

8th International Tall Building/High Rise Fire Safety Conference

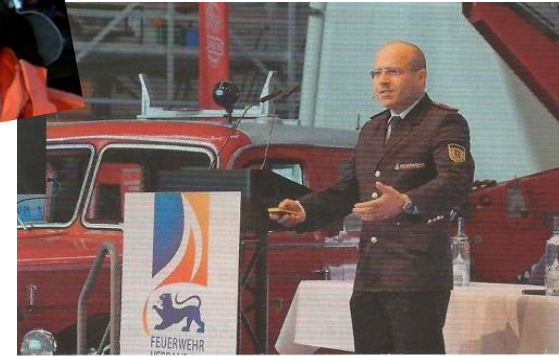


Indianapolis, US | April 15th-17th 2024

12:50 Presentation 18 – Dr. Michael Reick: 'Firefighting Smoke Control'.



30 Nach erstem HT-Einsatz



Kreisbrandmeister Dr. Reick referierte über den Brandschutz bei Hochhäusern und hohen Gebäuden

Do people still die from smoke fumes
in stairwells in your country?

Do you do everything possible
to protect the stairwell?



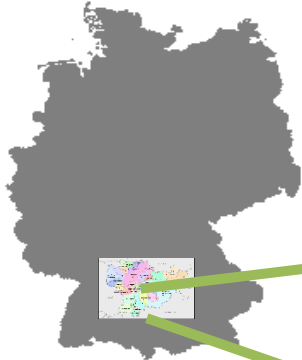
Fire Service in the County of Göppingen (Germany)

250.000 inhabitants

2.500 fire fighters (25 paid)

80 fire stations

200 engines





Midrise / Small Highrise
(no ladder access to building)

- No stairway pressurization
- Poor maintenance
- ...

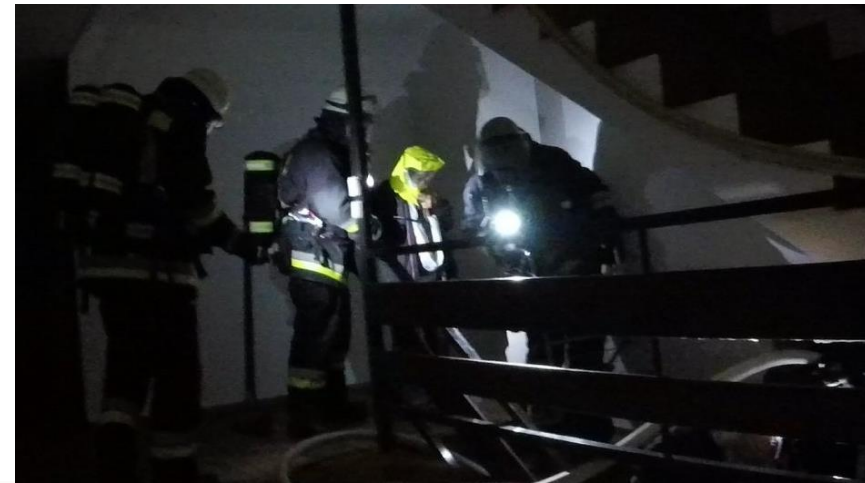
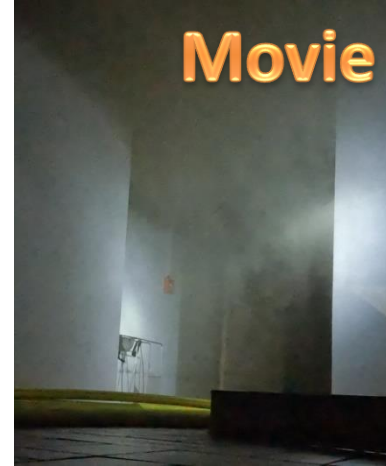
Nov. 26, 2017

50 apartments

Fire in basement and stairway

38 people rescued





Example: highrise fire in Dez. 2021



... and another highrise fire: March 2023

***Smokestopper: used in thousands of real fires
=> Standard Operational Precedure in many FD***

Your built environment!?



There are different experiences in the fire service due to

- different built environment

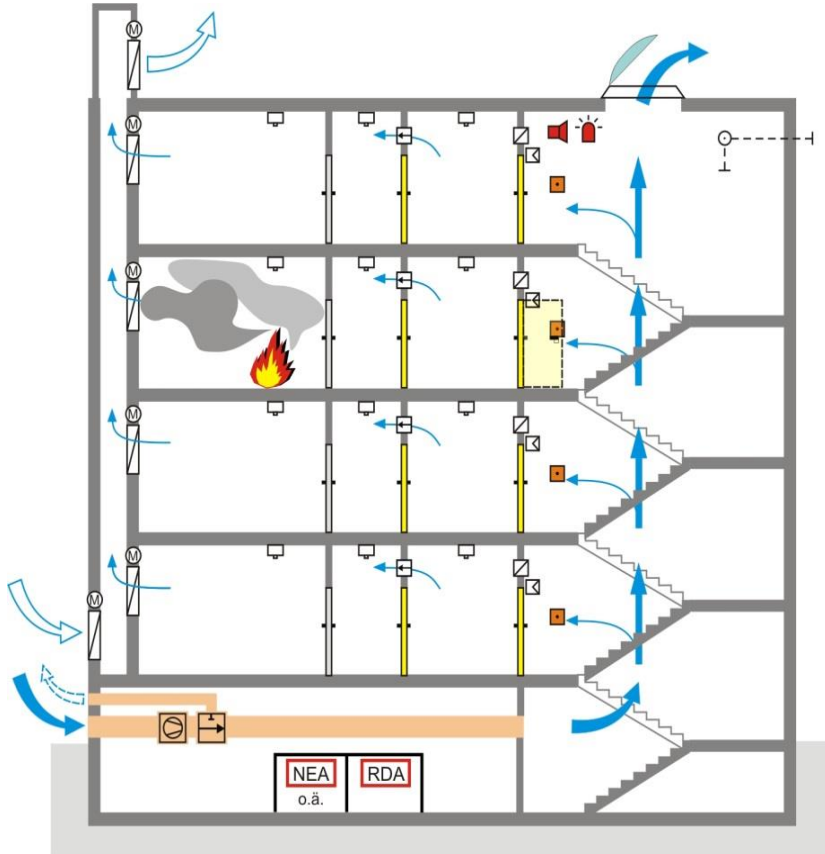
- different culture, tools, tactics, fire service training, ...



Example of multiple use of fans and smoke curtains to protect property (reduce smoke damage) in a normal apartment fire.

Movie

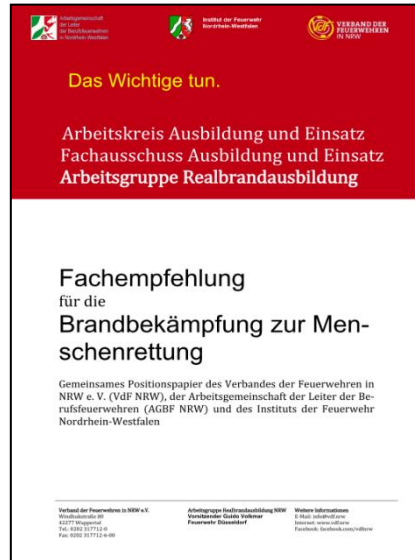
Do firefighters have to understand the principles of complex ventilation systems?
(or should we just not work in conflict with them?)



Germany



2012/2016



2019



Policy | Procedure



Tactical ventilation

New policy number: **883**

Old instruction number:

Issue date: **14 January 2016**

Reviewed as current: **11 May 2021**

some universal principles for fires:

Stabilize the situation first

(do not make it worse!)

Do not allow smoke spread

Protect egress routes (stairways!)

Especially if you use a “stay in place” tactic



Jan. 2022; New York, Bronx, USA



17 KILLED BY SMOKE INHALATION

72 HURT

35 LIFE-THREATENING INJURIES

Fire Department New York Incident Report

Amendments

Amended By	909715 - AUGHAVIN FRANCIS X. Captain	07/19/2022 10:16:28
Amended By	916618 - CARBONE CHARLES A. Lieutenant	01/24/2022 10:31:29

Incident

Incident #	2-0257-0
Status	Closed
Incident Date/Time	01/09/2022 10:54:46
Incident Type	111 - Building fire
Box #	2162

members took their roll up hoses to the building lobby and along with the officer of Ladder 56 determined that the attack stair would be the "B" stairway which would put them closer to the fire apartment on the

determine the fire apartment. Unfortunately for our members and many civilians the door to the fire apartment was left open when the occupants fled their apartment. As a result, heavy smoke, heat and fire were

sent a unit to the roof to prepare for a rope rescue due to the numerous people in distress at upper floor windows. It was later determined that the stair door on the 15th floor was left open and the duct work in the building contributed to the spread of smoke throughout the building. Numerous occupants made the decision to leave their apartment and attempt to flee the building but were overcome by smoke in the hall or stairway.

occupants in the apartment adjoining the fire apartment and above. Ladder 33's LCC began the difficult task of getting to the 19 floor to vent the attack stair bulkhead. He made his position and found the bulkhead door in zero visibility and vented. He then returned to the

encountered a similar smoke condition. The Roof firefighter forced several doors to gain access to the floor above the fire apartment. Roof

Cook County Administration Building Fire, 69 West Washington, Chicago, Illinois, October 17, 2003: Heat Release Rate Experiments and FDS Simulations



Jimmy Davis

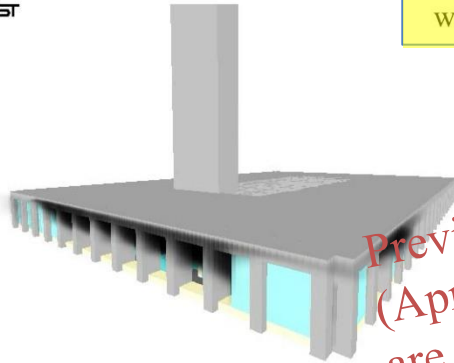
Introduction

On October 17, 2003, in the Cook County Administration Building, 69 West Washington, Chicago, Illinois, a fire resulted in the loss of six lives and several injuries. The victims were found in a stairwell, several floors above the fire floor. The Governor of Illinois

that had reached the 15th
At 690 s (16 min) smoke
e in the stairs had reached

the 17th floor at the end of the simulation 990 s (16 min 30 s).

NIST



0:16:30.0

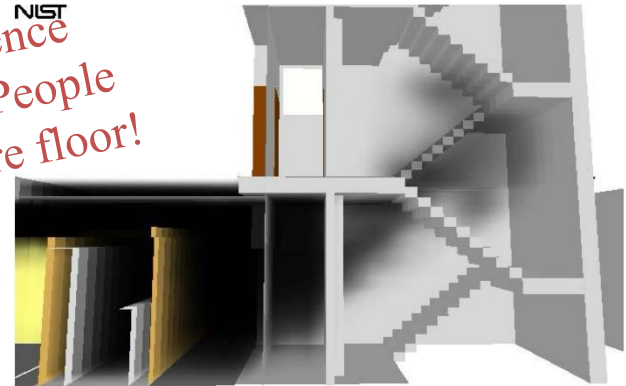
Figure 141. Smoke at 990 s (16 min 30 s)

Smoke Spread Up the Southeast Stairs Without a Functioning Smoke Shaft

At 930 s (15 min 30 s) the door to the southeast stairway was opened simulating the entry of the fire fighters onto the 12th floor to attack the fire. The southeast stairway had a door from the corridor to a ventless door from the vestibule to the stairs. A vent to a

*Previous presentation in this conference
(April 16th, 2024 by Jimmy Davis: People
are dying in staircases above the fire floor!*

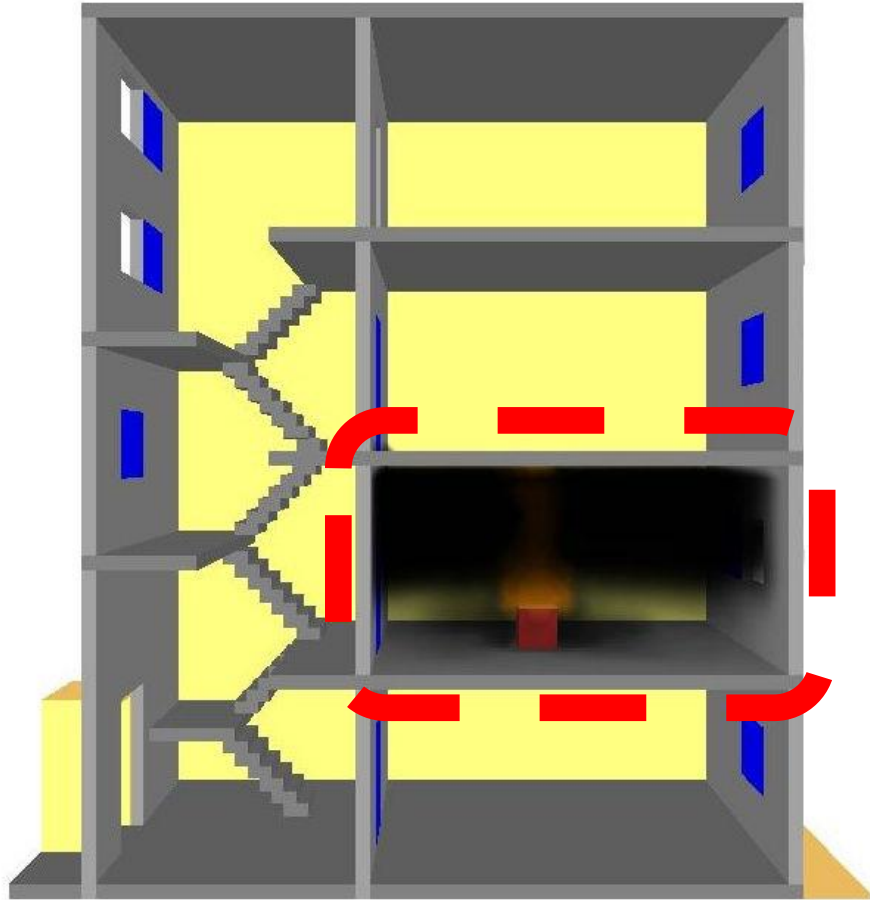
NIST



0:15:35.3

Figure 142. Smoke in southeast stairs at 935 s (15 min 35 s)

Flow Path Control



Fire in a closed compartment

vs.

Fire with flows ?

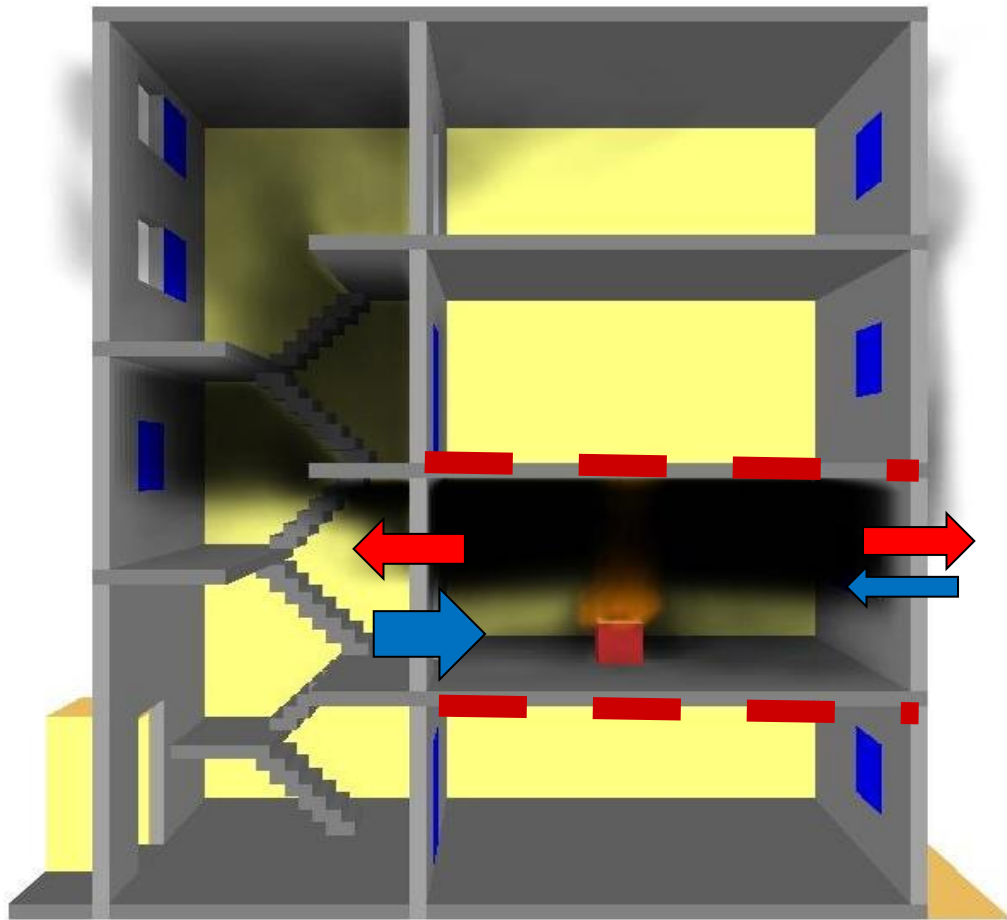
Extinguish vs.

Snuff / Throttle ?

SOPs?

How long can a substantial fire burn in a closed compartment?

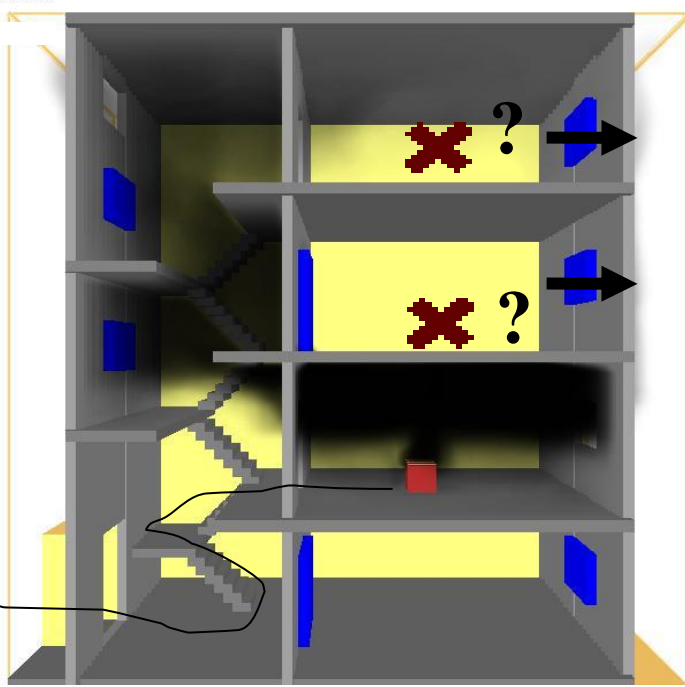
Multiple Flows / Bi – or Uni-Directional Flows



*Fire can exchange
gases within the
building and/or
to the outside:*

*Flow of Smoke
Flow of Air*

*In case
of fire:*



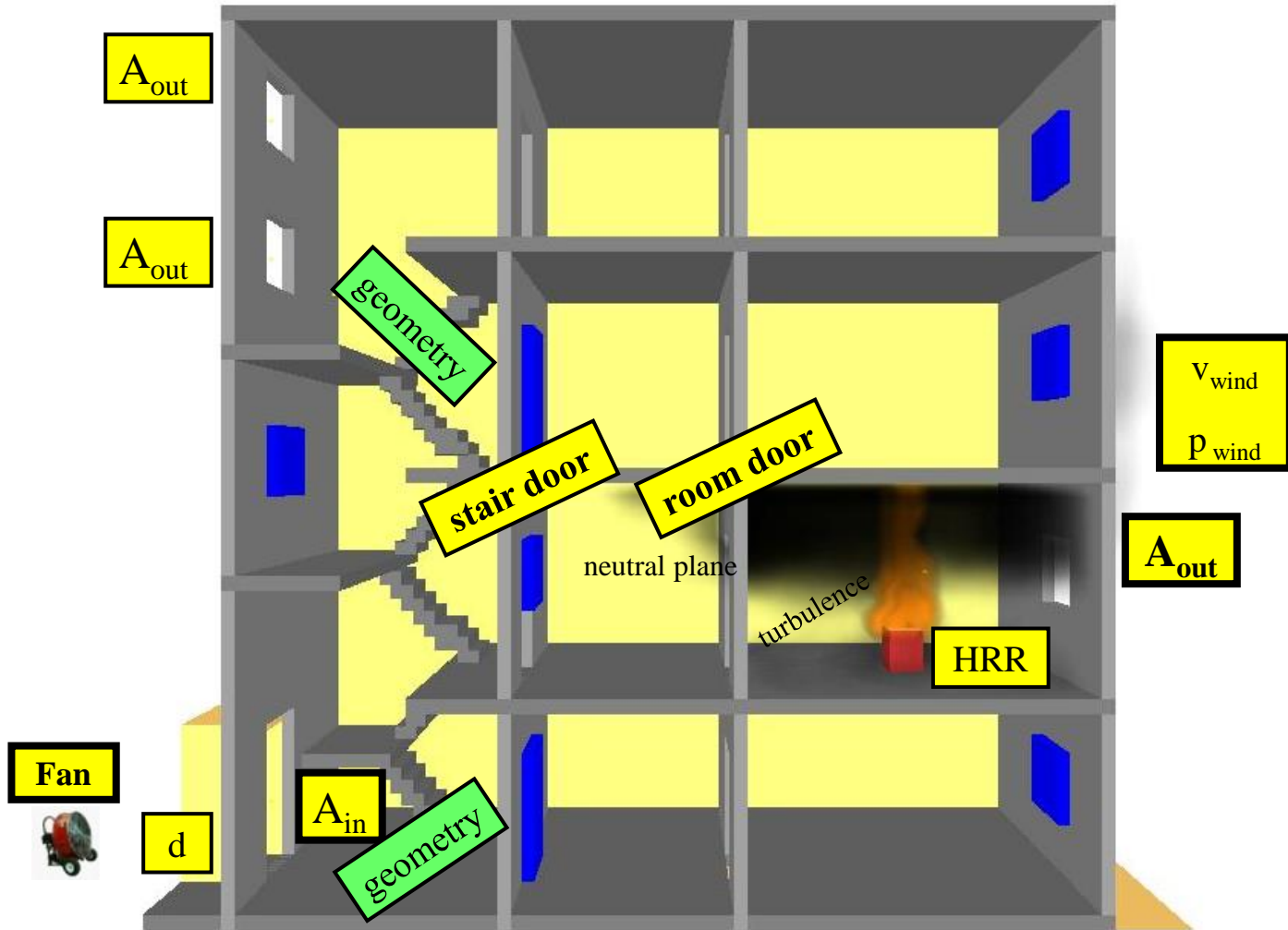
All of our actions should make the situation better!

Separate trapped people from fire and smoke!

One open door can change the situation totally!

Open doors can allow dangerous air tracks!

- **The stairway is the most important room!**
- **Always stabilize the situation against sudden changes (glass failure, flashover, wind, ...)**



child's room



corridor



stairway



Apartment fire in Heilbronn 2006



Apartment fire in Munich 2008



Foto: S. Rasch

Apartment fire in Berlin 2013

Berlin Fire Dept. – 2012 and 2013

Interior Survey with 67 battalion chiefs

Practical Rescue Experience on the fireground:

How practical do you judge the different rescue methods:

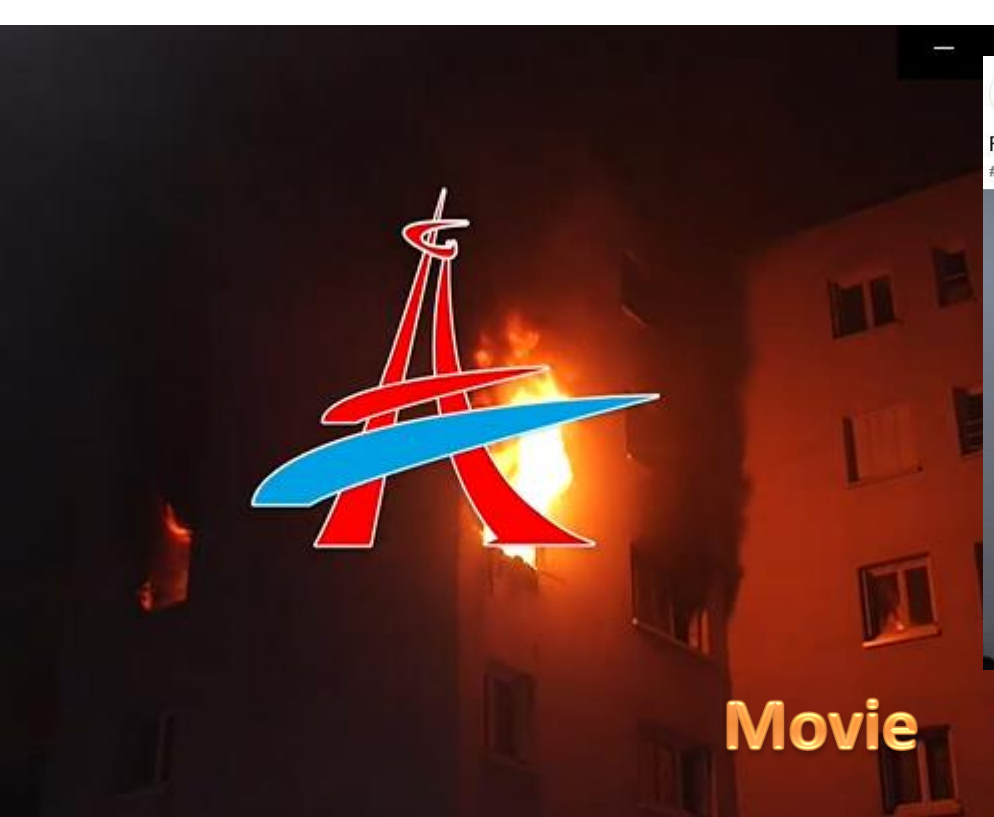
Jump pillow	4,4	
portable ladders	4,0	<i>acceptable</i>
rescue hoods	2,4	
Aerial ladders	2,2	<i>good</i>
Cleaning of stairway (ppv and smoke curtain)	1,7	<i>very good</i>



Apartment fire in Vienna 2014



Apartment fire in highrise, Hongkong 2015



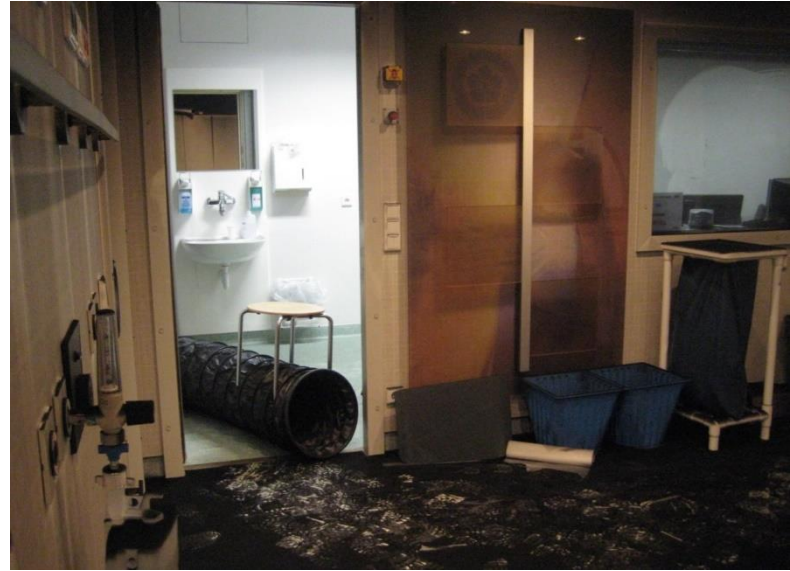
 **Pompiers de Paris**
5. Juli um 16:15 · 🌐

Retour en images sur le violent feu d'appartement au Blanc-Mesnil (93).

#Intervention 🚒 Retour en images sur le violent feu d'appartement au Blanc-Mesnil (93)...



Apartment fire in Paris 2020



Würzburg 2009
Hospital Fire

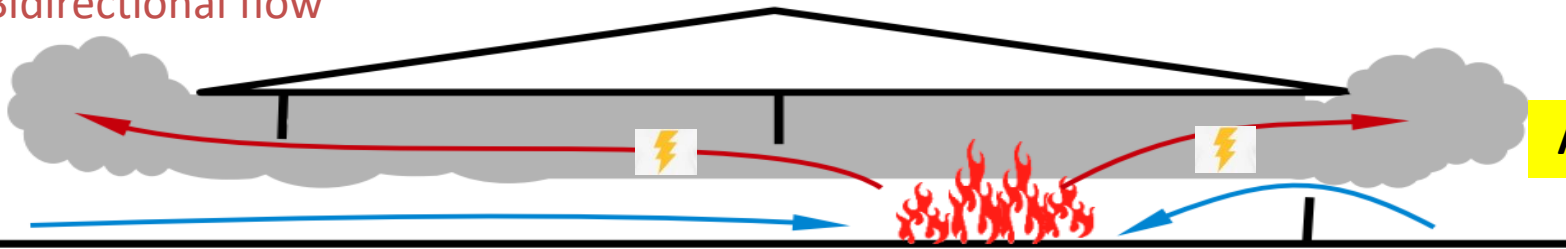


14.01.2009 - Bad Harzburg
*Two children trapped upstairs!
Blocking device used!*

*Rescue through stairway while
smoke curtain was fully
involved in flames*

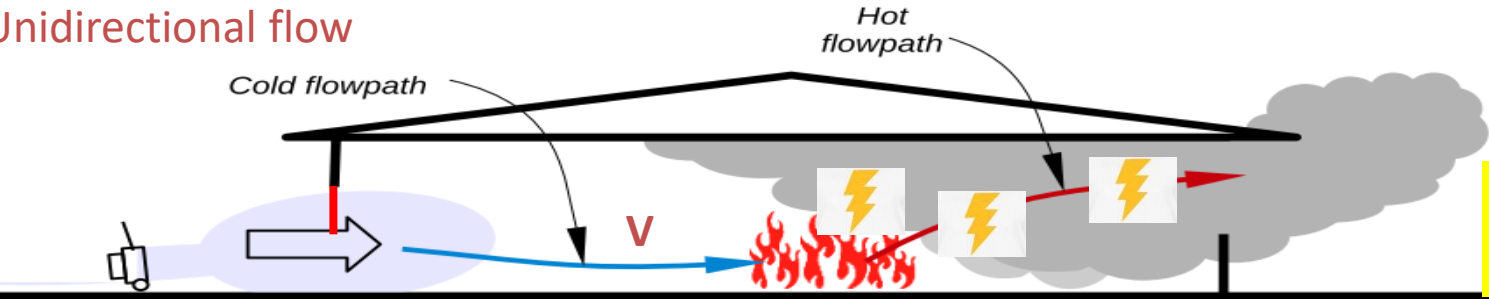


Bidirectional flow



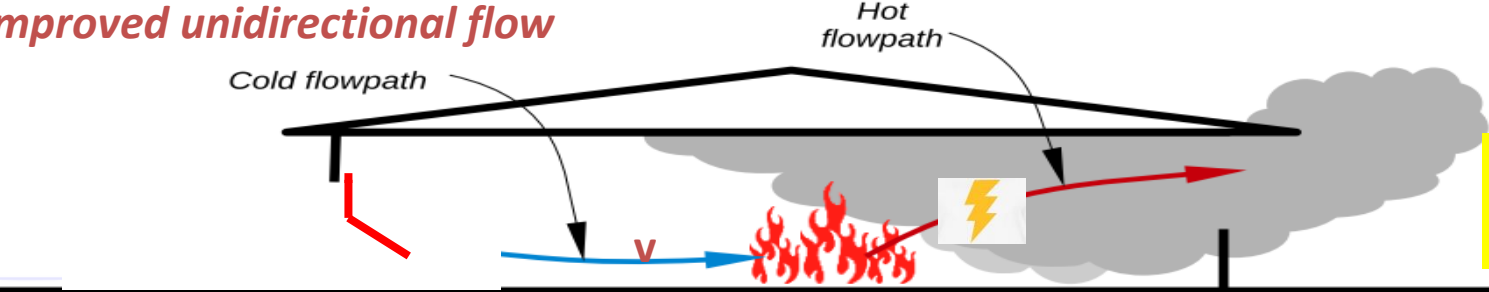
A
Always avoid:

Unidirectional flow



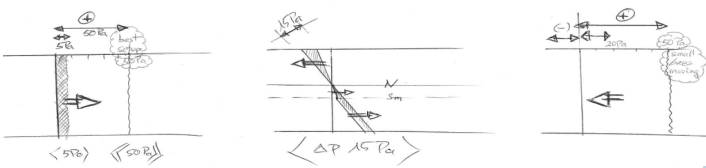
B
**2: fire controlled:
ventilate!!**

Improved unidirectional flow



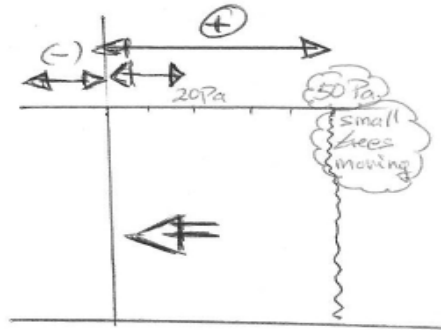
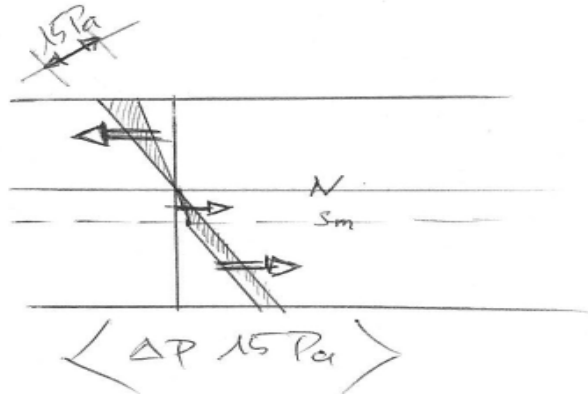
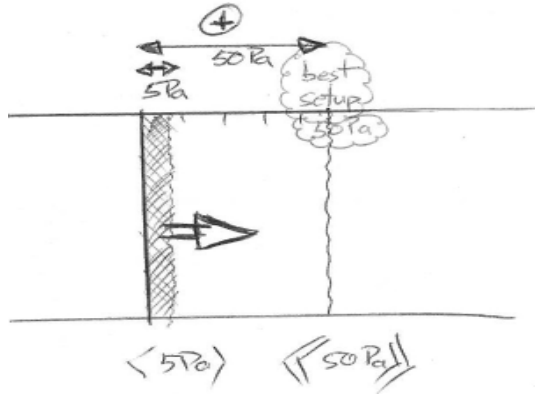
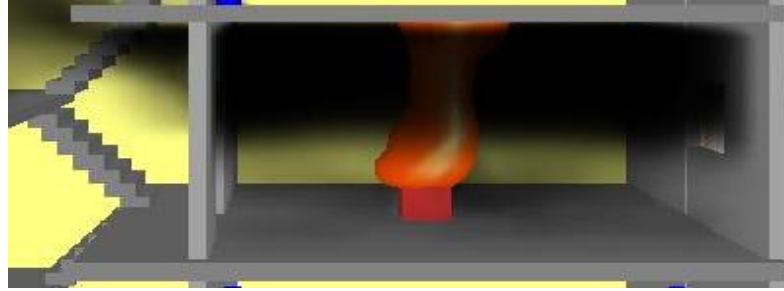
C
**1: Start safe:
limit air flow**





Movie1

Movie2





Movie



Movie



Training with smoke curtains
in Martinsville, VA; Feb. 2024

Use #1
block smoke



Use #2
limit air



Use #3
enhance ppv





links: Bei einer lichten Höhe der Zuluftöffnung von rund 1,5 Meter sollte der Abstand des Belüftungsgerätes ebenfalls 1,5 Meter betragen. rechts: Bei einer geringeren Höhe ist auch der Abstand zwischen der Zuluftöffnung und dem Belüftungsgerät entsprechend zu verringern.

+50%

+100%

some universal statements

Be able to do basic things that are common around the world!

- **Protect the stairway!**

Given building systems / smoke curtains

- **Get water on the fire – fast!**

But do not encourage fire and smoke spread

- **Be ready to rescue through smoke!**

Smoke hoods (filter and air supply)



RIT-Team:
Equipped to rescue one
unconscious person up to
four cooperating civilians

Attack-Team:
Equipped to rescue one
person with smoke hood
(filter vs. air supply)



some universal statements

Stabilize the situation first
(do not make it worse!)

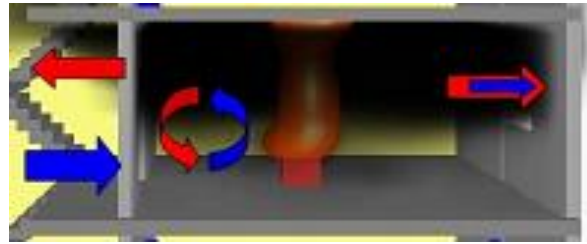
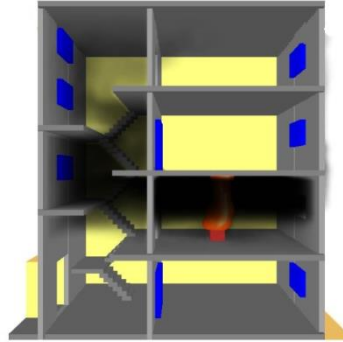
Do not allow smoke spread

Protect egress routes (stairways!)

Especially if you use a “stay in place” tactic



Fire Ventilation and Smoke Spread



Michael Reick
April 2024

michael@dr-reick.de

Movie from the presentation
on April 17th, 2024 in Indianapolis

Installing two smoke curtains
in a door and further use of a
fan to prevent smoke spread!

[https://www.youtube.com/
watch?v=rGMgFAqcawk](https://www.youtube.com/watch?v=rGMgFAqcawk)

