



## EVACUATION MODELLING

The life safety of building occupants is a primary concern in Fire Engineering and the manner in which occupants evacuate a building can have a significant effect on the outcome of an emergency situation. As such, it is an important part of fire engineering design to understand how people move in a particular building and ensure that occupants are afforded an adequate level of safety while evacuating a building.

Modelling the movements of individuals and groups of people in buildings is a complex problem with many influencing factors including age, gender, physical size and social interactions. In the most simple of cases, many rudimentary assumptions can be made to simplify the problem, permitting the use of hand calculation and spreadsheet based correlations to yield occupant movement and queuing times. For more complex buildings, or instances involving movements of large crowds, Holmes Fire is able to implement computer based evacuation simulation models to gain insight into the efficacy of an egress system.

These computer based models - such as STEPS and Pathfinder - utilise agent based molecular dynamics to model the movement of individual occupants within a building, around obstacles and towards exits. Each person in the model has individual attributes - such as size, walking speed, building familiarity and preferred exit path. The algorithms also account for social interactions - such as slowing of travel speed in high

density crowds, the formation of small groups that stay together and children tending to remain close to parents.

Some of these models can also be coupled with CFD programs, such that the predicted smoke movements influence the exit paths that occupants choose. By utilising these tools to predict occupant movement times and patterns, Holmes Fire is able to ensure adequate levels of occupant safety are maintained in buildings incorporating extended travel distances, reduced egress widths, reduced smoke exhaust and many other non-compliances with the Deemed-to-Satisfy Provisions of the BCA.

Egress modelling can also rationalise the design of high risk buildings such as hospitals, childcare centres, shopping centres and high rise buildings. The software can also be utilised to optimise non-emergency pedestrian flows in high traffic buildings - such as transport terminals, stadiums and concert halls.

