

PUBLIC TRANSPORT TERMINAL UTRECHT

ProRail

BIGGEST CHALLENGE

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KEYS TO SUCCESS

Simulation models of several time stages, representing current, final and intermediate phases of the public transport terminal Utrecht, have been built with Pedestrian Dynamics®

RESULTS

Prorail determines whether planned building activities will result in transfer or evacuation bottlenecks and which measures can or must be made to improve the situation. The associated animation appears to be very helpful in both detecting the bottlenecks and its causes and communicating the results to all stakeholders to create a broad base for cooperation.

“Building such a terminal is very complex, but it is a real challenge to do so while the daily transfer must go on and many parties have to work in and around the terminal”

UTRECHT CITY CENTER

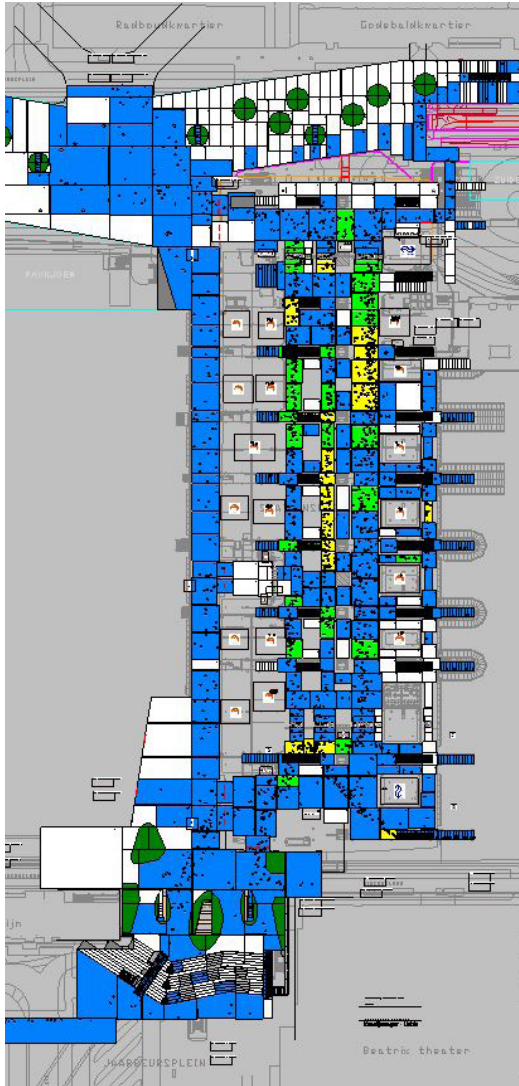
An important element of the reconstruction of the city center of Utrecht concerns the construction of a new terminal for public transport. This terminal will not only cover all train platforms, but it comprises also two separate bus stations, a tram platform, taxi lanes and a large transfer area. Adjacent to the terminal building large new office towers are erected and several multi-level bike storage buildings will be developed to accommodate about 22.000 bikes. All together it is expected that in the year 2025 over 100 million people per year will use this terminal.

BUILDING DURING OPERATION

Building such a terminal is already a tough labor, but it is a real challenge to do so while the daily transfer must go on and many involved parties have to work in and around the terminal. During each of the numerous stages in the building process

it is required that different sections of the existing terminal have to be taken out of use to create new construction areas. This will disturb the pedestrian flows, as the pedestrians have to deal with new and restricted situations frequently.

ProRail has commissioned the terminal building project and carries responsibility for accessibility, safety and convenience in the terminal. Another involved party is for example the municipal fire brigade, who demands certain standards for evacuation of the terminal and the influence on surrounding buildings. Therefore these parties have to propose and evaluate possible measures to solve pedestrian flow disturbances and keep evacuation procedures valid during all construction phases.



SIMULATION

An appropriate instrument to evaluate measures and their effectiveness is simulation. ProRail is already using simulation since a long time and in the previous years INCONTROL has performed many simulation studies in the field of train station simulation for them. Therefore in cooperation between ProRail and INCONTROL simulation models of several time stages, representing current, final and intermediate phases of the public transport terminal Utrecht, have been built with Pedestrian Dynamics®.

These models comprise the complete infrastructure and pedestrian flows in the train terminal and the arrivals from and departures to other means of transport. Elements of the models are:

- The terminal hall with facilities such as ticket sale, kiosks, shops and the chip card gates
- The available train platforms including connection to tunnels and terminal hall through stairs and escalators
- The origins and destinations of the pedestrians, e.g. the eastern and western bus terminal, tram platform, bike storages and entrances from/exits to the city districts where people come from or go to by foot
- The tunnels leading to and from the other means of public transport (tram, bus, taxi) and the city (by bike or foot)

The occupation of every part of the terminal is very dynamical, then it is very dependent on the peak flows of travelers. During the day one can of course distinguish common rush hours

in the morning and the afternoon, but the largest dependency is on the different schedules. An arriving train or bus causes periodic crowds at the platforms, on the escalators, in the tunnels and halls and in front of chip card gates, but minutes later all can be calm again..

During each of the construction phases, elements of the infrastructure, e.g. entrances, tunnel sections or stairs, will be closed. In order to see the effect of these works and measures to reduce consequences, especially during peak pressure, it is necessary to simulate the terminal in detail. Therefore the models are scaled representations of the available infrastructure, including marked building areas. They also comprise the timetables of the different means of transport and the expected amounts and routings of the travelers, based on counts and prognoses of future flows, all validated by ProRail and the other stakeholders.

RESULTS

Supported by the simulation models, ProRail determines whether planned building activities will result in transfer or evacuation bottlenecks and which measures can or must be made to improve the situation. The associated animation appears to be very helpful in both detecting the bottlenecks and its causes and communicating the results to all stakeholders to create a broad base for cooperation.