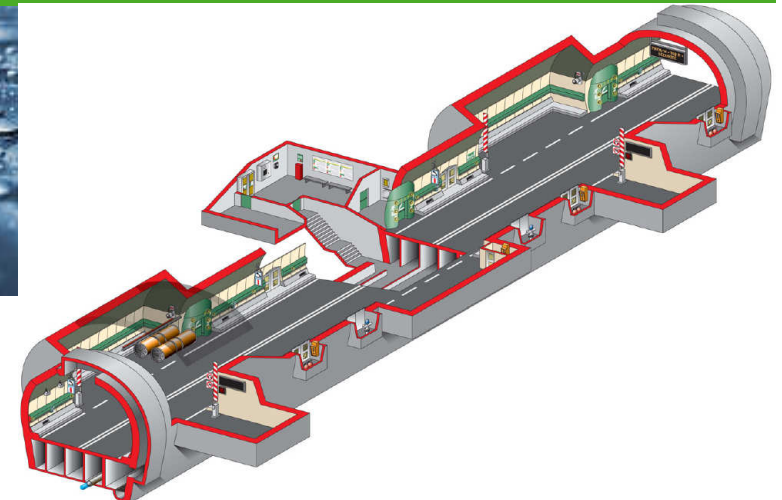


The Mont Blanc tunnel project

Eric CESMAT, Sylvain DESANGHERE

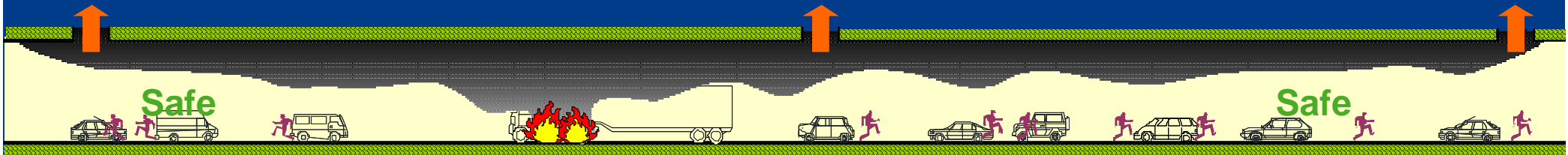


- **Car fire**
 - > 4 to 8 MW
- **Van fire**
 - > 15 MW
- **HGV fire**
 - > 30 MW
- **Big HGV fire**
 - > 100 MW
- **Big HGV fire with hazardous materials**
 - > Up to 200 MW

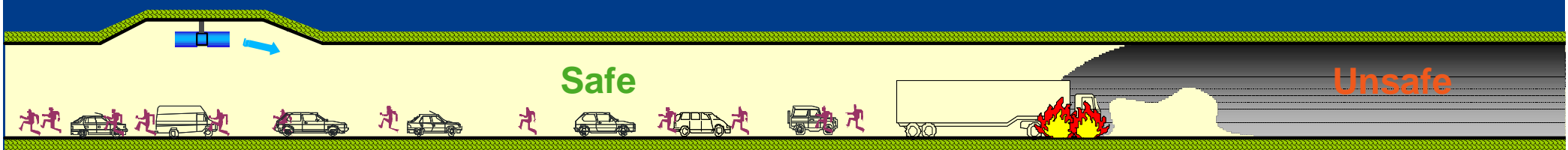


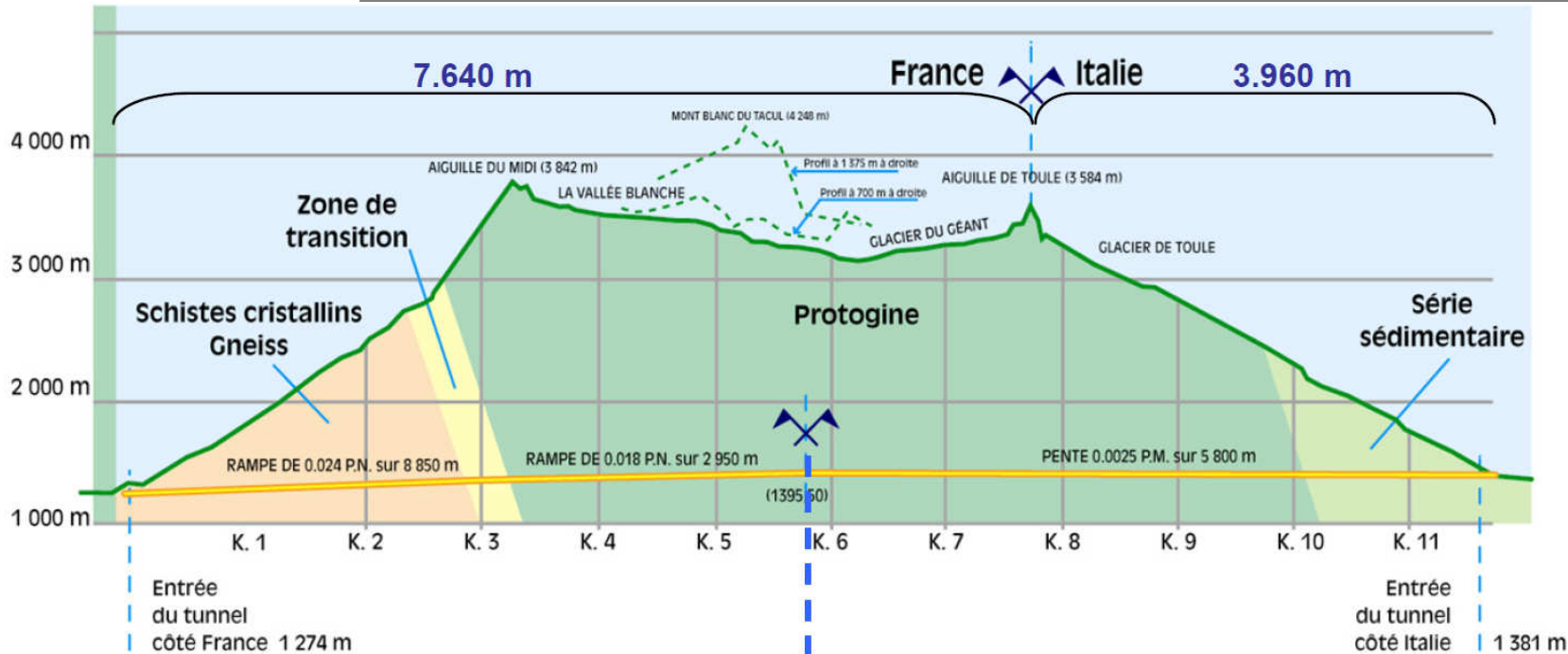
Smoke management strategy in tunnels

- Preserving smoke stratification = transversal ventilation



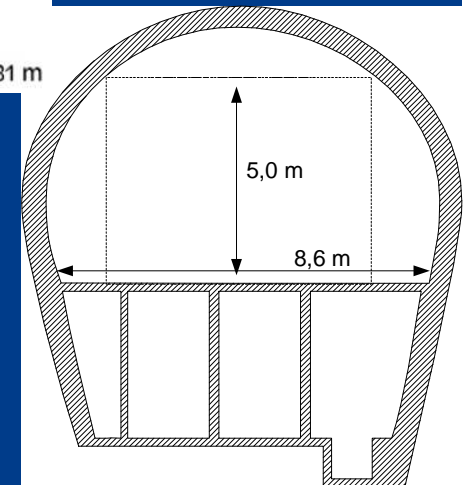
- Pushing the smoke = longitudinal ventilation



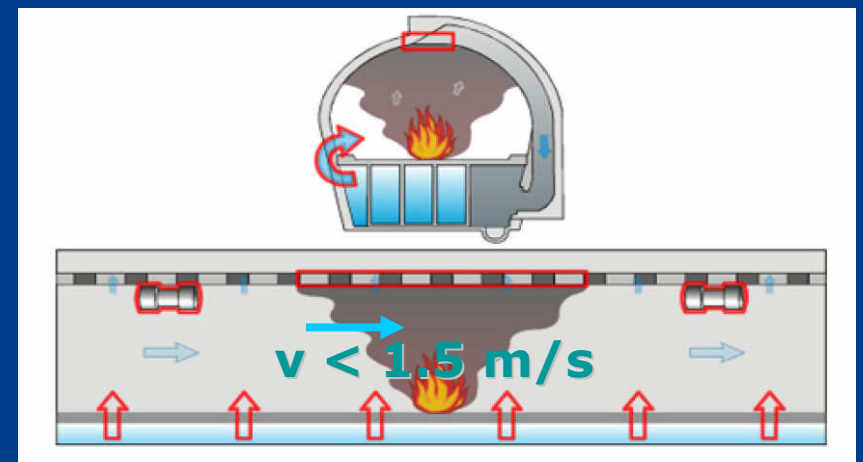
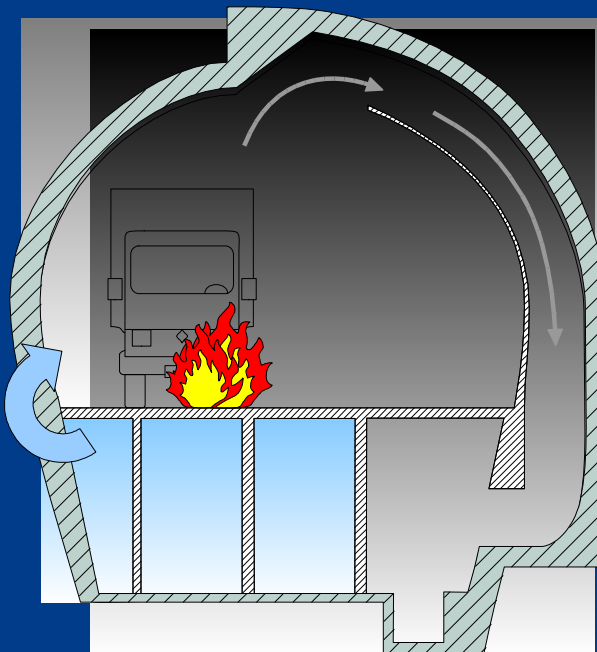
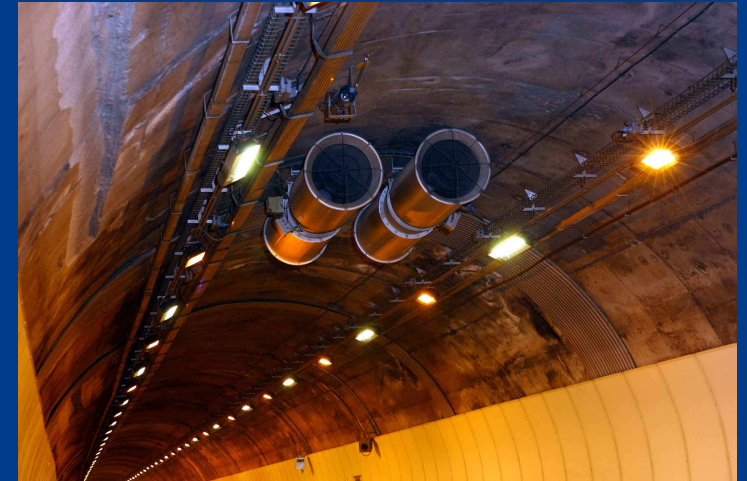


• Geometry

- > 11600 m length
- > Slight slopes
- > 8.6 m wide by 6.0 m high cross section

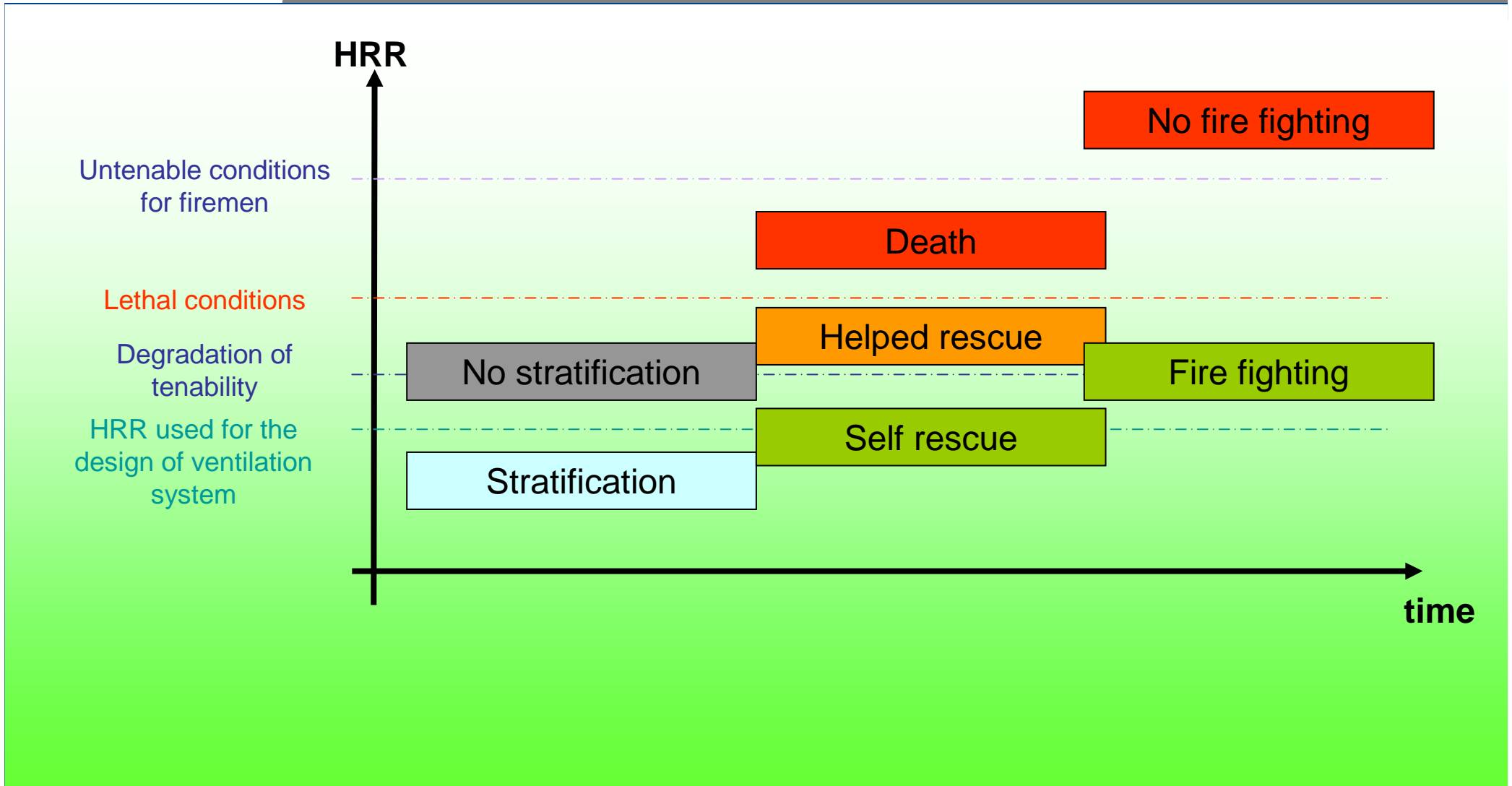


- **Smoke management strategy**
 - > Transversal ventilation (156 m³/s extraction)
 - > Longitudinal control of air flow
- **A very safe control of smoke**

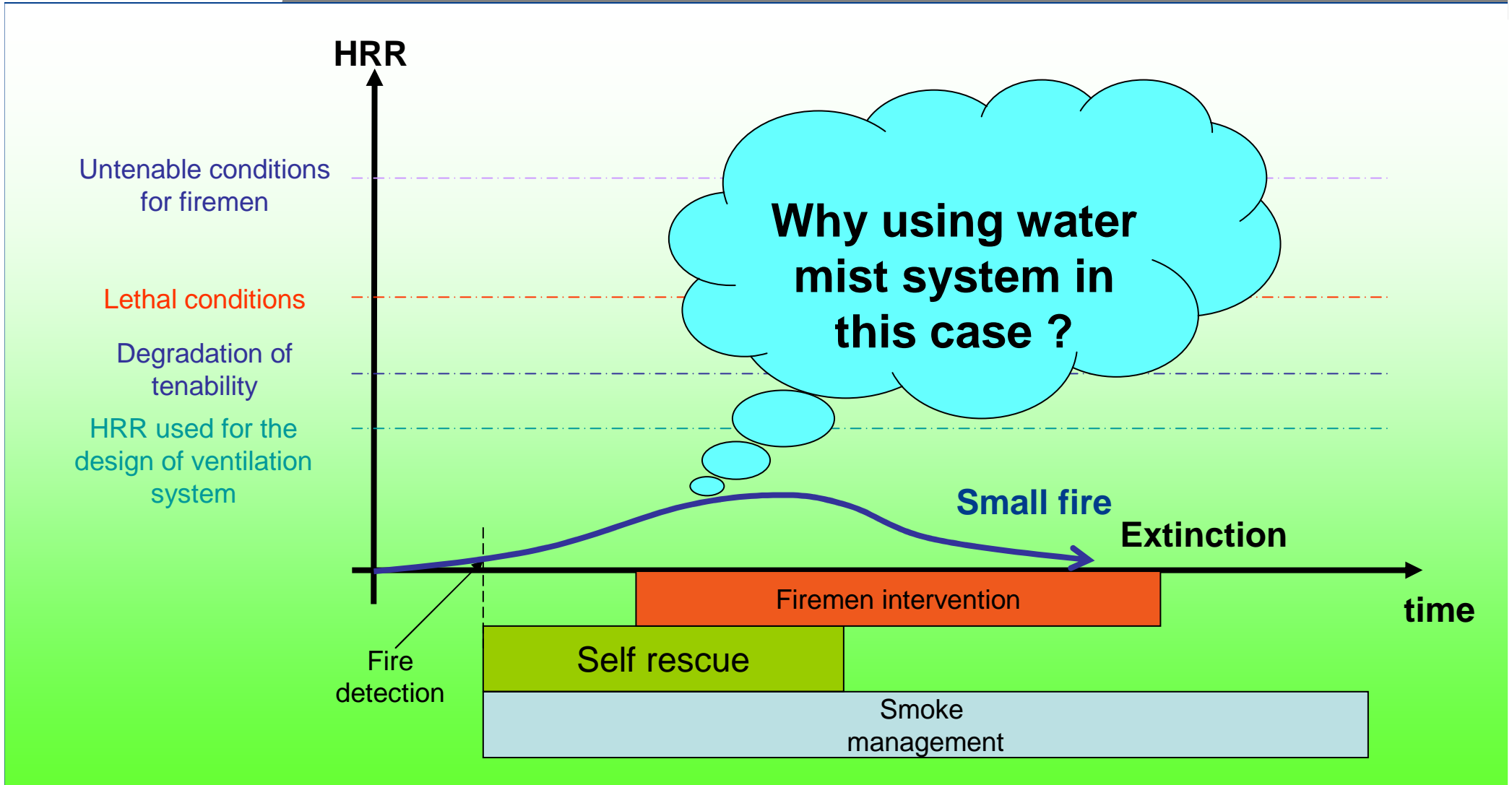


Critical questions about the use of water mist in Mont Blanc tunnel

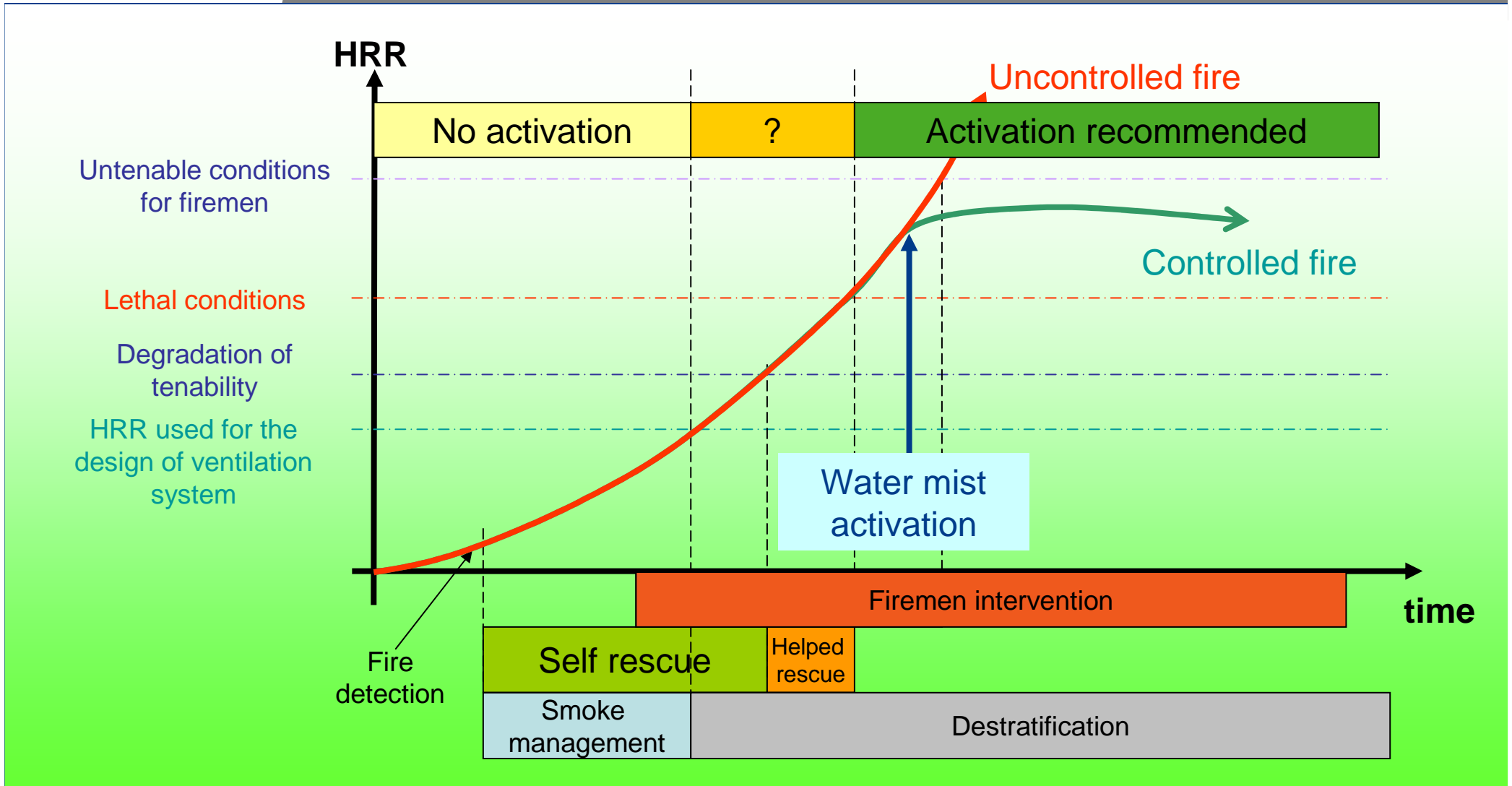
- **Can we use water mist in order to increase again the safety level in the tunnel ?**
 - > What is the impact of such system on the safety strategy ?
- **What is the best way to use water mist system as an additional safety equipment in cooperation with smoke management ?**
 - > How does water mist interact with smoke management system ?



Fire development phases: “small fire”

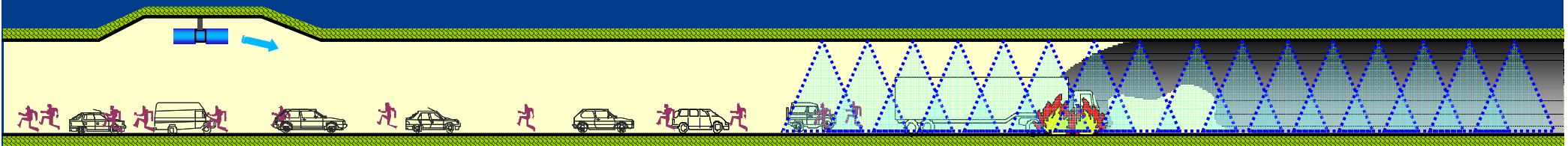


Fire development phases: “big fire”



Interaction between water mist and fire conditions

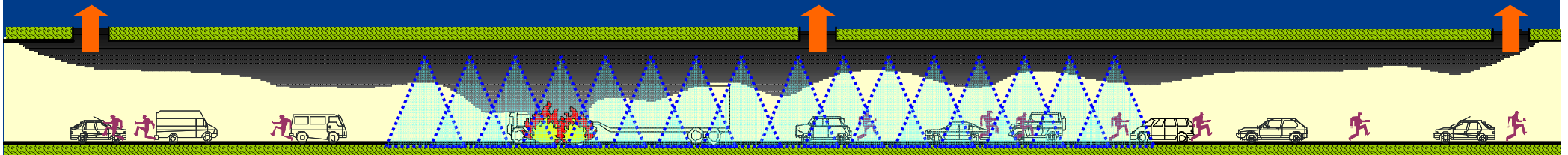
- Longitudinal ventilation



	HRR	Thermal actions	Toxicity	Visibility
People	++	++	+	Minor effect
Firemen	+++	+++	Protection	Minor effect
Fire propagation	++	++		
Structure	+++	+++		

Interaction between water mist and fire conditions

- **Transversal ventilation with smoke stratification**

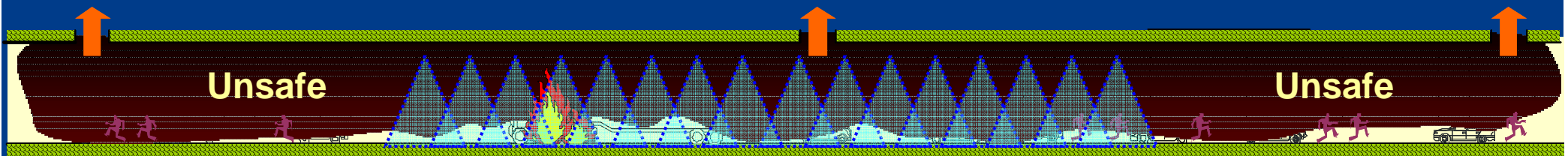


	HRR	Thermal actions	Toxicity	Visibility
People	++	++	-	?
Firemen	+++	+++	Protection	-
Fire propagation	++	+++		
Structure	++	+++		

Destratification ?

Interaction between water mist and fire conditions

- **Transversal ventilation without smoke stratification**



	HRR	Thermal actions	Toxicity	Visibility
People	++	++	?	?
Firemen	+++	+++	Protection	?
Fire propagation	++	+++	Reducing HRR can help the smoke extraction system	
Structure	++	+++		

- **Should we activate water mist system ?**
 - > What is the fire scenario ?
 - > Is the fire likely to degenerate ?
- **When should we activate the system ?**
 - > Are there still drivers in the tunnel ?
 - > Interaction between water mist and smoke stratification
 - > Effect of water mist flooding on fire activity
 - > Reducing HRR ?
 - > Increasing toxicity ?
- **Where should we activate the system ?**
 - > Ability to locate the fire
 - > Extent of flooding area ?





Thank you for your attention