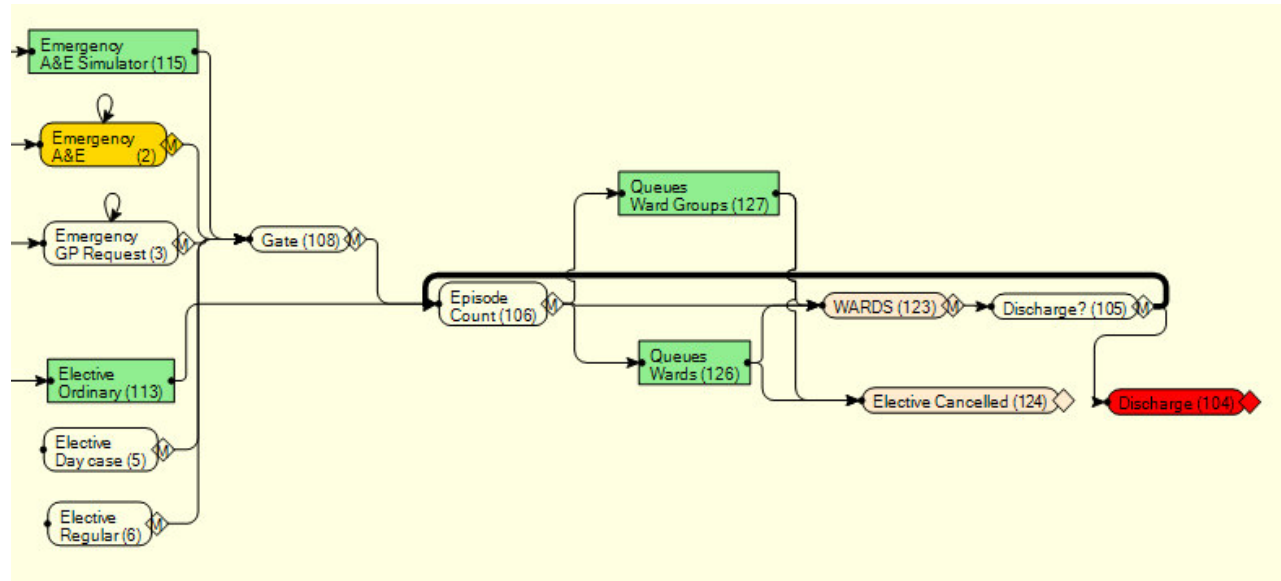


Issues

- Theatre and bed capacity
- Difficult to shorten
- Huge backlog
- Dedicated target (e.g. 6 months)

2004-2005 Data

The simulation model 1/2

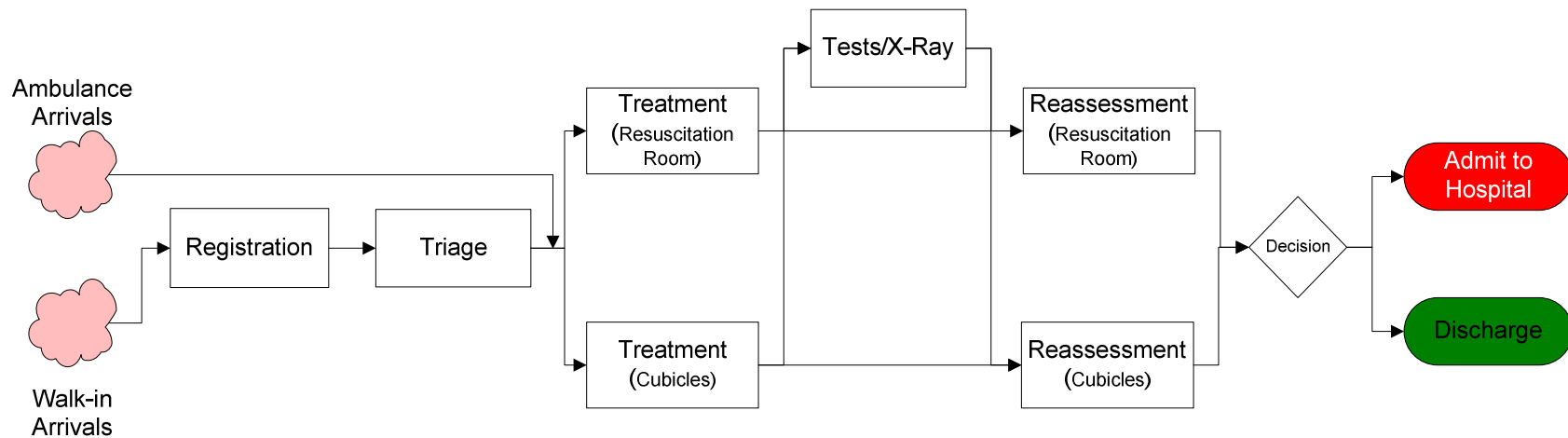


- Discrete event simulation model (coded in Micro Saint Sharp)
- Patient level model (e.g. individual patient attributes)
- Two types of emergency demand
- Elective patient generation by “additions to WL” rates
- Bed capacity constrained (Grouped ward beds)
- No theatre capacity
- Starting conditions (eg. List size, initial ward occupancy)

The simulation model 2/2

- Outputs
 - Waiting times (Elective and Emergency)
 - Ward occupancies
 - Length of stay
 - A&E related outputs
- Evaluating scenarios such as
 - Options to reduce backlog
 - Increasing capacity (beds, theatre sessions etc.)
 - Increasing throughput (shorter LOS, reduced DNA)
 - Diverting patients elsewhere (private providers)
 - Demand management (process redesign, diagnostic tests by GPs etc.)

DGHPSim: A&E Component



Inputs

- Patient arrival volumes and patterns
- Staffing by hour by role
- Physical bed (cubicle) capacity,
- Service time distributions parameters by triage categories and by doctor type,
- Test and X-ray percentages by triage category
- Patient population's triage category distribution

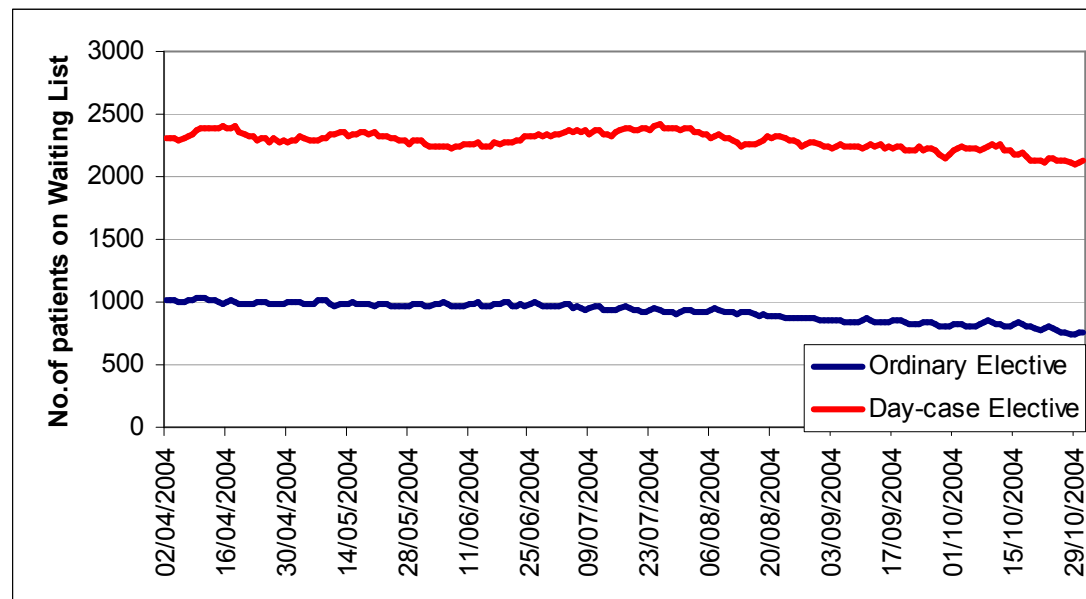
Conclusion

- Model of a single-site is taking shape but
 - Building a strategic model requires tricky judgement calls – do you overbuild and then backtrack, or just assume away?
 - Data doesn't tell you everything you need to know about what's happening currently
 - Lack of detailed information on capacity makes rolling out the model for all of England hard

A pilot hospital in the NW

Waiting list size – all specialties

- Ordinary list and day-case list
- 2004-2005 data



Old data, but ... the backlog problem