

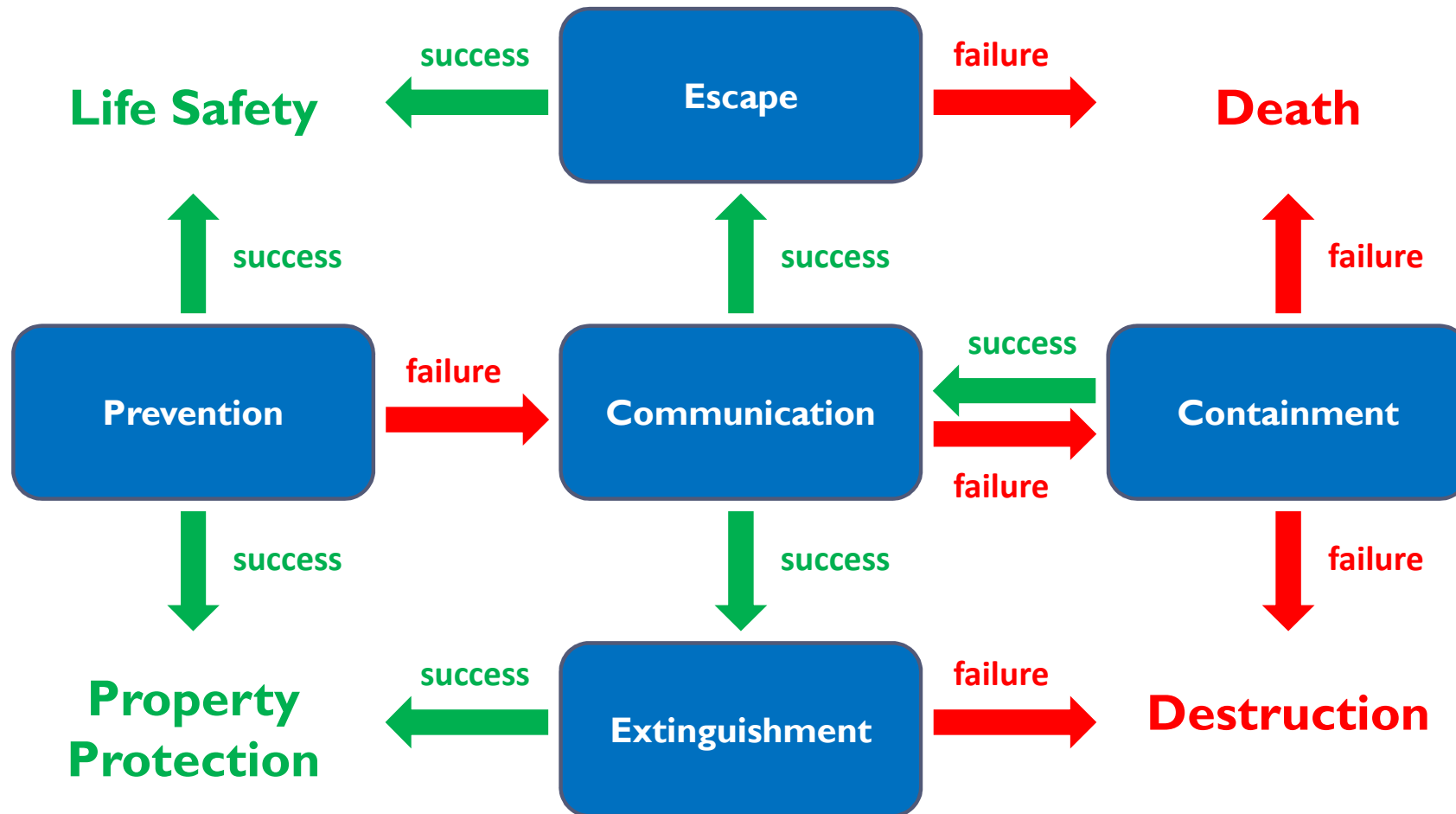


MECH4429

Integrated Capstone Experience

Fire Safety Design

Five Tactics for Fire Safety Design

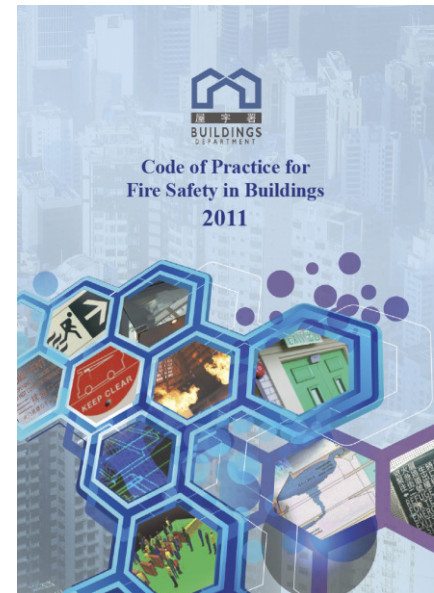


You have seen this before. The question is: how can we implement this concept in this project involving a historical building?

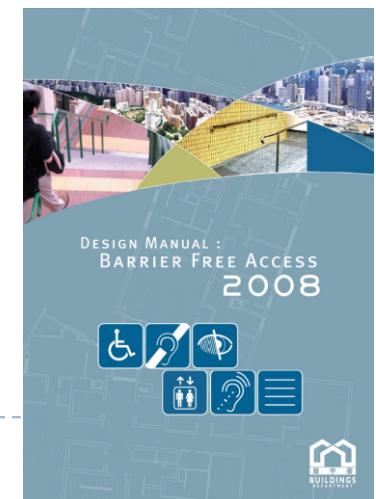
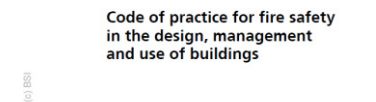
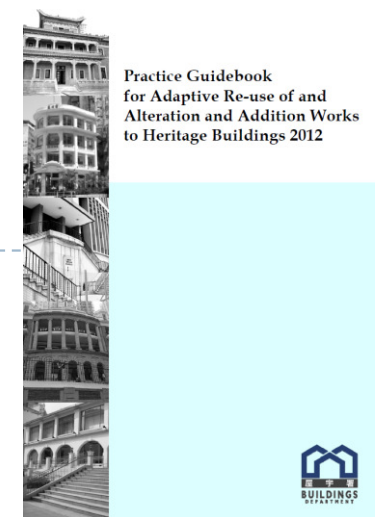
The Relevant Codes and Guidelines

Let's review what codes should we collect to have a general understanding of the requirements:

- ▶ **CoP for Fire Safety in Buildings**
 - ▶ Means of escape (escape routes, staircase requirements)
 - ▶ Fire resisting construction (building materials, compartmentation, separation of buildings)
 - ▶ Means of Access (firemen access)
 - ▶ Fire safety management (maintenance plan, training plan, fire action plan???)
 - ▶ Fire engineering design (the need for alternative design???)



-
- ▶ CoP for Minimum Fire Service Installations and Equipment (CoP FSI) & CoP for Inspection, Testing and Maintenance of Installations and Equipment
 - ▶ Prescriptive provisions for design of Fire Service Installations (FSI)
 - ▶ Fire Engineering approach as an alternative to the prescriptive requirements
 - ▶ Are there any other useful codes for reference?



► How about:

- BD's Practice Guidebook for Adaptive Re-use of and A&A Works to Heritage Buildings? Does it contain anything relevant?

► Other international standards like:

- BS 9999 – Code of Practice for Fire Safety in the Design, Management and Use of Buildings? Are there any guidelines that can further enhance the design?

► Consideration of people with disabilities?

- Design Manual : Barrier Free Access?
Does it cover anything particularly for fire safety?

▶ How do the codes and standards relate to the 5 tactics:

- ▶ Prevention
- ▶ Communication
- ▶ Escape
- ▶ Extinguishment
- ▶ Containment

▶ What are the challenges ahead?

- ▶ Are the fire loads huge? Will there be a bigger chance to a fire?
- ▶ Is there a difficulty in detecting a fire and alerting the occupants?
- ▶ Are there enough escape routes?
- ▶ Are there sufficient extinguishing devices for use?
- ▶ Is the structure good enough to sustain a fire and to prevent fire spread?
- ▶ Will there be a substantial change of usage and population that affects all?
- ▶ Can we work better than just what the codes demand us?

CoP FS – Means of Escape

- ▶ Performance Requirements (Section A8)
 - ▶ Adequate means of escape to evacuate safely
 - ▶ Adequate fire safety provisions to protect evacuating occupants
 - ▶ Adequate signs and identification of exits and paths of travel
 - ▶ Sufficient warning
 - ▶ Good management for orderly evacuation



CoP FS - Fire Resisting Construction

- ▶ Performance Requirements (Section A9)
 - ▶ Adequate fire safety provisions to inhibit the spread of fire
 - ▶ Within a building
 - ▶ Between buildings
 - ▶ Allow occupants to evacuate safely
 - ▶ Allow fire service intervention
 - ▶ Maintain its stability in case of fire
 - ▶ Allow sufficient time for occupants to evacuate safely
 - ▶ Allow fire service intervention
 - ▶ Others
 - ▶ Openings to be protected
 - ▶ Minimise the spread of smoke
 - ▶ ...



Stability, Integrity and Insulation

Still remember this? Or just learnt?

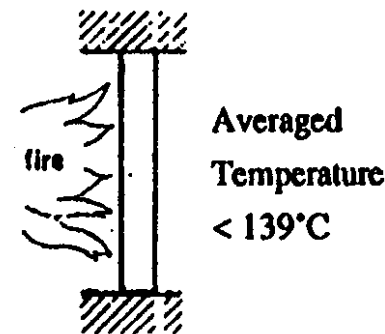
- ▶ **Stability**: ability to carry load without collapsing
- ▶ **Integrity**: cracks or perforations will not develop to allow passage of smoke and flame from one side to the other side of the element
- ▶ **Insulation**: ability to prevent the passage of heat from one face to the other face of the element.



collapse or excessive
deflection



passage of flames



lack of insulation

CoP FS – Means of Access

- ▶ **Performance Requirements (Section A10)**
 - ▶ Adequate access to allow firemen safe and unobstructed access all floors of the building
 - ▶ Provide emergency vehicular access for safe and unobstructed access
 - ▶ Provisions for access staircases, firemen's lifts



CoP FSI – Classification of Premises

- ▶ Premises inside May Hall and Eliot Hall?
 - ▶ Institutional type? Will you suggest to change the purpose?
 - ▶ How about exhibition area? Consideration as a museum?
 - ▶ Mechanical plant room? Luckily or unluckily, nothing inside!
 - ▶ What else?

CoP FSI – Requirement for Premises

- ▶ Institutional Buildings – Low Rise
 - ▶ A/V advisory system (>2000 sq.m?)
 - ▶ Automatic actuating devices
 - ▶ Automatic fixed installation other than water (is this a good alternative?)
 - ▶ Emergency generator (do we need that? will there a space for that?)
 - ▶ Emergency lighting (do we have that in the rooms?)
 - ▶ Exit sign
 - ▶ Fire alarm system (did you find it in the last visit?)
 - ▶ Fire detection system
 - ▶ FH / HR system (as usual, but are there any space for pumps and tanks?)
 - ▶ Firemen's lift (is the existing one good for this purpose?)
 - ▶ Portable hand-operated approved appliances
 - ▶ Sprinkler system (it is a demanding system!!!)
 - ▶ Ventilation / air conditioning control system

Practice Guidebook for Adaptive Re-use of and A&A Works to Heritage Buildings

- ▶ Section 5.11 to 5.29 provides a comprehensive guidance to the issues related to fire safety
 - ▶ Means of Escape
 - ▶ Do we have sufficient well compartmented staircases in the buildings? Can they be classified as escape staircases or access staircases by firemen?
 - ▶ Are the staircases too narrow, the risers too high or the number of risers too many between landings?
 - ▶ Fire Resisting Construction
 - ▶ Are there timber constructions?
 - ▶ Emergency Vehicle Access (where is it???)
 - ▶ Fire Service Installations and Equipment
 - ▶ Emergency generator – any alternative design suggested???
 - ▶ Water tank for automatic sprinkler system – improvised sprinkler system? Any FH / HR water tanks available?

Fire Safety for People with Disabilities

- ▶ **CoP Means of Escape 1996**

- ▶ **Commentaries:**

- V. Means of Escape for the Disabled**

This Code does not cover provisions of means of escape for the disabled. However, designers are recommended to take this into account in the design of the building. In this connection, reference may be made to BS5588 Part 8:1988. As a minimum provision, a communication panel may be installed adjacent to the fireman's lift as a "call point" for help for the disabled in case of fire.

- ▶ BS5588 Part 8:1988 has become obsolete and replaced by BS 9999:2008

- ▶ **CoP Fire Safety 2011**

- ▶ New implementation based on the amendment in Oct 2014

- ▶ Are there any in the existing halls? If not, then how to do?

- ▶ **Design Manual: Barrier Free Access 2008**

- ▶ Chapter 5 Building Services Design Requirements

- ▶ Performance objectives: where fire alarm systems are provided in areas of a building required to be accessible, the alarm shall emit both audible and visible signals

- ▶ By the way, are the halls good for Barrier Free Access?