

**NEWS RELEASE 11TH NOVEMBER 2013**  
**SCIENTISTS LAUNCH WORLD'S FIRST EVACUATION SOFTWARE TO SIMULATE**  
**REALISTIC HUMAN BEHAVIOUR ASSOCIATED WITH LIFT EVACUATION**

Scientists at the Fire Safety Engineering Group of the University of Greenwich have released the next generation of the world's most advanced evacuation and crowd simulation software, buildingEXODUS. Version 6.0 incorporates capabilities to simulate human behaviour associated with the use of lifts/elevators for both evacuation and circulation. This new capability is based on data collected from an international survey involving 468 people from 23 countries, which revealed that in the event of an emergency people are less willing to wait for a lift than previously assumed.

The software enables building engineers to perform realistic desk top simulations of people in both normal and emergency conditions. The software simulates not only how individual people interact with each other and the built environment, but also how they are debilitated by hazards such as heat, smoke and toxic gases. To simulate these complex relationships, the software uses sophisticated rule based systems to control the interaction of five advanced sub models. The software draws extensively on data and experience captured from experiments, real life incidents and international surveys. For example, the human behaviour submodel includes rules governing the behaviour of people interacting with smoke in fire situations; how people interact with wayfinding signage; and how people select whether to use a lift/elevator or an adjacent stair. The arrival of this level of sophistication on the desk top means that the building engineer can test more designs in less time to reach the optimal solution, free from costly and unrealistic assumptions.

*"buildingEXODUS Version 6.0 provides building engineers with a sophisticated and powerful analysis tool to simulate and analyse crowd circulation and evacuation," says Professor Ed Galea, Director of the University's Fire Safety Engineering Group and developer of buildingEXODUS. "The capability to simulate the use of lifts for evacuation provides safety engineers with an unrivalled ability to simulate every conceivable evacuation scenario in 21<sup>st</sup> century buildings. Unlike other models, the buildingEXODUS lift model not only considers the kinematics of lift movement, it also takes into consideration human behaviour in using lifts such as the willingness for people to wait for a lift in a crowded environment during an emergency. These new capabilities represent a quantum leap in the sophistication offered by buildingEXODUS, and will help to maintain the software as one of the most advanced crowd simulation packages available."*

The new release, Version 6.0, incorporates significant new modelling features allowing for the first time the simulation of evacuation and circulation in buildings using lifts/elevators. The new features include:

- **Lift/Elevator Model:** A lift/elevator model has been added to buildingEXODUS to enable lifts within structures to be accurately represented for both evacuation and circulation scenarios. The model requires a set of lift attributes (i.e. dimensions, capacity, kinematics, dwell time, door opening/closing times, etc.) to be specified and human behaviour characteristics and lift dispatch commands both of which are dependent on whether an evacuation or circulation scenario is being simulated.
  - **For Evacuation Scenarios:** Three types of lift floor sequences are available enabling the specification of virtually any type of lift evacuation strategy; Floor Sequence, Shuttle Floor Sequence and Sky Lobby Sequence. There is also a range of human behaviour attributes to specify such as the percentage of the population likely to use the lift, probability distribution for lift wait times and probability distribution for acceptable population lift wait area population density. Default values based on an FSEG international lift evacuation study are specified for these attributes.
  - **For Circulation Scenarios:** A lift dispatch algorithm based on the Estimated Time To Destination, utilising the Closs rules is implemented which determines the optimal lift to dispatch following a floor call. Agents wait for the lift until it arrives. Using this algorithm it is possible to simulate the normal circulation within a building, including how the population make use of lifts.

- **Lift Itineraries:** Two new itineraries have been created (i.e. Lift Bank and Lift Wait) to enable agents to interact with lifts. These itineraries enable not only the use of lifts but also control the behaviour of agents when waiting for a lift or their desire to redirect from the lift due to either excessive wait times or congestion within the lift waiting area.
- **Integrated OpenGL 3D View (Levels B and C only):** Enables a rudimentary three dimensional representation of the geometry to be viewed directly from within buildingEXODUS during runtime.
- **Multithreaded:** buildingEXODUS is now multithreaded, reducing run times for large jobs, making an already fast model even faster.
- **User Interface:** The interface now has a tabbed menu bar allowing the user to more rapidly switch between operation modes. There are also a range of new menus and dialogue boxes associated with the use of lifts.
- **Output:** A range of new output variables have been defined to measure the performance of agents using lifts such as the number of agents to use lifts, number of lift journeys, distance travelled using lifts, etc. askEXODUS has been expanded to accommodate lift data and the buildingEXODUS to vrEXODUS has been modified to enable agent movement between floors to be represented.

The sophistication of buildingEXODUS has made it one of the World's leading design tools for simulating evacuation from buildings. Since its launch in October 1996, the package has been used by engineering consultancies, architects, research laboratories, regulatory authorities, police forces, fire brigades and universities in 38 countries: Austria, Australia, Belgium, Brazil, Canada, China, Croatia, Czech Republic, Denmark, Finland, France, Germany, Hong Kong, Iceland, Indonesia, Ireland, Italy, Israel, Japan, Korea, Lithuania, Luxembourg, Malaysia, Netherlands, Poland, Portugal, Singapore, Saudi Arabia, Slovakia, Spain, South Africa, Sweden, Switzerland, Taiwan, Thailand, Turkey, UK and the USA. The package has been used to model the evacuation capabilities of a wide range of proposed or existing buildings and crowd situations, from the Love Parade disaster analysis to the Beijing Olympics, from the 911 WTC investigation to the Statue of Liberty redevelopment. The software is used in design analysis for underground stations, high-rise buildings, hospitals, shopping complexes, school buildings, museums, theatres, airport terminals, sports stadia, external crowd events – virtually any type of situation involving the gathering or movement of people.

**Contact:**

**Prof Ed Galea Phone: +44 (0)20 8331 8730**

**Fire Safety Engineering Group Fax: +44 (0)20 8331 8925**

**University of Greenwich email: [e.r.galea@greenwich.ac.uk](mailto:e.r.galea@greenwich.ac.uk)**

**30 Park Row WWW: <http://fseg.gre.ac.uk>**

**Greenwich SE10 9LS**

**UK**