

Science vs Experience



Science vs Experience

Cognitive Dissidents

 **the standard in safety** Underwriters
Laboratories

Impact of Ventilation on Fire Behavior in Legacy and Contemporary Residential Construction



The Subject
Steve Karber, PE
Research Engineer, Corporate Research

**Impact of Ventilation
On Fire Behavior**

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Science vs Experience



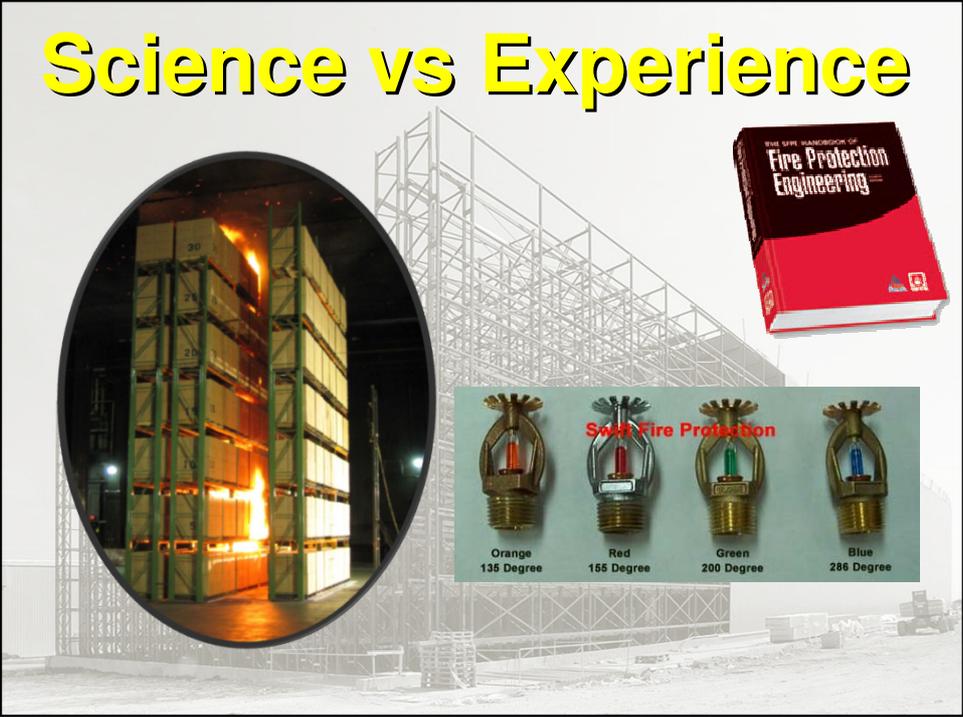


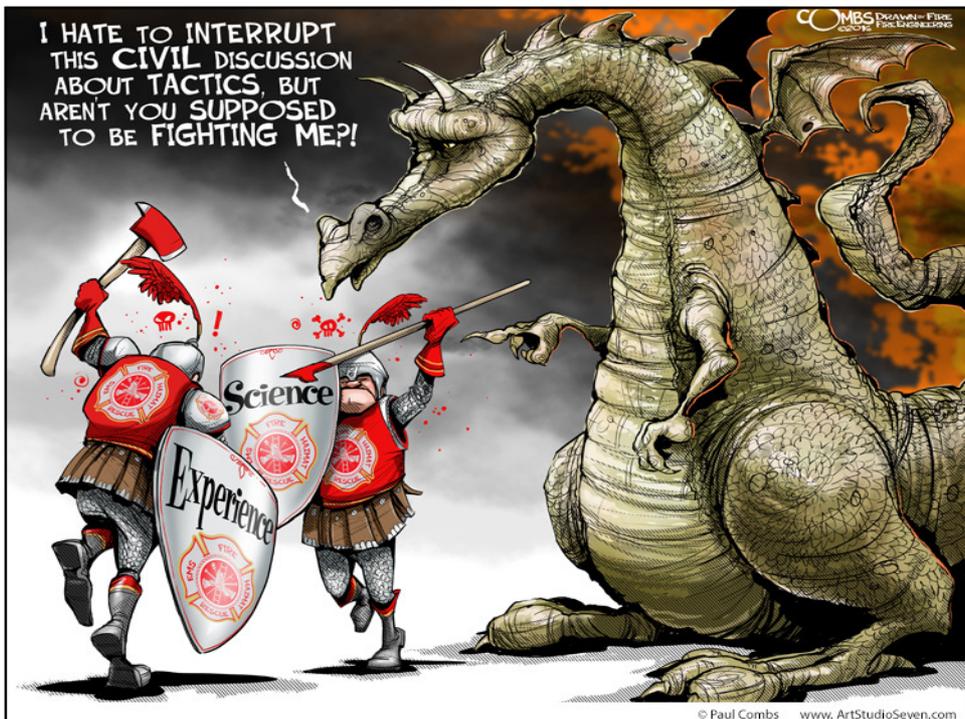
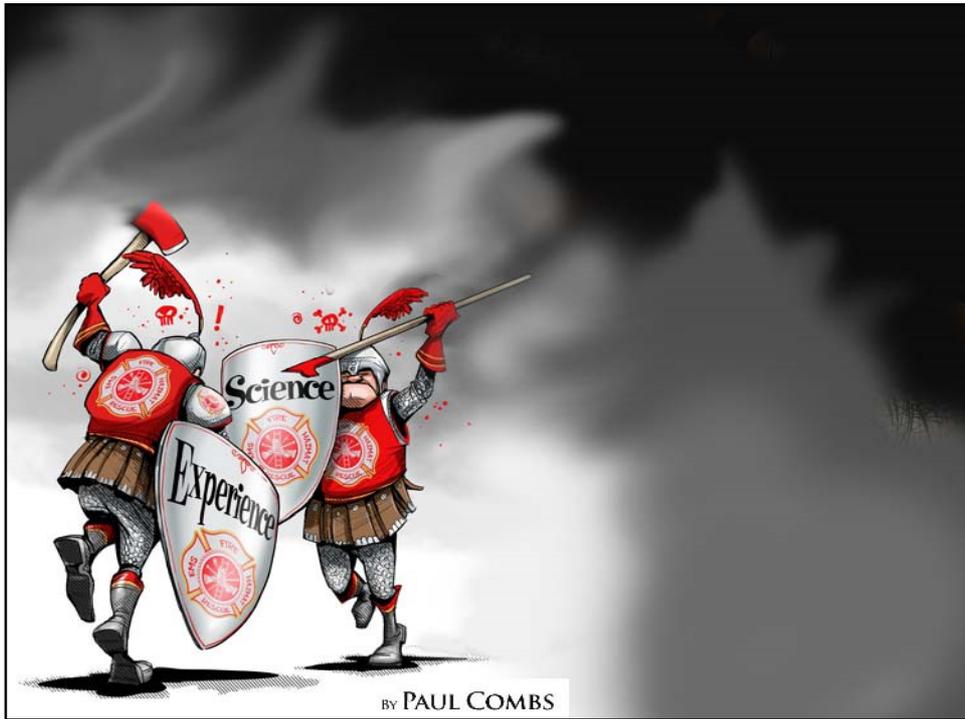
Fire Protection Engineering



Safe Fire Protection

Orange	Red	Green	Blue
135 Degree	165 Degree	200 Degree	286 Degree









Science = Experience

- *Governors Island 2008*



NYU·poly **NIST**

POLYTECHNIC INSTITUTE OF NEW YORK UNIVERSITY

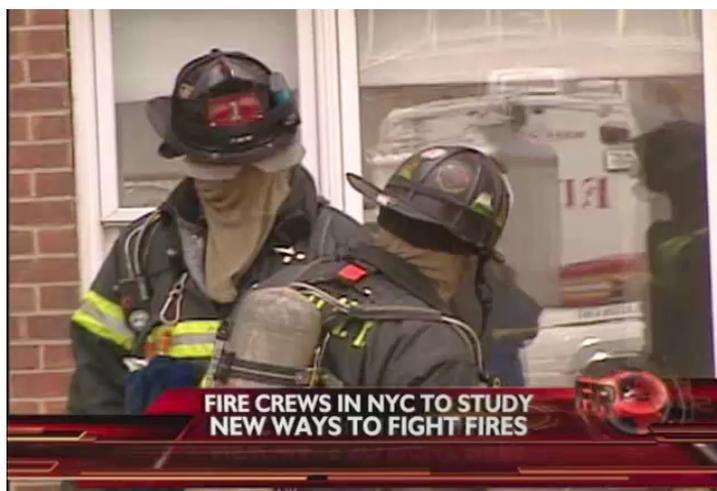
Science = Experience

- **Research**

- **Alternate Strategies**
 - Flanking Strategy
 - Defensive Strategy
- **Wind / Smoke – Management / Control**
 - Efficiency of Stairwell Pressurization
 - Fire Curtains / Blankets
- **Extinguishment / Control – HR Nozzle**
 - Efficient Design
 - Ease of Deployment (*Floor Below*)
 - Validate Effective Fire Streams

Science = Experience

- **PPV for Stairwell Pressurization**



Science = Experience

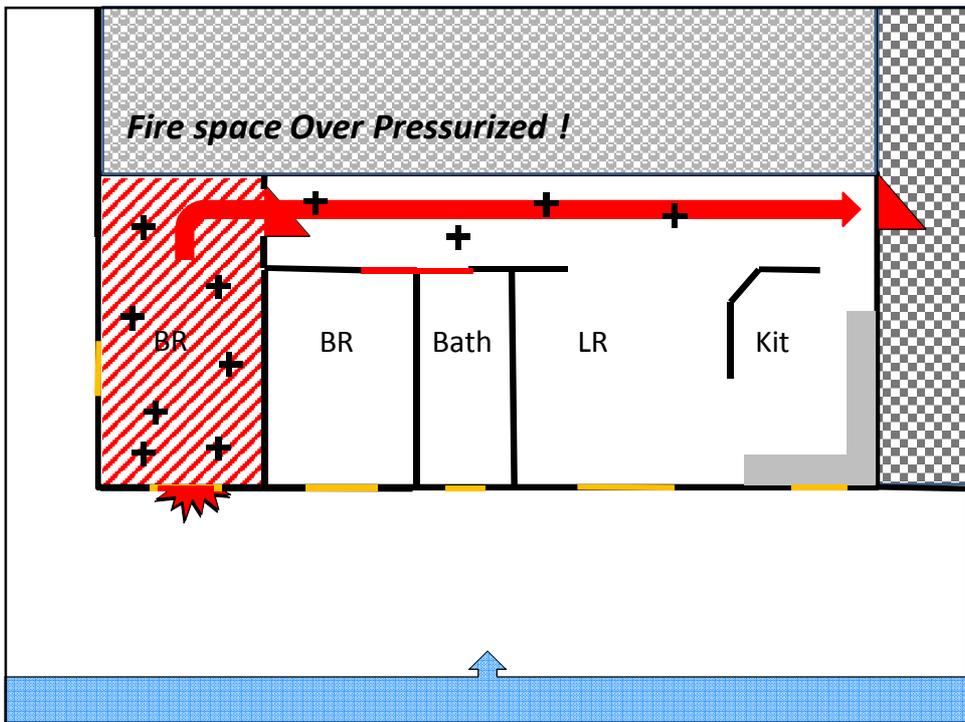
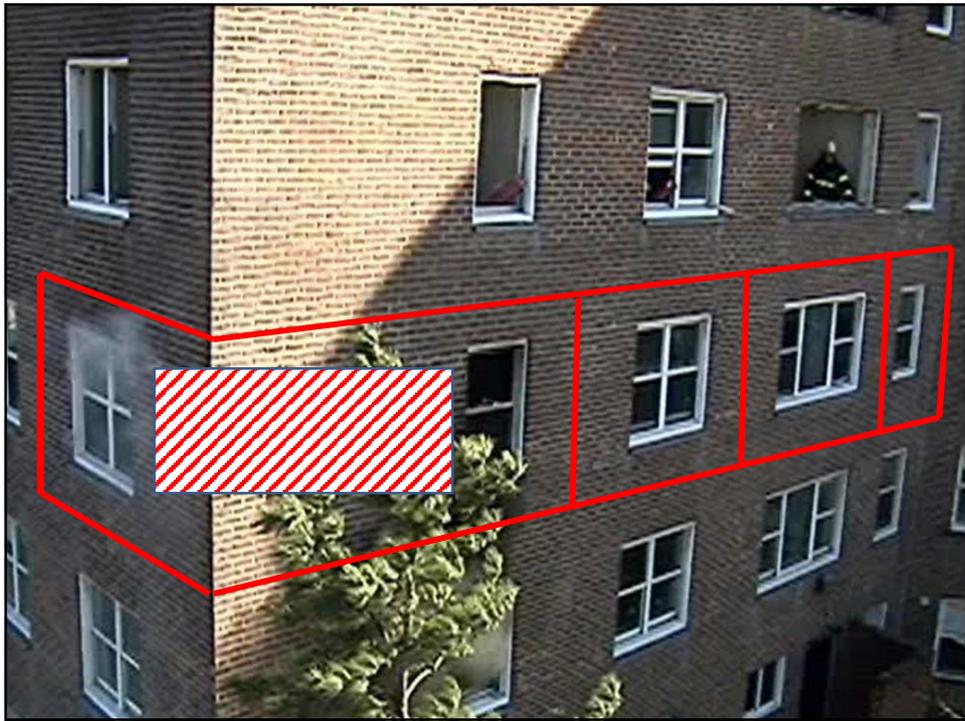
- *Wind Management & Control*



Science = Experience

- *High Rise Nozzle*





Environmental Factors

Fire space Over Pressurized !

Fire and Wind



Environmental Factors

Ventilation & flow path !

Fire and Wind





Environmental Factors

Fire space Over Pressurized !

Fire and Wind



Contributing Factors

BOARD OF INQUIRY REPORT

298 BEACON STREET
BOSTON, MASSACHUSETTS

BOX 9-1579

INCIDENT # 14-16454

MARCH 26, 2014



LT. Edward Walsh E-33

FF Michael Kennedy
L-15 Detailed to E-33



Death in the line of duty...



A summary of a MOSH fire fighter fatality investigation

March 2, 2014

Lieutenant and Fire Fighter Die and 13 Fire Fighters Injured in a Wind-driven Fire in a Brownstone—Massachusetts

Executive Summary

On March 26, 2014, a 43-year-old male career fire lieutenant and a 32-year-old fire fighter died during fire-fighting operations in an occupied multifamily residential structure (brownstone). Engine 33 was the first fire engine company assigned to Box 179. Engine 33 arrived on scene and reported, "We have a four-story with smoke showing from the first floor. Engine 33 is stretching a 1 1/2-inch hoseline in the front doorway." The lieutenant and the fire fighter stretched the 1 1/2-inch hoseline to the front steps (unlabeled), through the front door, and into the front hallway. When the lieutenant was informed the fire and a possible victim were in the basement, Engine 33 took the hoseline down the steps. The Engine 33 pump operator charged the line, but the line lost its water due to the rapidly deteriorating fire conditions which compromised the hose. Engine 7 arrived on scene and stretched a 2 1/2-inch hoseline as a back-up line to Engine 33. Engine 7 stretched their line to the front door following Engine 33's hoseline. Engine 22 was on scene and was preparing to stretch a hoseline into the basement apartment underneath the front steps. The crew from Engine 7 was moving their hoseline towards the stairwell leading to the basement, when conditions changed drastically. Fire and heat came up the steps from the basement. This was due to a maintenance worker leaving the rear door of the attached shed open while investigating the smoke detector activation. The conditions became untenable for the fire fighters from Engine 7. They moved out of the building to the landing of the front steps. Also, the interior door to the top of the basement stairs was open, the front exterior door was left open by its occupant fleeing the fire, and a rear basement door or window failed. Once the rear door or window burned through, this created an unrestricted flow path from the basement to the front door plus the doors above, thereby triggering a rapid progression of fire conditions. This trapped the officer and fire fighter from Engine 33 in the basement. The fire, heat, and smoke through the basement and first floor created untenable conditions on both floors. Due to the intense heat and fire conditions, the 1 1/2-inch attack hose burned through. Command then ordered the building to be evacuated. Approximately 1 minute later, the Engine 33 lieutenant called Command and said they were running out of water. The dispatcher replied, "OK, Engine 33, we are going to get you water." Command immediately called a



A view of fireground from Side Charles. The fire started near the one-story shed (located against the fence) and extended into hallway on the basement of the structure. (Photo courtesy of the fire department)

Evolution – Science - Experience



Boston Board of Inquiry

SOP's / Training

- Size Up - 360°
- Fire Behavior/Flow Paths/Ventilation
- Water Supply / Discharge Flows
- Accountability System / PAR
- RIT / Significance



