**D3.2– Cultural Risk Assessment CBT Material**

C. Dambra (PRO), A. Gralewski (PRO), V. Siciliano (PRO)

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*Impact of Cultural aspects in the management of emergencies in public Transport – IMPACT*
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CBT</td>
<td>Computer Based Training</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standardisation Organisation</td>
</tr>
<tr>
<td>WPn</td>
<td>Work Package n</td>
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Executive Summary

This document provides a set of lessons to introduce the cultural aspects into the management of risks in transport hubs into four steps:

1. An introduction of risk assessment and on how to consider cultural aspects.
2. An analysis of the complexity of different transport hubs and of the factors affecting them in view of a cultural risk assessment.
3. The analysis of hazards and threats and how culture can affect consequences and the identification of cultural hazardous behaviours triggering new hazards.
4. The identification of control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels.

All the above steps have been built using PowerPoint presentations and will be converted into e-learning materials in WP5.
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1 Introduction to the Cultural Risk Assessment CBT

D3.2 represents the training material developed on the basis of the cultural risk assessment methodology (D3.1).

The content of the lessons is based on:

- The content of the IMPACT Deliverable D3.1 “Cultural Risk Assessment Methodology Report”
- A review of the news describing events that are relevant to the subject.

The Computer Based Training (CBT) material described in this document is reported using the PowerPoint Notes Page format in the appendixes.

The material has been then converted into e-learning using Adobe Captivate e-learning suite through a joint DBL-PRO effort.

To harmonise content, D3.2 has adopted the same document structure as D5.2 Training Exercises, Modules and Packages leaded by DBL.
### 2 Target audience of the Cultural Risk Assessment CBT

Staff members of large transport hubs—such as airports, railways and underground stations, ports—confront every day a very complex mission: helping, supporting, providing medical assistance and inspect several thousand passengers of different nationalities and different cultures. Usually, staff receive a specific training on the functional and legal aspects of the work: relevant laws and regulations, and procedure. In a complex, networked society, also cultural competence is essential.

The IMPACT Cultural Risk Assessment CBT is mainly aimed at the following target audience:

- Hub managers, interested in introducing cultural aspects in their currently existing risk assessment procedures analysing the main threats and hazards linked to cultural behaviours and the possible mitigation measures.
- Transport hub policy makers and planners, willing to get experienced on the main approaches to risk assessment, the characterisation of hubs in view of introducing cultural aspects to risk assessment, and then analysing the main threats and hazards linked to cultural behaviours and the possible mitigation measures.
- Managers and training responsible of first responders’ organisations, focusing their interests on how to introduce cultural aspects in the mitigation of emergencies.

![Diagram of target audience](image)

*Figure 1 - Target audience for Cultural Risk Assessment CBT*

Especially the generic risk assessment module is aimed at providing a quick overview on approaches and methodologies and does not pretend to be exhaustive, leaving to further module outside IMPACT project the possibility to go in deep into the matter.
3 Training structure: Cultural Risk Assessment CBT lessons

The structure of the Cultural Risk Assessment CBT is based on 4 lessons (Figure 2):

1. Cultural Risk Assessment
2. The complexity of different transport hubs and the factors affecting them in view of a cultural risk assessment
3. Culture and threats/hazards in transport hubs/stations
4. Control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels

The trainee has the following options:

- Skip Lesson 1 if he is already familiar with risk assessment and, in particular, with ISO 31000 standards
- Concentrate on the type of hub of interest in Lesson 2 (airport, railway station or seaport) if he/she is not interested in a survey of the 3 different transport modes.

Figure 2 - The structure of the Cultural Risk Assessment CBT

The following sections describe more in detail the objectives, contents, key messages and format of the training modules developed.

The lessons are presented in Appendix 1 as PowerPoint presentations.
3.1 Lesson 1 – Cultural Risk Assessment

The characteristics of the Lesson 1 – Cultural Risk Assessment are summarised in Table 1.

<table>
<thead>
<tr>
<th>DURATION</th>
<th>30 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>Cultural Risk Assessment</td>
</tr>
</tbody>
</table>
| OBJECTIVES | • Provide an introduction to cultural risk assessment.  
  • After the lesson, participants will be able to:  
    o To understand the key concepts and basis of risk assessment,  
    o To understand what risk assessment can and cannot do,  
    o To understand how risks can be identified and assessed,  
    o To identify hazards and threats,  
    o To understand the key stages of the risk assessment process,  
    o To assess cultural risks. |
| MAIN CONTENTS | • Risk Basics  
  • Risk Assessment Methods  
  • Cultural Risk in Transport Hubs |
| KEY MESSAGES | • Risk assessment is a process that allows organisations to understand risks, defining acceptable levels of risk, risk criteria and reducing risks by proposing risk mitigation.  
  • Risk assessment:  
    o forces us to apply our experience and think about what might happen, in an open-ended way  
    o focuses attention on the high-risk areas, to set priorities for control  
    o provides an informed basis for decisions and an auditable trail  
  • For the more complex aspects of evaluating risk from a cultural behaviour point of view, the elicitation of cultural behaviour from experts could be applied and combined with more complex models. |
| PROPOSED FORMAT | • E-learning lesson  
  • Examples and additional materials  
  • Ppt presentation |
3.2 Lesson 2 - The complexity of different transport hubs and the factors affecting them in view of a cultural risk assessment

The characteristics of the Lesson 2 - The complexity of different transport hubs and the factors affecting them in view of a cultural risk assessment are summarised in Table 2.

<table>
<thead>
<tr>
<th>DURATION</th>
<th>30 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>The complexity of different transport hubs and the factors affecting them in view of a cultural risk assessment</td>
</tr>
</tbody>
</table>
| OBJECTIVES | • The current lesson presents the complexity of different transport hubs considered here (air terminals, railway stations and ports) and the factors affecting them.  
• Each hub is considered here from different points of view (geo-location, vulnerability and external events, service time, design and layout, mix of users etc.) and where possible their impact of cultural behaviour. |
| MAIN CONTENTS | • Introduction on the role of culture and risk in different types of hub  
• General hub factors affecting hub Risk Assessment  
• Hub areas and intrinsic risks and mitigations for passengers  
• Intrinsic cultural risks and mitigations in airports  
• Intrinsic cultural risks and mitigations in railway stations  
• Intrinsic cultural risks and mitigations in seaports |
| KEY MESSAGES | • To assess cultural risks, it is necessary to model passengers’ behaviours that depend on culture, in realistic hazard conditions.  
• To model passengers' behaviours it is necessary to characterise the typical mix of passengers in a hub, according to a cultural clustering.  
• To characterise the cultural mix of passengers it is necessary:  
  o to describe the hub characteristics from the psychosocial point of view and the impact on passengers;  
  o consequently, to understand how to indirectly compute or infer the passengers' cultural clusters |
| PROPOSED FORMAT | • E-learning lesson  
• PowerPoint presentation |
3.3 Lesson 3 - Culture and its role in threats/hazards in transport hubs/stations

The characteristics of the Lesson 3 - Culture and its role in threats/hazards in transport hubs/stations are summarised in Table 3.

<table>
<thead>
<tr>
<th>DURATION</th>
<th>30 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>Culture and threats/hazards in transport hubs/stations</td>
</tr>
</tbody>
</table>
| OBJECTIVES | • To properly define threats and hazards and the boundaries of the cultural aspects in risk assessment  
  • To identify cultural behaviours amplifying or diminishing consequences of generic safety hazards or security threats  
  • To identify cultural behaviours triggering new hazards  
  • To provide examples of past events based on published news |
| MAIN CONTENTS | • Threats and hazards definition  
  • Culture and risk in a hub  
  • Cultural behaviours amplifying or diminishing consequences of generic safety hazards or security threats  
  • Cultural behaviours triggering new hazards |
| KEY MESSAGES | • Cultural aspects can play a role either amplifying/diminishing consequences of generic safety hazards or security threats or triggering new hazards  
  • It is complex to distinguish between simple human hazardous behaviour and culture-specific ones.  
  • Airports are the hub in which culture plays a major role when compared with other hubs (railway stations, seaports) due to the more heterogeneous origin/type of passengers. |
| PROPOSED FORMAT | • E-learning lesson  
  • Examples and additional materials  
  • PowerPoint presentation |
3.4 Lesson 4 - Control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels

The characteristics of Lesson 4 - Control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels are summarised in Table 4.

<table>
<thead>
<tr>
<th>DURATION</th>
<th>30 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>Control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels</td>
</tr>
</tbody>
</table>
| OBJECTIVES | • To present possible control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels.  
• The proposed mitigation measures are mostly based on studies done at the international level that can be directly accessed using the links provided. |
| MAIN CONTENTS | • Hub strategies where cultural controls are more effective  
• Communication in presence of cultural differences  
• Training/awareness to manage cultural differences  
• Treatment of patients of different cultures  
• Mental health care for ethnical minorities  
• Individual-level risk factors for poor mental health outcomes  
• Multicultural signs  
• Disabled as minority language groups |
| KEY MESSAGES | • There are few examples in the world of culture-related risk mitigation measures.  
• The majority of culture-related risk mitigation measures are proposed by international organisations. |
| PROPOSED FORMAT | • E-learning lesson  
• Examples and additional materials  
• PowerPoint presentation |
4 Conclusions

This document provides a set of lessons to introduce the cultural aspects into the management of risks in transport hubs into four steps:

5. An introduction of risk assessment and on how to consider cultural aspects.
6. An analysis of the complexity of different transport hubs and of the factors affecting them in view of a cultural risk assessment.
7. The analysis of hazards and threats and how culture can affect consequences and the identification of cultural hazardous behaviours triggering new hazards.
8. The identification of control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels.

All the above steps have been built using PowerPoint presentations and will be converted into e-learning materials in WP5.
Appendix 1 - PowerPoint of the Cultural Risk Assessment CBT lessons
Cultural Risk Assessment CBT

Lesson 1: Cultural Risk Assessment
Risk Assessment

- Key Objectives of this module are:
  - To understand the key concepts and basis of risk assessment,
  - To understand what risk assessment can and cannot do,
  - To understand how risks can be identified and assessed,
  - To identify hazards and threats,
  - To understand the key stages of the risk assessment process,
  - To assess cultural risks.

In this module, we will look at the generic risk assessment methodology which can be applied to a specific transport hub. At the end of this course you will be able to conduct a risk assessment for your specific transport hub and be able to assess your own risks and cultural behaviour risk on your transport hub.
The training will consider some risk basics to ensure common understanding of risk and risk assessment terminology. This is then followed by risk assessment methods and techniques and finally applying it to cultural risk assessment to transport hubs. The risk approach presented here is based on the international standards. The user of this training course should make himself/herself familiar with these standards.
“Risk is the chance of something adverse happening”
(UK Health and Safety Executive - HSE)

Risk is an uncertain outcome or chance of an adverse outcome

Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.

There are many definitions of risk, most commonly a risk is defined as the product of probability of hazard occurrence and the severity of the resulting consequences. Here HSE definition will be adopted. This definition can be applied to risk to human safety, Risk to business operation, RISK to the environment and others.
There are many measures of risk and hence its metric. Some examples of risk metric is given here. There is no one best measure, the assessor should select his/her judgement for what is the most appropriate measure for the problem.
<table>
<thead>
<tr>
<th>HAZARD</th>
<th>An event, situation or object that has potential to cause harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSEQUENCE or HARM</td>
<td>Potential result of a hazard</td>
</tr>
<tr>
<td>SEVERITY</td>
<td>How bad is the consequence?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROBABILITY (or Chance or Likelihood)</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in 6 chance of throwing a 3</td>
<td>Probability within a certain time</td>
</tr>
<tr>
<td>5% chance of winning</td>
<td>Note: ‘1 in 100 years’ means a 1 in 100 chance in each year (not that it will happen after 100 years!)</td>
</tr>
<tr>
<td>odds of 100 to 1</td>
<td></td>
</tr>
</tbody>
</table>

Here you can find some definition of terms used in risk analysis and assessment including the difference between probability and frequency.
What type of hazard carries highest risk of death on UK population?
Gas explosion, flying, strike by lightning, road traffic accident.
The risk criteria can be demonstrated by risk “carrot” which represents graphically three level of risk, intolerable, ALARP (As Low As Reasonably Practicable) and negligible. Intolerable risk is not acceptable in any circumstances except in extraordinary situations and must be reduced. The ALARP region, in which the amount of risk reduction can be demonstrated by using cost benefit analysis CBA. In the negligible risk region, no need to demonstrate ALARP but it still requires monitoring to ensure that it does not increase over time.
A risk is ALARP when there is a
• gross disproportion of cost of improvement against safety benefit gained
• i.e. when everything reasonably practicable has been done to minimise risk

Demonstration of ALARP: through QRA quantitative risk assessment, it requires carrying out cost-benefit analysis to test effects of various risk measures - does the benefit justify the cost?
Remember, this only applies in the region below ‘unacceptable’ i.e. in ALARP region. In unacceptable region, actions must be taken whatever the CBA.
What constitutes ‘reasonable’ or ‘gross disproportion’ is subjective (and may be a matter for the courts).
Judgements can be helped by cost-benefit evaluation, based on the Value of Avoiding a Fatality (VAF).
VAF = ‘amount prepared to spend to save a life’
What is Risk Assessment?

Risk assessment is a process that allows organisations to understand risks, defining acceptable levels of risk, risk criteria and reducing risks by proposing risk mitigation.

- Risk assessment:
  - forces us to apply our experience and think about what might happen, in an open-ended way
  - focuses attention on the high risk areas, to set priorities for control
  - provides an informed basis for decisions and an auditable trail

It is important to understand, why the need to assess risk? And also how to assess risk? And not rely on good design, expertise, tried-and tested rules ... ? It is important for each organisation, industry to understand the risk that its workers are exposed to from its operation, what type of risks the organisation is posing on the surroundings and to the success of their own operation. The risk assessment should be conducted for every organisation since every risk situation is different and design standards and rules cannot cover every design or operational process.
### Criteria For Good Risk Analysis

<table>
<thead>
<tr>
<th>Comprehensive</th>
<th>Exposure of assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherent to evidence</td>
<td>Compatible with Legislation and accepted norms/standards</td>
</tr>
<tr>
<td>Logically sound</td>
<td>Conducive to learning</td>
</tr>
<tr>
<td>Practical</td>
<td>Understandable, sensitive to perceptions of risk</td>
</tr>
<tr>
<td>Open to evaluation</td>
<td>Innovative</td>
</tr>
<tr>
<td>Cost Benefit analysis</td>
<td></td>
</tr>
</tbody>
</table>

The risk assessment approach is different for different industries and types. To ensure that risk assessment analysis is appropriate, the list presented on the slide should be demonstrated.
Risk assessment methods

- Qualitative
  - e.g. subjective ranking using Boston Squares

<table>
<thead>
<tr>
<th>Potential Severity</th>
<th>Frequent</th>
<th>Occasional</th>
<th>Remote</th>
<th>Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>High Risk (6)</td>
<td>High Risk (5)</td>
<td>High Risk (4)</td>
<td>High Risk (3)</td>
</tr>
<tr>
<td>Critical</td>
<td>High Risk (5)</td>
<td>Medium Risk (4)</td>
<td>Medium Risk (3)</td>
<td>Medium Risk (2)</td>
</tr>
<tr>
<td>Moderate</td>
<td>Medium Risk (4)</td>
<td>Medium Risk (3)</td>
<td>Medium Risk (2)</td>
<td>Low Risk (1)</td>
</tr>
<tr>
<td>Minor</td>
<td>Medium Risk (3)</td>
<td>Low Risk (2)</td>
<td>Low Risk (1)</td>
<td>Low Risk (0)</td>
</tr>
</tbody>
</table>

- Quantitative
  - e.g. Monte Carlo simulation

The risk assessment can be carried out using: a) qualitative b) quantitative method.
The qualitative method is normally carried out in preliminary assessment where risk ranking is sufficient to help in decision making and where the data for analysis is subjective. A Boston square method could be adequate for assessing such risks.
The quantitative method is used where qualitative assessments indicate a significant number of risks in a system, and uncertainty in data is great, hence there is a need to prioritise risk reduction or mitigation work using more robust techniques, especially when significant levels of spending are required. Firstly the qualitative approach will be explained, nevertheless the main stages apply also to the quantitative approach.
The qualitative risk assessment approach is based on identifying threats/hazards and consequence, and evaluating the estimated risks from the perceived likelihood and consequence of each.

Simple qualitative classification into categories such as “High”, “Medium” and “Low”, can be utilised to categorise the likelihood and consequence of a given event.

The evaluated risk can then be categorised using the “Boston Square” method. The Boston Square approach has the advantage of relative simplicity but is very subjective and open to bias.
The general risk assessment follows several tasks, these will next explained. Define Risk Criteria. The risk criteria will need to be defined in order to be sure what criteria will be used to judge the tolerability of the predicted risks. There are several options that must be considered, mainly, general principle of risk control, the risk envelope, average or peak risk, measure of risk, and values of risk limits. The best option should be considered and applied, taking into consideration the various regulatory regimes under which the ALARP system will operate.
The examples of risk criteria are shown on the slides. From these only human health & safety and operation/business will be considered since cultural behaviours cannot have significant impact on the remaining risk criteria within the framework of the IMPACT project.
It is essential to define precisely the physical and operational boundaries of the assessment and should encompass the operational processes of the system and their interfaces with the surroundings.
The next step is aimed at identifying threats/hazards associated with the system under investigation including any existing controls. The success of any risk assessment depends on comprehensive identification of these potential hazards/threats. Hazard identification means establishing what could go wrong with the site, transport hub system or procedure being considered. Therefore, there is a need to identify all the ways in which the hazards will affect people and assets and their protective procedures/systems involved may fail, either through malicious activities or through human errors. Unfortunately, it is often easier said than done, to ensure that all the hazard/threats have been identified. It is challenging to ensure that all the vulnerabilities have been correctly identified and to prioritize the right ones. Threats/hazards can fall into two categories:

1. **Internal threats/hazards** - Hazards intrinsic to the organization or activity under consideration;
2. **External threats/hazards** - Hazards imposed by external factors.
Hazard Identification Techniques

A variety of more or less formalised hazard identification techniques have been developed to ensure that identification is as comprehensive as possible, these include:

- **Pre-defined checklists** - These are simple, quick and easy to apply, but have the danger of limiting the range of thought - if a hazard is not on the checklist the assessor may not look for it.

- **Structured techniques based on group sessions such as Hazard and Operability Study (HAZOP) or Failure Mode and Effect Analysis (FMEA)** – these are more thorough, time-consuming and more costly approaches.

- See for example IEC 61882:2001 “Hazard and operability studies (HAZOP studies) - Application guide”

- **Risk log**

The hazard identification techniques have been developed over the years. They vary between methods based on checklists and structured elicitation techniques. The checklists are simple and are more applicable to simple assessment or repeat assessment. The advantage of a group session is that the interactions between participants with differing experience and expertise tend to promote broader thinking, and take better account of the interfaces between subsystems and activities. Such sessions can also have more immediate and wider benefits in terms of the overall safety, security or cultural behaviour, by promoting awareness of existing hazards and understanding of differing viewpoints.

Risk Log : To help in identification and assessment of hazards/threats, a technical risk log should be established in the form of a database. This should contain the assets name/number hazards affecting it, owner of the asset etc. With this log, it is easier to manage any changes to such assets and threats as they change over time.
It is necessary to estimate the risk for each hazard identified, keeping the results for each risk type separately (e.g. financial, health & safety, technical). The scales for likelihood and consequence and hence risk are assigned here for illustration purpose.

Assess probabilities. To assess the probabilities of initial hazardous events, an analysis of historical data applicable (e.g. from the accident database of the European Railway Agency) to the given situation should be carried out, or in the event of very limited data, formalised techniques of elicitation of expert judgement could be applied. Alternatively a fault tree analysis (using component and human reliability data), when a combination of failure events is required, may be applied.

Assess consequences. The consequence of the postulated accidents will be assessed considering the transient behaviour of the processes involved. The consequences leading to worker fatalities and different degrees of injury must be considered.
Metric of Likelihood and consequences of a Hazard

<table>
<thead>
<tr>
<th>Scale of Likelihood</th>
<th>Likelihood of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly probable/Likely</td>
<td>10</td>
</tr>
<tr>
<td>Medium/Possible</td>
<td>5</td>
</tr>
<tr>
<td>Low/Remote</td>
<td>2</td>
</tr>
<tr>
<td>Negligible/Unlikely</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Consequence on assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>High/Severe</td>
<td>Irreparable harm to the company (1) may result in the highly costly loss of major tangible assets or resources; (2) may significantly violate, harm, or impede an organization’s mission, reputation, or interest; or (3) may result in human death or serious injury.</td>
</tr>
<tr>
<td>Medium/Major</td>
<td>Significant harm (1) may result in the costly loss of tangible assets or resources; (2) may violate, harm, or impede an organization’s mission, reputation, or interest; or (3) may result in human injury.</td>
</tr>
<tr>
<td>Low/Moderate</td>
<td>Moderate harm (1) may result in the loss of some tangible assets or resources or (2) may noticeably affect an organization’s mission, reputation, or interest.</td>
</tr>
<tr>
<td>Minor</td>
<td>Very unlikely to cause any harm to the company or caused injuries</td>
</tr>
</tbody>
</table>

The risk assessor can assign scale of values for the likelihood of hazard occurrence. An example of such a scale is shown on the slide. The likelihood of a hazard identified occurring is a function of probability of the resulting consequences being materialised and the possibility of the subject being exposed to it at a given location and time. The scale for the likelihood can be obtained from historical data or by data elicitation from experts.

The consequences as a result of a hazardous event can be different depending on organisation and transport hub activities. The risk assessor can assign the consequence severity level, here the scale presented ranges from value of 10 for severe level and value of 1 for a minor consequence. The consequence levels can be derived from historical data or expert elicitation relevant to organization operation.
When probabilities and consequences have been assessed it is necessary to evaluate risks and to assess them against criteria identified at the initial stages.
The risk can fall into:
- Low Risk (in Green) – can be considered as acceptable without review,
- Medium Risk (in Yellow) – Acceptable risk level but review is required by management and controls put in place,
- High Risk (in Red) – Risk reduction is required to acceptable level.

<table>
<thead>
<tr>
<th>Likelihood of threat(s)</th>
<th>Highly probable/Likely</th>
<th>10</th>
<th>20</th>
<th>50</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medium/Possible</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Low/Remote</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Negligible/Unlikely</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minor</th>
<th>Low/Moderate</th>
<th>Medium/Major</th>
<th>High/Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequences (severity) of RT associated threat(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
When assessing the risk, each aspect of risk e.g. financial risk, health and safety, environmental or reputational are evaluated separately, since each can have different metrics and as such cannot be added directly. For example, Environmental risk can be measured using loss of habitat, Health and Safety using mortality or degree of injuries and Financial risk using monetary value. Therefore, to be able to combine these different types of risk, the risks should be brought to a common metric e.g. monetary. Using simple approach based on Multi Criteria Analysis (MCA) could be sufficient to apply, to combine different types of risk.

Once the risk level is evaluated it will be assessed against defined risk criteria. For events exceeding the risk criteria, measures will be postulated for risk reduction /mitigation. The process to ensure ALARP (As Low As Reasonable Practicable) risks must be carried out during the assessment.
For risk in excess of risk criteria, measures to meet the risk limit, a mitigation should be proposed and the risk assessed again, to check on the effectiveness of the mitigation suggested. The concept of mitigation is presented on the slide. For each hazard, a prevention system should be put in place. When the prevention fails, a detection system should be activated and prevent the consequence. If it fails, a risk of system failure occurs.
Risk is the product of likelihood and consequence. Thus, to reduce the risk one can reduce the likelihood of risk (frequency of occurrence) or changing the system design to reduce the impact. The other options are as shown on the slide include:

- improving the ability for recovery from an occurrence;
- transferring the risk to another entity (e.g. an insurance company).

The mitigation proposed should be investigated and recorded for future reference.

The graph shows the cost of rectifying unacceptable risks at different stages of the project.
Quantitative risk assessment may be more appropriate in several circumstances, including:

- when there are concerns that significant hazards may be overlooked by qualitative approaches;
- where there may be uncertainties over the likelihood or consequence (or both) of a system going wrong and where quantifying these may reduce uncertainty;
- where qualitative assessments indicate a significant number of risks in a system, hence there is a need to prioritise risk reduction or mitigation work using more robust techniques, especially when significant levels of spending are required.

Examples of appropriate techniques:

- Monte Carlo sampling methods;
- Direct integration methods;
- Fuzzy logic

The more detailed risk assessments may be based upon a scenario approach or be based upon Monte Carlo (MC) simulation (probabilistic systems assessment (PSA) approach) taking advantage of qualitative data and quantitative inputs and assessments.

In such methods the risk is derived directly from a ‘complete’ representation and modelling of the overall system under all possible operation conditions. In these methods, the probability of any particular event and any associated uncertainty is implicitly accounted for in the distribution of possible values assigned to its inputs see below.
Overall risk assessment based on Monte Carlo simulation provides a method for dealing with the uncertainty and variability in data and model parameters. In such an approach the system under investigation is represented by models of the processes involved. In the above example, the risks are identified by brain storming and mapped using risk register. The deterministic model of the system is established and verified, uncertain parameters are then identified and elicited. The system is then run in stochastic mode providing results in a statistical form, see output graphs in the slide.
An illustration of a stochastic risk model is shown on the slide. In this case, risk is derived directly from a ‘complete’ representation of the system under all possible conditions. In these methods, the probability of any particular event and any associated uncertainty is implicitly accounted for in the distributions of possible values assigned to its inputs.

Uncertainty can be analysed using Monte Carlo approach, this process typically involves the development of a stochastic system representation of all the interacting processes. This model would be run many times, sampling its inputs from specified distributions of parameter value ranges. The results from this stochastic model must then be statistically analysed to ensure the results from the model are converged, to produce the output distribution and risk calculations.

An example of commercial tools for risk model development:

@Risk from Palisade Corporation
Oracle Crystal Ball
Data Requirement

- Data collection is needed for the analysis of risk assessment that will be required i.e. system description, operational procedure, likelihood estimation etc. Data collection and analysis is a major task in any assessment and it is particularly important for the successful completion of a Quantified Risk Assessment (QRA).

- The data requirements range from specific enterprise operation to simple system process operating diagrams, including historic data required to establish frequencies of failures and accidents. Data may be required on human behaviour and reliability as well as system reliability. Appropriate data should be collected and if hard data is not available then data elicitation should be initiated.

- The quality of the risk assessment relies on the quality of the data collected.

The risk methodology relies on data values from historical recorded events, data elicited from experts (covering expertise on risk assessment, involved transport modes, human factors and behaviours, psycho-social, socio-economic, medical, etc.). It is suggested that this data collection will include:

1. Hazards and threats applicable to cultural behaviour.
2. Likelihood of occurrence (per agreed scale).
3. Consequence magnitude (per agreed scale).

The elicitation can be conducted with individual experts separately or by means of group elicitation.

The advantage of a group session is that the interactions between participants with differing experience and expertise tend to promote broader thinking, and take better account of the interfaces between subsystems and activities. Such sessions can also have more immediate and wider benefits in terms of the overall safety culture, by promoting awareness of existing hazards and understanding of differing viewpoints.
Risk management is a process which must be considered throughout the life of a project and life cycle of system operation. It is required to ensure that the control measures put in place are effective: to this extent the process is required to be supervised and reviewed periodically.

The monitoring of the operation should ensure that controls put in place are effective and used when new equipment or/and processes are introduced and are recognised and appropriate risk management controls are applied.

Since the risk is a function of time, the status of risk must be monitored and if changes occur, evaluated. The overall cycle of risk management must include these time dependent changes and QA.
The cultural risk assessment is applied to three transport hubs, mainly:

a) airport hub,
b) railway hub
c) sea-port hub.

The characteristics of such hub is presented later.
“Culture”, taken in its broad, ethnographic sense, is that “complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society.”

[Culture] is the collective programming of the mind which distinguishes the members of one group or category of people from another.” (Hofstede 1994).

In the IMPACT project, we will refer to the classical definition of “culture” reported in Tylor’s essay on Primitive Culture: “Culture”, taken in its broad, ethnographic sense, is that “complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society.”

We will also refer, more in general, to the more recent and broader definition by Hofstede: “[Culture] is the collective programming of the mind which distinguishes the members of one group or category of people from another.”
TRANSPORT HUBS CONSIDERED

- Airport terminal hub
- Railway hub terminal
- Sea port terminal

ASSUMPTIONS

- only cultural behaviour hazards will be considered,
- a safety case or similar for the specific hub is available,
- list of general behaviour hazards is available or can be generated.

The cultural risk assessment for three transport hubs considered here are airport terminal, railway terminal and sea port terminal. The characteristics of these terminals will be discussed later. When dealing with cultural behaviour risk assessment several assumptions must be first established. Here only cultural hazards in specific terminals are considered, excluding any technical or operational generated hazards. To help with the scope and to limit the assessment, a safety case of the transport hub will be required when dealing with specific hub assessment. To help in generating cultural behaviour hazards a list of general behaviour hazards will be required.
When considering the risk assessment approach in the context of cultural behaviour CB, it is necessary to establish how human behaviour is adding to a risk situation or/and modifying any consequence of specific hazard. Once assessed, the risk methodology can proceed in a standard way, specific to a given transport hub. The task of general risk assessment methodology affected by cultural behaviour hazards is shown in orange colour on the slide.

**Define risk criteria** – this task is not affected by cultural behaviour (CB) hazards/threats, and must satisfy the general risk criteria for the assessment.

**Define system boundaries.** Defined earlier is also independent from CB.

**Identify threats/hazards.** The CB can introduce new hazards/threats, this is also discussion later.

**Assess probabilities.** The probabilities of CB hazards must be estimated. These may be estimated from historical data or using expert elicitation. Alternatively by using fault tree analysis (using component and human reliability data), when a combination of failure events is required, this is will be presented later.

**Assess consequences.** The CB generated consequences must be analysed and evaluated using historical data, expert elicitation or modelling for more complex systems and processes, e.g evacuation from terminals using deterministic or stochastic models (see below).

**Evaluate risks.** The CB risks can be estimated using Boston square techniques as described earlier or by complex modelling outlined earlier.

**Assess evaluated risk against criteria.** This process is performed as for general risk assessment presented earlier.

**Management and monitoring.** The CB aspects must be identified and reviewed as necessary. **Mitigation and risk control.** The CB related risk above negligible must be reduced by mitigation process and then controlled as per management and monitoring task (see later).

The risk assessment including cultural behaviour is described in the next slide.
Two cases to consider:

**Cultural behaviour modifying already analysed risks**

1. Extract from a hub safety case document, current hazards - likelihood - consequence - risks
2. For each extracted hazard in turn, assess whether it is going to be modified by cultural hazards
3. If the hazard is perceived to be modified reassess the risk
4. If not consider next hazard.

**Cultural hazard leading to new risks**

5. Using the cultural hazard list elicit whether these can lead to any new consequences.
6. If it is considered that new consequence can be developed, assess it.
7. If it is not, then consider next hazard from cultural hazard list.

The type of cultural assessment approach required is based on the stage or type of assessment required. When the cultural risk assessment follows general risk assessment, then it is necessary to consider cultural hazards and how these will modify already evaluated risks. When cultural hazards lead to new risks, the likelihood and consequences from the new hazard must be evaluated from first principles.
Culture and threats/hazards in transport hubs

• Here we consider
  - Cultural behaviours modifying already analysed risks
  - Cultural hazards/threats leading to new risks
• Analysing past events it is possible to identify the most common threats and hazards in which culture can play a role (Link to lesson 3.3)
• Analysing transport hubs it is possible to understand the cultural mix and how cultural aspects can be considered when managing crowds (Link to lesson 3.2)
### Examples of hazards applicable to railway terminals

<table>
<thead>
<tr>
<th>Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger falls between stationary train and platform</td>
</tr>
<tr>
<td>Passenger falls from platform and struck by train</td>
</tr>
<tr>
<td>Passenger struck by / contact with moving train while on platform</td>
</tr>
<tr>
<td>Passenger struck/crushed by train while crossing the track at or near a station on a crossing</td>
</tr>
<tr>
<td>MOP (non-trespasser) struck by / contact with moving train due to being too close to platform edge</td>
</tr>
<tr>
<td>MOP (non-trespasser) falls between stationary train and platform</td>
</tr>
<tr>
<td>Exposure to fire on railway infrastructure at a station</td>
</tr>
<tr>
<td>Exposure to fire in a station not on railway infrastructure</td>
</tr>
<tr>
<td>Exposure to an explosion at a station</td>
</tr>
<tr>
<td>Passenger falls from platform onto track (no electric shock nor struck by train)</td>
</tr>
<tr>
<td>Passenger injury during an evacuation from a station</td>
</tr>
<tr>
<td>MOP (non-trespasser) falls from platform onto track (no electric shock nor struck by train)</td>
</tr>
</tbody>
</table>

Examples of generic hazards applicable to railway terminal is listed on the slide (not exhaustive). This should be assessed considering a cultural behaviour effect. Considering the first hazard- in this case it should be re-considered whether a passenger with non standard closing has a higher chance of accident from such incidence and/or higher injury consequence.
Cultural Consequences Assessment
Using Modelling

The case of crowd behaviour or evacuation from confined spaces is possible with existing evacuation models, where cultural characteristics can be evaluated using existing parameters e.g. individual speed. The speed of movement can be simulated by a range of parameters or by distribution in the event of stochastic model.

For a given hub, the evacuation model should be run:
• Firstly without human cultural behaviour, to ascertain the evacuation time, effect of different level of people in the terminal buildings, noticing if any pinch points inherent in the design cause any delays.
• Secondly the model should be re-run again with the same number of people but now with assigned cultural behaviour characteristics to given individuals, and recording the time to mustering to obtain the effect of cultural behaviour on risks.

Assessment of consequences of cultural-dependent hazardous behaviours is complex and only in a few simple cases is it possible to model with existing models. The evacuation models application for each hub will be different by the nature of design and usage.
The output from the elicitation of risk values must be checked for reality and outliers. Reality checks can be agreed in post elicitation session, outliers eliminated during result analysis.

The procedure for risk evaluation presented based on Boston Square method can be applied to evaluate each risk

$$Risk = \sum \frac{Risk_i}{N}$$

(where N is the number of experts)

For the more complex aspects of evaluating risk from a cultural behaviour point of view, the elicitation of cultural behaviour from experts could be applied and combined with more complex models. The simplest method of combining the results from individual experts is by giving all the experts and model results equal weight. These can be then aggregated using an arithmetic mean.
For each identified cultural behaviour hazard – risk exceeding the risk criteria level, risk controls must be identified which will reduce the risk to acceptable level.

The control measures to be considered require improvements in following areas:

- **Signage.**
- **Mustering points and evacuation routes**
- **Staff training**
- **Communication strategies**
- **Health treatments**

Examples of risk control applicable to hazards emanating from cultural behaviour are presented of this slide and are as follows:

- **Signage.** The risk manager must review signage position, their clarity and presentation, both for general use and during emergency e.g. evacuation.

- **Mustering points and evacuation routes.** The mustering points and evacuation routes should be identified and assessed for the ease of movements of the passenger, public and staff.

- **Staff training.** The staff must be trained in identifying passengers’ stress levels, different cultural behaviour and human psychology.

- **Communication strategies.** Communication strategies shall be adapted to the cultural groups that are expected to transit across the considered hub.

- **Health treatments.** In case of emergencies with mass casualties with multi-cultural passengers, it is necessary to adopt culture-specific measures. Moreover, in the case of disasters with adverse psychological consequences on passengers, it is necessary to consider specific measures for ethnic minority individuals, having difficulty in accessing mental health care.
The procedure described in the slide is a general risk management procedure for review and supervision of the risks in an organisation as well as in transport hubs. This general process is augmented by cultural behaviour processes as indicated, i.e. risk assessment and review processes are mostly affected.

This process should be implemented and be continuous throughout the life cycle of hub operation. Monitoring, revision and feedback must be effective to ensure that the implementation process is working. Any changes in the system or control process must be reassessed and risk re-evaluated.
Cultural Risk Assessment CBT

Lesson 2 - The complexity of different transport hubs and the factors affecting them in view of a cultural risk assessment
Objectives of the lesson

- The current lesson presents the complexity of different transport hubs considered here (air terminals, railway stations and ports) and the factors affecting them.
- Each hub is considered here from different points of view (geo-location, vulnerability and external events, service time, design and layout, mix of users etc.) and where possible their impact of cultural behaviour.
To assess cultural risks it is necessary to model passengers’ behaviours that depend on culture, in realistic hazard conditions, e.g. evacuation from a hub, fighting for resources when stranded in a hub, etc.

To model passengers’ behaviours it is necessary to characterise the typical mix of passengers in a hub, according to a cultural clustering.

To characterise the cultural mix of passengers it is necessary:
- to describe the hub characteristics from the psycho-social point of view and the impact on passengers;
- consequently, to understand how to indirectly compute or infer the passengers’ cultural clusters.
Transport and Communication are the key components (both cause and effect) of economic growth and social relationship by exchanging goods and services. Travelling people, regardless of the scope: Commerce, Trade and Business, Works or Study, Leisure constantly interchange and deal with “cultures” among them and among the visited countries. Transport and particularly public transports are in an era of unprecedented growth and important changes. Understanding the impact of cross-culture attributes of travellers is crucial for any transport organization for reducing the risk that cultural interchange could verge into cultural clash, seeking to assure improved and safer services.
Diversity of cultures and behaviours is part of actual life and a real risk factor. Psychological and anthropological studies extracted theoretical and practical patterns of socio-cultural people behaviours. Planners often ignored or underestimate cultural aspects in human behaviour. "Universal" criteria and values are not effective in organising and managing people of different cultures. These patterns can direct and guide organizations in risk assessment and emergency for transport hubs.

It’s a given that diversity of cultures and complexity of cultural differences is part of actual life and a real risk factor. Planners often ignored or underestimate cultural aspects in making risk assessments and organizing emergency and recovery plans. It is not effective to apply “universal” or standard criteria and values in organizing and managing people of different cultures.

Many psychological and anthropological observations and studies, have registered and extracted interesting theoretical and practical patterns of socio-cultural behaviours of people, or of homogeneous groups of people, when they are facing normal or upset conditions. These patterns can orient and guide organizations in risk assessment and emergency management for the hazard events that can occur in any hub of transport modes.
In a risk assessment approach, to evaluate the frequencies of event and the consequences of the events that can happen in a hub, it is necessary to consider:

- the typology of asset considered, (in this case an air hubs, a rail hubs and ferry hubs)
- the main hazards or threats
- The behaviours of people involved
- The organization in charge of asset safety management

Basically the organization of an hub is founded on a Management hierarchical structure, a set of available tools and equipment, an operational staff with different (and adequate) skill and preparedness, in charge of the required tasks.

In conventional risk assessments, the behaviours of people are basically considered as uniform, or, in same cases, within a range of values, not directly related or driven by an actual cultural mix of people.

How culture can influence the safety targets.

- The organization itself, is influenced by the prevalent culture of the country.
- The diversity of each person produces a “cloud” of individual needs, actions and reactions, in many cases different or conflicting.

However, individuals of the same culture are recognized to present quite homogeneous behaviours, facing some event or situations. Grasp these groups or these “cultural clusters” in the people (passenger in these cases) concerned, and to assign them “cultural consistent” behaviours, allows to appreciate the impact of an actual mix on risks.

The awareness of the incremental risk should guide organizations to adapt structure, tools and staff preparedness to mitigate the risks.
The structure of transport hubs and terminals embraces all the strong differences in technologies of transport mode (vehicles and infrastructures), in the type and volumes of travellers, and is the direct consequence of commercial, operational requirements and constraints dictated by their location in a territorial and social context.

The design of terminals must follow specific national and international standards and rules adequate to provide comfort for passengers, safety, security and the “best possible” level of service.

The shape reflects also historical reasons or aesthetic choices, as well as the possibility to be expanded and to grow.

In addition, different structural concepts adopted even for terminals for the same transport mode;

- Airports may have different basic conceptual layout, like: Linear, Pier, Satellite concept, or in some cases, a mix of them.
- Railways stations usually follow the “terminus” scheme.
- Maritime terminals for ferries are a quite homogeneous shape but are bounded by waterfront and wharfs layout, and they need large square in front slip for passenger’s cars.
Basic common elements exist, quite independently from the transport mode.

Three basic sections are recognized, based on the functions assigned to each section and on the kind of people that are normally present at any time.

- **Technical areas**
  - Terminals/hubs basic structure

- **Public Shared areas**
  - Shared areas: Visitors + Passengers

- **Public Restricted areas**
  - Restricted areas

In spite of the diversity, for the scope of the project tasks and, it is possible to grasp and identify in any hub/terminal a set of basic common elements, quite independently from the transport mode.

At very macroscopic level, it is possible to recognize three basic sections, based on the functions assigned to each section and on the kind of people that can be normally present in any time: Technical areas, Public Shared areas and Public Restricted areas. In technical areas, public access is strictly forbidden and prevented (e.g. apron, tracks, control rooms, etc.), by physical barriers or alerting signs.

Public Shared areas (uncontrolled) are available and usable both for passengers and visitors (meeters - greeeters, well-wishers or simple users of common services offered inside the terminal). In these areas, any person can enter, move, exit, use any available facilities or service, without obligations or restrictions and often, without any specific control.

In Public Restricted areas (controlled) a person shall enter, move, use any available facilities or service inside, only if owner of a valid travel certificate, or permit to travel. Public Restricted areas are mainly composed by: checkpoint areas for tickets or identity, security control, where required, an area for departing and arriving passengers; an area where the vehicles dock and stop for loading passengers and areas for embarking and disembarking passengers.
In technical areas, public access is strictly forbidden and prevented (e.g. apron, tracks, control rooms, etc.), by physical barriers or alerting signs.

Public Shared areas (uncontrolled)
Area for entrance/exit, available and usable both for passengers and visitors (meeters -greeters, well-wishers or simple users of common services offered inside the terminal). In these areas, any person can enter, move, exit, use any available facilities or service, without obligations or restrictions and often, without any specific control.

Public Restricted areas (controlled)
In these areas, a person shall enter, move, use any available facilities or service inside, only if owner of a valid travel certificate, or permit to travel.
- Checkpoint areas for tickets or identity, security control, where required
- An area for departing and arriving passengers
- Area where the vehicles dock and stop for loading passengers
- Areas for embarking and disembarking passenger
In the context of a culture risk analysis and assessment we can find out “MAIN CRITICAL AREAS”, the areas where the consequences of any hazards, emergency, upset events or even unusual conditions,
• could be potentially amplified by differences in culture,
• the cultural behaviour can be a trigger of hazard events.

“FIVE CRISIS FACTORS” criteria:

1. **Competition for resources** when there is loss of availability of something people needs: space, (for moving, or standing), food, beverage, rescue or medical care, etc. Mostly, competition is between passengers.
2. **Dependency of people upon others**. That means loss of full autonomy of an individual in performing tasks or reaching a goals where, instead, cooperation or good harmony is necessary. Mostly, dependency is between passengers and passengers and staff.
3. **Misunderstanding or ambiguity about the events**, producing different reaction time, different perceptions of events, messages, orders,... Mostly, misunderstanding is between passengers and passengers and staff.
4. **Communication barriers** Any fact preventing full communication, i.e. different languages in exchanging messages. Mostly, barriers in happens between passengers and passengers and staff.
5. **Unintentional / intentional clashes of personalities, behaviours, habits**, Mostly, clashes or conflicts are between passengers. Less frequently but possible between passengers and staff.

It will be possible to identify and rank the potential criticality of combinations AREAS – CONDITIONS based on a “a priori” evaluation of “vulnerability” or “sensitivity” to the culture driven behaviours of involved entity (passenger, visitors, staff).

However the “a priori” level of criticality of any combination will change when considering: the real mix of culture present inside the terminal at the given moment, the actual hazard event or threat, the type of terminals/hub under study: airports, seaports and railway stations.
### Hub areas and intrinsic risks and mitigations for passengers

<table>
<thead>
<tr>
<th>Area</th>
<th>Risks</th>
<th>Mitigations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical areas</td>
<td>Faults in equipment and tools can generate hazards. Technical areas can be the target of human threats (terrorism, sabotage, etc.)</td>
<td>Passengers are normally confined far away from these areas.</td>
</tr>
<tr>
<td>Public Shared areas</td>
<td>Having free access these areas are prone to human threats and also to frictions between different cultural groups</td>
<td>Evacuation and intervention of rescue services are normally assisted by the large numbers of exits/entrances</td>
</tr>
<tr>
<td>Public restricted areas</td>
<td>The unevenly distributed occupant density (e.g. the retail areas are more crowded than the passenger waiting areas) can increase the complexity of evacuation.</td>
<td>Limiting the access to ticket owners and - normally - passing passengers through security checks reduces human induced hazards and threats. More trained staff is usually present in these areas</td>
</tr>
</tbody>
</table>

This table represents a synthesis of the possible intrinsic risks and related mitigations for the different areas of an hub having in mind the cultural hazards and threats described in the following lessons.
Geolocation, Vulnerabilities to external events impact on passengers services

**Geolocation**

Because of the large space they need and their environment impact, airports hubs are sited, with minor exception, at the periphery of urban areas. The distance from City centres ranges between 10 and 50 km.

Many cities (e.g. London, San Francisco, Paris, New York) are serviced also by another airport, but usually within a range of 100 to 150 km.

**Main impact on passengers**

Long time to reach and leave the terminals.
Few alternative for travellers to reach the required destination by changing transport mode or airport.

**Vulnerability to external events**

Aviation is greatly influenced by natural climatic events.
Thunderstorms, snow, wind, fog, volcanic ash, temperature and pressure extremes, impact severely the service availability of flights and hubs.
More frequently, problems arise mainly from service disturbances (e.g. failures, strikes) in connecting networks.
The distances from large agglomerations, contributes to preserve airport from other cities major troubling issues.

Flight cancellations or relevant delays.
Miss of connecting flights, Prevention of normal streaming out of arriving passengers
Stranded and bothered people for a relevant period of time.

Weather condition cause approximately 70 % of the delays in the US.
More frequently, problems arise mainly from service disturbances (e.g. failures, strikes) in connecting networks.
The distances from large agglomerations, contributes to preserve airport from other cities major troubling issues.

**Main impact on passengers**

Flight cancellations or relevant delays.
Miss of connecting flights,
Prevention of normal streaming out of arriving passengers
Stranded and bothered people for a relevant time, also overnight.
Other impacts on passenger services

Service time
Most large hubs (mainly transit airports) are open 24/7/week (usually not all the terminals of the hub), even often with reduced services. Ticketed passengers are allowed to stay overnight in case of flight cancellations or delay, long layover, early morning flights or, simply, because cheaper for young backpackers. However, security reasons can curfew operating hours and the airport can be closed to public overnight.

Main impact on passengers
Spend the night in airport is a general discomfort for all travellers and a extra duty for staff. Possible annoyance feeling among people.

Design and Layout
Stringent criteria from international regulations (e.g. ICAO, FAA) and national rules cover any aspect of facilities design, aiming to provide safety and comfort (e.g. n° of seat, rest rooms, climate control, shops, bars) facing passenger flows and density in normal and peaks hours. Airports present a strong separation between landside, terminals areas, airside and a clear segregation between secured and non-secured areas (by ticket control and security check).

Physical barrier, alarmed doors, signage, staff control, prevent unintentional access to technical areas and apron.

Non-cabin baggage follows an inbound/outbound path, separate from passenger. Collection at baggage claim carousels is left to passenger discretion.

Main impact on passengers
In normal condition, airports are the most comfortable places for staying during the travel. Segregation and clear delimitation of areas and passenger flow minimize the event of unintentional intrusion in dedicated areas.
SOCIO-CULTURAL CHARACTERISTICS

PASSENGERS
The mix is a complex function and time dependent of many interrelated variables:
• The Origin and Destination (O&D) of flights. Presence (and proportions) of domestic, international and intercontinental traffic. The extent of non-scheduled arrivals/departures
• The main scope of passenger travel: business, leisure, others (pilgrimages, sport events, expositions, ...).
• The total time duration of the travel: commuters, short-haul – medium - long-haul travellers
• The familiarity of passengers with airport and air travel: frequent flyers - occasional travellers
• The time frame: Peak hours - Working days - Week end - Holydays
• Number of Legacy and LCC carriers operating at the airport or charter flight

VISITORS
Frequently are meeter-greeters and well-wishers, rarely are the local residents using common offered services in shared areas. Occasionally are participants to congress, or businessman using dedicated meeting halls inside the airport or in the neighbourhood.

COUNTRY
The GDP of the country where is located the air hub has a limited direct influence on socio-cultural typology of people
As synthesis of the previous analysis of air hubs it is possible to identify intrinsic cultural risks and related mitigations.

The airport hub characteristics that may increase likelihood and/or consequences of culture-induced risks are the following:

- If a risk of limited operations materialises, passengers have normally few travel alternatives to leave the airport and continue their journey and thus remain stranded
- Given the recent series of terroristic events, even insignificant behaviours may easily generate panic
- When a hazard or a threat materialises, evacuation and intervention of rescue forces are - especially with old hub design - complicated by the relatively-limited number of exits/entrances
- During an evacuation, poor good design of signage and/or unclear loudspeaker announcements can decrease the evacuation progress
- The unevenly distributed occupant density (e.g. the retail areas are more crowded than the passenger waiting areas) can increase the complexity of evacuation.

The air-hub-related mitigations are the following:

- Passengers are security checked, minimising terroristic threats in public-restricted areas
- Some passengers' cultural data are known (sex, nationality, etc.) thus making culture-specific mitigation strategies more effective
- Airport staff are generally very well trained to manage emergency situations
- Airport hubs are generally designed for the easy movement of disabled and elderly
Geolocation
Many rail terminals were established in the 19th century and stations were systematically located out of the city centre. Today, passenger rail terminals are included in the city, occupy central locations and are often an important defining element of urban context. Main impact on passengers is the minimum time necessary to reach and leave the terminals.

Vulnerability to external events
As a whole, railway systems are quite resilient to climatic events compared to other mode of transportation. As surface transportation, many events can cause more or less severe disruption of train operations.

Snow, ice, wind, storms) can affect severely switches and conductor rails or catenary, especially in the morning hours. Flooding can affect rail infrastructure causing failures to signalling, communication, power distribution, rolling stock if low floor vehicles. Extreme heat can affect rail track integrity.

Rail hubs operation suffer from typical events or disturbing factors related to the urban agglomeration like surface traffic jams, nearby parking saturation, strikes in other any public transportation, strikes, demonstrations, protest marches or similar events, sport events, music concerts in the proximities of rail terminal.

Main impact on passengers: delay for departing passengers and possible missing train and/or preventing the normal streaming out of arriving passengers. However, the centrality of rail terminals makes it easier to find practical alternatives to reach the final destination or to spend the waiting time outside the terminals.

Service time
Traditionally, large part of main railways stations were open 24 hours, 7 days a week. Overnight, when there is no train traffic, and public services are closed, many areas of the railways station were accessible to any person. During the day, petty crimes such as muggings, bag snatching and pickpocketing are sadly common, especially in tourist areas, during the night the spaces of stations often become one of preferred site of lowlife, pushers, drug-addicted, of other illicit activities. Closing or leaving open rail station overnight is still an open and debated question, mainly for humanitarian considerations for homeless refuge in cold winter.
Control/Surveillance
Railway hubs and terminal have a long history of passenger freedom of move, without restrictions or controls unless validation of tickets. This aspect still remains a feature of rail transport. As consequences of a quite recent history of terrorist actions on railway several project and initiative, at national and international level, tackled the problem, proposing idea or solution for enhancing security.

The passenger freedom of movement is a feature of railway stations.

Recent terrorist actions on railway stations have increased the level of surveillance even if the level of control remains basically low.

Main impact on passengers

Control and security measures do not increase significantly the time to get the railway station.

Annoyance for random control.

Possible complaint for privacy violation. Increased suspicion among passengers.

In paid areas unusual queuing time at check points

Annoyance for systematic control.

The absence of barriers between platform, track and trains is a source of many hazards for travellers and meeter greeters.

Discomfort for travellers crossing other passengers in platforms, with heavy or many baggage.

Design & Layout

The station area can be divided into an "unpaid area" and a "paid area". For High-Speed lines also baggage control is possible.

The passage between unpaid and paid area is often controlled by agents or turnstiles.

Passengers will take care of their own safety when walking on platforms or waiting for trains. Only sign (yellow strip) or public announcement can prevent rail – trespassing.

Main impact on passengers

• New control and security measures do not increase significantly the time to get the railway station before boarding the train.
• Longer queuing time at any check points
• Annoyance for random control
• Possible complaint for Privacy violation.
• Increased suspicion among passengers.

Control/Surveillance

Railway hubs and terminal have a long history of passenger freedom of move, without restrictions or controls unless validation of tickets. This aspect still remains a feature of rail transport. As consequences of a quite recent history of terrorist actions on railway several project and initiative, at national and international level, tackled the problem, proposing idea or solution for enhancing security.

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Annoyance for systematic control.

The absence of barriers between platform, track and trains is a source of many hazards for travellers and meeter greeters.

Discomfort for travellers crossing other passengers in platforms, with heavy or many baggage.

Design & Layout

The station area can be divided into an "unpaid area" and a "paid area". Some railway operators maintain "open stations" concept, which allow passenger and visitors to wander at will, without a ticket and tickets can be purchased on the train. Nowadays, in most large rail terminals, the passage between unpaid and paid area is controlled by agents or turnstiles.

In railways, it has been assumed that passengers will take care of their own safety when walking on platforms or waiting for trains.

Only sign (yellow strip) or public announcement can prevent rail – trespassing.

Main impact on passengers

The absence of barriers between platform, track and trains is a source of many hazards for travellers and meeter greeters.

Discomfort for travellers crossing other passengers in platforms, with heavy or many baggage they need to carry.
SOCIO-CULTURAL CHARACTERISTICS

PASSENGERS
The mix of passengers is, on average, close to the mix of the city, more than the country, where the terminal is located.
A significant part of travellers in large rail hubs, like Brussels, Amsterdam, London, Paris, mirrors the cosmopolitan traits of the urban agglomeration and related activities and business.
Relevant is the contribution of residential population as short-medium haul commuters and the proportions between scheduled departure/arrivals of domestic train and international train is high.
Trains with pilgrims, sport supporters, participants to motor shows, expositions, etc. may modify significantly but temporarily, the basic mix.
Relevant for the mix, is the scope of travel: business, leisure, the familiarity of passengers with rail travel (frequent vs occasional travellers) and the period of time: Peak hours - Working days - Week end - Holydays

VISITORS.
Mostly are local residents using common offered services in shared areas
Less relevant is the contribution of meeter-greeters and well-wishers.

COUNTRY
The country GDP, for large hub railway terminals, has a direct strong influence on socio-cultural typology of people served, both passengers and visitors.
Intrinsic cultural risks and mitigations in railway stations

- Railway hub characteristics that may increase likelihood and/or consequences of culture-induced risks
  - Given the recent series of terroristic events, even insignificant behaviours may easily generate panic
  - Freedom of access can increase the risk of uncontrolled friction of different cultural groups (e.g. hooligans)
  - The vicinity between the trains and the passengers can increase the likelihood of system hazards
  - Many EU railway hubs have old design, e.g. high presence of stairs and narrow tunnels making evacuation more difficult, especially for disabled and elderly
  - Complex old design making crowd control quite difficult
  - Signage (especially for evacuation) is generally not adequate for multi-cultural crowds
- Mitigations
  - If a risk of reduced operations materialises, passengers have normally many travel alternatives to continue their journey due to the position of railway station in town centres. This reduces the possibility of being stranded.
  - Evacuation and intervention of rescue services are normally facilitated by the large numbers of exits/entrances
  - The cultural mix of visitors is typically linked to the mix of the hosting town: police and rescue services (that are normally those in the hosting town) are used to manage the existing cultures

As synthesis of the previous analysis of rail hubs it is possible to identify intrinsic cultural risks and related mitigations.

The railway hub characteristics that may increase likelihood and/or consequences of culture-induced risks are the following:
- Given the recent series of terroristic events, even insignificant behaviours may easily generate panic
- Freedom of access can increase the risk of uncontrolled friction of different cultural groups (e.g. hooligans)
- The vicinity between the trains and the passengers can increase the likelihood of system hazards
- Many EU railway hubs have old design, e.g.
  - high presence of stairs and narrow tunnels making evacuation more difficult, especially for disabled and elderly
  - complex old design making crowd control quite difficult
- Signage (especially for evacuation) is generally not adequate for multi-cultural crowds

The rail-hub-related mitigations are the following:
- If a risk of reduced operations materialises, passengers have normally many travel alternatives to continue their journey due to the position of railway station in town centres. This reduces the possibility of being stranded.
- Evacuation and intervention of rescue services are normally facilitated by the large numbers of exits/entrances
- The cultural mix of visitors is typically linked to the mix of the hosting town: police and rescue services (that are normally those in the hosting town) are used to manage the existing cultures
MARITIME HUBS
Ferry
Geolocation
Differently from air and rail hubs, geolocation is not strictly related to a “recent” transport technology, but is closely connected with the long history of navigation at sea. Ferries service are usually a part of ports involved in other activity, cargo, fishing, cruise and marina. With some exception (Helsinki, Copenhagen, Dublin, Tallinn, Athens, Barcelona) large ferry terminals are not closed to main capitals or metropolitan agglomerations.

Main impact on passengers
Long time to reach and leave the terminals.

Vulnerability to external events
Ferry service is greatly affected by sea state conditions, tidal stream and by the atmospheric conditions, like frog, snow, heavy rains, that reduce visibility. In compliance with international regulations regarding safety, the ship speed must be reduced to prevent collision. Because Ferry carry cars and lorries, disturbances may derive from: Surface traffic jams, Nearby Parking saturation, Working progress on the connection roads. Strikes in other any public transportation systems.

Main impact on passengers
Almost no practical alternative for travellers to reach the required destination by changing transport mode when considering ferries. Possible long delay to access them.

Service time
Large ferry hubs, usually offer, by the operating companies, sailings 24 hours a day, and 7 days a week. The opening hours of restricted areas of terminals are consistent with the scheduled departure and arrival of ships time requested from boarding and disembark. The opening period of other area available for passenger and visitors depends from policies rules and/or security reasons. Same building facilities could be left open for exceptional reasons.

Main impact on passengers
Spend the night in a ferry hub is non usually allowed. For early morning departures, it is possible to sleep inside the ship, after the boarding.
Control/Surveillance

As the whole, areas of the ferry terminal is divided by barriers and fences, and entrances and exits gates are well signed and controlled by agents. The type of ticket control is similar to airports, even if it follow the tradition scheme of sea navigation for inbound – outbound routes.

For international route in addition to traditional border control (passport or check for allowance to carry products such as alcohol and tobacco), reinforced controls have been deployed in recent years; as a condition of entering this restricted area travellers, baggage and vehicle may be required to be submitted to a security search and screening.

Few terrorist attacks are reported on ferry ships, at least in most recent years. On February 27, 2004, was a terrorist attack that resulted in the sinking of a ferry and the deaths of 116 people in the Philippines’ deadliest terrorist attack and the world's deadliest terrorist attack at sea. Like those in train stations, mainly for deterrence, France introduced armed patrols in ferry ports. It is under discussion an extension of the patrols’ mandate on board, from port to port.

Main impact on passengers

New control and security measures do not increase significantly the time to boarding.

Service time

Large ferry hubs, usually offer, by the operating companies, sailings 24 hours a day, and 7 days a week. The opening hours of restricted areas of terminals are consistent with the scheduled departure and arrival of ships time requested from boarding and disembark.

The opening period of other area available for passenger and visitors depends from policies rules and/or security reasons. Same building facilities could be left open for exceptional reasons.

Main impact on passengers

Spend the night in a ferry hub is non usually allowed. For early morning departures, it is possible to sleep inside the ship, after the boarding.

Design and Layout

The design is based on operational requirements, driven by the needs and rules of maritime transport.

Main impact on passengers

Typical long waiting time in these areas, in bad weather condition may cause considerable discomfort. Serious hazard of false manoeuvres for private car drivers or trucks.
PASSENGERS
The mix is a function of many factors. The regional location of main routes departing from terminal: *e.g.* Nord Europe, Baltic sea, Mediterranean, Aegean sea.
The Inbound - outbound destination of routes: *domestic or international; Schengen or non-Schengen*
The passenger travel main scope: commuters, business, leisure, others, (sport events, expositions)
The proportion between passengers, passenger with car and trucks on board
The familiarity of passengers with sea port and sea navigation: *frequent sailors - occasional travellers*
The time period: winter - summer – working days - holydays

VISITORS
Mostly are local residents using common offered services in the terminal areas, if any: usually shop, boutiques, supermarket.
Usually not relevant is the contribution of meeter-greeters and well-wishers.

COUNTRY
The GDP of the countries connected, has an undeniable influence on the socio-cultural typology of people travelling by ferry and passing through ferry terminals but mainly only for commuters.
The large presence of holidaymakers or workers, like the drivers of trucks, bring this correlation less evident for certain routes
Intrinsic cultural risks and mitigations in seaports (cruise and ferry terminals)

• Seaport hub characteristics that may increase likelihood and/or consequences of culture-induced risks
  o Given the recent series of terroristic events, even insignificant behaviours may easily generate panic
  o If a risk of limited operations materialises, passengers have normally few travel alternatives to leave the port and continue their journey and thus remain stranded
  o Signage (especially for evacuation) is generally not adequate for multi-cultural crowds

• Mitigations
  o Seaports nowadays do not appear as a target for terrorism
  o For cruise ships and ferries, some passengers’ cultural data are known thus making culture-specific mitigation strategies more effective
  o Given the low frequencies of ships traffic (compared with rail and aviation), the presence of crowds in the hub is concentrated in specific time slots, making management more easy

As synthesis of the previous analysis of sea hubs it is possible to identify intrinsic cultural risks and related mitigations.

The sea hub characteristics that may increase likelihood and/or consequences of culture-induced risks are the following:
• Given the recent series of terroristic events, even insignificant behaviours may easily generate panic
• If a risk of limited operations materialises, passengers have normally few travel alternatives to leave the port and continue their journey and thus remain stranded
• Signage (especially for evacuation) is generally not adequate for multi-cultural crowds

The sea-hub-related mitigations are the following:
• Seaports nowadays do not appear as target for terrorism
• For cruise ships and ferries, some passengers’ cultural data are known thus making culture-specific mitigation strategies more effective
• Given the low frequencies of ships traffic (compared with rail and aviation), the presence of crowd in the hub is concentrated in specific time slots, making management more easy
Cultural Risk Assessment CBT

Lesson 3 - Culture and threats/hazards in transport hubs/stations
The objectives of this lesson are:

• to properly define threats and hazards and the boundaries of the cultural aspects in risk assessment
• to identify cultural behaviours amplifying or diminishing consequences of generic safety hazards or security threats
• to identify cultural behaviours triggering new hazards
• to provide examples of past events based on published news
Threats and hazards definition

• Threat
  o Anything that can intentionally exploit a vulnerability, and obtain, damage, or destroy assets or services, and/or harm or kill persons

• Hazard
  o Anything that can accidentally exploit a vulnerability, and obtain, damage, or destroy assets or services, and/or harm or kill persons

• Hazards and threats can be emanating from
  o internal to the system (hub)
  o external to system (hub)

In the context of the IMPACT project, we need to clarify the difference between threat and hazard.
A threat is defined as anything that can intentionally exploit a vulnerability of the hub, and obtain, damage, or destroy assets or services and/or harm or kill persons.
A hazard is defined as anything that can accidentally exploit a vulnerability, and obtain, damage, or destroy asset or a service and/or harm or kill persons.
The only difference is between the intentionality and the accidentality of the event.
Finally, Hazards and threats can be emanating from either internal or externally to the hub.
• Cultural aspects in risk assessment can be:
  o a possible amplifying or diminishing factor for general consequences
    > safety hazards
    > security threats
  o a possible trigger for new hazards
    > specific cultural behaviours

In risk assessment, specific cultural behaviours can either modify the consequences of either a generic safety hazard or a generic security threat or be a possible trigger for new hazards. As examples, in the former case, if someone wear traditional long clothes then he may slow down during an evacuation thus increasing its risk of being injured by a fire. In the latter case,
Cultural behaviours amplifying or diminishing consequences of generic safety hazards or security threats
Typically culture can play a role in the following situations:

- Evacuation of passengers.
- Stranded passengers
- Passengers in need of medical care.

The typical situations to be managed by the hub managers during emergencies in which culture can play a role can be essentially of 3 types.
Evacuation of passengers where specific cultural behaviours or characteristics may slow down the evacuation process.
Stranded passengers that may compete for resources (food, water, space, travel means, etc.), may start discussing for priorities in queues, etc. and cultural habits may lead to critical/unpleasant/unethical situations (for example a cultural group may tend to overwhelm another cultural group).
Passengers belonging to specific cultural groups in need of medical care.
The consequences of threats and/or hazards can be escalated by cultural factors. We are listing here some examples:

Traditional clothing of some cultures may slow down evacuation and therefore increase the number of injuries and fatalities.

Slow reaction time may as well increase evacuation time with potentially more injuries and/or fatalities.

Misleading or misunderstood communications or staff non-properly trained to manage multi-cultural crowds may also have an impact on evacuation time or, more in general, on the management of emergencies.

A hub that is not prepared to provide medical care to passengers with special needs can also potentially increase the fatalities in case of certain type of emergencies.

Finally, disasters may leave, often underestimated, long-term adverse psychological consequences on surviving passengers, especially on cultural/ethnical minorities if not properly treated.
The safety hazards can be categorised according to the displayed tree. The main distinction is between internal and external hazards. Internal hazards include both system specific and human-induced hazards while typical external hazards are environmental events, connection problems and special events like political meetings, sport matches, etc. In the following you will find some news related to safety hazards: by clicking on the corresponding image or the news itself, you can open in a new window the corresponding web source.

Here you can find some news related to system-specific hazards. In the following, by clicking on the corresponding image or the news itself, you can open in a new window the corresponding web source.
In all the presented news the common factor is that when the functionality of the hub is compromised then the main problem to be handled by hub managers are the stranded passengers. And when you leave hundreds of passengers stranded for hours, you may start to have peculiar - sometimes culture-dependent - behaviours to be carefully managed to avoid that they escalate to something more critical.
In both reported news, fire in an airport has generated stranded passengers and panic. But in the former case, the situation has been properly managed and no injuries or fatalities happened, while in the latter case a passenger decision that typically depends on the human safety culture, has led to 10 deaths. The example is reported since, since then, the Düsseldorf airport has changed its safety policies.
Design inadequacy for people's movement

- Record 4 million passengers use Delhi airport in May but domestic terminal 1D a traveller's nightmare
  - Chaos, confusion, heated exchange of words between passengers on one side and security personnel, airlines and airport staff on the other side

A poor design of a hub (like the Terminal 1D at the Delhi airport) can significantly increase the risk of cultural clashes. In this case, clash between passengers and both security personnel and airport staff has been reported. The consequences of these clash may sensibly vary according to the involved cultural groups.
Human errors

- Passengers trampled on at terminal in Malta
  - a glass door was closed due to fears over the number of passengers boarding
  - escalator was not switched off and passengers continued to pour into the narrow area between the top of the escalator and the door
  - trampling over each other amid panic and screaming

Human errors mixed with different reactions to emergency situations and panic and miscommunications may often generate serious consequences. This is what happened in Malta where an initial human error - a glass door was closed due to fears over the number of passengers boarding - has generated a panic situation that the (cultural) behaviour of some passengers - fearing to lose their ferry - has transformed into panic with passengers trampling over each other.
Misperceived thread generating panic (1)

- False Reports of Gunfire at J.F.K. Airport Offer a Real Case Study in Security
  - some passengers found their way to the tarmac, scurrying underneath a parked jet toward a different, safe terminal
  - crowd control and maintaining passenger safety fell apart at times
  - the stunning effect, on a population that has more information than ever at its fingertips, of essentially shouting “fire” in a crowded theatre
- Once upon a time there was a boy who cried terrorist ...
  - the boy began shouting at a man he thought seemed suspicious, and panicked passengers rushed to the exits, with some sustaining minor injuries in the stampede

Also individual reactions may be the origin of panic like what happened at New York and Tel Aviv airports. In both cases the way in which individuals react to false alarm like shouting "fire" or "terrorist" can generate panic. And reactions to panic can be heavily dependent on cultural characteristics of the involved passengers. For example, the apparent lack of safety culture (that depends on many cultural parameters like their education, past travel experiences, country of origin, etc.) has led some passengers to find their escape way to the tarmac, scurrying underneath a parked jet toward a different, safe terminal thus putting at risk their lives and those of others.
Many natural events causing stranded passengers for long time have been reported in the news. In most of the cases consequences were not worsened by cultural behaviours like in those reported here. However, we will see in the next slides that sometimes cultural behaviours may dramatically increase the consequences of apparently harmless events.
• Pop fans' stampede crushes 54 to death in Minsk metro
  o more than 1,000 people - many drunk and high-spirited after a rock concert - rushed into the underpass to escape a sudden spring thunderstorm
  o some of the young women were killed because they were wearing high heels, which caused them to fall down a flight of slippery marble stairs as crowds thrust forward and then ran over them

A interesting example of how cultural behaviours can dramatically amplify consequences of a weather storm is what happened at Minsk metro. Here a combination of cultural behaviours (drunk and high-spirited as well as wearing high heels) and bad design of hub (slippery marble stairs) have heavily amplified the consequences of a simple thunderstorm.
• Anger at Chek Lap Kok as passengers stranded by Typhoon Usagi
  o Hundreds of angry travellers blame airlines for keeping them in the dark about flights
  o Frustrated air travellers spent the night at Chek Lap Kok airport

• Stranded passengers assault staff at Moscow airport after icy rain and blackouts
  o Irate holidaymakers beat up staff as thousands were stranded with little food or information for a third straight day
  o Personnel were scared of dealing with agitated passengers
  o "People are desperate, Fights have broken out. It feels like there is no air in here."

Other two examples on how two meteorological events have forced airlines to strand passengers at airport and how individual cultural behaviours have generated angry reactions against staff.
Special events

• Allahabad stampede kills 36 Kumbh Mela pilgrims
  o Kumbh Mela pilgrimage hosts some 30 million
  o A stampede at a railway station in Allahabad killed at least 36 Hindu pilgrims
  o Twenty-seven of the dead were women, mostly elderly and poor
  o police had been using batons to control the crowd, triggering panic

Also pilgrimages can generate emergency situations in which culture can play a role. This is the case of the Kumbh Mela pilgrimage in which a combination of the violent approach of the police combined with a very dense crowd and population at risk (women, elderly, poor) led to panic and 36 fatalities.
Cultural behaviours triggering new hazards
Possible cultural-dependent behaviours that could trigger new hazards are interactions between different cultural groups belonging to a crowd, interaction of crowd with information equipment (signage, voice messages, etc.), interaction crowd with physical environment and finally interaction of crowd with staff members. To have an example of what could happen, follow the specific cultural behaviour and then click on the corresponding picture to get a related news
Culture can be a trigger of hazardous situations leading to interrupting public services in a hub or to altercations between passengers putting at risk the safety of the hub. An example of interruption of public service is the refusal of Muslim taxi drivers in Minneapolis to take on-board their vehicles passengers carrying alcohol bottles.

The language misunderstandings can also generate hazardous situations like in the case reported at Paris airport. An altercation between a group of Chinese tourists and an Afro-American man started when the Chinese tourists had said the word ‘that’ (na ge) in Mandarin a few times in their conversation. Unluckily in Mandarin that is pronounced "na ge", which sounded like the word "nigger" to the Afro-American passenger. The altercation was calmed down by a woman speaking both languages explaining to the passengers the misunderstanding.
• Muslims Praying in Israeli Airport Synagogue Kick Up Religious Controversy
  o five Muslims, looking for a place to pray, entered the terminal’s synagogue and prostrated themselves towards Mecca, spreading out fringed prayer shawls to kneel upon in place of the traditional prayer rugs
  o some reacted with anger at the incident, perceiving it as desecration of Jewish prayer spaces and ritual objects, others saw it as a positive sign of coexistence
  o despite the airport having two synagogues, there is a lack of prayer facilities for other religions.

Religion can also potentially generate disputes that could develop to hazardous situations for an hub. In this case the dispute started when five Muslims, looking for a place to pray, entered the terminal’s synagogue and prostrated themselves towards Mecca. Some reacted with anger at the incident, perceiving it as desecration of Jewish prayer spaces and ritual objects. The incident has been managed properly by the airport’s staff, but this is a risky situation that an hub manager should consider identifying places to pray for the most frequent religious groups travelling through the hub.
Crowd interaction with information equipment

- Lost Passenger Causes Delays, Evacuation at German Cologne Bonn Airport
  - Man allegedly entered a restricted area without security clearance, causing flight delays and evacuations
  - The suspect was actually a 62-year-old Spanish tourist who got lost in the airport and went the wrong way in an attempt to catch his flight
  - Around 2,500 passengers in total were impacted by the miscommunication

- A woman that bypassed air security check at Frankfurt airport
  - Security staff requested police officers come over to check a suspicious female passenger
  - The passenger apparently thought the security check had finished and that's why she left
  - As a preventative measure, the police then took the decision to evacuate the entire departure area

Lack of proficiency in English may generate serious troubles to hubs. This is what happened in both reported cases: the lost passenger at Cologne Bonn and the woman at Frankfurt airport. Their suspicious behaviour led in both cases to the evacuation of the hub and to delays of both passengers and flights.
Crowd interaction with physical environment

- Dubai crash-landing: video footage shows passengers stopping for luggage
  - This incident raises the issue of passengers taking the risk of stopping to collect their luggage and carrying it during an evacuation
- Shouting and train noises mistaken for terrorist attacks in Spanish metros
  - In Madrid a number of passengers mistook the noise of an oncoming train and the burning smell of the wheels on the track for a shoot-out this led to a stampede as dozens of waiting travellers ran full-pelt for the exit
  - In Barcelona, passengers once again ended up running and screaming with fear after hearing a dispute between a drunken man and another group, and mistaking it for a terrorist attack

The incident in Dubai once again raises the issue of passengers taking the risk of stopping to collect their luggage and carrying it during an evacuation. Also misunderstandings (typically due to cultural biases) can generate panic as in the case of the two events happened in Spain.
Crowd interaction with staff

- The rioting of passengers at Shenzhen Airport after heavy rain that blocked flights
  - The airport was filled with people with nowhere to go getting hungry and restless.
  - Passengers started rioting by hurling the food back at the staff, then it escalated and equipment was smashed in a fight.
  - Riot police rushed in to form a human barricade.

- British man attacks police at German airport after woman knocked over in confrontation with security
  - A man single-handedly knocked at least three staff officers to the ground
  - The confrontation began after his wife fell over at security

Heavy rains caused crippling delays at Shenzhen Airport. The airport was filled with people with nowhere to go. Airlines were not giving out guaranteed compensation for the cancelled flights, and passengers were getting hungry and restless. 20 to 30 men encircled the Southern China Airlines counter and began berating the staff. Airlines distributed take-out boxed meals, bottled water, and instant noodles to the stranded passengers, but by this time it was too late. The customers hurled the food back at the staff. Then it escalated. Equipment was smashed in a fight. Riot police rushed in to form a human barricade between the tired masses and the surrounded airline staff.
Generic security threats

Threats (security)

- Terrorist act
- Hub's sabotage
- Explosive-based attack
  - CBRN attack
  - Cold weapon attacks (that could generate panic)
  - Fire-arm attack
Many terroristic attacks have happened recently in transport hubs. Amongst those based on the use of explosive it is worth mentioning the events in Brussels and Istanbul airports and those, less recent but equally significant, in the Atocha railway station. The common consequence to all listed attacks is panic. But interesting phenomena that can be classified as "cultural behaviours" are the real-time filming of the event itself. The diffuse use of mobile phones has induced - mostly young people - to film in real time the event leading to a slower than possible evacuation. At the same time it has been seen passengers evacuating the airport with their personal belongings on a trolley, so slowing down their evacuation.
Thank you for your attention
Cultural Risk Assessment CBT

Lesson 4 - Control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels

Impact of Cultural aspects in the management of emergencies in public Transport
Objectives of the lesson

• This lesson presents some control measures to reduce the risk generated by culture-related hazardous behaviours to acceptable levels.
• The proposed mitigation measures are mostly based on studies done at the international level that can be directly accessed using the links provided.
Hub strategies where cultural controls are more effective

- The areas where cultural controls are more effective are:
  - **Signage**
    - Signage position, clarity and presentation shall be reviewed both for general use and during emergency.
  - **Mustering points and evacuation routes**
    - The mustering points and evacuation routes should be identified and assessed for the ease of movements.
  - **Staff training**
    - The staff must be trained in identifying passengers’ stress levels, different cultural hazardous behaviours and human psychology.
  - **Communication strategies**
    - Communication strategies shall be adapted to the cultural groups that are expected to transit across the considered hub.
  - **Health treatments**
    - In case of emergencies it is necessary to adopt culture-specific measures.
    - In case of disasters with adverse psychological consequences it is necessary to consider specific measures for ethnic minority individuals.

- In the following we will touch some interesting controls related to the proposed aspects.

The hub strategies where cultural controls are more effective are: Signage, Mustering points and evacuation routes, Staff training, Communication strategies, Health treatments.
In the following we will touch some interesting controls related to the proposed aspects.
Communication in presence of cultural differences

• Use trusted sources. Different communities will trust different people, based on direct experience as well as historical, socio-cultural, or legal reasons.
• Assess the cultural and linguistic appropriateness of messages.
• Messages shall be audience-appropriate—including being clear, easily understandable, and culturally and linguistically appropriate.

According to what suggests the U.S. Department of Health and Human Services’ Office of Minority Health the communication strategies shall follow 3 main principles:
1. Use trusted sources. Different communities will trust different people, based on direct experience as well as historical, socio-cultural, or legal reasons.
2. Assess the cultural and linguistic appropriateness of messages.
3. Messages shall be audience-appropriate—including being clear, easily understandable, and culturally and linguistically appropriate.
Coordinating with non-English media - in TV and radio, as well as through online platforms and social media - to assist with sharing emergency information to LEP.

Providing a clear message for evacuation pickup points and escape routes.

Ensuring that emergency call centres have bilingual staff in the highest volume languages and access to telephonic interpretation services and properly training operators on how to handle an LEP caller.

Along the same line, these are the communication tips to reach Low English Proficiency (LEP) passengers provided by the US Department of Justice.
Barriers to full inclusion of Hispanics in emergency planning and response

- No plan for transmitting critical information/warnings to the Latino community via Spanish-language media and other mechanisms.
- Few Spanish-language and/or bilingual materials in use for either preparedness or response.
- Lack of procedures and/or low priority given to recruiting and training Latinos as emergency responders.
- Inappropriate actions by some responders that create distrust, so Latinos do not come forward and request assistance – even when their lives are at risk.
- Limited English skills among - especially recent - Latino immigrants
- Use of Spanish-language rather than mainstream media

Factors affecting communications with Latinos

- Trusted sources: Latinos (like other groups) pay most attention to messages that come from trusted sources.
- Community leaders, non-profits, faith-based groups, and family members are typically very credible, as are some Hispanic media outlets and personalities.
- Language: Spanish-dominant Latinos may not understand, read, or be aware of English-language warnings or directives. They may get their news from formal and informal Spanish-language sources.
- Access: Latinos may be relatively isolated in where they work and live, and therefore not see or hear most warnings or emergency directives.

Also the National Council of La Raza (NCLR) - the largest national Hispanic civil rights and advocacy organization in the United States - has published guidelines to meet the needs of Latino communities in emergencies identifying the barriers to full inclusion of Hispanics in emergency planning and response and the Factors affecting communications with Latinos.
• Tips on eye contact and gestures:
  - Some level of eye contact may be inappropriate in certain cultures (e.g., sustained contact could be perceived as a challenge to authority).
  - Some gestures may be inappropriate in some cultures or having completely different meaning (e.g., “The thumbs up sign in most American and European cultures meaning things are going according to your plans or something you approve of. However, the going good sign translates into a rude and offensive gesture in Islamic and Asian countries”).

Finally the Center for Public Safety Innovation and the National Terrorism Preparedness Institute have provided guidelines on eye contact and gestures.
Strategies for building organisational capacity based on cultural competences:

- Collaborate with cultural competence experts who can provide training on integrating key principles of cultural competence into emergency planning and response.
- Offer cultural competence education and training to emergency planners and first responders.
- Promote diversity in staffing and leadership.
- Develop a workforce language registry.
- Establish clear procedures for utilizing bilingual personnel and volunteers.
- Develop a repository of translated materials that have been vetted for accuracy and appropriateness.

The U.S. Department of Health and Human Services’ Office of Minority Health suggests specific strategies for building organisational capacity based on cultural competences.
Also the U.S. Department of Health and Human Services has developed a checklist for emergency managers whose aspects are applicable to transport hubs - click on the icon to see them.
Treatment of patients of different cultures - Muslims

- If possible, healthcare should be given by people of the same sex as the patient. In some cases, a close family member of the same sex may assist in the washing of the sick person.
- Unnecessary touching between non-related people of the opposite sex should be avoided. The left hand is considered unclean, so it is preferred that the right hand be used for feeding or administering medications.
- A beard is considered a very important religious symbol to the Muslim male patient. Like any other patient, permission must be obtained to shave any part of the beard, which should be done by a man.

Every culture has its specificity when dealing with health care and in particular during the interaction patient/doctor (or first responder). Here the key aspects of interacting with Muslim patients are presented. More details can be found in the linked paper.
• Sikhs are required to wear five articles of faith at all times. These articles are known as the Five Kakkars or Five Ks – Kesh (uncut hair), Kangha (wooden comb), Kara (steel bangle), Kirpan (short sword), and Kachera (undergarment). Hair should not be removed from any part of a Sikh patient’s body without consent from the patient or their substitute decision-maker.
• Some medicines may not be suitable for Sikh patients because they contain alcohol or are of animal origin.
• Sikh patients may prefer to be examined by a health care provider of their own gender.
• Sikh patients may wish to have a family member present during any clinical examination.
• Sikhs are also required to wear a turban at all times. ... If it is necessary to remove the turban during medical treatment, an alternative head covering should be provided.

As for the Muslims, here the key aspects of interacting with Sikh patients are presented. more details can be found in the linked paper.
Treatment of patients of different cultures - Hindu

- Modesty is an important consideration for Hindu men and women, and patients may prefer to be examined by a health care provider of their own gender. Hindu patients may also wish to have a family member present during a clinical examination or procedure.
- The need for invasive examinations may need to be carefully explained, particularly if a same-sex clinician cannot be accommodated.

And also for Hindu patients.
A specific case is the refusal of Jehovah Witnesses to accept blood products under any circumstances that causes concern to doctors in an emergency.

The approach taken by many hospitals in UK is the following:

- “Physicians should provide the necessary information for an individual to make an informed choice and where this is not possible, physicians should administer blood products in life threatening situations, if any doubt exists about the validity of a blood refusal card.”
US ethnic minorities (African American, Asian Americans, Native Americans, and Latinos) are at elevated risk for adverse psychological consequences after disasters with respect to white Americans. This concept can be easily extended to ethnic minorities in Europe. The two most likely adverse psychological consequences are: Post-Traumatic Stress Disorder and Depression. Culture is playing a role in both effects by shaping both experiences and consequences of disaster exposure. The issues are complex because the effects of ethnicity and culture are pervasive.
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## Individual-level risk factors for poor mental health outcomes

<table>
<thead>
<tr>
<th>Category</th>
<th>Risk factor</th>
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<tbody>
<tr>
<td>Trauma and stress</td>
<td>• Severe exposure to the disaster, especially injury, threat to life, and extreme loss.</td>
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<td></td>
<td>• Living in the context of a neighbourhood or community that is highly disrupted or traumatized.</td>
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<td></td>
<td>• High secondary stress, regardless of whether it is of an acute or chronic nature.</td>
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<tr>
<td>Survivor characteristics</td>
<td>• Female gender.</td>
</tr>
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<td></td>
<td>• If an adult survivor, aged in the middle years of 40–60.</td>
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<td></td>
<td>• Little previous experience relevant to coping with the disaster.</td>
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<td></td>
<td>• Membership of an ethnic minority group.</td>
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<td></td>
<td>• Poverty or low socioeconomic status.</td>
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<td>• Predisaster psychiatric history.</td>
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**Individual-level risk factors for poor mental health outcomes**

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| **Family context**| • If an adult survivor, the presence of children in the home and, if female, the presence of a spouse.  
• If child survivor, the presence of parental distress.  
• The presence of a family member who is significantly distressed.  
• Interpersonal conflict or lack of supportive atmosphere in the home. |
| **Resource context** | • Lacking or losing beliefs in one’s ability to cope and control outcomes.  
• Possessing few, weak, or deteriorating social resources. |
The safety signs are prescribed by international standards, guaranteeing a common understanding of the safety signs by passengers of different cultures. However, from various studies, it appears that there is an influence of culture on how people wayfind and that cultural minorities may have difficulties in wayfinding in hubs due to the poor signage. While difficult wayfinding during normal hub operation may simply make the travel experience less pleasant, it can create serious problems during emergencies, in particular during evacuation.
The recommendation is that airport administrators determine their hierarchy of values for their airports. Ranking values such as wayfinding time, passenger preference, and wayfinding accuracy will help guide an airport administrator as to which sign type will be the best fit for their airport.

An example in this direction is the Helsinki Vantaa airport that, having experienced between 2014 and 2015 a 50% increase in Chinese travellers, has decided to:

- Recruit Mandarin native-speaking guides
- Introduce two service points dedicated to Chinese visitors
- Add a customised WiFi portal with navigation instructions
- Include Mandarin (but also Korean and Japanese) in signage.

The recommendation is that “airport administrators determine their hierarchy of values for their airports. Ranking values such as wayfinding time, passenger preference, and wayfinding accuracy will help guide an airport administrator as to which sign type will be the best fit for their airport.”
As reported by Reduced Mobility Rights Limited: For many people, deafness is not linked to disability, but rather indicates belonging to a minority language community. Absence of induction loops at key areas (devices that amplify airport announcements for passengers with hearing problems) like security check points, passport control booths, and check-in counters, poor signage, older information displays, unavailability of text-phones and captioned videos are factors that contribute to unpleasant airport journey. The lack of hubs’ preparedness for disabled people may end up in serious consequences during emergencies. These risks can be mitigated by adopting assistive technologies in hubs.

An example of these solution has been introduced by the Edinburgh airport by adopting induction loops in various locations around the departure and arrival terminals.
Thank you for your attention