



The Challenges for Sustainable Fire Safety

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Presentation Outlines

Introduction

Why Fire Safety

Building Regulations & Codes (UBBL)

Performance-based Codes

Conclusions



Introduction



Fire Safety

Fire safety is the set of practices intended to reduce the destruction caused by [fire](#). Fire safety measures include those that are intended to prevent ignition of an uncontrolled fire, and those that are used to limit the development and effects of a fire after it starts.

Fire safety measures include those that are planned during the [construction](#) of a building or implemented in structures that are already standing, and those that are taught to occupants of the building.

Threats to fire safety are commonly referred to as *fire hazards*. A fire hazard may include a situation that increases the likelihood of a fire or may impede [escape](#) in the event a fire occurs.



Why Fire Safety



Why fire safety?

- Life safety
- Community impact
- Environment impact
- Business impact



ECONOMIC IMPACT OF WAREHOUSE FIRES

January 29, 2014

£1 billion cost of warehouse fires to UK Plc

The British economy has lost £1 billion in GDP and 5,000 full-time jobs through preventable fires in commercial warehouses over the last five years.



Why fire safety?

Safety of Occupant

Safety of Properties

Safety of Firefighters

Safety of Adjacent Premises

Business Continuity



Why fire safety?

To achieve this five principles, a building must have certain fire safety elements;

- an adequate means of escape for occupants,
- a structure that can withstand the fire for a period of time to allow occupant to get out of the building and for firefighters to extinguish the fire,
- appropriate compartmentation to contain the fire,
- the ability to detect and extinguish the fire at the earliest stage, and
- adequate access for intervention by the fire brigade.

Why fire safety?

Safety measures are based on years of experience

What we do now, the effect will be much later

The worst enemy of safety is complacency



Cost of Unsafe Act

Lost of life – occupants as well as firefighters

Lost of property

Lost of business

Lost of work

Lost in term of economy



Building Regulations & Codes (UBBL)



What is Building Regulations?

“Building Regulations set standards for the design and construction of buildings to ensure the safety and health for people in or about those buildings.”

-GOV.UK-



Prescriptive-based Building Codes

“The minimum requirement to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment.”

International Code Council



Building Regulations

In general, these building regulation achieve their intent of providing safety through the use of specific requirements based on generalized construction types and occupancy classifications.



History of Building Regulations

Ancient – Codes of Hammurabi (circa 3000 BC)

- 229. If a builder builds a house for someone, and does not construct it properly, and the house which he built falls in and kills its owner, then that builder shall be put to death.
- 230. If it kills the son of the owner, the son of that builder shall be put to death.

Big Fire Event i.e. Rome Fire (64 AD), London Fire (1666 AD), Chicago Fire (1871 AD)

19th Century – Modern Building i.e. North America



Building Codes – Comments

“The Deemed to Satisfy (DTS) provisions are very conservative. Things are changing – there is a need to be more efficient” Philip Chun, Australian Building Code Consultant.

“The presumption that there is only one way of providing the level of safety makes the prescriptive code rigid and inflexible” Hadjisophocleous and Benichou (1999) – Performance Criteria Used in Fire Safety Design, Automation in Construction, Canada

Building Codes – Comments

Unfortunately, many of the existing prescriptions are based on empirical fire statistics and historical data, without substantial scientific research data or practical evaluation to support them. In addition, the process of code development has been essentially reactive to events rather than proactive in anticipating events.



Building Codes – Comments

Given that many codes and standards are generic by occupancy and based primarily on past loss history, this minimum may well exceed what is needed for some buildings, yet fall far short of what is needed for others.

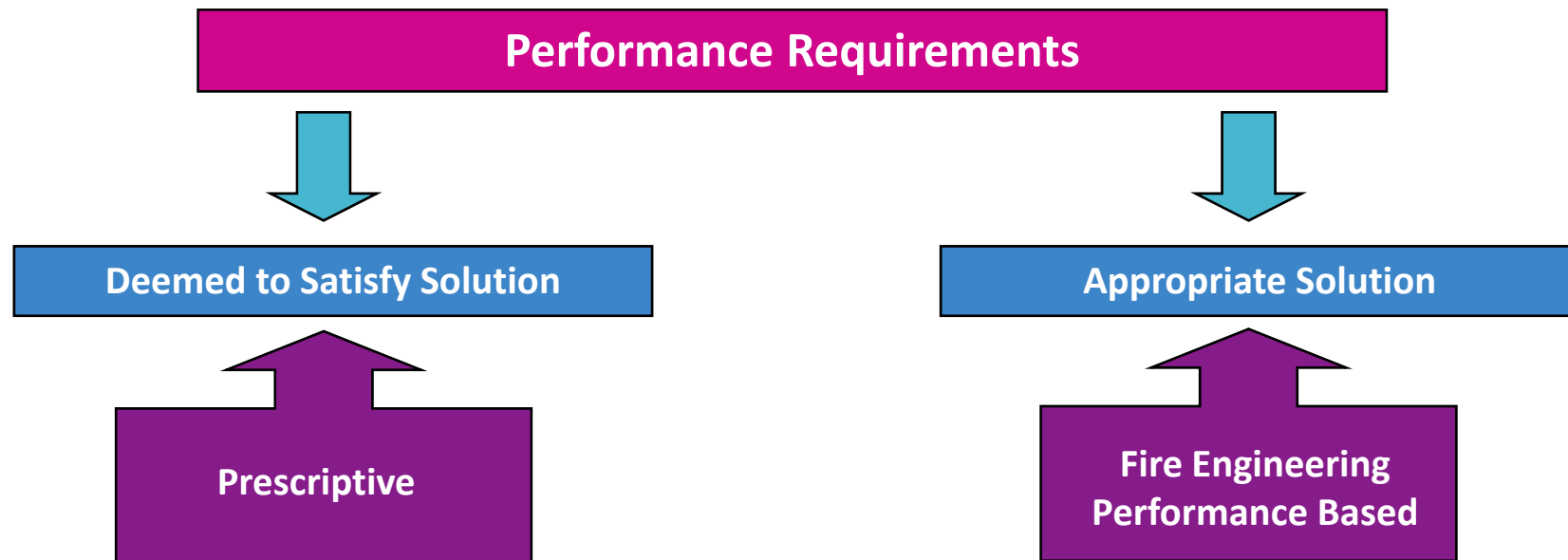
For Standard type of buildings it does provide consistent design perimeters for designers in achieving “deem to satisfied” design based on data provided in terms of maximum travel distance, compartmentation areas, size of compartmentation beyond which sprinkler protection is required.



Issues

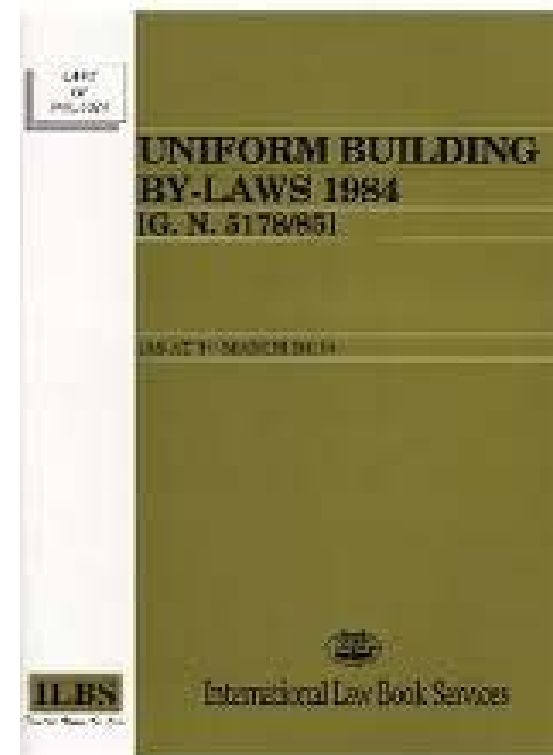
- Rigid and Not flexible
- Objective of design often not specified
- Lack of understanding of fire safety fundamentals , fire behaviour
- Contains grey areas due to complexity of modern building design
- Lack of clarity subject to individual interpretation of outcome
- Some “Deem-to –satisfied” By-law is outdated e.g. fire resistant doors
- Even for prescriptive code, all active and passive fire protection systems shall be performance-based orientated
- Fire resistant doorset and portable fire extinguishers Malaysian Standards are drafted in accordance to performance-based fundamentals with flexibilities in design

Building Fire Safety Solutions + Fire Engineering



Uniform Building By-Law (UBBL) 1984

- 1984 – buildings were small, shorts and easy to anticipate its design
- Recipe Book - prescribes materials, design and construction methods frequently without stating goals and objectives
- Unable to keep up with changes in design and innovation



Uniform Building By-Law (UBBL) 1984

Part I

Preliminary

Part II

Submission of Plans for Approval

Part III

Space, Light and Ventilation

Part IV

Temporary Works in Connection with Building Operations



Uniform Building By-Law (UBBL) 1984

Part V

Structural Requirements

Part VI

Constructional Requirements

Part VII

Fire Requirements

Part VIII

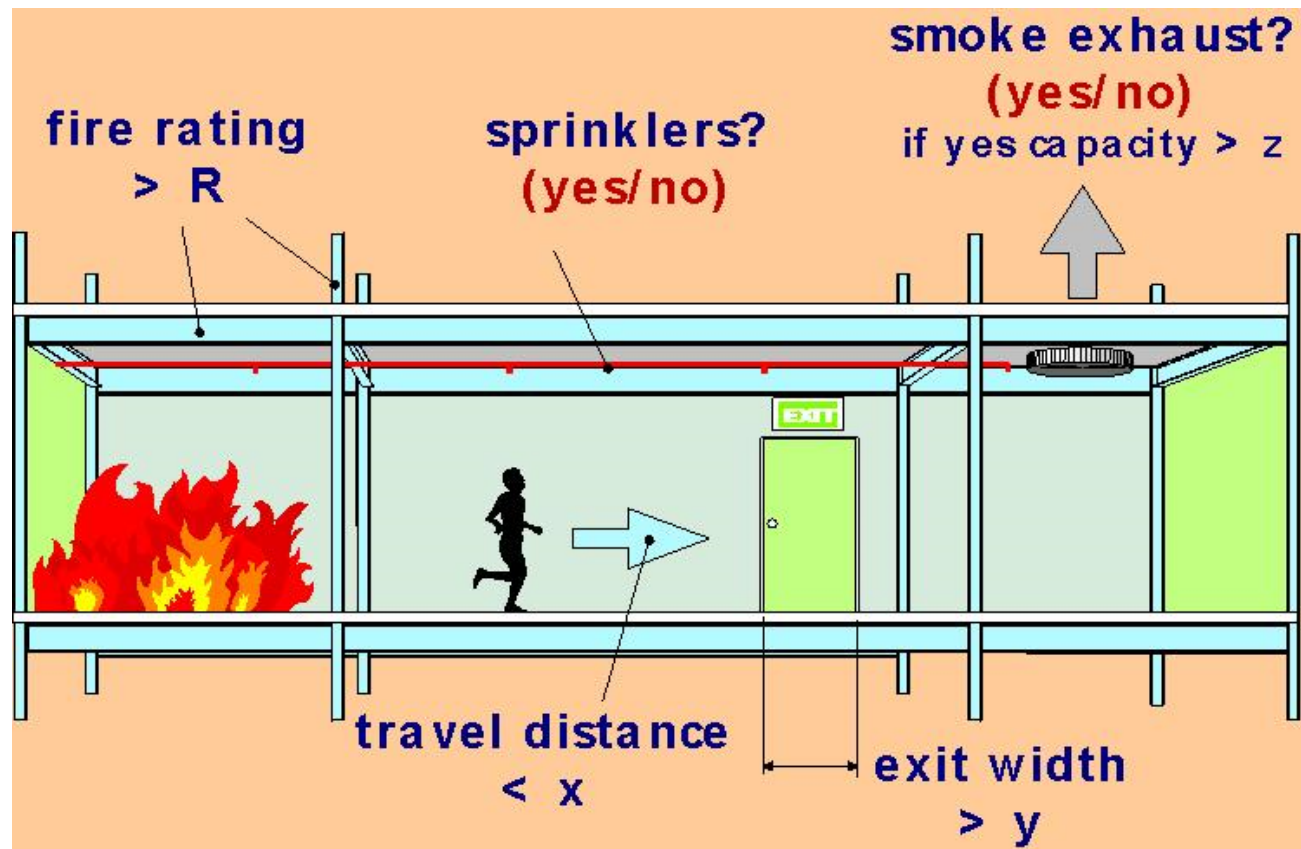
Fire Alarms, Fire Detection, Fire Extinguishment and Fire Fighting Access

Part IX

Miscellaneous



Deemed-to-Satisfy (DtS)



Level of Safety

- Alternate fire escape staircases for egress
- Tamper glass for building façade or atrium facade
- Proper separation of fire escape staircases
- Fire Appliance (truck) access road
- Accessibility of breeching inlet
- Ironmongery should be tested together with fire resistant doorset as a system
- Compartmentation wall with fire resistant doorset for underground car park lift lobby

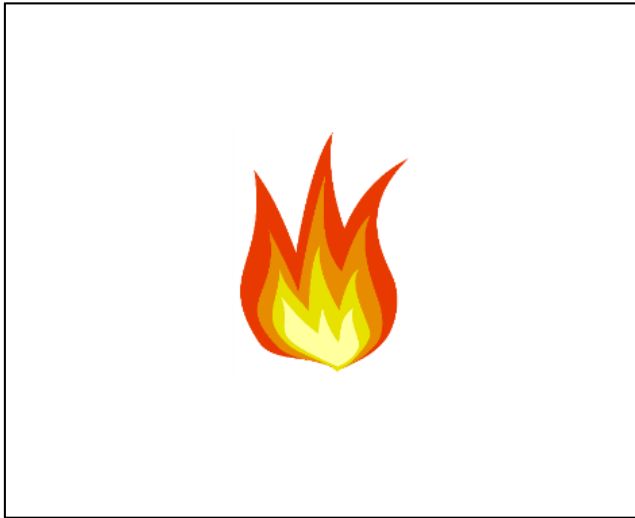
Level of Safety

- Is it sufficient?
- Yes for normal standard buildings
- No if interested parties still tries to asked for waiver from Fire and Rescue Department not to install critical life safety fire protection systems though our UBBL is already a minimum requirement
- Is it not enough?
- For those mega size buildings

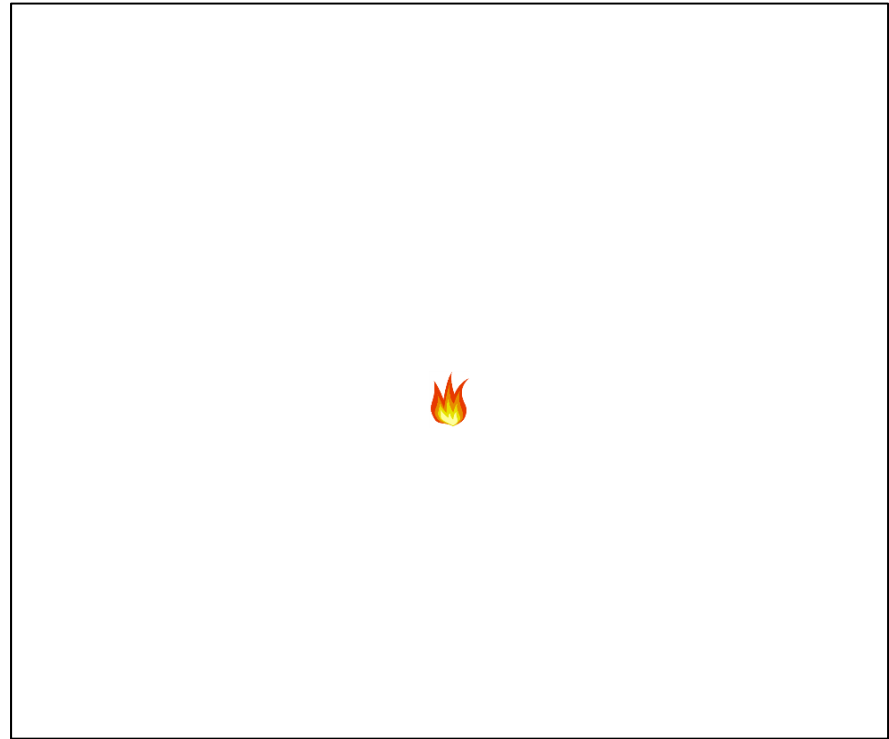


Example 1

5th Schedule – Compartments Dimension



2,000 m² Paper Storage

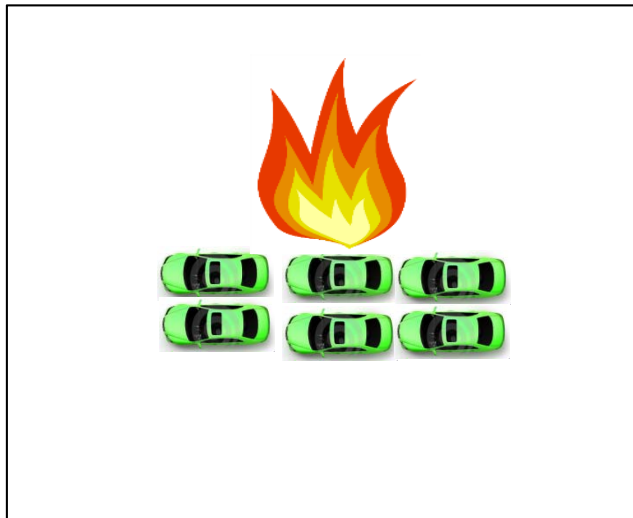


4,000 m² Steel Storage

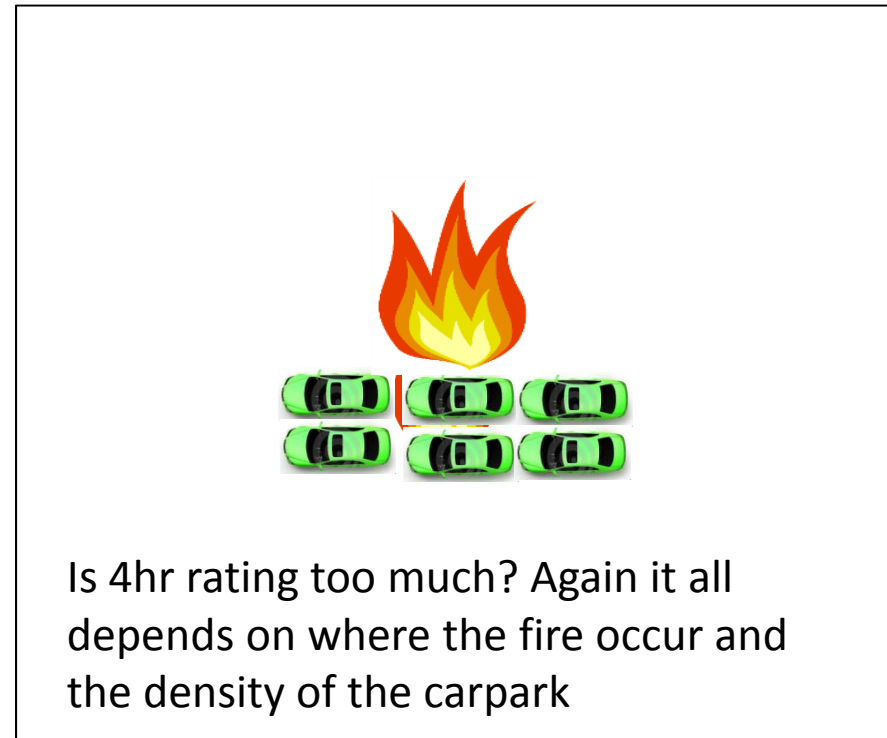
Example 2

5th Schedule – Compartments Dimension

Do we need
more fire
wall or FRS?



7,000 m² carpark



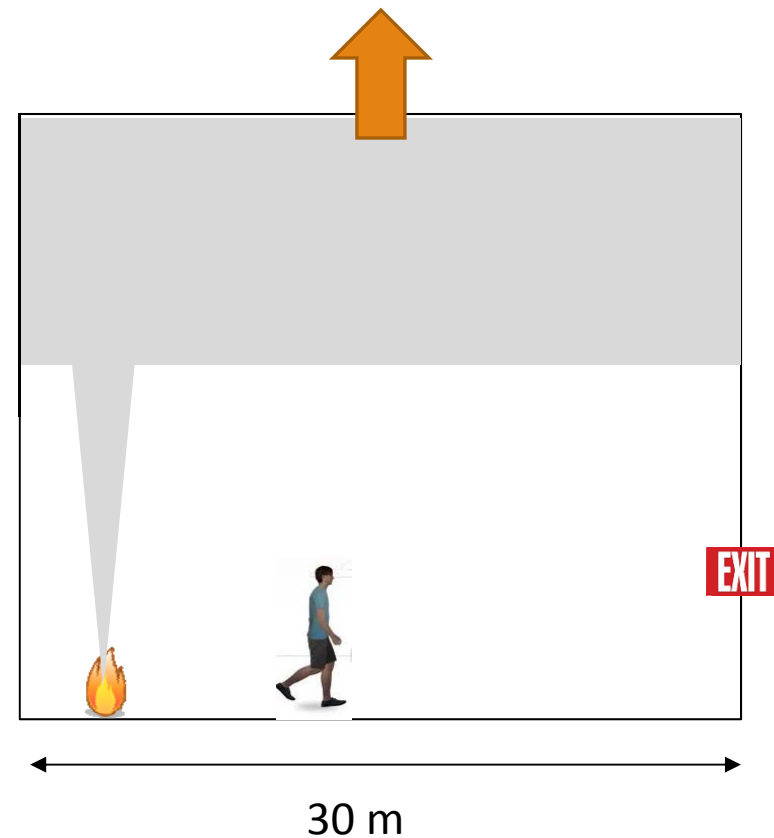
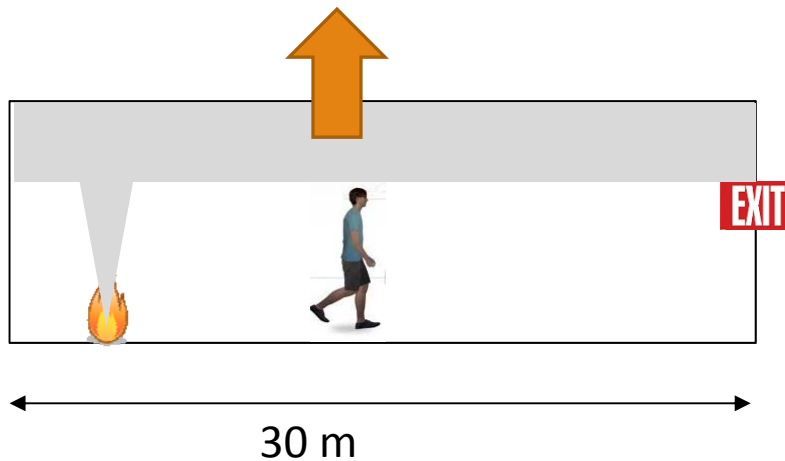
18,000 m² carpark

Example 3

Means of Egress

Which one is safer?

Fire size, high of ceiling and smoke layer will be the deciding factors instead of just the egress speed or the egress distance



Performance-based Codes



Building Design Evolution



New Technologies

- Fire Protection Systems

- State of the Art systems – more efficient systems i.e. sprinkler, fire detection etc.
- Do we need high fire rating or fire compartment if fire is kept small? (Fundamentals of Performance-based design and cant do this in prescriptive code)

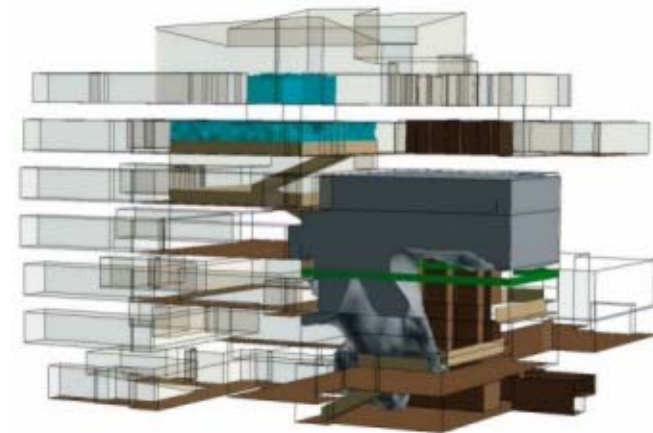
- Materials

- Lightweight Construction i.e. Cross Laminated Timber, Drywall
- Increase the quality, reduce the construction period, increase productivity but smoke density or the toxicity of adhesive as a result of heat needs to be established first for life safety

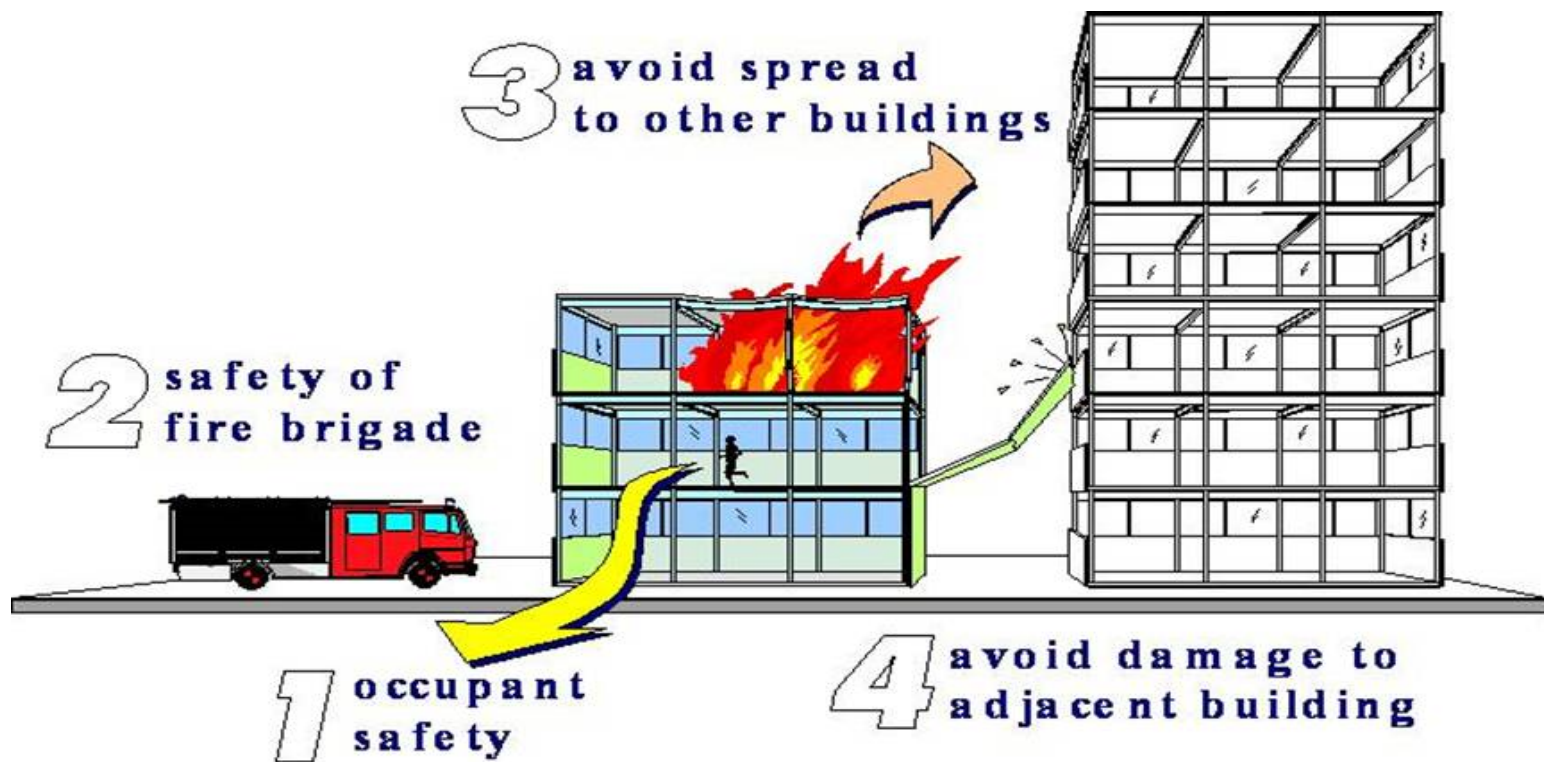


Alternative Solution

- Building Codes in many countries are shifting from prescriptive to more performance-based
- It has very broad application across various sectors – built environment, infrastructure and industrial
- Uses fire science, fire engineering principles, human science to protect people, property and the environment from fire



Building Performance Objectives



The challenges for sustainable fire safety

- Building are getting taller, bigger and complex

This basic design premise results in large, open building spaces, which span multiple floor levels classified as atriums, and desired use of materials such as glass and unprotected steel for assemblies that are required to maintain a fire resistance rating.

- Green building i.e. open concept for natural lighting, natural ventilation, modern building materials many of which is highly combustible

Many green building designs include atrium spaces to enhance light transfer and natural ventilation throughout the building area yet is not protected due to the height of the roof

Wall hanging plants if not properly maintained becomes fire hazards

Challenges!

- Fire safety culture is not properly embraced. Fire safety is important but not urgent!
- Lack of expert, specialist, skilled person if performance-based to be used extensively



Is Building Regulations Compliance a Burden?

- If life safety is the prime objective (Fire Services Act 341 – Building owners or management is responsible for occupant safety through self-declaration of Fire Certificate under Fire Regulation)
- If property protection is also the prime objective for business continuation
- The answer is **NO**

Conclusions



Conclusion

- UBBL defined minimum requirement by-law and is the fundamental to meet built-environment requirements!
 - Mandatory requirement
- Compare to direct losses and consequences losses, loss of lives, loss of job, loss of business income, loss of business goodwill, loss of market
 - Provide appropriate fire safety standard is a win-win scenario for building owners, occupants, Fire and Rescue Department Malaysia, insurance underwriters and National GDP

Conclusion

- UBBL needs to be regularly updated to include new materials, construction methods and technologies and eliminate unnecessary requirements
 - Recently updated 2012
- Performance based code and performance-based building regulatory system can be a solution. It is implemented solely not to reduce cost but adds flexibility to existing prescriptive requirements.
 - Accord building with appropriate protection in accordance with the fire hazards and fire risks

Conclusion

- Construction industry stake holders should embrace fire safety fundamentals for life safety and should not try to reduce the minimum fire requirement as cost saving exercise.
- If everyone plays their part diligently, it will be a win-win situation for building owners, Fire and Rescue Department Malaysia, Professional Engineers, Professional Architects, Insurance Underwriters and all occupants of the building (could be you and me with our families)

Thank You!

