



**Telesto  
Technologies**  
*Information Communication Technologies*

# Cruise Safety Innovations

**Telesto Technologies**  
IoT Solutions

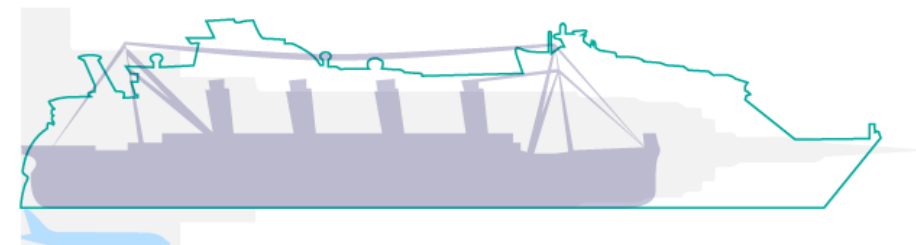


# Cruise ships are Mega Structures

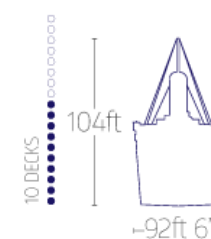
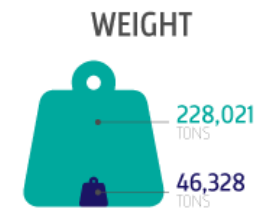
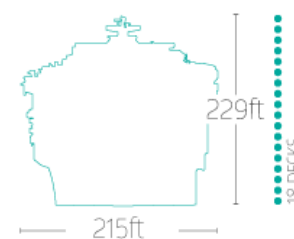


## SYMPHONY OF THE SEAS

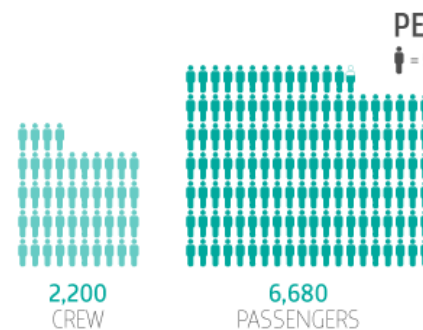
## TITANIC



EMPIRE STATE BUILDING	1,250ft
SYMPHONY OF THE SEAS	1,188ft
TITANIC	882ft 9"
BOEING 787-206ft	



### MAX SPEED







THE CRUISEWEB® Presents:

# Inside Royal Caribbean's *Harmony of the Seas*

The **Ultimate Abyss** provides the thrills as guests plummet 10 stories into the pools below on the tallest slide at sea!

Use **VOOM**, the fastest internet at sea, to share vacation highlights with friends and family using Facebook, Instagram, Facetime or Skype. Plus, you can play Spotify and watch Netflix!



Enjoy 360-degrees of immersive entertainment with *The Fine Line* at the **AquaTheater**. Marvel at the high-flying acrobatics and incredible stunts of this one-of-a-kind show!

The bigger and wetter **Splashaway Bay** aquapark features water cannons, slides, waterfalls and a massive drench bucket!



Head to the **Bionic Bar** to enjoy a delicious cocktail mixed by robots! Their robotic arms engineer the perfect drink while you stare in amazement!



Reach for the sky on the 40-foot **Rock Wall** or hang ten at one of the two **FlowRider** surf simulators found on board!



You never know where the **Stowaway Piano** player will turn up - by the pool, in Central Park, or even on the elevator! Try and track this stealthy performer as they appear throughout the ship.



Your favorite characters from *Shrek*, *Kung Fu Panda* and *Madagascar* come to life with the **DreamWorks** experience at sea. Enjoy 3D movies, special DreamWorks programming and even have breakfast with the characters.



Sneak away to the adults-only **Solarium** for a peaceful respite with soothing whirlpools, a relaxing indoor pool and warm sunshine!



Conquer an "escape room" at sea with **Puzzle Break: Escape The Rubicon**. Work with friends to find hidden clues and solve the puzzles before time runs out!

**Grease** heads to sea for the first time ever! Expect *Summer Lovin'*, *Greased Lightning* and more from the hit Broadway musical.



Combine world-class ice skating with high-tech visuals for an **Ice Show** like you've never imagined!



Created by The Cruise Web | 1.800.377.9383 | [cruiseweb.com](http://cruiseweb.com)

\* Images courtesy of Royal Caribbean



**HARMONY OF THE SEAS**





# Challenge and Motivation

Evacuating a large passenger ship is a hazardous, safety-critical and strictly time-bound task







# Challenge and Motivation

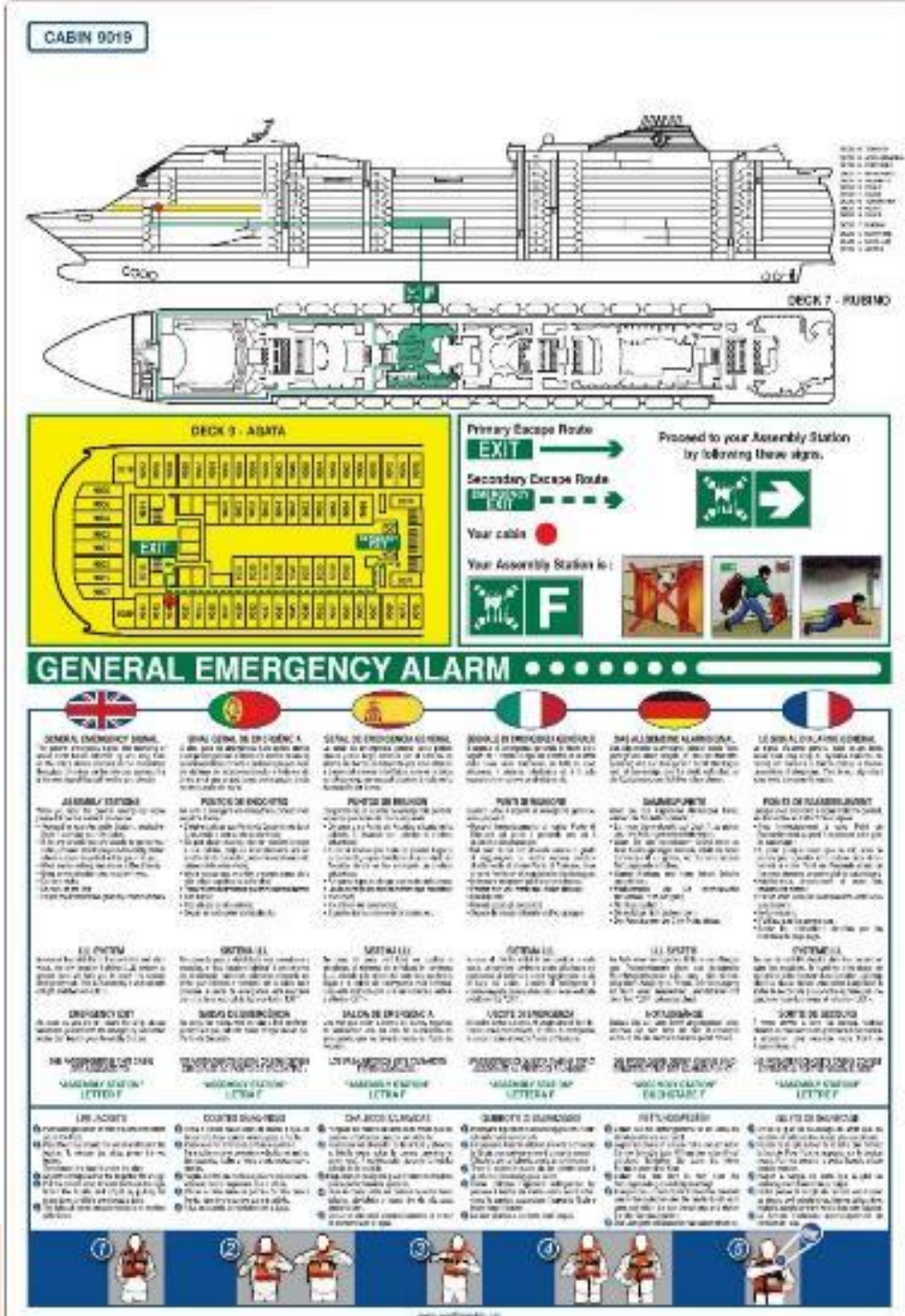
- All (8880!) passengers and crew need to be mustered and embark within 80'
- To familiarise the passengers, safety drills take place in the first day (after Costa Concordia) of every voyage
- Crews are extensively trained to facilitate the process (among other safety duties)





# Advances would be welcome

- Complexity of evacuation process
- Passengers need to understand guidelines under stress
- Multilingual audiences
- No way for one to locate himself once on board (no GPS signal)
- Stress is further increased by crowd psychology, adverse weather and low visibility

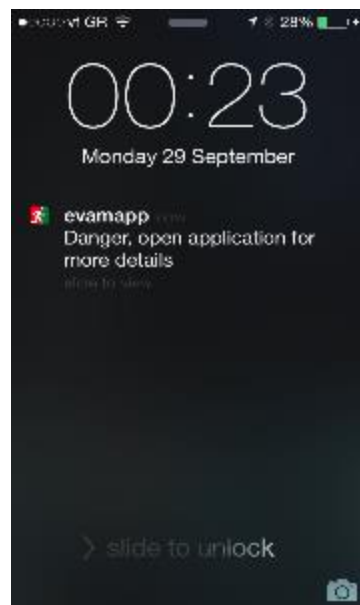




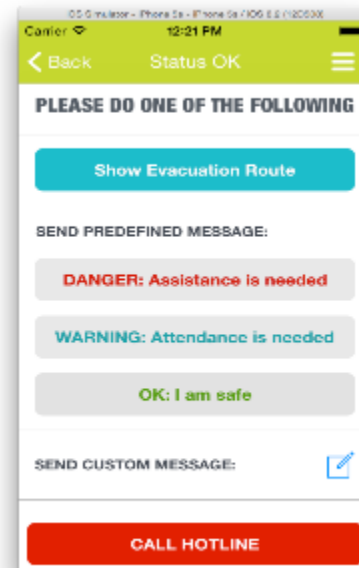


# What we can do today!

- Simplify & facilitate the evacuation training
- Update on current status and real time process
- BLE-based location
- Notification mechanism for smartphones



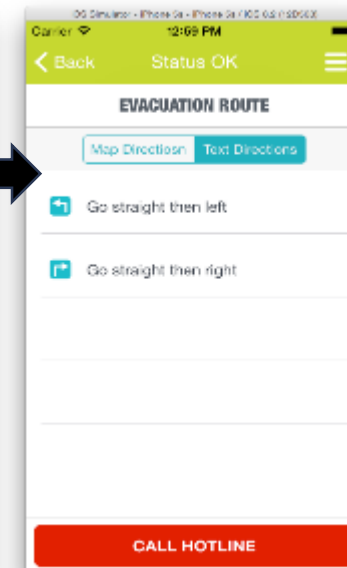
Push notifications update on the safety status.



Guidelines for Safety...



Action plans for safety



Guidelines for evacuation



# System Performance

## Tests performed with Crew

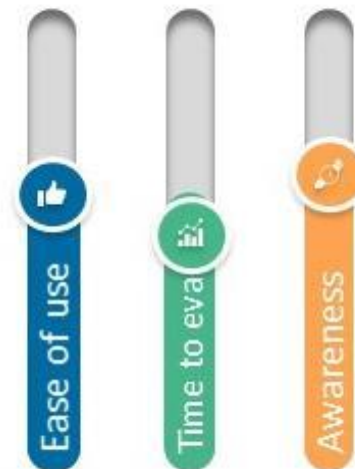


## Pilot Results

### Performance improvement

Improvement  
normal conditions

20%



**Perfect visibility – no obstructions**

Evacuation time improved 20% even in normal conditions (no obstacles, high visibility)

Improvement when  
Evacuation route jammed / blocked

60%



**Blocked exits**

Improvement rises to more than 60% if obstacles block the default exit. Without evaGuide people need to search themselves for alternative exits







# Goal: Advances in the evacuation preparation, training and increased situation awareness

- Aim: SafePASS aims to radically redefine the evacuation processes, evacuation systems/equipment and international regulations for passenger ships
  - ✓ Develop an integrated system to monitor, process and inform during emergencies both crew and passengers of the optimal evacuation routes
  - ✓ Develop new easy to use LSA
  - ✓ Significantly reduce the total time required for ship evacuation and increase safety





# SafePASS at a Glance

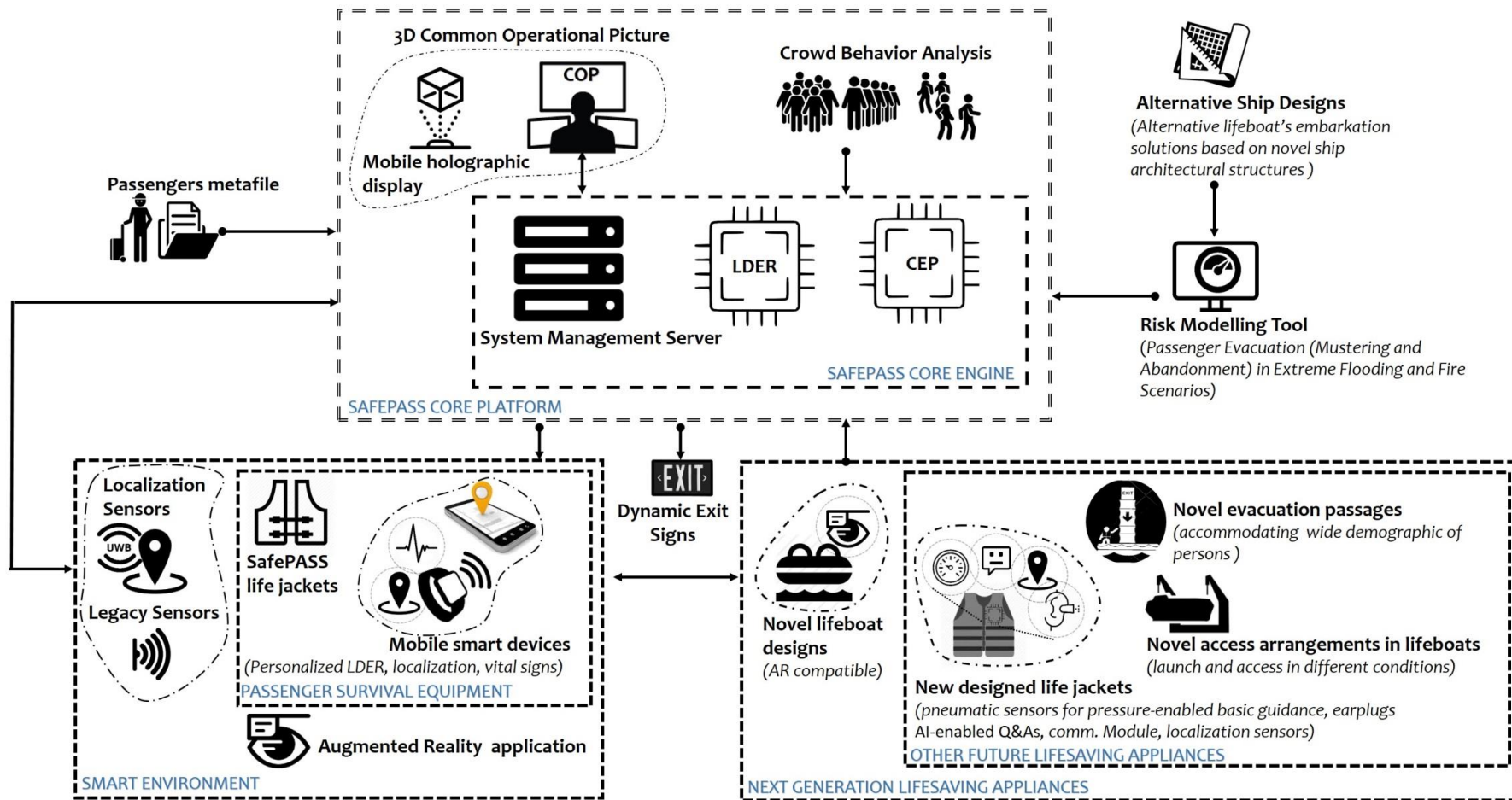
The SafePASS integrated system comprises of different ecosystems:

- **Next generation lifesaving appliances:** integrating a new smart life jacket (incorporates location finding, vibration sensors, earplug, translator bot, communication and processing)
- **Novel lifeboats and ship infrastructure to support:** design, novel access arrangements and evacuation passages, as well as novel ship architectural structures to accommodate the latter
- **Smart environment elements:** localization sensors, wearables for passengers (integrated lifejacket and smart devices), ship legacy systems and the AR crew application
- **Core platform:** Common Operational Picture and core engine
- **Algorithms:** Dynamic evacuation, crowd behaviour analysis



# SafePASS High-Level Architecture

Evidence Based Assessment & Socio-technical Modelling







# SafePASS Life Saving Appliances



1



2



3

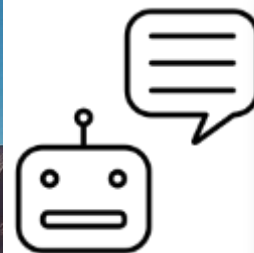


4

- 1 Possible integration of LSAs within the ship superstructure
- 2 Novel LSAs
- 3 Novel LSA Evacuation Passage exterior
- 4 Novel LSA Evacuation passage interior



# SafePASS Advanced Components

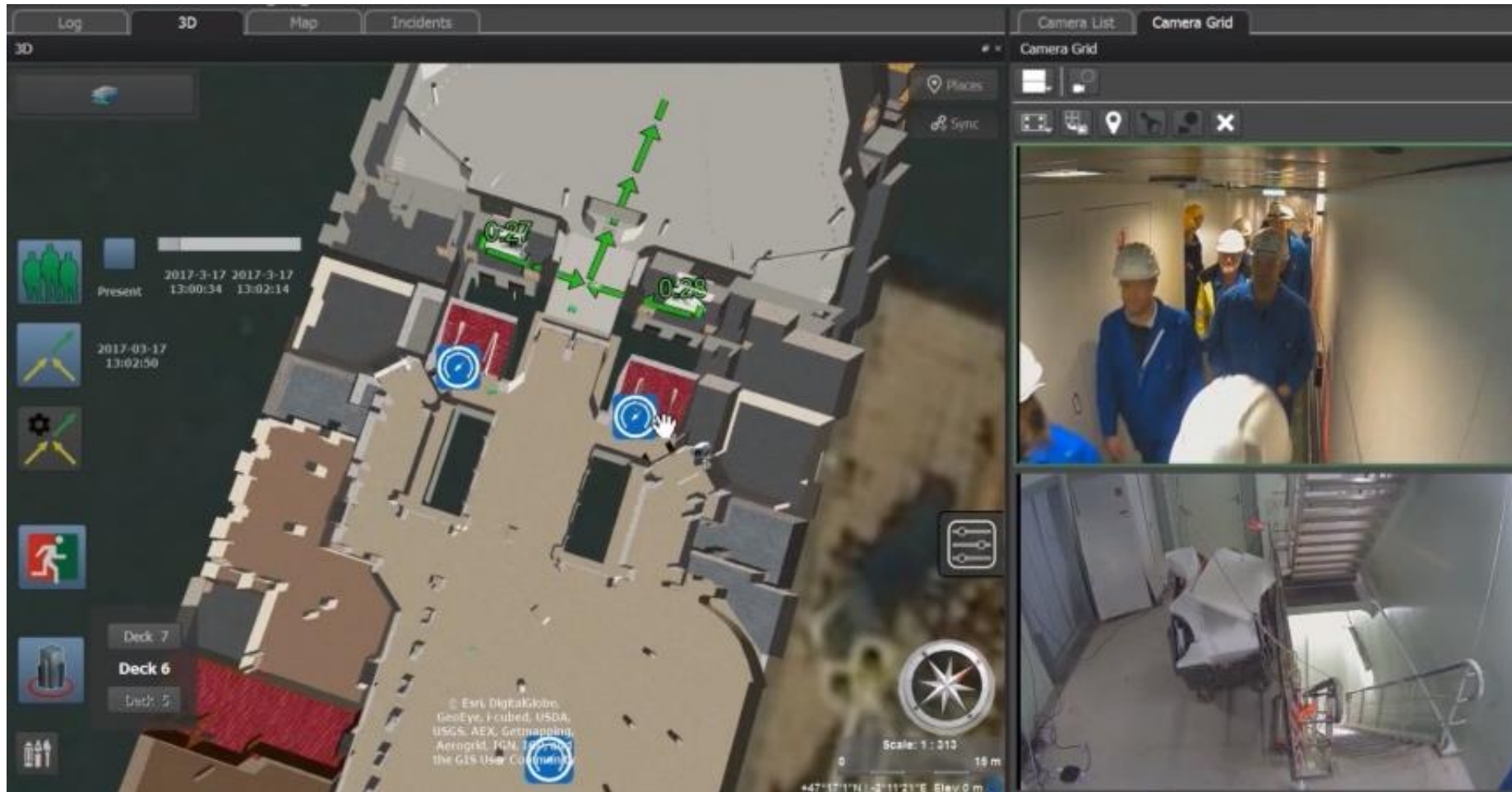


- 1 mobile application
- 2 AR application
- 3 indoor localization
- 4 ear plug AI enabled chat bot
- 5 Smart life jacket with pneumatic sensor/haptic device
- 6 smart bracelet etc.



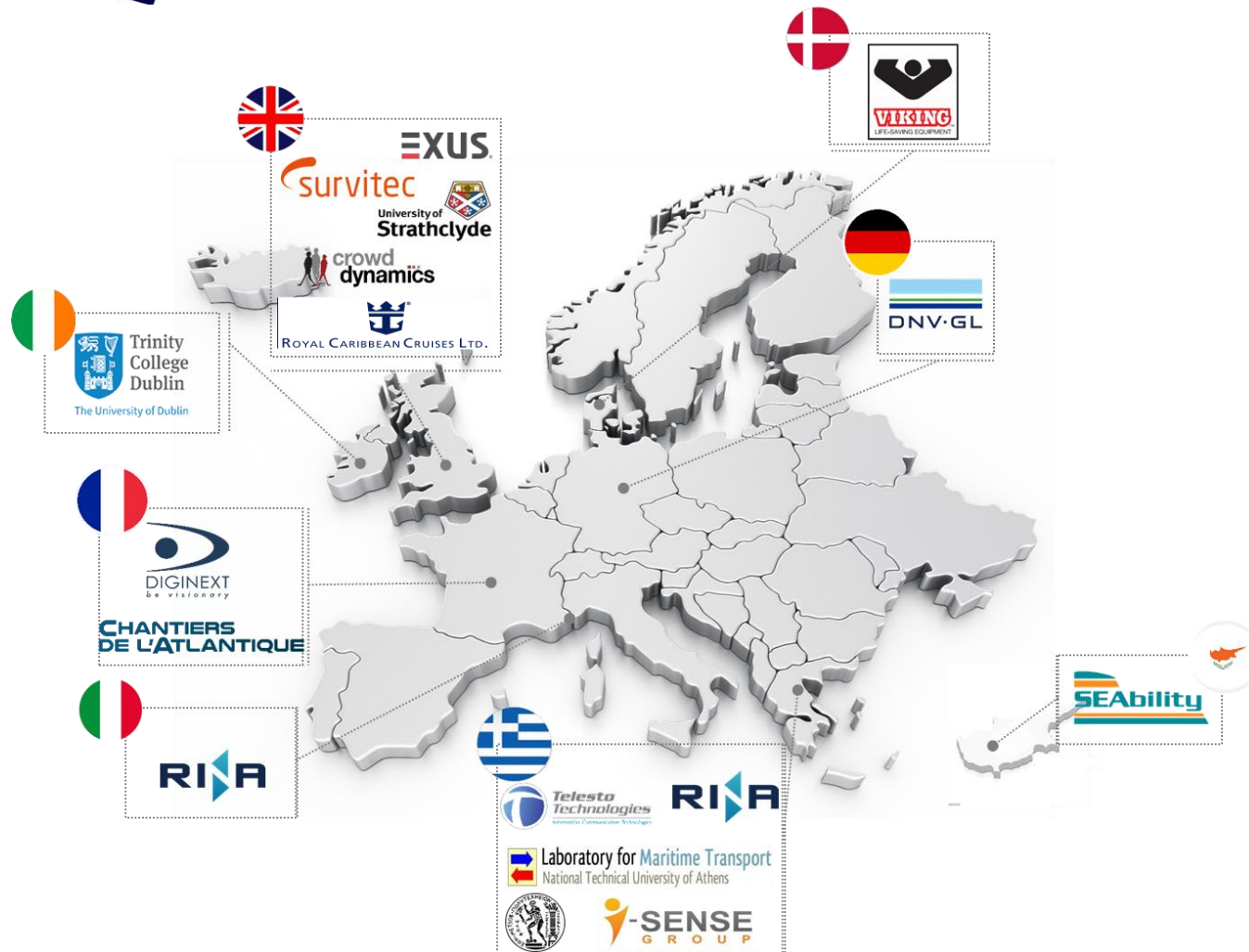


# SafePASS Situational Awareness





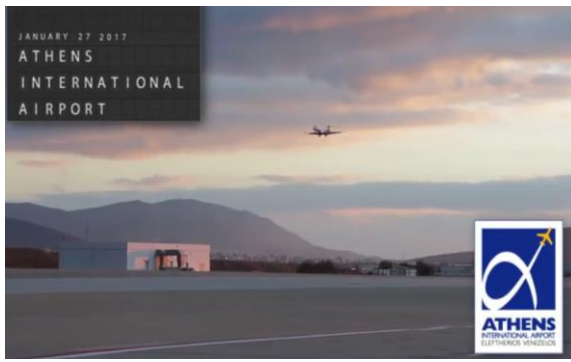
# SafePASS Facts and Figures



- MG-2-2-2018: Marine Accident Response (subtopic B)
- Total Funding: 8,270,366.25 €
- EC Requested Funding: 8,270,366.25 €
- Start 1/09/2019 – 31/08/2022 (36Months)
- Consortium: 15 partners from 8 different EU countries



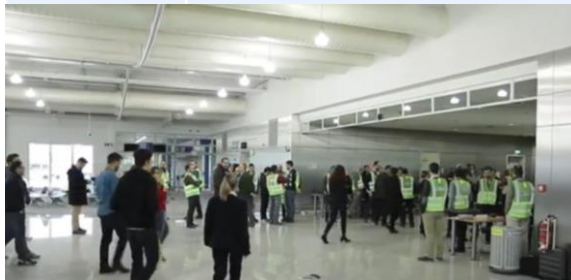




Trial	Anoeta Stadium (Spain)
Participants	100
Improvement achieved over legacy	Location availability vs GPS: +60% Location accuracy vs GPS: 5m, 95% Availability of exit route: 85% FR Messages received: 100%
Trial video	<a href="https://youtu.be/A0DmYViz3s8">https://youtu.be/A0DmYViz3s8</a>
Telesto role	<ul style="list-style-type: none"> <li>Mobile App for Visitors</li> <li>Mobile App for Stewards</li> <li>Social mining for alerts</li> </ul>



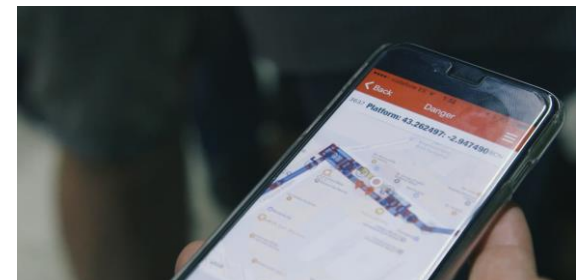
Trial	Athens Airport (GR)
Participants	100
Improvement achieved over legacy	Location availability vs GPS: + 40% Accuracy vs GPS: 5m, 95% Availability of exit route: 95% FR Messages received: 100%  Social networks used: 3
Trial video	<a href="https://www.youtube.com/watch?v=9uvWSdE4egs">https://www.youtube.com/watch?v=9uvWSdE4egs</a>
Telesto role	<ul style="list-style-type: none"> <li>Mobile App for Visitors</li> <li>Mobile App for Security staff</li> <li>Social mining for alerts</li> </ul>



Trial	Cruise Ship "Harmony of the Seas"
Participants	85
Improvement achieved over legacy	Location availability: + 80% (GPS is not available) Location accuracy: 5m, 95%
Trial video	<a href="http://www.telesto.gr/copy-of-map">http://www.telesto.gr/copy-of-map</a>
Telesto role	<ul style="list-style-type: none"> <li>Mobile App for Visitors (Location, Push Notif)</li> <li>Mobile App for Stewards</li> <li>Application for locating Missing Persons</li> </ul>



Trial	Metro Bilbao
Participants	100
Improvement achieved over legacy	Location availability: + 100% (GPS is not available) Location accuracy: 5m, 95% Availability of exit solution: 85% FR Messages received: 100% Social networks used: 3
Trial video	<a href="http://www.telesto.gr/copy-of-map">http://www.telesto.gr/copy-of-map</a>
Telesto role	<ul style="list-style-type: none"> <li>Mobile App for Visitors (Location, Push Notif)</li> <li>Social mining for alerts</li> </ul>

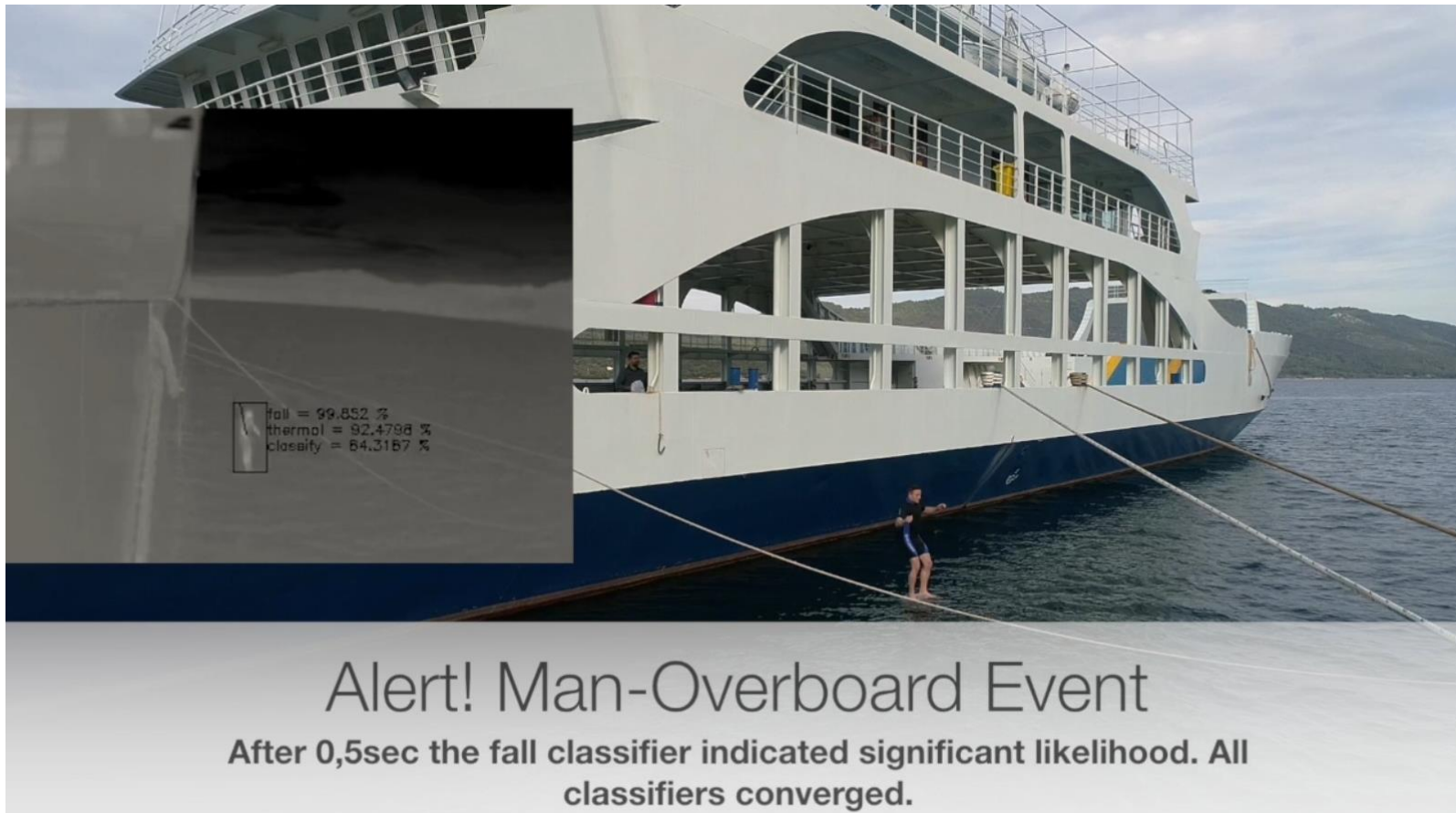


# Man Overboard Detection

Innovative solutions



Man overboard system



95 % of all-man overboard cases are detected.

No significant degradation regardless of day or night.

Number of false alarms small (up to 3 per day in adverse weather conditions).



# Awards

## European Satellite Navigation Contest 2015

Ranked among the top10 in the ESA Special Prize (*out of 107 candidates*)



## Innovate UK

In 2016 our team was awarded for the Carnival Challenge in the IC tomorrow of the Innovate UK



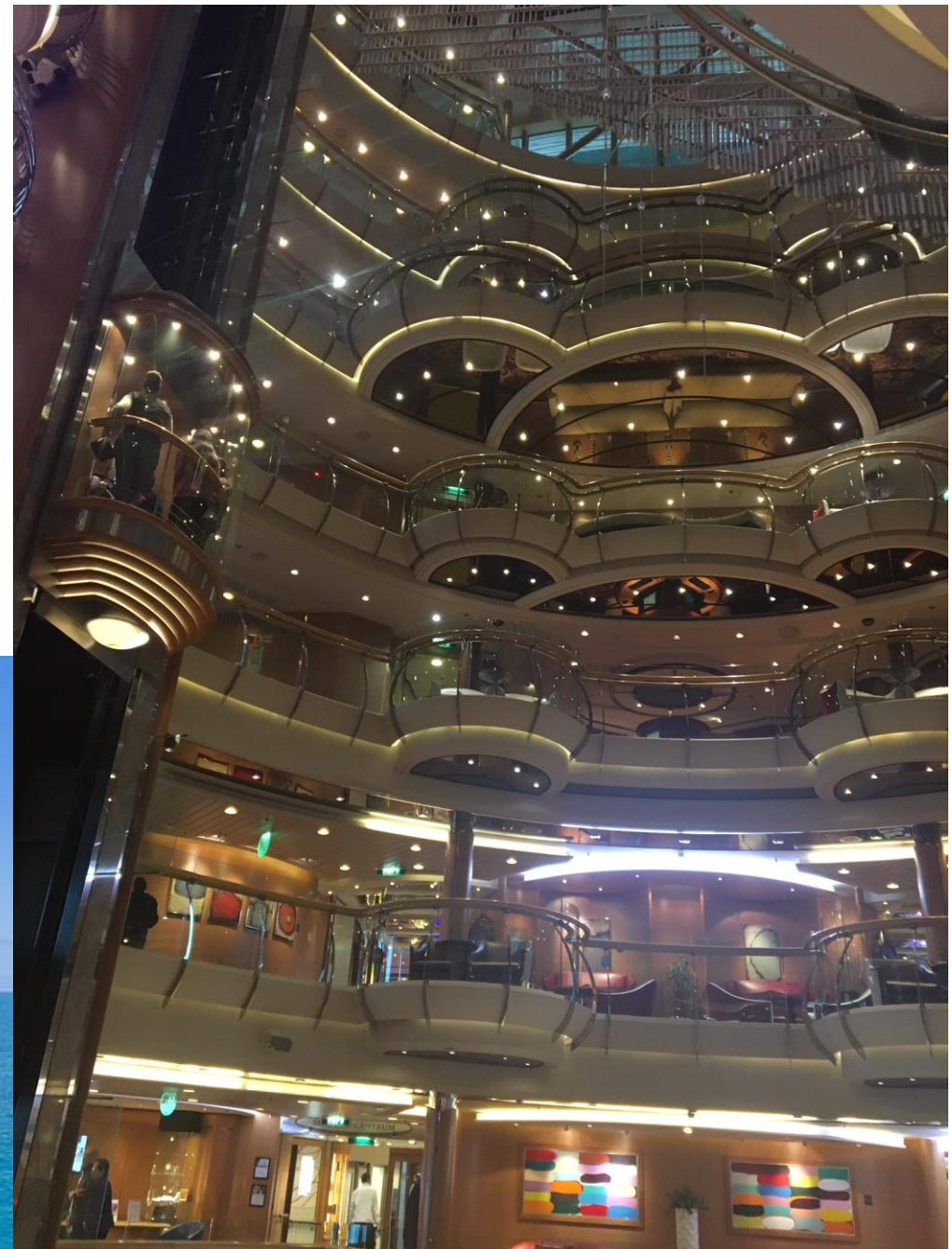
## EIT Digital Challenge

Ranked among 9 innovators (Scale-Ups) in the area of Digital Cities to compete in the EIT Digital Challenge finals



# Conclusions

- Large Cruise Lines prepare their crews to adapt to any adversity
- SafePASS will deliver new concepts so that both crew and passengers may reliably perform an evacuation if needed





# THANK YOU



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