PARIS
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OCTOBER
2016 ▸ Pullman Bercy Hotel

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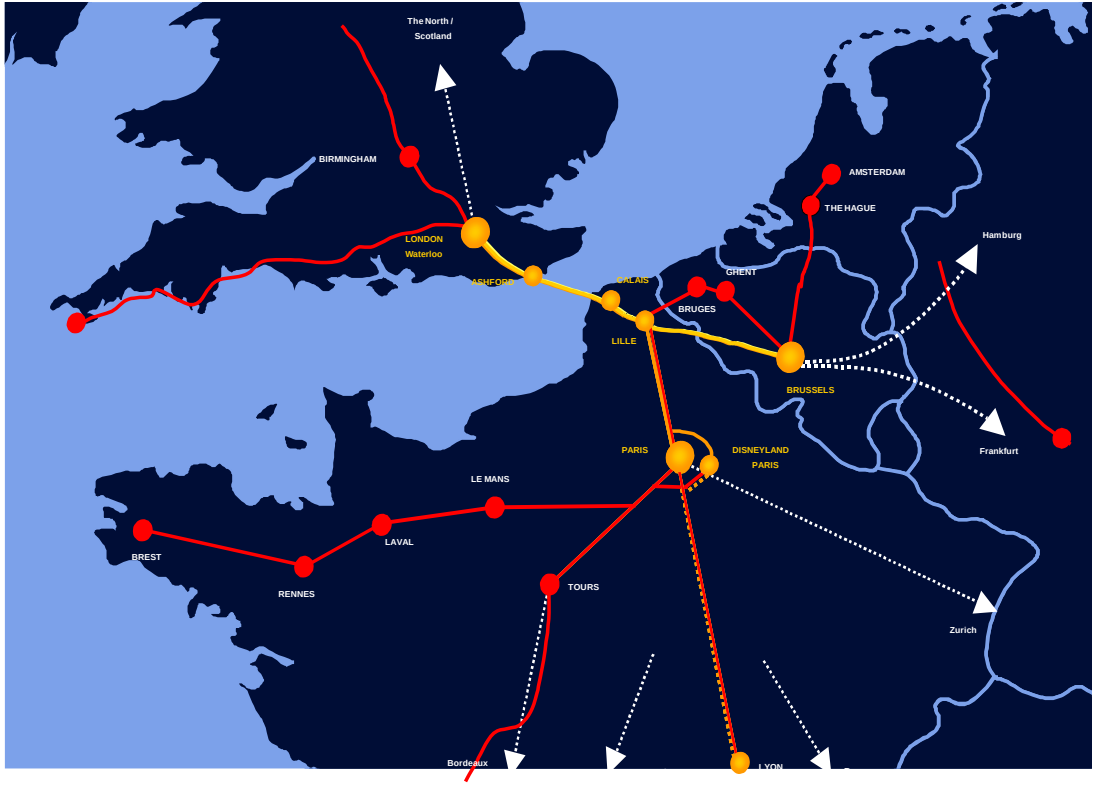
Developing New Evacuation Procedures for the Channel Tunnel

Steve Demetriou, Channel Tunnel Safety Authority

Agenda

- Channel Tunnel history and construction
- Rolling stock operating
- Previous fires and incident management
- Evacuation procedures review

A Vital Link



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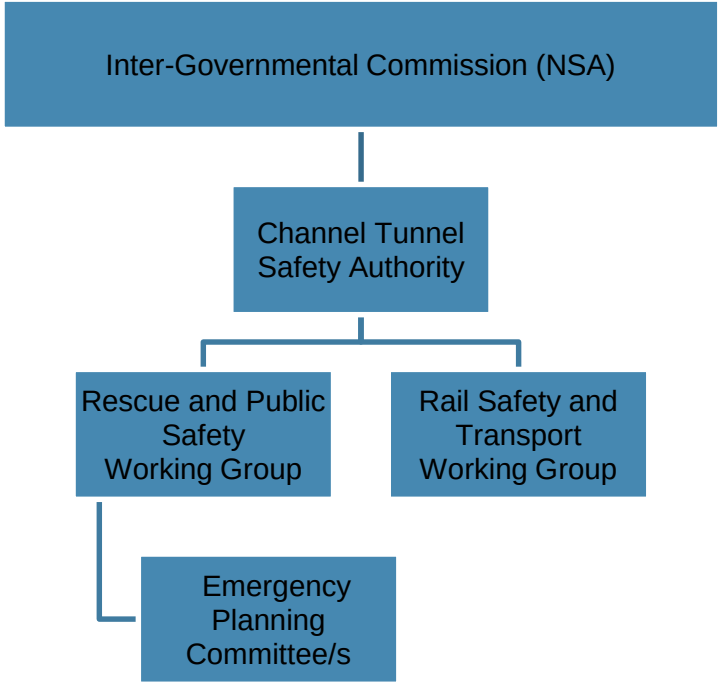
Construction History

- 1986 – Treaty of Canterbury Signed
- TML – A joint venture consortium between UK & France
- 1990 – Service tunnel completed
- For the first time in 12000 years, people can walk across the channel
- 8 years to design
- Cost of £9.6 billion = €13.4 billion

Open for Business

- The Channel Tunnel was officially opened by Her Majesty the Queen and President Mitterrand on 6 May 1994
- On the 19 May 1994 the Channel Tunnel opened as a commercial business
- Eurotunnel operate the Concession

Governance Arrangements



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The Terminals

Folkestone - Kent

Sangatte - Calais

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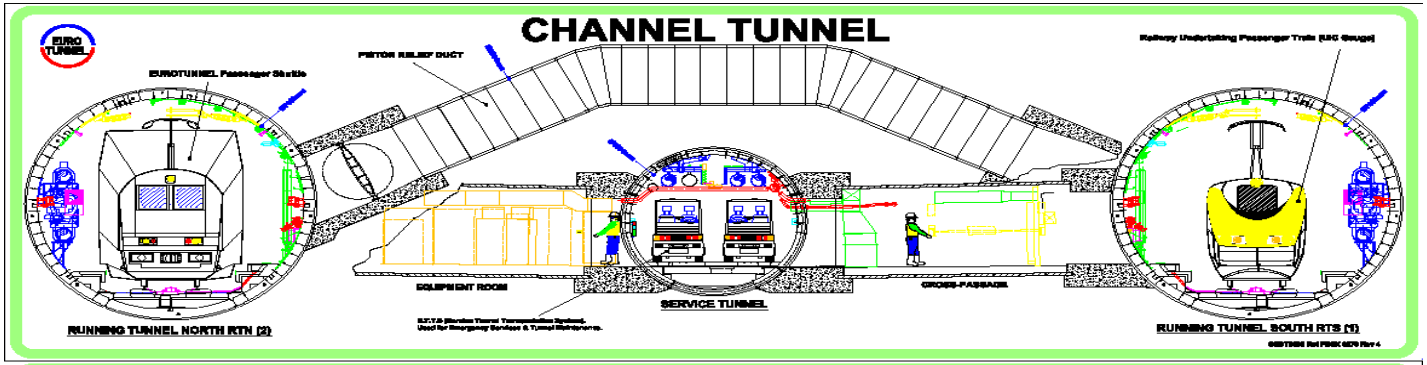
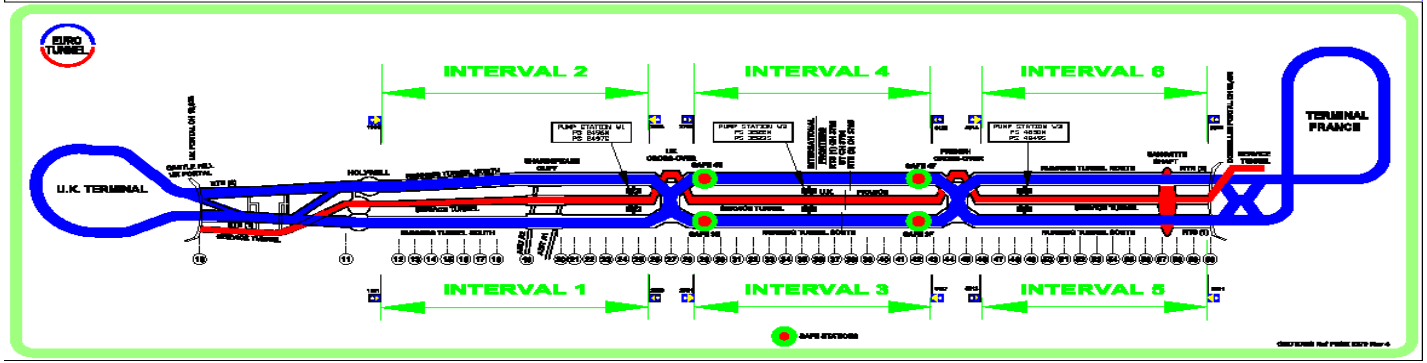
The Concession





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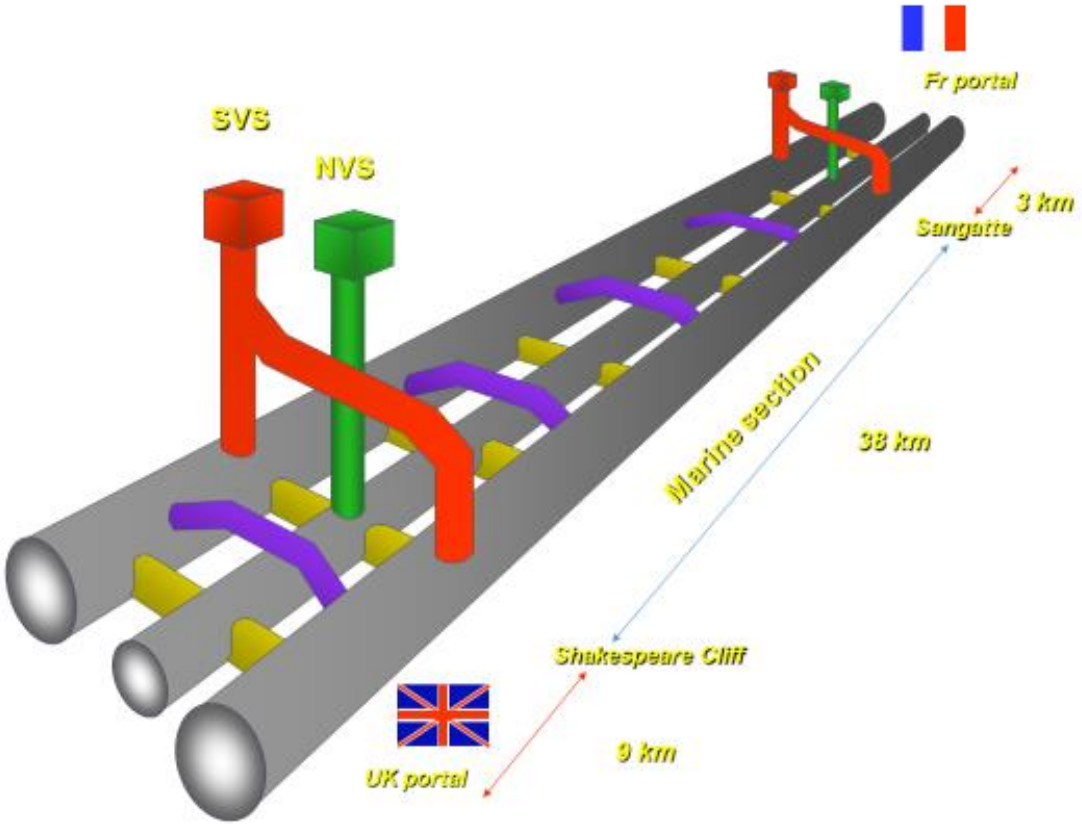
Tunnel Ventilation



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Rail Running Tunnel - [7.6m diameter]

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Service Tunnel - [4.8m diameter]

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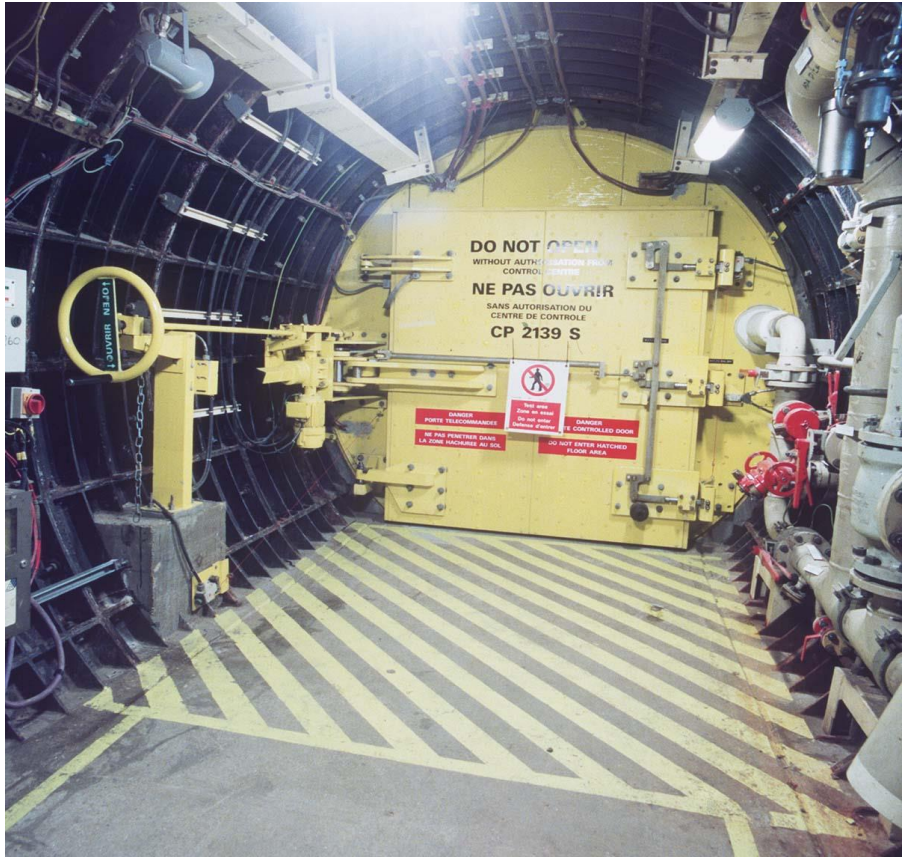
Cross Passage Door



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Eurotunnel Freight Shuttle

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Eurotunnel Passenger Shuttle

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Class 373 (Eurostar) Passenger Train

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Class 374 (Eurostar) Passenger Train

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National Freight Trains

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Channel Tunnel and SRT TSI

- The design of the CT is different from the requirements of the Safety in Railway Tunnel (SRT) TSI for very long tunnels (more than 20 km long)
- The service tunnel provides a good level of safety and is not compulsory in SRT TSI
- The running tunnels have continuous water supply throughout, which can be used by fire fighters. This is not required by the SRT TSI
- Installation of four “SAFE” (Station d’Attaque du Feu) stations in 2011. These are dedicated to lorry shuttles and freight trains and do not provide enough evacuation facilities to comply with the fire fighting points specified in SRT TSI 1303/2014, clause 4.2.1.7.e

Rolling Stock Requirements

- All trains for passengers using the tunnel must have a running capability in case of fire of 30 minutes because we want them to keep running and leave the tunnel so that passengers can be evacuated outside the tunnel.

- Category B trains (LOC & PAS TSI) only have 15 minute running capability but a specific case in the LOC & PAS TSI was agreed, on the basis of a risk analysis referring to:

- In the worst case it would take 30 minutes for a train on fire to get out of the tunnel

- Stopping and evacuating the passengers into the service tunnel would not provide the equivalent level of safety to taking them out of the tunnel (although it is possible to do so if the train fails)

Fires in the Channel Tunnel

- There have been 5 major Freight Shuttle Fires;

- 18 November 1996
  (RT South – France)

- 21 August 2006
  (RT North – UK)

- 11 September 2008
  (RT North – France)

- 29 November 2012
  (Em Sidings France)

- 17 January 2015
  (RT North France)

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Fire on Freight Shuttle 18th November 1996

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Fire on Freight Shuttle 21st August 2006

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Fire on Freight Shuttle 11th September 2008

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Fire on Freight Shuttle 17th January 2015

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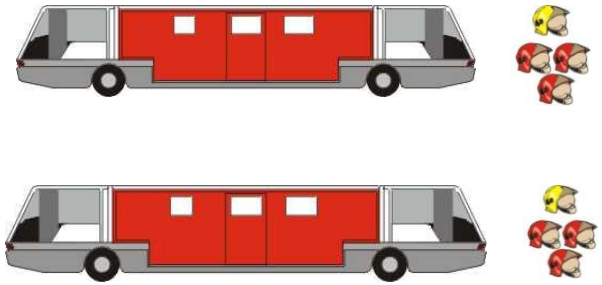
FLOR – First Line of Response

UK



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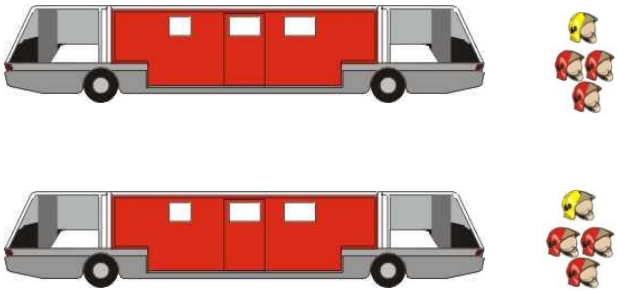

- 2 teams of 4 based close to Portals
- Patrol the Service Tunnel in specialist vehicles
- Not restricted to mid-point boundary
- Evacuation of passengers, first aid + initial fire fighting

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Incident Coordination Centres – UK and France

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Passenger Evacuation Procedures

- The existing procedures for evacuating a passenger train in the event of fire have been in place since 1994
- The procedures have not been used at any incidents primarily because of the very high level of safety of these specific passenger trains (Eurostar and ET passengers shuttles)
- There are means of fire extinction inside the engines and the carriages
- The standard procedure is to drive the train out of the tunnel to an emergency siding

Passenger Evacuation Procedures

- The previous procedures for evacuating a passenger train in the event of a fire were;
- **Drive through** to the emergency siding at the portal if possible
- If the train has to stop in the tunnel;
- **Controlled stop** - the doors of the train align with the CPDs and evacuation occurs simultaneously
- **Uncontrolled stop** - for a fire separating the train in two parts, the ventilation system provided fresh air to the longest part of the train and this part was evacuated
- The ventilation was reversed and the remaining part of the train evacuated
- The passengers have to walk on the sidewalk until the next cross passage door
- Previous exercises have shown that this procedure can take too long

Evacuation Procedures Review

- CTSA commissioned studies to help accelerate the passengers evacuation
- The study examined:
  - Reports from actual fires on passenger trains
  - Fire test data
  - Human behaviour theories
  - Modelled different evacuation procedures

Evacuation Procedures Review

- The study concluded that;
- A number of factors will have an impact on the number of people who will die or be seriously injured at these type of incidents. These factors included;
- Speed of fire development within the train
- Human management of the situation
- Effectiveness of evacuation systems, routes and procedures
- Quality of information and instruction given to the travelling public

Evacuation Procedures Review

- Findings regarding human behaviour included;
- Railway operators should develop a standardised information strategy that sets out who gives the information, what information is given, how and how often it is given and in which languages
- “Panic”, as people commonly perceives it, eventually turns out to be a much rarer phenomenon than expected when people’s actions are analysed
- Existing relationships/roles between individuals are maintained when a situation of evacuation occurs
- This means that train staff who are implicitly perceived as authority representatives and knowledgeable individuals are of great importance in the evacuation management

Evacuation Procedures Review

- To be able to cope with this responsibility and to deliver clear information to the public while keeping their composure, train staff have to be well prepared and trained, have a clear definition of their responsibilities and a basic notion of crowd management.

- Staff should be equipped with appropriate means of communication and crowd orientation.

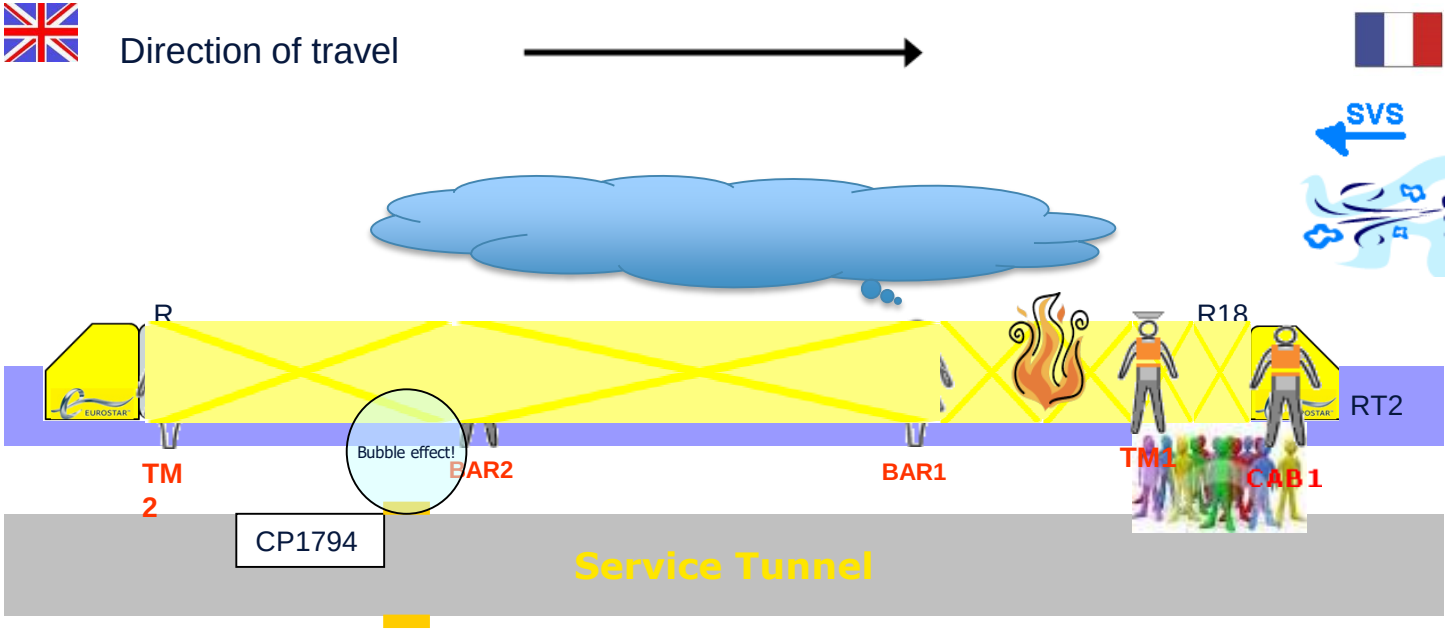
- During the evacuation of a train, high densities of people are foreseeable.

- Passengers tend to behave like people surrounding them when suffering from a lack of information, therefore information given to passenger is crucial if particular actions or behaviour are expected from the public

Evacuation Procedures Review

- Modelling of different procedures showed that it was possible to evacuate in a single phase rather than reverse the ventilation in a two phase evacuation
- Use of **all train doors** for evacuation was quicker than using **end doors only** but the passengers spent more time on the evacuation walkway
- Time to reach the Service Tunnel for both methods was similar but there was less exposure to fire products using end doors only
- ET and Eurostar used the study findings to develop new evacuation procedures which were supported by the IGC and became operational in May 2016

Uncontrolled stop
Single phase procedure.



Any Questions?

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