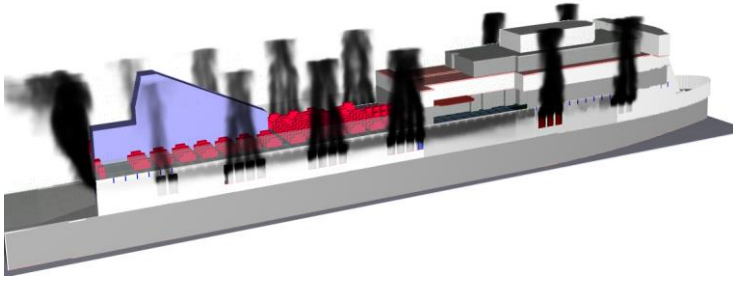
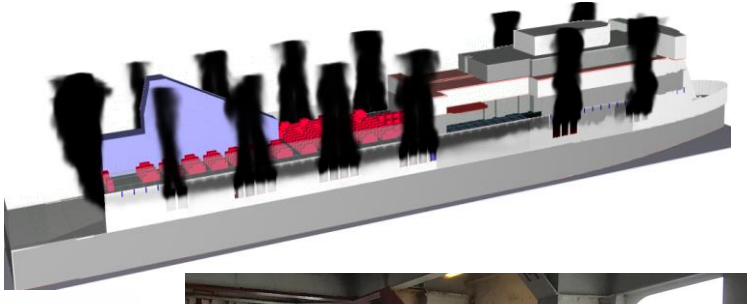
2023-06-28

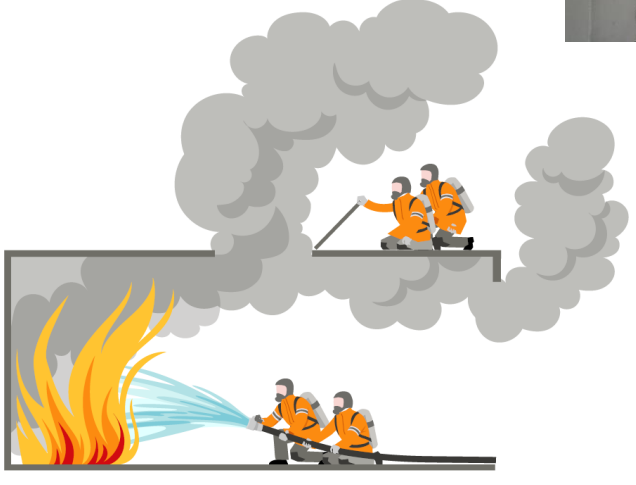
Ventilation in case of fire in a ro-ro space

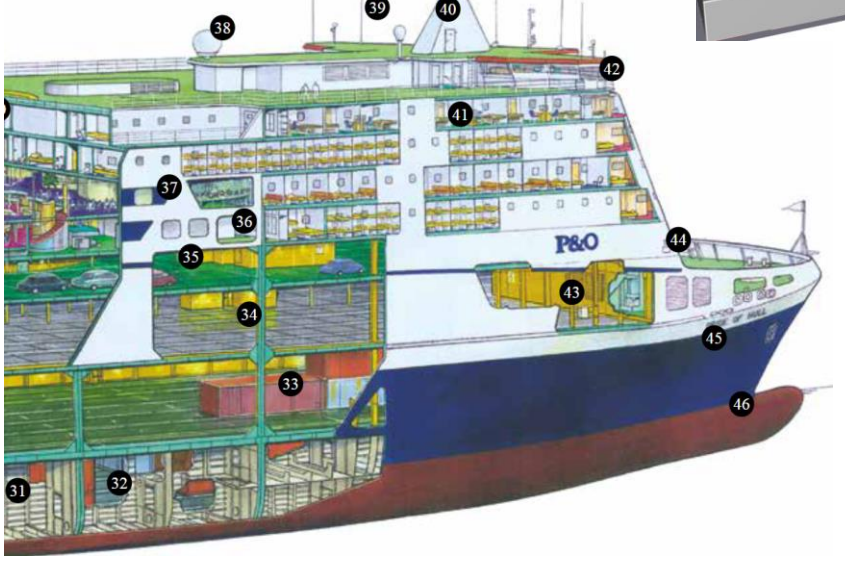
What improves safety?



Time (s) 300







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Starting point

- “Vehicle, special category and ro-ro spaces shall be adequately ventilated.” (SOLAS II-2/20.1.3)
- In case of fire - fans shut off and closure of fire dampers

- A fire needs oxygen to proceed
- Limited access to oxygen + free access to fuel => "ventilation-controlled“ fire
- Free access to oxygen + fuel => "fuel-controlled“ fire

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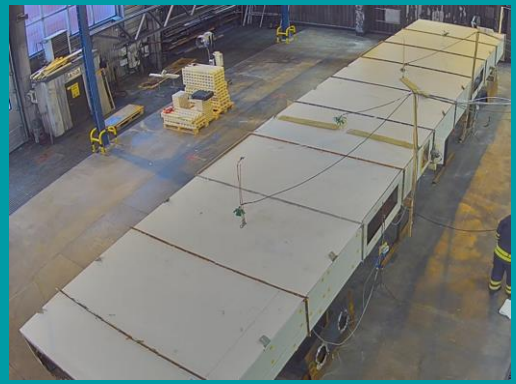
Open ro-ro spaces

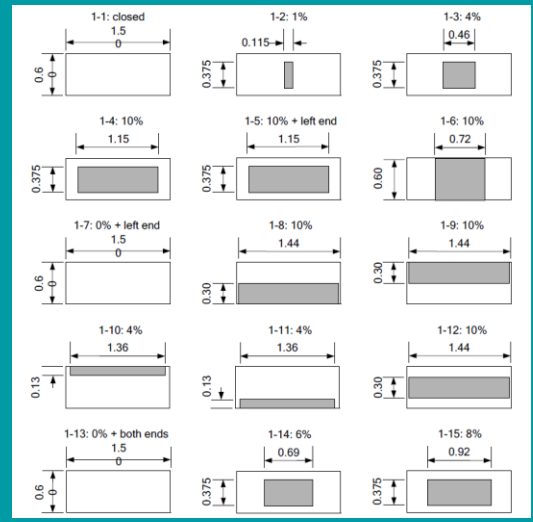
- Natural ventilation
- Influence of openings
- Self-extinguishment

Closed ro-ro spaces

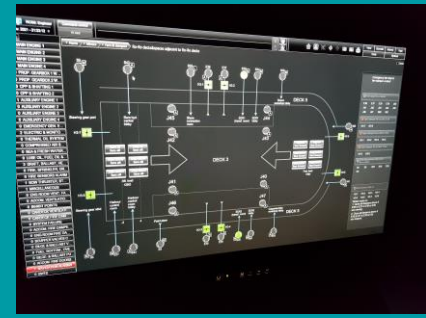
- Mechanical ventilation
- Usage of fans in case of fire
- Questioning the standard procedure

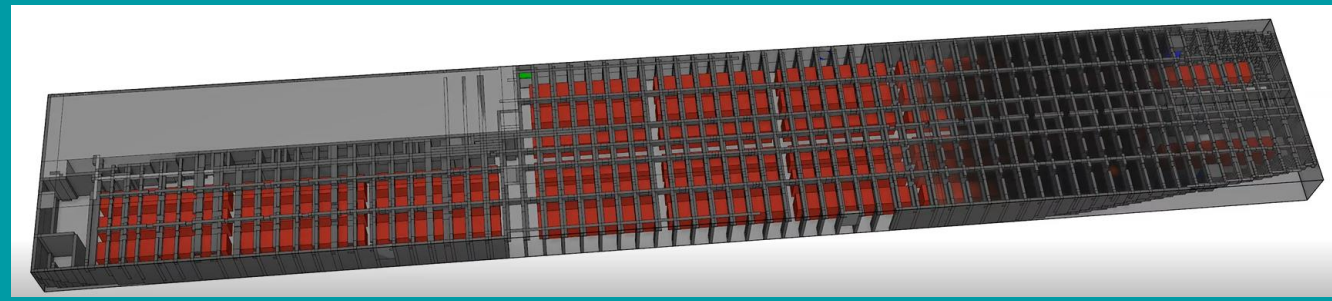
Performance assessment





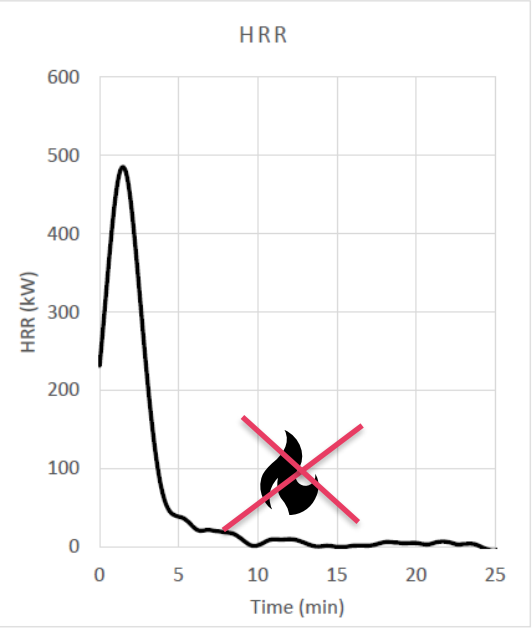
Fan settings	Short ends
10 ACPH, off at 3.5 min	Closed
10 ACPH, keep fans on	Closed
10 ACPH, keep fans on	Closed
8 ACPH, keep fans on	Closed
8 ACPH, keep fans on	Closed
16 ACPH, keep fans on	Closed
20 ACPH, keep fans on	Closed
8 ACPH, start fans at 3.5 min.	Closed
8 ACPH, start fans at 21 min.	Closed
Fans off.	Open
10 ACPH, keep fans on, only supply fans.	Open
Fans off.	Open

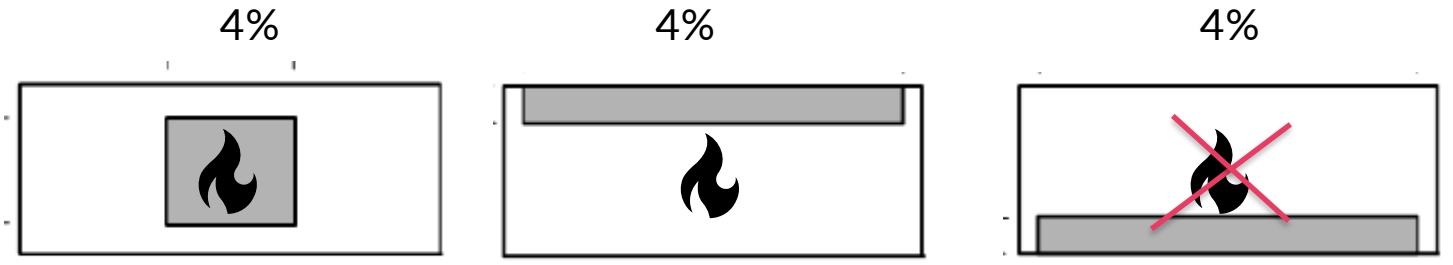




Natural ventilation

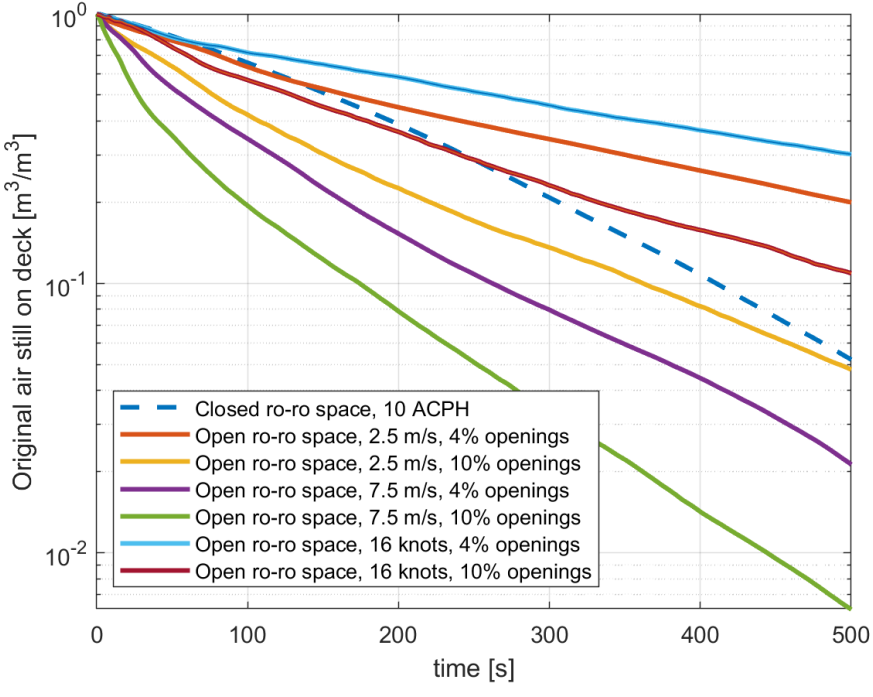
Effect of openings



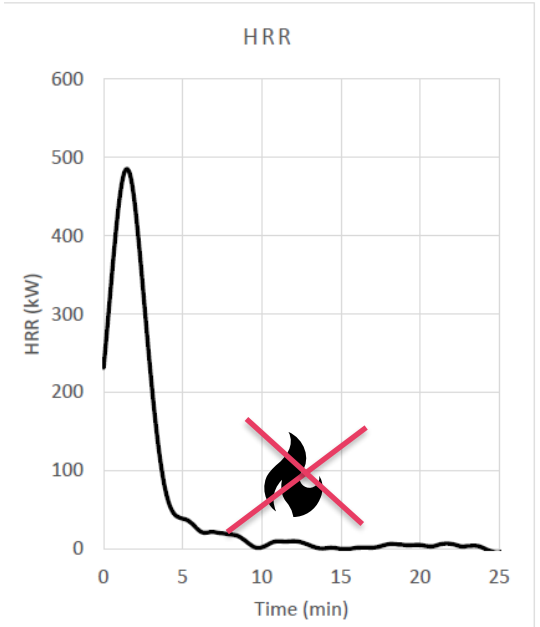


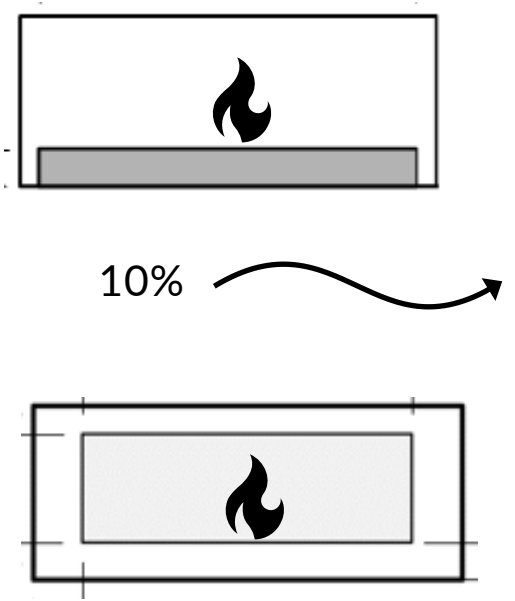
Fully closed – self extinguish

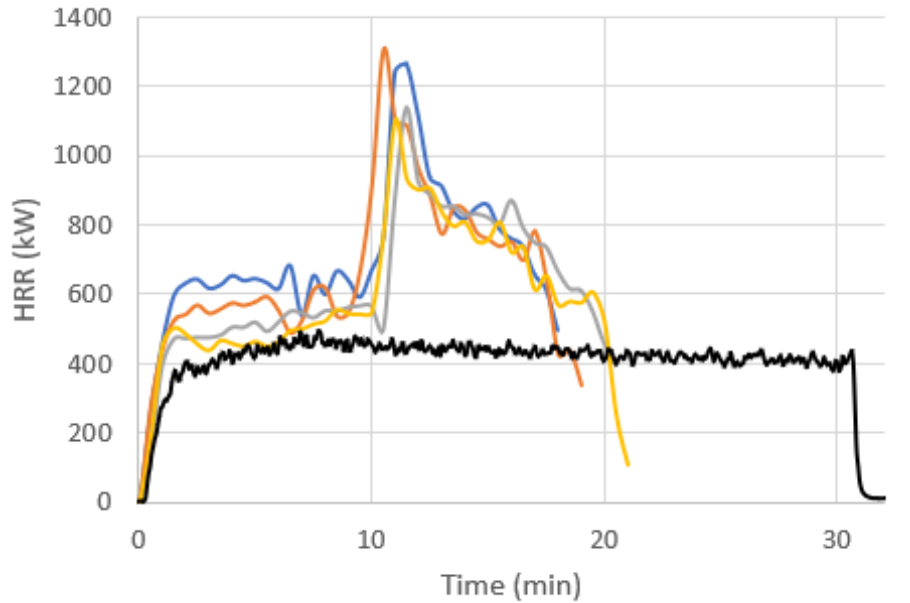
Result: reduced opening %



Effect of openings







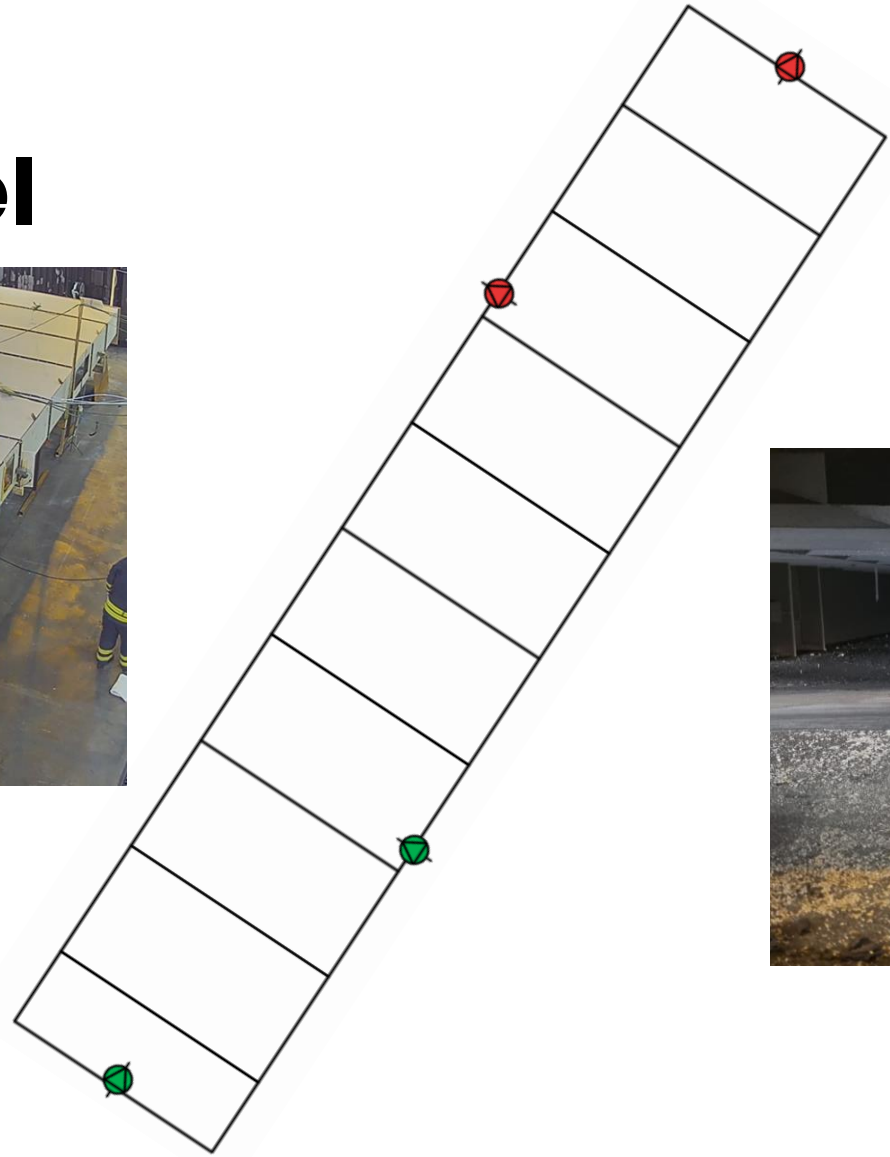
Fully closed – self extinguish

Conclusion open ro-ro spaces

- 4-6% for self-extinction to occur
- sides openings ≥10% to still maintain the same air exchange rate as 10 ACPH in a closed ro-ro space
- low placed openings (10%) will not reduce the fire development
- one open short end is enough to provide enough oxygen to sustain a fire

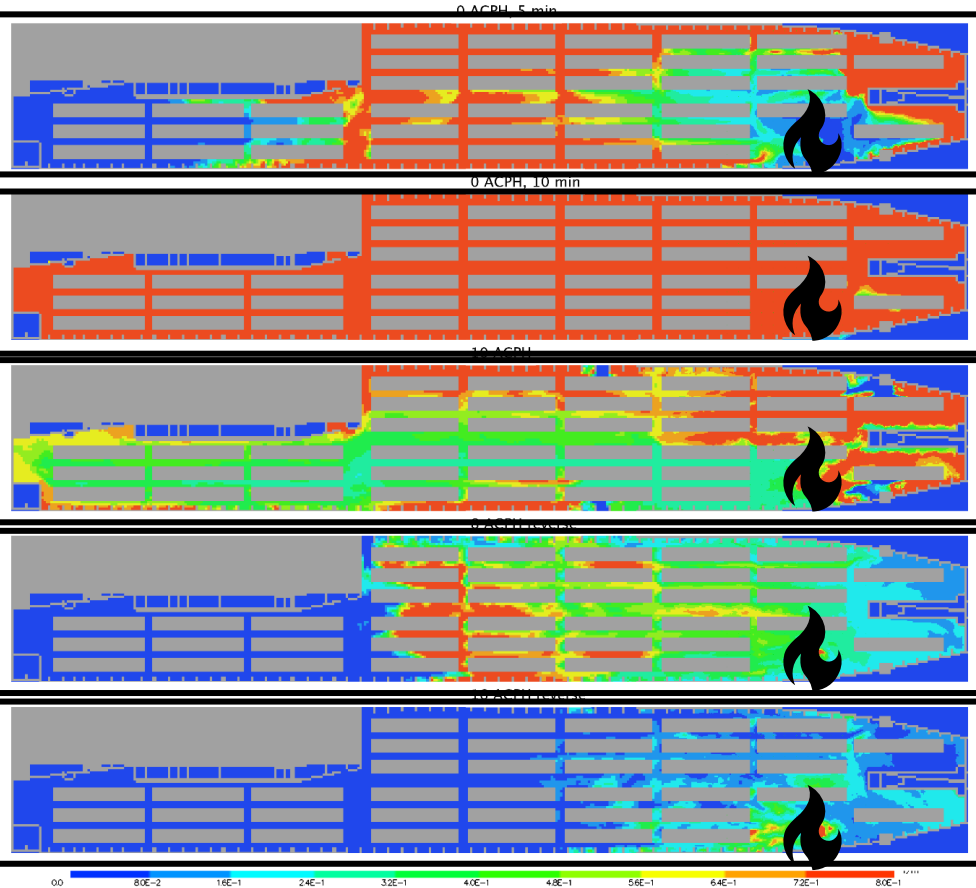
Mechanical ventilation

The model



Result: Light extinction

- Fans off (5 min)
- Fans off (10 min)
- 10ACPH inlet
- 8 ACPH outlet
- 16 ACPH outlet



Location of fire → Type of intervention ↓	Fire location close to supply fans	Fire located close to exhaust fan
Manual firefighting	NO	YES
Activation of extingushing system	NO	YES

Conclusions closed ro-ro spaces

- Using the ventilation
  - can reduce smoke density and improve visibility.
  - shall be considered with care.
- Stopping the ventilation
  - is the best way to reduce the fire intensity.
  - result in lowest radiation.

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What improves safety?

- Small steps to further understand and start practise work with ventilation in case of fire

Summary

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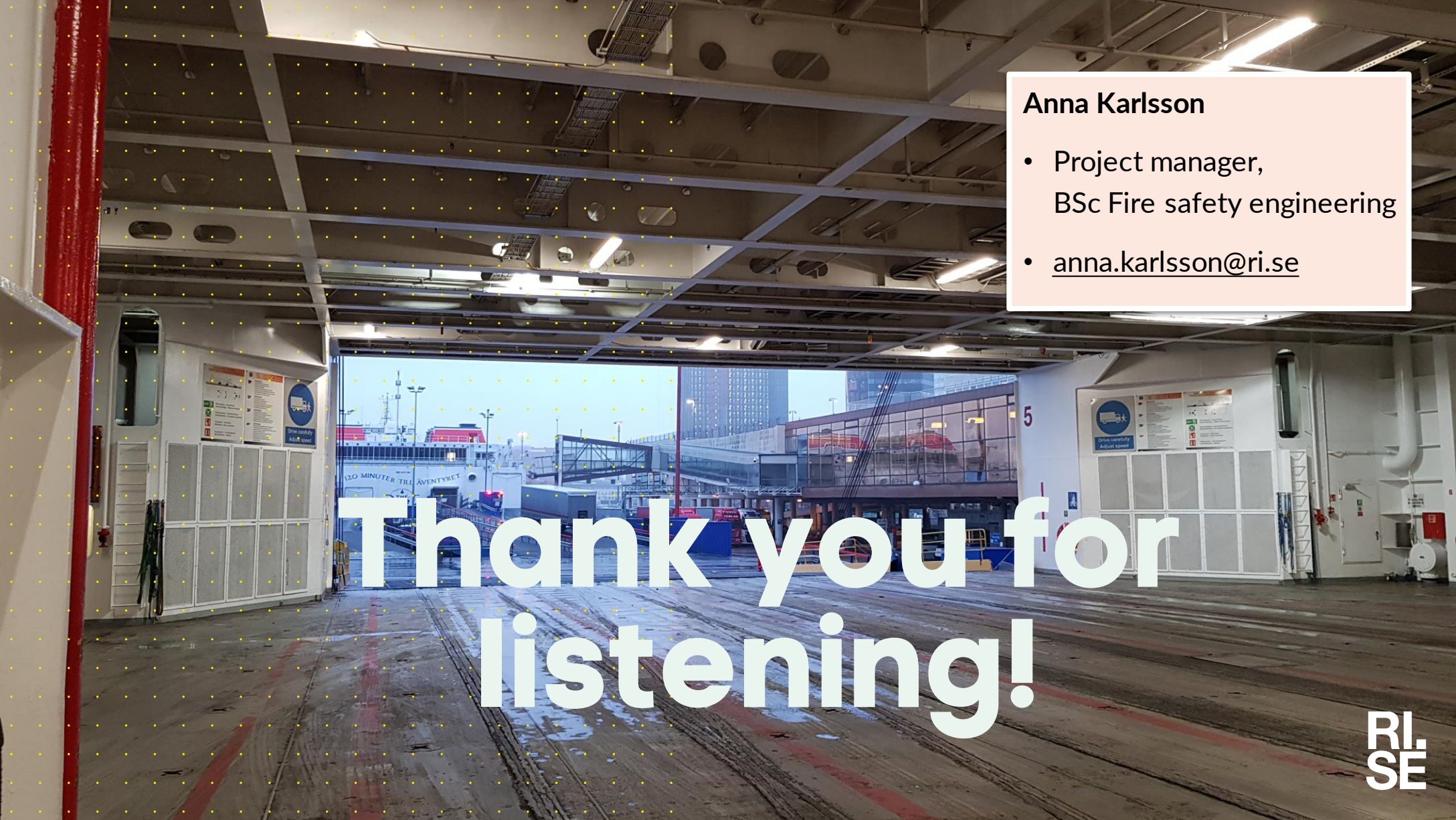

Thank you for listening!

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