

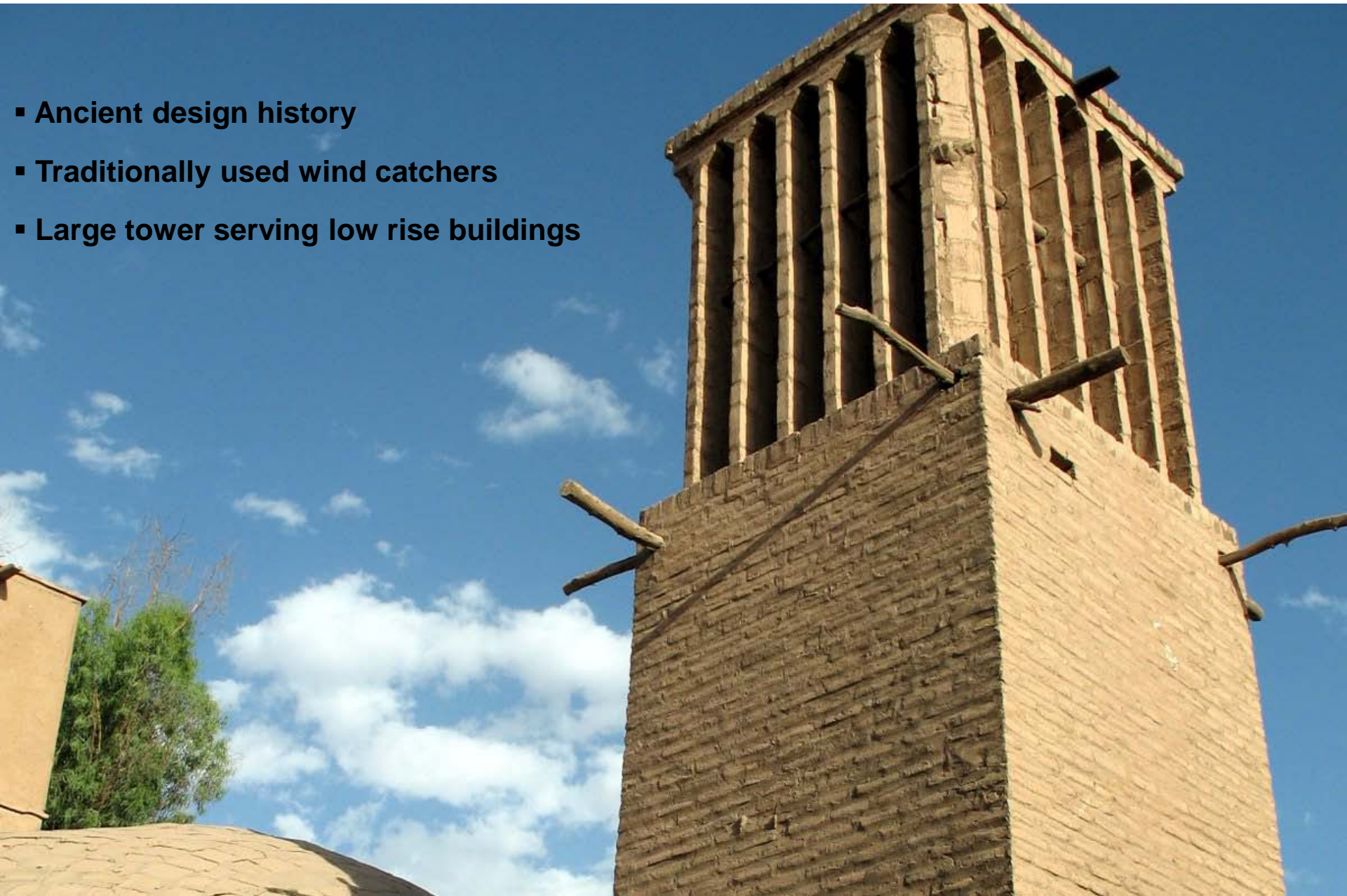


Natural Ventilation and Smoke Control:

What conflicts can arise and how can they be overcome whilst ensuring that the sustainability objectives of natural ventilation are still met?

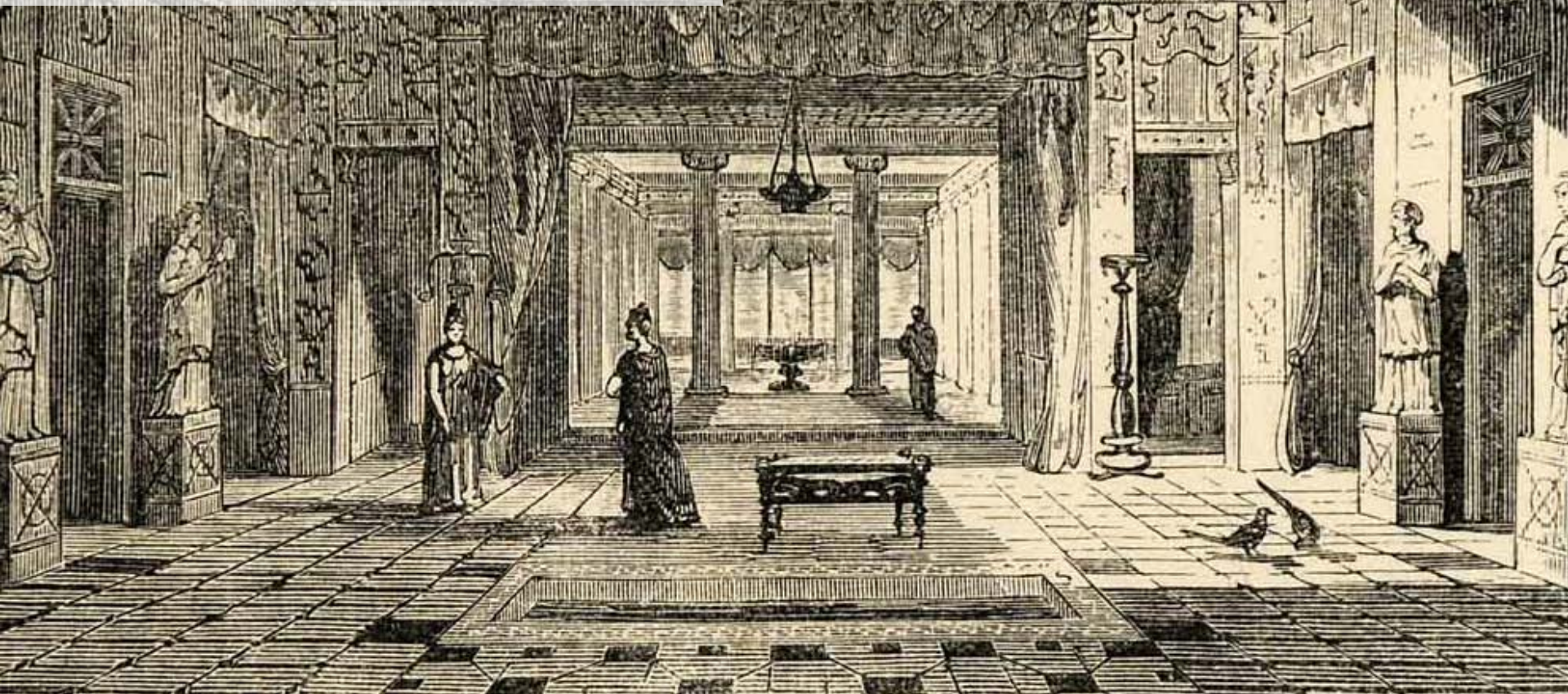
Principles of Natural Ventilation

- Ancient design history
- Traditionally used wind catchers
- Large tower serving low rise buildings

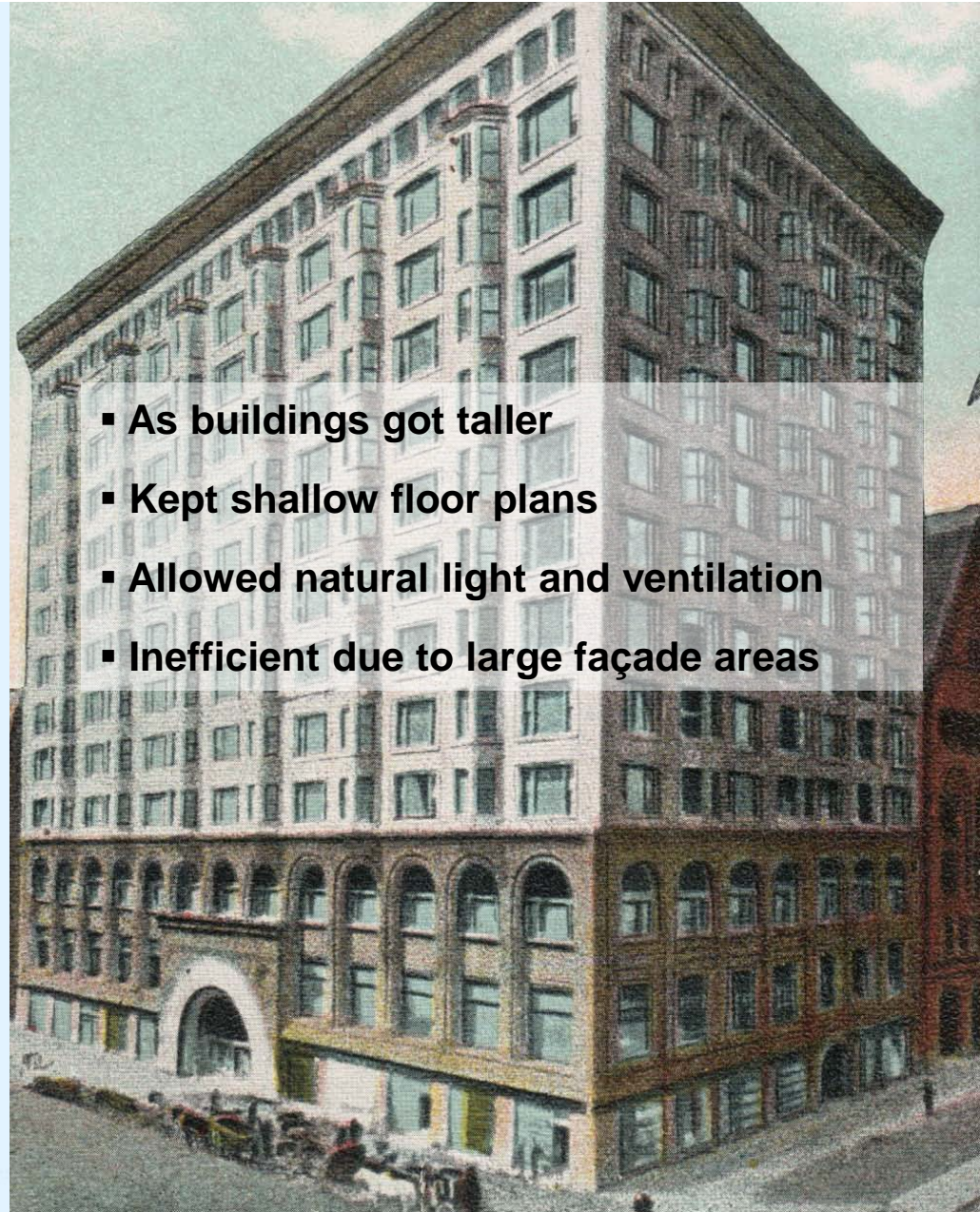
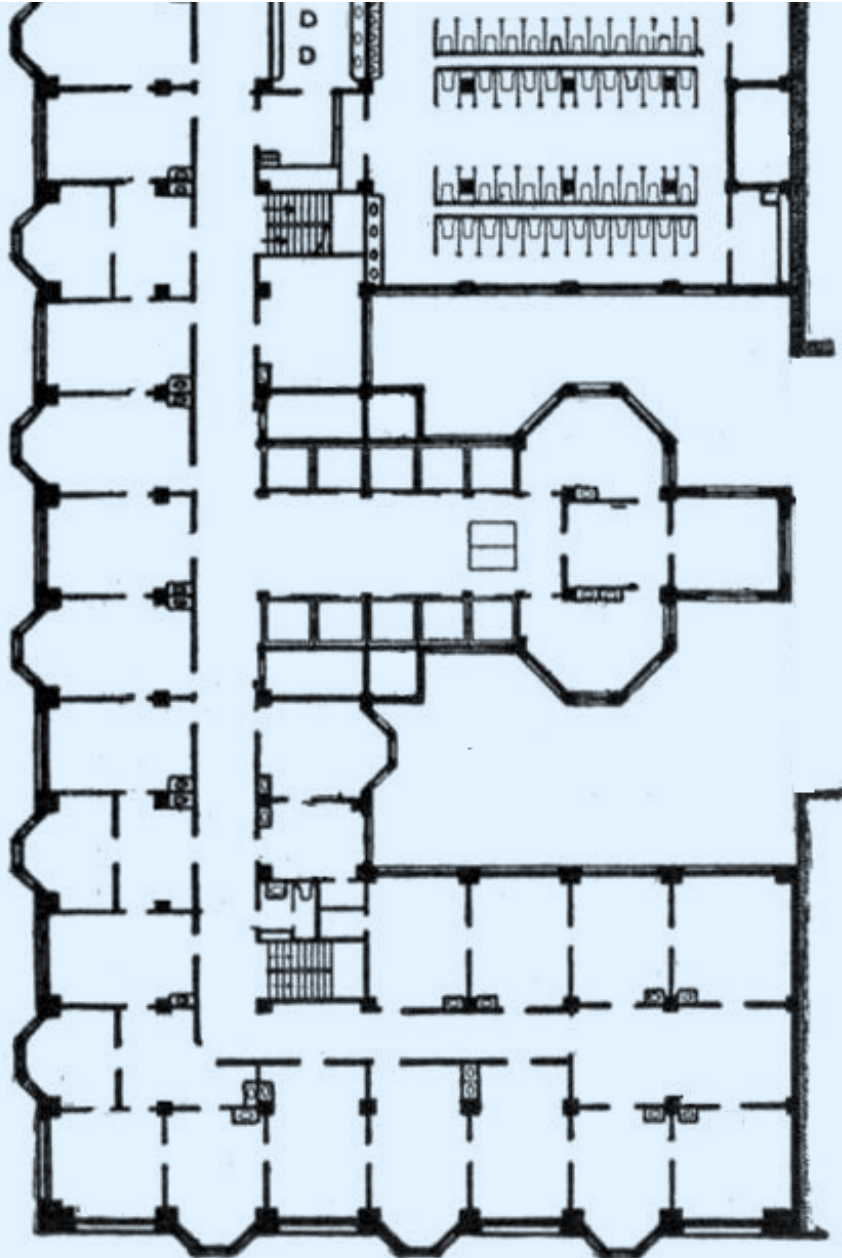


Principles of Natural Ventilation

- Roman internal courtyard or 'atrium'
- Provided cross flow
- Vertical exhaust of smoke and hot air



Modern Application of Natural Ventilation



- As buildings got taller
- Kept shallow floor plans
- Allowed natural light and ventilation
- Inefficient due to large façade areas

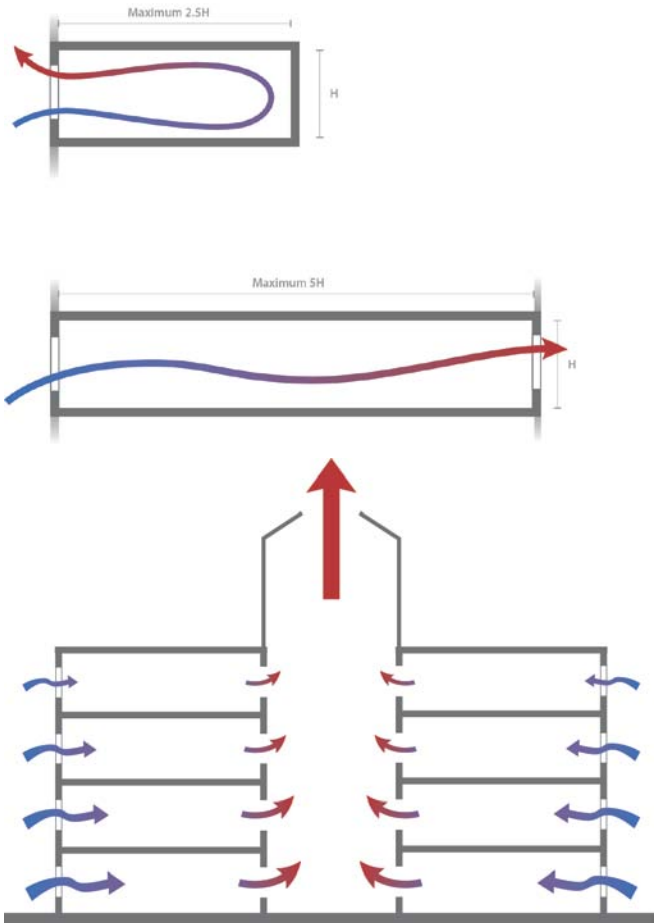
- **Building economics**
- **More complex solutions required**



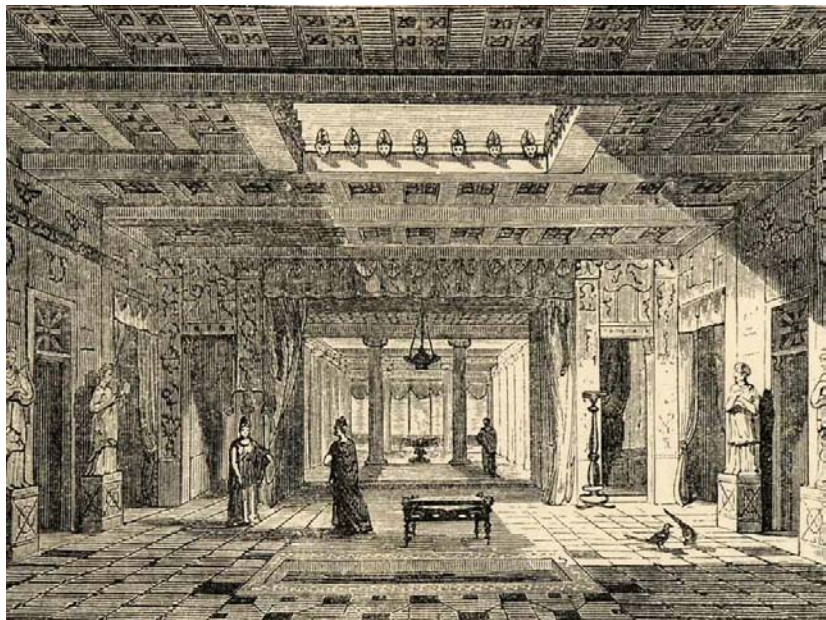
Modern Application of Natural Ventilation



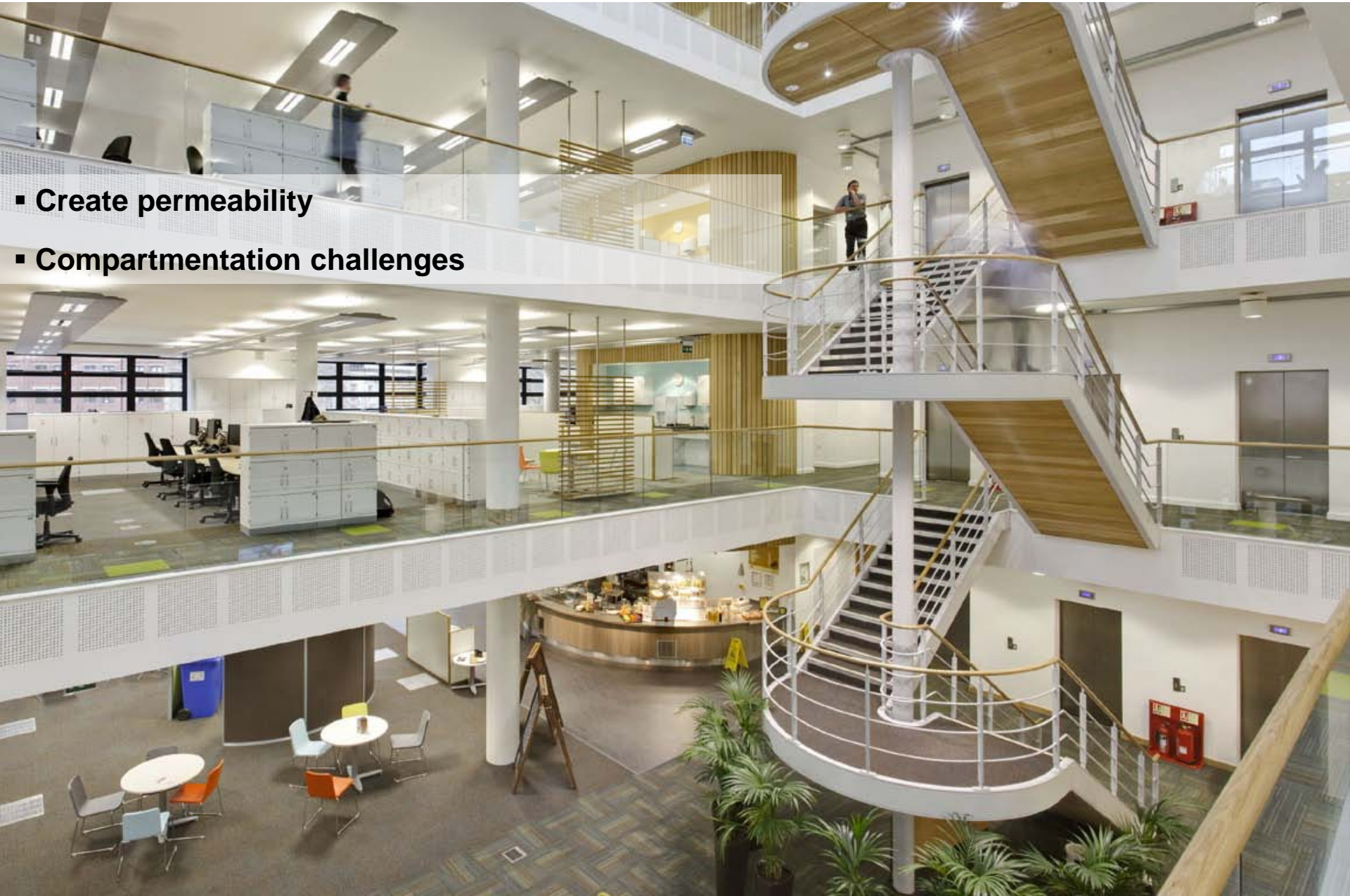
- Age old principles still applied
- But high-rise buildings has added complexity



© CTBUH



Potential Conflicts With Fire Safety



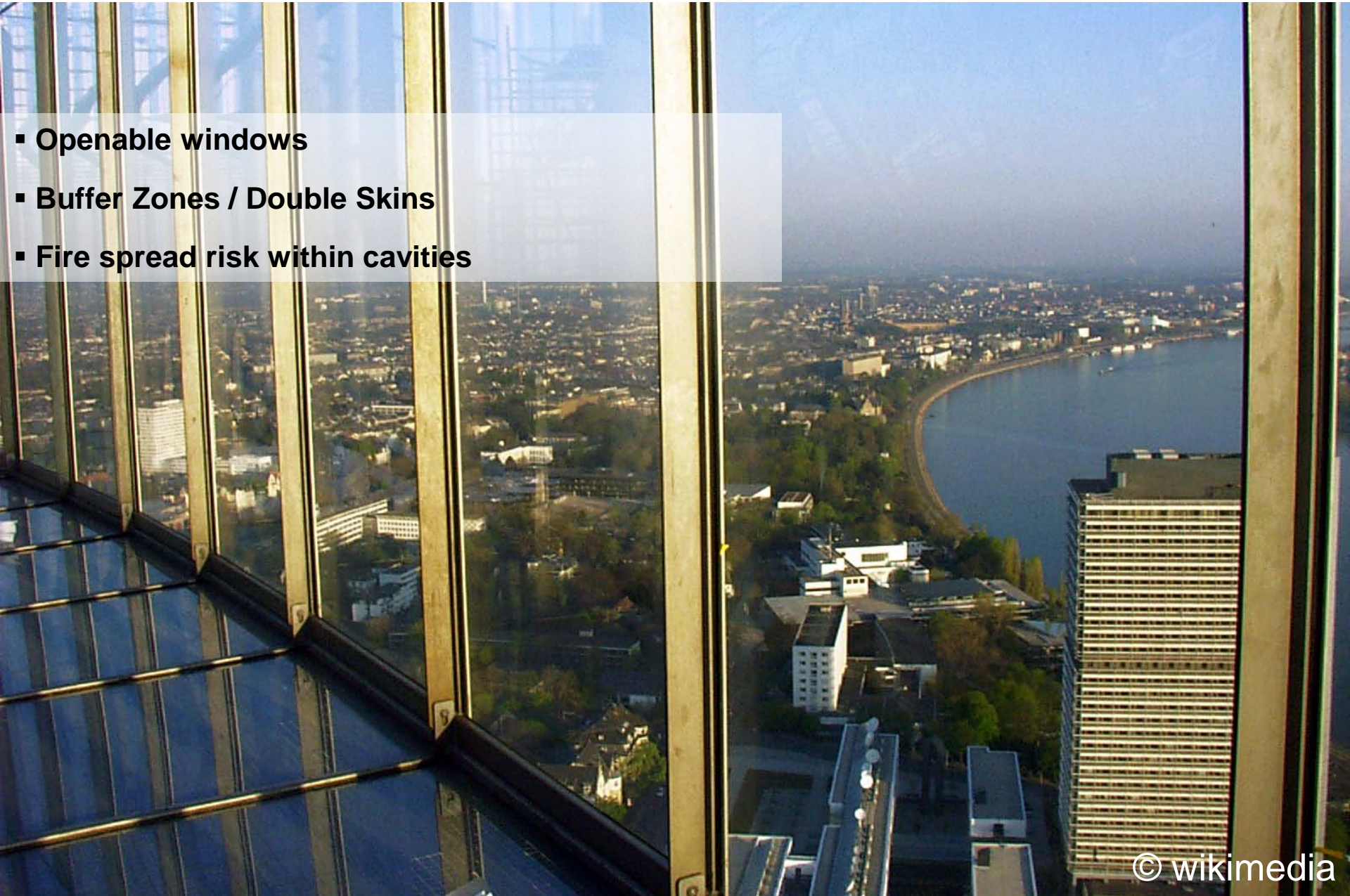
- Create permeability
- Compartmentation challenges

Potential Conflicts With Fire Safety

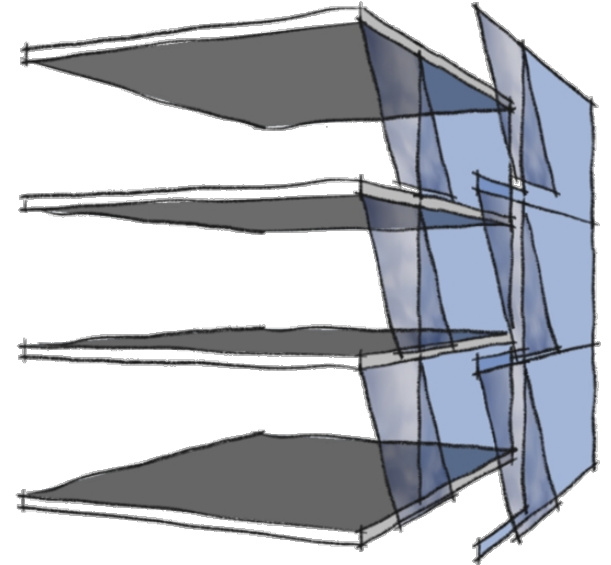
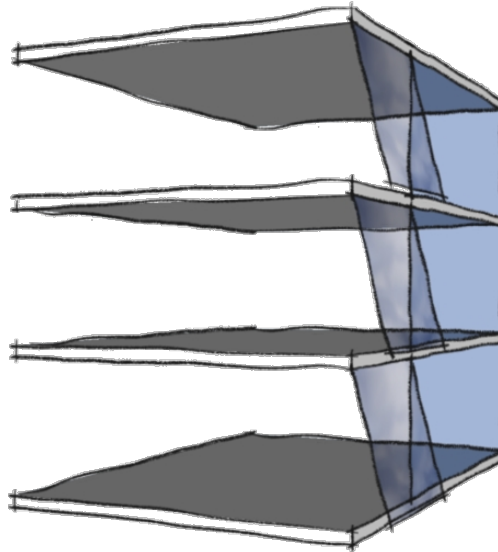
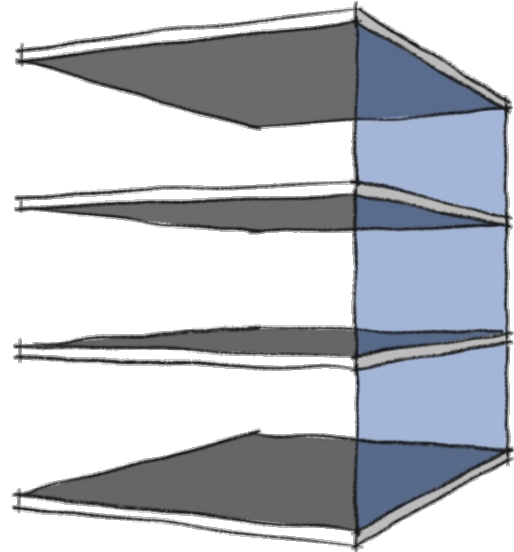


Potential Conflicts With Fire Safety

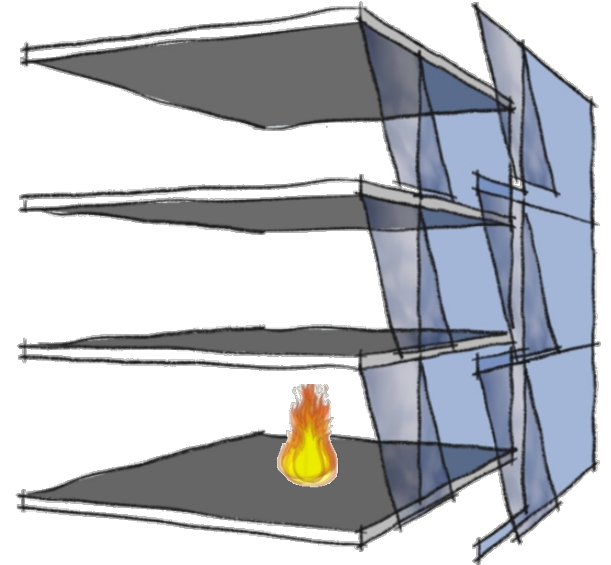
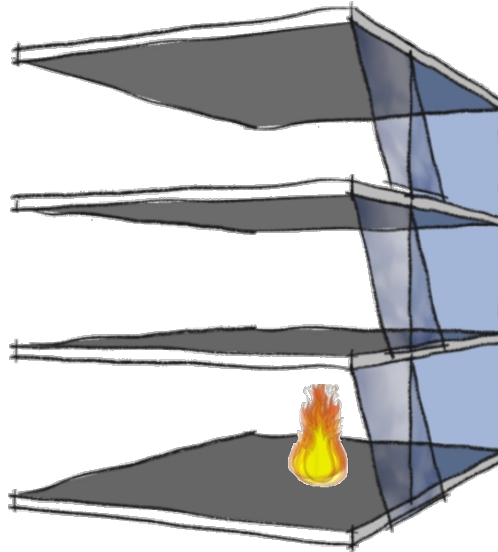
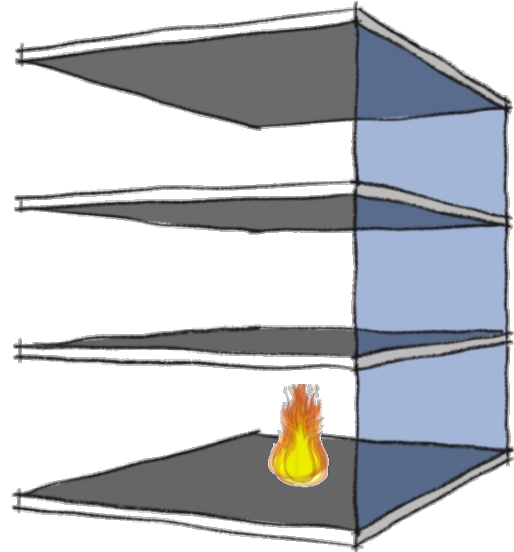
- Openable windows
- Buffer Zones / Double Skins
- Fire spread risk within cavities



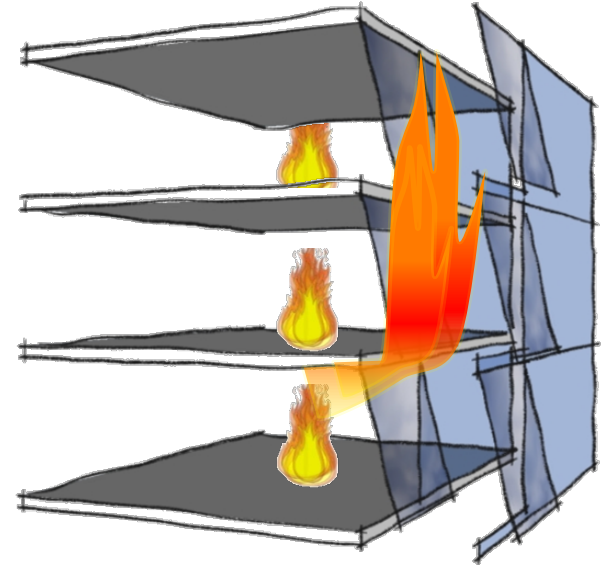
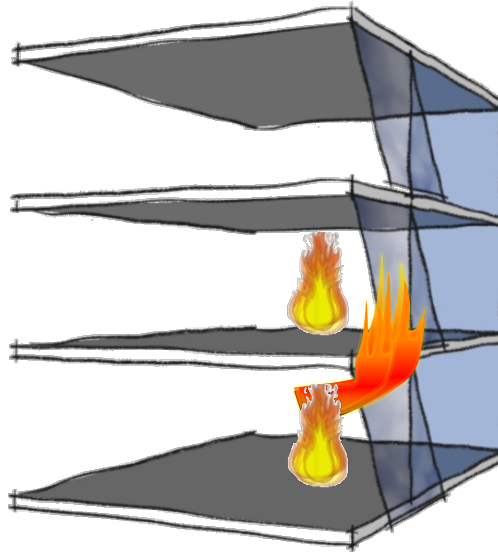
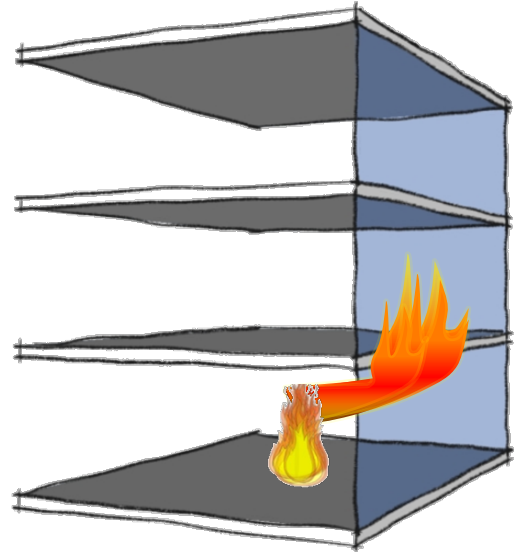
Potential Conflicts With Fire Safety



Potential Conflicts With Fire Safety



Potential Conflicts With Fire Safety



Potential Conflicts With Fire Safety

AECOM

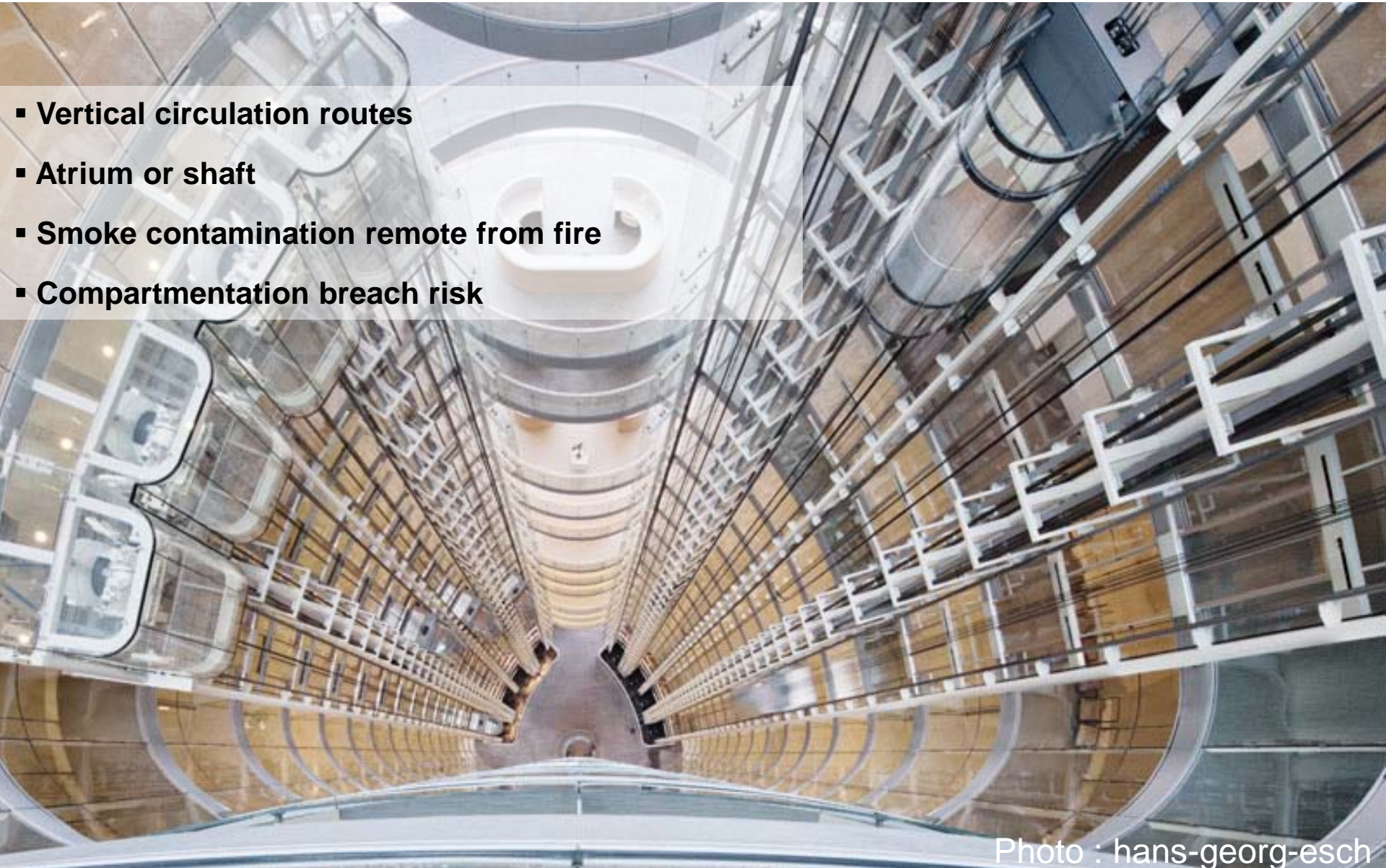


Potential Conflicts With Fire Safety

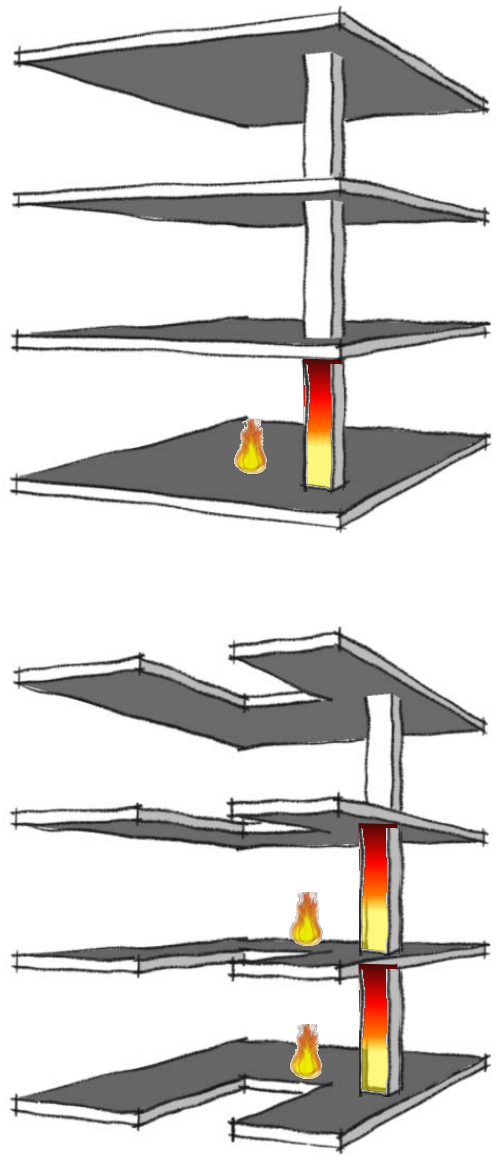


Potential Conflicts With Fire Safety

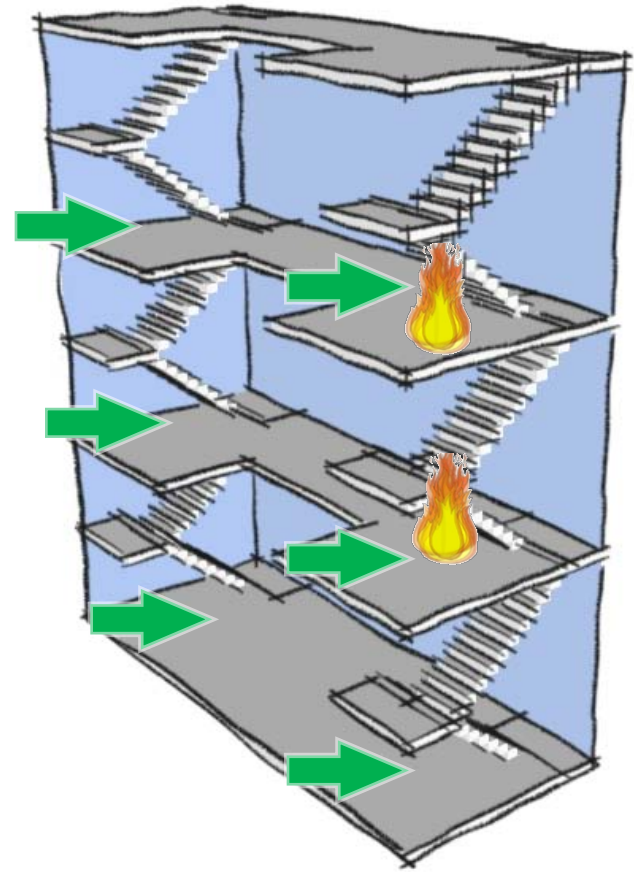
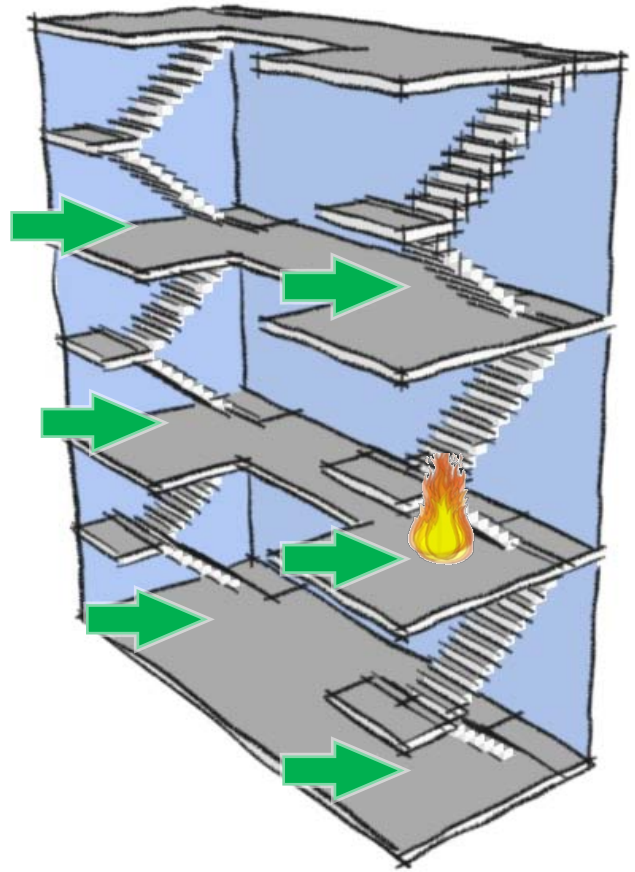
- Vertical circulation routes
- Atrium or shaft
- Smoke contamination remote from fire
- Compartmentation breach risk



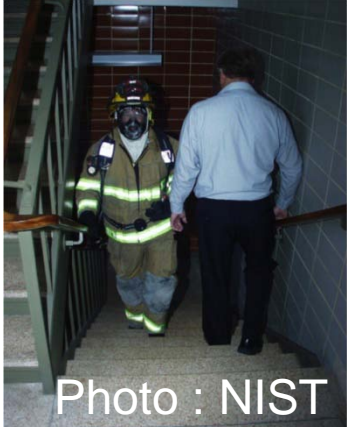
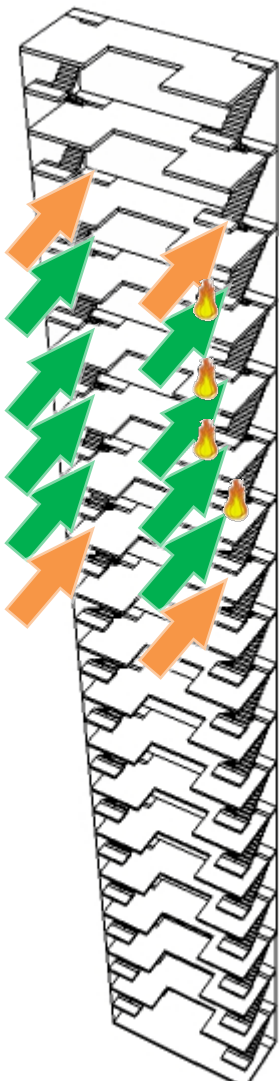
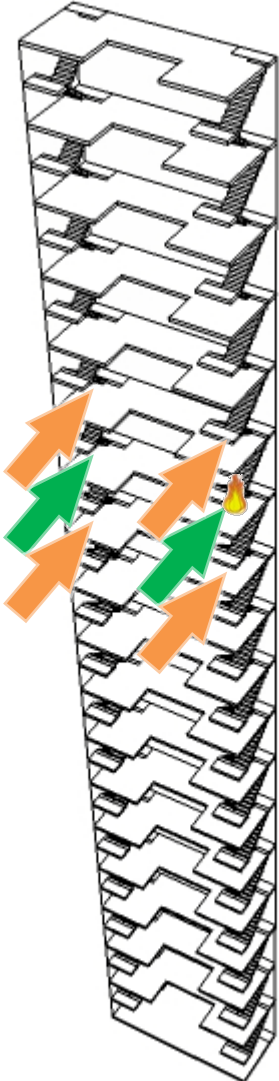
Potential Conflicts With Fire Safety



Potential Conflicts With Fire Safety



Potential Conflicts With Fire Safety



Current Typical Solutions

- Restore Compartmentation

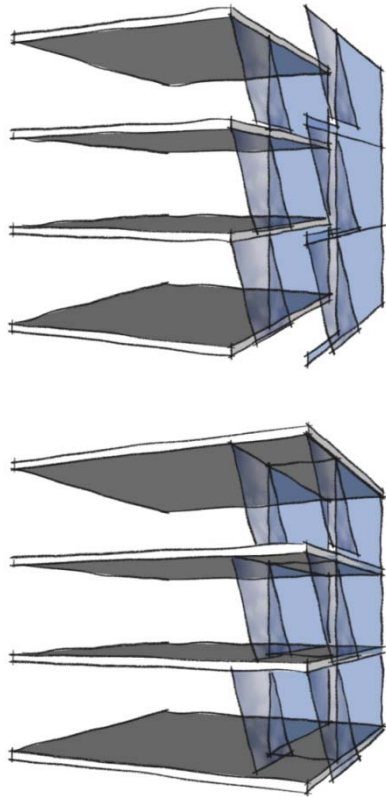


Photo : Baikonur

Current Typical Solutions

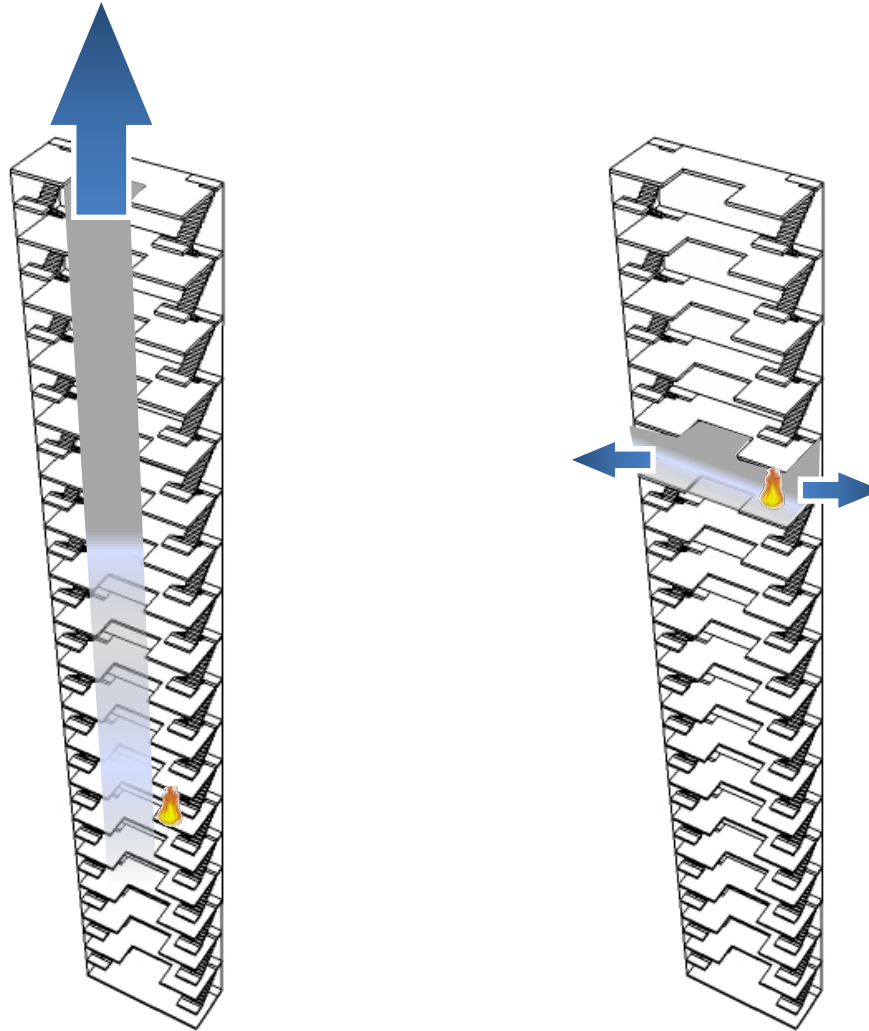
- Restore Compartmentation



Photo : John Seaman Photography, Bristol

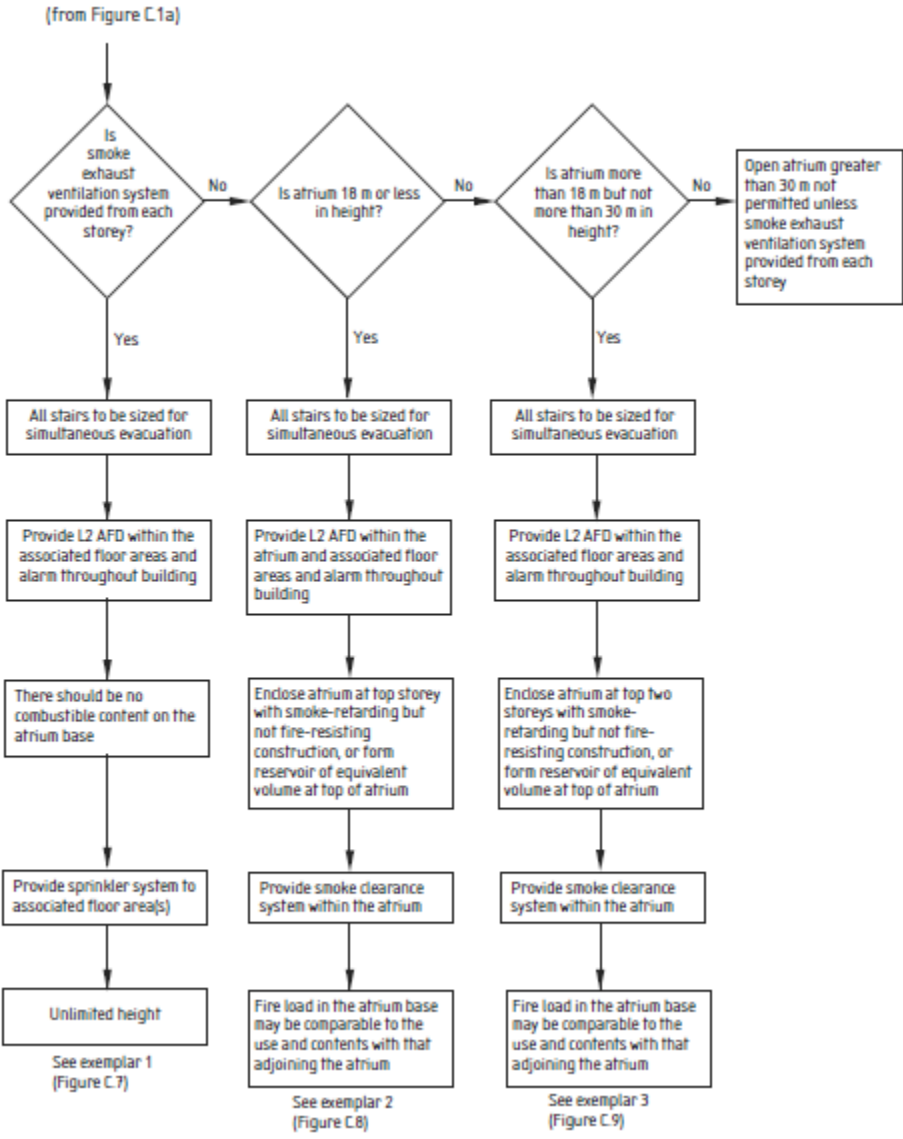
Current Typical Solutions

- Vent Smoke



Current Typical Solutions

- Atria Challenge Codes May Prohibit
- BS9999
 - > 30m
 - Open to atrium
 - Phased evacuation not allowed!

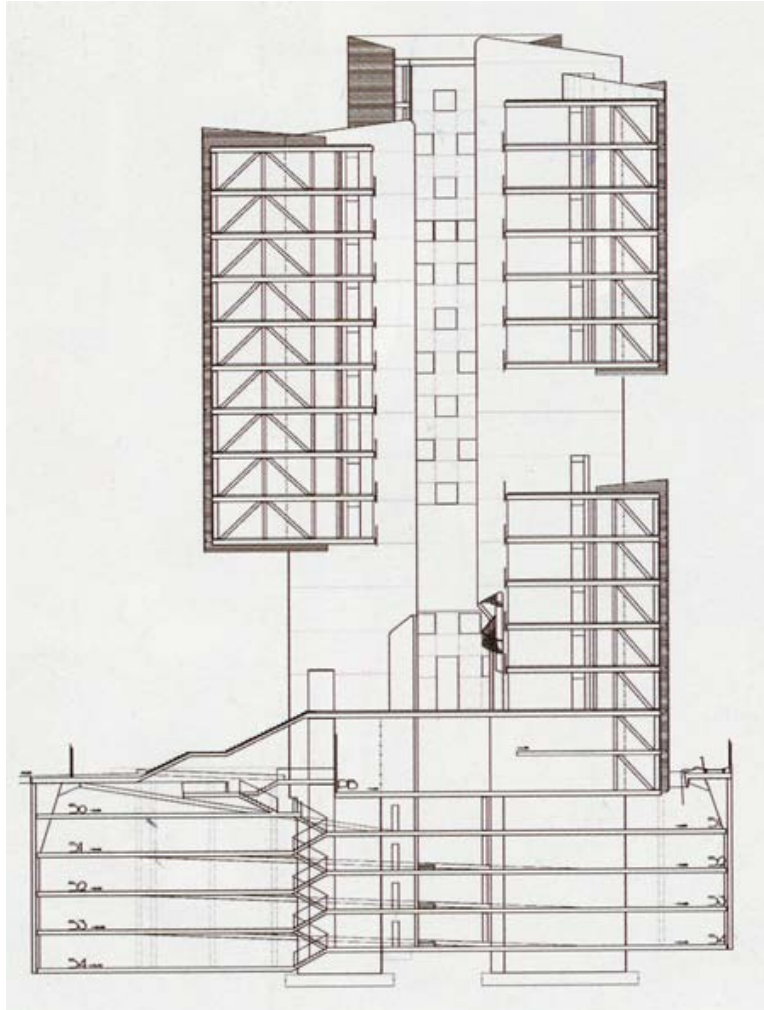


Current Typical Solutions



▪ Stacked Atria

Current Typical Solutions



- External Equivalency



Towards More Sustainable Thinking

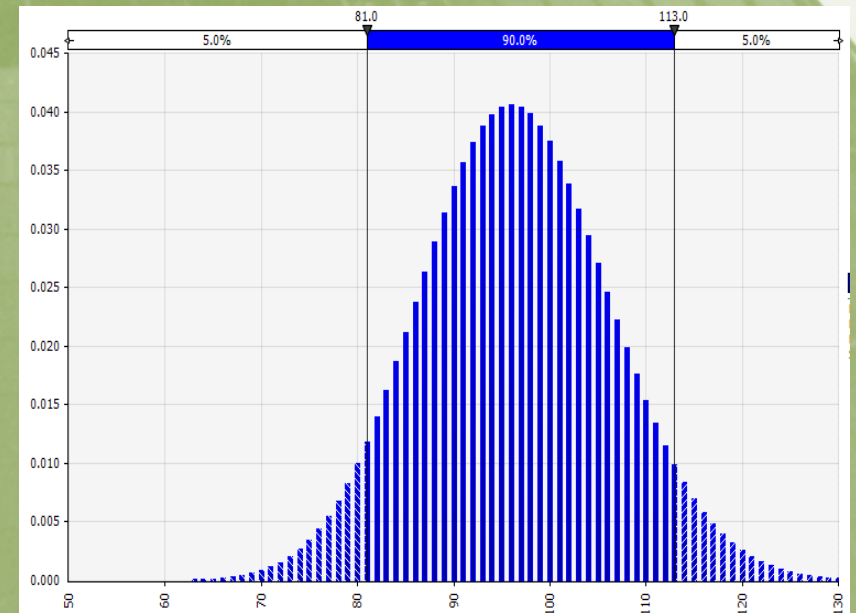


- Could we just rely on sprinklers?

Towards More Sustainable Thinking

- Robust Suppression
- Risk based approach
- Thorough modelling
- Introduction of risk based approach
- Consideration of societal benefits

If fire safety is so high, could we reduce in some areas to achieve more sustainable cities?





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What conflicts can arise and how can they be overcome whilst ensuring that the sustainability objectives of natural ventilation are still met?