IN PLANE TERMS

Special Edition: Predicting Performance

The performance framework trial — it works!

How can airport stakeholders maximise use of limited resources and avoid long, frustrating queues for passengers? What impacts do flight delays or new flight schedules create?

The Airports of the Future Project (AoTF) performance framework has been trialling an end-to-end model for facilitation processes that can be used to help answer these questions and more.

Not just another model

The performance framework trial was the first stage in developing models and methods to support management of airport planning and operations. The AoTF developed a dynamic modeling methodology that can capture relationships between facilitation factors. It identifies performance metrics such as dwell time, facilitation rate, and capacity (i.e., number of passengers). The result is a prototype called the Inbound Passenger Facilitation Model (IPFM), which has been tested at Brisbane International Airport.

The ability to trace causal effects and predict knock on affects sets this tool apart from anything currently available.

How is it useful?

The model is demonstrated on three scenarios:

Scorecard scenario: presents a scorecard type report of “what just happened” in day-to-day operations.

What’s about to happen? scenario: the model estimates likely performance of the inbound system for the next time period or any future time period given a specific airport operational configuration and flight schedule.

Communicate wait time: estimates the expected queue wait time.

These three usage scenarios focus on three main types of metrics: facilitation rate (or throughput), dwell time and congestion (i.e., number of passengers in each area).

How was the model built?

The model was developed through use of currently available data (e.g., flight log data, immigration demographic data, CCTV intelligent surveillance and summary statistics) and inclusion of expert knowledge. The data used was for 6:00-12:00 and 16:00-20:00 (a total of 10 hours) on Sunday, September 30 2012 at Brisbane International Airport.

What can it do?

The model estimates the number of passengers in each area. Effects of passenger and flight characteristics on performance are captured, allowing the user to identify factors contributing to a certain performance outcome.
Four areas are defined for the inbound passenger process: Arrival Concourse (AC), Entry Control Point (ECP), Baggage Hall (BH) and Secondary Examination Area (SEA).

One type of application that can be built from the performance framework is a ‘moving bars’ visualisation, as pictured above. This shows the capacity, the facilitation rate and the dwell time for each area.

Flights are shown on the timeline on the bottom of the screen, unloading passengers at each gate on the top bar. Each bar in the middle reflects the state of that performance metric at the time indicated by the blue line on the timeline.

Is it accurate?

Despite limited available data, the model produced a reasonable estimation of actual passenger movements as verified by experts. The predicted departure curve was found to have an error of just 5.7% compared to the ground truth (from Customs’ time stamped movement data). The model also passed thorough testing for accuracy.

What next?

Next steps:
- testing portability by trialling the model on a smaller airport (e.g. Darwin), and using larger training
- testing data sets for further model refinement.

The final stage will be the development of commercial grade software and implementation in a live airport environment.

Interested in more info?

For links to further information and technical reports please contact us or go to www.airportsofthefuture.qut.edu.au