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THE ROLE OF SFPE IN REDUCING BARRIERS TO THE EFFECTIVE IMPLEMENTATION OF PERFORMANCE-BASED DESIGN

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Introduction

This article is the third in a series of articles that summarise a presentation entitled *The Contribution of the RTM to the Global Advancement of Performance-Based Design*, given by the author at the SFPE 2020 Performance-Based Conference & Expo, which was staged in Auckland, New Zealand from 11 to 13 March 2020.

This third article deals with the primary theme of the conference presentation, namely the broader role of the SFPE as a whole, and the SFPE's *Standing Committee for Research, Tools and Methods* (the so-called 'RTM'), in advancing the implementation of performance-based design (PBD) internationally.

As with the previous articles in the series, the context for this third article is a new SFPE committee which has recently been formed to develop a new SFPE Standard on PBD. One of the objectives of this new standard making committee is to reduce the barriers to the effective implementation of PBD by producing an ANSI-accredited SFPE Standard on PBD that can be widely used and relied upon around the world in numerous regulatory jurisdictions.

The first article in this series was entitled *Defining Performance-Based Design* and was published in the Q1 2020 Issue 17 edition of SFPE Europe Magazine [1]. The article provided the author's definition for PBD and the comparative status of different exemplar New Zealand Building Code compliance documents in relation to the definition.

For clarity, it should be noted that the views expressed in this and previous articles (and the conference presentation) are those of the author alone and do not represent the formal view of the above-mentioned committee, or for that matter the SFPE as a whole.

The SFPE Standing Committee for Research, Tools and Methods (RTM)

The RTM is one of six standing committees within the SFPE's organizational structure, the other five standing committees being: (1) Continuing Professional Development (CPD); (2) Membership and Chapter Relations (CMC); (3) Outreach and Advocacy (COA); (4) Professional Qualifications (CPQ) and (5) Nominations Committee.

As noted on the Standing Committees page on the SFPE website [2], "the work of the Society is largely done by six standing committees and their respective subcommittees" with each standing committee led by a chair (or co-chairs) and members of the committees being primarily volunteers from the Society's membership base, although it is important to note that non-members of SFPE can and do contribute to the work of the committees.

The RTM has three key areas of activity within its scope of work [3], namely:

1. To identify, develop and oversee some of the Society's technical products and research work
2. Review new innovations emerging in the fire engineering sector, and
3. Help establish a research agenda for the international fire safety engineering profession.

The SFPE currently has seven discrete technical products, as follows:

1. Fire Protection Engineering (FPE) Magazine
2. FPE Extra Digital Magazine
3. SFPE Europe Magazine
4. Fire Technology
5. SFPE Handbook
6. SFPE Engineering Guides, and
7. SFPE Standards (ANSI-accredited).

The RTM is responsible for the technical products items 5, 6 and 7 in the above listing.

There are four separate subcommittees within the RTM operational structure:

1. The Subcommittee for Handbook Development (SCHD) – SCHD is responsible for the SFPE Handbook
2. The Subcommittee for Research and Innovation (SCRI) – SCRI is responsible for identifying and reviewing emerging innovation trends and the research agenda
3. The Subcommittee for Codes and Standards Liaison (SCCSL) – SCCSL is responsible for the citation of SFPE technical products in codes and standards that are published by external organisations such as the National Fire Protection Association (NFPA) and the International Code Council (ICC), and
4. The Subcommittee for Standards Oversight (SCSO) – SCSO oversees and is responsible for the technical products (SFPE Standards and SFPE Guides) that the RTM produces for the Society.

Within the current RTM/SCSO work programme, there are eight active projects in progress – four Standard making committees and four Guide task groups – including the aforementioned PBD Standard making committee.

Barriers to the Effective Implementation of PBD and Key Needs to Reduce Barriers

The second article in this series was entitled *Barriers to the Effective Implementation of Performance-Based Design* and was published in the Q2 2020 Issue 18 edition of SFPE Europe Magazine [4]. The article gave details of seven discrete barriers, as follows:

- Barrier 1 - Legal/Regulatory
- Barrier 2 – Definitional Clarity
- Barrier 3 - Sector Capability
- Barrier 4 - Quantification
- Barrier 5 - Probabilistic Acceptance Criteria
- Barrier 6 - Accepted Tools and Methods
- Barrier 7 - Societal Impact Barrier

The same article also provided some specific examples of these barriers.

The article concluded by distilling the seven barriers down into three key needs that, if addressed appropriately, would reduce barriers to the implementation of PBD. The three key needs were:

Key Need 1 – International Acceptance

The first key need is for comprehensive design methodologies to be developed by authoritative organisations that have the international mandate to do so. This is as an important first step to ensure such design methodologies have sufficient credibility to achieve widespread international acceptance.

Key Need 2 – Quantified Design Criteria

On the basis of the definition presented for PBD, the second key need is for performance and acceptance criteria to be quantified with the combination of specific target values and an acceptable probability of non-exceedance for each target value.

Key Need 3 - Tools

The third key need is for suitable computer tools to be developed, validated, introduced and supported so that practitioners are able to consistently implement probabilistic design criteria in their design analyses.

Role of SFPE to Reduce Barriers

What role does the SFPE and the RTM have in reducing the barriers to the implementation of PBD in a global context? As the very name of the RTM suggests (Research, Tools and Methods), the committee has an important and influential role to play in the global fire safety engineering community and the building regulatory sectors to reduce barriers to the effective implementation of PBD. At the same time, the wider SFPE has an equally important

contribution to make in parallel to the efforts of the RTM. As the professional society representing those practicing in the field of fire engineering internationally, the SFPE has the credibility and profile to advocate at an international, regional, national and local level.

Reducing Barrier 1 - Legal/Regulatory

In relation to legal and regulatory barriers, for jurisdictions where the existing Building Code is either not performance-based, or there are no provisions within the existing Code to permit PBD, the wider SFPE has a very important and crucial advocacy role to continue to promote and advocate for the adoption and implementation of PBD.

Reducing Barrier 2 – Definitional Clarity

With regard to the barrier of a lack of definitional clarity as to what constitutes PBD, the RTM has an important role to play by increasing the visibility of what the term PBD actually means by firstly developing a very clear and widely-applicable definition itself, and then by promoting the definition as widely as possible in the international fire engineering community.

Reducing Barrier 3 - Sector Capability

For the third barrier where a lack of sector capability inhibits the effective implementation of PBD, the existing and widespread educational and credentialing initiatives within the Society will continue to be pivotal on behalf of the fire engineering community to improve the capability of the sector at the global level.

Reducing Barrier 4 - Quantification

In jurisdictions where a lack of quantification of building code clauses (in particular at the functional, i.e., the most detailed level) is in effect hindering the implementation of PBD, once again the RTM has an instrumental role to play by actually supporting the development of the numerical metrics that are needed by the code writers to include in building code provisions. The wider SFPE also has an important support role to encourage and enable the necessary technology transfer to occur from the RTM outputs to external code-writing organisations.

Reducing Barrier 5 - Probabilistic Acceptance Criteria

On the definitional premise that PBD involves probabilistic methods, for PBD to be implemented, the building code clauses that contain acceptance criteria (sometimes known as 'performance criteria') most include targets that are stated in probabilistic terms. In a similar vein to Barrier 4, the RTM can make an important contribution by establishing what are acceptable probabilistic thresholds, based on consensus from a wide international group of stakeholders and practitioners. Again, the Society has a support and promotional role to increase the scale and breadth of uptake internationally.

Reducing Barrier 6 - Accepted Tools and Methods

The mandate of the RTM is to develop tools and methods that are technically robust and fit for purpose for the international fire engineering community. Delivering upon this mandate will prove to be a very effective ways that the work of the RTM and the SFPE can help to

reduce the barrier posed by a lack of suitable design tools and methodologies. The credibility that the SFPE brand brings to such tools and methods can also not be underestimated and such SFPE endorsements do not need to be limited to products that are produced by the Society.

Reducing Barrier 7 - Societal Impact Barrier

The most difficult barrier for the RTM and/or SFPE to help reduce is that posed by the awareness that PBD practice brings to the question of accepting a certain (albeit very low) level of fatalities and injuries in fire where the design has followed a PBD process. That being said, the Society must continue to support and contribute to the wider discussion about the benefits and advantages of PBD.

Summary - Key Messages

The RTM is one of six standing committees within the SFPE organizational structure. One of the key activities of the RTM is to produce Engineering Guides and Standards, and the SFPE Handbook, which collectively constitute some of the most important technical publications that are used in the international fire engineering community.

A number of significant barriers to the implementation of PBD exist internationally, including legal/regulatory barriers, the capability of the sector, quantification of code clauses, and accepted design tools and suitable engineering methods.

These barriers can be consolidated into three key aspects, namely international acceptance, quantified design criteria, and tools.

The SFPE and RTM continue to have a vitally important role to play in reducing the barriers to PBD design being implemented effectively.

A future article is planned which will provide examples of some of the tools that are available to support robust PBD practice.

References

- [1] Baker, G. (2020) *Defining Performance-Based Design*, SFPE Europe, Q1 2020 Issue 17, <https://www.sfpe.org/general/custom.asp?page=Issue17Feature2>: Society of Fire Protection Engineers, Gaithersburg, MD, USA.
- [2] SFPE, *Standing Committees webpage*, accessed 25 March 2020, <https://www.sfpe.org/page/StandingCommittees>.
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- [4] Baker, G. (2020) *Barriers to the Effective Implementation of Performance-Based Design*, SFPE Europe, Q2 2020 Issue 18, <https://www.sfpe.org/page/Issue18Feature5>: Society of Fire Protection Engineers, Gaithersburg, MD, USA.