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Flood risk mitigation and commercial property advice: an international comparison

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Flood risk mitigation and commercial property advice: an international comparison

Report for Royal Institution of Chartered Surveyors

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Contents

Figures

Tables

Glossary

Central Business District (CBD) is the preferred Australian and US term for the commercial area within an urban centre, comprising predominantly retail and office buildings. The UK term 'city centre' is less specific, as it implies a geographically central location (which may or may not reflect such commercial usage).

Claim is usually defined in the policy wording and is often defined as any demand or notice (verbal or written) made by a third party seeking compensation from the insured. A claim may be made by a writ, statement of claim, application or other originating legal process or by other written or verbal notice. Note: The definition of 'claim' varies across policies and is one of the key definitions in a policy as it forms part of the insurance clause that triggers a policy response.

Loss is the financial cost of damage and disruption caused by direct and indirect effects of flooding.

Deductible/Excess is a policy condition requiring the insured to pay a portion of the loss. Usually this amount represents the first amount which is payable by the insured in respect of any one claim with the insurer paying the balance over that amount up to the limit of indemnity. The excess can also be referred to as the 'deductible'. There can be subtle differences between how an 'excess' and a 'deductible' work.

Direct damage covers all varieties of harm which relate to the immediate physical contact of flood water to humans, property and the environment. This includes, for example, damage to buildings, economic assets, loss of standing crops and livestock in agriculture, loss of human life, immediate health impacts, and loss of ecological goods.

Flood damage includes loss of life, loss of value of elements at risk (buildings, inventories, infrastructure, goods, cultural and ecological assets) compared to pre-flood conditions and loss of production caused by a flood.

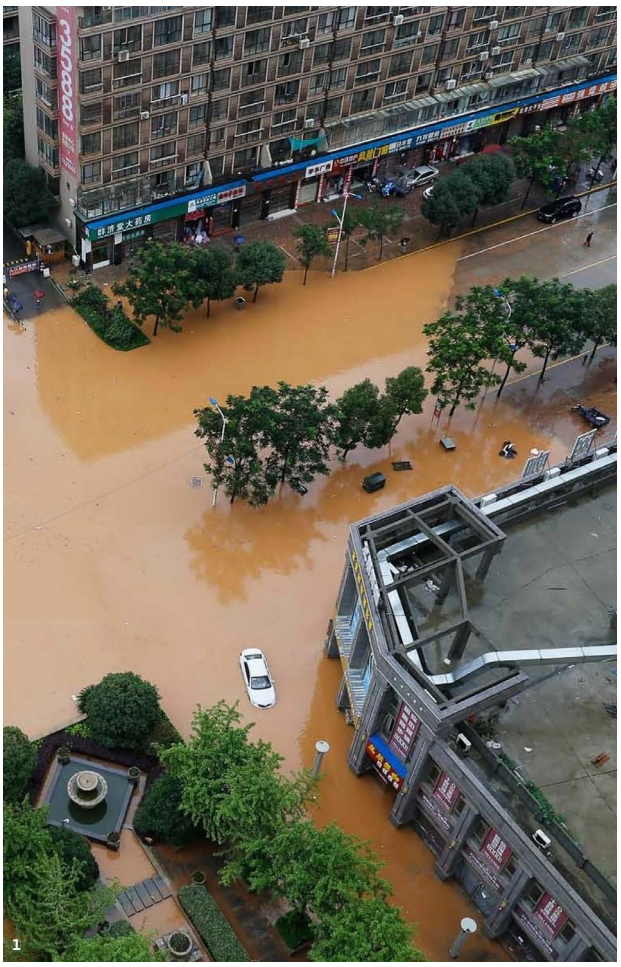
Indemnity contract arises when one individual takes on the obligation to pay for any loss or damage that has been or might be incurred by another individual. The right to indemnity and the duty to indemnify ordinarily stem from a contractual agreement, which generally protects against liability, loss, or damage.

Indirect damage is loss caused by disruption of physical and economic linkages of the economy, and the extra costs of emergency and other actions taken to prevent flood damage and other losses. This includes, for example, the loss of production of companies affected by the flooding, induced production losses of their suppliers and customers, the costs of traffic disruption or the costs of emergency services.

Reinstatement is to bring (a commercial premises) back into use or to restore (property and contents) to a previous (pre-flood) condition or position.

List of abbreviations

ABI	Association of British Insurers
ACCC	Australian Competition and Consumer Commission
BFE	Base Flood Elevation
CBD	Central Business District (city centres)
CPD	Continuing Professional Development
DKKV	Deutsches Komitee Katastrophenvorsorge (German Committee for Disaster Reduction)
FEMA	Federal Emergency Management Agency
FMA	Floodplain Management Australia
GDP	Gross Domestic Product
GDV	German Insurance Association
HKIS	Hong Kong Institute of Surveyors
ICA	Insurance Council of Australia
LOMA	Letter of Map Amendment
MAXQDA	Qualitative data analysis software
NFIP	National Flood Insurance Programme
NVIVo	Qualitative data analysis software
PRC	People's Republic of China
RICS	Royal Institution of Chartered Surveyors
SBSM	State Bureau of Surveying and Mapping Geographic Information



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Executive summary

The appropriate and effective management of commercial property at risk of flooding demands well-targeted and informed advice from building professionals. RICS professionals can, in particular, provide advice in order to reduce the severity of loss, damage[1] and disruption caused by flooding. However, the range of advice needed and the skills and knowledge required to deliver this guidance remains an elusive matter on which there has been a dearth of research until now. Previous research, albeit limited, indicates that the role of built environment professionals in providing this advice has been restricted due to a variety of real and perceived barriers.

Aim and objectives

The aim of this research is to provide insight on the current and future roles of built environment (and RICS) professionals in advising on commercial property at risk of flooding in a number of key international locations.

The objectives of the study are:

- To identify the role built environment professionals play and the skills they need in providing professional advice on flood risk in the context of commercial properties.
- To develop understanding of how different international insurance and regulatory regimes promote effective flood risk mitigation for commercial property.
- To explore the consistency of international approaches to the valuation of commercial property at flood risk.
- To investigate both perceived and real barriers and opportunities for built environment professionals in providing advice.

Research approach

An illustrative case study approach was undertaken in key international locations in Australia, China, Germany, UK and US as a means to understand different flood scenarios, regulatory and insurance regimes. After a review of published studies and reports to establish both the national and international context, the research team conducted 72 semi-structured interviews with experienced built environment professionals. The interviews were transcribed and analysed by country and across countries to explore common features and to highlight emerging opportunities and cross-country learning.

1 Loss and damage can be seen to be both direct (e.g. physical damage to buildings and stock) and indirect (e.g. business disruption and loss of business due to direct damage and lack of access). Some of this impact is tangible and can be easily measured and claimed, others are less tangible (such as loss of reputation, issues with renewing insurance) but may erode the viability of a business district in the longer term.

Findings

The role of built environment professionals in advising on commercial property at risk of flooding

The evidence from this study points to the important role built environment professionals are already playing in providing impartial and professional advice on commercial properties at risk of flooding in all the regions considered. Built environment professionals are found to be providing advice on:

- Flood risk for new developments and for building adaptation and reinstatement (Australia)
- Building structures, maintenance and surface water drainage systems (China)
- Assessment of risk and development of risk maps including advice on flood precautionary measures (Germany)
- Levels of damage and advice on property valuation (Germany and UK)
- Risk mitigation measures (UK)
- Elevation Certificates and flood-proofing certificates (US).

However, there is much potential for this advice to be broadened and deepened. The importance of legislation in mandating the need for this advice is notable in the US and is highlighted in many other regions where this legislative requirement is currently absent. In many instances, the need for further training and development of expertise in managing flood risk were common emergent themes across all countries. This includes developing a better understanding of how climate change may be altering the risk to properties. A conceptual model of the roles and opportunities for built environment professionals was developed and is summarised in Figure 1 below.

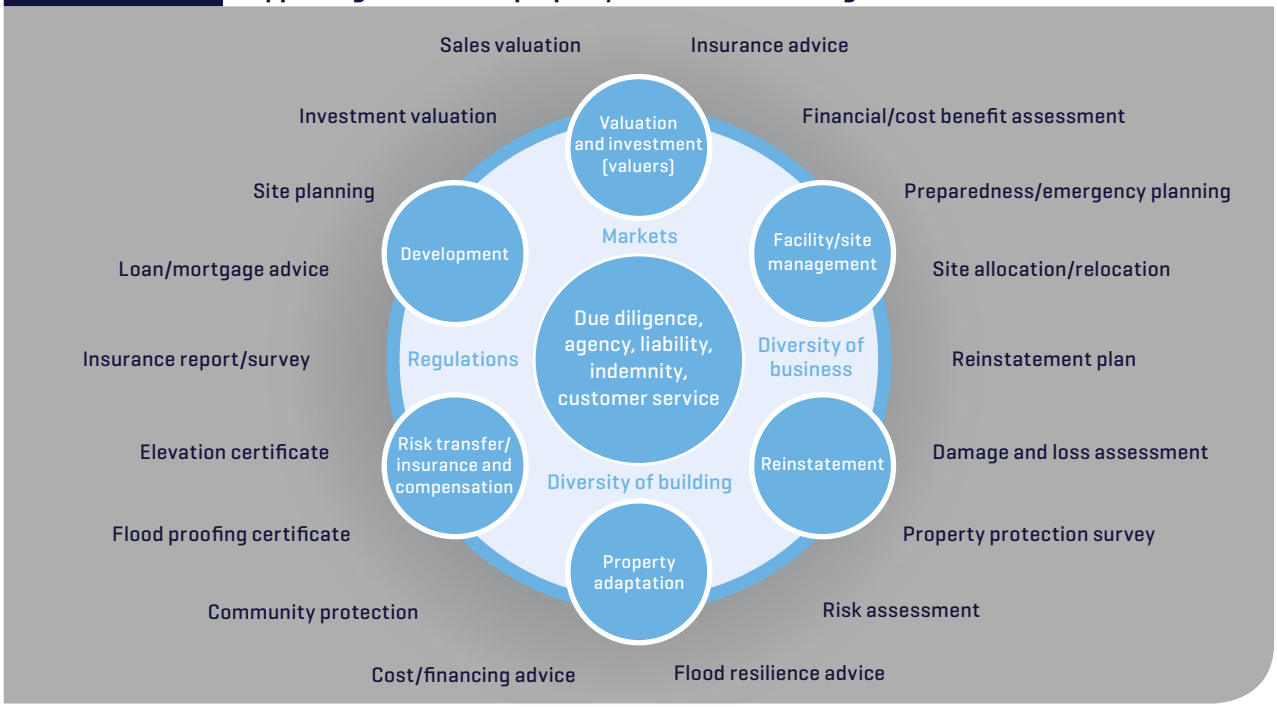
The role of insurance and regulation in promoting effective flood risk mitigation

Insurers were seen as a key stakeholder in encouraging flood risk mitigation across all countries in the research. There is also substantial potential to increase the involvement of built environment professionals in flood risk mitigation and to raise standards in flood recovery.

- In some parts of Australia, mitigation measures have even been imposed by insurers.
- In China and the UK, flood insurance is normally provided as part of a bundled insurance package.
- In Germany insurers have started to reward precautionary measures through lower premiums and excesses, although more could be done.

Contrasts in the current practices existing in different countries revealed that the influence of insurers on flood risk mitigation is heavily dependent upon the uptake of insurance policies, which in turn depends upon insurance terms and conditions, legislative and regulatory requirements and the perception of flood risk. Flood risk insurance (including all types of flooding and the range of potential damage and loss) is rarely mandatory and many businesses choose not to cover themselves for all risks.

Figure 1 **Conceptual model illustrating the potential roles for built environment professionals in supporting commercial property at risk from flooding.**



When companies are uninsured or under-insured, whether through self-insurance[2], low risk awareness or unaffordability (insurance premiums for flood risk are perceived to be too costly), the potential for insurers to influence businesses towards taking preventative or precautionary action is actually limited. Insurers cannot act in isolation, but have an important role to play in the provision of information, incentivising mitigation and collaboration with other stakeholders. Regulation, such as in the US and Australia, was seen by the research participants as a means to increase the demand for advice. However, the advice sought by businesses under these circumstances may only be limited to the minimum required for regulatory compliance.

The impact of flooding and flood risk on commercial property value

There was a general consensus among practitioners that the utility underlying property value is affected negatively by flood risk, but that this effect is not consistently reflected in market values. Other locational factors generally tend to have more of an influence on market price, although prices may be subject to short term or long term impacts, especially in the period immediately following a flood.

In general, RICS and built environment professionals were found to use current market values (comparatives) to advise on value, but would welcome further guidelines and improvements in the availability of flood risk information. Where businesses fail to recover from flood damage[3] or properties are badly restored, an area may become blighted. Appropriate advice on risk mitigation from built environment professionals could help circumvent this blight and support appropriate and risk aware floodplain occupation and investment.

Barriers and opportunities for built environment professionals in providing advice

There are many challenges and barriers to be overcome if built environment professionals are to play a more central and consistent role in advising commercial properties at risk of flooding. Some relate to lack of demand from clients. Convincing clients that the cost of flood risk mitigation is a good investment has been problematic. The lead-in time for some flood risk measures means they may not be available sufficiently quickly in the post flood period. The interviewees also stated that clients are generally more focused on the short term or on other business priorities. Clients are unconcerned (either through a lack of understanding or lack of financial incentive) about future flood predictions and the associated risks of damage from flooding.

Notwithstanding the above challenges, there are clearly opportunities for RICS and built environment professionals, for example in providing advice on payback periods and cost benefit analysis or return on investment on flood mitigation measures.

Although some thought that younger professionals seem to be better prepared to provide this advice, more could be done by giving the subject of managing climate hazards greater prominence in RICS professional competencies and, where appropriate, in undergraduate and postgraduate curricula of surveying courses and CPD.

Recommendations

The increased involvement of built environment professionals in providing advice about flood risk to commercial property presents a positive opportunity to reduce flood risk and support business, communities and investors. To take advantage of the identified opportunities and offer improved support to clients and potential clients, there were several common strategies suggested, which include:

- **Avoidance of professional silos** and greater collaborative practice among built environment professionals and other stakeholders.
- **Improved access to risk information** and databases of specialists that can support built environment professionals. This needs to be supported by the appropriate development and provision of flood risk education and training opportunities.
- **Improved understanding of insurance options processes** within the commercial property market.
- **Development of professional competencies** that include better understanding of hazard information and risk mitigation options.

Policy makers and leaders of the built environment professions need to consider providing standards and guidance in this area which, if supported by appropriate regulation, would help to encourage interest in and motivation for flood risk mitigation. Insurers, recognised as another key stakeholder, could become more proactive and influential in this regard. Insurers' influence could be strengthened through legislation, encouraging insurance uptake in areas at risk of flooding.

Originality and value of the research

The research is unique in providing a global perspective on issues affecting the built environment professions in providing professional advice on commercial property at risk of flooding. The results indicate some important recurring international themes across all five case study countries and are therefore widely applicable regardless of local flood conditions, regulatory frameworks and insurance regimes. This could help improve our understanding and contribute towards the development of a fully integrated approach to future flood risk management, policy and strategy.

2 Companies usually choose to self-insure, that is to accept the risk of flooding as a company, if they believe that the cost of insurance is greater than the annual expected losses and the company can withstand the maximum probable loss. This may or may not include a formal internal process and the holding of reserves against loss. 3 Studies have suggested that the indirect impacts of flooding often exceed the costs of direct damage and claims for business interruption may dwarf claims against property insurance (Heite and Merz, 2009; Kleindorfer and Germaine, 2005).

1.0 Introduction

Commentators have increasingly raised concern over the impact of flood risk on commercial property insurability, maintenance and recovery, property utility and, ultimately, property value (Bhattacharya-Mis and Lamond, 2016; Bubeck *et al.*, 2012; Kenney *et al.*, 2006). Furthermore, there are questions about the optimal strategies for improving flood risk awareness and risk reduction within the commercial property sector and the potential for built environment professionals to play a role in providing advice to the owners (and occupiers of) investors of and investors in property. Certainly, with improved understanding of risk and mitigation, there is a potential for improved flood resilience in the built environment through advice to property owners and occupiers. However, this needs to be supported by property market mechanisms and insurance incentives. Research in the UK shows that the realisation of this is still limited (Pottinger and Tanton, 2012). The involvement of built environment (and RICS) professionals in the context of resilient flood recovery and reinstatement processes has been found to be limited to date (Ingirige *et al.*, 2012).

Previous research has concentrated largely on residential property and has not considered the variety of international risk disclosure, insurance and regulatory regimes within which built environment professionals function. Recent flood events (Australia 2011; US 2013, UK 2013, 14, and 15; Germany 2013 and16; China 2013, 15 and 16) and the evolving response to them by governments, insurers and property markets also make this topic highly relevant. The aim of this study is therefore to develop an international understanding of the current and future role of built environment professionals (including RICS professionals) in providing professional flood risk advice on commercial property, using evidence from UK, Germany, China, US, and Australia.

1.1 Impacts of flooding on commercial property

Loss and damage from the flooding of commercial properties is evident globally and seen to be prevalent in the selected case study countries in Australia, China, Germany, UK and US. The UK insurance industry paid out approximately £446 million in business claims after the winter 2013-14 flood event (ABI, 2014). Similarly, the estimated cost on small businesses in the Tasmanian flood (Australia) in 2016 was around A$3.4 million (ABC News, 2016). In China the flood impacts are potentially massive, especially in urban areas (cities) which are estimated at 60% of the (103 million annual) total flooding costs (Hu, 2016), while flooding in Louisiana (US) affected around 7,300 small businesses which employed more than 60% of the local population (Wisner, 2016). The floods in eastern Germany 2016 cost the insurance industry over 1bn Euros (Commercial Risk Europe, 2016). Claims were mostly from home owners, but business interruption also caused significant losses (ibid.).

Loss and damage can be seen to be both direct (e.g. physical damage to buildings and stock) and indirect (e.g. business disruption and loss of business due to direct damage and lack of access). Some of this impact is tangible and can be easily measured and claimed, others are less tangible (such as loss of reputation, issues with renewing insurance) but may erode the viability of a business district in the longer term. Studies have suggested that the indirect impacts of flooding often exceed the costs of direct damage and claims for business interruption may dwarf claims against property insurance (Heite *et al.*, 2009; Kleindorfer and Germaine, 2005).

Image source: Nataliya Nazarova / Shutterstock.com

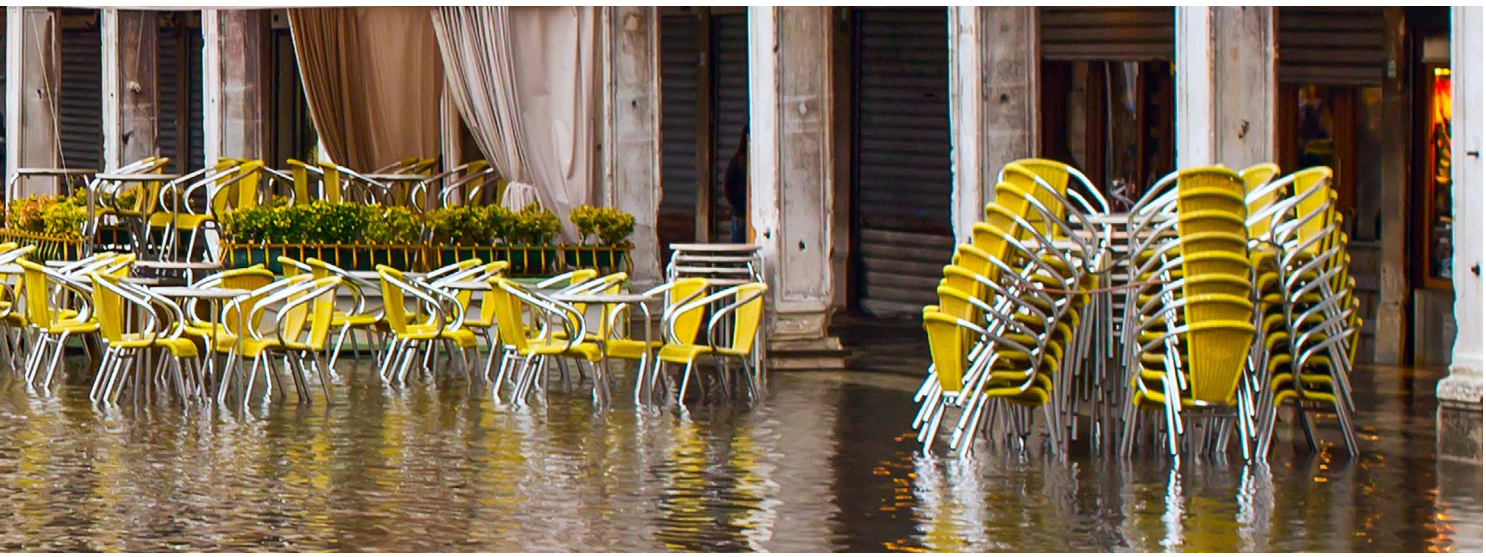
1.2 Mitigation of flood risk for commercial property

Mitigation of the risk from flooding to commercial property is a multi-layered multi-stakeholder task. Often the primary risk reduction mechanisms are regarded as large scale flood prevention infrastructure (such as the Thames Barrier in the UK), national and regional prediction, emergency warning and preparedness initiatives (Jha *et al.*, 2012). Such schemes, generally funded by governments and donors, have reduced the risk to life, livelihoods and domestic and commercial property. However, not all properties benefit from large scale schemes and even when these schemes are in place, residual risk will always remain. These residual risks can be further mitigated at property or small neighbourhood level through insurance, property adaptation, emergency planning and preparedness measures.

Most research in property level flood risk mitigation has been directed at residential property. However, many of the property level measures designed to prevent physical damage may also be appropriate for small commercial premises, while measures designed to protect small communities or neighbourhoods may also be applicable to large scale properties (Kreibich *et al.*, 2015; White *et al.*, 2013; Defra, 2008). Insurance, covering both direct and indirect damage can be used to offset the financial risk associated with flooding and allow businesses time to recover. Other contingency plans, such as business reserves, emergency plans and the relocation of sensitive goods[4] and functions can also be effective. As reductions in direct damage and disruption lead to lower indirect losses, businesses can recover faster, resulting in the greater perceived utility of property in the floodplain. This should in turn result in the maintenance of property values and the sustainability of commercial districts (Bhattacharya-Mis and Lamond, 2016; Bell, 1998).

1.3 Role of insurance in flood mitigation

It has widely been argued, particularly in the residential sector, that insurance can play a role in maintaining properties at risk from flooding by providing funds for recovery after an event (Lamond and Penning-Rowsell, 2014; Botzen *et al.*, 2010; Bouwer *et al.*, 2007). This can also be true for commercial properties, as businesses often rely on property insurance to protect themselves against loss from a range of catastrophic scenarios, of which flooding is just one. However the role of insurance in commercial property may be subtly different. In the residential property market, the ability to obtain insurance is a key factor ensuring the saleability of property at risk of flooding (RICS, 2015; Burby, 2001). While the ability to obtain insurance may also be a large determinant for the saleability of commercial property, there is a dearth of research on this topic. The universal availability of subsidised flood insurance below the actuarial rate (such as in the US) has been said to lead to a moral hazard, where owners and occupiers at risk fail to take measures to protect themselves (Freeman and Kunreuther, 1997). While this has been frequently demonstrated in the residential sector in the UK and US, the extent to which it is a feature of the international commercial property sector is unknown. The failure to take the opportunity to "build back better" after flooding has been attributed to provisos against "betterment" in domestic insurance policies and contracts. This has led to like for like reinstatement. Although "no betterment" also prevails in commercial markets, it is an open question as to whether businesses are as likely as domestic occupiers to forgo the opportunity to improve their flood resilience.



4 Goods, such as computer processors or buildings management systems which vital to business operations are often located in the most exposed areas of the building (at ground or basement level). These can be easily relocated to less exposed sections of the building, for example, the first or second floors.

Figure 2 **Components of due diligence for property adaptation**

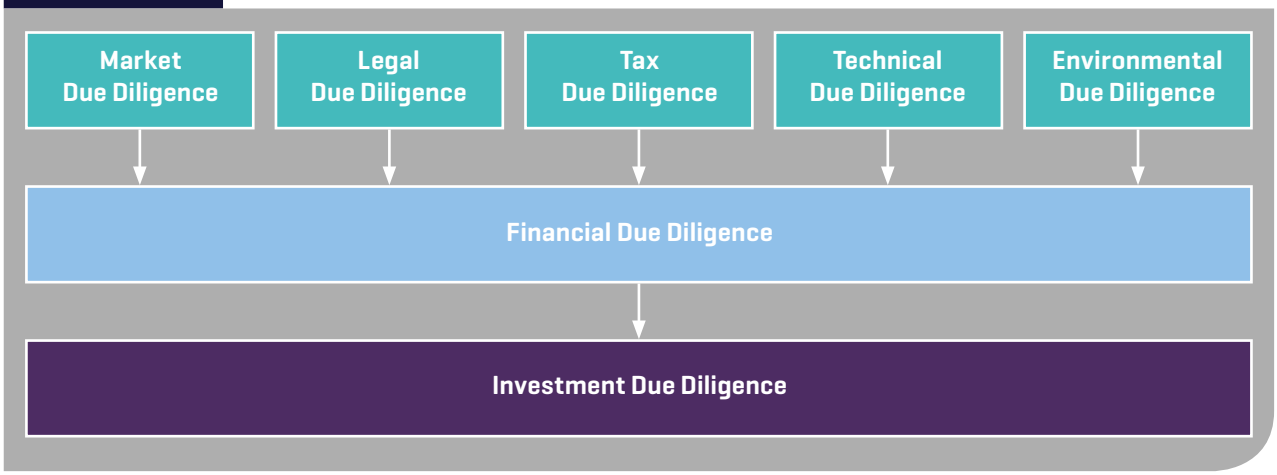


Figure source: Adapted from Pottinger and Tanton, 2011

1.4 Rationale for research

There is little previous work in the international commercial property sector which addresses built environment professionals' perspectives of the impact of flood risk to assets, costs or the availability of insurance. However the case for built environment professionals to engage with understanding and building capacity in the area of flood risk and commercial property has been researched in the UK. Previous research has emphasised the importance of the due diligence process as a means for valuers to identify risks, reduce uncertainties in property value and provide a sound base for dealing with the problems associated with property transactions (PricewaterhouseCoopers (PwC), 2010). It is important for built environment professionals to provide appropriate advice during physical, environmental and structural surveys because (i) the buyer is at risk during and after the transaction (Pottinger and Tanton, 2011) and (ii) failure to advise appropriately may lead, for example, valuers to be charged with negligence. The main components and advantages of due diligence when assessing property adaptation have been discussed by Pottinger and Tanton (2011) in relation to commercial property investment in the UK (see figure 1).

The goal of improved sustainability of property, championed by the RICS (Sayce and Quinn, 2013) in support of a more resilient society and economy, will be better achieved if built environment professionals can play a successful role in limiting flood damage and loss. By investigating the role, skills, challenges and capacity of building professionals in regard to flood risk across key world regions, this research can contribute to the development of a consistent and improved international approach. The research highlights different international practice and policy regimes such as insurance and risk management. However, it also points to core competency requirements for RICS professionals.

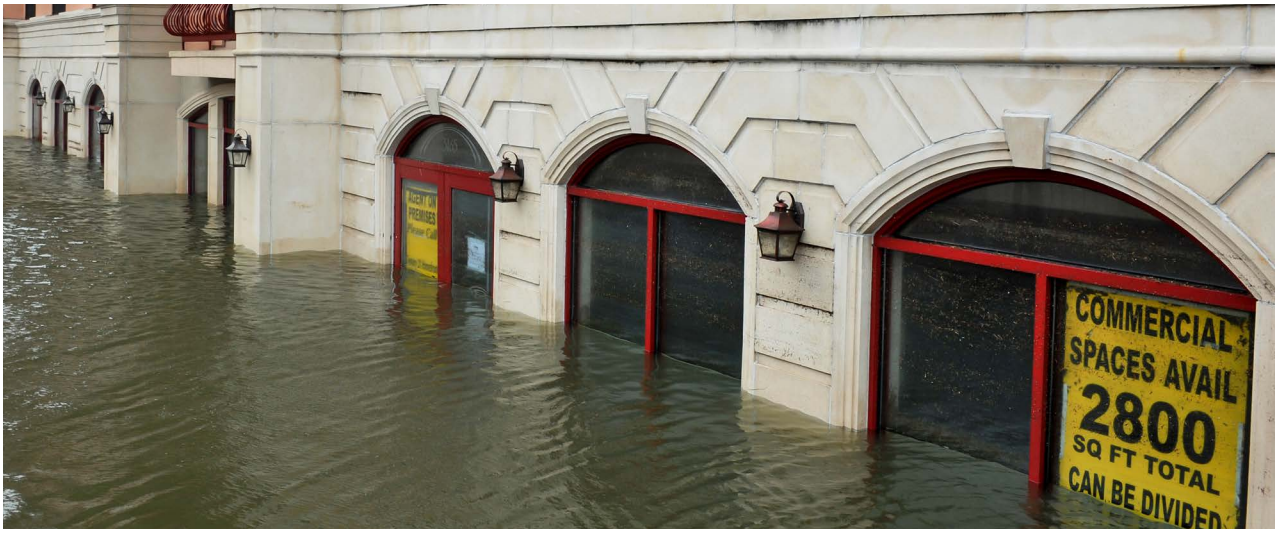
1.5 Aim and objectives

The aim of this research was to provide insight on the current and future roles of built environment professionals in advising on commercial property at risk of flooding in a number of key international locations.

The objectives of the study were:

- To identify the role built environment professionals play and the skills they need in providing professional advice on flood risk in the context of commercial properties;
- To develop understanding of how different international insurance and regulatory regimes promote effective flood risk mitigation for commercial property;
- To explore the consistency of international approaches to the valuation of commercial property at flood risk; and
- To investigate both perceived and real barriers and opportunities for built environment professionals in providing advice.

2.0 Methods



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A qualitative approach was adopted to explore the barriers and opportunities for built environment professionals and valuers dealing with commercial properties in providing flood risk mitigation advice. Previous quantitative survey research in the UK indicates a lack of awareness and experience among built environment professionals in dealing within flood affected properties (Ingirige *et al.*, 2012). To outline the scope and skills needed for built environment professionals requires consultation with experts that have understanding of advising on commercial properties affected by flood risk. This dictates a qualitative approach of in-depth interviews with a target population of building assessors, insurance experts, valuation professionals and investment experts with understanding of commercial properties. These experts were purposively sampled in each international location.

The approach allowed for acquisition of existing knowledge and practice in the selected countries. Furthermore, it has also enabled a comparison of experiences, needs, and challenges among built environment professionals and the development of a conceptualisation of opportunities and barriers. The interviews also led to the identification of emerging practice and demand patterns in different countries, which in turn provided insight on the need to build capacity in the sector.

The study countries were chosen based on the significant amount of heterogeneity in the type of flooding, growth and development of commercial property sector, building regulations and nature of insurance industry and the roles played by built environment professionals in providing advice in those sectors. This was useful to demonstrate a holistic view of the practice of providing advice within the commercial property industry and give a global perspective to the research. Lessons drawn from these international locations provided a rich set of data and scope for analysis, as well as revealing the culture of providing advice to commercial properties at risk of flooding.

2.1 Literature review

The literature review was based on databases of academic and industry sources along with generic websites searches. The websites of specialised relevant organisations were also accessed. For this a systematic scoping review protocol[5] was designed to identify literature covering commercial property assessment, flood risk management, valuation and insurance themes. For the search databases, an advanced search query was developed working with the ISI Web of Science and then applied to other databases. The inclusion criteria for the study were based on:

- Subject relevance: approaches at a commercial building scale, building insurance, business disruption, building damage, status of insurance;
- Type of intervention: built environment profession role and capacity building strategies in a post flood situation; and
- Type of outcome: best practice guideline for built environment professionals globally.

The geographical scope for country specific studies was limited to the selected five countries (UK, US, Australia, China and Germany).

5 The search followed guidance for systematic reviews and evidence assessment (Collins et al., 2014) in defining comprehensive search terms and systematic search and filtering of abstracts to obtain relevant literature.

2.2 Expert Interviews

The target population for the interviews was built environment professionals (preferably RICS), advising on valuation, risk mitigation and post-flood reinstatement in the commercial property market. Advice for new development, although recognised as a potential area, was excluded for reasons of pragmatism given the limitation of resources. As the target population is problematic to identify, a variety of strategies was necessary in order to select participants, which included support from RICS regional offices, publically available expert lists and social media. The process of research involved:

1. Development of interview schedule
2. Gaining ethics approval
3. Identification of participants and obtaining their informed consent
4. Undertaking the interviews (via telephone or personal) including recordings
5. Transcription and translation (where relevant).

Ethics approval regarding interviews was organised according to local protocols in each region. The application was supported by a common interview information sheet, invitation letter and consent form for the participants. Participants were selected on the basis of experience in dealing with commercial properties in areas at flood risk (with a preference for RICS professionals where possible). A target of fifteen (15) semi-structured interviews was to be conducted in each (5*15 = 75) international location, with an additional 5 interviews with centrally placed individuals having an overview perspective. A sample of 15 interviews in each international location was considered appropriate, given the in-depth nature of the research and small population of built environment professionals working in this area.

Each participant was informed of the nature and purpose of the interview and the main questions in advance and anonymity was assured. Interviews were recorded for accuracy. The interview format was semi-structured with a series of main questions guiding the process, but additional prompts were used where appropriate. Finally the interviews were transcribed in respective countries and translated where required and cleaned for the analysis of data. The interview schedule is presented in the Appendix.

2.2.1 Profile of interviewees

A total of 72 interviews from five different countries were used for the analysis. The role of respondents varied from risk mitigation and reinstatement experts, property adaptation and management and valuation experts. The profiles of the respondents are illustrated in Table 1.

2.3 Analysis

A common set of themes was employed to code the interview data, to allow for cross-country comparison and development of a common understanding of the data. Coding was performed in NVivo and MAXQDA software (Lewins and Silver, 2007). Data was first analysed on a country by country basis and then commonalities and differences among the different international locations were identified based on the common coding. Cross-country comparison of current practice, the role of insurance in mitigation and the impact of flood risk were undertaken. Further, the main barriers in performing these roles and the future opportunities were also identified using a similar technique. The approach adopted here was aimed at providing an overview of the contemporary roles in different built environment professional practices across key world regions. Finally, mapping of roles and required competencies of built environment professionals was performed based on a combination of literature and the cross country analysis.

Table 1 **Profile of respondents**

Country	Valuation and investment	Risk mitigation (property management)	Reinstatement	Risk mitigation (property adaptation)	Other	RICS	Non RICS	Total
Australia	2	1	0	0	3	5	1	6
China	4	7	0	2	1	14	0	14
Germany	3	8	2	2	0	2	13	15
UK	5	3	4	3	0	12	3	15
US	4	5	5	3	0	5	12	17
Overview	2	0	1	1	1	5	0	5
Total	20	24	12	11	5	43	29	72

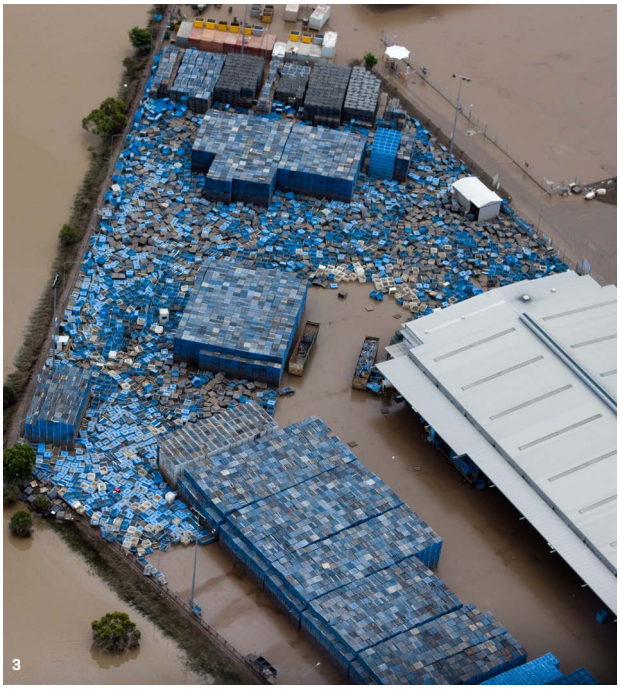

Image sources: 1 wallaby / Shutterstock.com 2 paintings / Shutterstock.com 3 brisbane / Shutterstock.com

3.0 Results

This section presents the results from the literature review and semi-structured interviews with 72 interviewees (experts) across five world regions. Results are discussed first by country and then the cross country analysis is presented.

3.1 Australia

Development in areas at risk of flooding in Australia has long been subject to regulation since Governor Macquarie's 1819 general order for settlers to avoid developing in flood prone areas (Macquarie, 1817). However, the number of properties at risk varies greatly between states, with 94% of residential properties at risk of exposure to 1 in 100 year (or more frequent) flood events being situated on the East coast, of which 36% are located in Queensland alone. According to Molino (2009), federal, state and local governments along with some regional organisations are jointly responsible for floodplain management, community education, warning, response and recovery. Research into the 2001 Kempsey flood showed that the response of commercial property owners and occupiers to warnings was limited (Gissing, 2003), despite an estimated potential reduction of damage by 80% if a comprehensive flood action plan was developed (Molino, 2009).

The roles and potential roles of built environment professionals in providing flood risk advice

The interviewees saw roles and potential roles in Australia falling into two phases, pre and post flood, in terms of new developments in building or reinstatement design and land use planning. A regulatory role for licensed professionals is ensured for new developments in the flood zone. For example, in the Gold Coast the City requires that habitable floor levels are a minimum of 300 mm above the Designated Flood Level (City of Gold Coast, 2016). Home and land buyers in the Gold Coast are also recommended to engage a licensed professional to accurately determine property and floor levels. When interviewees were asked if they use guidance and advisors to reduce risk, some used council databases and geo-technical engineers who 'usually have good knowledge' because they advise on the construction of floor slabs and know whether an area is flood affected.

With regard to land-use planning the consensus was that built environment professionals should consider flood risk and adopt appropriate development types (e.g. industrial) along with suitable design and construction qualities (e.g. elevated construction) when building or renovating buildings in flood prone areas. Historically flood prone areas were zoned as 'industrial / retail / commercial' and typically car parking was located below ground, which although flood exposed, was deemed as sacrificial.

Some participants noted that riverside (often formerly industrial) property had been sited where materials could be easily transported regardless of risk. However, as industrial land uses have changed to commercial land uses and property owners have a reduced awareness of flood risk, extensive flooding has occurred to properties which lack any kind of flood adaptation.

In areas such as Sydney, land is scarce and developers build on flood-affected land as long the development is designed appropriately. Some interviewees mentioned that built environment professionals should also consider building typologies and be aware that some are affected more than others. Interviewees' experience in Queensland revealed that some local knowledge and traditional building designs result in more resilient stock and built environment professionals should be cognisant of this when advising clients. The Queenslander design with the raised floor provides good airflow under the building to attenuate humidity and high air temperatures; it also provides good protection against flood for small premises. Multiple storey commercial buildings allow for implementation of facilities management and adaptation advice. This can include preventing damage by relocating services above the flood level and ensuring that vital coordinating activities are not located in areas of buildings that are prone to flooding. This avoids the sort of incident described by one interviewee where:

"...[the] head office flooded to the ceiling of the second floor and all our servers, not just for that office believe it or not, but nationally, were in that basement. It was out of action for weeks".

Interviewees recognised the need to do their due diligence to understand the history of an area economically, geographically and physically when providing clients with property value, property management or building adaptation services. Where climate is changing, built environment professionals should be aware of the potential changes in the locations where they are giving advice and, where necessary, whether construction and or design will need to consider the impacts of floods in the future. Proactive action should be recommended by built environment professionals to reduce exposure to risk and flood damage.

Role of insurance and compensation regimes in promoting or not promoting mitigation

Insurance policy-making in Australia stemmed from UK companies, prior to the 1968 'Gentlemen's Agreement'. Early cover for domestic property included 'flood' without defining the term (Australian Government, 2016). From 1984 the Insurance Council of Australia (ICA) definition of flood[6] enabled partial or fuller add on 'flood' cover. However, multiple interpretations have been applied over the decades. This has led to contention among the ICA, the Australian Competition and Consumer Commission (ACCC) and consumer groups, among others. After the Queensland floods in 2011, the Federal Government looked at mandatory flood insurance, however, following the National Disaster Insurance Review (NDIR, 2011), the government did not legislate for compulsory flood cover. As a result, the definition of flood remains contested today and the lack of understanding of the distinction between flood and storm endures (Australian Government, 2016).

According to the respondents, insurance cover varies from state to state, each having different risk profiles. Insurers in flood prone areas often ask for mitigation measures or impose penalties for not adopting mitigation measures. One participant commented;

"Brisbane insurers are likely to be red hot on this, whereas in Sydney they wouldn't be because they've not had a lot of flooding here".

With regards to insurance cover, it seems some owners chose not to have flood cover. This is based on the perception that the likelihood of flood is very low, and where multiple properties are owned, the costs of insurance may be prohibitive. Another participant stated:

"Supposing they've got, a thousand supermarkets, it'll cost them A$10 million a year to get building and flood insurance, they just don't insure, they do a self-insure. ... if they lose a supermarket through a flood, they just rebuild/repair it. Each supermarket costs probably less than A$10 million to rebuild. As long as you don't have more than one flood in your portfolio in a year, you're ahead."

However another view was that institutional bodies in the built environment professions should advocate for compulsory insurance in some flood prone areas, because areas can become blighted when buildings remain unrepaired after flooding. Most agreed flood risk leads to increased premiums in areas at risk and that commercial construction costs and project timelines increase. One respondent noted:

"that's when insurance companies come in, because they've seen that [flood risk] is increasing, and they're spending lots of money on claims. They push back on us saying; "Well what are you doing about mitigating the risk?" Premiums go up, deductibles increase. There's a big focus on what we're doing; to mitigate the cost to the insurer."

A valuation professional noted if there is flooding shortly after completion of new buildings or refit, it may come off of the contractor's or designers insurance rather than the building owners insurance, if the damage is seen to be a deficiency in design. He posited the scenario where:

"if there was flooding damage, the building owner's insurers would investigate. If they could trace legal liability for the loss to someone else, they would sort out their client by dealing with their loss and fixing up the building, but then pursuing whoever they felt caused or contributed to the loss … I'm sure they'd chase the contractor."

6 Described as 'the inundation of normally dry land by water escaping from the normal confines of any natural watercourse or lake whether or not altered or modified, or any reservoir, canal or dam'.

As a result of the diversity in the management of flood risk between different states in Australia, state governments can have a significant indirect impact on the cost and availability of property insurance. After the 2011 Queensland flood, for example, mitigation works were required to limit the impact of future floods and ensure continuation of insurance cover. To achieve this required substantial funding and local government input, given that actions such as the compulsory acquisition of land for flood protection can only be taken by government bodies.

Impact of flood risk or flooding on commercial property value

Participants were divided about the extent of the impact of flood risk or flooding on commercial property value. It is partly related to the scale and extent of the flood event. One participant, referring to the Brisbane flood of 2011, agreed there was a *"negative impact on value in the short term but memory can be short"* and added that in the longer term commercial property was not blighted. Another commercial valuation professional concurred that

"commercial investment slowed in Brisbane after floods, [the] focus was on getting buildings back into operation not sale and acquisition, but people tend to 'forget'".

The scale of the 2011 Queensland flood was extensive; it was the worst flood since 1974. The estimated losses of agriculture production reduced gross domestic product (GDP) of the State by 0.1 – 0.2%, coal production by 0.4% GDP and tourism by 0.4% GDP. In the medium term, when leases expire some tenants relocate from flood prone areas, thus dampening values. However, in Queensland a rebound effect occurred, with an economic boost from rebuilding of 0.5% GDP (Härtel and Latemore, 2011). Therefore, while the initial impact was negative, the Queensland example indicates that in the longer term it can be positive. Respondents also stated that the disclosure of flood risk to buyers (as recommended by Queensland Floods Commission of Inquiry, 2012), should be based on reliable accurate data. Such data, in theory, allows buyers to make informed decisions about property purchase and building value, as well as insurance cover requirements. In addition, such resources can assist insurers to assess risk levels and appropriate insurance premiums.

Although the general view was that the impact on property value as a result of flooding is temporary and does not last long, the interviewees highlighted instances where there had been long term damage to property values. As an interviewee stated:

"after a big flood you may not get tenants back into a commercial building and those tenants are lost forever".


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One of the participants had a more negative perspective, noting the impact on [commercial property] values *"will be profound and lasting"* (following the 2011 Queensland flood) as banks *"reduce willingness to lend in flood prone areas"*. The participant felt that councils may not grant building permits and that construction costs were likely to rise. The same interviewee cited examples such as the rebuilding of Darwin after cyclone Tracey in 1974 and the 2009 Victorian bush fires where more onerous building standards were implemented, which added to costs. This negative perspective was echoed by another respondent who cited cases *"where property near rivers became unsellable post flood"*, impacting on value. People become nervous about locating on or buying property in flood plains, with the resulting effect that areas become blighted. In the medium term, values are impacted by the view that some flooded areas need re-zoning and if owners and tenants are unable to get flood insurance then property transactions are negatively affected.

One interviewee, who worked in New South Wales, noted some negative impacts on project value as a result of flooding during construction, especially for engineering projects in flood plain areas. However, overall the interviewee noted; *"In terms of flood risk for commercial properties, I'll be honest and say it probably hasn't been a big issue"*. Furthermore the respondent added when developing in the Central Business District (CBD),

"we are developing existing blocks, there might be considerations from the basement structure, and how deep you go, and where the water table is. But other than that, it's pretty basic."

This outlook, contrasted with those who had experienced the 2011 Brisbane flood, reveals the impact of experience on a person's or businesses' outlook and their perception of risk.

Challenges and opportunities for built environment professionals in giving advice

The biggest challenge is to persuade clients that the upfront costs associated with flood mitigation measures will have a future benefit. Many developers say *"I can't afford it"* or *"I don't want to do it"*, because raising floor slabs using earthworks is very expensive. In the long run it will probably pay, but in the short term, it does not. Again, regional variation exists and there are different inundation scenarios in Sydney as opposed to, for example, Brisbane. If it is necessary for flood works to handle 1 in 10 year or 1 in 25 year flood events then expensive culverts and channels need to be provided by the developer or by local government. These provisions are expensive and take years to return the investment.

There is a knowledge gap among built environment (including RICS) professionals in Australia; Australian professionals have not been involved in flood services because this field has traditionally been dominated by engineers. However, engineers are not experts in land value and so there is an opportunity for built environment professionals. A good example, cited by an interviewee, has related to the Sydney Olympic rowing lake. His role was to work out the best place to tip spoil from excavation from the lake so that the land could be sold after the games. The interviewee decided that this excavated material could be used to build up land nearby in a finger formation for residential development post games. As a result the land was sold to developers at a higher rate because more properties had water front locations and thus values were higher. Moreover *"this extra income offset the cost of excavating the rowing lake"*. The land was built up to a high standard of 1 in a 200 year flood level.

"I was the only RICS professional in a team of engineers and my role was to advise how to create value when digging a big hole".

This is an excellent example of the added value an RICS professional can provide in creating flood resilient higher value property development.

A further challenge for built environment professionals in Australia is that flood advice and flood risk management are considered specialist knowledge. If built environment professionals are going to offer advice about flooding, they have to be sufficiently competent in providing advice so as not to put their professional indemnity insurance at risk. Conversely, if it is just a case of being mindful of flood issues and alerting clients to procure appropriate advice from another suitably insured professional, this can be a less risky option.

There are some opportunities in Australia for built environment professionals to provide financial advice, for example, around whether the payback for the flood mitigation measures is viable. Participants felt that in Australia it would be a thin market. While interviewees acknowledged that the service will be needed, they highlighted that industrial areas that are already fully developed would only be able to infill low lying areas and it would be hard to see how one could retrofit all the building services higher up on a platform. In more

Highlighted practice: facilities management advice on building adaptation

In the Brisbane floods, one group had a flood plan already in place. They monitored the weather, and when the river reached a certain level, they phoned a water pumping company. Immediately after the flood started, they pumped water out. Their building was also designed so that services, typically found in the basement, were sited on the second floor. As a result, the building was operational within 48 hours of the flood. This shows how the appropriate professional advice can save clients time and money.

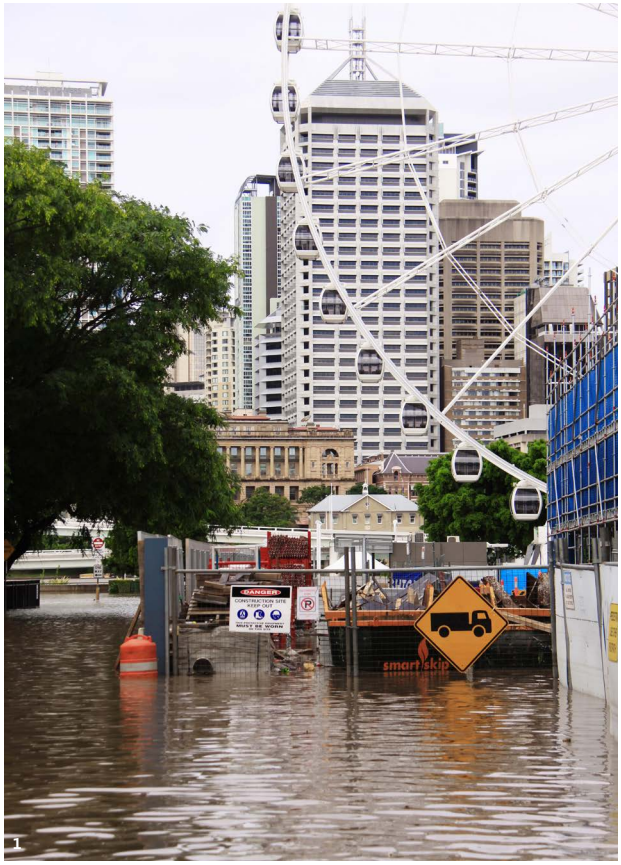
mature property (25 years old), most services will need replacement and so opportunities would arise for built environment professionals to provide this advice.

The increasing availability of data provides another opportunity for built environment professionals who have to manage the risk of flooding. The Australian Flood Risk Information Portal was established by the Federal Government after the flooding across Eastern Australia in 2011 (Australia Government GeoScience, 2016) with data from Geoscience Australia's Flood Studies Database. Interviewees suggested that data produced by government agencies or others in respect of flood could be made available on a phone app to be used when assessing flood risk and valuing commercial property. Such an app would enable enhanced professional services to be provided by built environment professionals for their clients.

Highlighted practice: the role of flood plain management authority in capacity building of practitioners' understanding of flood risk

Floodplain Management Australia (FMA) promotes appropriate development within floodplain areas to help to reduce risks of flooding to people and property. Members include over 120 councils, catchment management authorities, businesses, and professionals involved in all aspects of urban and rural floodplain risk management. FMA represents members' interests at State and Commonwealth government levels, promotes public awareness of flood issues, and provides professional development for floodplain managers, information sharing opportunities and representation of the interests of Local Government at State and Federal levels.

With the New South Wales Office of Environment and Heritage, in 2009 FMA initiated Australia's only industry based flood risk management course tailored to the needs of technical and land use planning staff, and elected council representatives. The program is conducted by the University of Technology Sydney (UTS). FMA has developed a national presence, participating in initiatives such as the National Floods Forum, National Flood Risk Advisory Group, the National Workshop on Temporary Flood Barriers, and the Planning Institute of Australia's Post Disaster Flood Planning Seminars in Queensland and New South Wales.



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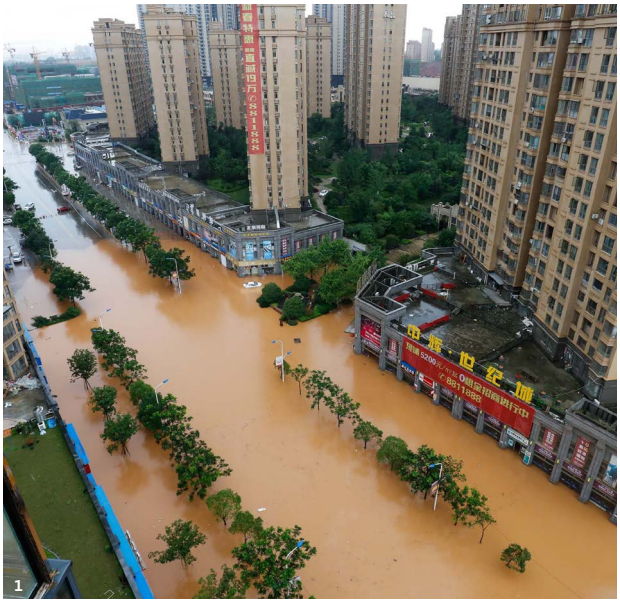

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3.2 China

In the People's Republic of China (PRC), financial damages from flooding have cost over $50 billion in the last decade (Michel-Kerjan and Kunreuther, 2011). The 2010 flooding resulted in more than 12 million people losing their properties and homes across 28 provinces (Gu *et al.*, 2011). Many major Chinese cities, particularly on the East and South Coasts and deltas (e.g. Shanghai, Shenzhen, Guangzhou and Hong Kong, etc.) have now been transformed to commercial, financial, business trade centres and global ports in East Asia (Varis *et al.*, 2012; Zhang *et al.*, 2012; Ge *et al.*, 2011; Seto, 2011).

Flood risk is increasing from multiple causes. Climate change enhanced factors such as intensive rainfall, storm surges and sea-level rise, have combined to accelerate inland (surface water and fluvial flooding) and coastal flood risk (Chan *et al.*, 2014; Fuchs *et al.*, 2011). Increasing populations and properties will also increase the level of flood exposure and vulnerability (Güneralp *et al.*, 2015; Yang *et al.*, 2014). At the same time, rapid urbanisation and increasing urban runoff has increased the burden on existing drainage systems, which in turn increases the probability of surface water flooding (Shi *et al.*, 2007). Planners and flood management officials are facing challenges of identifying optimal changes to land use patterns in the light of uncertain flood risk and climate projections across many Chinese cities (Byrne *et al.*, 2015).

The roles and potential roles of built environment professionals in providing flood risk advice

According to the National construction project management authority (CPM-China, 2016), the role of built environment and RICS professionals in the PRC and Hong Kong is not documented and there are a lack of policies, practices or schemes for PRC built environment professionals to address any kind of flood risk. Building advisors are not required to consider flood hazards other than (storm water/surface water) drainage conditions around buildings or infrastructure (i.e. checking for water seepage or leakage from drainage pipes in the property) (SBSM, 2016; HKIS, 2016). Lo *et al.* (2015) noticed the public's perception and awareness of flood risk is weak in Tianjin, despite the city (CBD area) having been flooded on several occasions in the last decade. Built environment and RICS professionals therefore have scope to provide a professional standpoint on strategies to improve flood resilience, flood proofing levels for commercial buildings and infrastructure and on methods to enhance preparedness for climate extremes.

Highlighted practice: the role of surveyors in providing mitigation advice in Ningbo.

Professional advice from building advisors on the designs of new buildings in Ningbo have improved the flood resilience and reduce the flood impacts from the 2013 flood. As an interviewee noted,

"…For example in 2013 (Ningbo) flood, you can see the flooding only occurred at the entrance of Big hotels such as Shangri-La and Sheraton hotels have been surveyed and built in Ningbo, as far as I know some surveying works have been done from our friends (from the industry) for these hotels, these properties have not been flooded because of land raising for some steps outside the buildings."

Most interviewees in China agreed that professional advice and guidance from built environment professionals (particularly for building and valuation surveyors) is vital for flood-proofing and improving the resilience of commercial and other properties in the region. Interviewees agreed built environment professionals should follow the technical specifications on building guidelines CN (*'Chinese standard for the People's Republic of China'*). Most of the interviewees have generally shared their views on flood risk mitigation from surface water flooding, but were not particularly focused on fluvial or coastal scenarios. Their perceptions and reasons for this were (i) the occurrence probabilities are low, and (ii) the flood protection level is currently satisfied and the (iii) responsibility for managing flood risk lies on the municipal government. An interviewee stated that:

"We cannot interfere in the drainage system of that street or district, as that is not our responsibilities, but that is the job for municipal water bureau…".

This indicates that building professionals in this region are primarily focused on the drainage infrastructure of buildings. Professional guidance (the 'General Specification for Building Maintenance Works in Commercial and Residential Buildings' produced by the Building Surveying Division (BSD) of the Hong Kong Institute of Surveyors (HKIS, 2009)) states that built environment professionals should be primarily responsible for assessing pipes for leakages and the waterproof materials in roofs and walls of the property before and after any *"release of the water or flooding"*.

Role of insurance and compensation regimes in promoting or not promoting mitigation

According to the disaster mitigation protocol established by the Ministry of Housing and Urban-Rural Development (MOHURD, 2016), flood insurance is encouraged in China. The current flood insurance system in China (including Hong Kong) is included by default within a general (or 'bundled') property policy for commercial buildings, which is provided by both, the private and commercial market-based systems (Walker *et al.*, 2009).

The national government encourages companies and citizens to participate in insurance programs according to the '*Emergency Response Law of the PRC*' (2007). However, Shi and Liu (2013) criticise this system because it lacks any legally binding incentive mechanisms. Flood insurance is not mandatory or required by the national government, nor by provincial, municipal and district authorities. The large private insurance companies have dominated and captured a majority share of the market, and there is no state pool solution currently in China.

Commercial property owners or landlords (or property management companies) are required to purchase property insurance. This legislation is integrated with mortgages and rental agreements for leaseholders (Li *et al.*, 2015). The bundled type property insurance package normally covers a limited set of flood related problems such as:

- Rainwater overflow or leakage at roof top;
- Storm-water drainage blockages or damages (including leakage);
- Seepages from ceilings by failure of pipes; and
- Surface water flooding.

According to the 'Principles and Practice of Insurance' published from the Office of the Commissioner of Insurance from the HKSAR Government, private insurers can provide insurance coverage for fluvial, coastal or combined flooding, but that is optional and not compulsory to property owners (HKOCI, 2013). Gaschen *et al.* (1998) stated that around 80% of property flood insurance schemes are purchased by large and medium sized commercial enterprises. The availability of, and demand for, both bundled property insurance and extra flood cover may be enhanced if urban provincial and local governments support the private insurers with the required risk information and financial support (e.g. through private-public partnership) (Wang *et al.* 2012; Li *et al.* 2015).

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According to the interviews with professionals in the Greater China region, having property insurance is a common practice among land and property owners. One interviewee commented on the role of insurance for commercial properties, stating,

"…as far as I know most of commercial properties are required to purchase the property insurance and it is combined with flood disaster, fire and other hazards and most of our clients are obliged to follow, as to protect themselves and the property, but of course, it is optional if our clients (the property landlords) want to increase the premium of their own needs on extra requests; as far as I know such as Sheng Wan district in Hong Kong which has been flooded before (in 2001 and 2006), they may need to negotiate with the private insurers, as Hong Kong and China, there are no a single-out flood insurance product or package available as far as I know. So, I understand the property insurance that my clients to purchase are normally can cover the cost from surface water flooding includes fixing the lifts or escalators or the flood from pipe leakages and seepages, etc."

Some interviewees felt that the current bundled insurance system does adequately addresses the flood risks in most Chinese cities. The interviewees implied that because the majority of commercial buildings in the Greater China region are skyscrapers (and mostly located at the city centre or CBD), the surface water flooding they are exposed to is usually covered in the bundled commercial property insurance package, as noted:

"You know the commercial or residential properties in Hong Kong and other Chinese cities are high rise buildings, also normally developers and the government are not foolish, they will not put developments into a high (flood risk areas), normally the drainage system is well equipped, such as in Hong Kong and Shanghai are pretty good standard."

However, those interviewed also indicated that property insurance premiums would likely rise after flooding occurred, especially if some relatively expensive facilities or equipment (such as lifts, escalators and data storage facilities) are damaged. As one interviewee pointed out:

"as far as I know in many cases, if it is needed to repair or fixing a lift/escalator in a commercial building (with 30th to 40th floors/levels - common height in the Greater China region) will approximately cost at least with $1 million (or more) Hong Kong Dollars (HKD) (equivalent to £100,000)…".

The increase in insurance premiums after flood events will depend on the level of damage caused to such facilities. Where insurance premiums have increased, the interviewees in China indicated that these costs are usually transferred to the leaseholders directly, or added to annual rental costs.

Given the limited definition of flooding used in standard insurance policies and the low availability and demand for the additional flood premiums, the responses indicate that insurance plays a negligible role in incentivising flood risk mitigation.

Impact of flood risk or flooding on commercial property value

One valuation professional believed flood risk did not have a significant impact upon commercial markets. Even in cases where property owners transferred the costs of increased insurance premiums onto leaseholders, commercial property is still in high demand. This is a result of both, the low perception of flood risk among businesses and the belief that the strength of the Chinese economy:

"…I have to mention one thing, because the current office and commercial property are very demanding in Chinese cities like Hong Kong and Shanghai, you can see the commercial property offices emptiness rate is very low especially the grade A and B offices, I believe even if the landlord were to put up the rent because of the insurance and other costs. This will not affect the situation (rental) too much."

It is worth noting that this low perceived flood risk contrasts sharply with global insurers' assessments (e.g. Swiss Re, 2014), which place Chinese cities high in the global ranking of cities under threat from natural disasters.

Challenges and opportunities for built environment professionals in giving advice

Interviewees in this region have noted that they do not receive many requests from clients for advice which is specifically targeted at strategies to mitigate the increased flood and climatic risks associated with climate change. One respondent noted,

"To be honest with you, not many clients have asked about some special services due to climate change, perhaps the understanding of climate change is not as strong as the western countries, or the priorities of landlords are not on the issues of climate change. But yes, I think it (climate change) is an important issue, in my past experiences there are requests for special measures for preparing or maintaining water pipes from leakages by rainstorms and typhoons … for example in Hong Kong, many grade A office building … they request us to provide some services."

However, interviewees in China believe that there are opportunities to provide professional advice on measures to improve building resilience to flooding and other climate extremes associated with climate change. An interviewee responded that:

"…I can see there are opportunities for us to take a bigger role, the government also need to supplement the building guidelines and legislated rules with specifications on climate change and flood risk; currently the TG [technical guidance] *only covers seepage, pipe leakages and maintenance, storm water pipes connection with the existing drainage system."*

Some interviewees in China believe the government should provide both legislation to support the adoption of flood mitigation strategies and supplementary technical guidance for built environment professionals on the minimum standards required by law:

"… if things not have been legislated, we cannot do anything more and I believe landlords and tenants will not be very active, as if they think the flood issues is not a big problem, they may not invest [in flood protection measures] *that much. Thus I think it is lacking of binding by laws and no enforcement will be occurred as well. We seek for more opportunities working on such areas, I hope the government will provide clearer guidance and address climate change issues."*

Unless there is legislation making the inclusion of climate and flood resilience measures compulsory, interviewees believed that land and property owners would not take serious steps to improve the climate and flood resilience of their properties:

"… if these issues are not properly legislated, even we are strongly suggesting owners to improve the infrastructure against flood risk or addressing other hazards, I don't think the owners will be bothered that much. It needs a better guidance and regulations in both Hong Kong and China."

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2 Valentin Ivantsov / Shutterstock.com

3.3 Germany

Floods are one of the most important natural hazards in Germany; they caused about 50% of the past economic damage due to natural hazards between 1950 and 2013 (Kreibich *et al.*, 2014). For contemporary integrated flood risk management, the contributions of property owners to flood risk reduction are important. This includes preparedness for response, property level precautionary measures, and flood insurance (Bubeck *et al.*, 2012). Since 2005, the obligation to take private precautionary measures has been codified in the Federal Water Act (WHG § 5, 2009). The Federal Water Act states that every person that could be affected by a flood is obliged to take appropriate actions (actions which are reasonable and within one's means) to reduce flood impacts and damage. Insurance companies also reward buildings which have precautionary measures within their design more strongly today than in 2002 (DKKV, 2015). Thieken *et al.* (2016a) state that the recently developed 'flood passport'[7] which supports a systematic object-specific risk assessment and reduction methodology, should also be tailored to the requirements of commercial properties. Built environment professionals should further stimulate property level precautionary measures of flood prone companies to further exploit this potential for flood risk reduction.

The roles and potential roles of built environment professionals in providing flood risk advice

There are various activities of built environment professionals which may offer the possibility to provide flood risk advice to businesses. Businesses may consult built environment professionals on the assessment of risk; the professional can point out and explain any potential consequences of a flooding incident. For businesses, a case by case decision is always required; a one–size-fits-all approach, which says per square meter this or that damage will occur, is not possible. Additionally, the professional can indicate which advantages the implementation of flood precautionary measures would have for the company, for example in avoiding or reducing interruptions to production. One interviewee stated:

"the task of the surveyor [built environment professional] is to identify the most cost-effective measure […] as well as suitable types of measures with which he [the company] can live with. This need to be suitable solutions for everyday use."

Suggested measures may first of all be structural improvements to protect from flooding, but also include change in production processes and secure storage of materials sensitive to water damage. It was suggested that advice may also cover the question of what happens if production stops. Interviewees indicated that built environment professionals can also point towards the possibility of getting an insurance policy. It is expected within the industry that mitigation measures, when

7 The German Hochwasserpass was developed by the Hochwasser Competence Center eV (HKC) in Cologne. It was supported by the GDV to characterise properties and give essential information for obtaining insurance cover.

implemented, may lead to the property being insurable or may reduce the insurance premium. However, for built environment professionals working for insurance companies, a good assessment of the flood hazard and risk is particularly important. In such cases, the built environment professional assesses the property on site and provides an appropriate response afterwards.

After a flood, insurance companies commission built environment professionals to assess the level of damage and the legality of the claims made by the insured parties. Built environment professionals can detect structural damage which was caused by the flood event and which can reduce the lifespan of a building. Building valuation professionals also provide assessments of the value of a property for credit ratings or mortgage applications for banks. Advice on possible protection measures is not important in this context. Important questions for these kinds of assessment concern whether or not a property is in the flood zone; whether there have been damages in the past; and whether these are still visible or detectable.

To provide flood risk advice, the interviewees were in agreement that the built environment professional should fulfil two requirements: (i) they should have adequate local knowledge about the flood hazard and knowledge about previous incidents, and (ii) they should also have relevant 'engineering' knowledge, in order to assess and analyse any weaknesses and suggest appropriate and suitable flood protection measures. Built environment professionals should not be from communities local to the flooded property in order to guarantee their independence. Built environment professionals should have an approach that is not only quantitative, but that also takes qualitative aspects into account. For example, it might be relevant if the company has a well-functioning risk management framework, which guarantees the successful implementation of measures.

Role of insurance and compensation regimes in promoting or not promoting mitigation

In Germany, insurance against flood damage is available via commercial property insurance and 'all-risk' policies. Cover is also available for interruption to business, covering fixed expenses as well as lost profit (Jakli, 2003). Small company (with an insured value less than 2.5 million Euros) premium setting relies on the ZÜRS flood zoning system, which is specifically developed for the insurance industry (GDV, 2008). Premium setting also takes into account previous claims. Under this 4 zone system, properties in zone 4 (more frequent than 1/10 years) are considered uninsurable. Premiums and deductibles increase from zone 1 to zone 4 (Seifert *et al.*, 2013). For larger companies or those with high premiums, individual examinations are carried out and built environment professionals could play a major role in informing and motivating companies to undertake private precautionary measures.

Around one fifth of companies in Saxony were covered by insurance in 2002 (Kreibich *et al.*, 2007). However, there are large regional differences due to historically compulsory flood insurance in the former German Democratic Republic (Thieken *et al.*, 2006; Seifert *et al.*, 2013), and the penetration rate of flood insurance increased strongly in recent years. The majority of the interviewees recognized that with industrial and large commercial businesses, the insurance premium, insurance excess and how much is paid in the case of an incident is commonly negotiated on a case by case basis. Small businesses can chose from several standards or levels of insurance. It was stated that the German Insurance Association (GDV) has developed non-binding insurance templates for the flood insurance of businesses which can be adapted for individual business. The insurance premiums depend on the flood risk and the amount to be insured (the rebuild value).

The price of an insurance policy is calculated by multiplying the premium rate by the total value of the property. That is the insurance premium the customer has to pay, minus an agreed excess charge. The purpose of the excess is to encourage the insured party to implement protection measures so to avoid large damages. However, insurance companies currently do not provide sufficient economic incentives for the customer. There is a large difference between the excess and the insurance premium and this could be significantly improved. There is also scope to allow prevention measures to influence the insurance premium calculated. Reduced insurance premiums would act as an incentive for the owner of a commercial property to carry out flood protection measures on their property, in order to get into a better risk category.

Most participants believe that many insurance companies are not sufficiently progressive to significantly stimulate flood precaution. However, an interviewee states:

"Conceptually I could imagine the following: subject to implemented measures, but which of course previously have been recommended by a neutral, competent body somewhere, one could then decide on the insurance premium".

The interviewees' explanation about the governmental compensation programs was that they do not motivate businesses to implement prevention measures or to get an insurance policy. Compensation programs play only a minor role for businesses, since they are implemented on an ad hoc basis and one cannot count on them. If at all, compensation payments may be a negative incentive, since owners of property who have protected themselves will not be treated any differently to others who have not taken any action to protect their property.

The insurance conditions for integrated flood risk management which stipulate private precautionary measures have improved during recent years, but the potential to use insurance policies to stimulate mitigation has not been fully exploited.

Impact of flood risk or flooding on commercial property value

According to many of the interviewees, flood risk and actual flood events do have a negative impact on commercial property values. However, the extent of this impact greatly depends on the individual case and the general situation.

One interviewee suggested that after flood events such as the recent large scale flood in Germany in 2013 or the flash flood in 2016, *"suddenly disproportionately high value markdowns occur, which are probably not risk appropriate"*. The flood in 2013 resulted in total losses of about 6-8 billion Euros and Saxony-Anhalt, Saxony and Bavaria were the three most affected federal states (Thieken *et al.*, 2016b). Approximately 19% of all losses incurred in the industrial and commercial sector.

Some participants said that the public availability of flood hazard maps and their increasing publicity has led to decreasing commercial property values in flood prone areas. One participant stated that the value of commercial properties in flood prone areas decreased significantly after the first round of flood risk management plans was produced in the European countries towards the end of 2015 (European Flood Directive 2007/60/EC). Some participants believe that this effect will increase in the future, also due to increasing flood hazard.

In contrast, other participants believe that flooding has no effect or maybe even a positive effect on the value of the commercial property if the right precautionary measures are put in place post flood. Participants who claim *"no effect on property value"* explain that this is because most potential buyers of a commercial property are not aware of the flood risk, do not inquire about it and do not consider it.

Highlighted practice: the role of an insurance company to promote mitigation measures among clients.

A participant named the insurance company FM Global as an example of best practice. FM Global work with their customers to identify risks to company property and develop suitable risk mitigation strategies with these companies. The insurance company sends experts to companies wishing to get insurance in order to make an assessment of the risks to the property. The expert suggests preventive measures which can also have an effect on the insurance premium once they are implemented.

Highlighted practice: using transparency about flood risk protection to improve property value.

In the federal state of Saxony, potential buyers have to be informed about existing flood risk. One participant believes, that:

"it may take another 10 years, but then flood risk will by default be considered in the valuation of commercial properties".

Another participant said (and some others argued in a similar way):

"companies which have their property on the floodplain and have been affected by a flood, have undertaken […] building measures to resist flooding, so that they were save during the next flood. In these cases the commercial property value is either stable or even increased, since they have a verifiably better property protection than before."

Challenges and opportunities for built environment professionals in giving advice

The assessment of flood risk in the industry is in its infancy. It was advocated by the interviewees that it should be more promoted and funded by the state, so that this type of business becomes more attractive for built environment professionals. By doing so, more professionals would invest time and money into professional development.

Flood risk and flood protection is a complex topic. It requires knowledge from a number of different disciplines, from construction engineering to hydrology. As a consequence of this complexity, companies may need more than one advisor, but companies also need to be able to finance this.

Despite the use of built environment professionals to assess flood risks for insurance purposes in Germany, the interviews revealed that there are not enough professionals who are sufficiently familiar with the topics of flooding and hydrological engineering. One interviewee expressed a wish that:

"*the training programme of the federal chamber of architects and of engineers shall contain the topic of reconstruction of flood damage as certifiable advanced training course.*"

Many businesses consider the specialist flood advice too expensive and find the individual advice too time consuming. Companies often consider protection measures a waste of money due to a lack of understanding of flood risk. It is easier to provide advice to a company which already has a risk management department than a company with no risk management culture. However, companies are sometimes hesitant to commission flood risk assessments, since they fear that poor assessments might require them to make expensive investments into protection measures. The interviewees recommended that the state should subsidise this advice because society can benefit from more effective private protection measures. Furthermore, respondents stated that government regulation of, or guidance for, rates of pay could improve how customers value the advice. Clarity is also needed as to who should be responsible for the flood risk advice: is it technical experts from the courts, engineers or the assessor?

University degrees in technical disciplines should have more of a focus on the consequences of climate change and the impact that requirements for climate change adaptation will have on the construction of buildings. In architecture, engineering and economic engineering, there is too little teaching on flood adapted construction and flood protection.


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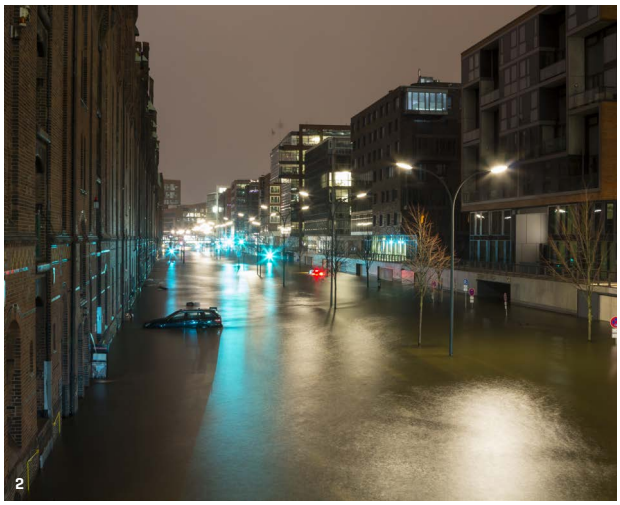
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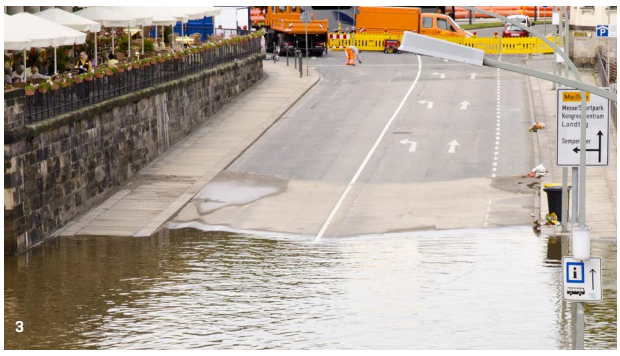
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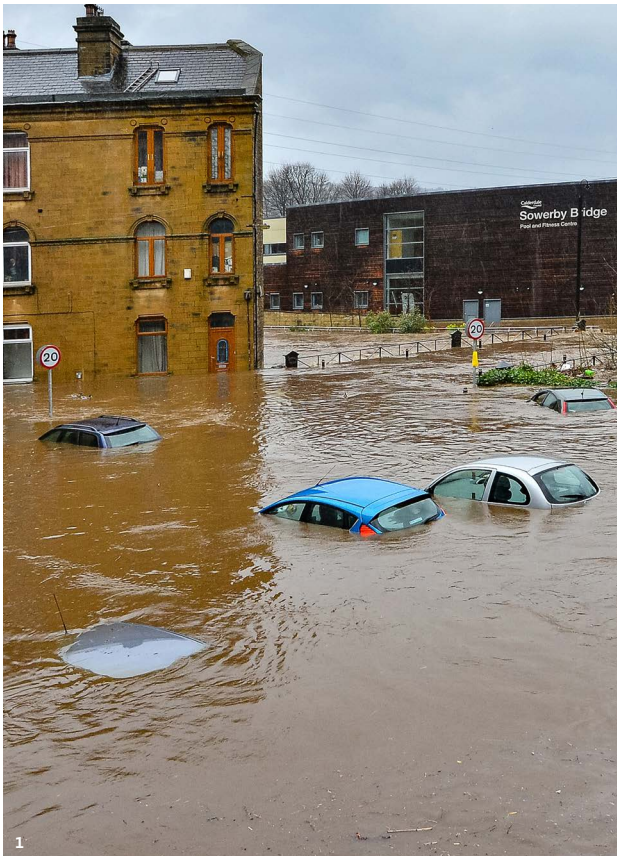

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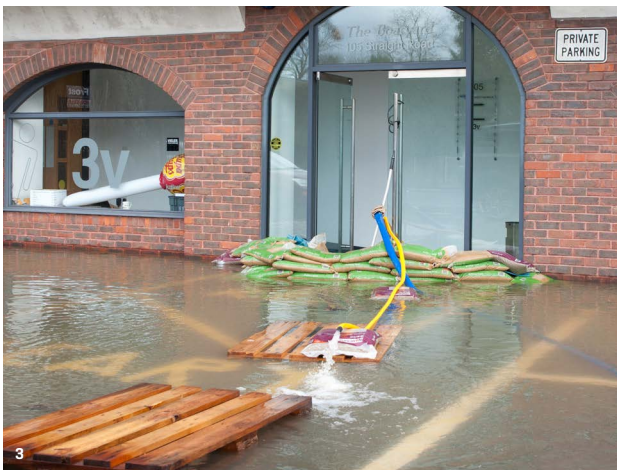

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3.4 UK

Concern about the risk of flooding to small and medium sized businesses in the UK is an emerging issue that has been researched from multiple perspectives (Federation of Small Businesses, 2015; McGuinness and Johnson, 2014; Ingirige and Wedawatta, 2014). The debate about the role of built environment professionals in flood risk management in the UK has been dominated by the relationship with insurers and insurance terms and the residential market.

The potential roles of built environment professionals in providing flood risk advice

After flood events in the UK, built environment (particularly RICS) professionals are frequently involved in the process of post-flood recovery in assessing damage, loss and reinstatement strategies (Nicholas and Proverbs, 2002). Built environment professionals are also seen as important in the process of risk assessment during property transfer and valuation for investment purposes (Pottinger and Tanton, 2012).

These roles were reflected in the interviews; many of those interviewed were already offering advice on aspects of commercial property management and valuation where properties were at risk of flooding or had recently experienced flooding. Other interviewees recognised the need for advice and the potential for built environment professionals to be involved, but were unsure how much is actually happening in practice. Examples of existing roles included risk-mitigation solutions using background information and mapping the risk in flood protection surveys to advise about resistant and resilience measures, insurance and compliance.

Built environment professionals need to understand what data is available and how to interpret it, as well as how the data can be challenged on a case by case basis. From a property management point of view, advice is needed to understand where the risk lies for individual sites and in providing mitigation advice based on that.
As one of the interviewees suggested:

"… all you really need to get to is 'what's my level of risk, physically, on site' and then it's all building surveyors skill set to do the next section of that and also, you're impartial, I think that's the thing that the industry suffers from, the fact that proprietary products market themselves incredibly well out there and people are vulnerable …"

In terms of valuation, qualified, experienced RICS professionals can play a significant role in the guiding of clients on investment in properties and advice is frequently offered at a basic level. In the words of a valuer:

"… every valuation we carry out should have some input in relation to this as we obviously do various environmental checks … this would always include flooding."

Built environment professionals have a role to play in advising both potential investors and owners. There is a need for synergy between different professionals such as those involved in the environment, buildings and valuations, with specialist flood risk expertise called in as needed. It is important to involve well qualified professionals, because otherwise quick fixes can lead to long-term problems like moulds, compounding the short term damage. However, there is also a need for people with knowledge of risk assessment and insurance issues and processes. As one of the interviewees summarised:

"… what I'm trying to say is most people wouldn't regard that as their role, but there are people who are more specialised in that area; therefore, you start to rely on them, but that's how the world works I think…".

The role of insurance and compensation in promoting mitigation

Insurance arrangements vary, but standard property insurance usually includes cover for flooding of all types, and 'business interruption' insurance can also be purchased. However, the bundling of flood risk with other property hazards reduces the appreciation of risk status (Lamond and Penning-Rowsell, 2014). Recent developments, including the introduction of the Flood Re insurance pool (April 2016) that specifically excludes commercial property, may lead to large increases in premiums and excesses for small to medium businesses at risk. Therefore, the role of built environment professionals in assessing risk and risk mitigation for small and medium businesses has the potential to increase. In contrast, larger commercial concerns, having long been excluded from the Association of British Insurers (ABI) agreement, may have already used professional advisors to mitigate their risk and gain cover.

The general consensus from respondents was that the insurance industry is a major stakeholder with a lot of weight in the promotion of mitigation. There is a perception that flood risk can reduce the chances of getting affordable insurance because such properties are seen as a risky investment. On the whole, the interviewees felt that the insurance industry could play a bigger role in promoting mitigation, as well as being more transparent in their approaches. Some felt that the closed nature of the reinstatement process, with inexperienced loss assessors advising owners and occupiers rather than properly experienced building professionals, worked against the installation of measures.

A critical barrier to insurers promoting mitigation is that insurance companies do not currently pay for betterment, they only pay for reinstatement on a like for like basis. It was felt that insurance companies could still promote sensible management of property by making sure property managers understand appropriate mitigation measures during reinstatement. Another suggestion is to incorporate resilience in building regulations as insurers will abide by regulations and do the repairs accordingly.

A majority of the interviewees suggested that insurance premiums and excesses should reflect whether mitigation measures are installed. Suggestions were made that this can be done by contracting out to independent built environment (and RICS) professionals or using in-house experts to understand the risk of flooding in detail.

Within the commercial market, there is often less direct involvement by insurers in the repair process. Cash settlements are commonly based on assessments of loss and damage that may not be well founded and professionals with the appropriate expertise may not be called on to advise at any stage. Owners and occupiers may self-insure because of high insurance premiums. If premium incentives can therefore be offered, there will be more interest in risk mitigation. In relation to recent opportunities relating to small government grants, it was pointed out that insurers could be more proactive in making people aware of the different available products and other measures such as waterproof plaster, waterproof kitchens and so on.

Impact of flood risks on commercial property value

Although previous research highlights the role of insurance in supporting the saleability and value of commercial property (Kenney et al., 2006), such concerns do not always emerge during the property transfer process. Market studies and expert consultation suggest that actors in commercial property are more focussed on opportunities rather than risks when assessing commercial premises.

There is a growing concern among interviewees that increasing incidents of flooding may have an impact on property value, as one valuer commented: *"there has to be a difference in value between a property that floods and one that doesn't".* However, the general consensus was that the relationship between value and flood risk is unlikely to be tangible or to directly manifest in property price. Impact on value depends on the particulars of the commercial property, in particular its use and location. It might be that the location is desirable enough that companies are prepared to accept the risk. As one of the interviewees mentioned:

"You could have a property that does have an elevated level of risk, but if every other factor is a big tick and there's very few, other options in the vicinity, well you're gonna find a deal that gets done despite the flood risk issue."

Transactions are still happening in high-risk areas because of their locational advantages. However, where choice within these areas does exist, low-risk properties are preferred (for example Leeds city centre after flooding in 2015).

Valuation professionals are able and primed to obtain flood risk information, but there is a lack of information on the impact of flood risk the market at present. It is expected that, in the future, with more data of comparable properties, it will be possible to better reflect risk in valuations, particularly for investment so information regarding future risk is also vital:

" ..So yeah, it is a key consideration for investors and therefore, as valuers, we need to put ourselves in the shoes of those investors and to consider the situation as we would expect them to consider the situation."

Value could also potentially be affected by the adoption of resistant and resilient measures. As one of the interviewees indicated:

"So if a business, or a commercial property, or even a domestic property could demonstrate that significant flood resistance measures have been adopted. Now, whether that's through a larger scale development scheme... or something which has been carried out by the business itself within the confines of the footprint, or the property itself, then I'm sure that would have a positive effect on the valuation of the business, or the property itself."

However, interviewees noted that the valuation of such measures is problematic in the absence of a professional consensus or recognition from the insurance industry.

Challenges and opportunities for built environment professionals

It was recognised that built environment professionals can play an important role in risk mitigation and property adaptation advice, but there are very few of these professionals with adequate experience in the field of flood risk assessment. Lack of training and the need for training is one of the biggest challenges faced by built environment professionals and enabling professional development may be a good way to overcome that. As one of the interviewees noted:

"there is a need to equip the profession better with the right tools to do the job".

Apart from skills and competency aspect, there is also a gap in coordination between built environment professionals, which poses a challenge to those who wish to deal with the multi-faceted problem of flood risk. Commentators increasingly call for RICS professionals to advise on risk mitigation (Soetanto et al., 2008). However, Ingirige et al. (2012) and have highlighted that built environment professionals may not have access to adequate guidance on measures for the wide variety of construction forms encountered in commercial property. Built environment professionals also need to recognise the priorities of business continuity in advising on adaptation for commercial premises.

Highlighted practice: multi-stakeholder collaboration in Sheffield Business Improvement District (BID).

Advising on mitigation of risk can be a complicated process because many business premises are part of larger structures or business may occupy multiple sites and have large assets outside the main building. Sometimes businesses need to collaborate, not only with each other, but with agencies to get the protection they need. In the UK, it is possible to improve the chances of flood protection works by being pro-active and providing some match funding. One good example of this is in the Sheffield Lower Don Valley that suffered heavily in the 2007 summer flooding event. To address the ongoing risk to commercial property, a business improvement district has been set up with the aim

"...to protect over 500 business properties and thousands of jobs, as well as ensuring that the LDV remains an attractive place for new investment and a great place to do business. In particular, improved flood protection should help businesses in the area to secure flood risk insurance, and potentially at more competitive rates."

BIDs were enabled in the UK in 2003 by the Local Government Act to be set up by democratic ballot of affected businesses. The local authority will collect the levy through business rates for five years. According to an interviewee:

"…we can therefore protect jobs in Sheffield Lower Don Valley - and still 30,000 people are employed there - and we can also create the right climate for investment for the longer term which will allow banks to invest in those businesses and for new businesses to invest in the Lower Don Valley and into Sheffield."

Image source: Hanna Grzesik / Shutterstock.com

One interviewee explains:

"I think there's a real wide, massive sort of difference from one surveyor to other surveyors and I think there is opportunity there for perhaps focused, targeted CPD [Continuing Professional Development] training to improve that"

There is currently a lack of a specific standard qualification required for flood risk and property mitigation advice.

Despite widespread availability of indicative floodplain mapping, getting site-specific risk information is difficult and the market is increasingly interested in detailed surveys on the ground. Most of the currently available commercial surveys are perceived as not sufficiently detailed to support good advice or as unreliable or hard to interpret, especially in areas of high flood risk. Furthermore, in times of a flood event, there is a capacity issue with insufficient professionals with the relevant knowledge to offer advice to flooded businesses in a post incident scenario where there is additional time pressure to re-establish business operations. An interviewee suggested that:

"For it to be of a more proactive basis, there needs to be a scheme devised, or properties are checked, or commercial properties are checked before the event where you can give this advice".

Highlighted practice: in house flood risk specialist can support the wider practice

A large industrial estate with 15 different light industrial units in Leeds was flooded to a depth of over one metre in December 2015. A large professional practice was brought in to advise on mitigation used their in-house flood risk expert to advise on the hydrological risk. The detailed risk assessment indicated that the high depth of flooding was likely to be repeated in future events. Therefore, property level measures (as planned by the businesses) would be inappropriate and a different approach had to be adopted. By recognising the underlying site-specific causes of flooding, likelihood and rarity of floods in a site specific manner before refurbishment took place, the business was able to incorporate the most suitable flood protection measures to reduce future risk. To summarize, in the specialist's own words:

"it's not necessarily an expensive and arduous technical exercise (for a specialist), it is a high level piece of that can be given relatively quickly, relatively cheaply and unlock potential improvements in risk in the future."

One of the other interviewees commented:

"sometimes you've got lead in times with some of the products where that could delay handing the property back … so there is a risk that the flood resilience and resistance measures could be pushed towards the back of the queue".

The provision of reports for flood risk assessment during commercial property valuation is not subject to national standards. Often, due to the added cost, this is not provided unless requested by the client. Advising on flood risk affected properties is seen as a niche market requiring more collaboration between built environment professionals, so as to provide well-informed advice and reduce potential liability issues. Market competitiveness and the proliferation of small firms also present barriers to collaboration among built environment professionals. A referral system or directory of experts was seen as a realisable opportunity to overcome this lack of synergy among built environment professionals. Bigger firms may have their own experts within their organisation but it is the smaller firms that will get help from a referral system. As one of the interviewees suggested:

"What worries me more is the smaller, local practice, maybe in residential, or commercial, when you don't have any experience, or active contacts who could help, so maybe that's where RICS information could help, or a directory, or referral system".

Whereas another specialist organisation noted:

"So I don't know whether, if you went on RICS 'search for surveyor' and you put in '… surveyors [RICS professionals] *who specialise in flood restoration,' whether that would come up on the RICS website at all."*

Flood risk is still a specialist area but the industry is starting to move in a positive direction.

On the matter of education and training opportunities, there were mixed views, from one interviewee:

"…there's 2,000 surveyors [RICS professionals] being trained at the moment, we're going to suggest that each of them does some research, or does some training on flood risk assessment' – they might never, ever get to use it in the whole of their career..".

While this is a reasonable point another interviewee commented:

"The younger professionals have comparatively higher awareness regarding flooding and flood risk as sustainability of property is included in the training".

A balance is called for with some general awareness backed by signposting to more detailed guidance and CPD to guide built environment (and RICS) professionals in the right direction where they can find more information.

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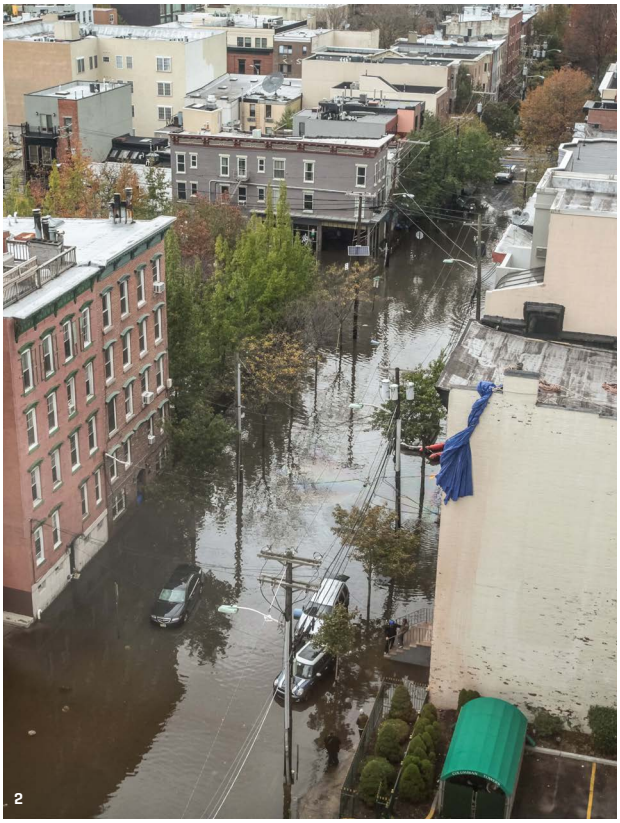

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3.5 US

According to the Federal Emergency Management Agency (FEMA, 2016), from 2010-14, the average commercial flood claim amounted to nearly $89,000. However, that figure only accounts for claims filed under the National Flood Insurance Program (NFIP) and does not include claims through other carriers. According to provisions of the NFIP, properties in the 1% floodplain (vulnerable to 1 in 100 year flood events) must carry flood insurance if the property is below the base flood elevation[8] (BFE), determined by property professionals. This applies to both new and existing development, although mitigation measures can be undertaken to reduce insurance premiums or even eliminate the insurance requirement altogether. The extent to which commercial property can reduce its flood exposure may be limited depending on a variety of factors, including the importance of the location to the success of the business (for example coastal versus inland; CBD versus outlying area) and the tenancy relationship (for example, owner versus franchisee). While local governments have responsibility for overseeing implementation of the NFIP, there is also much variation in enforcement across the country.

The roles and potential roles of built environment professionals in providing flood risk advice

It is the Elevation Certificate that is most applicable to the role of built environment professionals in the US. Elevation Certificates must be certified by a professional surveyor, engineer or architect and are required for multiple purposes:

- To determine the proper insurance premium for any structure;
- To support a Letter of Map Amendment (LOMA) in cases where an owner intends to contest the flood insurance requirement; and/or
- To verify compliance with the requirement that new non-residential structures built in the 1 in 100-year flood zone must be elevated above the Base Flood Elevation (BFE), or designed to be watertight.

This certificate requires information on the property, Flood Insurance Rate Map specifications (including BFE and the datum used), and building elevation information specifying the elevation of a structure's lowest enclosed area (FEMA, 2012).

An alternative to the flood elevation certificate is the flood-proofing certificate that also needs to be prepared by a suitably qualified person, such as an RICS professional. This NFIP requirement states that all new property that is due to be developed in designated floodplains must be surveyed to document the elevation of the property with respect to the BFE. However, many professionals only

8. The computed elevation to which floodwater is anticipated to rise during the base flood. Base Flood Elevations (BFEs) are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles. The BFE is the regulatory requirement for the elevation or floodproofing of structures.

do the minimum by completing the Elevation Certificate to FEMA. They do not help developers understand the flood risk and opportunities for mitigation. As one of the interviewees mentioned:

"More than a majority of [built environment] *professionals dabble in floodplain work and that is a very dangerous area to be – lots to learn. A lot of professionals go out pull up a FIRM* [Flood Insurance Rate Map]*, interpolate between some BFE lines on a map, determine what BFE is for site, do the elevation survey, give them certificate and don't provide other information on what they can do to make structure safer or about insurance."*

Other built environment professionals are well trained in flood risk mitigation and offer advice to clients. Indeed, some specialize in addressing the flood risk to properties, though they are a small minority.

In conjunction with FEMA, North Carolina implemented a pilot program offering a training program for built environment professionals to become Certified Floodplain Surveyors (CFS). The original intent of the program was to allow specially trained professionals to fast-track processing of Elevation Certificates (ECs). Once the processing of ECs was fully digital, FEMA saw no need to expand the program to other states. However, there are benefits of the program beyond ECs, and the National Society of Professional Surveyors has been considering undertaking such a certification program because of the training it provides its members. With such certification, built environment professionals will be better able (and likely more willing) to expand beyond the task of surveying to complete ECs. Without such a program, there is little motivation for built environment professionals to go beyond what is required by FEMA.

Role of insurance and compensation regimes in promoting or not promoting mitigation

Many companies in the US (those within the designated areas) are covered under the state subsidised National Flood Insurance Program (NFIP); a scheme established by the passage of the National Flood Insurance Act (the Act) in 1968. The Act aimed to guide development away from floodplains, thereby minimising flood damage and also to transfer the costs to those at risk rather than to all taxpayers. The Act also encompasses flood hazard mapping and floodplain regulations. Access to the NFIP scheme is contingent on the at-risk community complying with other aspects within the Act (mapping of flood hazard areas, and implementation of building restrictions). After 1973, with passage of the Flood Disaster Protection Act, all US communities of more than 20,000 designated as flood prone must join the Programme (L. R. Johnston Associates, 1992).

Most recently, the Biggert-Waters Flood Insurance Reform Act of 2012 was enacted, designed to phase out subsidies on many flood insurance premiums.

As a result, structures in the 100-year floodplain with any level below the BFE must carry flood insurance, though some argue for (and some places require) a higher standard, which is often the BFE plus 1 foot (Emmer, 1999; Federal Interagency Floodplain Management Task Force, 1994). Structures in moderate to low risk areas can purchase a "preferred risk" policy which offers coverage up to $500,000 for the building and the same for contents, though an owner can opt for contents coverage only. Flood insurance coverage for commercial structures depends on:

- The risk area in which the structure is located
- The year of building construction
- The number of floors
- The location of its contents
- The location of the lowest floor in relation to the elevation requirement on the flood map (in newer buildings only)
- The deductible chosen and the amount of building and contents coverage.

Interviewees felt that the current structure of flood insurance does not necessarily promote mitigation. As a flood plain manager commented:

"The pricing of flood insurance sends a signal to do mitigation and if you have a subsidized pricing structure then you aren't sending the mitigation message but if you have more actuarially rated policies then you are sending the message that if you mitigate it can reduce your insurance premium."

The rate structure through NFIP does not reward policy holders for further mitigating for flood risk. It was suggested that properties in designated floodplains must meet basic mitigation requirements. For commercial properties, these requirements would include dry-flood proofing through elevation, for example, when building a new structure or flood gates over openings when retrofitting. However, commercial coverage through the NFIP is seen to be too low for most commercial entities, so many also go to the private market. Mitigation requirements in the private market are minimal if any. It has been argued that the NFIP can do a better job of promoting mitigation by rewarding it through significantly reduced insurance premiums. However, without the cooperation of the private insurance market, this will not have a significant impact on commercial property.

Impact of flood risk or flooding on commercial property value

The interviewees noted that because all properties are not equal, the impact of flood risk on commercial property value is difficult to generalize. Often property value comes down to location and function which can make an area so desirable that the flood risk associated with that property is an unimportant consideration. In such cases, the costs of insurance and/or mitigation are seen as part of the cost of doing business, because the benefits of the location are

Image source: Matthew Orselli / Shutterstock.com

sufficiently high as to outweigh the extra costs. Examples include water dependent businesses and high amenity locations such as coastal areas. While these businesses may be at high risk, they also anticipate high rewards and there is demand for such locations because of the anticipated high rewards. At the same time, in a situation with both flood and non-flood property in a similar location, the property with higher flood risk will likely be valued lower than the non-flood property.

Despite the influence of other, location-based factors on commercial property value, one flood could completely change the perception relating to a given property, at least until memories of the flood fade. This is has occurred New York City area following Hurricane Sandy. In the past, areas including in Brooklyn and the adjacent part of Queens have experienced high demand associated with desirable views and other amenities associated with the location. In these areas development sites had been trading for hundreds of dollars per buildable square foot. Interviewees perceived that, following Hurricane Sandy, some of this area has become 'unbuildable' as FEMA revised their hazard zoning. While this is an extreme example in the United States, insurance presents another dynamic that affects value. Any applicant for a loan from a bank will be required to carry flood insurance. This factor can change the way investors view high risk properties because they know that they are insured. As noted above, it is seen as a cost of doing business, provided the benefits of the location are sufficiently high. One of the interviewees (a commercial lender) summarised the impact of flooding on property value in the following words:

"If market participants believe there is a risk then it affects value. For example a shopping centre could be in a flood zone since say 1973 but has never flooded no matter what the risk is, so value isn't affected but one flood can change that."

Highlighted practice: recognised qualification for surveyors and the role of North Carolina's Flood Plain Management authority in capacity building

North Carolina's Certified Floodplain Surveyor (CFS) program was initiated as a pilot program in collaboration with the Federal Emergency Management Agency to facilitate processing of documents required under the National Flood Insurance Program. Specifically, the certification was designed to fast track applications. Although FEMA has since implemented other processes, so fast tracking is no longer helpful, there are many other benefits to the training which involves a very intense 3 day program after which participants take a two-part exam. The first day of training normally covers NFIP, associated regulations as well as what affects mapping requirements and community ordinance requirements. On the second day emphasis is on the FEMA forms that professionals are responsible for and what is involved in getting those processed. Finally there is a half day on elevation certificates, which are really the crux of the NFIP and of insurance and mitigation decisions. The program has been very successful as CFS submits more accurate and more complete elevation certificates. In addition, the knowledge that professionals have gained from the training have made it so some have educated insurance agents on NFIP.

Although the program has been relatively dormant since FEMA stopped supporting it, there has been some interest within the National Society of Professional Surveyors (NSPS) to implement such a program. NSPS has been in conversations with the Association of State Floodplain Managers (ASFM, 2000) about its certification program for floodplain managers, with an eye to perhaps emulate that process.

Challenges and opportunities for built environment professionals in giving advice

The interviewees indicated that there might be an opportunity for built environment (and RICS) professionals to give advice on flood risk and mitigation because of their role in certifying a property's elevation with respect to the base flood elevation. Where a property that is being considered for development is at or below base flood elevation (as indicated on the Flood Insurance Rate Maps), the built environment professional is in a position to let the client know what options are available. However, this would only apply to undeveloped land. For existing commercial properties, built environment professionals with the appropriate training and expertise are rarely involved, except perhaps to verify a property's elevation. In these cases, it is in the engineering and construction professions where mitigation options are recommended and designed.

It appears that built environment professionals are rarely asked by their clients about flood risk and mitigation options. Once a property is found to be in a flood risk area, there is an opportunity to provide such advice, but it often is not requested. Too often, the response to the property survey is to undertake the minimum mitigation required to obtain approval. A specific challenge facing appropriately qualified and experienced professionals in giving advice is that they are only a small part of the process. Too often, by the time the professional with specialist knowledge of flood risk is called in, appraisers, bank officials, engineers, and architects have been involved in the project, with little if any communication among them. Insurance has already been required and/or mitigation designed, sometimes with little to no consultation among all parties. Interviewees emphasized that probably the biggest challenge is relaying information in a way that property owners/developers can understand such that they see the importance of mitigation. Often flood risk is just another box on a sheet of data points.

Finally, many have pointed out that decisions on flood risk mitigation tend to be made with respect to today's flood levels and patterns, and not the flood levels or patterns of the future. A significant challenge therefore is getting people to look at both the short and long-term. Many businesses are just trying to survive and make ends meet, rather than looking at the long-term risk within the context of total business continuity plans. As mentioned by one of the interviewees:

"I think it comes down to short term versus long term view and a lot individuals/businesses are more focused on the short term because they are just trying to survive. People in my profession are more focused on the long term meaning what is going to happen if it exceeds BFE or what is going to happen in the next twenty years when sea levels rise a foot."

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2 FashionStock.com / Shutterstock.com

3.6 Cross-country summary and mapping

The study has shown a variety of regulatory and insurance regimes that influence the existing roles for built environment professionals in giving mitigation advice for commercial property, from China, where the roles are minimal through to the US, where elevation certificates are required for all properties in the floodplain. However, all countries also revealed various potential opportunities for those professionals and identified that certain barriers are having an impact on the advising role of built environment (and RICS) professionals. The results are summarised on a cross country basis in Figure 3.

The increased involvement of built environment professionals in the processes around property reinstatement after a flood, development in flood affected areas and flood mitigation certification does not necessarily lead to a demand from commercial property owners or developers for advice on flood risk mitigation. Built environment professionals do not always see their role as going beyond the minimal standards. Furthermore, other professionals who lack appropriate buildings expertise may be employed to give advice instead of those professionals with the relevant buildings expertise, knowledge or training. Interviewees recognised the need for specific flood risk knowledge and advocated for increased specialisation and/or appropriate referrals and collaboration between professionals. Therefore there is potential to either create specialist roles in flood risk advice within general building surveying, property management and valuation practices (as some have already done) or for professional practices to link or partner with specialist flood risk advisory firms and insurance specialists.

With respect to the role of insurance on mitigation, the main commonalities in all five countries relate to the perceived failures of the insurance system in fully incentivising mitigation. This was observed despite differences in the levels of cover, the type of insurer and the cover offered. The direct influence of insurance on mitigation is contingent on companies seeking to obtain insurance. Where national or regional trends are for companies to be uninsured, the influence of insurance incentives is limited. Reasons for this lack of insurance vary: it may be unavailable or unaffordable in high risk regions, or companies may choose to self-insure. National differences are apparent, ranging from the US, where cover is mandatory, to Australia, where availability is severely limited.

A difference between smaller and larger enterprises was also highlighted, with self-insurance more likely among larger companies and smaller companies therefore more influenced by the terms and conditions offered by insurers. Factors implicated in failure of insurance conditions to incentivise mitigation included:

- A lack of flood specific clauses and the bundled nature of property insurance
- Ambiguity of liability for damage
- The perception that existing general cover is adequate
- A lack of involvement of insurers in the recovery process
- No betterment clauses
- Limited knowledge of insurers in mitigation
- A focus on elevation.

The indirect influence of insurance terms and conditions on mitigation via the need to secure loan finance and saleability were raised by interviewees from all case countries except China.

With respect to the impact of flooding on value of commercial properties, a consensus emerged that value should be impacted by risk but that there was little evidence of this happening in markets. The factors that arose in all five locations are associated with:

- Other priorities in selecting suitability of premises being more important than flood risk
- A lack of understanding of how flood risk might sensibly be factored into property value.

However, concern was expressed about the short term, disproportionate impact of flood events on property value and the impact of blight on whole areas.

The impact of regulation and the provision of information about flood risk (e.g. in the form of flood zone maps) was variously felt to impact on (i) the ability of valuers to reflect flood risk in routine valuations in different countries and (ii) the perception of valuers that the presence of mitigation strategies, particularly insurance, can offset risk.

In the light of their reflections on existing features of the commercial property sector, discussions on the opportunities and barriers for built environment professionals included examination of the ways of improving the existing services provided, as well as perspectives on future opportunities and challenges to be overcome. These are summarised in Figure 4.

Figure 3 Emerging themes from the cross country analysis

Figure source: Interview with building professional's in five international locations

Interviewees in all countries highlighted the importance of training experts in flood risk assessment. However, they all also felt there are not enough incentives to do so in the current market and in the absence of strong emphasis in professional competency requirements. A combination of low levels of demand due to low risk awareness or perception, coupled with lack of suitable recognition of the acquired expertise in most countries was felt to limit the attractiveness of investment in non-mandatory training.

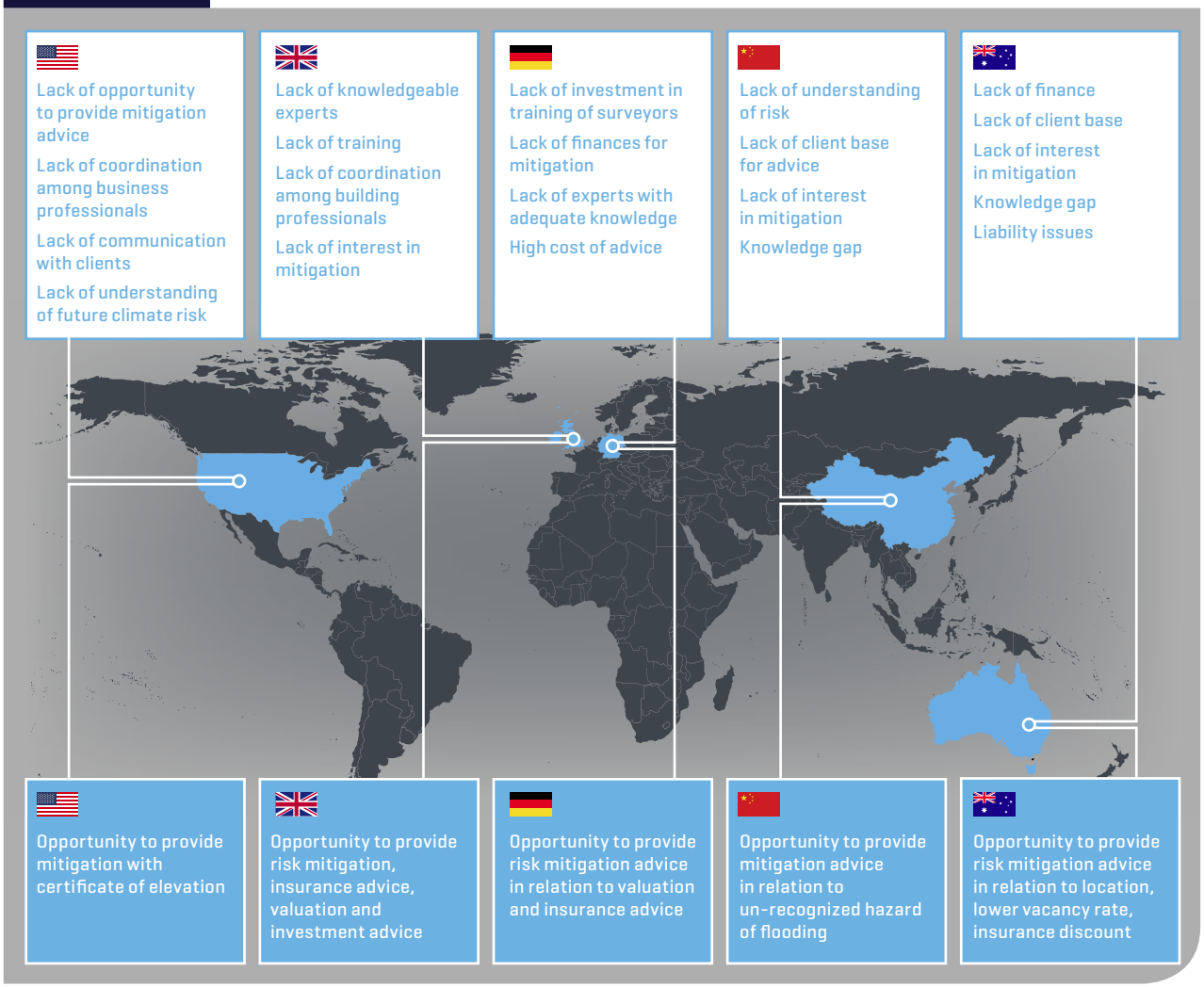
A similar situation is seen in case of adoption of mitigation measures which may involve substantial financial investment. Furthermore, clients may be deterred by mixed messages from different building professionals and other stakeholders such as government and insurers, and the real moral hazard where positive action is not recognised by lowering of premiums and inaction is rewarded through compensation.

Mixed messages stem partly from a lack of communication between stakeholders and building professionals and among professionals themselves. Opportunities arise to boost interest in mitigation when there is more integration (as in the US where insurer and government are integrated) or better communication (as in the Sheffield BID).

The importance of clarity is also highlighted by the German example where legislated obligations exist but are rather too general to be strictly applied. Built environment (and RICS) professionals work extremely well within clear guidelines and standards, whereas professional indemnity clauses may preclude them from offering speculative advice.

In summary, built environment professionals generally recognise the need for providing a variety of advice on flood risk and other topics and the opportunity to improve flood risk now and in the future. However they reasoned that the major challenges are related to government policy; whether there are provisions to encourage professionals (by legislated technical guidelines) to undertake consultative roles. Whether property owners are fully aware of their flood risk or not there appears to be little willingness to go beyond mandatory requirements for flood risk mitigation advice.

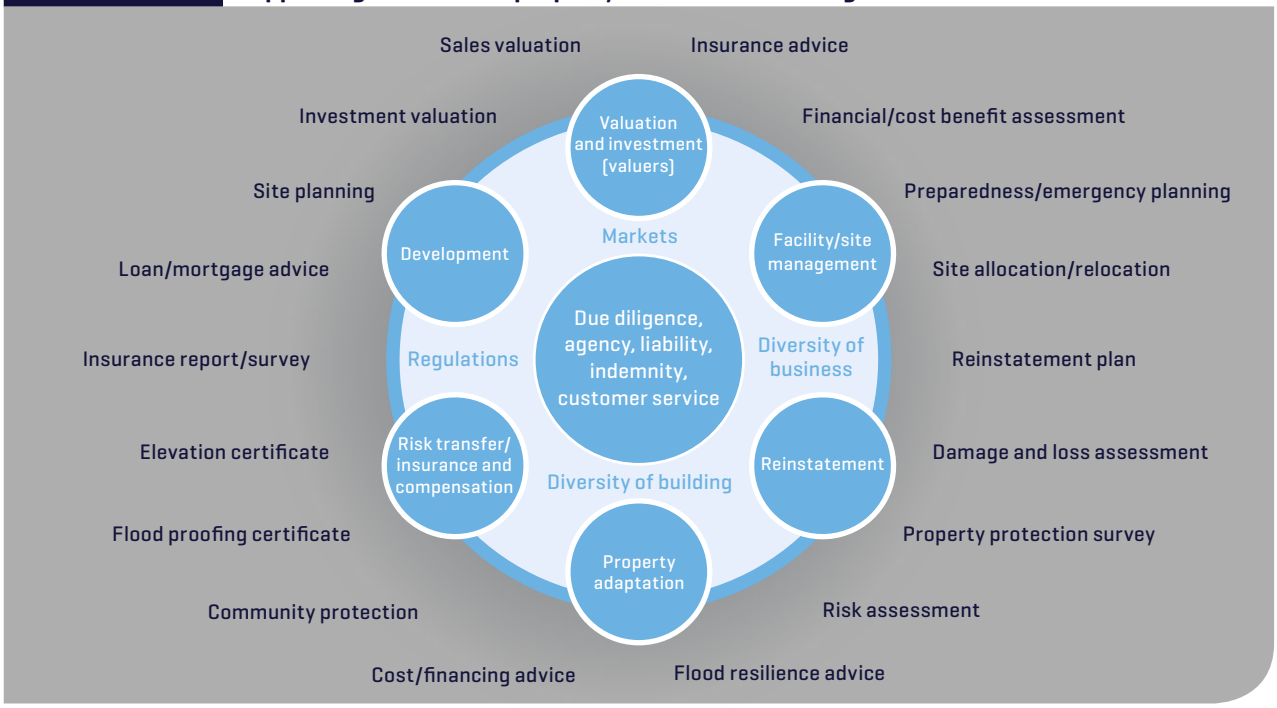
Figure 4 **Barriers and opportunities for built environment professionals in playing a greater role in flood risk reduction advice**



The interviewees argue for higher mandatory requirements in order to increase their role in flood risk mitigation and improvement of resilience for commercial buildings.

The potential roles of built environment professionals and key considerations as revealed through literature and interview survey is shown in Figure 1 below. The figure is a simple depiction of the summary of potential roles built environment professionals can play in advising on flood risk reduction and mitigation. One way of visualising the diagram is to understand the diversification of professional roles around the core issues of consideration for their actions such as due diligence, agency, liability and indemnity and customer service. These factors are reflected according to different aspects of market structure, type of business and property (building in this case) diversification and the existing regulations. The main roles revolve around advising on valuation and investment, facility management, reinstatement, property adaptation, insurance and compensation as well as new developments. Different specific roles emerge from each of these group of activities and the third level scatter of terminologies provide a general idea of the type of advice each group of experts are likely to provide. The services do not correspond neatly to existing RICS specialisms or professional groups – rather, they are very much overlapping. This conceptualisation puts further emphasis on the need for built environment professionals from different disciplines to work together to play a bigger role in risk mitigation and management.

Figure 1 **Conceptual model illustrating the potential roles for built environment professionals in supporting commercial property at risk from flooding.**



4.0 Conclusion

Image source: meunierd / Shutterstock.com

The evidence from this study points to the important role built environment professionals are already playing in providing impartial and professional advice on commercial properties at risk of flooding in all the regions considered. Built environment (and RICS) professionals are found to be providing advice on:

- Flood risk for new developments and for building adaptation and reinstatement (Australia)
- Building structures, maintenance and surface water drainage systems (China)
- Assessment of risk and development of risk maps including advice on flood precautionary measures (Germany)
- Levels of damage and advice on property valuation (Germany and UK)
- Risk mitigation measures (UK)
- Elevation Certificates and flood-proofing certificates (US).

While built environment professionals' roles in flood risk advice vary across regions, what is consistently clear is that there is considerable scope for extending the role that built environment (and RICS) professionals currently play. The importance of legislation in mandating the need for this advice is notable in the US and is highlighted in many other regions where this legislative requirement is currently absent. In many instances, the need for further training and development of expertise in managing flood risk is highlighted including a better understanding of how climate change may be altering the risk to properties.

Generally, insurers were seen to be important stakeholders, with scope to play a greater role in motivating and incentivising flood risk mitigation measures at the individual property level. Insurance (or the absence of it) plays a key part in the post flood recovery period and in the promotion of flood risk mitigation measures.

- In some parts of Australia, mitigation measures have even been imposed by insurers.
- In China and the UK, flood insurance is normally provided as part of a bundled insurance package.
- In Germany insurers have started to reward precautionary measures through lower premiums and excesses, albeit more could be done.

However, the role of insurers in commercial property flood mitigation in most countries is limited by the propensity of businesses to self-insure or ignore flood risk. In the US, uniquely, building owners are required to take out flood risk insurance if their property is in the floodplain and has any level below the BFE and mitigation can reduce the costs of insurance.

The impact of flooding or the risk of flooding on the value of commercial property was broadly consistent. The most likely impact was seen to be immediately following a flood event, when there may be a disproportionate negative impact on value in the short term, but this is likely to fade with time. In some cases, flood risk is considered unimportant for businesses with a specific function that is in high demand and in a good location – this will often

Image source: Hanna Grzesik / Shutterstock.com

outweigh the threat of flood risk for most commercial properties. It was noted how the emergence of better flood risk information in some locations has led to a reduction in property values for flood prone premises. There was anecdotal evidence to suggest that flood mitigation measures at the property level might help maintain or possibly have a positive effect on the valuation of a business in these instances.

There are many challenges and barriers to be overcome if built environment professionals are to play a more central and consistent role in advising commercial properties at risk of flooding. Some relate to lack of demand from clients. Convincing clients that the cost of flood risk mitigation is a good investment has been problematic. The lead-in time for some flood risk measures means they may not be available sufficiently quickly in the post flood period. The interviewees stated that clients are generally more focused on the short term or on other business priorities. Clients are unconcerned (either through a lack of understanding or lack of financial incentive) about future flood predictions and the associated risks of damage from flooding. Where legislated obligations do exist, these can sometimes (as in Germany) be too vague to be strictly applied by built environment professionals without further underpinning through standards and guidance. This is particularly the case where professional indemnity clauses may preclude professionals from offering speculative advice.

Notwithstanding the above challenges, there are clearly opportunities for built environment (and RICS) professionals, for example, in providing advice on payback periods and cost benefit analysis or return on investment on flood mitigation measures. Although some thought that younger professionals seem to be better prepared to provide this advice, more could be done by giving the subject of managing climate hazards greater prominence in RICS professional competencies and, where appropriate, in undergraduate and postgraduate curricula of RICS professional courses and CPD.

4.1 Recommendations

Increased legislation, development of relevant professional standards and building regulations and appropriate insurance terms could be effective means of increasing this demand.

There are lots of stakeholders involved in providing advice to commercial properties at risk of flooding – insurers, engineers, architects, and lenders, among others. There needs to be greater communication between professionals so as to develop a more integrated approach. Trust in professional advice is lost when commercial property owners receive mixed messages from these different groups. There exists a lack of experience, knowledge and expertise relating to flood risk among RICS and built environment professionals especially at the specific property level. There are also liability concerns for these professionals if the guidance provided or measures taken are not seen either reliable or effective.

Improved access to flood risk data and information coupled with better training and guidance would help to increase the pool of built environment professionals with appropriate expertise. However the limitations of professional competence needs also to be recognised and specialist advice made more accessible as part of the service. RICS could help develop a referral system to identify professionals and others with the appropriate experience and expertise and signpost these on their website.

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7.0 Appendix

Interview questions for semi structured interviews:
An international evaluation of the role of built environment professionals in providing professional flood risk advice on commercial property

Part A: You and your role

1. Can you tell me about your level of experience in providing advice about flood risk?
2. Now can you tell me under what circumstances you give this advice - how you are approached?
3. When you give the advice are there any standards or guidance that you use?

Part B: The role of flood insurance in promoting effective flood risk mitigation in the commercial property sector

4. Can you tell me a little bit about the ways commercial property owners and occupiers can get insurance or compensation for flood damage and disruption?
5. What effect do you think these arrangements for flood insurance or compensation have on promoting risk mitigation?
6. Can you tell me about any specific property level flood risk mitigation measures that are known to be efficient or are promoted by insurance companies or by you ?
7. Can you suggest ways that the insurance or compensation schemes could be improved to promote mitigation?

Part C: Your experience of impact flood risk has on future value of commercial portfolios

8. Can you tell me about the ways flood risk affects the value of commercial property at present?
9. Can you tell me about the ways flood risk might affect the value of commercial property in the future?

Part D: The challenges and limitations the surveying (and built environment) professions face and ways of overcoming them

10. What are the biggest challenges RICS professionals, including surveyors, face in giving advice?
11. What ways have you found or can you suggest that might overcome these challenges?
12. Is there anything else you would like to talk about that we have not discussed?

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