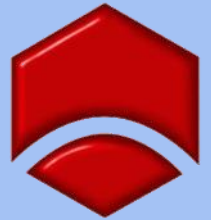



SFS FSVM Investigation

Presented by:

Geri Martin - AECOM



ENGINEERS
AUSTRALIA
SOCIETY OF
FIRE SAFETY

The graphic features a central dark purple circle containing the text 'SFS FSVM Study'. Surrounding this central circle are several other circles in various shades of purple and pink, some overlapping. The background is a solid dark blue, with a geometric pattern of light blue and white triangles in the top right corner. A solid red horizontal bar is located at the bottom of the image.

SFS FSVM Study

What we did

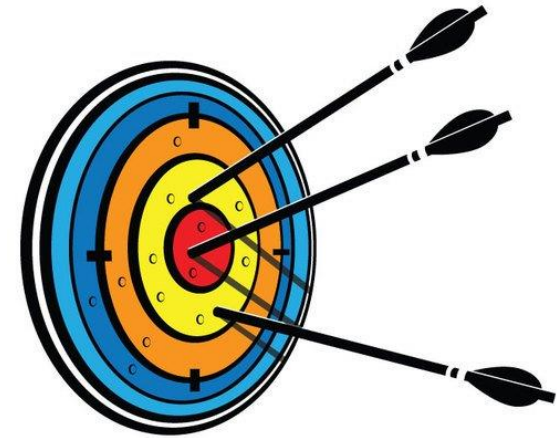
What we
found

What we recommend

Overview

Purpose is to undertake a review of the Fire Safety Verification Method with the aim of reach one of the three recommendations:

1. The FSVM and FSVM Handbook are recommended for use in most performance based designs, noting that the NCC does state that is will not be the most appropriate approach in all cases.
2. The FSVM and FSVM Handbook are not recommended for use in any/majority of performance based designs.
3. The FSVM and FSVM Handbook are recommended for use in certain cases, with certain limitations/considerations.



Structure of Assessment

- Performance based design scenarios were proposed by the design team based on common non-compliances that are currently addressed through Performance Solutions
- Test Cases were agreed upon by the design team
- Engineers and reviewers were established for each Test Case
- Assessment were completed independently between groups



01

Schedule 7 - Fire Safety Verification Method - Normative

- Part of the Normative BCA
- Is an **option** to compliance, **not a required path**

02

Fire Safety Verification Method Handbook - Non-Mandatory

- Informative guide
- Information on process and considerations for scenarios
- No quantitative inputs

03

Fire Safety Verification Method Data Sheets (Handbook annex) - Non-Mandatory

- Includes some input data
- Summary of approaches and high level review of some calculation methods and limitations
- Might have use for non-FSVM approaches

Test Case #1 - New Apartment Building

Building Description

- Residential apartments opening into common corridor (fully enclosed) with single non-fire-isolated stair and lift.
- Stair discharge into corridor in Ground Level.
- Full height glazing on apartment external walls.

Performance Solution

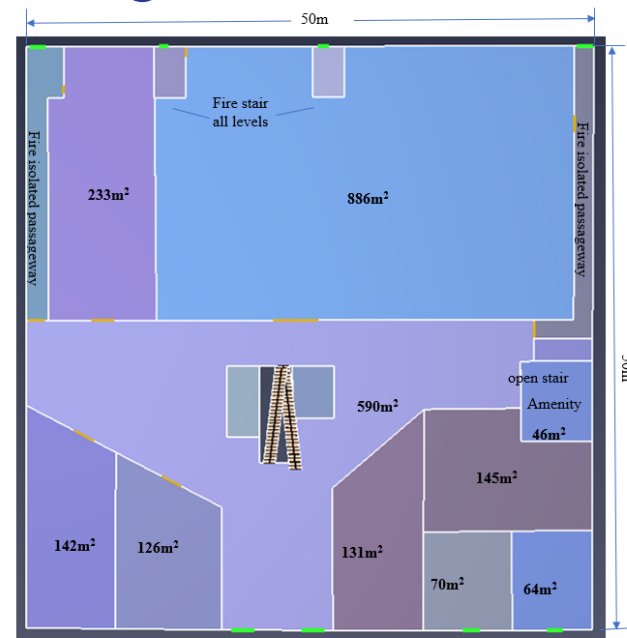
- Travel distance from the doorway of First Floor Units to the exit (top riser of the non-fire isolated stairway), via the common corridor ~ 8 m in lieu of 6 m .



Test Cast #2 - Commercial Building

Building Description

- Basement carpark under entire site.
- Ground Level and Level 1 form a single retail fire compartment with a total floor area of 5,000 m²
- Ground Level and Level 1 retail including enclosed mall with a collection of tenancies, some up to 950 m², most approx. 150 m². Fully glazed façade.
- Common open space on roof of podium and then commercial tower extending above. Tower 18 storey (65 m effective height).

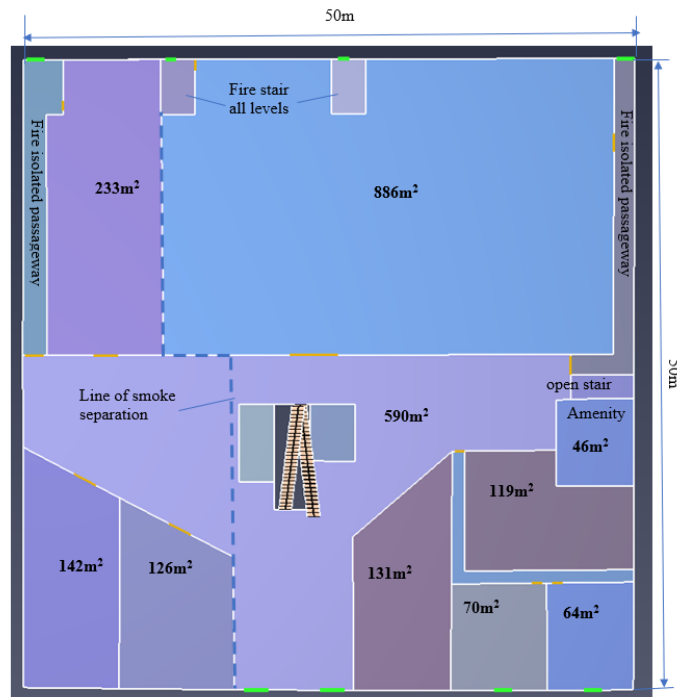


Ground Floor Plan - Subject Building

Test Cast #2 - Commercial Building (Retail)

Performance Solution

- The fire rated elements within the retail areas are proposed to achieve a general FRL of 120/120/120 in lieu of 180/180/180.
- A number of retail tenancies on Ground Level (all less than 100 m²) are provided with a single exit direct to open space.
- The Class 6 retail mall is proposed to be served by a rationalised smoke exhaust system that incorporates smoke reservoirs of up to 2,500 m² and extract rates that are not in accordance with BCA Specification E2.2b.



Ground Floor Plan - Reference Building

Test Cast #2 - Commercial Building (Office)

Performance Solution

- The fire rated elements within the commercial areas are proposed to achieve a general FRL of 90/90/90 in lieu of 120/120/120.
- The commercial tower contains a non-required, non-fire-isolated stair that connects three storeys (Level 10 to Level 12 inclusive), none of which is at a level providing access to a road or open space is at ground.
- The Tower is to have a larger floor plate or higher occupant density (e.g. 1:8) such that the OL of a storey is 220 people being served by 2 x 1m fire stairs which only support an OL of 200 people under BCA
- Single direction of travel of up to 28 m and up to 50 m multi-directional travel distances are to be permitted

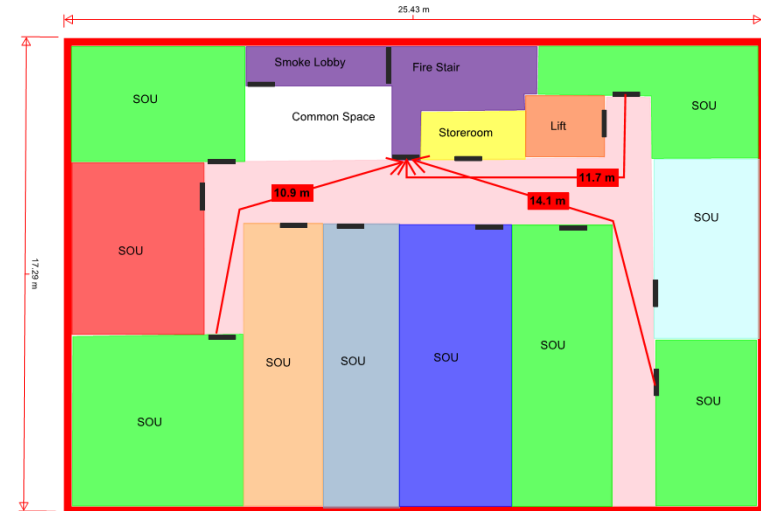
Test Case #3 - New Residential Building

Building Description

- Predominantly Residential building with basement carparking and small office tenancy on Ground Level.
- Building is < 25 m in effective height and provided with a single fire-isolated stair serving all levels.
- Basement is provided with 2 exits, one of which is the residential fire-isolated stair.

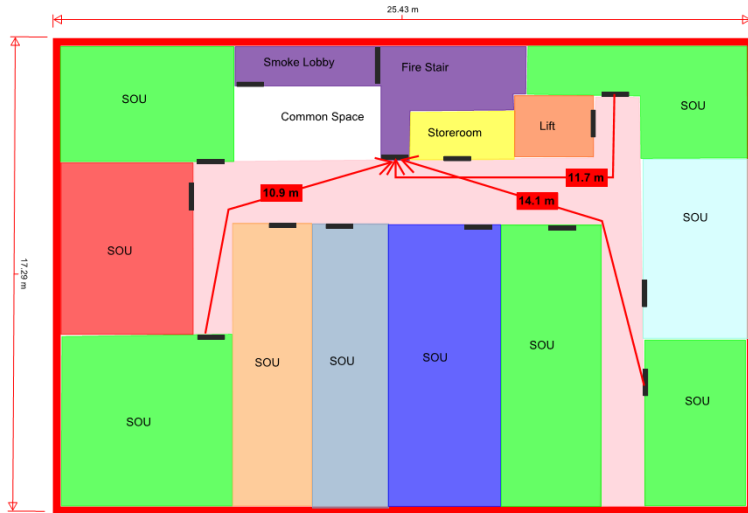
Performance Solution

- The residential levels contain openable glazed windows that are located 2.5 m (parallel) and 1.2 m (perpendicular) from the east allotment boundary, however these windows are not protected in accordance with BCA Clause C3.4.
- Travel distance on upper residential levels is up to 16 m to the single exit.
- The travel distances within the carpark are up to 30 m to a point of choice, 56 m to an exit and 80m between exits
- The fire-isolated stair discharges within the residential entry foyer (containing only the lift mailboxes and FIP)
- There is no separation between the rising and descending flights of the central fire-isolated stair

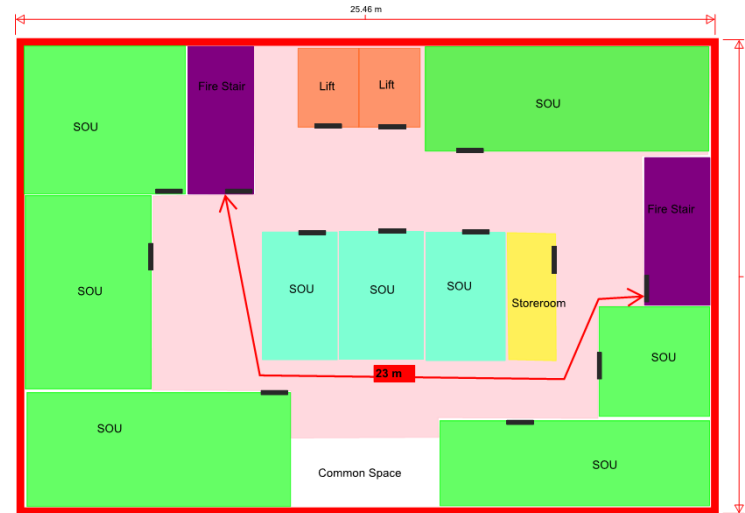


Test Case #3 - New Residential Building

Comparison of subject building to BCA DtS reference building



Subject Building



Reference Building

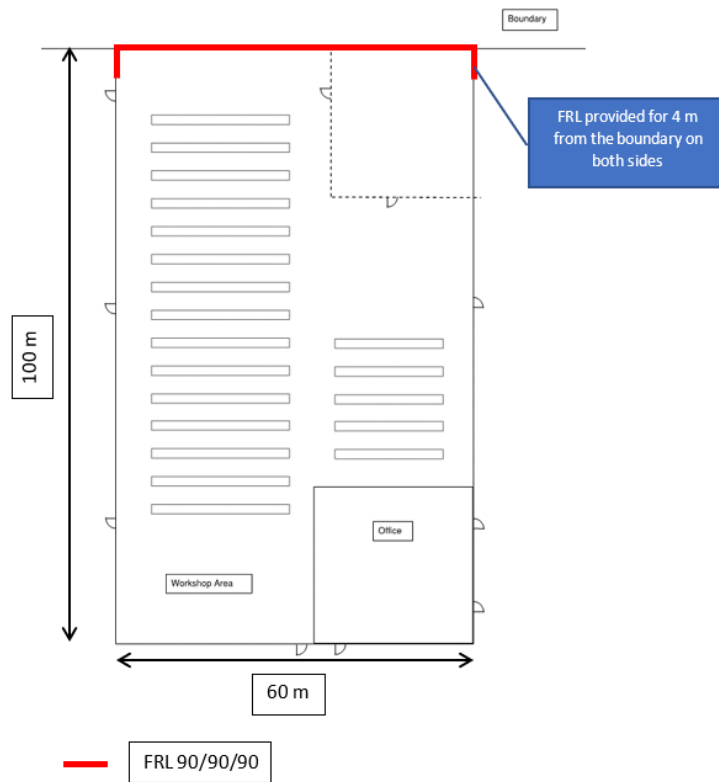
Test Case #4 - Industrial Building

Building Description

- Large isolated building
- Extension to an existing manufacturing / warehouse building
- Ground Floor fire compartment - 6,000 m² / 66,000 m³

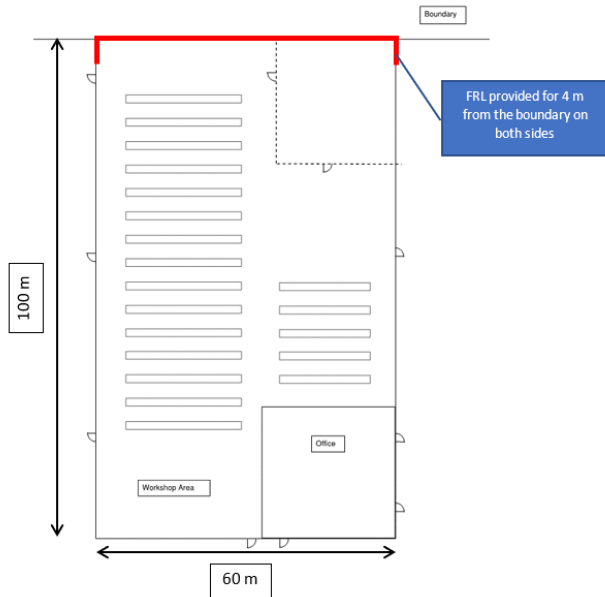
Performance Solution

- The building is provided with perimeter vehicular access on 3 sides only and is built up to the allotment boundary on the 4th side.
- Travel distances from the warehouse and manufacturing areas are up to 15 m to a point of choice, 55 m to an exit and 80 m between exits
- To achieve coverage to the building, a third length of hose is required (one length is laid external to the building).

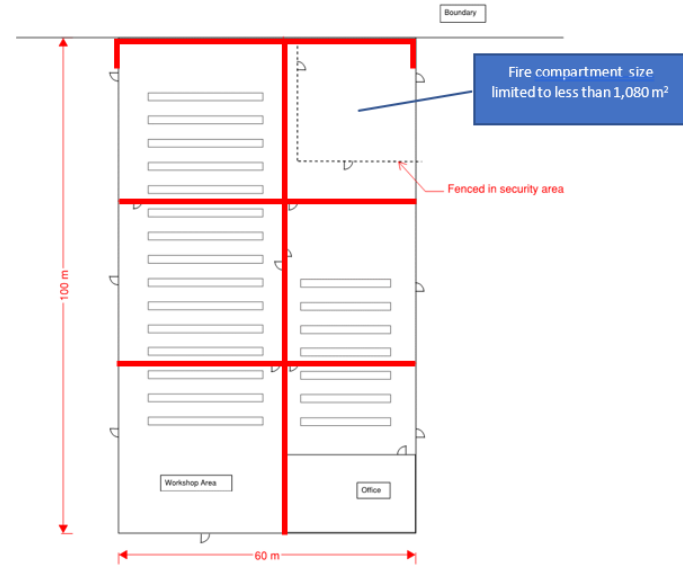


Test Case #4 - Industrial Building

Comparison of subject building to BCA DtS reference building



Subject Building



Reference Building

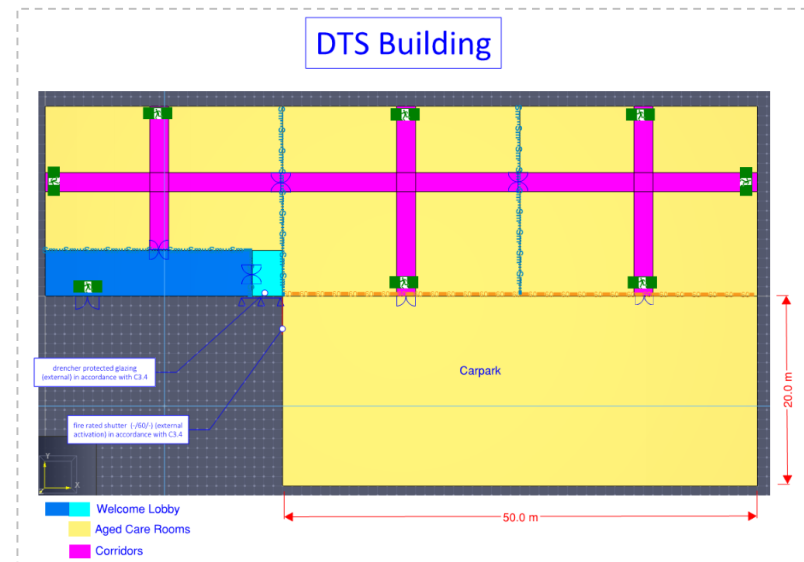
Test Case #5 - Aged Care Building

Building Description

- Rise in stories of 4
- Includes Class 9c aged care (Ground, Level 1, 2, 3)
Class 7a carpark, Class 5 office comprising less than 10% of the storey

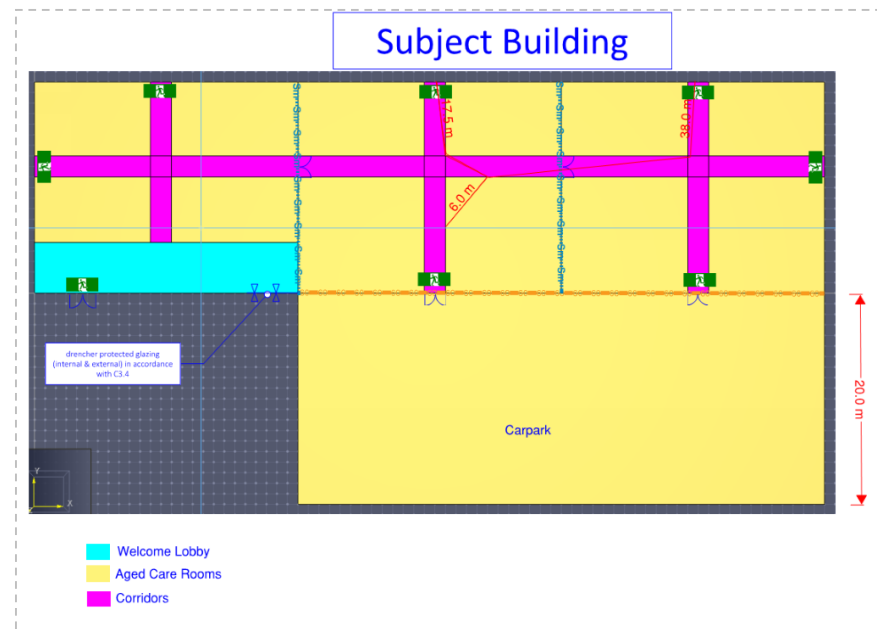
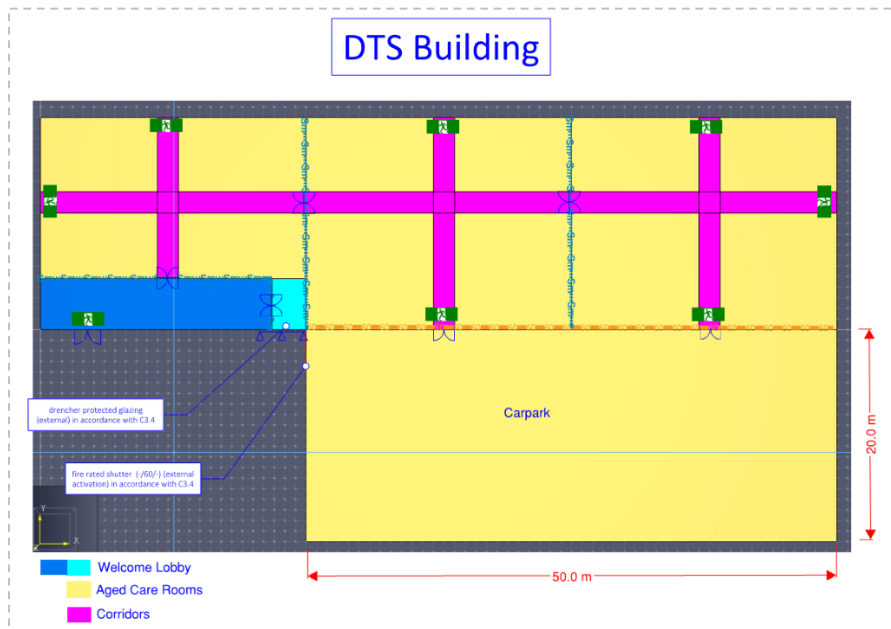
Performance Solution

- Openings in the external wall of the carpark fire compartment are not protected where they are located within 4 m of the external glazed wall of the aged care fire compartment on Ground Level
- Direction of door swing in portions of horizontal exits that form part of a required exit



Test Case #5 - Aged Care Building

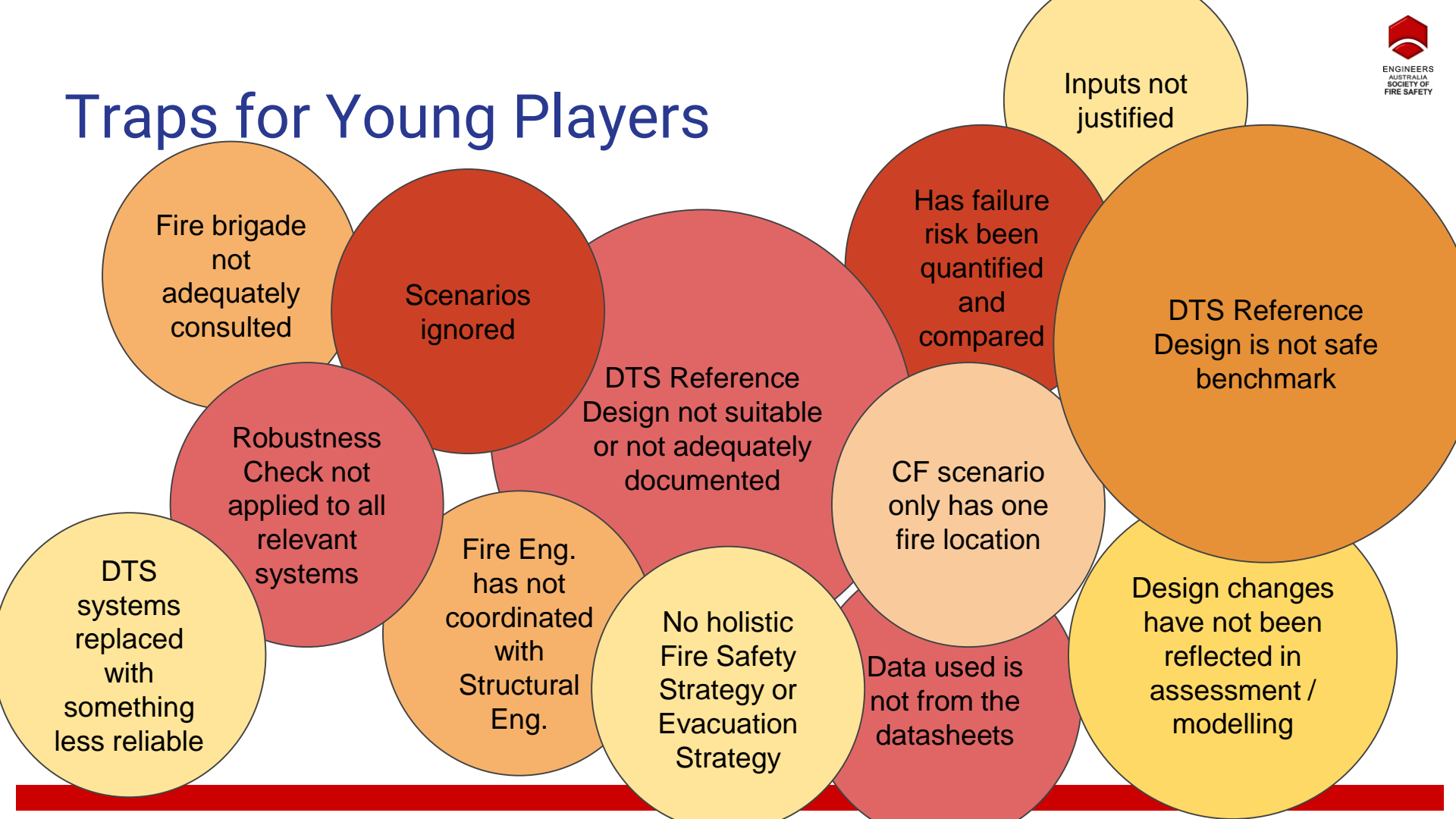
Comparison of subject building to BCA DtS reference building



Common Themes/Conclusions

- Derivation of the BCA DtS reference building
 - Handbook, in some instances, leads to derivation of unrealistic reference building
 - Who takes responsibility for derivation of the reference building?
- Additional time required for stakeholders
 - Assessments require approximately x2.5 the allocated time for current Performance Solutions for Fire Safety Engineers
- The comparison portion of the FSVM can allow for design that do not achieve compliance with Performance Requirements
- Early stakeholder engagement
 - Additional time for multiple stakeholders
 - Increased level of consultation
- Design changes have the potential to impact the assessment (i.e., require additional modelling)

Traps for Young Players



Questions to you as the AHJ

Is the DTS Benchmark a true representation of societal acceptable risk?

What benefits am I looking for from the FSVM?

If all the non compliances are on the ground floor, levels above are all compliant. Does the designer need to develop a design above ground, - noting that there are some scenarios that have two requirements i.e. DTS equivalency and absolute, so do we need to test DTS floors?

What else could be done with the FSVM?

Am I happy to endorse a Fire Engineering Report that states the result of the FSVM analysis is 'X occupants trapped in the building'?



Implications if FSVM becomes the norm

If the FSVM were to replace the current methodology for Performance based Fire Engineering:

- Increase in workload for Fire Engineers and Certifiers
- Not cost effective to address small number of DTS deviation
 - These designs return to DTS
 - Productivity gains associated with PBD are lost
- Performance Solutions that most consider 'standard type solutions' may not be feasible under FSVM
 - Step backwards in terms of productivity gains
- Junior Fire Engineers don't learn how to think critically, they just learn to paint by numbers.
- Trajectory towards automation of Fire Engineering is accelerated



SFS Recommendations

A

Nothing substantial to be gained by using FSVM

B

SFS Members should not adopt the FSVM in their work
Certifiers should not mandate that FSVM is used

C

The methodology and concepts + datasheets, could serve as a helpful guide to first principle designs (without comparison to the DTS) - *Thought process could be used to increase the level of rigor*

D

If FSVM is used:

- Certifiers should recommend independent Peer Review
- Margin of safety >0 for subject building

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Questions?