

TABLE OF CONTENTS

KEYNOTES

Burning Down the Silos: Integrating New Perspectives from Social Science Research
Erica Kuligowski, NIST, USA001

Virtual Reality Experiments - The future or a dead end?
Daniel Nilsson, Lund University, Sweden and Max Kinatered, Brown University, USA013

CONCEPTUAL MODELLING (DECISION MAKING)

Human Behaviour in Fire – Model Development and Application
Steve Gwynne, NRCC, Canada, E Kuligowski, NIST, USA and M Kinsey, Arup, UK.....023

Assessment of the New Zealand Verification Method Pre-travel Scenarios using the Evacuation Decision Model
Elisa Retana Rodriguez, Holmes Fire, USA and M Spearpoint, University of Canterbury, New Zealand035

A Simple Decision Model for Managing the Movement of Building Occupants during Fire Emergencies
Norman Groner, John Jay College of Criminal Justice, City University of New York, USA047

Designing an Event Feedback System Integrated into Collective Activity
Christelle Casse, S Caroly, Grenoble University and M Tesson, C William, CETU, France057

NOVEL APPROACHES TO HUMAN BEHAVIOUR RELATED RESEARCH

Using Infra-Red Technology to Track People Moving in the Built Environment – Accuracy of Automatically Measuring Walking Speed and Crowd Congestion
Robert Brown, Memorial University, Canada and E Galea, S Deere, L Filippidis, University of Greenwich, UK067

Estimating the Number of People in Buildings with Data from Ventilation Systems
Emma Ingmarsson, Ida Pettersson, D Nilsson, Lund University, Sweden and D Purser, Hartford Environmental Research, UK079

Influence of Passive Bystanders on Human Behavior in a Virtual Road Tunnel Fire
Max Kinatered, Brown University, USA, D Groner, S Buld, P Gast, M Jost, M Nehfischer, M Müller, A Mühlberger, P Pauli, University of Würzburg, Germany.....091

EVACUATION FLOW DYNAMICS

Characteristics of Evacuation Behavior Based on Observation of a Total Evacuation Drill in a High-Rise Building
Tomonori Sano, Waseda University, M Yajima, NTT Docomo Inc, H Kadokura, Tokyo Research Institute and A Sekizawa, Tokyo University of Science, Japan097

Investigation of Occupant Behaviours and Movement on Stairs
Camille Levy, Arup Group Ltd, J Pierce, A Porter, Jensen Hughes Inc, A da Vitoria, Savannah River Nuclear Solutions LLC and B Meacham, WPI, USA109

Analysis of Crowd Flow Through Doors Merged to a Crowded Corridor
Akihide Jo, Takenaka Corporation, T Sano, Waseda University and Y Ohmiya, Tokyo University of Science, Japan121

The Impact of Security Bollards on Evacuation Flow
Ed Galea, D Cooney, G Sharp, University of Greenwich, UK and S Gwynne, NRCC, Canada131

The Effect of Alcohol Related Impairments on Evacuation Characteristics
Anne Madsen, Marlene Westmose Hansen, A Dederichs, Technical University of Denmark and J Sørensen, Rambøll, Denmark143

Ascending Stair Evacuation – Effects of Fatigue, Walking Speed & Human Behaviour <i>Johan Noren, Briab Brand & Riskingenjörerna AB, M Delin, DeBrand Sverige AB, K Fridolf, SP Technical Research Institute of Sweden/Lund University and K Kuklane, A Halder, K Lundgren, E Ronchi, S Arias, Lund University, Sweden</i>	155
Ascending Evacuation - Walking Speed in Stairs as a Function of Height <i>Mattias Delin, DeBrand Sverige AB, J Noren, Briab Brand & Riskingenjörerna AB, K Fridolf, SP Technical Research Institute of Sweden/Lund University and K Kuklane, A Halder, K Lundgren, S Månsson, Lund University, Sweden</i>	161
Exploring the Biomechanics of Walking and Crowd 'Flow' <i>Peter Thompson, AutoDesk Ltd, UK, D Nilsson, Lund University Sweden, D McGrath, University College Dublin, Ireland and K Boyce and M Molloy, University of Ulster, UK</i>	173
EVACUATION MODELLING – VALIDATION AND APPLICATION	
Uncertainties in Evacuation Modelling: Current Flaws and Future Improvements <i>Rodrigo Machado Tavares, CH2M Fire Safety Team, UK and E Ronchi, Lund University, Sweden</i>	185
People Movement Study of Large Airport – Data Generation, Flow Dynamics and Coupled Analysis <i>Steve Strege, Simon Goodhead, Jensen Hughes, USA</i>	197
Proposal of Elements and Methods of Validation and Calibration in the Context of Architectural Fire Evacuation Design; Through the Validation and Calibration of a Multi-Agent Evacuation Simulator Simtread <i>Yoshikazu Minegishi, N Takeichi, A Jo, Takenaka Corporation, Y Yoshida, Yoshida Safe Design Laboratory, T Sano, Waseda University and T Kimura, A&A Co Ltd, Japan</i>	209
The Simulation of Urban-Scale Evacuation Scenarios: Swinley Forest Fire <i>Anand Veeraswamy, E Galea, L Filippidis, P Lawrence, University of Greenwich and R Gazzard, Forestry Commission England, UK</i>	221
Collection and Use of Data from School Egress Trials <i>Enrico Ronchi, Lund University, Sweden, A Cuesta, University of Cantabria, Spain, and S Gwynne, NRCC, Canada</i>	233
MEANS OF EGRESS – ACCESSIBLE FOR ALL?	
Refuge Floors – History, Implementation and Methods for Improvement <i>David Barber, Arup, USA and P Johnson, Arup, Australia</i>	245
To Areas of Refuge and Beyond: Proposals for Improving Egressibility for the Disabled. A Case Study in Italy <i>Elisabetta Carattin, Arup Fire, UK / IUAV University of Venice, Italy and V Tatano, IUAV University of Venice, Italy</i>	257
Attitudes about Safe Refuge Areas as an Egress Strategy from the Point of View of the Mobility Impaired People, Authorities and Building Planners <i>Kristin Andree, H Frantzich, Lund University and S Bengtson, A Jönsson, Brandskyddslaget, Sweden</i>	269
Accessible Emergency Egress – Mapping of New Zealand Guidance and Community Experiences <i>Amanda Robbins, K Calder, Jensen Hughes Consulting Canada Ltd, Canada, J Warren, Warren and Associates and C Wade, Branz Ltd, New Zealand</i>	281

WAY FINDING IN COMPLEX ENVIRONMENTS

- A Wayfinding Experiment in a Multiple-Floor Complex Building Focused in Fire Routes and Fire Exits
Rosaria Ono, K Moreira, T Leivas, G Camanho, University of Sao Paulo, Brazil293
- Active Dynamic Signage System: A Full-Scale Evacuation Trial
Ed Galea, H Xie, D Cooney, L Filippidis, University of Greenwich, UK.....303
- Smart Evacuation Guiding Systems and Evaluation
Wallace Zhong, Red Fire Engineers and Y He, University of Western Sydney, Australia315
- Knowledge- and Perception-Based Route Choice Modeling for Evacuation in Case of Fire
Benjamin Schröder, D Haensel, M Chraibi, L Arnold, A Seyfried, Jülich Supercomputing Centre and E Andresen, Bergische Universität Wuppertal, Germany327

CULTURE INFLUENCES ON BEHAVIOUR

- The Effects of Cultural Differences between Teachers and Pupils in the USA and Saudi Arabia on Emergency Evacuation – Analysis of Fire Alarm Perception and Training
Majed Almejmaj, BuroHappold Engineering/WPI and J Skorinko, B Meacham WPI, USA..... 339
- Investigating the Impact of Culture on Evacuation Response Behaviour
Ed Galea, M Sauter, S Deere, L Filippidis, University of Greenwich, UK351
- Response to Emergency Way-finding Systems by People from Different Cultures
Jorge Troncoso, Lund University, Sweden/Extintores Batallon 40 SRL. Lambare, Paraguay and D Nilsson, E Ronchi, Lund University, Sweden361

UNDERSTANDING RESPONSE BEHAVIOUR

- A Study of Human Behaviour during Evacuation of Licensed Premises
Karen Boyce, N McConnell, J Shields, University of Ulster, UK.....373
- A Study of Response Behaviour in a Theatre during a Live Performance
Ed Galea, C Hopkin, S Deere, University of Greenwich, UK385
- A New Approach to Measure the Collective Behavior During Evacuation
Arturo Cuesta, O Abreu, D Alvear, University of Cantabria, Spain399
- A Mixed-Ordered Approach to Investigate Correlations Among Different Affordances in Fire Evacuation
Ruggiero Lovreglio, Politecnico de Bari, Italy and E Ronchi, D Nilsson, Lund University, Sweden409

HUMAN BEHAVIOUR IN DWELLINGS

- Human Behavior in Non-Injury Accidental Residential Fires
Lin Xiong, D Bruck, M Ball, Victoria University, Australia421
- Analysis of Response Behavior of People In Fire Incidents where Residential Fire Alarms Successfully Worked
Ai Sekizawa, M Mizuno, Tokyo University of Science, T Shimadzu, Hochiki Corporation, Y Gomi, T Doi, Tokyo Gas Co and T Suina, Tokyo Fire Department, Japan433
- Fire Alarm Waking Effectiveness for Alcohol Impaired Adults
Ian Thomas, D Bruck, M Ball, Victoria University, Australia443
- Recollection of Flame Height and Smoke Volume in Domestic Fires
Lynn Hulse, E Galea, A Siddiqui, University of Greenwich and D Wales, O Thompson, Kent Fire & Rescue Service, UK453

From Data to Difference – Considering the Application of a Large-Scale Database of Human Behaviour in Accidental Dwelling Fires <i>David Wales, O Thompson, Kent Fire & Rescue Service and L Hulse, E Galea, University of Greenwich, UK</i>	465
---	-----

UNDERSTANDING VULNERABLE POPULATIONS

Real Time, Real Fire, Real Response: An Analysis of Response Behaviour in Housing for Vulnerable People <i>Mike Burroughs, Devon & Somerset Fire & Rescue Service and E Galea, University of Greenwich, UK</i>	477
---	-----

Effects of Pre-Fire Age and Health Status on Vulnerability to Incapacitation and Death from Exposure to Carbon Monoxide and Smoke Irritants in Rosepark Fire Incident Victims <i>David Purser, Hartford Environmental Research, UK</i>	489
---	-----

An Investigation and Analysis of Pre-Movement and Evacuation, Times, Procedures and Behaviours in Irish Health Sector Buildings <i>Catriona MacCallum, P Lennon, R Lennon, Letterkenney Institute of Technology, Ireland</i>	501
---	-----

Impact of Smoke Compartment Size on Horizontal Evacuation Time in Healthcare Facilities <i>Drew Martin, Arup, Mary Long, Jensen Hughes and B Meacham, WPI, USA</i>	513
---	-----

Fire Evacuation of People with Mobility Impairments using Elevators <i>Erica Kuligowski, K Butler, S Furman, NIST, USA</i>	525
---	-----

EGRESS SPEED – INFLUENCING FACTORS

The Relationship between Obstructed and Unobstructed Walking Speed: Results from an Evacuation Experiment in a Smoke Filled Tunnel <i>Karl Fridolf, SP Fire Research and E Ronchi, D Nilsson, H Frantzich, Lund University, Sweden</i>	537
---	-----

Impact of Gender on Egress Speeds <i>Bryan Hoskins, Oklahoma State University, USA</i>	549
---	-----

Effect of Emergency Sign and Illumination on Walking Speed in Smoke-Filled Corridor <i>Kosuke Fujii, National Research Institute of Fire and Disaster, T Sano, Waseda University and Y Ohmiya, Tokyo University of Science, Japan</i>	561
--	-----

Quantifying the Influencing Parameters for Egress in Rail Tunnels: An Attempt to Bridge the Gap between Research and FSE <i>Xavier Deckers, B Van Weyenberge, Fire Engineered Solutions Ghent/ Ghent University and B Merci, Ghent University, Belgium</i>	573
---	-----

PANEL PAPER

Investigating Ethical Attitudes in Human Behaviour in Fire Research <i>Karen Boyce, Ulster University, UK and Daniel Nilsson, Lund University Sweden</i>	585
---	-----

POSTERS

The Importance of Probability in Different Aspects of Human Behaviour in Evacuation Analysis <i>Bart Van Weyenberge, X Deckers, Ghent University/Fire Engineered Solutions Ghent and R Caspeepele, B Merci, Ghent University, Belgium</i>	599
--	-----

User Inputs and their Influence on the Dynamics of Pedestrian Movement in Evacuation Simulations <i>Christian Rogsch, Fire Safety Engineering and R Galster, T Luthardt, D Mohr, Ingenieurbüro Riesener GmbH & Co, Germany</i>	605
---	-----

Occupants with Mobility Impairments and Social Groups in Design Calculations <i>Rainer Könnecke, V Schneider, IST GmbH, Germany</i>	611
--	-----

Standardizing “Agent” Characteristics for Agent Based Pedestrian Egress Modeling <i>Majed Almejmaj, Worcester Polytechnic Institute/BuroHappold Engineering and B Meacham, N Dembsey, M Radzicki, J Skorinko, Worcester Polytechnic Institute, USA</i>	617
A Review of Human Behaviour Assumptions within Standard Fire Design Guidance <i>Michael Kinsey, N Butterworth, N Swailes, T Roberts, D O’Donnell, Arup, UK</i>	623
Modelling the Impact of Sky-Bridges on Total Evacuation in High-Rise Buildings <i>Enrico Ronchi, D Nilsson, Lund University, E Haliti, Sweco Systems AB/Lund University, Sweden</i>	629
Evaluation of Fire Fighters’ Acute Fatigue Based on On-Line Physical Measurement <i>Yukihisa Kuriyama, University of Tokyo and Y Oka, Y Ito, M Enari, Yokohama National University, Japan</i>	635
Management of Refuge Areas – What is the Level of Risk to Individuals using Refuge Areas? <i>Per Bostrom, M Spelmans, D Nilsson, Lund University, Sweden</i>	641
Evaluation of NFPA’s Remembering When™ Program <i>Amanda Kimball, Fire Protection Research Foundation and K Berard-Reed, National Fire Protection Association, USA</i>	645
Architectural Considerations for Egress in Nursing and Long Term Care Homes <i>Jarett Pichler, R Tannahill, J Gales, Carleton University, Canada</i>	649
Determining Research Needs from the Practitioners’ Perspectives <i>Rita Fahy, NFPA and A Kimball, Fire Protection Research Foundation, USA</i>	655
Comparative Study of Walking Speeds of School Children <i>Rosaria Ono, M Valentin and N Mir, Univ of Sao Paulo, Brazil</i>	661
Comparative Study of Evacuation Dynamics using a Lecturer Room <i>Paul Geoerg, A Hofmann, BAM and U Krause, Otto-von-Guericke University, Germany</i>	667
A Parametric Multi-Tool Study to Assess Smoke Management System Performance for an Atrium (Egress Modeling Results) <i>Alberto Alvarez-Rodriguez, Aon Fire Protection Engineering, USA</i>	671
Time Measurements of Moving the Elderly by the Piggyback Ride <i>Jong Hoon Kim, H2K Solution Inc, W-H Kim, Kyungmin College and S-J Woo, E-K Hwang, Korea Institute of Civil Engineering and Building Technology, South Korea</i>	677
LATE PAPER	
Effects of Human Body on Pedestrian Flow Characteristics at Openings <i>Mineko Imanishi, Aachen University, Germany/ Waseda University, Japan and T San , Waseda University, Japan</i>	681
AUTHOR INDEX	693
OUR SPONSORS	695