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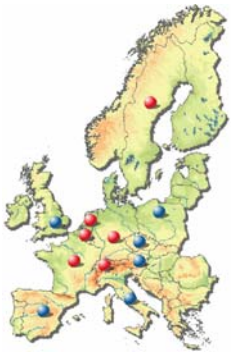
Traffic Microsimulation with VISSIM

PTV Asia-Pacific
19 September 2007

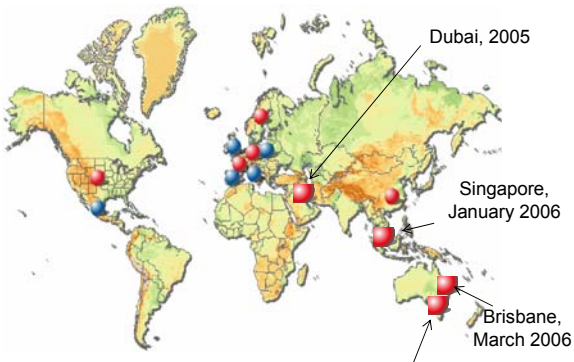
traffic mobility logistics.

PTV International Branches and Partners

Europe



World-wide



PTV Group
Partner

PTV VISION is used by
1300+ clients in 80 countries

Outline

Key Clients

Recent and Upcoming Enhancements of VISSIM

> VISSIM4
> VISSIM5 – release date 1 October 2007
> VISSIM5.1 – within 6 months

Example Applications

> International Applications – Singapore
> International Applications – Hong Kong
> International Applications – London
> International Applications – North America
> Applications in Melbourne (Doug Harley)

New Focus Areas

> Pedestrian/Passenger Crowding
> Ports and Airports
> Emissions – Transport Services and Facilities

VISSIM: Key Clients

Asia-Pacific Region:

1. **Singapore Land Transport Authority**
2. **Airport Authority of Hong Kong**
3. **Hong Kong International Terminals (HIT)**
4. **Macau DSSOPT**
5. **Beijing City Planning Institute**
6. **City of Shanghai**
7. **City of Seoul**
8. **Thailand Office of Transport & Traffic Policy**
9. **Metro Manila Development Authority**
10. **New South Wales RTA, Australia**
11. **VicRoads, Australia**
12. **Queensland Transport, Australia**

Worldwide:

1.Transport for London

2.New York State and Washington State DoTs

3.National Railways of Austria, Denmark, France and Germany

4.Planning authorities of Dubai, Qatar and Bahrain

5.More than 100 cities and regions in Europe including Berlin, Madrid, Milan, Munich, Venice, Warsaw, Zurich

6.BMW, Daimler Chrysler, Ford

7.TOTAL 1300 users worldwide

Recent Developments of VISSIM

- **VISSIM4.0, 4.1, 4.2 (2005/2006)**
  - New GUI and graphical controls
  - COM Interface
  - Parking model
  - 3-dimensional signal heads and signage
  - Parallel VISSIM and 64-bit version

- **VISSIM4.3 (March 2007)**
  - VISSIM Analyser
  - Conflict Areas
  - Animated 3D objects
  - Export to Studio 3D Max

Upcoming Developments of VISSIM

VISSIM5.0 (October 2007)

New VISUM Interface
Fully integrated import and update of network description, O-D demand and assignment paths.

VISSIM5.1 (early 2008)

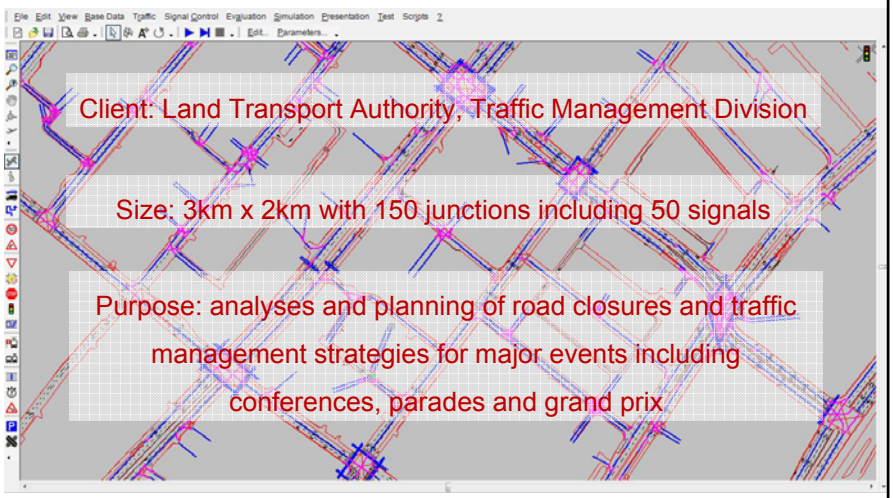
Multi-threading
The multi-threading feature will enable VISSIM to run faster on multi-core and multi-processor computers. As opposed to the parallel computing version, all instances share the same data in memory and therefore no data transmission between them is needed.

Pedestrian/Passenger Simulation
Simulation of multi-dimensional objects. VISSIM will no longer be limited to linear movements along links. Multi-sided and irregular polygons will form the limits of the navigable area. Obstructions such as barriers and columns can be inserted as obstructions The new functionality will be released in several stages.

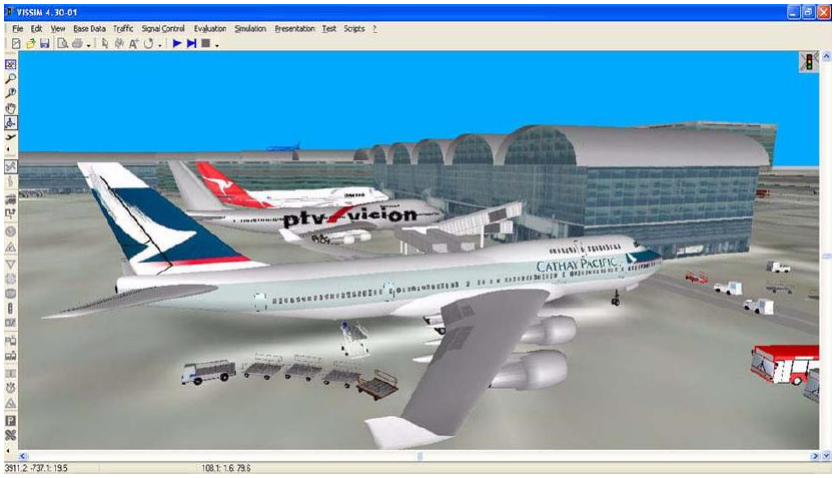
Dynamic Assignment Enhancements
The overall objective of this working package is to make it easier for the user to achieve a converged assignment. This includes more statistical criteria for assessing the convergence and to measure how close to equilibrium the solution is.

Graphics Enhancements
A smart map in 2D and the ability to have more than one view on the network in 2D and 3D.

Example VISSIM Applications – Singapore



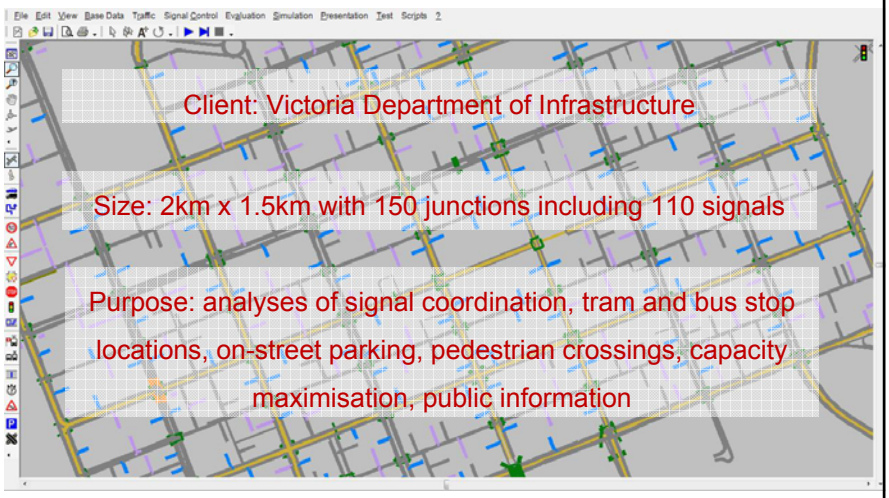
Example VISSIM Applications – Hong Kong



Example VISSIM Applications – London

Example VISSIM Applications – North America

Case Study: Melbourne CBD



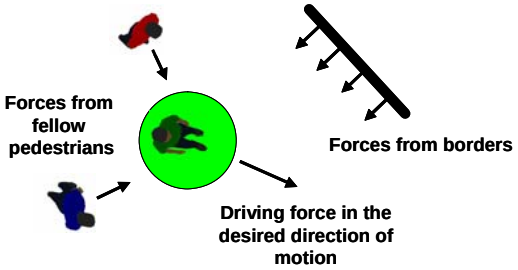
Pedestrians in VISSIM

- Pedestrians have always been in VISSIM as an important aspect in junction modelling
- A simple behavior model was sufficient for these applications
- pedestrian flows play a more important role in other situations:
  - bus terminals
  - railway and underground stations
  - airports
  - buidlings
  - sports stadiums
- For these applications, a more sophisticated behavior model was included in VISSIM : The social force model

The Social-Force-Model

> Developed by Prof. Helbing, University of Dresden

> Each pedestrian is influenced by a number of forces, i.e. repulsive forces from other pedestrians, repulsive forces from borders and a driving force towards the desired direction of motion.



The Social Force Model – some details

> In the Social Force Model, the acceleration (change of velocity) of pedestrian α is composed from a deterministic and a stochastic part.

$$\frac{d\vec{v}_\alpha}{dt} = \vec{f}_\alpha(t) + \vec{\xi}_\alpha(t)$$

> The deterministic part *f* is the sum of…

- …an acceleration toward the preferred velocity,
- …repulsive forces from boundaries,
- …repulsive forces from other pedestrians,
- …attractive forces from other pedestrians.

$$\vec{f}_\alpha(t) = \vec{f}_\alpha^{\,0}(\vec{v}_\alpha) + \vec{f}_{\alpha B}(\vec{r}_\alpha) + \sum_{\beta(\neq\alpha)} \vec{f}_{\alpha\beta}(\vec{r}_\alpha, \vec{v}_\alpha, \vec{r}_\beta, \vec{v}_\beta) + \sum_i \vec{f}_{\alpha i}(\vec{r}_\alpha, \vec{r}_i, t)$$

VISSIM Pedestrian/Passenger Simulation

- **Simulation Parameters**
  - Physical dimensions of pedestrians/passengers
  - Variation in desired speed / desired personal space
  - Temperature, time of day
- **Evacuation Scenarios**
  - Cooperative evacuation
  - Panic situation (can feel the heat)
- **Applications**
  - Stadium – end of event departure – how many exits?
  - Crowding situations (platform edge, service disruption, special event/concert/parade/protest)
  - Design optimisation – station concourse, barriers, etc.
  - Shopping malls – retail exposure

VISSIM Example Application - Munich

VISSIM Example Application – Port Operations

Emissions Modelling with VISSIM