N E T I M I S

The NETIMIS Care Pathway Simulation Tool

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NETIMIS (Network Tools for Intervention Modelling with Intelligent Simulation) is a Discrete Event Simulation (DES) tool that was developed by X-Lab in the UK to help model care pathways.

Care pathway – "a complex intervention for the mutual decision-making and organisation of care processes for a well-defined group of patients during a well-defined period." European Pathway Association (EPA) E-p-a.org

Although care pathways are frequently discussed there are few tools specifically designed to model them.

We designed NETIMIS to be easy to use by healthcare professionals with only an hour's training. With NETIMIS it is easy to draw simple, animated models of care pathways and run them as simulations to explore issues of time, patient demographics, probabilities, outcomes and costs. The solution combines elements of business process modelling with agent based and discrete event simulation. The design was inspired by research-led software used for road traffic simulation but with paths and patients rather than roads and vehicles.
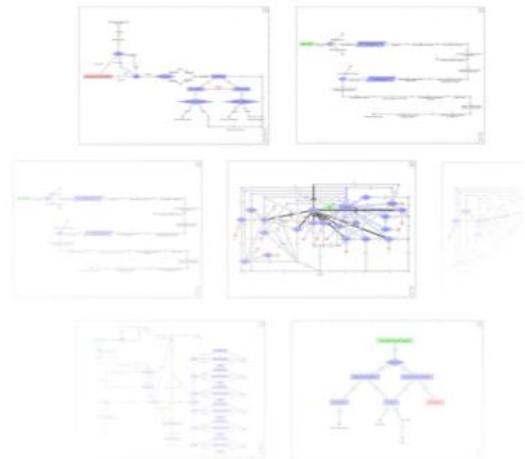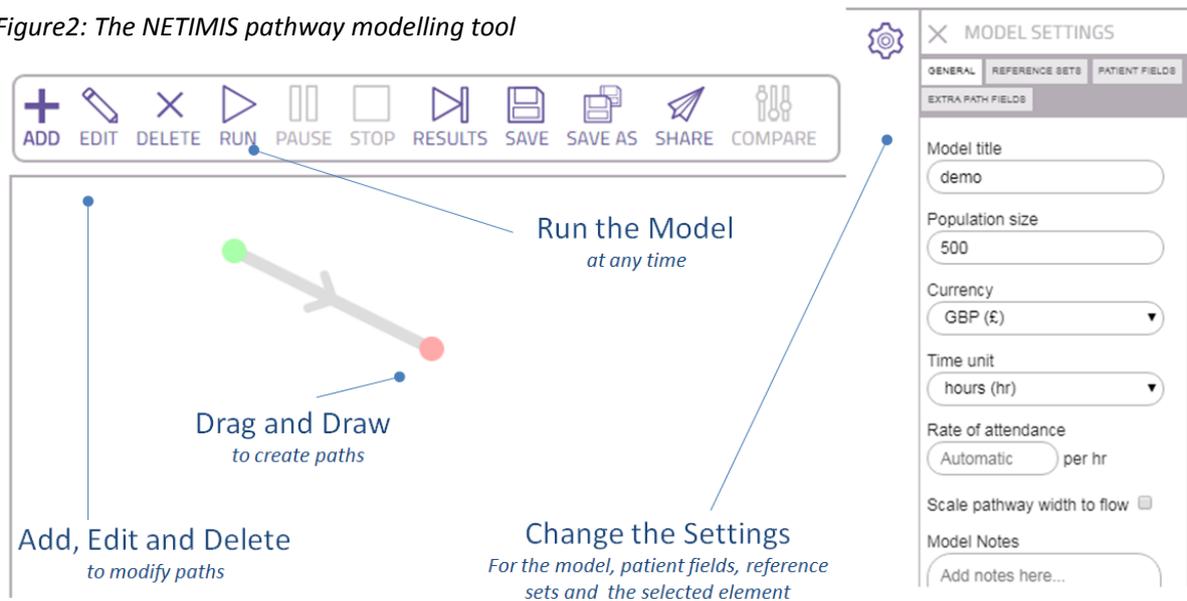
NETIMIS is available for academic and commercial use

www.netimis.com

Figure 1: A simple NETIMIS model
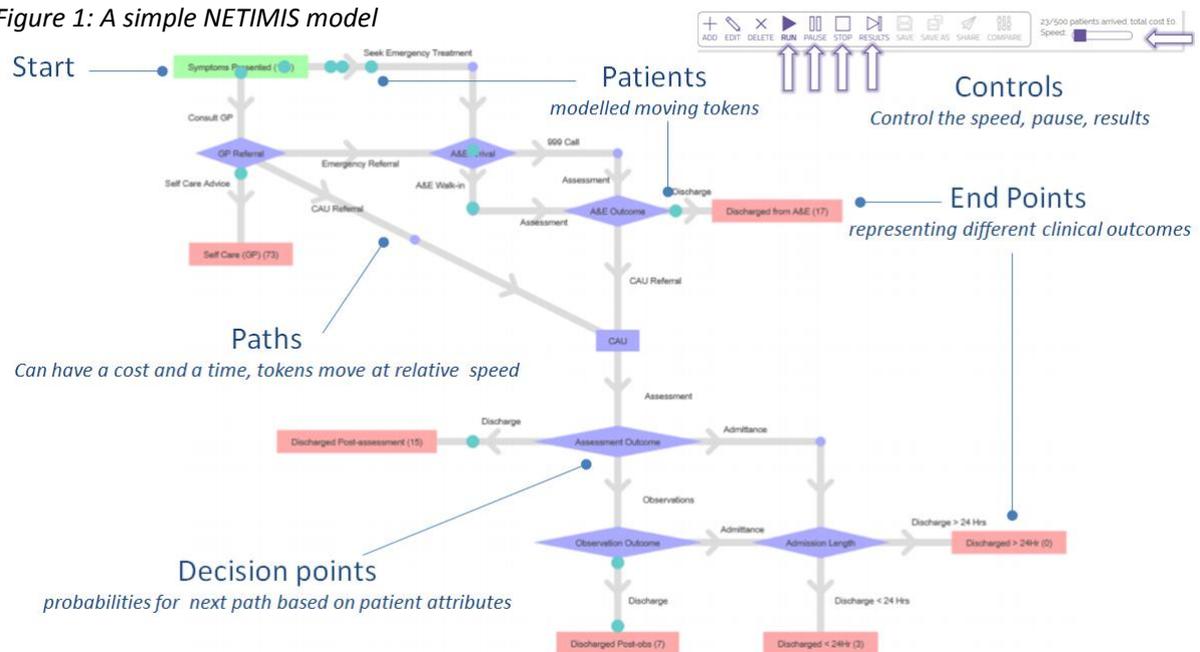
The care pathway for paediatric ambulatory care at Bradford Royal Infirmary, UK
Full case study at www.netimis.co.uk/downloads/fyp2018/samgair/Ambulatory Care Pathway at BRI.pdf

Figure2: The NETIMIS pathway modelling tool

Settings and model elements can be adjusted to reflect the results of process analysis.

Model Settings: Base population (up to 100,000); Currency (GBP(£), CAD($), USD($) and EUR(€)); Time unit (seconds, minutes, hours, days, weeks, months and years); Rate of attendance (number of patients per time unit); Scale pathway width to flow.

**Patient settings:** Multiple user defined attributes (label, colour, probability).

Path settings: Label, cost(s), time, colour, capacity (max number of patients), counter.

Decision points: Label, shape, next path probability (percentage, patient attribute, previous path).

Feature Summary: Following the analogy of cars on roads, multiple patient tokens flow through care pathways to create a highly visual and engaging model. In NETIMIS attributes of patient tokens are randomized to reflect those of the base population and pathway junctions are given probabilities that are dependent on those attributes. Both edges and nodes can be named, edge and node colours and node shapes (e.g. dot, oval or diamond shapes) are user configurable as is the choice of colour for the circular tokens. Tokens colours can be configured by individual attribute values, for example a token with two attributes (age and sex) may be coloured yellow (age band: 0-4) and blue (sex: female). The tool supports constraints that can lead to bottlenecks and probabilities that are affected by repetition. Health outcomes are represented by pathway end nodes and each simulation run calculates total costs and times based on the sum of individual costs and times assigned to each activity completed for all of the patients' care. Users interact with the visualization through features including accelerate, pause, zoom, inspect, change, share and compare. Two models can be run side by side so that differences can be explored visually. Outputs include a summary report and detailed event log which can be used for further statistical analysis, process mining or reporting.

Technical Summary: Microsoft Azure Cloud using .NET MVC, runs on any modern Web browser (e.g. Chrome). Free registration, academic use and to run from email and hyperlinks.

Figure3: NETIMIS examples
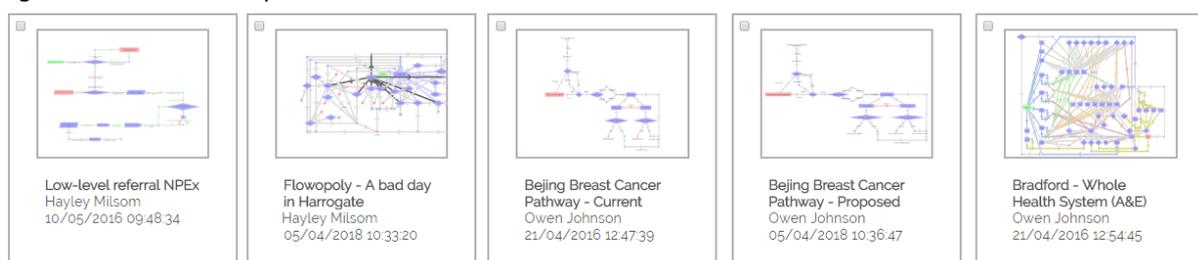
NETIMIS has been used successfully for dozens of case studies. There are many examples are online.