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Harmonised recommendations on response to hydrogen accidents

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The task

To rescue people, firefighters must enter tunnels or confined spaces.

Hazards

Fire fighters can protect themselves against heat and smoke.

HyTunnel-CS findings

Possible consequences

- …„devastating blast wave, large fireball and projectiles”
- …“the formation and accumulation of a flammable atmosphere that will subsequently be ignited leading to a flash fire, deflagration or even transition to detonation.”
- …“a hydrogen jet-fire”

from: HyTunnel-CS D1.3, 2019

Hazards

The only protection against explosion hazards is distance.

The crucial question

No: No chance to rescue

Yes Risk of explosion

Not enough time to reliably estimate the probability and severity of an explosion.

Overall recommendation

Avoid problems that even the fire services cannot solve.

“Therefore, it is recommended to develop and/or use hydrogen vehicle technologies that exclude explosion hazards, e.g. explosion free in a fire microleak-no-burst (mLNB) self-venting TPRD-less technology validated and described in the HyTunnel-CS project deliverable D6.9 “Recommendations for inherently safer use of hydrogen vehicles in underground traffic systems” (HyTunnel-CS, 2022).

This would eliminate most of the concerns of the FRS intervention strategies and tactics described in this document.

Risks of hydrogen vehicles would be reduced with the use of such safety technologies to a level equal to or even below the risk of today’s fossil fuel vehicles that FRS can manage well.”

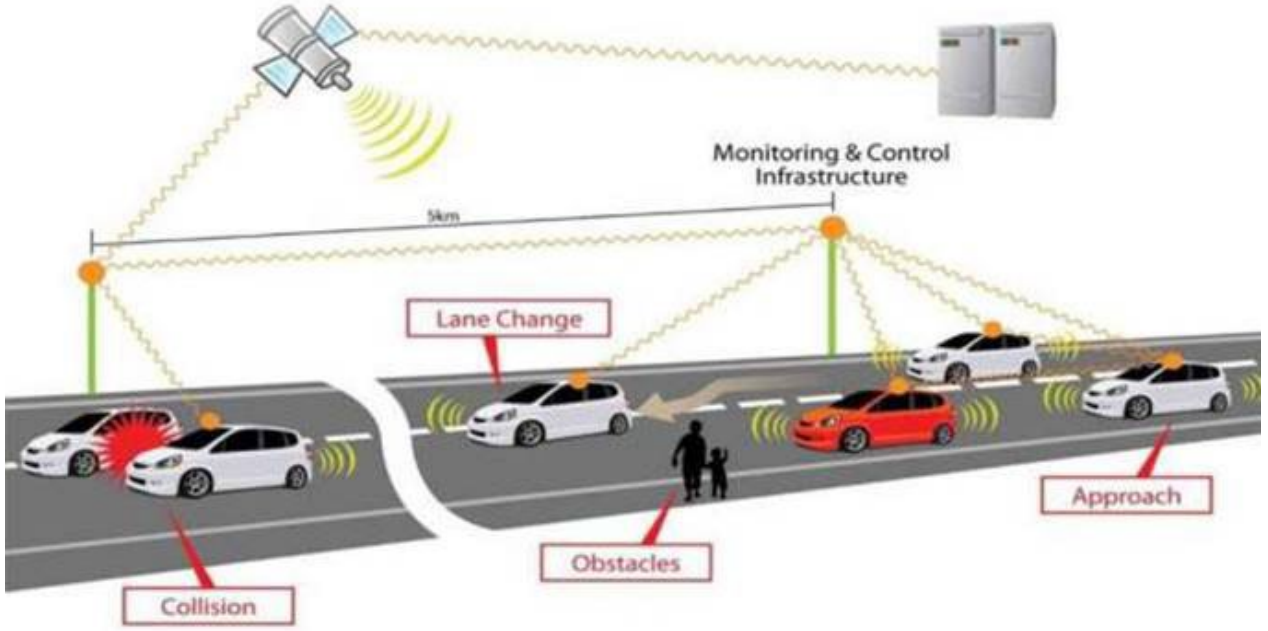
Most important: Information management

- All existing recommendations propose specific measures for incidents involving hydrogen. E. g.: Let Hy-vehicles burn down in a controlled manner.
- First responders must be able to immediately recognize with certainty that hydrogen is involved.
- So far there is no reliable method to identify hydrogen powered vehicles.
- Solution Approach by Service Public Federal Interieur SPFI in connection with International Association of fire and rescue services.
  - ISO 17840 defines markings and rescue information for all types of vehicles.
  - Crucial question: How to get this information as early as possible?

Information Management

Ensure that the emergency services receive the rescue relevant information at the earliest possible time.

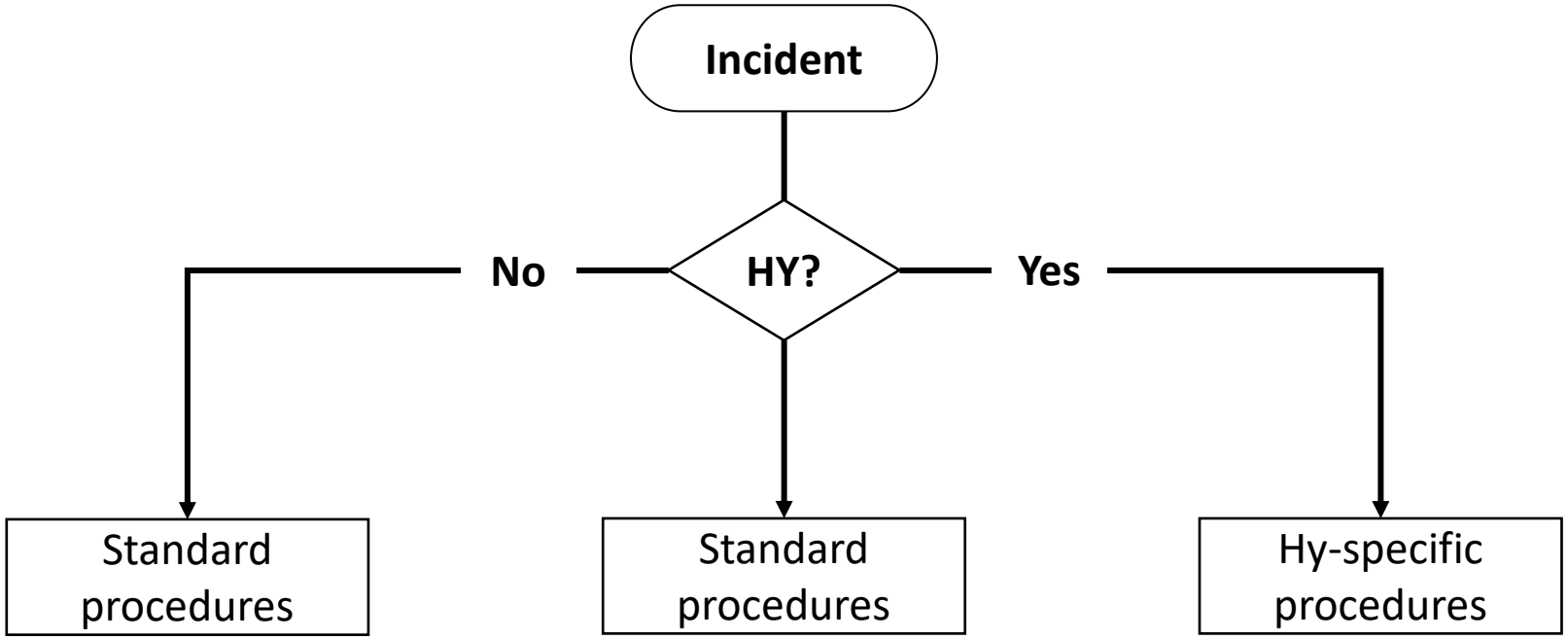
- Type of propulsion
- Parameters of safety systems
- Vehicle type specific information



See: D6.10 “Recommendations for RCS” (HyTunnel-CS D6.10, 2022-2)

Recommendations for authorities

- Make sure all relevant information are available as early as possible.



Main target groups

- Authorities
- Operators of facilities with confined spaces
- Emergency Services
- Fire and Rescue Services FRS
- General prevention
- Insurers

Recommendations for operators

Analyse and decide

- Do risk analysis!
- Decide on the use of facilities with HY-vehicles (as with LPG etc.)!
- Provide special safety devices if needed.

Recommendations for all emergency services

Detection

- Make sure all personnel are able to detect HY-hazards.

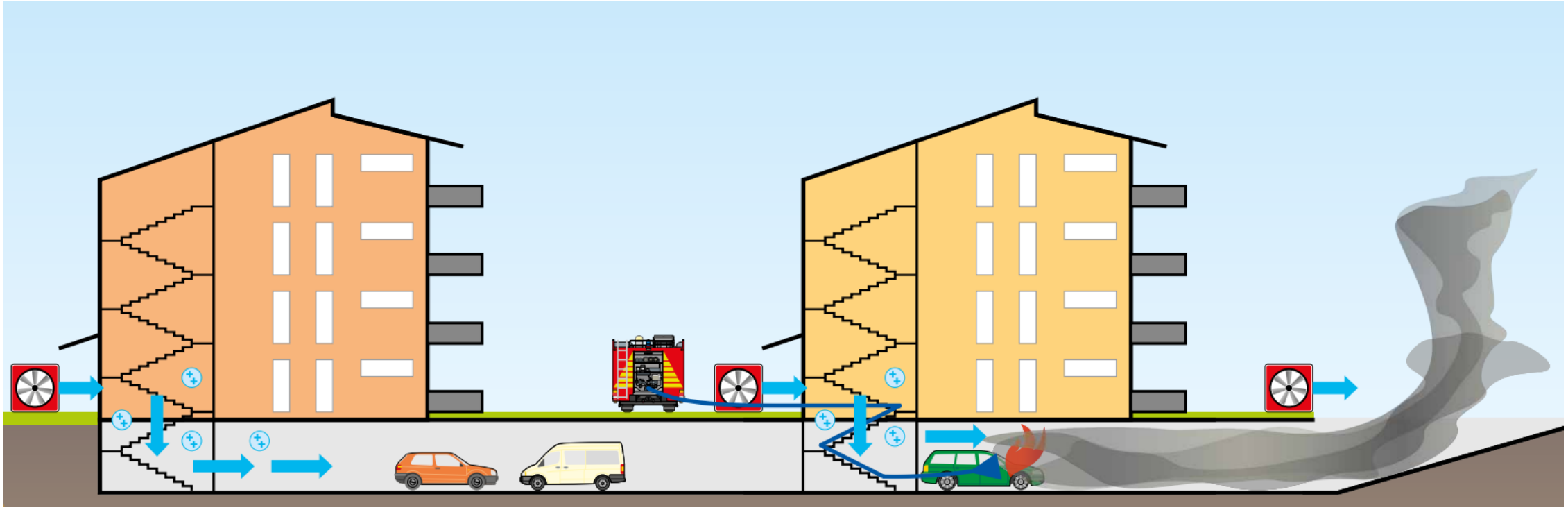
easy

difficult

Recommendations for FRS

Preparedness

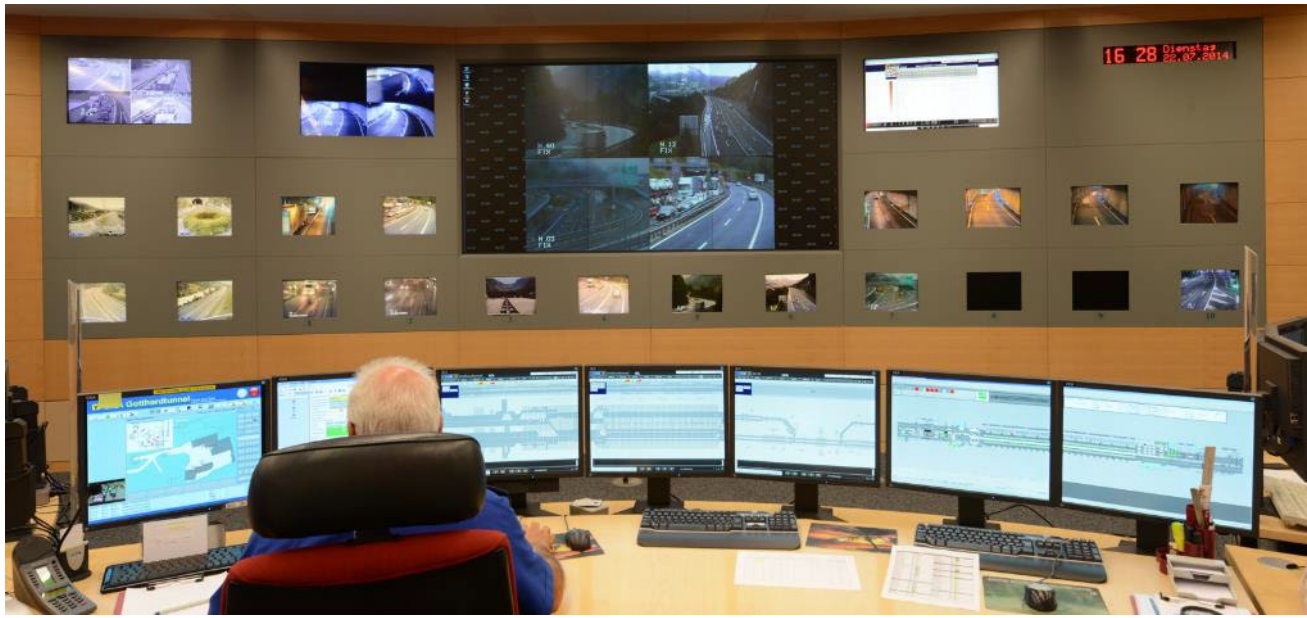
- Prepare NOW and adapt SOPs.
- Make sure to be informed on possible scenes of HY-incidents.



Recommendations for higher-level FRS

Analyze and develop

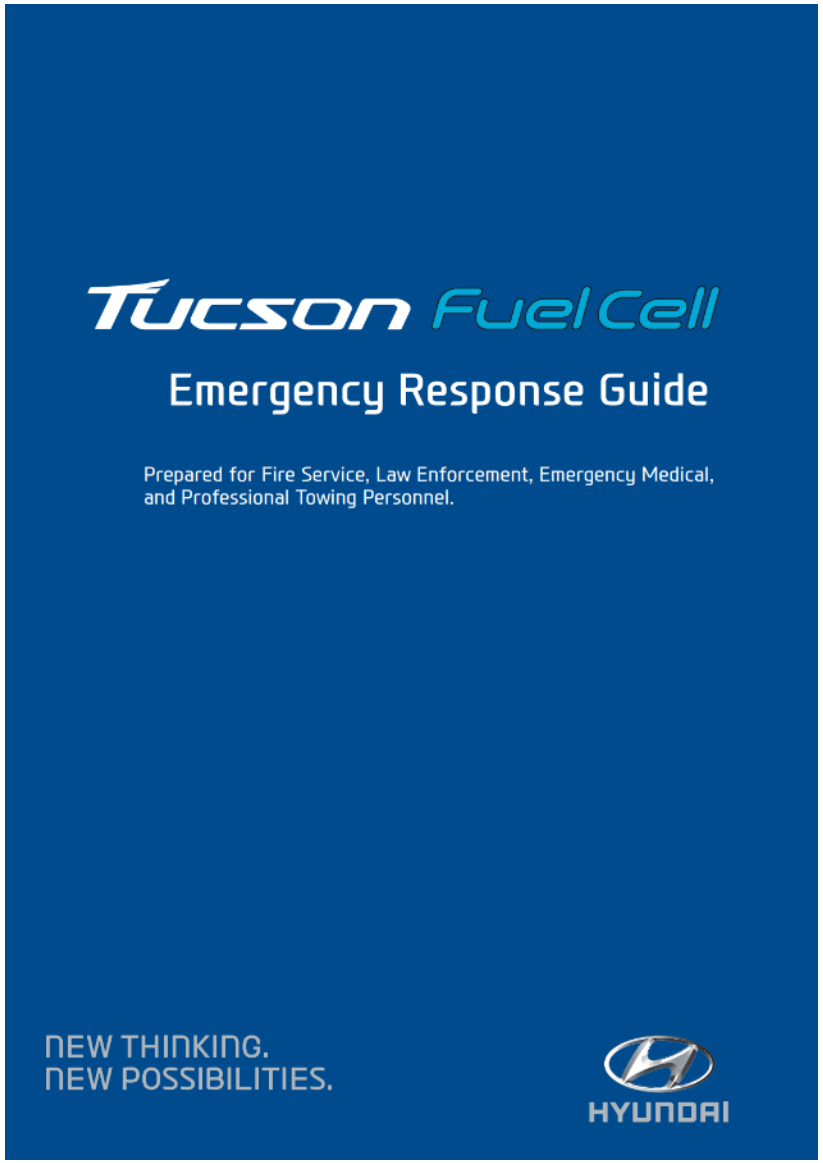
- Ask emerging callers.
- Use VIN-information.
- Demand risk analysis.
- Approval processes?
- Redefine hazard distances.
- Develop rules of thumb.
- Investigate ventilation by FRS.
- Create network of experts.
- Initiate exchange of experiences with HY-incidents.
- Continuously develop and optimize tactics and techniques.



Recommendations for general prevention

Risk awareness

- Inform all target-groups for general prevention



Recommendations for insurers

Risk management

- Risk analysis
- Consider premiums, coverage, and exclusions

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