

# Road Tunnel Classification System for Fire Brigades



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SAVE ME meeting Rome 2011-03-03

# The presentation

1. Background and objectives
2. Exemples of tactics
3. The concept basis
4. The classification system
5. Conclusions



# 1. Background



## Effective Firefighting Operations in Road Tunnels

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SP Report 2010:10 ([www.sp.se](http://www.sp.se))



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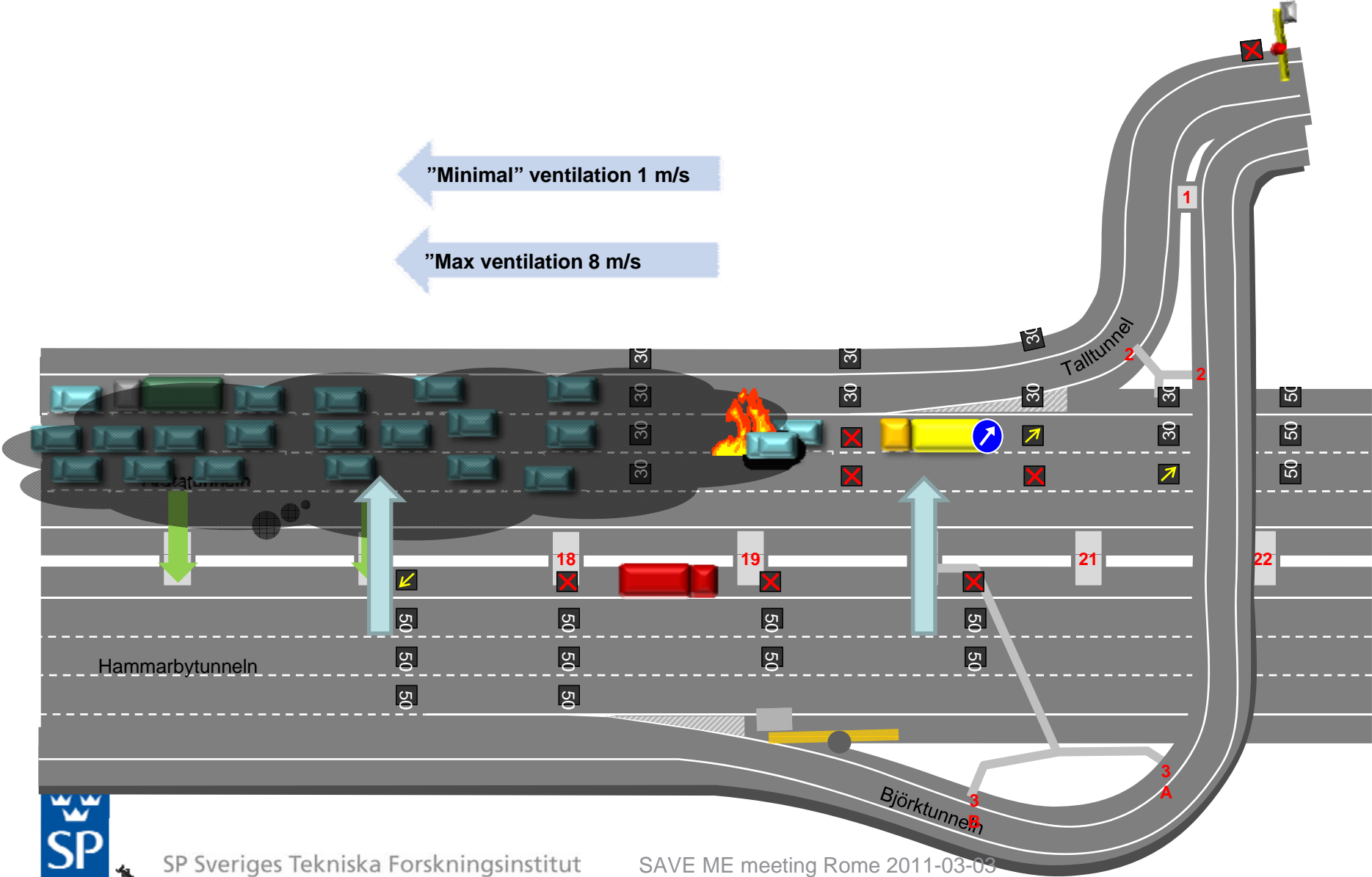
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# 1. Objectives

- develop operational procedures for fire services in road tunnels
- increase the interest for the subject
- relate risks to choice of tactics
- give regulators and authorities a tool that can be included in the design



# 2. Example of rescue strategies in road tunnels



### 3. The concept basis

- Incident Categories
- Fire Scenario Curves
- Classification system

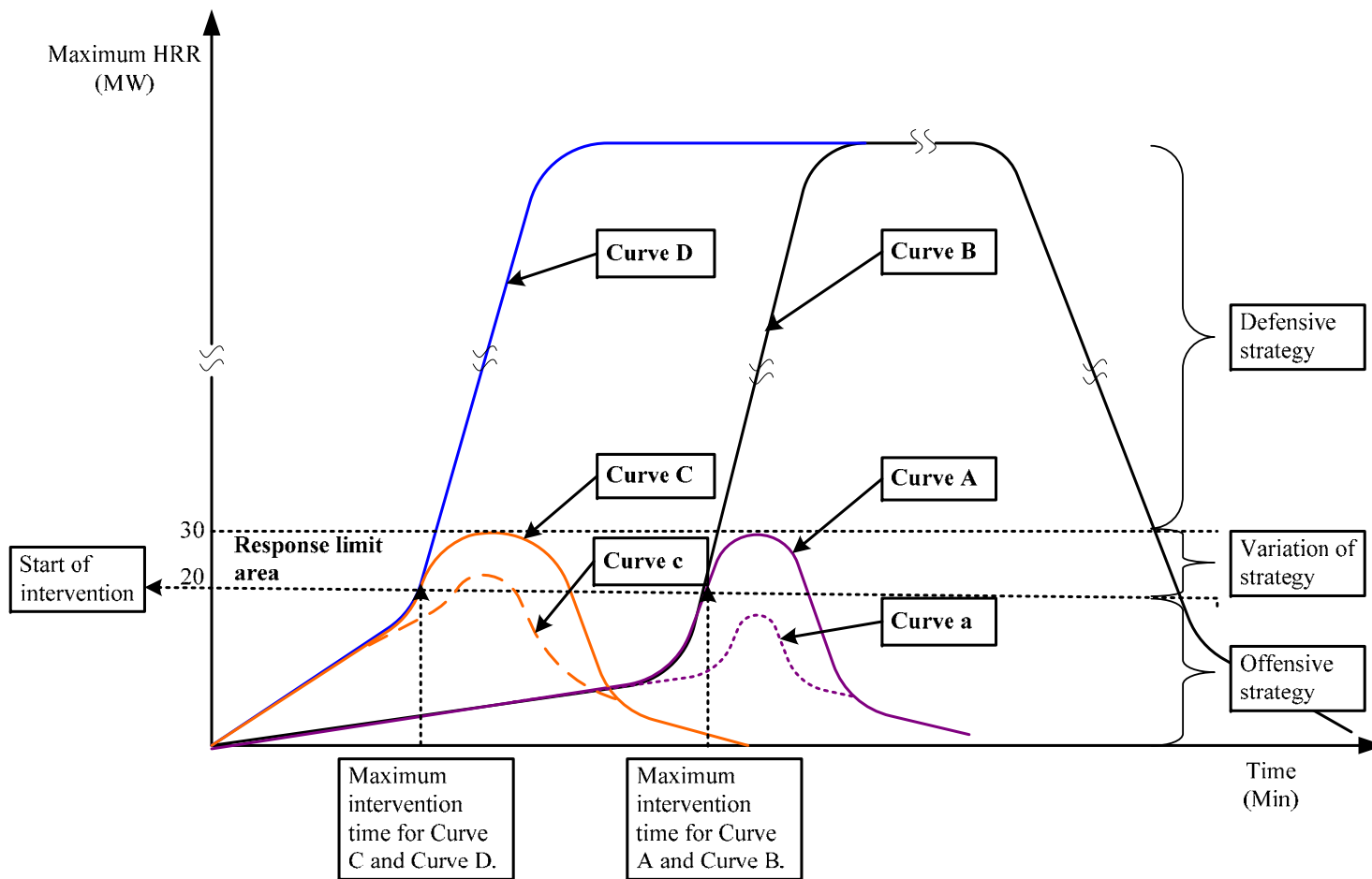


### 3. Incident Category (IC)

- **Incident Category 1 (IC1):** single fire that does not spread to other vehicles (62 %)
- **Incident Category 2 (IC2):** single fire that propagates to neighbouring vehicles (7 %)
- **Incident Category 3 (IC3):** collision fire that is limited to the vehicles which are involved in the collision (10%)
- **Incident Category 4 (IC4):** collision fire that spreads to other vehicles which are not involved in the collision (19 %)



### 3. The fire scenario curve



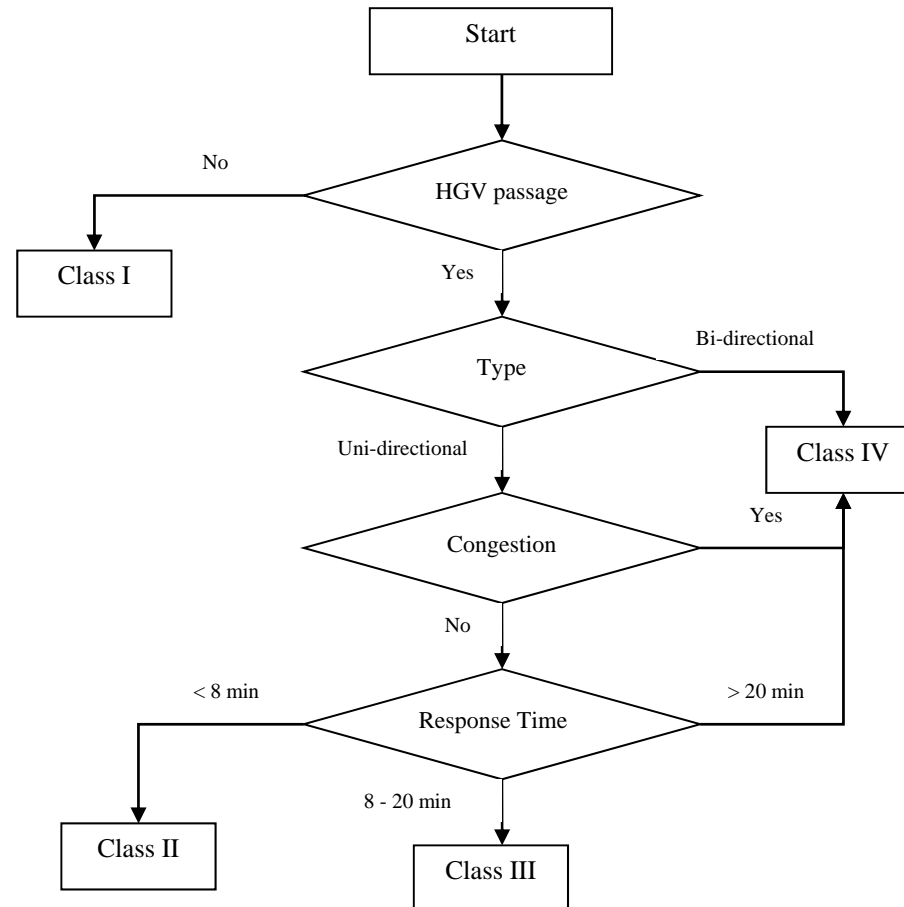


## 4. The classification system

- Passage of HGV and vehicles carrying dangerous goods
- the type of tunnel
- The traffic situation
- Response time and type of countermeasures



## 4. Classification system



Class	Description	Response time (min)	Example of Incident Category	Example of fire scenario Curve	Example of tunnels
<b>Class I</b>	The passage of HGV and flammable vehicles carrying dangerous goods is restricted. On the view of fire spread, there is little risk. <b>The tunnels are regarded as the safest tunnels.</b>	Fire brigade may be able to extinguish the fire regardless of response time and the size of the fire.	<b>IC1</b>	<b>A, a</b>	Some urban tunnels only for cars and buses.
<b>Class II</b>	The uni-directional tunnels that are within 8 min time distance from the fire stations or where fixed fire suppression systems like sprinkler are installed. <b>All types of fires may be under control either by fire brigades or fixed fire suppression systems.</b>	<b>Less than or equal to 8 minutes</b>	<b>IC1,IC2, IC3,IC4</b>	<b>A, a, C, c</b>	Fløyfjell tunnel in (sprinkler system) or urban tunnels with high fire load.
<b>Class III</b>	The uni-directional tunnels. Fire brigade may be able to extinguish <b>slow-developed fires</b> such as IC2, resulting in IC1 fires.	<b>Between 8 to 20 minutes</b>	<b>IC1, IC2</b>	<b>A, a, C, c</b>	Guadarram in (20 min distance)
<b>Class IV</b>	Tunnels that are <b>congested or bi-directional</b> . The possibilities of occurrence of single fire or collision fires and fire spreads are expected to be <b>significantly high</b> .	<b>More than 20 minutes</b>	<b>IC2, IC4</b>	<b>B, D</b>	Bi-directional tunnels: Mont Blanc, Tauern, tunnel.



## 5. Conclusions 1(2)

- Robust assessment of the risk a key parameter
- Single fire or collision fire in combination with vehicle type two major factors
- Two tactics; offensive or defensive
- Fire service can deal with 20 – 30 MW fires



## 5. Conclusions 2(2)

- The lowest risk class presupposes that the fire and rescue services are capable of tackling all types of fires
- Installation of a sprinkler system can affect the class rating of the tunnel.
- Tunnel owners and fire and rescue services can use the classification system in their discussions to select appropriate physical safety systems and to make assessments concerning the necessary response times and strategies.

