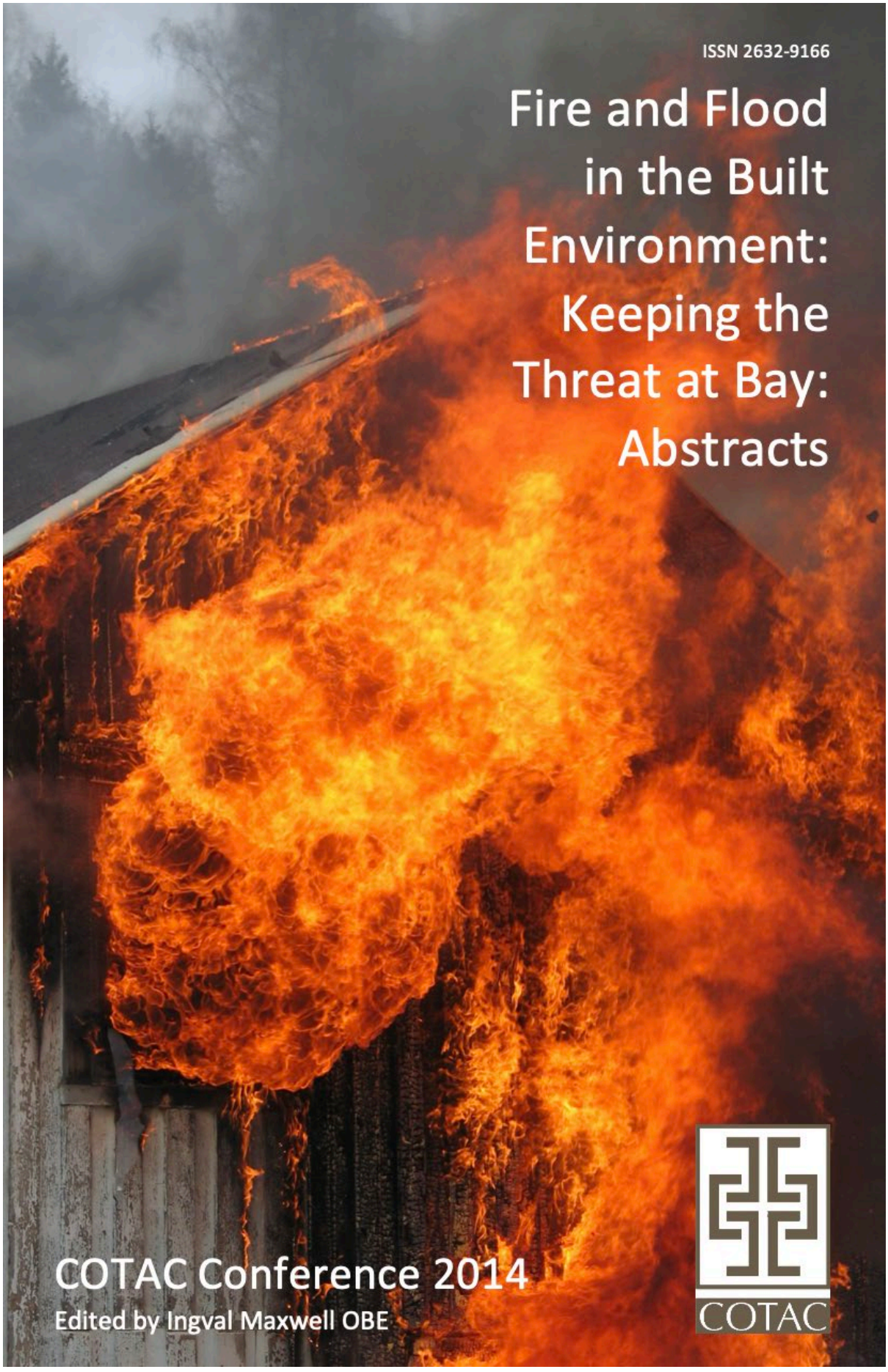

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Fire and Flood in the Built Environment: Keeping the Threat at Bay: Abstracts

COTAC Conference 2014

Edited by Ingval Maxwell OBE

COTAC

Council on Training in Architectural Conservation (COTAC)

COTAC originated in 1959 in response to the need for training resources for practitioners in the repair and conservation of historic churches. Since its inception the Charity has consistently worked to lift standards across the UK's conservation, repair and maintenance (CRM) sector. This has involved working in partnership with national agencies, professional and standard setting bodies, educational establishments and vocational training interests.

Acknowledgments

The Conference was organized by COTAC with support from the British Automatic Sprinkler Association and Alan Baxter Integrated Design. It was sponsored by the Building Crafts College; Henley Business School University of Reading, Historic Scotland and the IHBC, to which COTAC offers thanks.

Thanks are also due to the various conference speakers for the information freely offered through their various presentations which also underpins the abstracts in this report.

Cover illustration: Melhus © Ingval Maxwell

Fire and Flood in the Built Environment: Keeping the Threat at Bay

COTAC Conference: The Gallery, Alan Baxter and Associates, Cowcross Street, London 20 November 2014

Edited by Ingval Maxwell OBE

Conference Summary

The ICOMOS Guidelines on Education and Training are at the heart of COTAC's omnibus approach to improve the standard, education and awareness of those disciplines working in the broad field of building conservation. Through their holistic approach the Guidelines identify the need to read, understand and obtain relevant information about what is being worked on so that appropriate decisions can be taken based on relevant information. But, significantly, paragraph 9 of the Guidelines also indicate that:

> *Training in disaster preparedness and in methods of mitigating damage to cultural property, by strengthening and improving fire prevention and other security measures, should be included in courses.*

There has been no shortage of the number of disastrous situations that have emerged to threaten the integrity of the built historic environment. Many nationally and internationally important buildings have been regularly lost to the effects of fire due to a variety of causes, and the impact of climate change seems to be directly related to the increasing number of flooding incidents that have seriously affected a wide variety of heritage assets.

With regard to fire, the declared aim of UK building codes is for occupant safety, not the built fabric or its contents. Any development from such a prescriptive approach toward an alternative, based on a better understanding of potential threats and their impacts, needs to be encouraged. Building upon recent work, this conference will examine principles and case histories to help designers and users benefit from lessons learnt in consequence of dealing with such experiences. It also aims to combine resultant practices and evolving knowledge to assist in developing associated thoughts in the application of BIM for Conservation (BIM4C).

The conference was aimed at a broad range of owners, managers and practitioners who have to pre-plan for, or deal with, the risk and consequence of fire or flood affecting the build environment. Through attendance, participants gained an understanding of:

- Disaster planning and management
- What work is being carried out in the field
- The range of available technical solutions
- The challenges that have to be addressed

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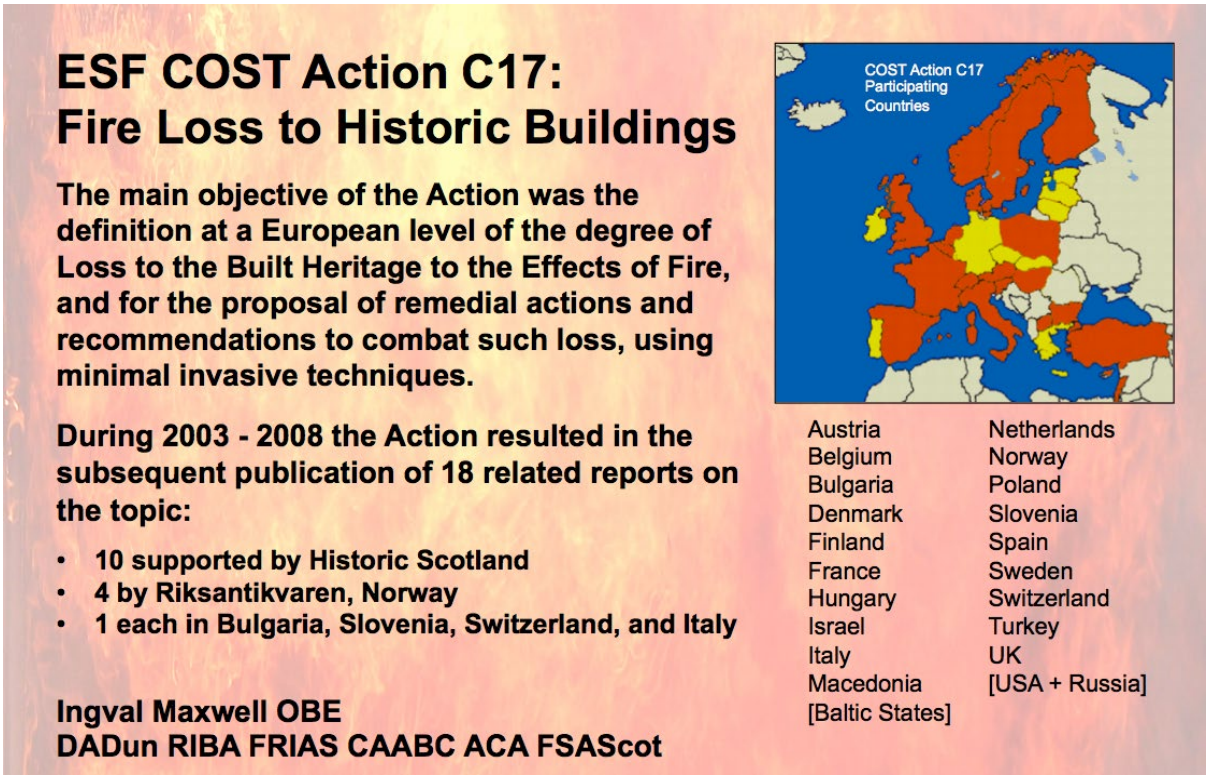
COST Action C17: Fire Loss to Historic Buildings

Ingval Maxwell, Chairman COST Action C17

In addition to the existing serious levels of loss to life and contents, the number, authenticity and quality of European historic buildings is being steadily eroded through the effects of fire. In 1993 this loss was recognised by the Council of Europe Committee of Ministers, who in the *Protection of the Architectural Heritage Against Natural Disasters, Recommendation No R(93)9* recommended that *'governments of the Member States adopt all legislative, administrative, financial, educational and other appropriate measures'* with the aim of reducing the levels of risk. Then, as now, there was a need to balance technological and management solutions in achieving this aim. The full extent of the physical loss by fire to Europe's built heritage is still unknown, although some suspect it to be as high as one important historic building each day.

In December 2002 the *European Science Foundation Co-operation in Science and Technology Urban Heritage* programme *COST Action C17 'Built Heritage: Fire Loss to Historic Buildings'* initiative was established. Its four-year programme involved a wide range of disciplines and professions from 20 countries with corresponding member in the Baltic States, USA and Russia. Its main objective was the definition at a European level of the degree of loss to the built heritage to the effects of fire, and for the proposal of remedial actions and recommendations to combat such loss, using minimal invasive techniques. The programme was managed through a series of 12 working meetings, and a referenced series of 147 original papers were presented and compiled. By 2008 the Action had resulted in the subsequent publication of 18 related reports on the topic. Ten of these were supported or published by Historic Scotland, four by Riksantikvaren, Norway, and one each by authorities in Bulgaria, Slovenia, Switzerland and, subsequently, Italy.



Fire Safety in Heritage Buildings: Providing Guidance in the context of the Built Heritage

Johanna Berntsson-Arje, Area Fire Safety Manager and Head of Heritage
London Fire Brigade

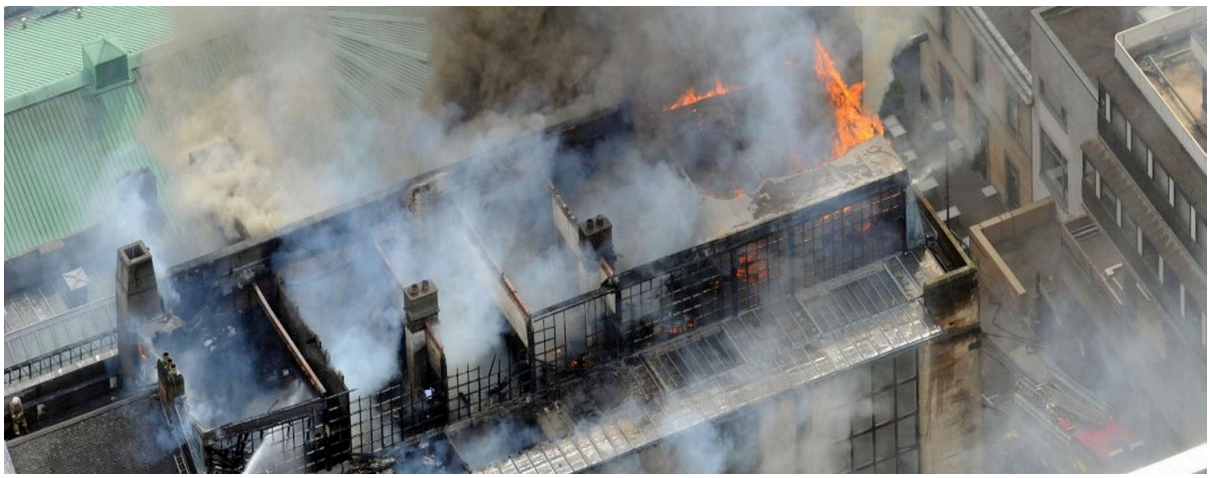
The built heritage and buildings containing valuable collections presents a range of specific fire risks and hazards. The Fire Safety Heritage group in the London Fire Brigade have created two Fire Safety Guidance Notes for best practice how to manage these risks and hazards. The Guidance Notes are aimed towards people who manage the fire safety in listed buildings, and/or buildings with valuable collections, and cover a range of topics including salvage and damage control, fire risk assessment, liaison with the fire service and how to tackle common fire risks in historic buildings.

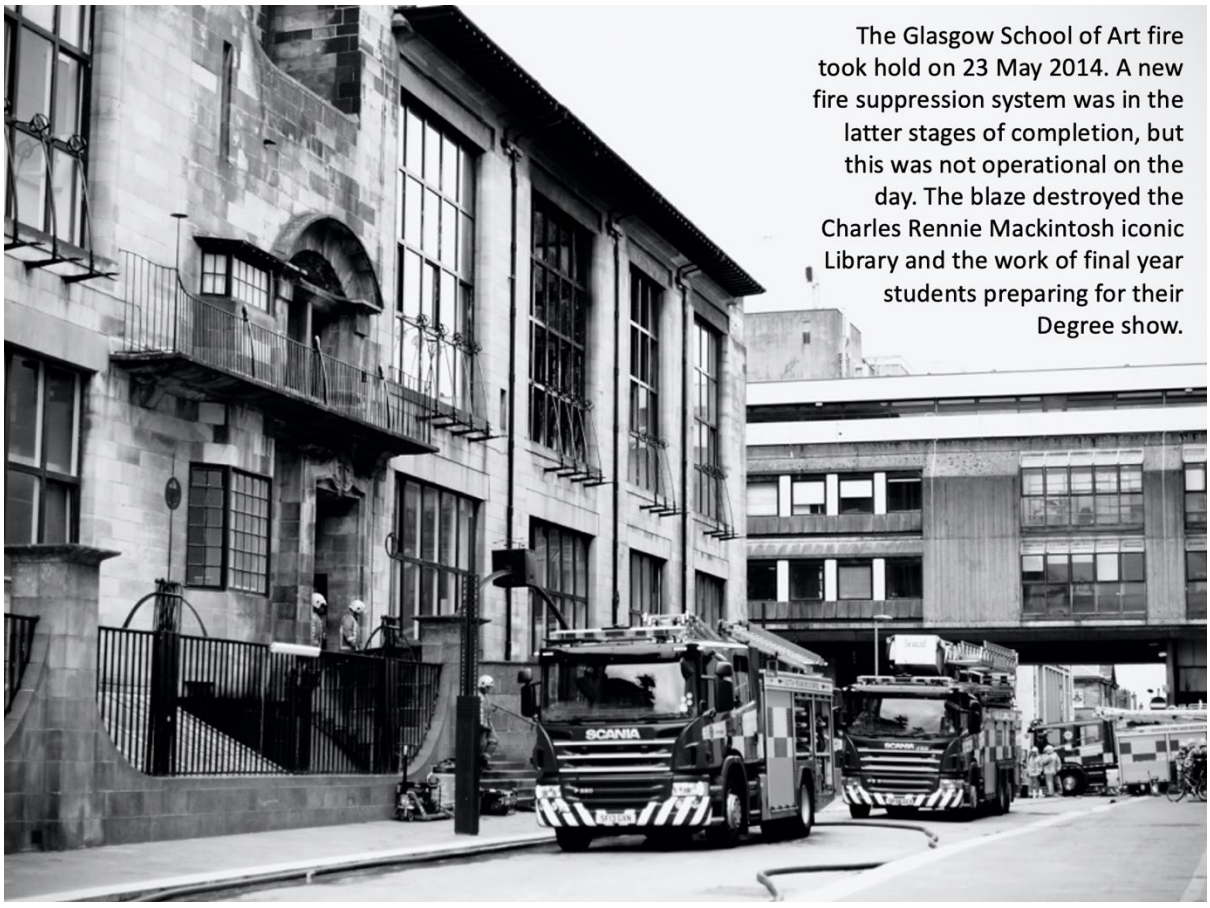
This presentation will provide an overview of what is included in the Guidance Notes as well as providing information of the work that London Fire Brigade do to try and prevent and reduce the impact of fires in historic buildings.

Glasgow School of Art Fire: Lessons Learnt

Dr. David Mitchell, Director of Conservation, Historic Scotland
Chris McGregor, Head of Major Projects, Historic Scotland

The fire at Glasgow School of Art in May 2014 prompted a highly emotive response from the heritage sector and most particularly the broader public. Dr David Mitchell and Chris McGregor of Historic Scotland were on site in the immediate aftermath to assist Glasgow School of Art. They will talk through the challenges, events and successes of the week immediately following the fire.





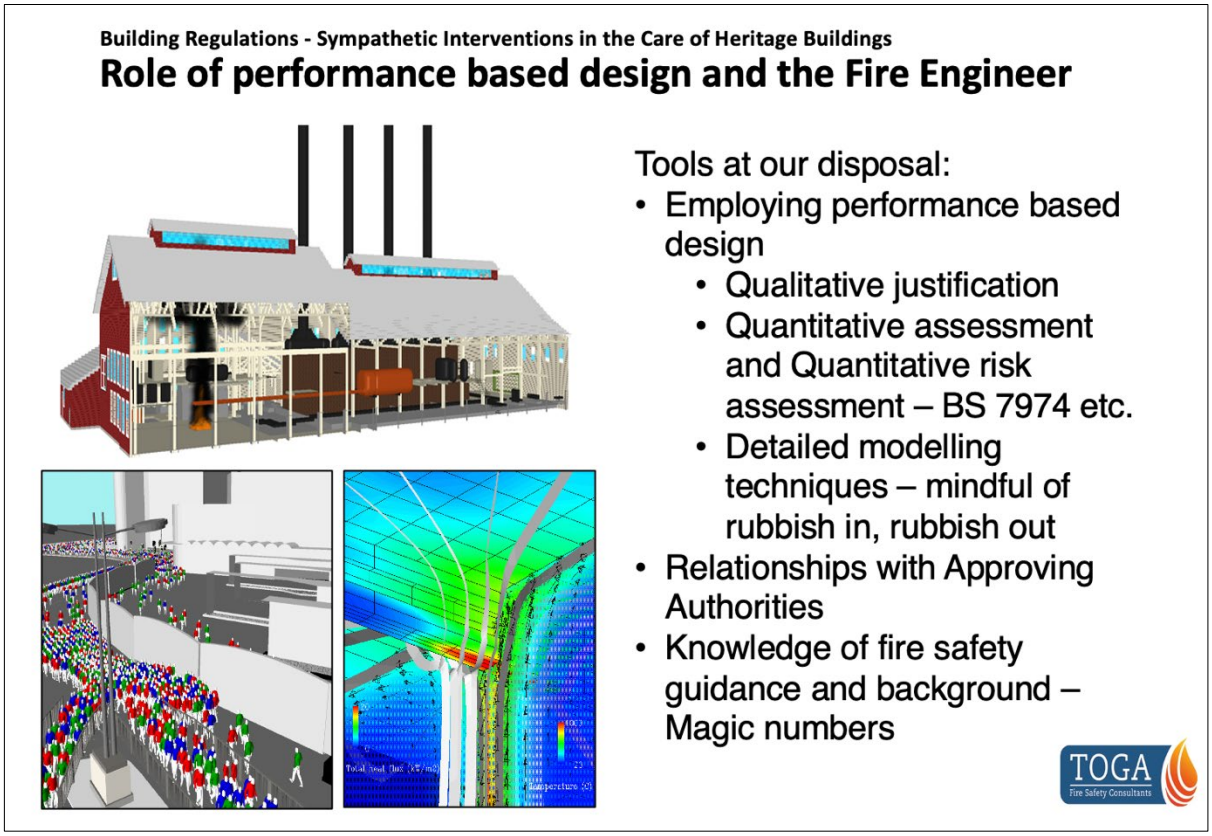
The Glasgow School of Art fire took hold on 23 May 2014. A new fire suppression system was in the latter stages of completion, but this was not operational on the day. The blaze destroyed the Charles Rennie Mackintosh iconic Library and the work of final year students preparing for their Degree show.

Building Regulations: Sympathetic Interventions in the Care of Heritage Buildings

Toby McCorry, TOGA Fire

Refurbishment or re-purposing of our heritage buildings typically imposes the requirements of the Building Regulations to address a 'material alteration' or ' change of use'. Often, the fire safety provisions required to meet current Building Regulations (Part B) and the recommendations of contemporary life safety guidance or Regulatory bodies cannot be achieved without significant intervention or upgrades to the building fabric. This can be at great detriment to the historic and important features of our heritage buildings. Can a resolution be sought that marries a sympathetic and sensitive intervention philosophy with the rigours of modern fire life safety requirements?

The answer is thoughtful and pragmatic fire safety design advice supported by performance based engineering. If applied throughout a project, this approach will play a key role in achieving and demonstrating an appropriate and robust level of life safety whilst preserving the fabric, character and integrity of the building. Though case studies, the legislative requirements of the Building Regulations are explored and examples of the application of fire safety design advice and performance based engineering in heritage buildings will be discussed, together with key lessons learnt.



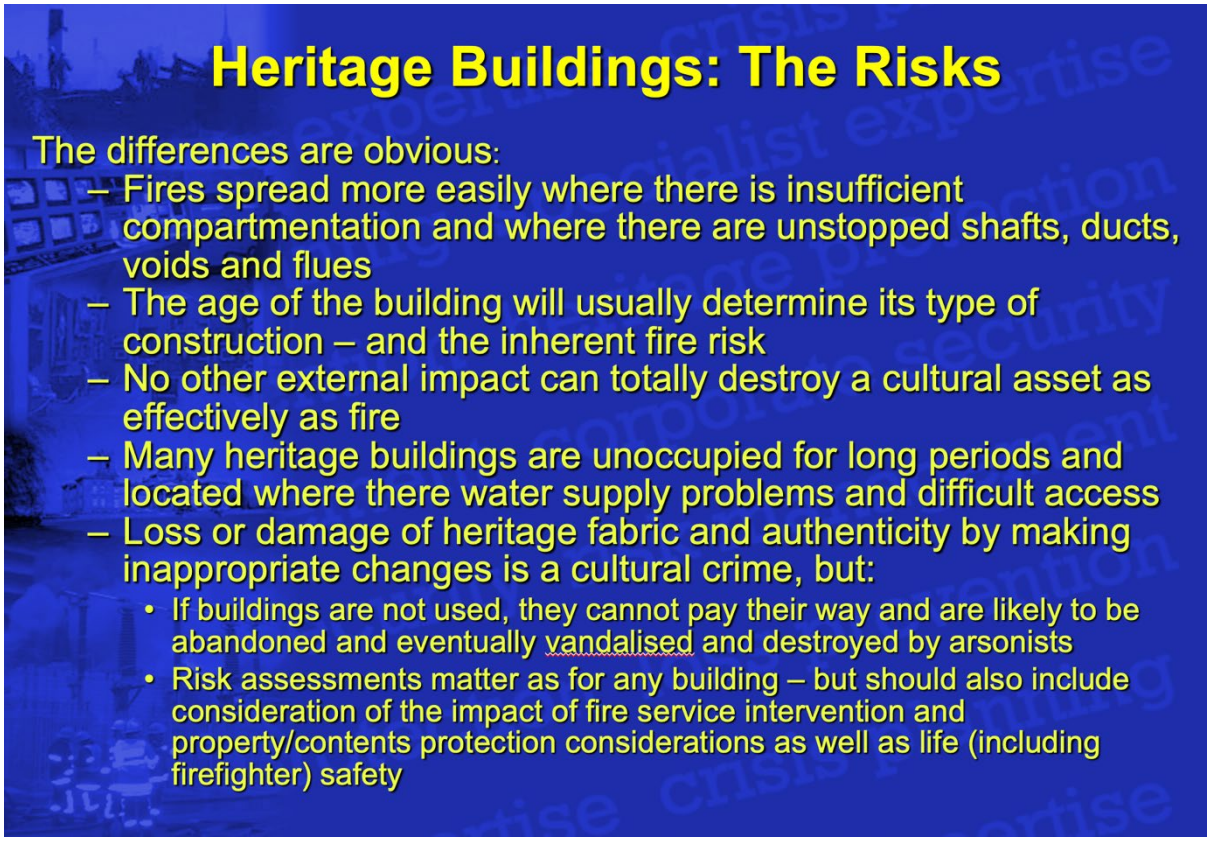
Selection of Fire Suppression Systems for Cultural Resources

Stewart Kidd, Loss Prevention Consultancy Ltd

Fire can cause the total destruction of a building and its contents in only a few hours; areas not directly damaged by flame or heat may be damaged by smoke, dirt and falling debris or by the huge volumes of water which may be used in fighting the fire. One threat, which cannot be over-stressed, is the potential loss of authenticity - which is, after all, the quality from which the importance of the cultural heritage flows.

Following pioneering work in Scotland and the US there is now a greater understanding of the role that modern fire suppression systems can play in mitigating the risks and extent of fire loss in historic and heritage buildings. The proper selection and installation of fire protection can also play significant part in the reduction in the loss of heritage fabric or visual and aesthetic impact which is sometimes called for in adaptive reconstruction as a means of complying with contemporary building standards and fire regulations.

This presentation reviews the available types of fire suppression equipment and by the use of case studies suggests the optimum solutions that can be achieved to satisfy all parties.



Flooding and Historic Buildings

David Pickles, Senior Architect, English Heritage

We know the risk of flooding is likely to increase as a result of a changing climate and increased urbanisation. Many properties which are at a high risk are historic buildings of traditional construction that need particular care if damage is to be minimised from inappropriate property protection measures, the flooding event itself, and subsequent recovery and repair work.

Establishing the flood risk and methods to mitigate damage are emerging areas of expertise. Government policy is increasingly looking to the use of property level protection to emphasise individual and community responsibility, alongside engineered flood alleviation schemes. The talk will focus on the three key areas of resilience, recovery and repair in respect of the risks and vulnerabilities for historic buildings and their contents. It will also discuss areas where a better evidence base is needed to inform future guidance and best practice advice.

Flood risk

- Currently around 560,000 properties are located in areas where there is a high risk of flooding
- Many of these buildings were built before 1919 and are likely to be of historic interest
- The number of properties at high risk of flooding could increase by over 60% to 900,000 by 2035

Flooding: Tirley Church Case Study, Lessons Learnt

Henry Russell, Chair, Gloucester Diocesan Advisory Committee for the Care of Churches

St Michael and All Angels Church sits on the edge of the village of Tirley. It was severely affected by the 2007 floods in Gloucestershire and received national attention when it was featured on the front page of newspapers, pictured in the midst of the surrounding flood-waters. After much work St Michael and All Angels has been restored, with a new organ gallery especially designed with stainless steel columns, and an open worship space.

Flooding and the National Trust Experience

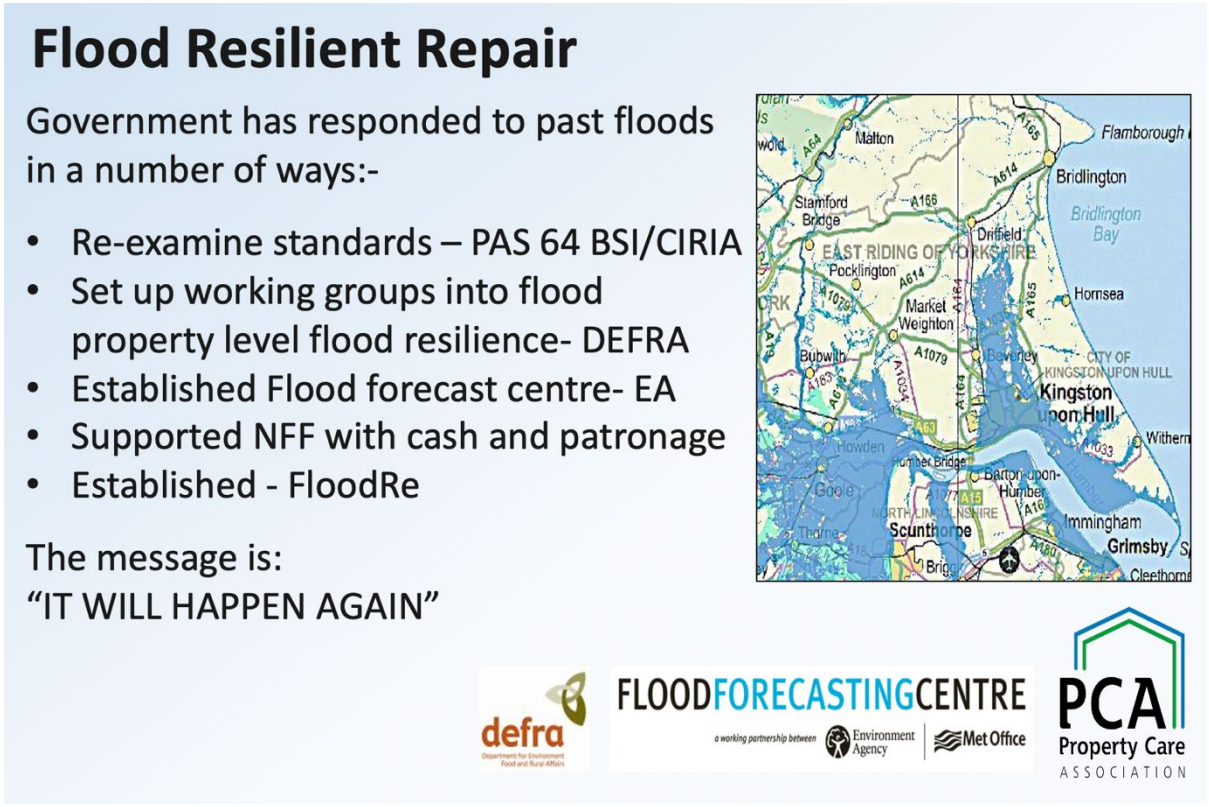
Katy Lithgow, National Trust Head Conservator

Over the past three decades, flooding impacts on historic properties in the care of the National Trust seem to be happening more and more often. Whether due to severe rainfall, tidal surges, or the consequences of freezing weather, these events expose damage to building structures and weaknesses in their design in particular lack of capacity. This presentation will reflect on flooding impacts, relate these to the conservator's professional framework, and consider the Trust's response at both an interiors, building and landscape level.

Code of Practice for the Recovery of Flood Damaged Buildings

Stephen Hodgson, CEO Property Care Association

Stephen Hodgson will present a summary of the PCA Code of Practice for the Recovery of Flood Damaged Buildings. The code encourages focus on the building, its characteristics, underlying condition, and how best to affect recovery. Sections of the document describe how to approach an initial assessment, drying out, and the importance of a considered approach to refit. Stephen will talk through how and why the PCA created the code, why it differs from other guides to flood recovery, and the current thoughts of the Property Care Association in respect to flood recovery, resilience and resistance.



Disaster Planning and its Implementation for BIM4Conservation requirements

Ingval Maxwell, COTAC

The government strategy paper published in March 2011 defined four maturity levels of BIM, based not only on the level of technology used to design a building, but the level of collaboration within the process. These are:

- Level 0 Unmanaged 2D CAD, with data exchanged in paper or electronic paper form.
- Level 1 Managed CAD in 2D or 3D format, with data shared via a collaborative tool to provide a common data environment (CDE) with a standardised approach to data structure and format. No integration of commercial data.
- Level 2 Managed 3D environment where each discipline creates its own model, with information electronically shared in a CDE. Commercial data is integrated into BIM by proprietary interface or bespoke software. Level 2 BIM may use 4D construction sequencing and/or 5D cost information. This level of BIM is the target for 2016.
- Level 3 Fully integrated, collaborative process with models shared between the project team on a web-enabled BIM hub.

By 2016 it will be compulsory for fully collaborative BIM processes to be used on all government projects greater than £5m in value. The wider industry is adopting BIM as a way to more accurately predict and ensure performance throughout the life of a building. However, to date, the approach has been new build orientated and an awareness of conservation requirements is missing.

Informing Conservation

The practical requirement of undertaking effective and appropriate conservation work in the CRM sector requires detailed information on:

- Accurate survey material
- Understanding the construction
- Condition monitoring
- Deviation mapping
- Integrated approach to :
  - Structural movement
  - Voids and surface disruption
  - Water penetration
  - Mechanical and Electrical malfunctions
- Risk Monitoring
- Post-disaster recording
- Physical replication