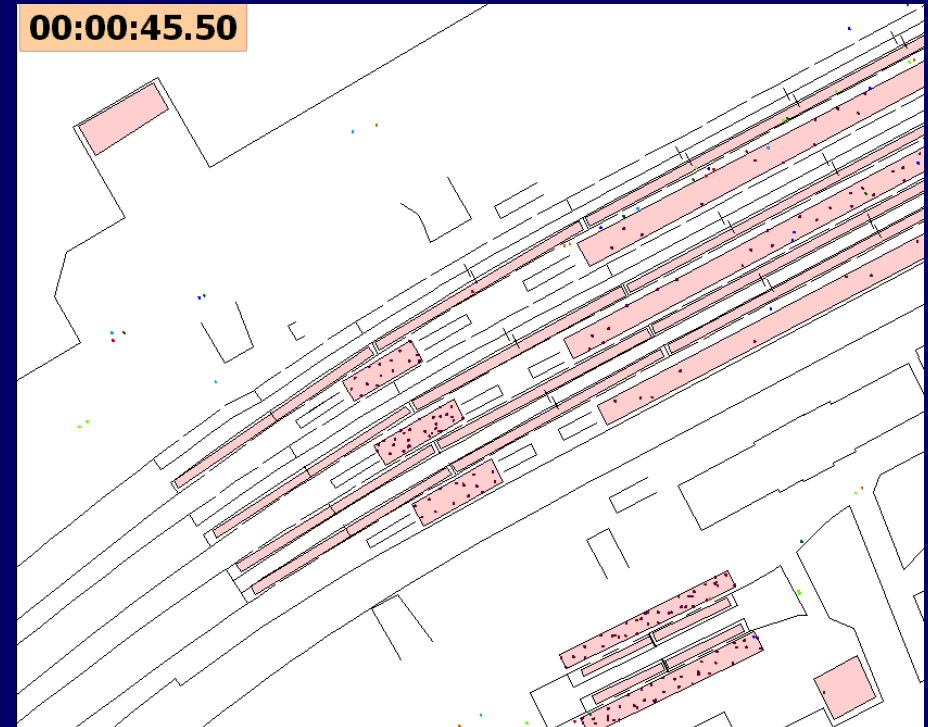
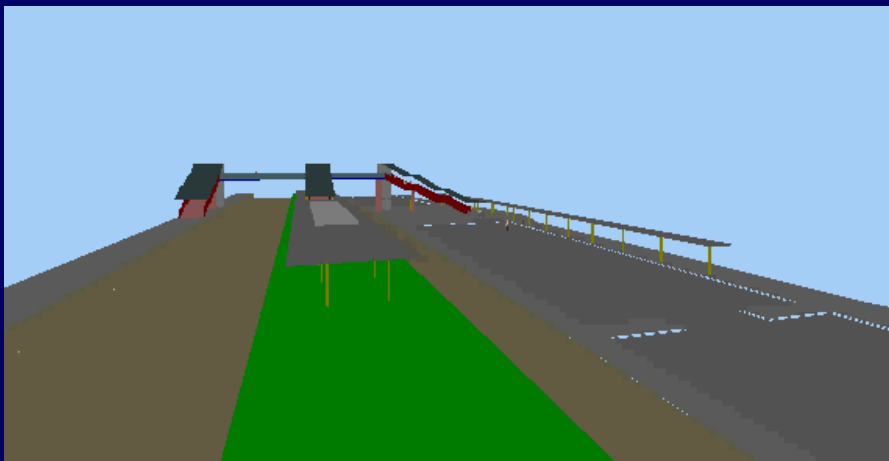


Integration of Passenger Simulation into Station Operations and Management

Alex Schmid, managing director, Savannah Simulations AG

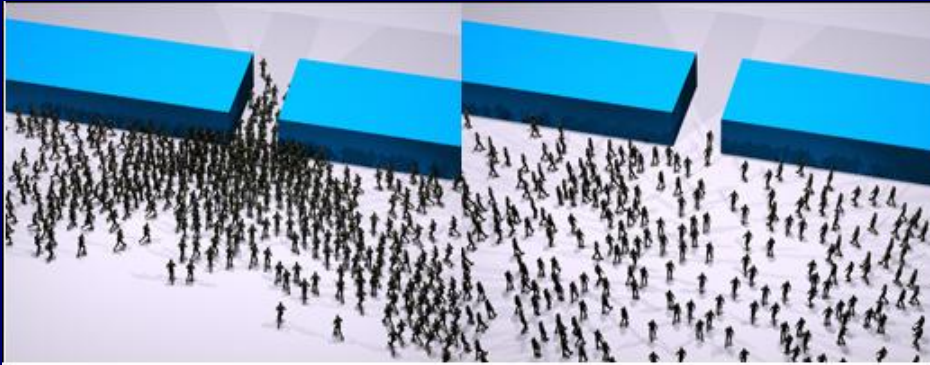


Why Simulate Passengers in Railway Stations?



- ➔ To improve passenger flow efficiency as well as station operations and design through realistic simulation and analysis
- ➔
 - Analysis of platform capacities
 - Comfort levels for passengers
 - Boarding / alighting process
 - Evaluation of rolling stock
 - Optimization of transfer times and timetables
 - Analysis of station objects (stairs, elevators etc.)

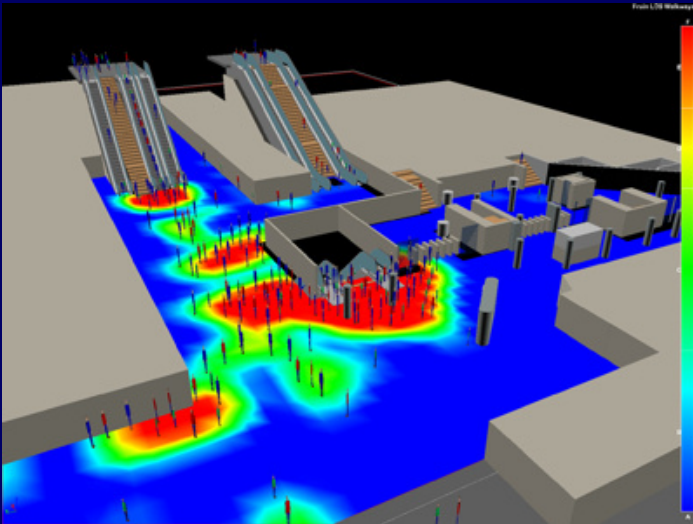
Passenger Modeling – State-of-the-Art



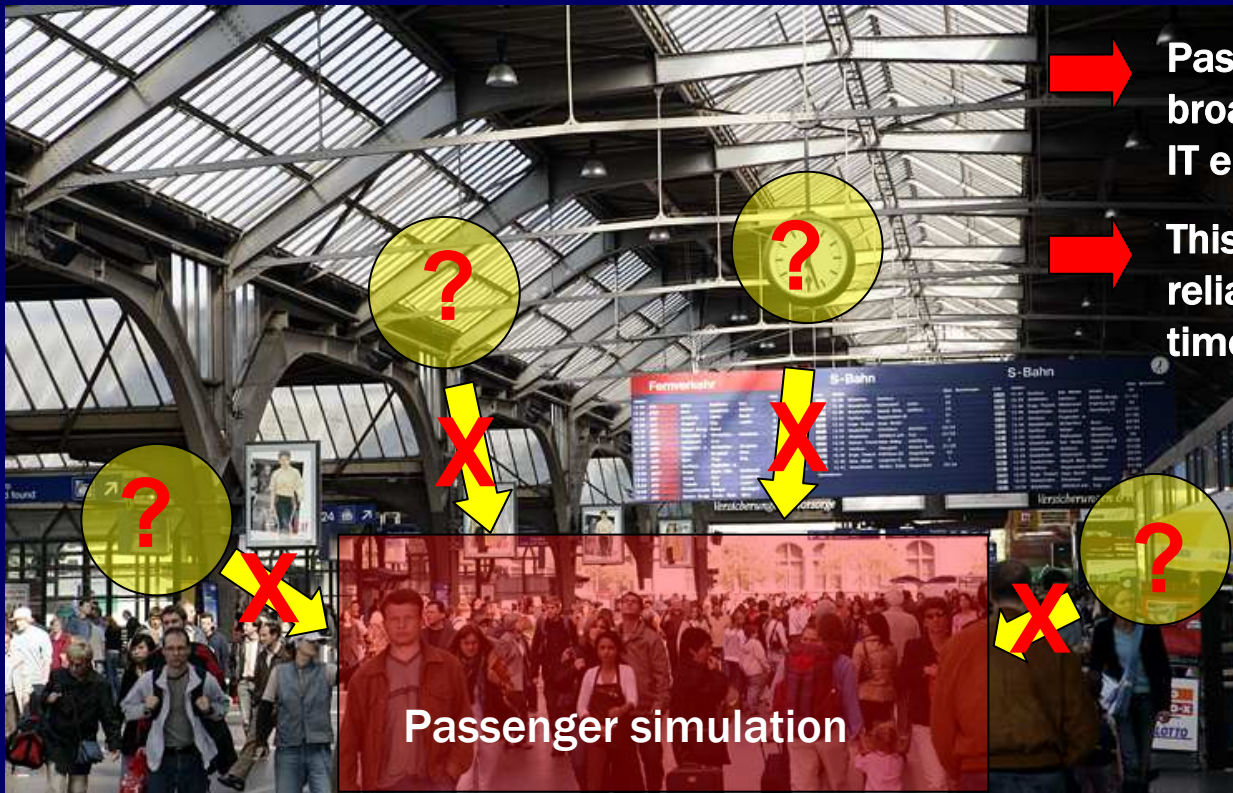
➔ **microsimulation** = every passenger is modelled realistically as a separate person with its properties

➔ **agent-based** = passengers are modelled „humanlike“ with goals and restricted intelligence

➔ **continuous** = passengers move realistically in continuous space



Simulation Integration: „Stand-Alone Problem“

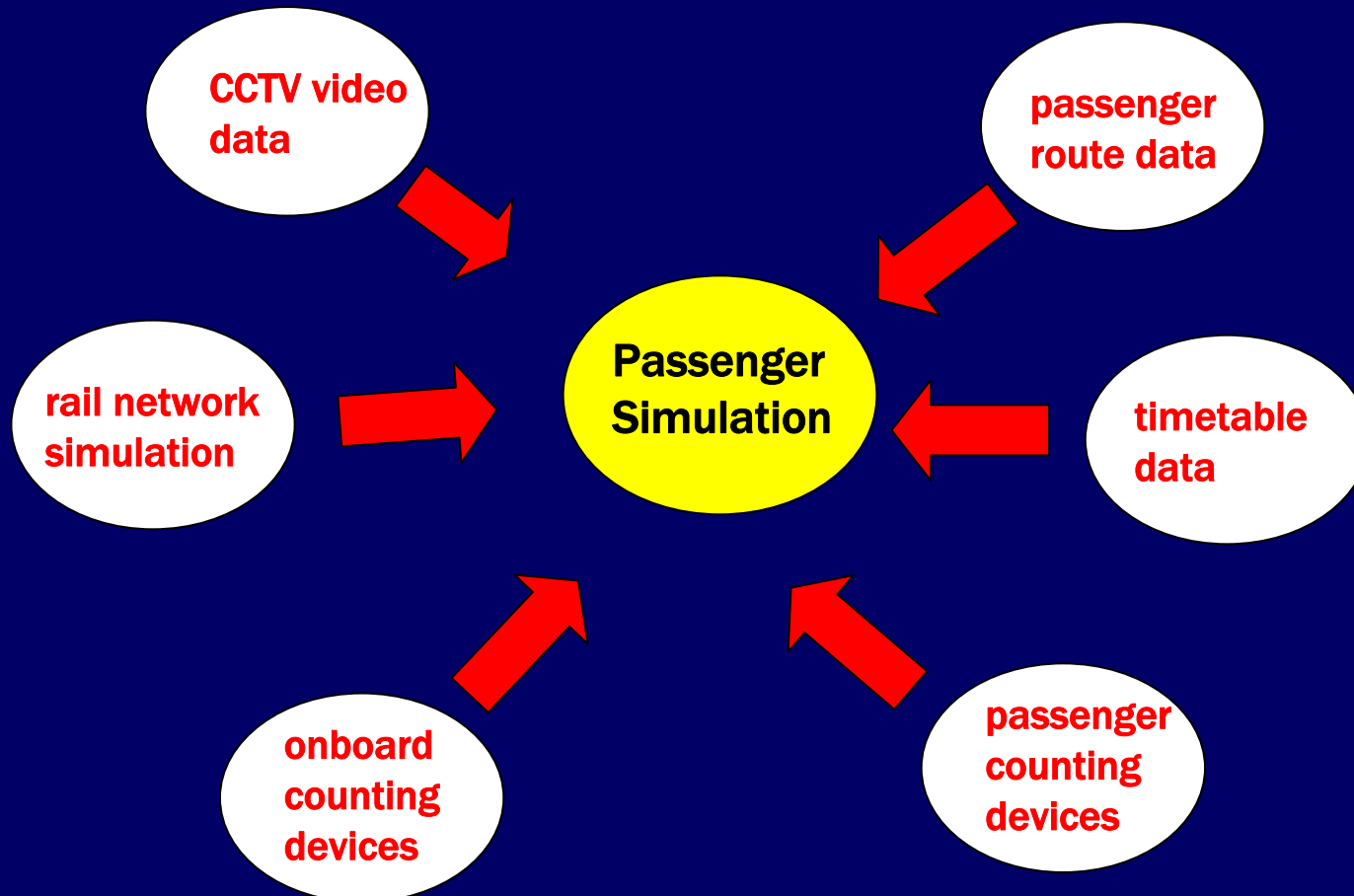


Passenger simulations ignore the broader station context (data and IT environment)

This narrows applicability and reliability of simulation projects (in time and space)

Passenger simulation should become an integral part of terminal IT and operations

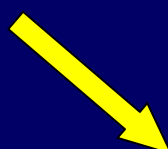
Where Does Simulation Data Come From?



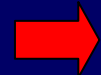
Passenger Route Choice Data

Ticket office

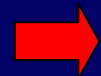
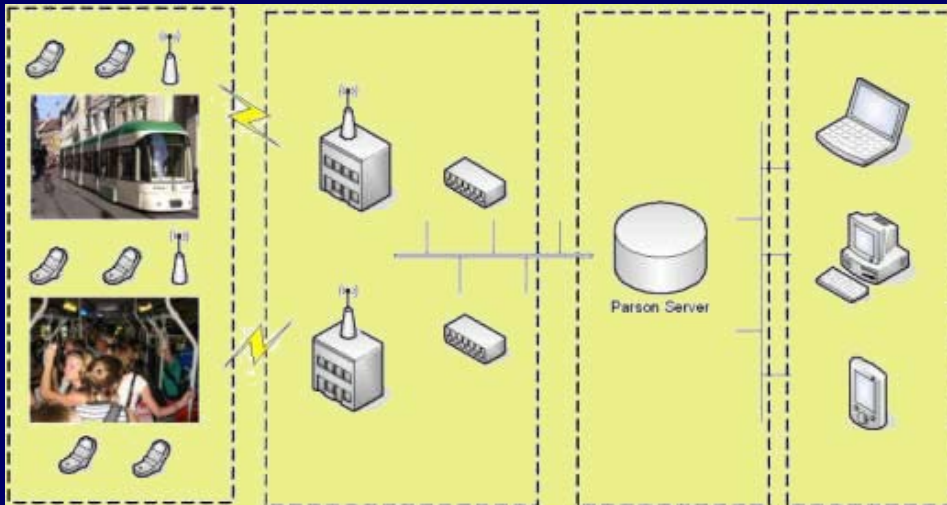
Platform 1



Platform 4



Passenger origin-destination data are of major importance for passenger modeling and simulation



Tracking bluetooth interfaces in mobile phones is one way to get origin-destination passenger data

Timetable Data

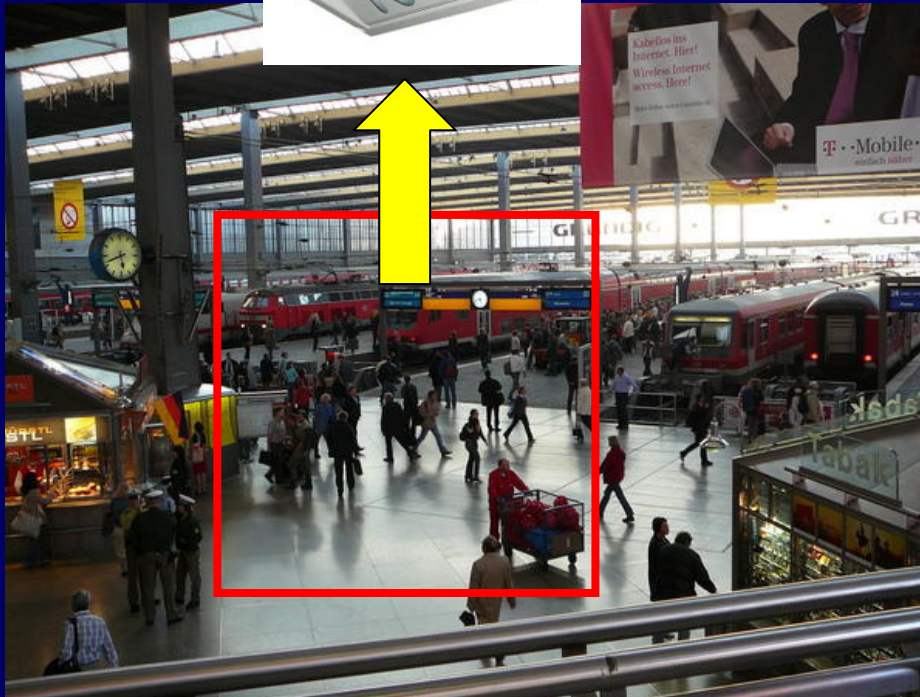
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<!-- edited with OpenTrack (http://www.opentrack.ch) -->
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- <train trainID="FR35000" intervalGroupID="FR35000" trainNumber="FR35000" remarks="Demo" type="pl
- <timetableentries>
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</train>
- <train trainID="FR35001" intervalGroupID="FR35001" trainNumber="FR35001" remarks="Demo" type="pl
- <timetableentries>
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  <composition co
</entry>
<entry posID="ST
<entry posID="ST
<entry posID="ST
<entry posID="ST
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</train>
```

➔ Planned or simulated timetable data of railway, metro or bus operations

➔ Standardized formats (e.g. RailML or others)



Passenger Counting Devices inside Stations



➔ Automatic passenger counting at selected locations in railway stations

➔ Standard formats (.txt or .csv) for easy import

Automatic Onboard Passenger Counting Systems

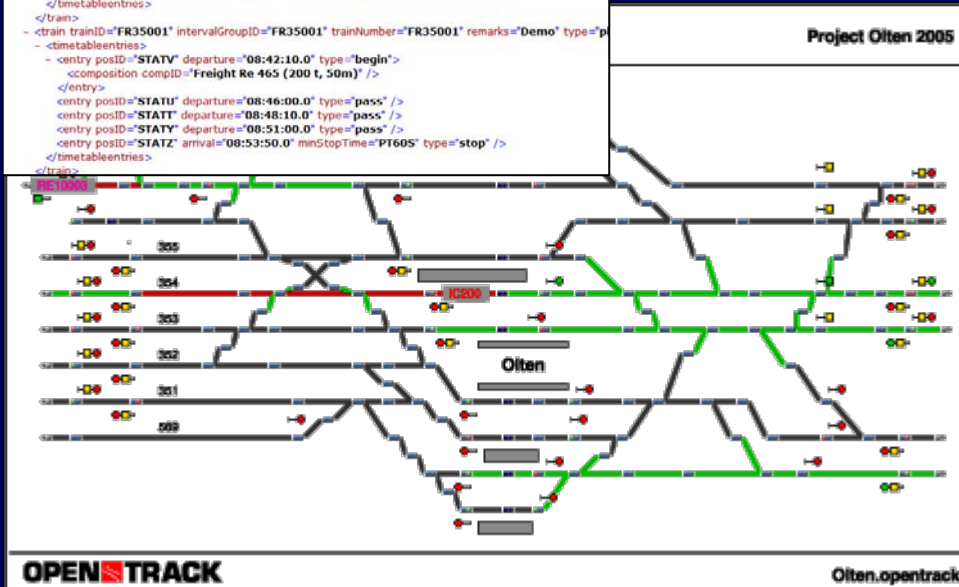


➔ Passenger counting onboard depending on train composition and timetable

➔ Combination with route choice data = number of passengers per origin-destination relation

Integration With Railway Network Simulation Data

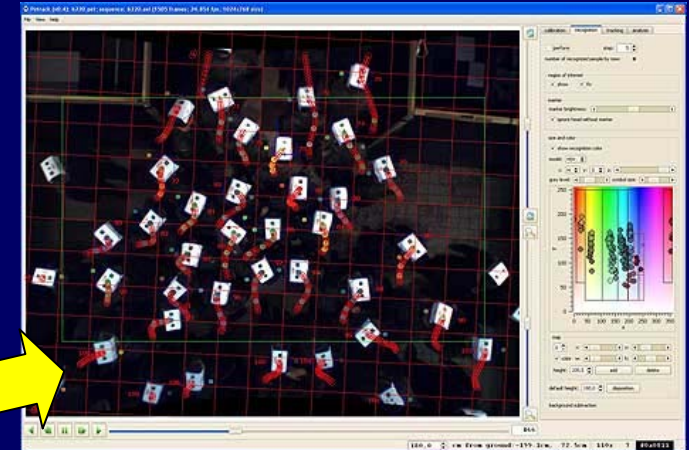
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<!-- edited with OpenTrack (http://www.opentrack.ch) -->
<!-- crainl xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-instance" xsi:namespaceSchemaLocation
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      <entry posID="STATU" arrival="08:29:55.0" departure="08:37:50.0" type="pass" />
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➔ Simulation analysis of railway infrastructures, e.g. regarding capacity of lines and stations

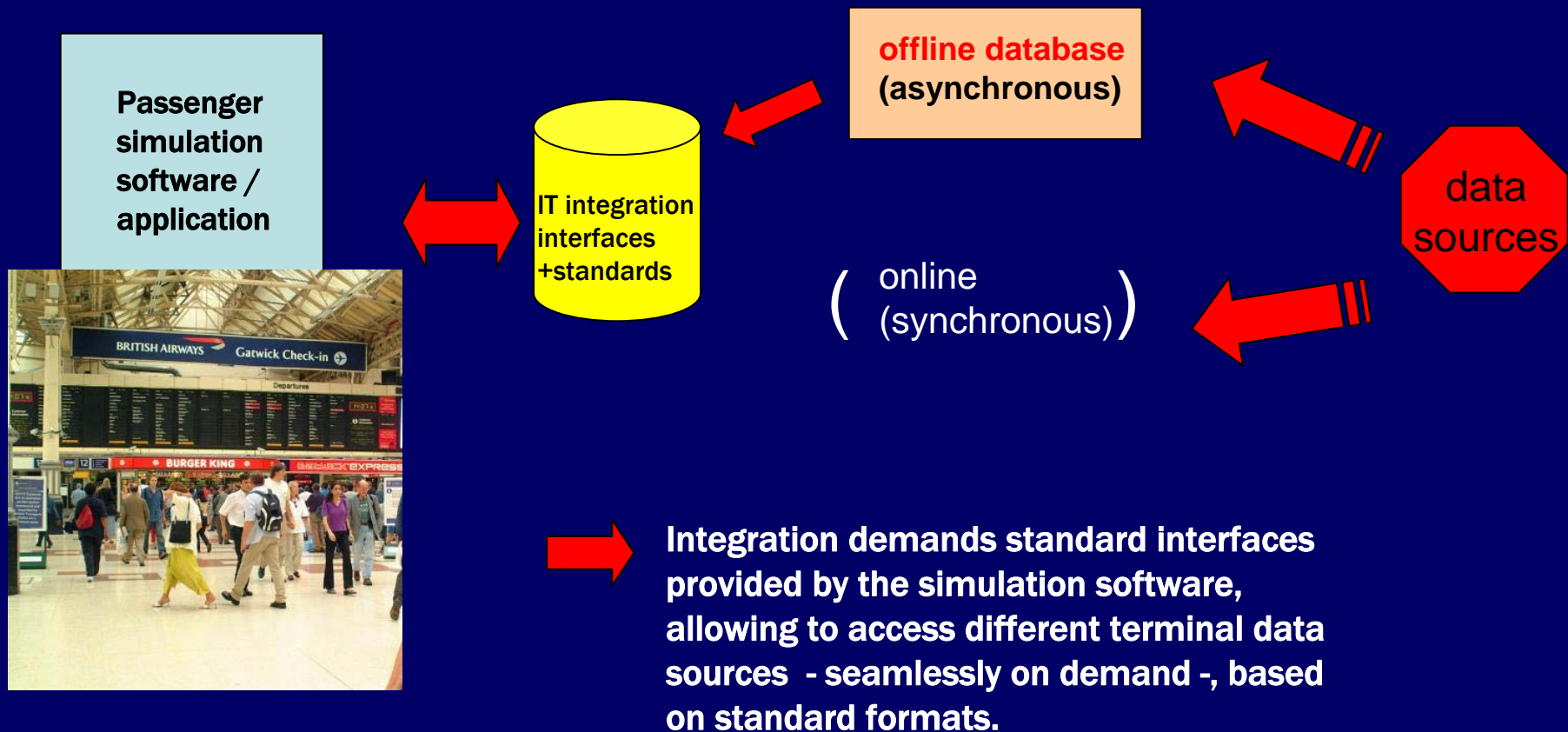
➔ Integration for example of planned and simulated arrival / departure data of specific terminals

CCTV Video Data



Integration and analysis of CCTV data for validation = is the simulation valid in representing passenger flows in terminals?

How does Passenger Simulation Integration work?

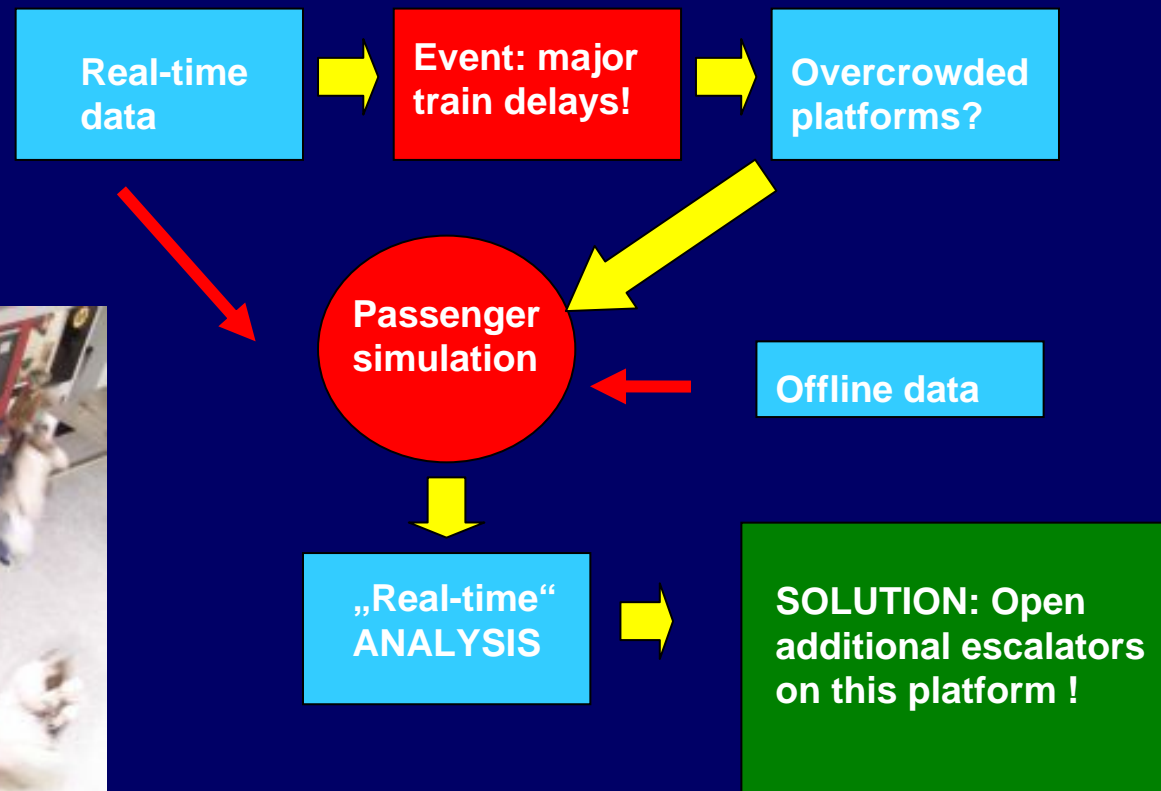


Benefits of Passenger Simulation Integration



- ➔ **Higher reliability and validity of simulation results based on better data !**
- ➔ **Allows to better integrate passenger simulation into terminal operations and management !**
- ➔ **Increased flexibility in time – simulations can be set up faster because of integration !**
- ➔ **Passenger simulation as effective and efficient routine operation in terminal management**

Real-Time Simulation Systems – the Future of Passenger Simulation



**Thank you for your interest
and your questions !**