Maths saves lives

Operational research for healthcare

School of Mathematics

Vince Knight

Data

	Sex	Height	Weight
0	M	187.306088	72.233276
1	M	170.595112	92.195728
2	F	157.637346	64.835601
3	M	162.010640	130.462244
4	F	154.017198	81.568846
⋮	⋮	⋮	⋮

Data

	Sex	Height	Weight
0	M	187.306088	72.233276
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4	F	154.017198	81.568846
⋮	⋮	⋮	⋮

```
>>> import scipy.stats

>>> ttest = scipy.stats.ttest_ind(
...     df[df['Sex']=='M']['Height'],
...     df[df['Sex']=='F']['Height'])
>>> ttest.pvalue
0.07003363047042102 1
```

Examples
(Geraint Palmer)

Optimisation

Shift	9	10	11	12	13	14	15	16	17	18
Nurses	7	8	9	9	7	5	4	8	4	3

Full Time

£7.50 per hour

4hrs, 1hr break, 3hrs

Part Time

£8 per hour

4hrs

Optimisation

Shift	9	10	11	12	13	14	15	16	17	18
Nurses	7	8	9	9	7	5	4	8	4	3

3

Full Time

£7.50 per hour

4hrs, 1hr break, 3hrs

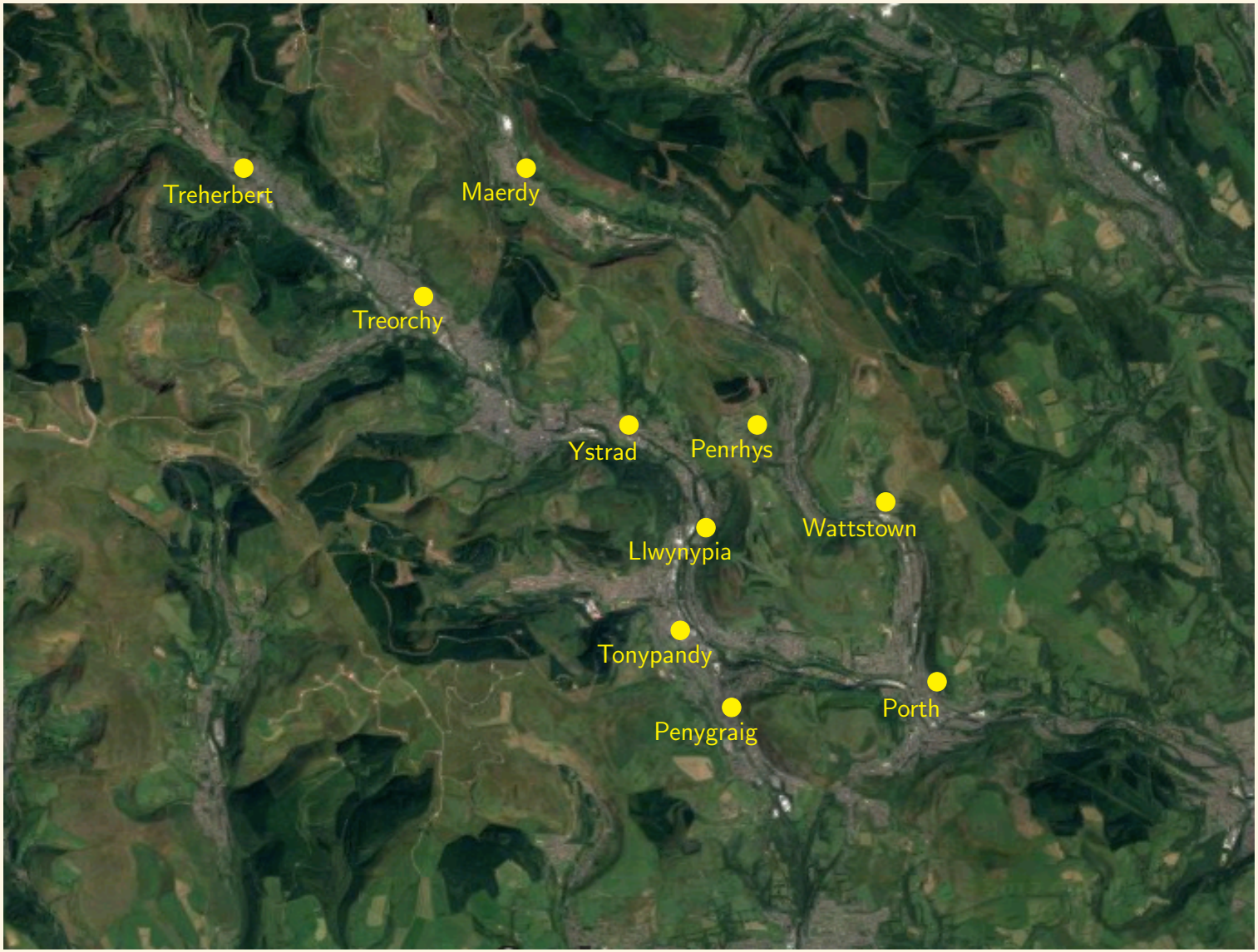
12

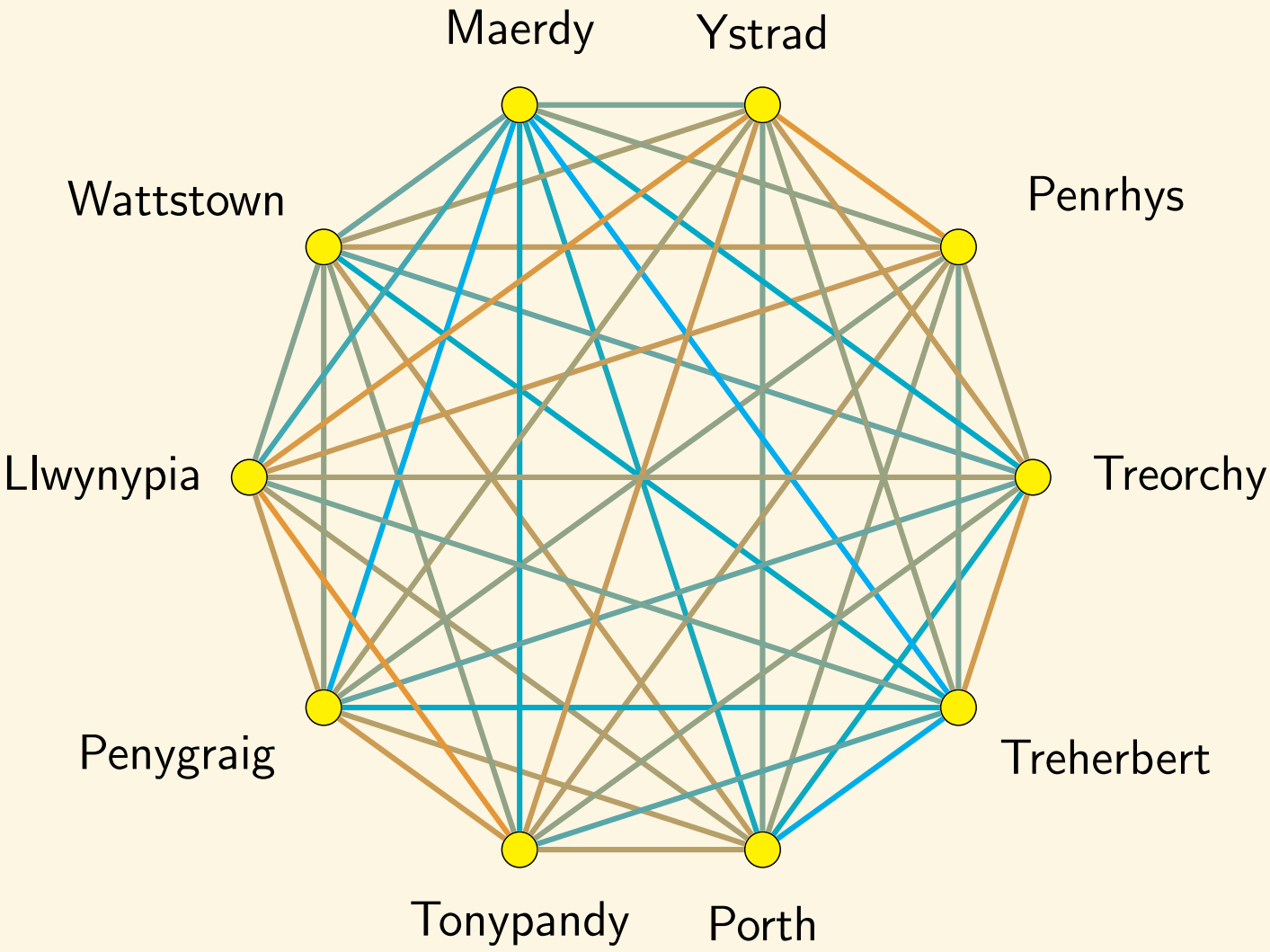
Part Time

£8 per hour

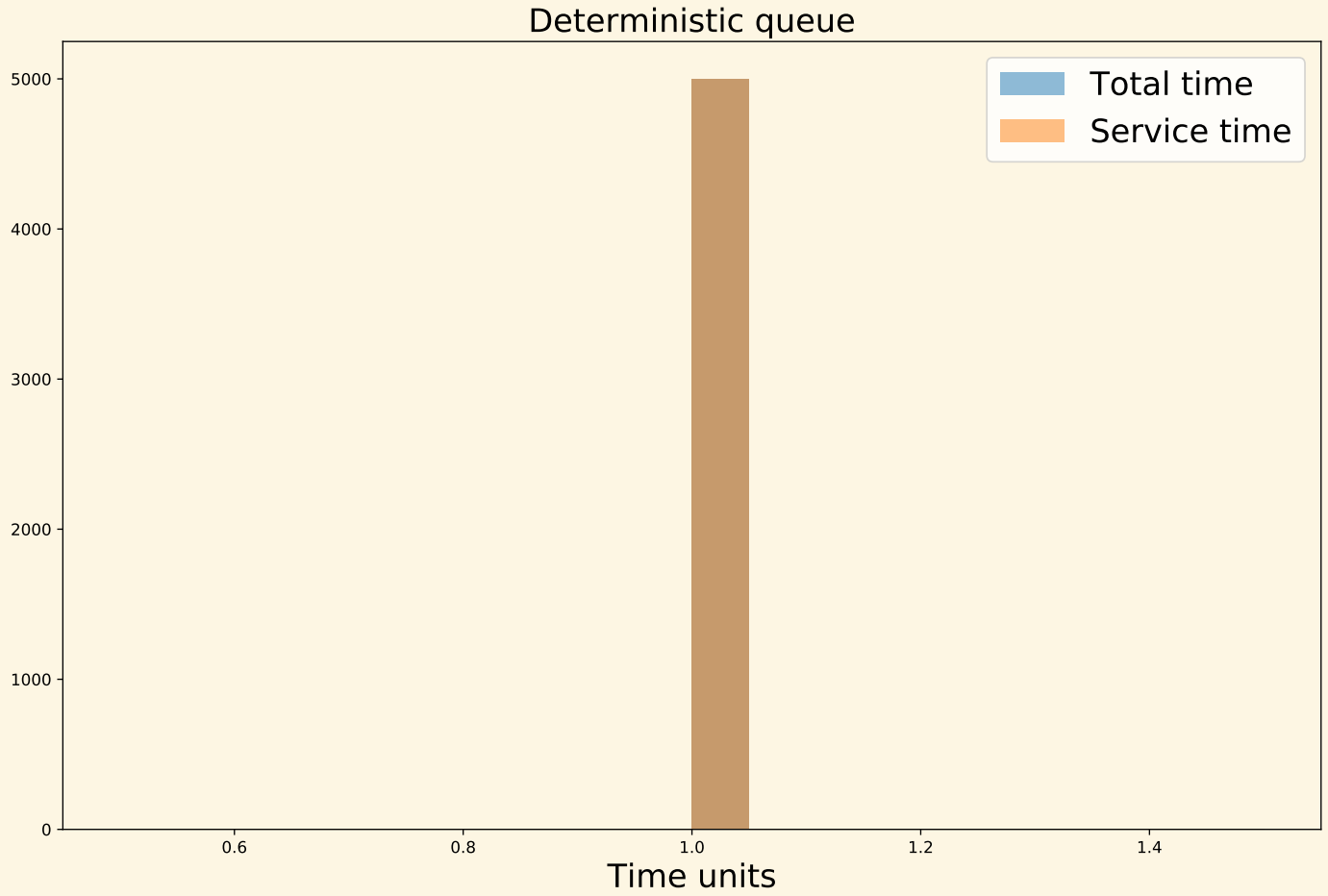
4hrs

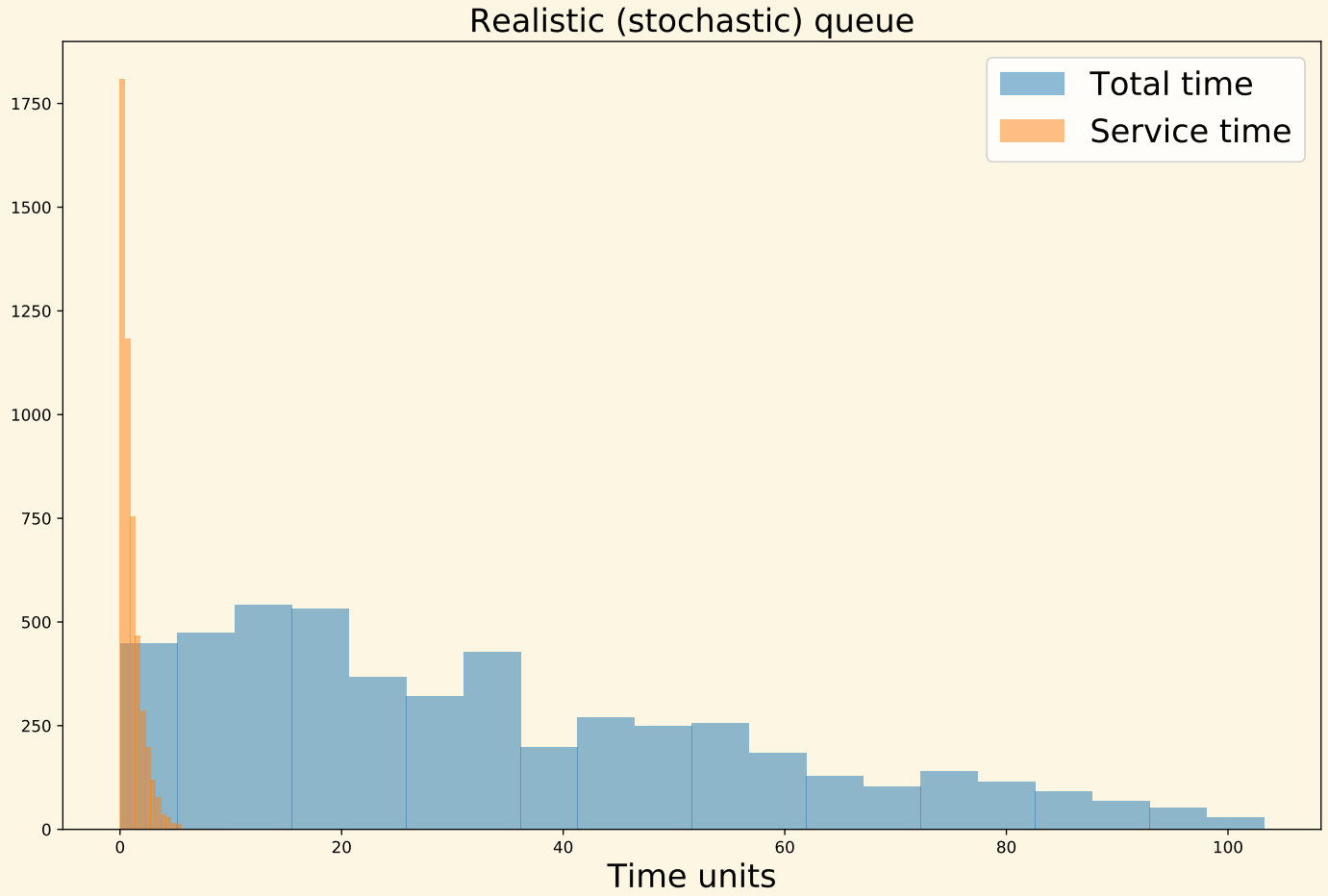
Graph Theory



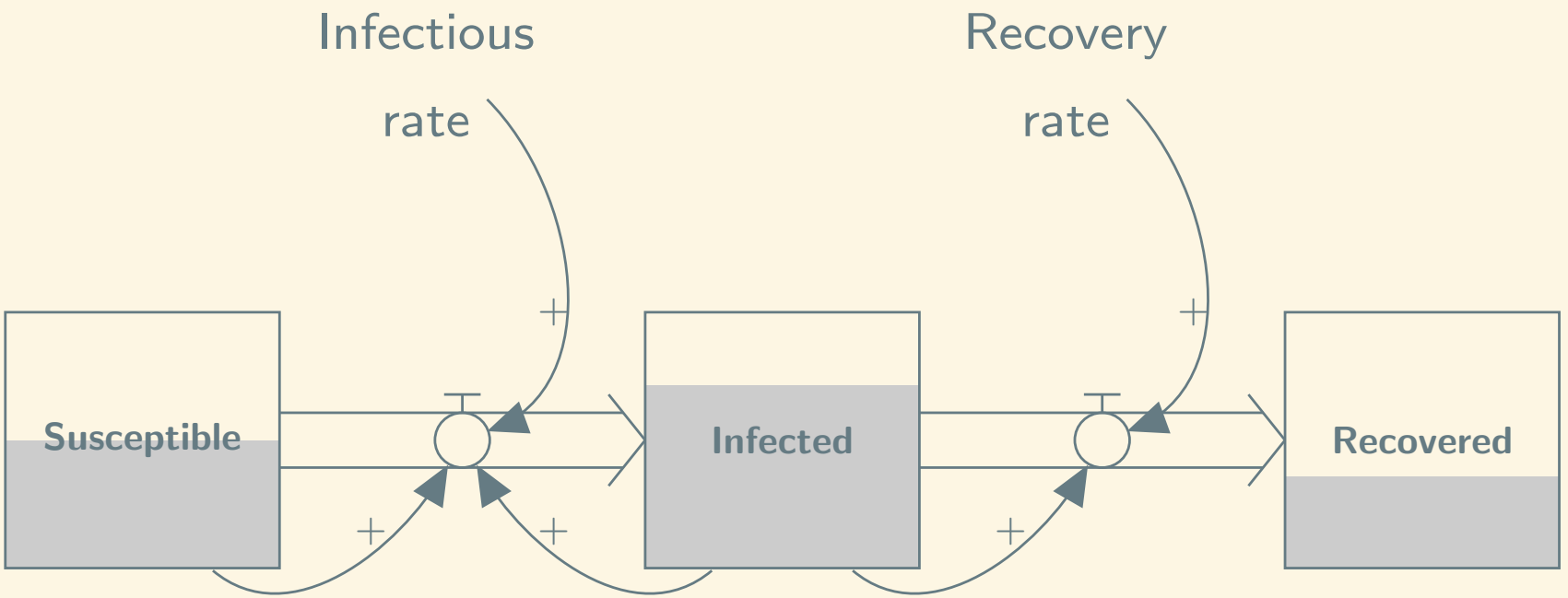

Maerdy
Ystrad
Wattstown
Penrhys
Llwynypia
Treorchy
Penygraig
Treherbert
Tonypandy
Porth

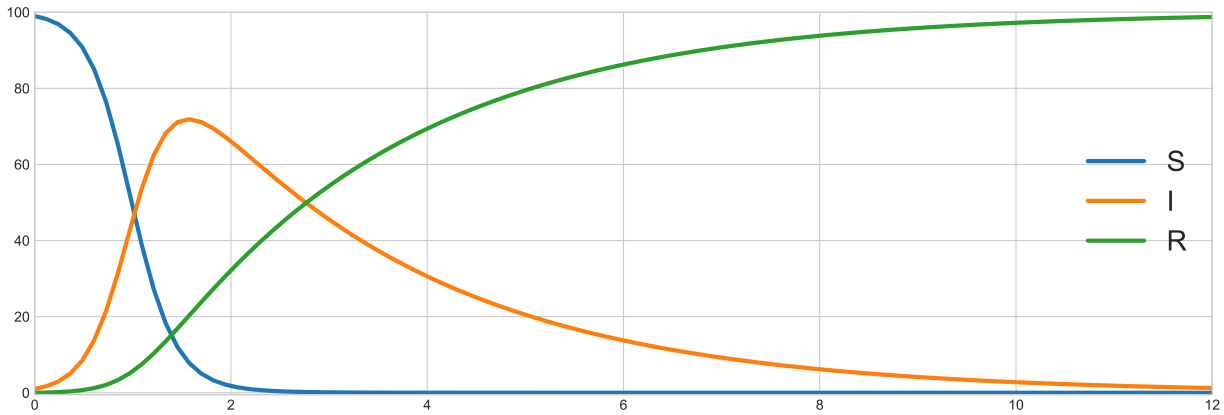
Queueing Theory


Deterministic queue
Total time
Service time
5000
4000
3000
2000
1000
0
0.6
0.8
1.0
1.2
1.4
Time units

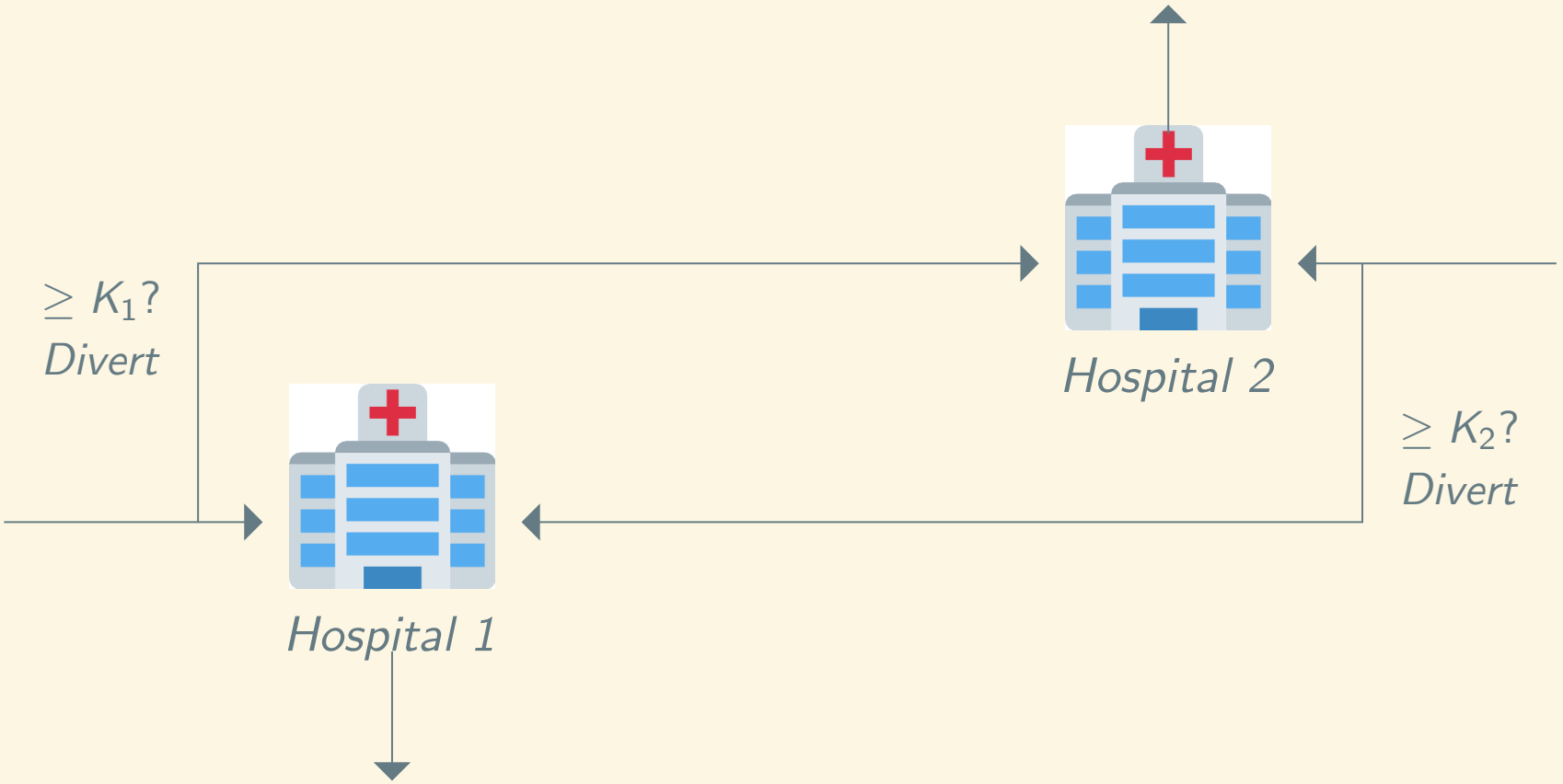

Realistic (stochastic) queue
Total time
Service time
1750
1500
1250
1000
750
500
250
0
0
20
40
60
80
100
Time units

Dynamical Systems



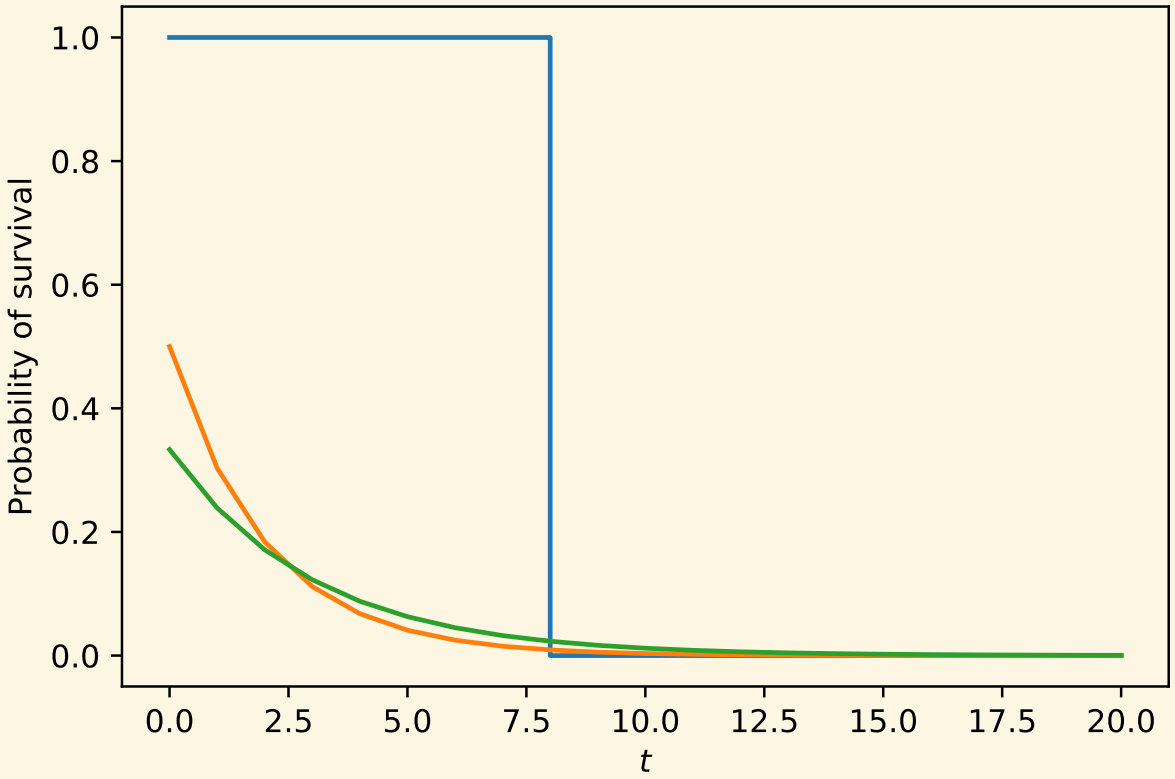

100
80
60
40
20
0
0
2
4
6
8
10
12
S
I
R

Game Theory



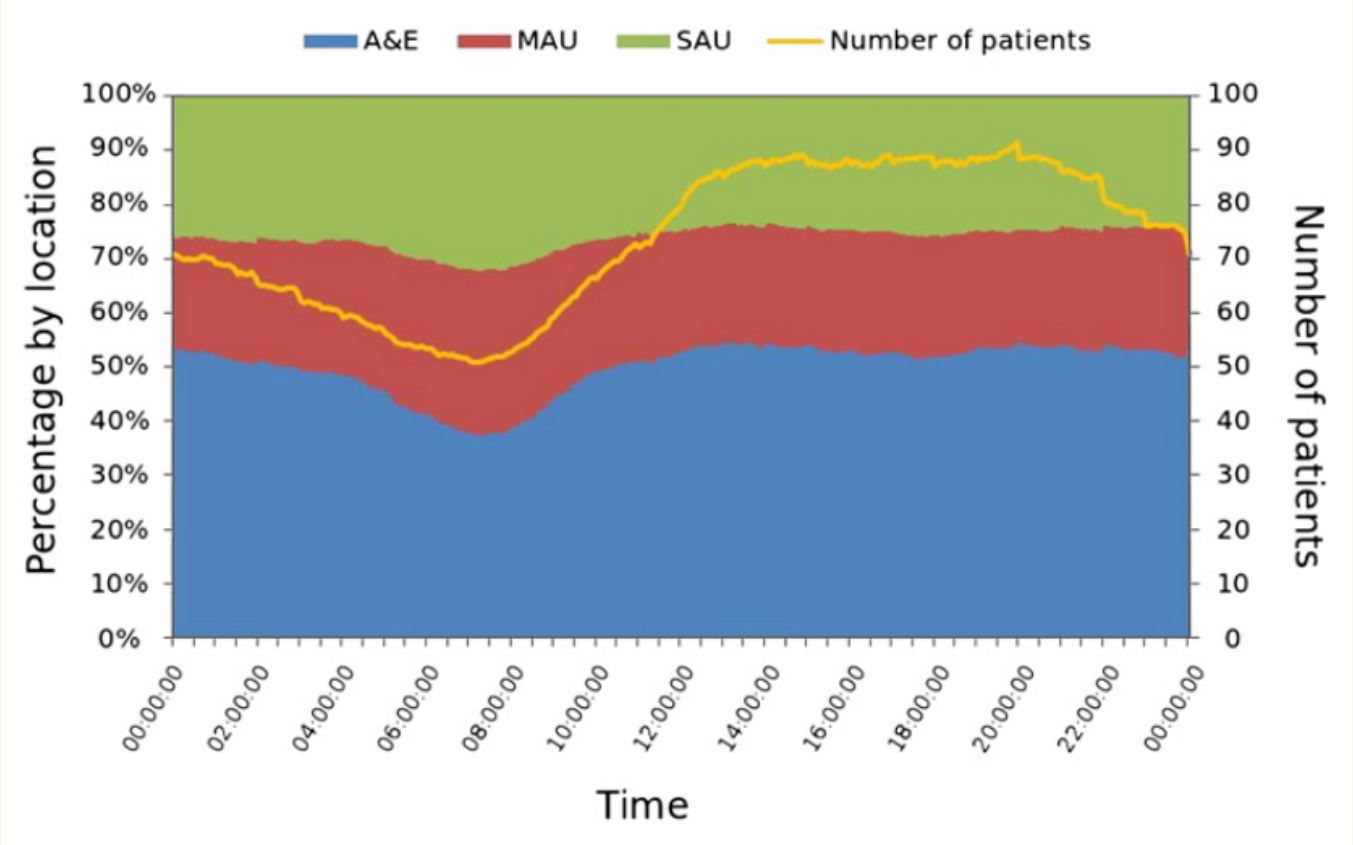
Partnerships

Welsh Ambulance Service Trust



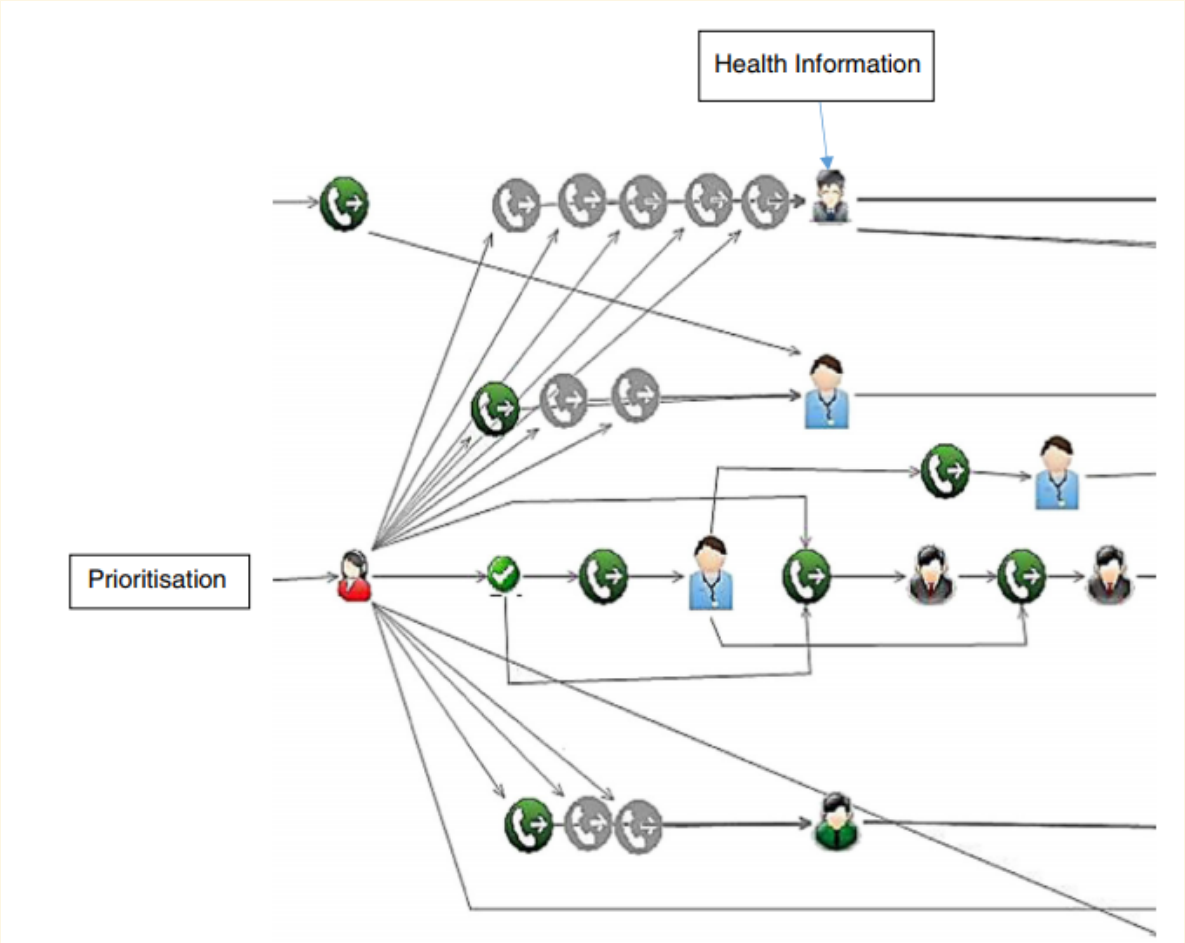
Ambulance allocation for maximal survival with heterogeneous outcome measures V.A. Knight, P.R. Harper, L. Smith (2012) **Omega**

University Hospital of Wales (UHW)



How efficient can an emergency unit be? A perfect world model. Kesh Baboolal, Jeff D Griffiths, Vincent A Knight, Andrew V Nelson, Cheryl Voake, Janet E Williams (2012) **EMJ**

Aneurin Bevan University Health Board



Modelling for the proposed roll-out of the 111 service in Wales: a case study Mark Tuson, Tracey England, Doris Behrens, Richard Bowen, Dorothy Edwards, John Frankish, Jude Kay (2016) **Health Care Management Science**

TIMES
HIGHER
EDUCATION
AWARDS
2015
AMITY

M.Sc.

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