SMART Move
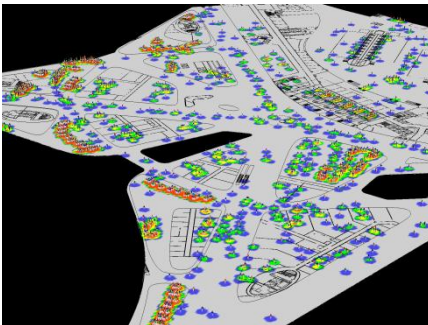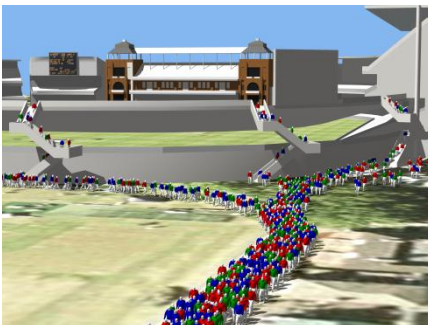## Rapid simulation and optimisation of circulation spaces

Cairo Expo City simulation

Retail footfall at an airport

Lord's Cricket Ground egress validation

London 2012 Media Hub

SMART Move is a visual simulation tool to analyse the flow and interaction between people, spaces, and processes, with a view to optimising them. It brings together the strengths of network modelling and agent-based simulation technologies to offer a fast, flexible and visual tool, with significant functionality for integrated modelling of people, transport, and baggage. Its intuitive drag-and-draw interface, integration with BIM, real-time interaction, and rapid sensitivity analysis capability make it a unique tool for early stage design optioneering as well as operational planning.

SMART Move allows detailed simulation of people movement through a given space. The software is highly scalable and capable of analysis as well as design optimisation of circulation routes through an office floor, school, high rise building, sport stadia and urban spaces alike. The software's static network analysis capability is used for conceptual design and analyses of spaces, while the dynamic simulation capability allows testing of complex interaction of hundreds of thousands of people in scenarios such as day-to-day circulation, mass arrival/exodus, and emergency evacuations.

SMART Move's statistical modelling, sensitivity analysis, and design optimisation capability enables various design variables and management measures to be tested thoroughly to achieve the desired levels of comfort and safety criteria, while minimising costs.

SMART Move capability is complemented by our team's powerful data capturing and analysis methodology for the understanding of population behaviours and movement patterns. We have developed SMART Sensor software that allows rapid analysis of video data to generate statistical information on walking speeds, queuing behaviour, service times, limiting flow rates, etc. This data can be superimposed on a circulation network to obtain visual flow paths and congestion map.

The software, integrated with Rhino, provides fully interactive 3D virtual simulation of the circulation space in operation, making it an invaluable selling tool for the designers and developers to prove the feasibility of the scheme.

The team behind the software is SMART Crowd Flow Solutions – Buro Happold's specialist circulation modelling consultancy service. It therefore benefits from innovations brought out from the team's years of experience on the work on several landmark buildings and projects, including: Ascot Racecourse Redevelopment, London 2012 Media Hub, Makkah Pedestrian Corridor, Cardiff City Capital Square, Liverpool King's Waterfront development, Jeddah Airport Hajj Terminal (Saudi Arabia), DY Patil Management School (India), etc.

Buro Happold SMART Space
Optimising the Interface between People and Places

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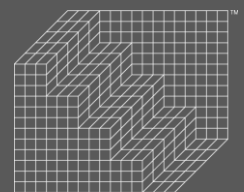
Buro Happold

What is SMART Move?

SMART Move is a visual simulation tool for analysis and optimisation of circulation spaces. It brings together the strengths of network modelling and agent-based simulation technologies to offer a fast, flexible and visual tool, with significant functionality for integrated modelling of people, transport, and baggage. Its integration with 3D CAD, ease of data input, and rapid simulations and design-mode capability make it a unique design optimisation tool.

Key features

- A designer's tool for quick optioneering of multiple design options
- Rapid modelling engine – integration of network modelling and agent-based simulation
- Fully integrated with Rhino 3D (numerous data formats including dwg/3dm/rvt/dgn/3ds/skp/pdf/…)
- Developed and tested at the back of numerous real life case-studies
- Normal circulation as well as evacuation modelling
- Integrated people-baggage-transport modelling
- Rapid simulations of multiple scenarios in batch mode
- Simple, scalable network plus continuous space model
- Intuitive interface
- Direct 3D visual output – no need for post-processing
- Fully extendable to cover complex modelling scenarios.

London City Airport Baggage Hall

Technical background

• **Platform:** Works on Windows platform within Rhino 3D CAD.

▪ **Spatial representation:** Choice of network based or continuous space model

▪ **Population/occupant behaviour:** Individuals or groups, statistical behavioural parameters, customisable features. Easily define occupancies with destinations and itinerary.

▪ **Interactions:** Modelled between individuals as well as with the space/geometry restrictions. Associations between groups can be modelled e.g. people, bags, train, cars, etc.

▪ **Circulation elements modelled:** Internal: lobbies, rooms, corridors, doors, ramps, stairs, escalators, lifts. External: pedestrian streets, high streets, car parks, bus stops, junctions, etc.

▪ **Static analysis:** Rapid, real time analysis of the spatial arrangements for quick comparison of alternatives. Outputs of average footfalls, density maps, mean distance maps, etc.

▪ **Dynamic simulations:** Agent based simulation with live visualisations of movements in 2D/3D, density maps, waiting times, etc. Can be run in batch mode.

▪ **Outputs:** Live visualisation of 2D/3D movements, static analysis results, heat maps of densities/conflicts/journey times, optimum widths, live simulation graphs, reports.

▪ **Multi-discipline interactions:** Modelling of interaction of people with traffic, trains, baggage, trolleys, components. Security and fire scenarios. Modelling of pre-movement times, exit route choice, holding capacities and deference behaviour at stairs.

• **Validations:** Ongoing validations and verifications. Significant validations on a number of airport, rail, airport, education, urban, and office modelling projects.