TCC-CASEMIX® Analytics

Combining discrete event modelling with personalised operation duration predictions to optimise planning and improve the productivity of surgical pathways

TCC-CASEMIX® uses powerful simulation software AnyLogic to facilitate a complete digital pathway in elective surgery, from the preoperative assessment process, to the surgical planning process and through to completing the surgery.
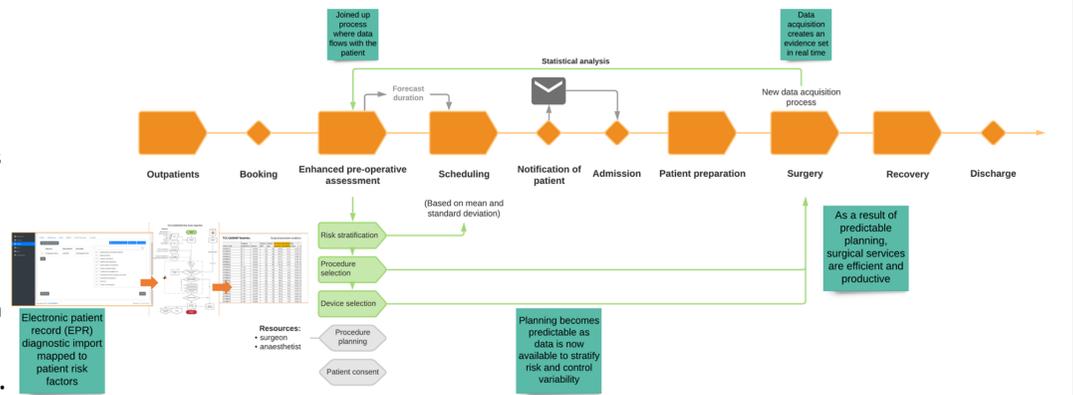
The process context

- Decades of simulation work in operating rooms to improve scheduling – work that goes back to the 1960s.
- In recent years a significant emphasis on discrete event simulation. **But we have yet to find a model that is an acceptable reflection of the real-world.**
- All models that we have studied make significant assumptions concerning 'system' variables – but as every 'system' is different and the inputs to it are different, they offer limited value. **The simulation logic attempts to reflect the real world (with assumptions).**
- So we have reversed this logic – that puts the system variables in control of the user and by doing so, they will no longer be variables but defined constraints or targets for performance (key performance indicators). **Constraints can be tested in using experiments…**
- In doing so, the team then selects the best experiment to embed in the operational policy for surgical services delivery. So now the 'real world' will follow the simulation – **not the other way around…**

The current, disjointed, dysfunctional surgery planning process

Outpatients | Booking | Pre-operative assessment | Scheduling | Notification of patient | Admission | Patient preparation | Surgery | Recovery | Discharge

No data capture

The elective surgery planning process conceived by TCC-CASEMIX®

Outpatients | Booking | Enhanced pre-operative assessment | Scheduling | Notification of patient | Admission | Patient preparation | Surgery | Recovery | Discharge

Joined up process where data flows with the patient

Statistical analysis

Data acquisition creates an evidence set in real time

Forecast duration

New data acquisition process

(Based on mean and standard deviation)

As a result of predictable planning, surgical services are efficient and productive

Risk stratification
Procedure selection
Device selection

Resources:
• surgeon
• anaesthetist

Procedure planning
Patient consent

Electronic patient record (EPR) diagnostic import mapped to patient risk factors

Planning becomes predictable as data is now available to stratify risk and control variability

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TCC-CASEMIX®
Simulation expert perspective

Technical development needs:
- Powerful simulation service
- Highly configurable simulation environment to reflect the real-world
- A hybrid simulation service to combine agent-based simulation with discrete event simulation
- Scalable for complex pathways
- Database integration with TCC-CASEMIX® cloud technology

Using a powerful simulation tool to meet complex and intersecting needs
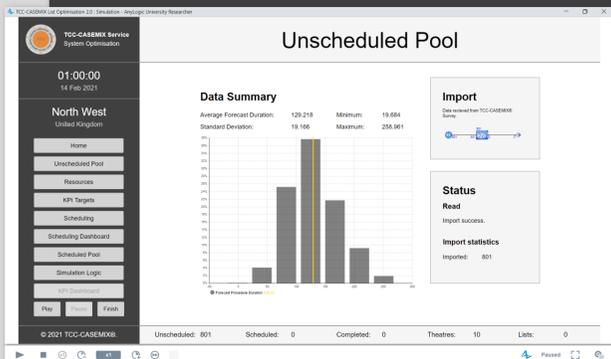
Surgical services teams
Customers

Usability needs:
- Able to be used by non-experts with an intuitive user interface, directly in the hands of customers and supported by consultants
- Demystify the simulation environment, guided by the customer who are in full control of inputs and outputs
- To be deployed in the cloud, using the simulation service anywhere (e.g. workshops, multi-disciplinary team meetings, surgery planning)
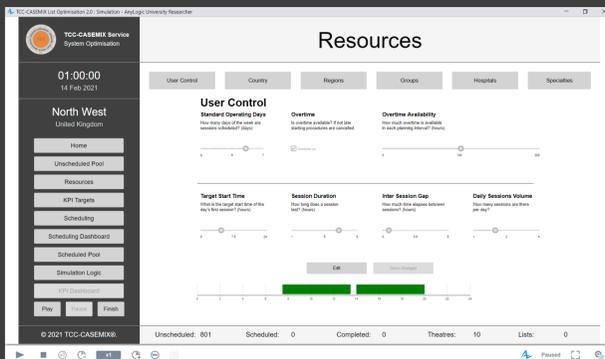

Unscheduled pool of patients from TCC-CASEMIX®
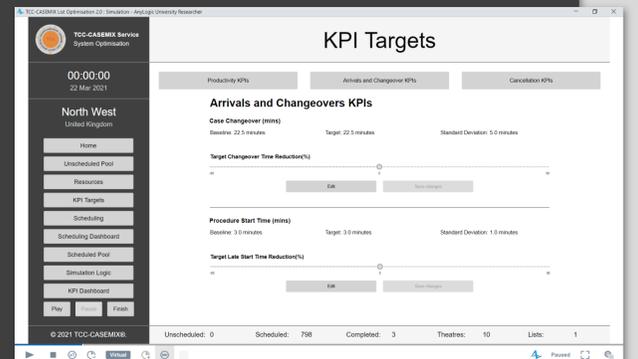Input parameters: patient identifier | mean duration | standard deviation | target date

Input resources and their availability
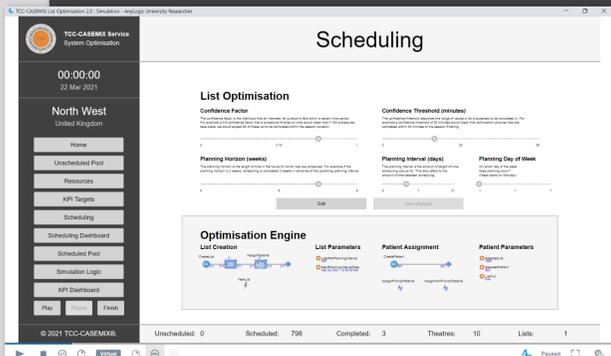Input parameters: start time | theatre availability | overtime availability | number of sessions | more

Set key performance indicator (KPI) targets
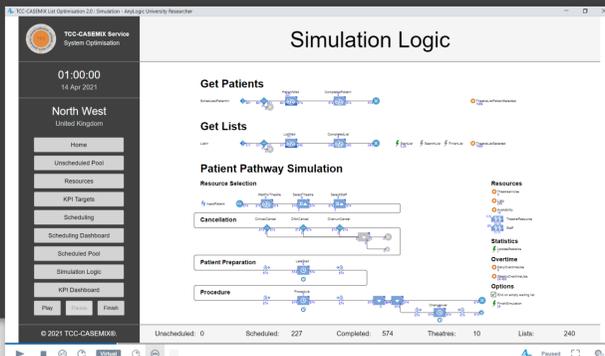Input parameters: productivity | arrivals | changeover | cancellations

Schedule lists using a custom optimisation engine
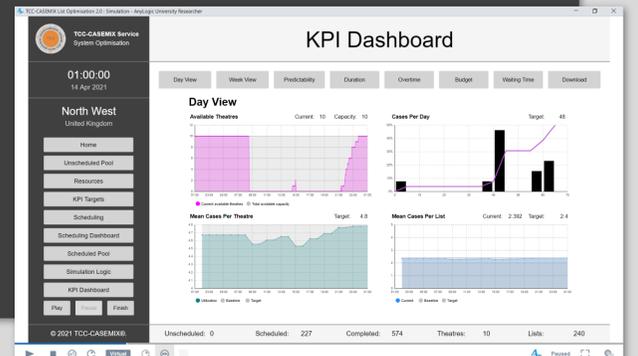Input parameters: confidence factor | confidence threshold | planning horizon | planning interval

Simulate the entire surgical pathway
Discrete event simulation models resource use and produces powerful statistics for the KPI Dashboard.

A KPI Dashboard to understand tangible benefits
Output parameters: productivity | predictability | duration | overtime | budget | waiting time

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In everything we do, we believe in making transformational change possible. Our quality data and human insights enable better care and delivery. We guide and maximise healthcare planning and productivity …we just happen to humanise data.

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