Digital Stakeholders Workshop
05/05/2020

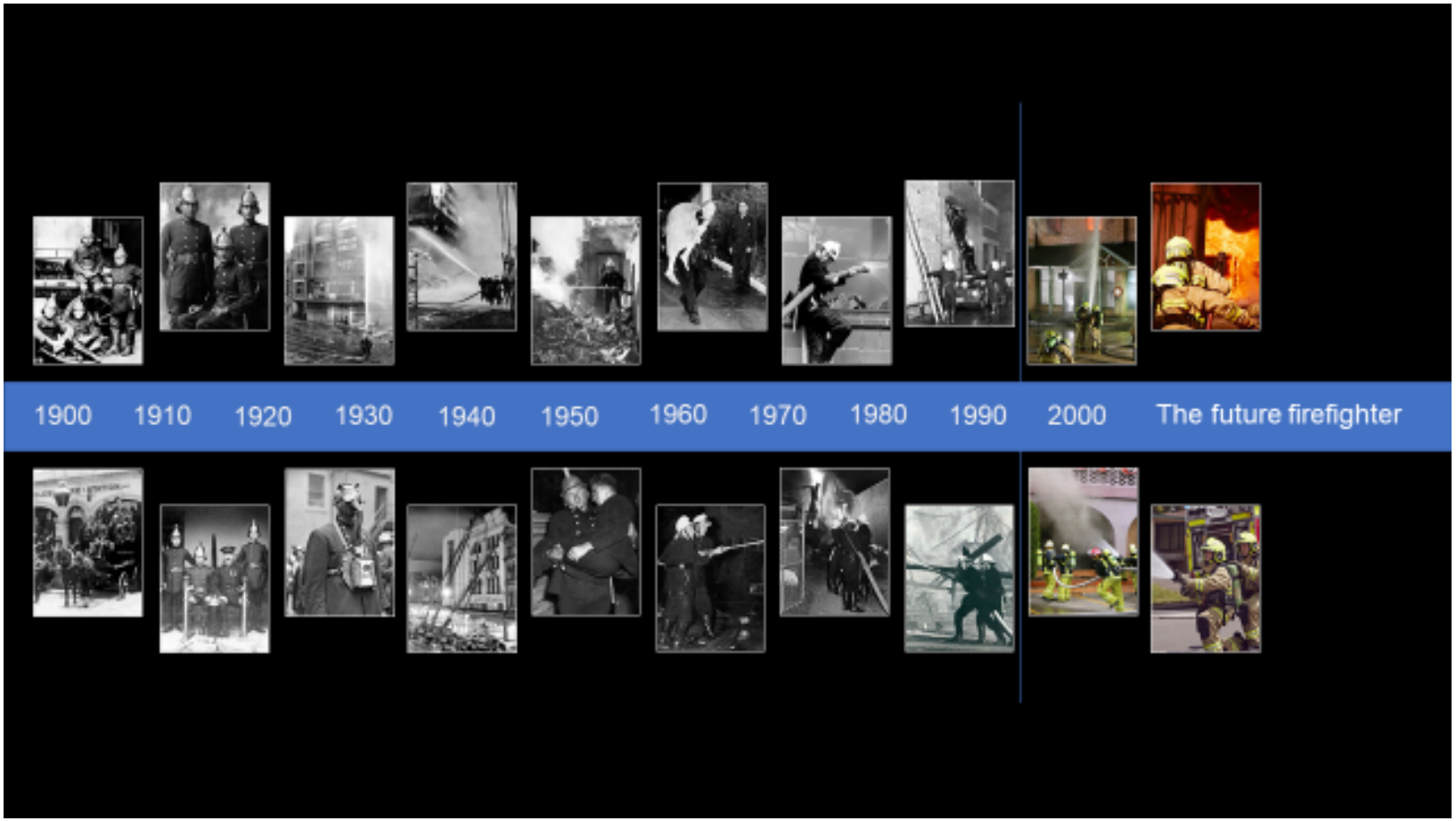
Dispatched for fire in tunnel, no further information. Now what?

"Basics and principles of fire interventions"

Capt. ir. Matthias Van de veire, SPFI

Timeline

Where do we come from



Timeline

Where do we come from

Timeline

Comparing past to present

- Experience based
- More incidents
- Outside attack due to lack of technology

- Knowledge based
- Less incidents
- Inside attack due to SCBA and TIC

Timeline

What has science taught us

- Fire terminology
  - Heat Release Rate vs. Temperature
  - Heat Flux
- Cooling capacity water
- “Advanced” Fire triangle
  - Fuel controlled
  - Ventilation controlled
- Fire growth in small compartments

Science

Some quotes

- Tank blowdown in 25’ if 1 MW/m² - GTR# test WP2.2
- 1 MW/m² and more => Tank blowdown in less than 5’ - Comments Molkov
- “Tanks should never explode” - Heggem

Science

Tanks should never explode

tunnel

Science

Science vs practise

	Lab	Field
Time	Days, months, years Starts at ignition	Minutes Starts at arrival
Recourses	Everything available	Little to no imformation
Factors	Controlled, setup	People factor
Reliability	Repeatable	One shot
	How can results lead to fast and simple answers on the field?	**How can we first responders give an idea what they need?**

How does a tunnel intervention look like?

Intervention

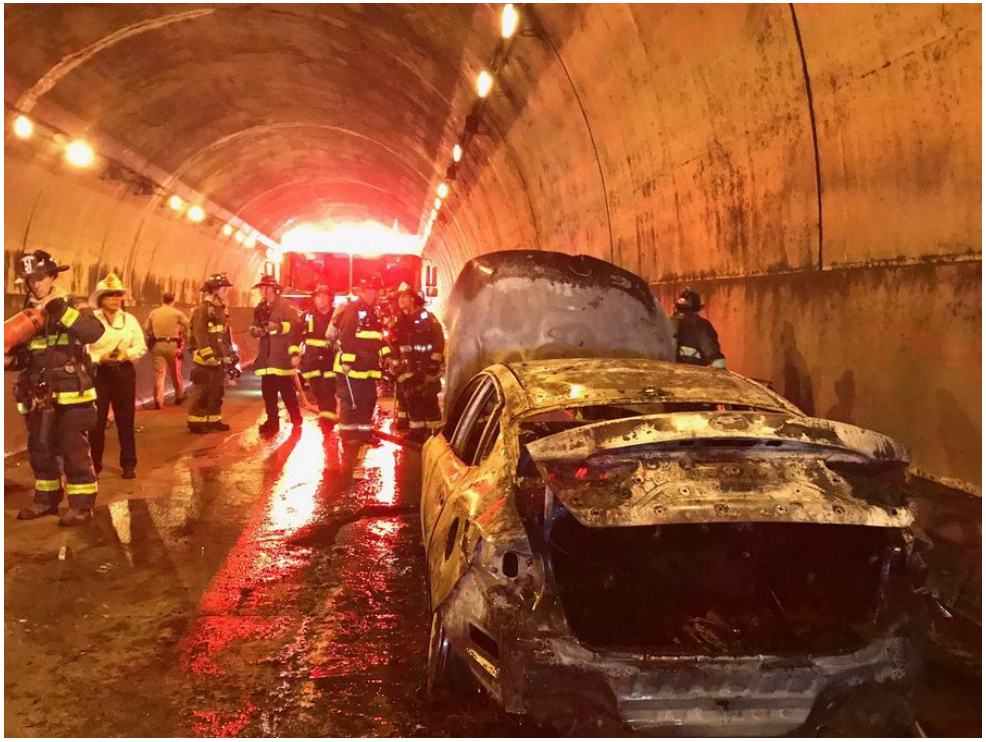
Standard

- Call
- Dispatch
- Alarm
- Driving
- Arrival

Intervention

Standard

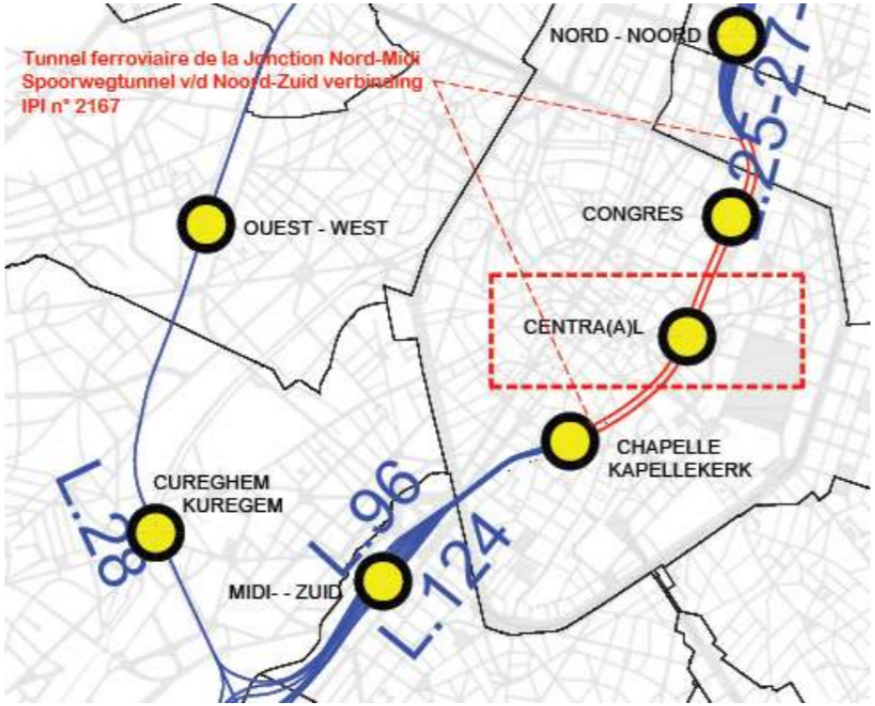
- Reconnaissance
- Goals
- Strategy
- Tactics
- Verification
- **When is it done?**



Intervention

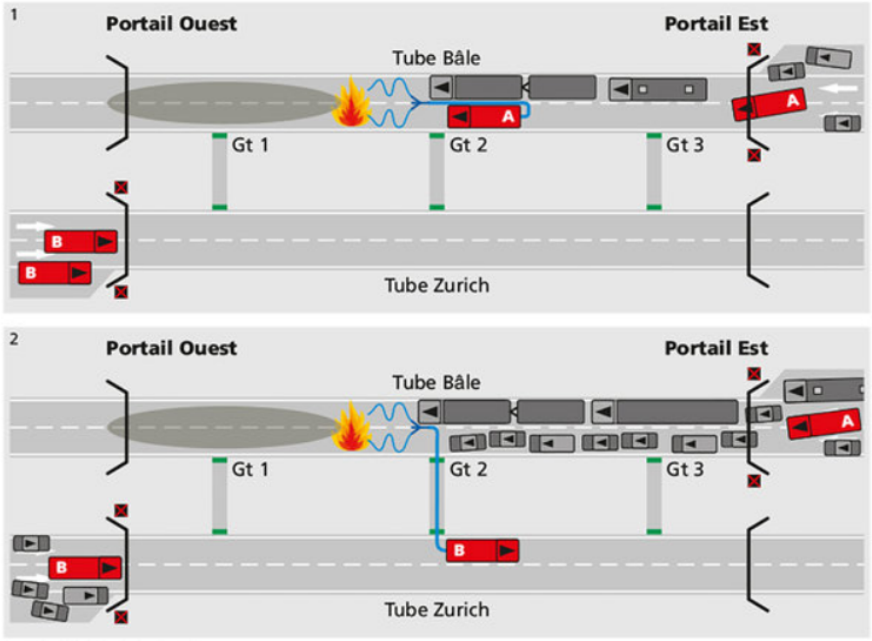
Brussels railway fire

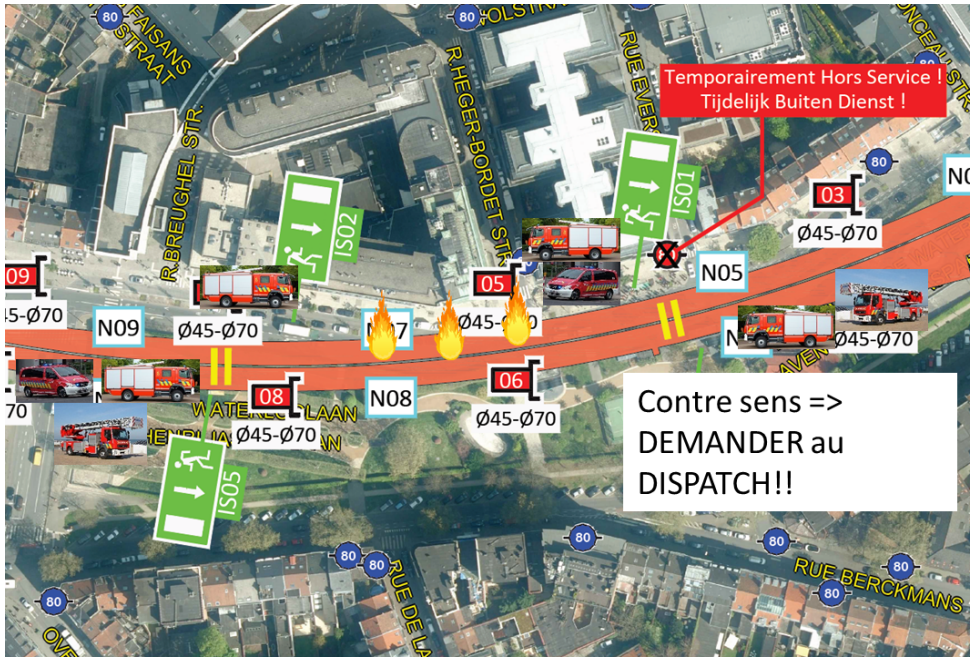
- 15 april 2017
- Centre of Belgian railway
- 10 000 people during rush hours
- Timeline
  - 4h55 a.m. => alarm
  - 4h57 departure
  - 5h02 first arrival (appliance)
  - 5h03 HQ arrival



Intervention

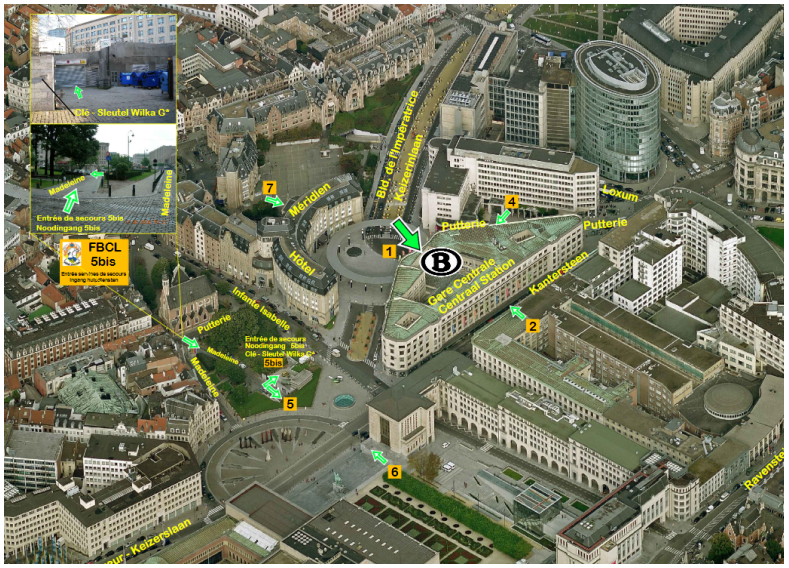
Planning and procedures

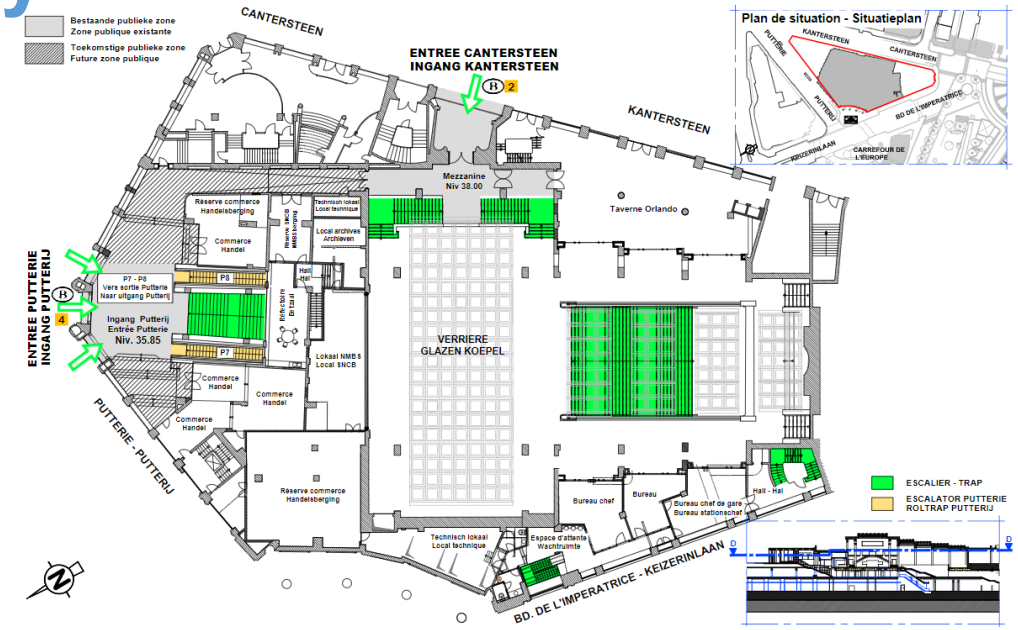


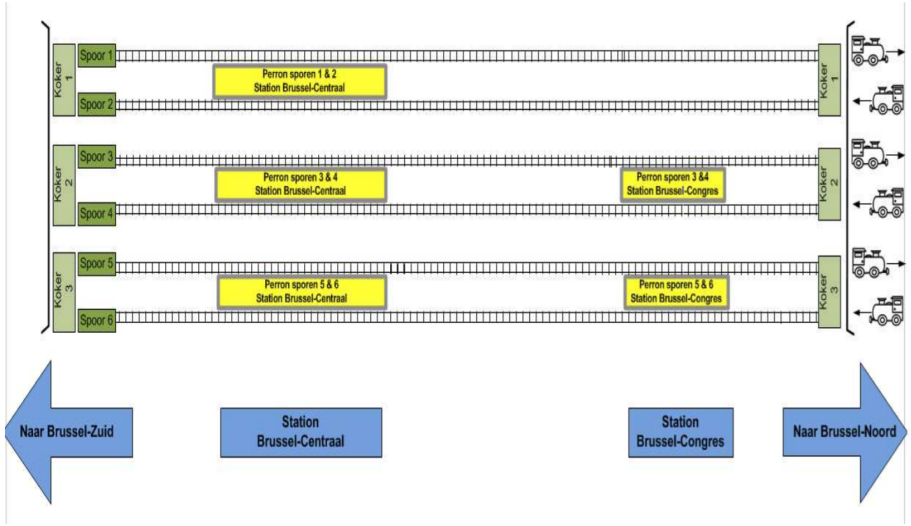


Intervention

Expectation vs reality







Intervention

Brussels railway fire

- Complex railway station
- Large distances
- Information: Fire at track 4
- No compartmentation => Smoke in complete building
- Timeline
  - 5h07 descent
  - 5h08 reinforcement
    5h11 reco team sees burning item at track 5
  - 5h12: confirmation of error => power unit on track 5 burning

Intervention

Brussels railway fire

- Timeline
  - 5h13: Change of line depoyment
  - 5h14: arrival at burning vehicle
  - 5h17: reco says that fire can be extinguished with 1 line. Power unit not involved
  - 5h19: Stability evaluation. Surface temperatures of 250°C – 300°C
    => 1 extra line for boundary cooling

Intervention

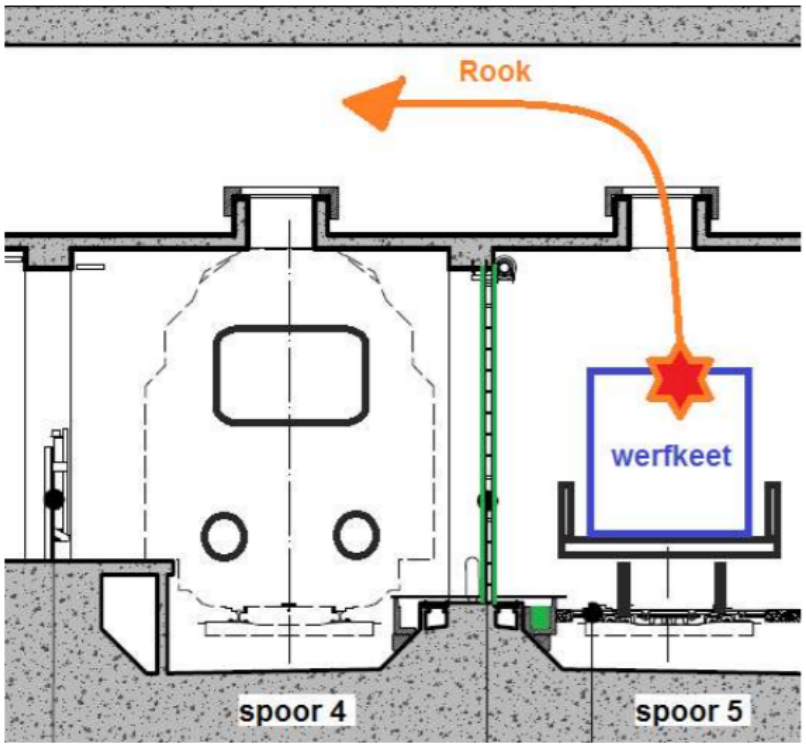
Brussels railway fire

- Timeline
  - 5h28: arrival of 2 hoselines
  - 5h29: fire under control
  - Continue boundary cooling
- Water on fire 26’ after arrival
- Burning for 33’
- Timeline
  - 5h31: SCBA maintenance
  - 5h43: ventilation
  - 6h00: CO measurement in surrounding metro stations

Intervention

Brussels railway fire

- Timeline
  - 6h05: CO measurement railstation
  - 6h09: No CO in metro => open
  - 7h30: personnel railstation to hospital (smoke inhalation)
  - 7h35: stability verification
  - 9h58: end intervention



What to learn?

Brussels railway fire

- Large interventions are time consuming
- Standard Operation Procedures
- Extra recources = extra time

What if?

- Relatively small fire
- During night
- Alternative risks
  - Explosions

BLOCKHEAD MENTALITY

What to learn?

HyTunnel expertise

- Understand that interventions take time (cfr. time to detonation)
- There is little information at hand and it is very unreliable
  - Information that is offered by HyTunnel needs to be simple but well funded
  - Possible to obtain with current (firefighting) technology
- Risks vs. statics
  - We need to know the consequences
  - We need to know how to deal with consequences

Acknowledgements

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (JU) under grant agreement No 826193. The JU receives support from the European Union's Horizon 2020 research and innovation programme.