Need for a Mission in Fire Safety – Fire Safety Engineering Perspective

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SFPE Mission

- The Society of Fire Protection Engineers (SFPE) is a professional society representing fire protection engineers, fire safety engineers and fire engineers, with some 4600 members worldwide, more than 1200 of whom hold a professional registration / license in engineering
- The SFPE Mission of is to define, develop, and advance the use of engineering best practices; expand the scientific and technical knowledge base; and educate the global fire safety community, to reduce fire risk

Fire Safety Engineering

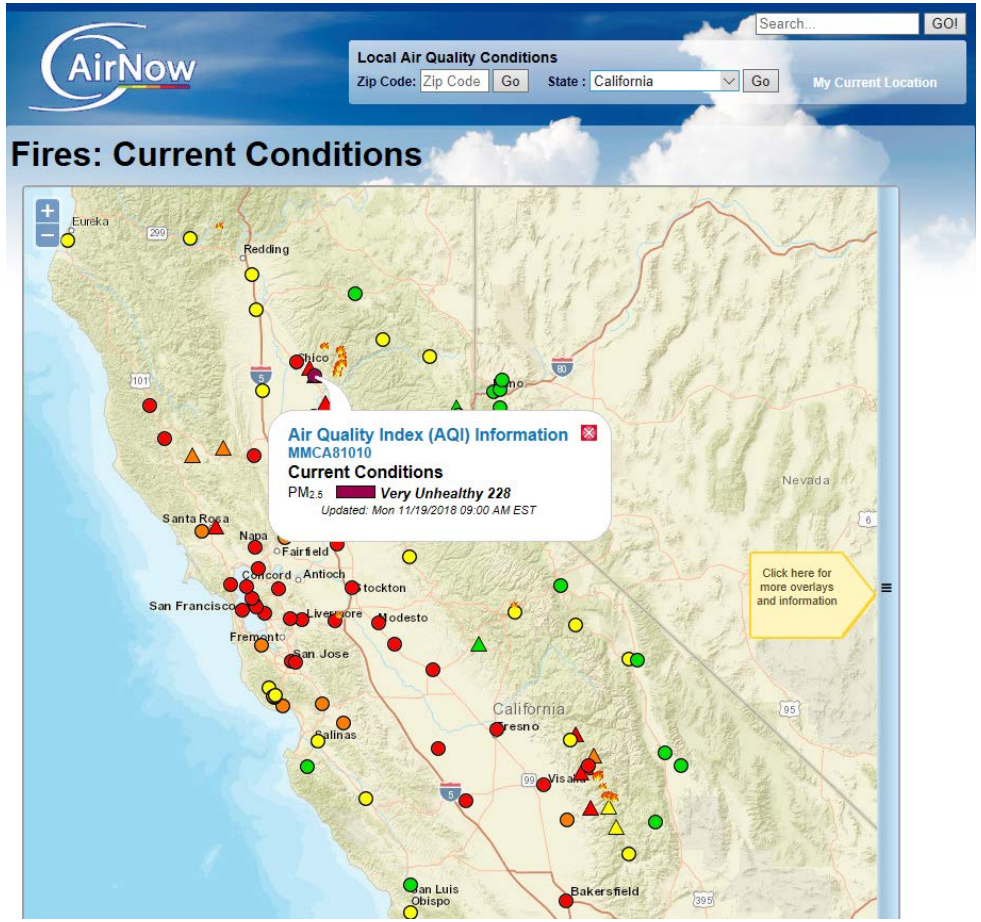
- Fire safety engineering is the application of science and engineering principles to protect people and their environment from destructive fire
- Fire safety engineering is focused on helping society address new and emerging challenges associated with fire in the built environment, infrastructure, and natural environment
- To appropriately address societal needs, a mission in fire safety, that is integrally linked with other research activities that aim to address critical Societal Grand Challenges, is essential

We Face Societal Grand Challenges That Require Cross-Disciplinary Solutions (Horizon Europe)

- Health
  - Environmental and social health determinants (pollution, aging, poverty), disabilities, and more
- Inclusive and Secure Society
  - Disaster resilient societies
- Digital and Industry
  - Digital technologies, AI, robotics, and more
- Climate, Energy and Mobility
  - Climate adaptability and resilience, sustainability, energy performance, urbanization, buildings and housing
- Food and Natural Resources
  - Forests / wildland environments

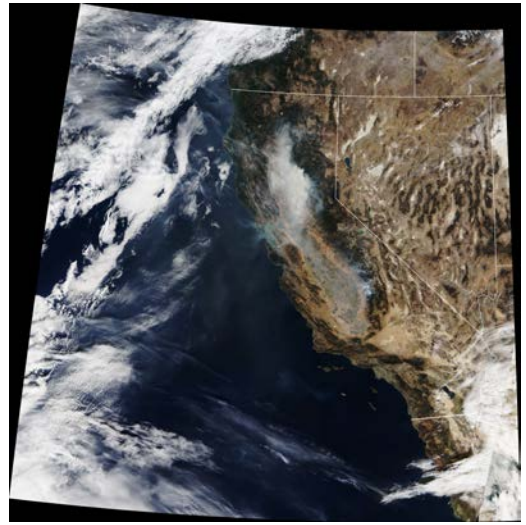
There Are Clear Fire Safety Needs in Each Challenge Area

- Health
  - Health impacts of smoke (particulates, toxics) – building and wildland fire



https://airnow.gov/index.cfm?action=topics.smoke_wildfires

https://www.foxnews.com/us/smoke-from-camp-fire-smothering-california-cities-shuttering-popular-attractions-in-san-francisco

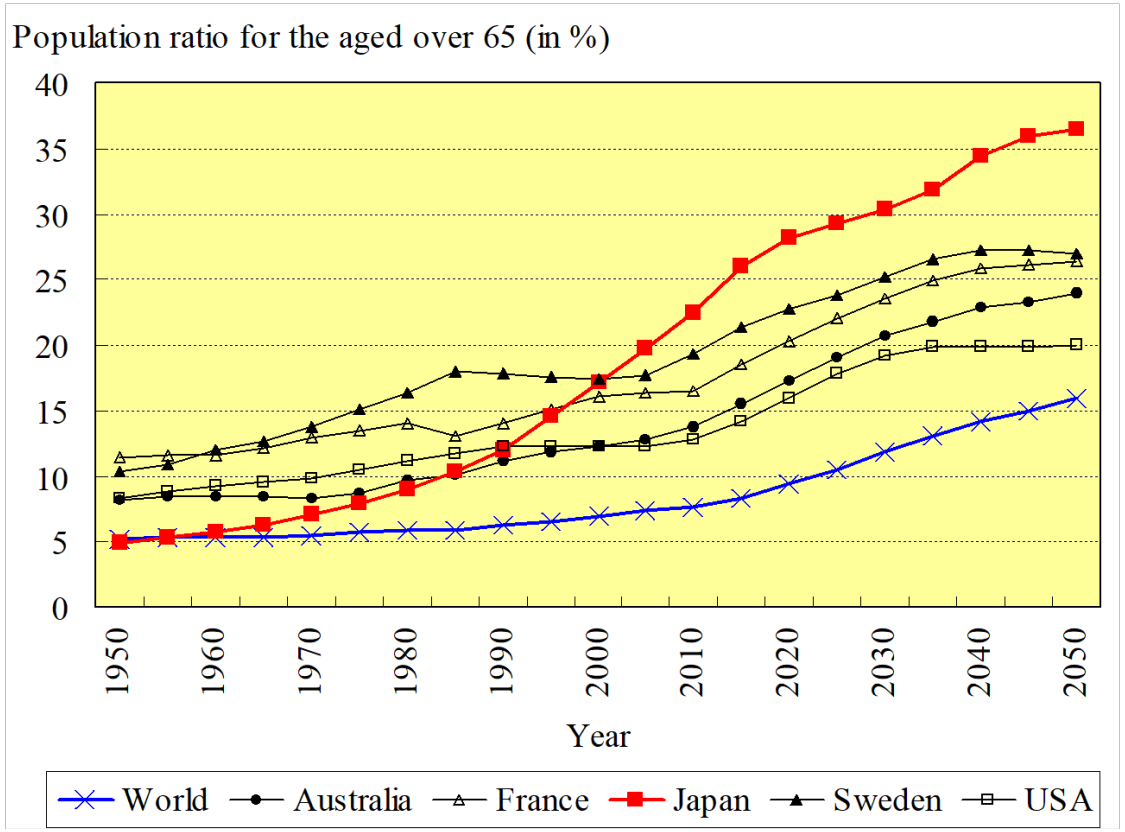


Credit:
NASA Earth Observatory image by Joshua Stevens, using MODIS data from NASA EOSDIS/LANCE and GIBS/Worldview. Caption by Adam Voiland.

There Are Clear Fire Safety Needs in Each Challenge Area

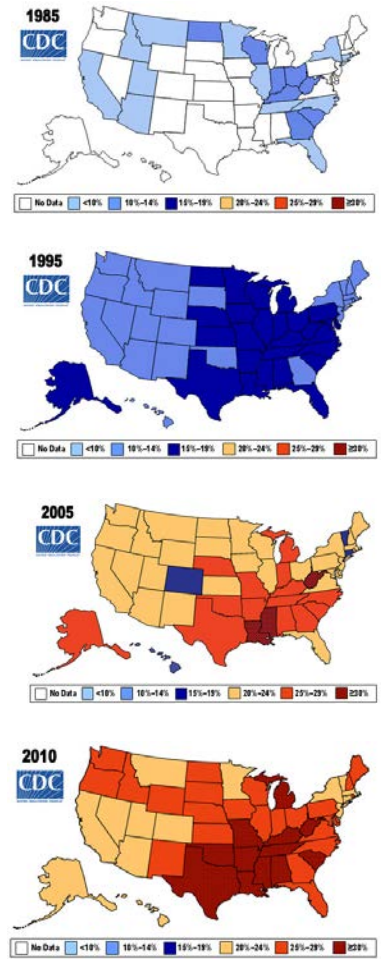
- Health
  - Aging population, obesity, range of abilities.

Rapidly Aging Society



Prof. Ai Sekizawa, Tokyo University of Science

Becoming Obese



There Are Clear Fire Safety Needs in Each Challenge Area

- Inclusive and Secure Society
  - Resilience to fire – large life-loss events

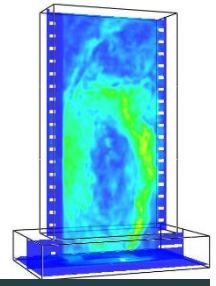
http://www.bbc.com/news/uk-england-london-40272168

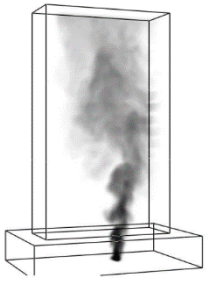
https://www.cnbc.com/2017/10/13/california-wildfire-disaster-could-bring-local-fiscal-pain-for-years.html

There Are Clear Fire Safety Needs in Each Challenge Area

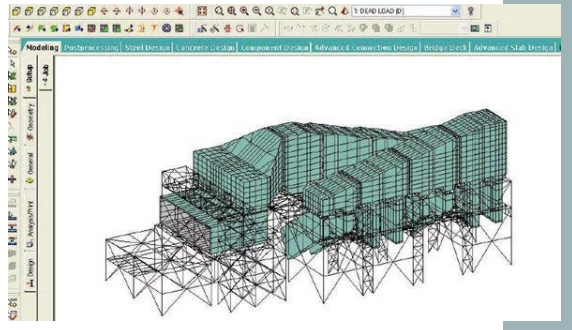
- Inclusive and Secure Society
  - Resilience to fire – urban conflagration – the latter particularly in low- and middle-income countries

There Are Clear Fire Safety Needs in Each Challenge Area

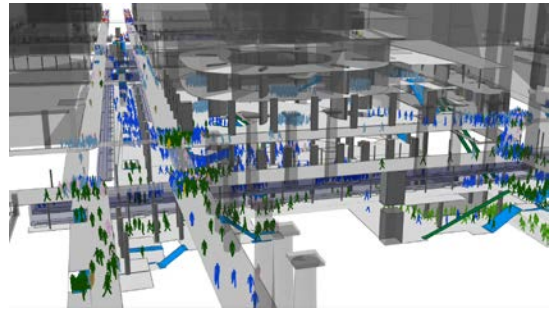




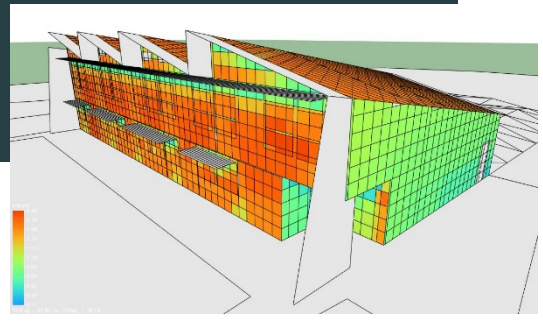
- Digital and Industry
  - Fire modeling integrated into BIM, robotic sensors and fire fighting technologies, appropriate protection of industry



https://www.linkedin.com/pulse/top-5-structural-design-analysis-software-get-work-done-yan-chu/



http://www.oasys-software.com/products/engineering/massmotion.html



There Are Clear Fire Safety Needs in Each Challenge Area

- Climate, Energy and Mobility
  - Fire impacts of sustainable technologies

http://www.bbc.com/news/uk-england-london-40272168

http://www.fireengineering.com/articles/2010/05/modern-building-materials-are-factors-in-atlantic-city-fires.html

http://www.youtube.com/watch?v=oyQLIlletDM

http://www.bbc.com/news/world-middle-east-22346184

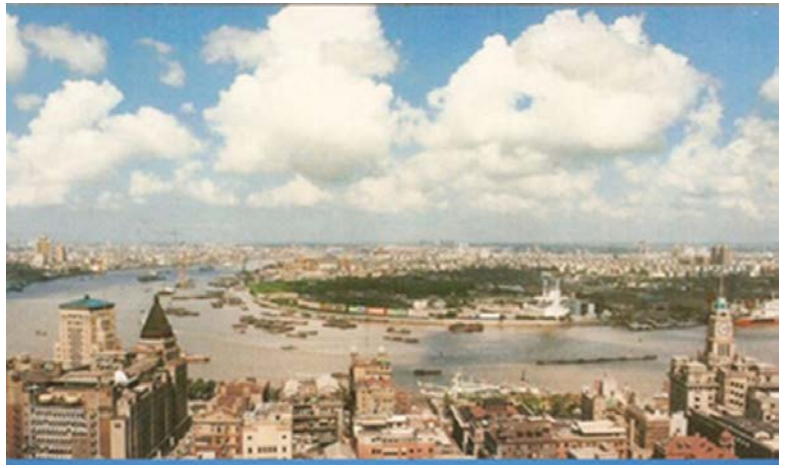
Metropolitan Fire Brigade

Manderin Oriental Hotel, Beijing

There Are Clear Fire Safety Needs in Each Challenge Area

- Climate, Energy and Mobility
  - Fire impacts of rapid urbanization and vertical growth of cities

"Globally, 54% of the population lives in urban areas today. By 2045, the number of people living in cities will increase by 1.5 times to 6 billion, adding 2 billion more urban residents."
(http://www.worldbank.org/en/topic/urbandevelopment)



Shanghai, 1990

Shanghai, 2010

There Are Clear Fire Safety Needs in Each Challenge Area

- Food and Natural Resources
  - Fire in the wildland and wildland-urban interface

https://www.mercurynews.com/2018/11/13/scientists-wind-drought-worsen-fires-not-bad-management/

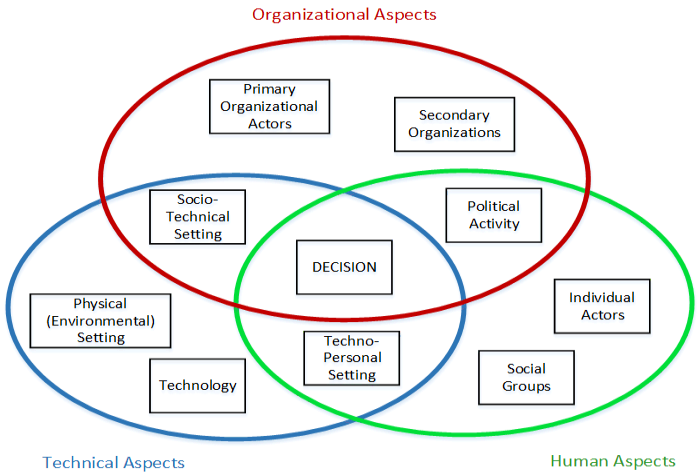
https://www.cnbc.com/2017/10/13/california-wildfire-disaster-could-bring-local-fiscal-pain-for-years.html

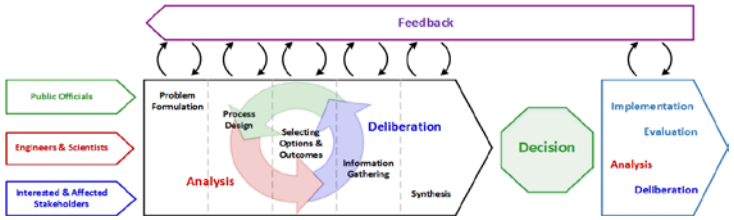
http://www.ntfire.net/main.asp?id=11

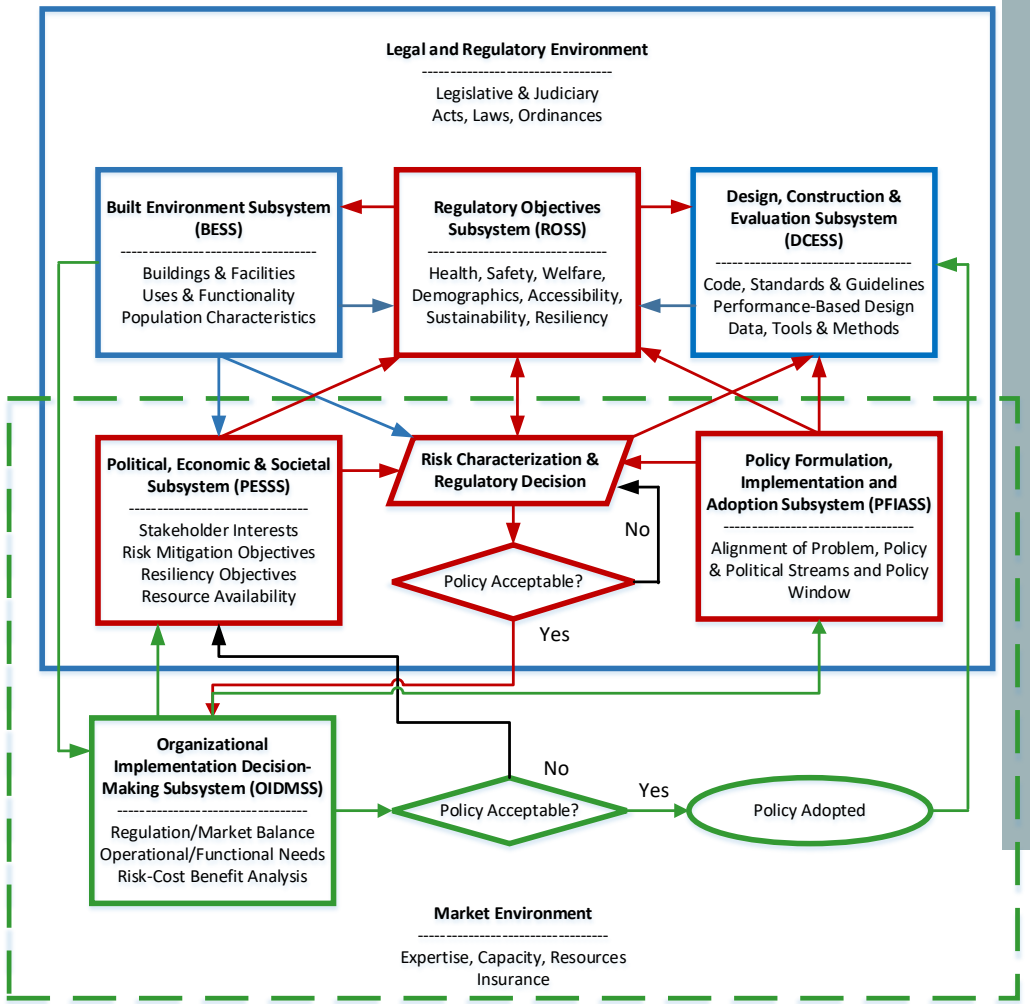
https://news.sky.com/story/the-community-of-paradise-is-destroyed-thousands-displaced-in-california-wildfire-11548787

There Are Clear Fire Safety Needs in Each Challenge Area

- Need to think of building regulatory system as complex socio-technical system
- Need to develop common regulatory and engineering frameworks







Strong Correlation between IAFSS Vision 2030 for a Fire Safe World and SFPE Mission

- Forest Fires and Wildland-Urban Interface
  - Engineering wildland fire resilient buildings
- Societal Resilience
  - Engineering solutions for aging, diverse populations
  - Engineering solutions for low- and middle-income
- Fire Safety and Sustainability
  - Engineering fire-safe and sustainable buildings
- Tall Buildings and Urban Development
  - Engineering fire-safe tall, densely packed buildings
- Globally-Consistent Regulations, Standards, and Guidelines
  - Socio-technical systems (STS) approach

Mission in Fire

Reduce the losses from destructive fire in Europe by 50% from 2018 values by the year 2030

- Reduce fire-related deaths by 50%, focus on vulnerable populations
  - Collaborative work with medical community, psychologists, sociologists, toxicologists, etc., along with fire scientist and engineers – how fire impacts people and how protect
- Reduce cost of fire losses by 50%
  - Collaborative work with materials scientists, fire scientists, engineers, regulators, fire service, insurers, etc. – reduce ignition, fire losses, cost of fire protection, fire brigade operations, etc.
- Reduce regulatory burden of fire by 50%
  - Collaborative work with regulators, enforcers, architects, engineers, professional societies, building owners and managers – new regulatory structures, engineering methods, etc. – require practice by competent fire safety engineers

Mission in Fire

- Reduce the losses from destructive fire in Europe by 50% from 2018 values by the year 2030
  - Reduce climate-induced fire losses by 50%
    - Work with climatologists and meteorologists to understand trends; work with ecologists to understand risks, work with planners to zone better; more sustainable and fire resilient buildings, …
  - Reduce building fire safety design costs by 50%
    - Better integrate with BIM and emerging technologies, promote use of only competent engineers and designers, reduce regulatory burden with higher levels of competency, …
- Associated benefit – reduction of global fire losses by a significant amount
  - Adoption of outcomes and adapted to local needs
  - Significant benefits for low- and middle-income countries

Summary

- Heath, climate change, population growth, globalization, rapid urbanization are critical issues
- Fire safety engineering is needed, along with other disciplines, to address such societal grand challenges, as fire is a hazard that impacts people, the environment, and the built environment
- An EU Mission in Fire Safety, which brings multidisciplinary teams to solve these challenges, would be extremely beneficial
- A 50% reduction in fire losses from the 2018 values by 2030 is offered for discussion and consideration